REFERENCE MANUAL | PUBLIC

SAP Adaptive Server Enterprise 16.0 SP03

Document Version: 1.0 – 2020-03-04

Reference Manual: Building Blocks

Content

1 Reference Manual Series. 10

2 System and User-Defined Datatypes. 13

2.1 Datatype Categories. 13
Exact Numeric Datatypes. 13
Approximate Numeric Datatypes. 16
Money Datatypes. 18
timestamp Datatype. 19
Date and Time Datatypes. 19
Character Datatypes. 26
Binary Datatypes. 30
bit Datatype. 32
sysname and longsysname Datatypes. 33
text, image, and unitext Datatypes. 33

2.2 Range and Storage Size. 43

2.3 Datatypes of Columns, Variables, or Parameters. 45
Declaring Datatypes for a Column in a Table. 45
Declaring Datatypes for Local Variable in a Batch or Procedure. 46
Declaring Datatypes for a Parameter in a Stored Procedure. 47
Determine the Datatype of Numeric Literals. 47
Determine the Datatype of Character Literals. 47

2.4 Datatypes of Mixed-Mode Expressions. 48
Determine the Datatype Hierarchy. 48
Determine Precision and Scale. 49

2.5 Datatype Conversions. 50
Automatic Conversion of Fixed-Length NULL Columns. 50
Handling Overflow and Truncation Errors. 51

2.6 Datatypes and Encrypted Columns. 55

2.7 User-Defined Datatypes. 56

2.8 Standards and Compliance. 57

3 Transact-SQL Functions. 59

3.1 abs. 59

3.2 acos. 60

3.3 allocinfo. 62

3.4 ascii. 63

3.5 asehostname. 65

3.6 asin. 66
3.7 atan. 67
3.8 atn2. 68
3.9 avg. 70
3.10 audit_event_name. 72
3.11 authmech. 76
3.12 biginttohex. 78
3.13 bintostr. 79
3.14 cache_usage. 81
3.15 case. 83
3.16 cast. 86
Usage for cast. 88
3.17 ceiling. 89
3.18 char. 91
Usage for char. 92
3.19 char_length. 93
3.20 charindex. 95
3.21 coalesce. 97
3.22 col_length. 99
3.23 col_name. 101
3.24 compare. 103
Usage for `compare`. 107
3.25 convert. 110
Usage for convert. 114
3.26 cos. 117
3.27 cot. 118
3.28 count. 119
3.29 count_big. 121
3.30 create_locator. 123
3.31 current_bigdatetime. 124
3.32 current_bigtime. 126
3.33 current_date. 127
3.34 current_time. 128
3.35 curunreservedpgs 130
3.36 data_pages. 132
3.37 datachange. 135
Usage for datachange. 136
3.38 datalength. 137
3.39 dateadd. 138
3.40 datediff. 142
3.41 datename. 145

3.42 datepart. 148
3.43 day. 152
3.44 db_attr 153
3.45 db_id. 156
3.46 db_instanceid. 158
3.47 db_name. 160
3.48 db_recovery_status. 162
3.49 dbencryption_status. 164
3.50 defrag_status. 165
3.51 degrees. 168
3.52 derived_stat. 170
3.53 difference. 175
3.54 dol_downgrade_check 177
3.55 exp. 179
3.56 floor. 180
3.57 generate_sqlscript 182
3.58 get_appcontext. 183
3.59 get_internal_date. 185
3.60 getdate. 186
3.61 getutcdate. 188
3.62 hadr_mode. 189
3.63 hadr_state. 190
3.64 has_role. 192
3.65 hash. 194
3.66 hashbytes. 196
3.67 hextobigint. 199
3.68 hextoint. 200
3.69 host_id. 201
3.70 host_name. 203
3.71 identity_burn_max. 204
3.72 imrs_rowinfo. 205
3.73 index_col. 207
3.74 index_colorder. 209
3.75 index_name. 211
3.76 instance_id. 213
3.77 instance_name. 214
3.78 inttohex. 215
3.79 isdate. 216
3.80 is_quiesced. 217
3.81 is_sec_service_on. 219
3.82 is_singleusermode. 221

3.83 isnull. 222
3.84 isnumeric. 223
3.85 lc_id. 224
3.86 lc_name. 225
3.87 lct_admin 226
3.88 left. 230
3.89 len. 231
3.90 license_enabled. 233
3.91 list_appcontext. 234
3.92 locator_literal. 236
3.93 locator_valid. 237
3.94 lockscheme. 239
3.95 log. 241
3.96 log10. 242
3.97 loginfo 243
3.98 lower. 248
3.99 lpad. 249
3.100 lprofile_id. 251
3.101 lprofile_name. 253
3.102 ltrim. 255
3.103 max. 256
3.104 migrate_instance_id. 258
3.105 min. 259
3.106 month. 260
3.107 mut_excl_roles. 262
3.108 newid. 263
3.109 next_identity. 266
3.110 nullif. 267
3.111 object_attr 269
3.112 object_id. 273
3.113 object_name. 275
3.114 object_owner_id. 277
3.115 pageinfo. 279
3.116 pagesize. 282
3.117 partition_id. 284
3.118 partition_name. 286
3.119 partition_object_id. 288
3.120 password_random. 290
3.121 patindex. 293
3.122 pi. 295
3.123 power. 297

3.124 proc_role. . . . 298
3.125 pssinfo. . . . 300
3.126 radians. . . . 302
3.127 rand. . . . 304
3.128 rand2. . . . 305
3.129 replicate. . . . 307
3.130 reserve_identity. . . . 308
3.131 reserved_pages. . . . 311
3.132 return_lob. . . . 315
3.133 reverse. . . . 317
3.134 right. . . . 318
3.135 rm_appcontext. . . . 321
3.136 role_contain. . . . 323
3.137 role_id. . . . 324
3.138 role_name. . . . 326
3.139 round. . . . 327
3.140 row_count 329
3.141 rtrim. . . . 332
3.142 sdc_intempdbconfig. . . . 333
3.143 session_context. . . . 334
3.144 set_appcontext. . . . 335
3.145 setdata. . . . 338
3.146 show_cached_plan_in_xml. . . . 339
3.147 show_cached_text. . . . 344
3.148 show_cached_text_long. . . . 346
3.149 show_condensed_text. . . . 348
3.150 show_dynamic_params_in_xml. . . . 350
3.151 show_plan. . . . 352
3.152 show_prepared_statements. . . . 358
3.153 show_role. . . . 360
3.154 show_sec_services. . . . 361
3.155 shrinkdb_status. . . . 362
3.156 sign. . . . 364
3.157 sign_pages. . . . 366
3.158 sin. . . . 368
3.159 sortkey. . . . 369
Usage for sortkey. . . . 371
3.160 soundex. . . . 375
3.161 space. . . . 376
3.162 spaceusage. . . . 378
3.163 spid_instance_id. . . . 381

3.164 square. . . . 382
3.165 sqrt. . . . 384
3.166 stddev. . . . 385
3.167 used_pages. . . . 386
3.168 stdev. . . . 388
3.169 stdevp. . . . 389
3.170 stddev_pop. . . . 389
3.171 stddev_samp. . . . 391
3.172 str. . . . 393
3.173 str_replace. . . . 395
3.174 strtobin. . . . 398
3.175 stuff. . . . 400
3.176 substring. . . . 402
3.177 sum. . . . 404
3.178 suser_id. . . . 406
3.179 suser_name. . . . 407
3.180 syb_quit. . . . 409
3.181 syb_sendmsg. . . . 410
3.182 sys_tempdbid. . . . 411
3.183 tan. . . . 412
3.184 tempdb_id. . . . 414
3.185 textptr. . . . 414
3.186 textvalid. . . . 417
3.187 to_unichar. . . . 418
3.188 tran_dumpable_status. . . . 419
3.189 tsequal. . . . 421
Usage for `tsequal`. . . . 422
3.190 uhighsurr. . . . 423
3.191 ulowsurr. . . . 425
3.192 upper. . . . 426
3.193 uscalar. . . . 427
3.194 user. . . . 428
3.195 user_id. . . . 430
3.196 user_name. . . . 431
3.197 valid_name. . . . 433
3.198 valid_user. . . . 434
3.199 var. . . . 436
3.200 var_pop. . . . 437
3.201 var_samp. . . . 439
3.202 variance. . . . 440
3.203 varp. . . . 441

3.204 workload_metric. 441
3.205 xa_bqual. 443
3.206 xa_gtrid. 446
3.207 xact_connmigrate_check. 448
3.208 xact_owner_instance. 449
3.209 xmlextract. 451
3.210 xmlparse. 451
3.211 xmlrepresentation. 452
3.212 xmltable. 452
3.213 xmltest. 452
3.214 xmlvalidate. 453
3.215 year. 453

4 User-Defined Functions (UDFs). 455

5 Global Variables. 457
5.1 Using Global Variables in a Clustered Environment. 467

6 Expressions, Identifiers, and Wildcard Characters. 468
6.1 Expressions. 468
Size of Expressions. 468
Arithmetic and Character Expressions. 469
Relational and Logical Expressions. 469
Operator Precedence. 469
Arithmetic Operators. 470
Bitwise Operators. 471
String Concatenation Operator. 472
Comparison Operators. 473
Nonstandard Operators. 473
Using any, all, and in. 474
Negating and Testing. 474
Ranges. 474
Using Nulls in Expressions. 474
Connecting Expressions. 476
Using Parentheses in Expressions. 477
Comparing Character Expressions. 477
Using the Empty String. 477
Including Quotation Marks in Character Expressions. 478
Using the Continuation Character. 478
6.2 Identifiers. 478
Short Identifiers. 479
Tables Beginning With # (Temporary Tables). 480

Case Sensitivity and Identifiers. 480
Uniqueness of Object Names. 481
Using Delimited Identifiers. 481
Identifying Tables or Columns by Their Qualified Object Name. 485
Determining Whether an Identifier is Valid. 487
Renaming Database Objects. 487
Using Multibyte Character Sets. 487
6.3 like Pattern Matching. 488
6.4 Pattern Matching with Wildcard Characters. 489
Case and Accent Insensitivity. 490
Using Wildcard Characters. 490
Using Multibyte Wildcard Characters. 492
Using Wildcard Characters as Literal Characters. 492
Using Wildcard Characters With datetime Data. 494

7 Reserved Words. 495
7.1 Transact-SQL Reserved Words. 495
7.2 ANSI SQL Reserved Words. 496
7.3 Potential ANSI SQL Reserved Words. 498

8 SQLSTATE Codes and Messages. 499
8.1 SQLSTATE Warnings. 499
8.2 Exceptions. 500
Cardinality Violations. 500
Data Exceptions. 501
Integrity Constraint Violations. 502
Invalid Cursor States. 502
Syntax Errors and Access Rule Violations. 503
Transaction Rollbacks. 504
with check option Violation. 505

1 Reference Manual Series

Along with this the SAP ASE Reference Manual: Building blocks, the Reference Manual series includes three additional volumes.

Building Blocks	Describes the “parts” of Transact-SQL: datatypes, built-in functions, global variables, expressions and identifiers, reserved words, and SQLSTATE errors.
Commands	Provides reference information about the Transact-SQL commands, which you use to create statements.
Procedures	Provides reference information about system procedures, catalog stored procedures, extended stored procedures, and `dbcc` stored procedures. All procedures are created using Transact-SQL statements.
Tables	Provides reference information about the system tables, which store information about your server, databases, users, and other details of your server. It also provides information about the tables in the `dbccdb` and `dbccalt` databases.

Conventions

The following sections describe conventions used in the Reference Manual guides.

SQL is a free-form language. There are no rules about the number of words you can put on a line or where you must break a line. However, for readability, all examples and most syntax statements in this manual are formatted so that each clause of a statement begins on a new line. Clauses that have more than one part extend to additional lines, which are indented. Complex commands are formatted using modified Backus Naur Form (BNF) notation.

This table shows the conventions for syntax statements that appear in this manual:

Element	Example

Command names,procedure names, utility names, database names, datatypes, and other keywords display in sans serif font.	`select`
	`sp_configure`
	`master` database

Book names, file names, variables, and path names are in italics.	*System Administration Guide* `sql.ini` file <column_name> `$SYBASE/ASE` directory

<table>
<tr><th>Element</th><th>Example</th></tr>
<tr><td>Variables—or words that stand for values that you fill in—when they are part of a query or statement, are in angled brackets.</td><td>select <column_name> from <table_name> where <search_conditions></td></tr>
<tr><td>Type parentheses as part of the command.</td><td>compute <row_aggregate> (<column_name>)</td></tr>
<tr><td>Double colon, equals sign indicates that the syntax is written in BNF notation. Do not type this symbol. Indicates “is defined as”.</td><td>::=</td></tr>
<tr><td>Curly braces mean that you must choose at least one of the enclosed options. Do not type the braces.</td><td>{cash, check, credit}</td></tr>
<tr><td>Brackets mean that to choose one or more of the enclosed options is optional. Do not type the brackets.</td><td>[cash | check | credit]</td></tr>
<tr><td>The comma means you may choose as many of the options shown as you want. Separate your choices with commas as part of the command.</td><td>cash, check, credit</td></tr>
<tr><td>The pipe or vertical bar (|) means you may select only one of the options shown.</td><td>cash | check | credit</td></tr>
<tr><td>An ellipsis (...) means that you can repeat the last unit as many times as you like.</td><td>buy thing = price [cash | check | credit] [, thing = price [cash | check | credit]]...

You must buy at least one thing and give its price. You may choose a method of payment: one of the items enclosed in square brackets. You may also choose to buy additional things: as many of them as you like. For each thing you buy, give its name, its price, and (optionally) a method of payment.</td></tr>
</table>

- Syntax statements (displaying the syntax and all options for a command) appear as follows:

  ```
  sp_dropdevice [<device_name>]
  ```

  For a command with more options:

  ```
  select <column_name>
      from <table_name>
      where <search_conditions>
  ```

  In syntax statements, keywords (commands) are in normal font and identifiers are in lowercase. Italic font shows user-supplied words.
- Examples showing the use of Transact-SQL commands are printed like this:

  ```
  select * from publishers
  ```

- Examples of output from the computer appear as follows:

```
pub_id    pub_name               city         state
-------   ---------------------  -----------  -----
0736      New Age Books          Boston       MA
0877      Binnet & Hardley       Washington   DC
1389      Algodata Infosystems   Berkeley     CA
(3 rows affected)
```

In this manual, most of the examples are in lowercase. However, you can disregard case when typing Transact-SQL keywords. For example, `SELECT`, `Select`, and `select` are the same.

SAP ASE sensitivity to the case of database objects, such as table names, depends on the sort order installed on the SAP ASE server. You can change case sensitivity for single-byte character sets by reconfiguring the SAP ASE sort order. For more information, see the *System Administration Guide*.

2 System and User-Defined Datatypes

SAP® Adaptive Server® Enterprise provides several system datatypes and the user-defined datatypes `timestamp`, `sysname`, and `longsysname`, which specify the type, size, and storage format of columns, stored procedure parameters, and local variables.

2.1 Datatype Categories

SAP ASE provides several system datatypes and the user-defined datatypes `timestamp`, `sysname`, and `longsysname`.

2.1.1 Exact Numeric Datatypes

Use the exact numeric datatypes to represent a value exactly. SAP ASE provides exact numeric types for both integers (whole numbers) and numbers with a decimal portion.

Transact-SQL provides the `smallint`, `int`, `bigint`, `numeric`, and `decimal` ANSI SQL exact numeric datatypes. The `unsigned bigint`, `unsigned int`, `unsigned smallint`, and `tinyint` types are Transact-SQL extensions.

2.1.1.1 Integer Types

SAP ASE provides these exact numeric datatypes to store integers: `bigint`, `int` (or `integer`), `smallint`, `tinyint` and each of their unsigned counterparts. Choose the integer type based on the expected size of the numbers to be stored. Internal storage size varies by type:

Datatype	Stores	Bytes of Storage
`bigint`	Whole numbers between -2^{63} and 2^{63} - 1 (from -9,223,372,036,854,775,808 to +9,223,372,036,854,775,807, inclusive.	8
`int[eger]`	Whole numbers between-2^{31} and 2^{31} - 1 (-2,147,483,648 and 2,147,483,647), inclusive.	4
`smallint`	Whole numbers between -2^{15} and 2^{15} -1 (-32,768 and 32,767), inclusive.	2
`tinyint`	Whole numbers between 0 and 255, inclusive. (Negative numbers are not permitted.)	1

Datatype	Stores	Bytes of Storage
`unsigned bigint`	Whole numbers between 0 and 18,446,744,073,709,551,615	8
`unsigned int`	Whole numbers between 0 and 4,294,967,295	4
`unsigned smallint`	Whole numbers between 0 and 65,535	2

Integer Data

Enter integer data as a string of digits without commas. Integer data can include a decimal point as long as all digits to the right of the decimal point are zeros. The `smallint`, `integer`, and `bigint` datatypes can be preceded by an optional plus or minus sign. The `tinyint` datatype can be preceded by an optional plus sign.

The following shows some valid entries for a column with a datatype of `integer` and indicates how `isql` displays these values:

Value Entered	Value Displayed
2	2
+2	2
-2	-2
2.	2
2.000	2

Some invalid entries for an `integer` column are:

Value Entered	Type of Error
2,000	Commas not allowed.
2-	Minus sign should precede digits.
3.45	Digits to the right of the decimal point are nonzero digits.

2.1.1.2 Decimal Datatypes

SAP ASE provides two other exact numeric datatypes, `numeric` and `dec[imal]`, for numbers that include decimal points. The `numeric` and `decimal` datatypes are identical in all respects but one: only `numeric` datatypes with a scale of 0 and `integer` datatypes can be used for the IDENTITY column.

Precision and Scale

The `numeric` and `decimal` datatypes accept two optional parameters, `precision` and `scale`, enclosed in parentheses and separated by a comma:

```
<datatype> [(<precision> [, <scale>])]
```

SAP ASE treats each combination of precision and scale as a distinct datatype. For example, `numeric(10,0)` and `numeric(5,0)` are two separate datatypes. The `precision` and `scale` determine the range of values that can be stored in a decimal or numeric column:

- The precision specifies the maximum number of decimal digits that can be stored in the column. It includes *all* digits, both to the right and to the left of the decimal point. You can specify precisions ranging from 1 digit to 38 digits or use the default precision of 18 digits.
- The scale specifies the maximum number of digits that can be stored to the right of the decimal point. The scale must be less than or equal to the precision. You can specify a scale ranging from 0 digits to 38 digits, or use the default scale of 0 digits.

Storage Size

The storage size for a `numeric` or `decimal` column depends on its precision. The minimum storage requirement is 2 bytes for a 1- or 2-digit column. Storage size increases by approximately 1 byte for each additional 2 digits of precision, up to a maximum of 17 bytes.

Use this formula to calculate the exact storage size for a `numeric` or `decimal` column:

```
ceiling (precision / log10(256)) + 1
```

For example, the storage size for a `numeric`(18,4) column is 9 bytes.

Decimal Data

Enter `decimal` and `numeric` data as a string of digits preceded by an optional plus or minus sign and including an optional decimal point. If the value exceeds either the precision or scale specified for the column, the SAP ASE server returns an error message. Exact numeric types with a scale of 0 are displayed without a decimal point.

Some valid entries for a column with a datatype of `numeric(5,3)`, and how these values are displayed by `isql`:

Value Entered	Value Displayed
12.345	12.345
+12.345	12.345
-12.345	-12.345
12.345000	12.345
12.1	12.100
12	12.000

Some invalid entries for a column with a datatype of `numeric(5,3)` include:

Value Entered	Type of Error
1,200	Commas not allowed
12-	Minus sign should precede digits.
12.345678	Too many nonzero digits to the right of the decimal point.

2.1.2 Approximate Numeric Datatypes

Use the approximate numeric types, `float`, `double precision`, and `real`, for numeric data that can tolerate rounding. The approximate numeric types are especially suited to data that covers a wide range of values. They support all aggregate functions and all arithmetic operations.

The `float`, `double precision`, and `real` datatypes are ANSI SQL entry-level compliant.

2.1.2.1 Understanding Approximate Numeric Datatypes

Approximate numeric datatypes, used to store floating-point numbers, are inherently slightly inaccurate in their representation of real numbers—hence the name “approximate numeric.” To use these datatypes, you must understand their limitations.

When a floating-point number is printed or displayed, the printed representation is not quite the same as the stored number, and the stored number is not quite the same as the number that the user entered. Most of the time, the stored representation is close enough, and software makes the printed output look just like the original input, but you must understand the inaccuracy if you plan to use floating-point numbers for calculations, particularly if you are doing repeated calculations using approximate numeric datatypes—the results can be surprisingly and unexpectedly inaccurate.

The inaccuracy occurs because floating-point numbers are stored in the computer as binary fractions (that is, as a representative number divided by a power of 2), but the numbers we use are decimal (powers of 10). This means that only a very small set of numbers can be stored accurately: 0.75 (3/4) can be stored accurately because it is a binary fraction (4 is a power of 2); 0.2 (2/10) cannot (10 is not a power of 2).

Some numbers contain too many digits to store accurately. `double precision` is stored as 8 binary bytes and can represent about 17 digits with reasonable accuracy. `real` is stored as 4 binary bytes and can represent only about 6 digits with reasonable accuracy.

If you begin with numbers that are almost correct, and perform computations with them using other numbers that are almost correct, you can easily end up with a result that is not even close to being correct. If these considerations are important to your application, use an exact numeric datatype.

2.1.2.2 Range, Precision, and Storage Size

The `real` and `double precision` types are built on types supplied by the operating system. The `float` type accepts an optional binary precision in parentheses. `float` columns with a precision of 1–15 are stored as `real`; those with higher precision are stored as `double precision`.

The range and storage precision for all three types is machine-dependent.

The range and storage size for each approximate numeric type are:

Datatype	Bytes of Storage
`float[(default precision)]`	4 for `default precision` < 16 8 for `default precision` >= 16
`double precision`	8
`real`	4

`isql` displays only 6 significant digits after the decimal point and rounds the remainder.

2.1.2.3 Entering Approximate Numeric Data

Enter approximate numeric data as a mantissa followed by an optional exponent.

- The mantissa is a signed or unsigned number, with or without a decimal point. The column's binary precision determines the maximum number of binary digits allowed in the mantissa.
- The exponent, which begins with the character "e" or "E," must be a whole number.

The value represented by the entry is:

```
mantissa * 10<EXPONENT>
```

For example, 2.4E3 represents the value 2.4 times 10^3, or 2400.

2.1.2.4 NaN and Inf Values

"NaN" and "Inf" are special values that the IEEE754/854 floating point number standards use to represent values that are "not a number" and "infinity," respectively.

In accordance with the ANSI SQL92 standard, the SAP ASE server does not allow the insertion of these values in the database and do not allow them to be generated. In SAP ASE versions earlier than 12.5, Open Client clients such as native-mode `bcp`, JDBC, and ODBC could occasionally force these values into tables.

If you encounter a NaN or an Inf value in the database, contact Sybase Customer Support with details of how to reproduce the problem.

2.1.3 Money Datatypes

Use the `money` and `smallmoney` datatypes to store monetary data.

You can use these types for U.S. dollars and other decimal currencies, but SAP ASE provides no means to convert from one currency to another. You can use all arithmetic operations except `modulo`, and all aggregate functions, with `money` and `smallmoney` data.

The `money` and `smallmoney` datatypes are Transact-SQL extensions.

2.1.3.1 Accuracy

Both `money` and `smallmoney` are accurate to one ten-thousandth of a monetary unit, but they round values up to two decimal places for display purposes. The default print format places a comma after every three digits.

2.1.3.2 Range and Storage Size

The range and storage requirements for money datatypes are:

Datatype	Range	Bytes of Storage
`money`	Monetary values between +922,337,203,685,477.5807 and -922,337,203,685,477.5808	8
`smallmoney`	Monetary values between +214,748.3647 and -214,748.3648	4

2.1.3.3 Entering Monetary Values

Monetary values entered with E notation are interpreted as `float`. This may cause an entry to be rejected or to lose some of its precision when it is stored as a `money` or `smallmoney` value.

`money` and `smallmoney` values can be entered with or without a preceding currency symbol, such as the dollar sign ($), yen sign (¥), or pound sterling sign (£). To enter a negative value, place the minus sign after the currency symbol. Do not include commas in your entry.

2.1.4 timestamp Datatype

Use the user-defined `timestamp` datatype in tables that are to be browsed in Client-Library™ applications. SAP ASE updates the `timestamp` column each time its row is modified. A table can have only one column of `timestamp` datatype.

2.1.4.1 Creating a timestamp Column

If you create a column named `timestamp` without specifying a datatype, SAP ASE defines the column as a `timestamp` datatype.

```
create table testing
    (c1 int, timestamp, c2 int)
```

You can also explicitly assign the `timestamp` datatype to a column named `timestamp`:

```
create table testing
    (c1 int, timestamp timestamp, c2 int)
```

You can also explicitly assign the `timestamp` datatype to a column with another name:

```
create table testing
    (c1 int, t_stamp timestamp,c2 int)
```

You can create a column named `timestamp` and assign it another datatype (although this may be confusing to other users and does not allow the use of the `browse` functions in Open Client™ or with the `tsequal` function):

```
create table testing
    (c1 int, timestamp datetime)
```

2.1.5 Date and Time Datatypes

Use `datetime`, `smalldatetime`, `bigdatetime`, `bigtime`, `date`, and `time` to store absolute date and time information. Use `timestamp` to store binary-type information.

SAP ASE has various datatypes used to store date and time values.

- `date`
- `time`
- `smalldatetime`
- `datetime`
- `bigdatetime`
- `bigtime`

The default display format for dates is “Apr 15 1987 10:23PM”. `bigdatetime/bigtime` types have a default display format of “Apr 15 1987 10:23:00.000000PM” You can use the `convert` function for other styles of date display. You can also perform some arithmetic calculations on `date` and `time` values with the built-in date functions, though the SAP ASE server may round or truncate millisecond values.

- `datetime` columns hold dates between January 1, 1753 and December 31, 9999. `datetime` values are accurate to 1/300 second on platforms that support this level of granularity. The last digit of the fractional second is always 0, 3, or 6. Other digits are rounded to one of these three digits, so 0 and 1 round to 0; 2, 3, and 4 round to 3; 5, 6, 7, and 8 round to 6; and 9 rounds to 10.. Storage size is 8 bytes: 4 bytes for the number of days since the base date of January 1, 1900 and 4 bytes for the time of day.
- `smalldatetime` columns hold dates from January 1, 1900 to June 6, 2079, with accuracy to the minute. Its storage size is 4 bytes: 2 bytes for the number of days after January 1, 1900, and 2 bytes for the number of minutes after midnight.
- `bigdatetime` columns hold dates from January 1, 0001 to December 31, 9999 and 12:00:00.000000 AM to 11:59:59.999999 PM. Its storage size is 8 bytes. The internal representation of `bigdatetime` is a 64 bit integer containing the number of microseconds since 01/01/0000.
- `bigtime` columns hold times from 12:00:00.000000 AM to 11:59:59.999999 PM. Its storage size is 8 bytes. The internal representation of `bigtime` is a 64 bit integer containing the number of microseconds since midnight.
- `date` columns hold dates from January 1, 0001 to December 31, 9999. Storage size is 4 bytes.
- `time` is between 00:00:00:000 and 23:59:59:990. `time` values are accurate to 1/300 second. The last digit of the fractional second is always 0, 3, or 6. Other digits are rounded to one of these three digits, so 0 and 1 round to 0; 2, 3, and 4 round to 3; 5, 6, 7, and 8 round to 6; and 9 rounds to 10.You can use either military time or 12AM for noon and 12PM for midnight. A time value must contain either a colon or the AM or PM signifier. AM or PM may be in either uppercase or lowercase.

When entering date and time information, always enclose the time or date in single or double quotes.

2.1.5.1 Range and Storage Requirements

There are range and storage requirements for the `datetime`, `smalldatetime`, `bigdatetime`, `bigtime`, `date`, and `time` datatypes:

Datatype	Range	Bytes of Storage
`datetime`	January 1, 1753 through December 31, 9999	8
`smalldatetime`	January 1, 1900 through June 6, 2079	4

Datatype	Range	Bytes of Storage
`bigdatetime`	January 1, 0001 to December 31, 9999	8
`bigtime`	12:00:00.000000AM to 11:59:59.999999PM	8
`date`	January 1, 0001 to December 31, 9999	4
`time`	12:00:00 AM to 11:59:59:990 PM	4

2.1.5.2 Entering Date and Time Data

The `datetime`, `smalldatetime`, `bigdatetime` and `bigtime` datatypes consist of a date portion either followed by or preceded by a time portion (you can omit either the date or the time, or both). The `date` datatype has only a date and the `time` datatype has only the time. You must enclose values in single or double quotes.

2.1.5.2.1 Entering the Date

Dates consist of a month, day, and year and can be entered in a variety of formats for `date`, `datetime`, `bigdatetime`, `bigtime` and `smalldatetime`.

- You can enter the entire date as an unseparated string of 4, 6, or 8 digits, or use slash (/), hyphen (-), or period (.) separators between the date parts.
  - When entering dates as unseparated strings, use the appropriate format for that string length. Use leading zeros for single-digit years, months, and days. Dates entered in the wrong format may be misinterpreted or result in errors.
  - When entering dates with separators, use the `set dateformat` option to determine the expected order of date parts. If the first date part in a separated string is four digits, SAP ASE interprets the string as `<yyyy>-<mm>-<dd>` format.
- Some date formats accept 2-digit years (`<yy>`):
  - Numbers less than 50 are interpreted as 20`<yy>`. For example, `01` is 2001, `32` is 2032, and `49` is 2049.
  - Numbers equal to or greater than 50 are interpreted as 19`<yy>`. For example, `50` is 1950, `74` is 1974, and `99` is 1999.
- You can specify the month as either a number or a name. Month names and their abbreviations are language-specific and can be entered in uppercase, lowercase, or mixed case.
- If you omit the date portion of a `datetime` or `smalldatetime` value, SAP ASE uses the default date of January 1, 1900. If you omit the date portion of a `bigdatetime` a default value of January 1, 0001 is added.

This table describes the acceptable formats for entering the date portion of a `datetime` or `smalldatetime` value:

Table 1: Date Formats for Date and Time Datatypes

Date Format	Interpretation	Sample Entries	Meaning
4-digit string with no separators	Interpreted as `<yyyy>`. Date defaults to Jan 1 of the specified year.	"1947"	Jan 1 1947
6-digit string with no separators	Interpreted as `<yymmdd>`. For `<yy>` < 50, year is 20`<yy>`. For `<yy>` >= 50, year is 19`<yy>`.	"450128" "520128"	Jan 28 2045 Jan 28 1952
8-digit string with no separators	Interpreted as `<yyyymmdd>`.	"20150415"	Apr 15 2015
String consisting of 2-digit month, day, and year separated by slashes, hyphens, or periods, or a combination of the above	The `dateformat` and `language set` options determine the expected order of date parts. For us_english, the default order is `<mdy>`. For `<yy>` < 50, year is interpreted as 20`<yy>`. For `<yy>` >= 50, year is interpreted as 19`<yy>`.	"12/15/94" "12.15.94" "12-15-94" "12.15/94"	All of these entries are interpreted as Dec 15 1994 when the `dateformat` option is set to `mdy`.
String consisting of 2-digit month, 2-digit day, and 4-digit year separated by slashes, hyphens, or periods, or a combination of the above	The `dateformat` and `language set` options determine the expected order of date parts. For us_english, the default order is `<mdy>`.	"04/15.1994"	Interpreted as Apr 15 1994 when the `dateformat` option is set to `mdy`.
Month is entered in character form (either full month name or its standard abbreviation), followed by an optional comma	If 4-digit year is entered, date parts can be entered in any order.	"April 15, 1994" "1994 15 apr" "1994 April 15" "15 APR 1994"	All of these entries are interpreted as Apr 15 1994.
	If day is omitted, all 4 digits of year must be specified. Day defaults to the first day of the month.	"apr 1994"	Apr 1 1994
	If year is only 2 digits (`<yy>`), it is expected to appear after the day. For `<yy>` < 50, year is interpreted as 20`<yy>`. For `<yy>` >= 50, year is interpreted as 19`<yy>`.	"mar 16 17" "apr 15 94"	Mar 16 2017 Apr 15 1994
The empty string ""	Date defaults to Jan 1 1900.	""	Jan 1 1900

2.1.5.2.2 Entering the Time

You must specify the time component of a `datetime`, `smalldatetime`, or `time` value.

```
<hours>[:<minutes>[:<seconds>[:<milliseconds>]] [AM | PM]
```

The time component of a bigdatetime or bigtime value must be specified as follows:

```
<hours>[:<minutes>[:<seconds>[<.microseconds>]] [AM | PM]
```

- Use 12AM for midnight and 12PM for noon.
- A time value must contain either a colon or an AM or PM signifier. The AM or PM can be entered in uppercase, lowercase, or mixed case.
- The seconds specification can include either a decimal portion preceded by a decimal point, or a number of milliseconds preceded by a colon. For example, “15:30:20:1” means twenty seconds and one millisecond past 3:30 PM; “15:30:20.1” means twenty and one-tenth of a second past 3:30 PM. Microseconds must be expressed with a decimal point.
- If you omit the time portion of a `datetime` or `smalldatetime` value, SAP ASE uses the default time of 12:00:00:000AM.

2.1.5.2.3 Displaying Formats for datetime, smalldatetime, and date Values

The display format for `datetime` and `smalldatetime` values is “Mon dd yyyy hh:mmAM” (or “PM”); for example, “Apr 15 1988 10:23PM”.

To display seconds and milliseconds, and to obtain additional date styles and date-part orders, use the `convert` function to convert the data to a character string. SAP ASE may round or truncate millisecond values.

Some examples of `datetime` entries and their display values are:

`datetime` Entries	Value Displayed
“1947”	Jan 1 1947 12:00AM
“450128 12:30:1PM”	Jan 28 2045 12:30PM
“12:30.1PM 450128”	Jan 28 2045 12:30PM
“14:30.22”	Jan 1 1900 2:30PM
“4am”	Jan 1 1900 4:00AM

Some examples of `date` entries and their display values are:

`date` Entries	Value Displayed
“1947”	Jan 1 1947
“450128”	Jan 28 2045
“520317”	Mar 17 1952

2.1.5.2.4 Display Formats for bigdatetime and bigtime

For `bigdatetime` and `bigtime` the value displays reflects a microsecond value. `bigdatetime` and `bigtime` have default display formats that accommodate their increased precision.

- hh:mm:ss.zzzzzzAM or PM
- hh:mm:ss.zzzzzz
- mon dd yyyy hh:mm:ss.zzzzzzAM(PM)
- mon dd yyyy hh:mm:ss.zzzzzz
- yyyy-mm-dd hh:mm:ss.zzzzzz

The format for time must be specified as:

- ```
  hours[:minutes[:seconds[.microseconds]] [<AM> | <PM>]
  ```
- ```
  hours[:minutes[:seconds[number of milliseconds]] [<AM> | <PM>]
  ```

Use 12 AM for midnight and 12 PM for noon. A `bigtime` value must contain either a colon or an AM or PM signifier. AM or PM can be entered in uppercase, lowercase, or mixed case.

The seconds specification can include either a decimal portion preceded by a point or a number of milliseconds preceded by a colon. For example, “12:30:20:1” means twenty seconds and one millisecond past 12:30; “12:30:20.1” means twenty and one-tenth of a second past.

To store a `bigdatetime` or `bigtime` time value that includes microseconds, specify a string literal using a point. “00:00:00.1” means one tenth of a second past midnight and “00:00:00.000001” means one millionth of a second past midnight. Any value after the colon specifying fractional seconds continues to refer to a number of milliseconds. Such as “00:00:00:5” means 5 milliseconds.

2.1.5.2.5 Displaying Formats for time Value

The display format for `time` values is “hh:mm:ss:mmmAM” (or “PM”); for example, “10:23:40:022PM.

time Entry	Value Displayed
"12:12:00”	12:12PM
“01:23PM” or “01:23:1PM”	1:23PM
“02:24:00:001”	2:24AM

2.1.5.2.6 Finding Values That Match a Pattern

Use the `like` keyword to look for dates that match a particular pattern. If you use the equality operator (=) to search date or time values for a particular month, day, and year, the SAP ASE server returns only those values for which the time is precisely 12:00:00:000AM.

For example, if you insert the value "9:20" into a column named `arrival_time`, the SAP ASE server converts the entry into "Jan 1 1900 9:20AM." If you look for this entry using the equality operator, it is not found:

```
where arrival_time = "9:20" /* does not match */
```

You can find the entry using the `like` operator:

```
where arrival_time like "%9:20%"
```

When using `like`, the SAP ASE server first converts the dates to `datetime` or `date` format and then to `varchar`. The display format consists of the 3-character month in the current language, 2 characters for the day, 4 characters for the year, the time in hours and minutes, and "AM" or "PM."

When searching with `like`, you cannot use the wide variety of input formats that are available for entering the date portion of `datetime`, `smalldatetime`, `bigdatetime`, `bigtime`, `date`, and `time` values. You cannot search for seconds or milliseconds with `like` and match a pattern, unless you are also using `<style>` 9 or 109 and the `convert` function.

If you are using `like`, and the day of the month is a number between 1 and 9, insert 2 spaces between the month and the day to match the `varchar` conversion of the `datetime` value. Similarly, if the hour is less than 10, the conversion places 2 spaces between the year and the hour. The following clause with 1 space between "May" and "2") finds all dates from May 20 through May 29, but not May 2:

```
like "May 2%"
```

You do not need to insert the extra space with other date comparisons, only with `like`, since the `datetime` values are converted to `varchar` only for the `like` comparison.

2.1.5.2.7 Manipulating Dates

You can do some arithmetic calculations on date and time datatypes values with the built-in date functions.

See *Transact-SQL Users Guide*.

2.1.5.3 Standards and Compliance

ANSI SQL – Compliance level: The `datetime` and `smalldatetime` datatypes are Transact-SQL extensions. `date` and `time` datatypes are entry-level compliant.

2.1.6 Character Datatypes

Character datatypes store strings consisting of letters, numbers, and symbols, and can store a maximum of a page size worth of data.

Which character datatype you use for a situation depends on the type of data you are storing.

Character Datatype	Usage
varchar(n) and **char(n)**	Both single-byte character sets such as us_english and for multibyte character sets such as Japanese.
unichar(n) and **univarchar(n)**	Use to store Unicode characters. They are useful for single-byte or multibyte characters when you need a fixed number of bytes per character.
nchar(n) and **nvarchar(n)**	The fixed-length datatype, `nchar(n)` , and the variable-length datatype, `nvarchar(n)`, for both single-byte and multibyte character sets, such as Japanese. The difference between `nchar(n)` and `char(n)` and `nvarchar(n)` and `varchar(n)` is that both `nchar(n)` and `nvarchar(n)` allocate storage based on <n> times the number of bytes per character (based on the default character set). `char(n)` and `varchar(n)` allocate <n> bytes of storage.
text	The `text` datatype – or multiple rows in a subtable – for strings longer than the `char` or `varchar` datatype allow.

Related Information

text, image, and unitext Datatypes [page 33]

2.1.6.1 unichar and univarchar

You can use the `unichar` and `univarchar` datatypes anywhere that you can use `char` and `varchar` character datatypes, without having to make syntax changes.

Queries containing character literals that cannot be represented in the server's character set are automatically promoted to the `unichar` datatype so you do not have to make syntax changes for data manipulation language (DML) statements. Additional syntax is available for specifying arbitrary characters in character literals, but the decision to "promote" a literal to `unichar` is based solely on representability.

With data definition language (DDL) statements, the syntax changes required are minimal. For example, in the `create table` command, the size of a Unicode column is specified in units of 16-bit Unicode values, not bytes, thereby maintaining the similarity between `char(200)` and `unichar(200)`. `sp_help`, which reports on the lengths of columns, uses the same units. The multiplication factor (2) is stored in the new global variable `<@@unicharsize>`.

See *Configuring Character Sets, Sort Orders, and Languages* in the *System Administration Guide* for more information about Unicode.

2.1.6.2 Length and Storage Size

Character variables strip the trailing spaces from strings when the variable is populated in a `varchar` column of a cursor.

Use `<n>` to specify the number of bytes of storage for `char` and `varchar` datatypes. For `unichar`, use `<n>` to specify the number of Unicode characters (the amount of storage allocated is 2 bytes per character). For `nchar` and `nvarchar`, `<n>` is the number of characters (the amount of storage allocated is `<n>` times the number of bytes per character for the server's current default character set).

If you do not use `<n>` to specify the length:

- The default length is 1 byte for columns created with `create table`, `alter table`, and variables created with `declare`.
- The default length is 30 bytes for values created with the `convert` function.

Entries shorter than the assigned length are blank-padded; entries longer than the assigned length are truncated without warning, unless the `string_rtruncation` option to the `set` command is set to `on`. Fixed-length columns that allow nulls are internally converted to variable-length columns.

Use `<n>` to specify the maximum length in characters for the variable-length datatypes, `varchar(n)`, `univarchar(n)`, and `nvarchar(n)`. Data in variable-length columns is stripped of trailing blanks; storage size is the actual length of the data entered. Data in variable-length variables and parameters retains all trailing blanks, but is not padded to the defined length. Character literals are treated as variable-length datatypes.

Fixed-length columns tend to take more storage space than variable-length columns, but are accessed somewhat faster. This table summarizes the storage requirements of the different character datatypes:

Datatype	Stores	Bytes of Storage
`char(n)`	Character	`<n>`
`unichar(n)`	Unicode character	`<n>*@@<unicharsize>` (`@@<unicharsize>` equals 2)
`nchar(n)`	National character	`<n> * @@<ncharsize>`
`varchar(n)`	Character varying	Actual number of characters entered
`univarchar(n)`	Unicode character varying	Actual number of characters * `@@<unicharsize>`
`nvarchar(n)`	National character varying	Actual number of characters * `@@<ncharsize>`

2.1.6.2.1 Determining Column Length with System Functions

Use the `char_length` string function and `datalength` system function to determine column length.

- `char_length` returns the number of characters in the column, stripping trailing blanks for variable-length datatypes.
- `datalength` returns the number of bytes, stripping trailing blanks for data stored in variable-length columns.

When a `char` value is declared to allow NULL values, the SAP ASE server stores it internally as a `varchar`.

If the `min` or `max` aggregate functions are used on a `char` column, the result returned is `varchar`, and is therefore stripped of all trailing spaces.

2.1.6.3 Entering Character Data

Character strings must be enclosed in single or double quotes. If you use `set quoted_identifier on`, use single quotes for character strings; otherwise, the SAP ASE server treats them as identifiers.

Strings that include the double-quote character should be surrounded by single quotes. Strings that include the single-quote character should be surrounded by double quotes. For example:

```
'George said, "There must be a better way."'
"Isn't there a better way?"
```

An alternative is to enter two quotation marks for each quotation mark you want to include in the string. For example:

```
"George said, ""There must be a better way."""
'Isn''t there a better way?'
```

To continue a character string onto the next line of your screen, enter a backslash (\) before going to the next line.

For more information about quoted identifiers, see the section *Delimited Identifiers* of the *Transact SQL User's Guide*.

2.1.6.3.1 Entering Unicode Characters

Optional syntax allows you to specify arbitrary Unicode characters.

If a character literal is immediately preceded by U& or u& (with no intervening white space), the parser recognizes escape sequences within the literal. An escape sequence of the form \xxxx (where xxxx represents four hexadecimal digits) is replaced with the Unicode character whose scalar value is xxxx. Similarly, an escape sequence of the form \+yyyyyy is replaced with the Unicode character whose scalar value is yyyyyy. The escape sequence \\ is replaced by a single \. For example, the following is equivalent to:

select * from mytable where unichar_column = '五'

```
select * from mytable where unichar_column = U&'\4e94'
```

The U& or u& prefix simply enables the recognition of escapes. The datatype of the literal is chosen solely on the basis of representability. Thus, for example, the following two queries are equivalent:

```
select * from mytable where char_column = 'A'
```

```
select * from mytable where char_column = U&'\0041'
```

In both cases, the datatype of the character literal is `char`, since “A” is an ASCII character, and ASCII is a subset of all SAP-supported server character sets.

The U& and u& prefixes also work with the double-quoted character literals and for quoted identifiers. However, quoted identifiers must be representable in the server's character set, insofar as all database objects are identified by names in system tables, and all such names are of datatype `char`.

2.1.6.4 Example of Treatment of Blanks

Create a table named `spaces` that has both fixed- and variable-length character columns.

```
create table spaces (cnot char(5) not null,
    cnull char(5) null,
    vnot varchar(5) not null,
        vnull varchar(5) null,
    explanation varchar(25) not null)
insert spaces values ("a", "b", "c", "d", "pads char-not-null only")
insert spaces values ("1    ", "2    ", "3    ", "4    ", "truncates trailing
blanks")
insert spaces values ("    e", "    f", "    g", "    h", "leading blanks, no
change")
insert spaces values ("   w ", "   x ", "   y ", "    z ", "truncates trailing
blanks")
insert spaces values ("", "", "", "", "empty string equals space")
select "[" + cnot + "]",
       "[" + cnull + "]",
       "[" + vnot + "]",
       "[" + vnull + "]",
    explanation from spaces
```

```
                                   explanation
 -------  -------  ------- ------- --------------------
 [a    ]  [b]      [c]      [d]     pads char-not-null only
 [1    ]  [2]      [3]      [4]     truncates trailing blanks
 [    e]  [    f]  [    g]  [    h]  leading blanks, no change
 [   w ]  [   x]  [   y]  [   z]  truncates trailing blanks
 [ ]      [ ]      [ ]      [ ]     empty string equals space
(5 rows affected)
```

This example illustrates how the column's datatype and null type interact to determine how blank spaces are treated:

- Only char not null and nchar not null columns are padded to the full width of the column; char null columns are treated like varchar and nchar null columns are treated like nvarchar.
- Only unichar not null columns are padded to the full width of the column; unichar null columns are treated like univarchar.
- Preceding blanks are not affected.
- Trailing blanks are truncated except for char, unichar, and nchar not null columns.
- The empty string (“ ”) is treated as a single space. In char, nchar, and unichar not null columns, the result is a column-length field of spaces.

2.1.6.5 Manipulating Character Data

You can use the like keyword to search character strings for particular characters and the built-in string functions to manipulate their contents.

You can use strings consisting of numbers for arithmetic after being converted to exact and approximate numeric datatypes with the convert function.

2.1.6.6 Standards and Compliance for Character Datatypes

ANSI SQL – Compliance level: Transact-SQL provides the char and varchar ANSI SQL datatypes. The nchar, nvarchar, unichar, and univarchar datatypes are Transact-SQL extensions.

2.1.7 Binary Datatypes

Use the binary datatypes, binary(n) and varbinary(n), to store raw binary data, such as pictures, in a raw binary notation, up to the maximum column size for your server’s logical page size.

The binary and varbinary datatypes are Transact-SQL extensions.

2.1.7.1 Valid binary and varbinary Entries

Binary data begins with the characters “0x” and can include any combination of digits, and the uppercase and lowercase letters A through F.

Use <n> to specify the column length in bytes, or use the default length of 1 byte. Each byte stores 2 binary digits. If you enter a value longer than <n>, the SAP ASE server truncates the entry to the specified length without warning or error.

Use the fixed-length binary type, binary(n), for data in which all entries are expected to be approximately equal in length.

Use the variable-length binary type, varbinary(n), for data that is expected to vary greatly in length.

Because entries in `binary` columns are zero-padded to the column length (`<n>`), they may require more storage space than those in `varbinary` columns, but they are accessed somewhat faster.

If you do not use `<n>` to specify the length:

- The default length is 1 byte for columns created with `create table`, `alter table`, and variables created with `declare`.
- The default length is 30 bytes for values created with the `convert` function.

2.1.7.2 Entries of More than the Maximum Column Size

Use the `image` datatype to store larger blocks of binary data (up to 2,147,483,647 bytes) on external data pages.

You cannot use the `image` datatype for variables or for parameters in stored procedures.

Related Information

text, image, and unitext Datatypes [page 33]

2.1.7.3 Treatment of Trailing Zeros

All `binary not null` columns are padded with zeros to the full width of the column. Trailing zeros are truncated in all `varbinary` data and in `binary null` columns, since columns that accept null values must be treated as variable-length columns.

The following example creates a table with all four variations of `binary` and `varbinary` datatypes, NULL, and NOT NULL. The same data is inserted in all four columns and is padded or truncated according to the datatype of the column.

```
create table zeros (bnot binary(5) not null,
            bnull binary(5) null,
            vnot varbinary(5) not null,
            vnull varbinary(5) null)
insert zeros values (0x12345000, 0x12345000, 0x12345000, 0x12345000)
insert zeros values (0x123, 0x123, 0x123, 0x123)
select * from zeros
```

```
bnot                bnull         vnot          vnull
------------        ---------     ----------    ---------
0x1234500000        0x123450      0x123450      0x123450
0x0123000000        0x0123        0x0123        0x0123
```

Because each byte of storage holds 2 binary digits, the SAP ASE server expects binary entries to consist of the characters “0x” followed by an even number of digits. When the “0x” is followed by an odd number of digits, the SAP ASE server assumes that you omitted the leading 0 and adds it for you.

Input values “0x00” and “0x0” are stored as “0x00” in variable-length binary columns (`binary null`, `image`, and `varbinary` columns). In fixed-length binary (`binary not null`) columns, the value is padded with zeros to the full length of the field:

```
insert zeros values (0x0, 0x0,0x0, 0x0)
select * from zeros where bnot = 0x00
```

```
bnot            bnull       vnot        vnull
----------      ------      -----       ------------
0x0000000000    0x00        0x00        0x00
```

If the input value does not include the “0x”, the SAP ASE server assumes that the value is an ASCII value and converts it. For example:

```
create table sample (col_a binary(8))
insert sample values (’002710000000ae1b’)
select * from sample
```

```
col_a
------------------
0x3030323731303030
```

2.1.7.4 Platform Dependence

The exact form in which you enter a particular value depends upon the platform you are using. Therefore, calculations involving binary data can produce different results on different machines.

You cannot use the aggregate functions `sum` or `avg` with the binary datatypes.

For platform-independent conversions between hexadecimal strings and integers, use the `inttohex` and `hextoint` functions rather than the platform-specific convert function. For details, see *Transact-SQL Users Guide*.

2.1.8 bit Datatype

Use the `bit` datatype for columns that contain true/false and yes/no types of data. The `status` column in the `syscolumns` system table indicates the unique offset position for `bit` datatype columns.

`bit` columns hold either 0 or 1. Integer values other than 0 or 1 are accepted, but are always interpreted as 1.

Storage size is 1 byte. Multiple `bit` datatypes in a table are collected into bytes. For example, 7 `bit` columns fit into 1 byte; 9 `bit` columns take 2 bytes.

Columns with a datatype of `bit` cannot be NULL and cannot have indexes on them.

The `bit` datatype is a Transact-SQL extension.

2.1.9 sysname and longsysname Datatypes

`sysname` and `longsysname` are user-defined datatypes that are distributed on the SAP ASE installation media and used in the system tables.

The definitions are:

- `sysname` – `varchar(30) "not null"`
- `longsysname` – `varchar(255) "not null"`

You can declare a column, parameter, or variable to be of types `sysname` and `longsysname`. Alternately, you can also create a user-defined datatype with a base type of `sysname` and `longsysname`, and then define columns, parameters, and variables with the user-defined datatype.

All user-defined datatypes, including `sysname` and `longsysname`, are Transact-SQL extensions.

2.1.10 text, image, and unitext Datatypes

`text` columns are variable-length columns that can hold up to 2,147,483,647 (2^{31} - 1) bytes of printable characters.

The variable-length `unitext` datatype can hold up to 1,073,741,823 Unicode characters (2,147,483,646 bytes).

`image` columns are variable-length columns that can hold up to 2,147,483,647 (2^{31} - 1) bytes of raw binary data.

A key distinction between `text` and `image` is that `text` is subject to character-set conversion if you are not using the default character set of SAP ASE. `image` is not subject to character-set conversion.

Define a `text`, `unitext`, or `image` column as you would any other column, with a `create table` or `alter table` statement. `text`, `unitext`, or `image` datatype definitions do not include lengths. `text`, `unitext`, and `image` columns do permit null values. Their column definition takes the form:

```
<column_name> {text | image | unitext} [null]
```

For example, the `create table` statement for the author's `blurbs` table in the `pubs2` database with a `text` column, `blurb`, that permits null values, is:

```
create table blurbs
(au_id id not null,
copy text null)
```

This example creates a `unitext` column that allows null values:

```
create table tb (ut unitext null)
```

To create the `au_pix` table in the `pubs2` database with an `image` column:

```
create table au_pix
(au_id          char(11) not null,
pic             image null,
format_type     char(11) null,
bytesize        int null,
pixwidth_hor    char(14) null,
```

```
pixwidth_vert    char(14)  null)
```

The SAP ASE server stores text, unitext, and image data in a linked list of data pages that are separate from the rest of the table. Each text, unitext, or image page stores one logical page size worth of data (2, 4, 8, or 16K). All text, unitext, and image data for a table is stored in a single page chain, regardless of the number of text, unitext, and image columns the table contains.

You can place subsequent allocations for text, unitext, and image data pages on a different logical device with sp_placeobject.

image values that have an odd number of hexadecimal digits are padded with a leading zero (an insert of "0xaaabb" becomes "0x0aaabb").

You can use the partition option of the alter table command to partition a table that contains text, unitext, and image columns. Partitioning the table creates additional page chains for the other columns in the table, but has *no* effect on the way the text, unitext, and image columns are stored.

You can use unitext anywhere you use the text datatype, with the same semantics. unitext columns are stored in UTF-16 encoding, regardless of the SAP ASE default character set.

2.1.10.1 Data Structures Used for Storing text, unitext, and image Data

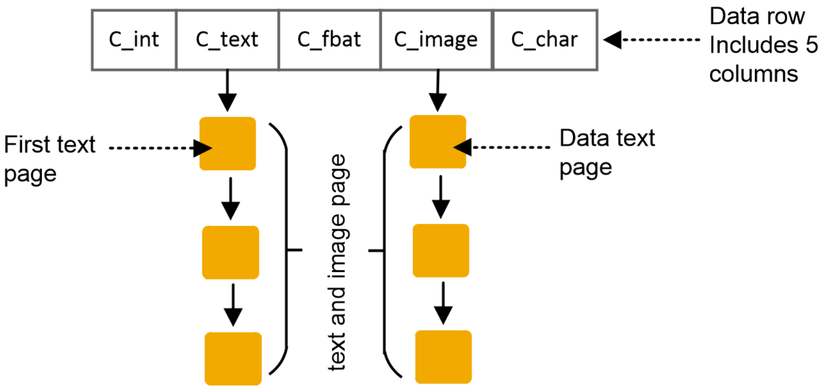
When you allocate text, unitext, or image data, a 16-byte text pointer is inserted into the row you allocated. Part of this text pointer refers to a text page number at the head of the text, unitext, or image data. This text pointer is known as the first text page.

The first text page contains two parts:

- The text data page chain, which contains the text and image data and is a double-linked list of text pages
- The optional text-node structure, which is used to access the user text data

Once an first text page is allocated for text, unitext, or image data, it is never deallocated. If an update to an existing text, unitext,or image data row results in fewer text pages than are currently allocated for this text, unitext, or image data, the SAP ASE server deallocates the extra text pages. If an update to text, unitext, or image data sets the value to NULL, all pages except the first text page are deallocated.

This figure shows the relationship between the data row and the text pages.



In the figure, columns `c_text` and `c_image` are text and image columns containing the pages at the bottom of the picture.

2.1.10.2 Initialize text, unitext, and image Columns

`text`, `unitext`, and `image` columns are not initialized until you update them or insert a non-null value. Initialization allocates at least one data page for each non-null text, unitext, or image data value. It also creates a pointer in the table to the location of the text, unitext, or image data.

For example, the following statements create the table `testtext` and initialize the `blurb` column by inserting a non-null value. The column now has a valid text pointer, and the first text page has been allocated.

```
create table texttest
(title_id varchar(6), blurb text null, pub_id char(4))
```

```
insert texttest values
("BU7832", "Straight Talk About Computers is an annotated analysis of what
computers can do for you: a no-hype guide for the critical user.", "1389")
```

The following statements create a table for `image` values and initialize the `image` column:

```
create table imagetest
(image_id varchar(6), imagecol image null, graphic_id char(4))
```

```
insert imagetest values
("94732", 0x0000008300000000000100000000013c, "1389")
```

> **i Note**
>
> Surround `text` values with quotation marks and precede `image` values with the characters “0x”.

For information on inserting and updating `text`, `unitext`, and `image` data with Client-Library programs, see the *Client-Library/C Reference Manual*.

2.1.10.2.1 Define unitext Columns

You can define a `unitext` column the same way you define other datatypes, using `create table` or `alter table` statements. You do not define the length of a `unitext` column, and the column can be null.

This example creates a `unitext` column that allows null values:

```
create table tb (ut unitext null)
```

The default unicode sort order defines the sort order for unitext columns for pattern matching in `like` clauses and in the `patindex` function, this is independent of the SAP ASE default sort order.

2.1.10.3 Save Space by Allowing NULL

To save storage space for empty text, unitext, or image columns, define them to permit null values and insert nulls until you use the column. Inserting a null value does not initialize a text, unitext, or image column and, therefore, does not create a text pointer or allocate storage.

For example, the following statement inserts values into the `title_id` and `pub_id` columns of the `testtext` table created above, but does not initialize the `blurb` text column:

```
insert texttest
(title_id, pub_id) values ("BU7832", "1389")
```

2.1.10.4 Obtain Information from sysindexes

Each table with `text`, `unitext`, or `image` columns has an additional row in `sysindexes` that provides information about these columns. The `name` column in `sysindexes` uses the form "`tablename`." The `indid` is always 255.

These columns provide information about text storage:

Column	Description
`ioampg`	Pointer to the allocation page for the text page chain
`first`	Pointer to the first page of text data
`root`	Pointer to the last page
`segment`	Number of the segment where the object resides

You can query the `sysindexes` table for information about these columns. For example, the following query reports the number of data pages used by the `blurbs` table in the `pubs2` database:

```
select name, data_pages(db_id(), object_id("blurbs"), indid)
    from sysindexes
    where name = "tblurbs"
```

i Note

The system tables poster shows a one-to-one relationship between `sysindexes` and `systabstats`. This is correct, except for `text` and `image` columns, for which information is not kept in `systabstats`.

2.1.10.5 Using readtext and writetext

Before you can use `writetext` to enter `text` data or `readtext` to read it, you must initialize the `text` column.

Using `update` to replace existing `text`, `unitext`, and `image` data with NULL reclaims all allocated data pages except the first page, which remains available for future use of `writetext`. To deallocate all storage for the row, use `delete` to remove the entire row.

There are restrictions for using `readtext` and `writetext` on a column defined for `unitext`.

For more information, see `readtext` and `writetext` in the *Reference Manual: Commands*.

2.1.10.6 Determine How Much Space a Column Uses

`sp_spaceused` provides information about the space used for text data as `index_size`.

```
sp_spaceused blurbs
```

```
name            rowtotal  reserved  data    index_size unused
--------------- --------  --------- ------- ---------- ------
blurbs          6         32 KB     2 KB    14 KB      16 KB
```

2.1.10.7 Restrictions on text, image, and unitext Columns

You cannot use `text`, `image`, or `unitext` columns in some places.

- `order by`, `compute`, `group by`, and `union` clauses
- An index
- Subqueries or joins
- A `where` clause, except with the keyword `like`

In triggers, both the inserted and deleted text values reference the new value; you cannot reference the old value.

2.1.10.8 Selecting text, unitext, and image Data

`text`, `unitext`, and `image` values can be quite large. When the select list includes text and image values, the limit on the length of the data returned depends on the setting of the `@@textsize` global variable, which contains the limit on the number of bytes of text or image data a select returns.

The default limit is 32K bytes for `isql`; the default depends on the client software. Change the value for a session with `set textsize`.

These global variables return information on `text`, `unitext`, and `image` data:

Variable	Explanation
`@@<textptr>`	The text pointer of the last `text`, `unitext`, or `image` column inserted or updated by a process. Do not confuse this global variable with the `textptr` function.
`@@<textcolid>`	ID of the column referenced by `@@<textptr>`.
`@@<textdbid>`	ID of a database containing the object with the column referenced by `@@<textptr>`.
`@@<textobjid>`	ID of the object containing the column referenced by `@@<textptr>`.
`@@<textsize>`	Current value of the `set textsize` option, which specifies the maximum length, in bytes, of `text`, `unitext`, or `image` data to be returned with a `select` statement. It defaults to 32K. The maximum size for `@@<textsize>` is 2^{31} - 1 (that is, 2,147,483,647).
`@@<textts>`	Text timestamp of the column referenced by `@@<textptr>`.

2.1.10.9 Converting text and image Datatypes

You can explicitly convert text values to `char`, `unichar`, `varchar`, and `univarchar`, and `image` values to binary or varbinary with the convert function, but you are limited to the maximum length of the character and binary datatypes, which is determined by the maximum column size for your server's logical page size.

If you do not specify the length, the converted value has a default length of 30 bytes. Implicit conversion is not supported.

2.1.10.10 Converting to or from Unitext

You can implicitly convert any character or binary datatype to `unitext`, as well as explicitly convert to and from `unitext` to other datatypes. The conversion result, however, is limited to the maximum length of the destination datatype.

When a `unitext` value cannot fit the destination buffer on a Unicode character boundary, data is truncated. If you have enabled `enable surrogate processing`, the unitext value is never truncated in the middle of a surrogate pair of values, which means that fewer bytes may be returned after the datatype conversion. For example, if a unitext column `ut` in table `tb` stores the string "U+0041U+0042U+00c2" (U+0041 representing the Unicode character "A"), this query returns the value "AB" if the server's character set is UTF-8, because U +00C2 is converted to 2-byte UTF-8 0xc382:

```
select convert(char(3), ut) from tb
```

Conversion	Datatypes
These datatypes convert implicitly *to* unitext	`char`, `varchar`, `unichar`, `univarchar`, `binary`, `varbinary`, `text`, `image`
These datatypes convert implicitly *from* unitext	`text`, `image`
These datatypes convert explicitly *from* unitext	`char`, `varchar`, `unichar`, `univarchar`, `binary`, `varbinary`

The `alter table modify` command does not support `text`, `image`, or unitext columns to be the modified column. To migrate from a `text` to a unitext column:

- Use `bcp out -Jutf8` out to copy `text` column data out
- Create a table with unitext columns
- Use `bcp in -Jutf8` to insert data into the new table

2.1.10.11 Pattern Matching in text Data

Use the `patindex` function to search for the starting position of the first occurrence of a specified pattern in a `text`, `unitext`, `varchar`, `univarchar`, `unichar`, or `char` column. The % wildcard character must precede and follow the pattern (except when you are searching for the first or last character).

You can also use the `like` keyword to search for a particular pattern. The following example selects each `text` data value from the `copy` column of the `blurbs` table that contains the pattern “Net Etiquette.”

```
select copy from blurbs
where copy like "%Net Etiquette%"
```

2.1.10.12 Duplicate Rows

The pointer to the text, image, and unitext data uniquely identifies each row. Therefore, a table that contains text, image, and unitext data does not contain duplicate rows unless there are rows in which all text, image, and unitext data is NULL. If this is the case, the pointer has not been initialized.

2.1.10.13 Using Large Object text, unitext, and image Datatypes in Stored Procedures

The SAP ASE server allows you to declare a large object (LOB) `text`, `image`, or `unitext` datatype for a local variable, and pass that variable as an input parameter to a stored procedure, as well as prepare SQL statements that include LOB parameters.

The SAP ASE server caches SQL statements using LOB when you enable the statement cache. See *Configuring Memory* in the *System Administration Guide, Volume 2*.

These restrictions apply to using LOBs in stored procedures.

- LOB parameters are not supported for replication.
- You cannot use LOB datatype for `execute immediate` and deferred compilation.

2.1.10.13.1 Declaring a LOB Datatype

Use the `declare` function to declare an LOB datatype for a local variable.

Syntax

```
declare @<variable> <LOB_datatype>
```

<LOB_datatype>
is one of: `text`, `image`, and `unitext`.

Example

This example declares the `<text_variable>` as `text` datatype:

```
declare @text_variable text
```

2.1.10.13.2 Creating a LOB Parameter

Use the `create procedure` command to create an LOB parameter.

Syntax

```
create procedure <proc_name> [@<parameter_name> <LOB_datatype>
as {<SQL_statement>}
```

Example

This example creates the `new_proc` procedure, which uses the `text` LOB datatype:

```
create procedure new_proc @v1 text
as
select char_length(@v1)
```

2.1.10.13.3 Examples for Using LOB Datatypes

Use LOB datatypes as the input parameter for a stored procedure, or in a `text` function.

Example: Example 1

Uses an LOB as the input parameter for a stored procedure:

1. Create `table_1`:

   ```
   create table t1 (a1 int, a2 text)
       insert into t1 values(1, "aaaa")
       insert into t1 values(2, "bbbb")
       insert into t1 values(3, "cccc")
   ```

2. Create a stored procedure using an LOB local variable as a parameter:

   ```
   create procedure my_procedure @new_var text
       as select @new_var
   ```

3. Declare the local variable and execute the stored procedure.

   ```
   declare @a text
   select @a = a2 from t1 where a1 = 3
   exec my_procedure @a
   ```

   ```
   ---------------------------
   cccc
   ```

Example: Example 2

Uses an LOB variable in a `text` function:

```
declare @a text
select @a = "abcdefgh"
select datalength(@a)
```

```
--------------
              8
```

Example: Example 3

Declares an LOB text local variable:

```
declare @a text
select @a = '<doc><item><id>1</id><name>Box</name></item>'
    +'<item><id>2</id><name>Jar</name></item></doc>'
select id from xmltable ('/doc/item' passing @a
    columns id int path 'id', name varchar(20) path 'name')
as items_table
```

```
 id
-----------
          1
          2
```

And then passes the same LOB parameters to a stored procedure:

```
create proc pr1 @a text
as
select id from xmltable ('/doc/item' passing @a
columns id int path 'id', name varchar(20) path 'name') as items_table
declare @a text
select @a =
'<doc><item><id>1</id><name>Box</name></item>'
+'<item><id>2</id><name>Jar</name></item></doc>'
```

```
 id
-----------
          1
          2
```

2.1.10.14 Standards and Compliance

ANSI SQL – Compliance level: The `text`, `image`, and `unitext` datatypes are Transact-SQL extensions.

2.2 Range and Storage Size

The range of valid values and storage size differ with each system-supplied datatypes.

For simplicity, the datatypes are printed in lowercase characters, although the SAP ASE server allows you to use either uppercase or lowercase characters for system datatypes.

User-defined datatypes, such as `timestamp`, are *case-sensitive*. Most SAP ASE-supplied datatypes are not reserved words; you can use them to name other objects.

Table 2: Range and Storage Size of Exact Numeric Integer System Datatypes

Datatype	Range	Bytes of Storage
`bigint`	Whole numbers between 2^{63} and -2^{63} - 1 (from -9,223,372,036,854,775,808 to +9,223,372,036,854,775,807, inclusive.	8
`int` Synonym: `integer`	2^{31} -1 (2,147,483,647) to -2^{31} (-2,147,483,648	4
`smallint`	2^{15} -1 (32,767) to -2^{15} (-32,768)	2
`tinyint`	0 to 255 (Negative numbers are not permitted)	1
`unsigned bigint`	Whole numbers between 0 and 18,446,744,073,709,551,615	8
`unsigned int`	Whole numbers between 0 and 4,294,967,295	4
`unsigned smallint`	Whole numbers between 0 and 65535	2

Table 3: Range and Storage Size of Exact Numeric Decimal System Datatypes

Datatype	Range	Bytes of storage
`numeric (p, s)`	10^{38} -1 to -10^{38}	2 to 17
`decimal (p, s)`	10^{38} -1 to -10^{38}	2 to 17

Table 4: Range and Storage Size of Approximate Numeric System Datatypes

Datatype	Range	Bytes of storage
float (precision)	machine dependent	• 4 for default precision < 16 • 8 for default precision >= 16
double precision	machine dependent	8
real	machine dependent	4

Table 5: Range and Storage Size of Money Datatypes

Datatype	Range	Bytes of storage
smallmoney	214,748.3647 to -214,748.3648	4
money	922,337,203,685,477.5807 to -922,337,203,685,477.5808	8

Table 6: Range and Storage Size of Date/Time System Datatypes

Datatype	Range	Bytes of storage
smalldatetime	January 1, 1900 to June 6, 2079	4
datetime	January 1, 1753 to December 31, 9999	8
date	January 1, 0001 to December 31, 9999	4
time	12:00:00AM to 11:59:59:990PM	4
bigdatetime	January 1, 0001 to December 31, 9999 and 12:00.000000AM to 11:59:59.999999 PM	8
bigtime	12:00:00.000000 AM to 11:59:59.999999 PM	8

Table 7: Range and Storage Size of Character System Datatypes

Datatype	Synonyms	Range	Bytes of storage
char(n)	character	pagesize	n
varchar(n)	character varying, char varying	pagesize	actual entry length
unichar	Unicode character	pagesize	<n> * <@@unicharsize> (<@@unicharsize> equals 2)
univarchar	Unicode character varying, char varying	pagesize	actual number of characters * <@@unicharsize>

Datatype	Synonyms	Range	Bytes of storage
`nchar(n)`	`national character, national char`	pagesize	`<n>` * `<@@ncharsize>`
`nvarchar(n)`	`nchar varying`, `national char varying`, `national character varying`	pagesize	`<@@ncharsize>` * number of characters
`text`		2^{31} -1 (2,147,483,647) bytes or fewer	0 when uninitialized; multiple of 2K after initialization
`unitext`		1 – 1,073,741,823	0 when uninitialized; multiple of 2K after initialization

Table 8: Range and Storage Size of Binary System Datatypes

Datatype	Range	Bytes of storage
`binary(n)`	pagesize	`<n>`
`varbinary(n)`	pagesize	actual entry length
`image`	2^{31} -1 (2,147,483,647) bytes or fewer	0 when uninitialized; multiple of 2K after initialization

Table 9: Range and Storage Size of Bit System Datatypes

Datatype	Range	Bytes of storage
`bit`	0 or 1	1 (one byte holds up to 8 `bit` columns)

2.3 Datatypes of Columns, Variables, or Parameters

You must declare the datatype for a column, local variable, or parameter. The datatype can be any of the system-supplied datatypes, or any user-defined datatype in the database.

2.3.1 Declaring Datatypes for a Column in a Table

Declare the datatype of a new column in a `create table` or `alter table` statement.

Syntax

```
create table [[<database>.]<owner>.]<table_name>
        (<column_name> <datatype> [identity | not null | null]
            [, <column_name> <datatype> [identity | not null |
```

```
                null]]...)
```

```
alter table [[<database>.]<owner>.]<table_name>
        add <column_name datatype> [identity | null
        [, <column_name> <datatype> [identity | null]...
```

Example

For example:

```
create table sales_daily
    (stor_id char(4)not null,
     ord_num numeric(10,0)identity,
     ord_amt money null)
```

You can also declare the datatype of a new column in a `select into` statement, use `convert` or `cast`:

```
select convert(double precision, x), cast ( int, y) into
    newtable from oldtable
```

2.3.2 Declaring Datatypes for Local Variable in a Batch or Procedure

Use the `declare` function to declare the datatype for a local variable in a batch or stored procedure.

Syntax

```
declare <@variable_name> <datatype>
        [, <@variable_name> <datatype> ]...
```

Example

For example:

```
declare @hope money
```

2.3.3 Declaring Datatypes for a Parameter in a Stored Procedure

Use the `declare` function to declare the datatype for a parameter in a stored procedure.

Syntax

```
create procedure [<owner>.]<procedure_name> [;n<umber>]
        [[(]@<parameter_name> <datatype> [= default] [output]
            [,@<parameter_name> <datatype> [= default]
                [output]]...[)]]
[with recompile]
as <SQL_statements>
```

Example

For example:

```
create procedure auname_sp @auname varchar(40)
as
    select au_lname, title, au_ord
    from authors, titles, titleauthor
    where @auname = au_lname
    and authors.au_id = titleauthor.au_id
    and titles.title_id = titleauthor.title_id
```

2.3.4 Determine the Datatype of Numeric Literals

Numeric literals entered with E notation are treated as `float`; all others are treated as exact numerics.

- Literals between 2^{31} - 1 and -2^{31} with no decimal point are treated as `integer`.
- Literals that include a decimal point, or that fall outside the range for integers, are treated as `numeric`.

> **Note**
>
> To preserve backward compatibility, use E notation for numeric literals that should be treated as `float`.

2.3.5 Determine the Datatype of Character Literals

You cannot declare the datatype of a character literal. SAP ASE treats character literals as `varchar`, except those that contain characters that cannot be converted to the server's default character set.

Such literals are treated as `univarchar`. This makes it possible to perform such queries as selecting `unichar` data in a server configured for "iso_1" using a "sjis" (Japanese) client. For example:

```
select * from mytable where unichar_column = '[illegible]'
```

Since the character literal cannot be represented using the `char` datatype (in “iso_1”), it is promoted to the `unichar` datatype, and the query succeeds.

2.4 Datatypes of Mixed-Mode Expressions

When you perform concatenation or mixed-mode arithmetic on values with different datatypes, the SAP ASE server must determine the datatype, length, and precision of the result.

2.4.1 Determine the Datatype Hierarchy

Each system datatype has a datatype hierarchy, which is stored in the `systypes` system table. User-defined datatypes inherit the hierarchy of the system datatype on which they are based.

The datatype hierarchy applies only to computations or expressions involving numeric datatypes. SAP ASE converts all terms involved first to the datatype highest in the hierarchy before the expression is evaluated or the comparison is performed. For example, when adding and `int` to a `float`, the resulting sum has a `float` datatype.

That is, the SAP ASE server considers the `datetime` value “20-Nov-2012 23:24:25” equal to the `date` value “20-Nov-2012” since it compares only the date component (in this case, the string “20-Nov-2012”).

This is compliant with the ANSI SQL standard.

The following query ranks the datatypes in a database by hierarchy. In addition to the information shown below, your query results include information about any user-defined datatypes in the database:

```
select name, hierarchy
    from systypes
    order by hierarchy
```

```
name           hierarchy
---------- ---------
floatn             1
float              2
datetimn           3
datetime           4
real               5
numericn           6
numeric            7
decimaln           8
decimal            9
moneyn            10
money             11
smallmoney        12
```

```
smalldatet         13
intn               14
uintn              15
bigint             16
ubigint            17
int                18
uint               19
smallint           20
usmallint          21
tinyint            22
bit                23
univarchar         24
unichar            25
unitext            26
sysname            27
varchar            27
nvarchar           27
longsysnam         27
char               28
nchar              28
timestamp          29
varbinary          29
binary             30
text               31
image              32
date               33
time               34
daten              35
timen              36
bigdatetime        37
bigtime            38
bigdatetimen       39
bigtimen           40
xml                41
extended time      99
```

i Note

u<int_type> is an internal representation. The correct syntax for unsigned types is unsigned {int | integer | bigint | smallint }

The datatype hierarchy determines the results of computations using values of different datatypes. The result value is assigned the datatype that is closest to the top of the list or has the least hierarchical value.

In this example, <qty> from the sales table is multiplied by royalty from the roysched table. qty is a smallint, which has a hierarchy of 20; royalty is an int, which has a hierarchy of 18. Therefore, the datatype of the result is an int:

```
smallint(qty) * int(royalty) = int
```

2.4.2 Determine Precision and Scale

For numeric and decimal datatypes, each combination of precision and scale is a distinct SAP ASE datatype.

If you perform arithmetic on two numeric or decimal values:

- <n1> with precision <p1> and scale <s1>, and
- <n2> with precision <p2> and scale <n2>

SAP ASE determines the precision and scale of the results:

Operation	Precision	Scale
n1 + n2	max(s1, s2) + max(p1 -s1, p2 - s2) + 1	max(s1, s2)
n1 - n2	max(s1, s2) + max(p1 -s1, p2 - s2) + 1	max(s1, s2)
n1 * n2	s1 + s2 + (p1 - s1) + (p2 - s2) + 1	s1 + s2
n1 / n2	max(s1 + p2 + 1, 6) + p1 - s1 + p2	max(s1 + p2 -s2 + 1, 6)

2.5 Datatype Conversions

Many conversions from one datatype to another are handled automatically by the SAP ASE server. These are called implicit conversions. Other conversions must be performed explicitly with the `convert`, `hextoint`, `intttohex`, `hextobigint`, `bintostr`, `strtobin`, and `biginttohex` functions.

See *Transact-SQL Users Guide* for details about datatype conversions supported by the SAP ASE server.

2.5.1 Automatic Conversion of Fixed-Length NULL Columns

Only columns with variable-length datatypes can store null values. When you create a NULL column with a fixed-length datatype, the SAP ASE server automatically converts it to the corresponding variable-length datatype. The SAP ASE server does not inform the user of the datatype change.

This table lists the fixed- and variable-length datatypes to which they are converted. Certain variable-length datatypes, such as `moneyn,` are reserved datatypes; you cannot use them to create columns, variables, or parameters:

Original Fixed-Length Datatype	Converted to
`char`	`varchar`
`unichar`	`univarchar`
`nchar`	`nvarchar`
`binary`	`varbinary`
`datetime`	`datetimn`
`date`	`daten`
`time`	`timen`

Original Fixed-Length Datatype	Converted to
`float`	`floatn`
`bigint`, `int`, `smallint`, and `tinyint`	`intn`
`unsigned bigint`, `unsigned int`, and `unsigned smallint`	`uintn`
`decimal`	`decimaln`
`numeric`	`numericn`
`money` and `smallmoney`	`moneyn`

2.5.2 Handling Overflow and Truncation Errors

Arithmetic overflow errors can result from a number of datatype conversions.

2.5.2.1 Determining Server Behavior During an Arithmetic Error

The `arithabort` option determines how the SAP ASE server behaves when an arithmetic error occurs.

The two `arithabort` options, `arithabort arith_overflow` and `arithabort numeric_truncation`, handle different types of arithmetic errors.

You can set each option independently, or set both options with a single `set arithabort on` or `set arithabort off` statement.

- `arithabort arith_overflow` specifies behavior following a divide-by-zero error or a loss of precision during either an explicit or an implicit datatype conversion. This type of error is considered serious. The default setting, `arithabort arith_overflow on`, rolls back the entire transaction in which the error occurs. If the error occurs in a batch that does not contain a transaction, `arithabort arith_overflow on` does not roll back earlier commands in the batch, but the SAP ASE server does not execute any statements that follow the error-generating statement in the batch.
  Setting `arith_overflow` to `on` refers to the execution time, not to the level of normalization to which the SAP ASE server is set.
  If you set `arithabort arith_overflow off`, the SAP ASE server aborts the statement that causes the error, but continues to process other statements in the transaction or batch.
- `arithabort numeric_truncation` specifies behavior following a loss of scale by an exact numeric datatype during an implicit datatype conversion. (When an explicit conversion results in a loss of scale, the results are truncated without warning.) The default setting, `arithabort numeric_truncation on`, aborts the statement that causes the error but continues to process other statements in the transaction or batch. If you set `arithabort numeric_truncation off`, the SAP ASE server truncates the query results and continues processing.

The `arithignore` option determines whether the SAP ASE server prints a warning message after an overflow error. By default, the `arithignore` option is turned `off`. This causes the SAP ASE server to display a warning message after any query that results in numeric overflow. To ignore overflow errors, use `set arithignore on`.

2.5.2.2 Resolving Arithmetic Overflow Errors from the round Function

SAP ASE may issue an arithmetic overflow error when converting a `bigint` value to an `int`.

Use the `exception on rounding overflow` configuration parameter to determine if the `round` function produces an overflow error. Enabling `exception on rounding overflow` means the server returns a overflow error, disabling this parameter means the server returns a value of 0 when the server converts a `bigint` value to an integer.

For example, if table `big_table` includes columns `int_4` and `char_10` with this data:

```
int_4       char_10
----------- ----------
          0        001
          0        002
          0        003
-2147483648        004
 2147483647        005
          0        006
          0        007
          0        008
          0        009
          0        010
          0        011
          0        012
```

When `exception on rounding overflow` is set to the default (0), this query returns a result set of 0:

```
select round(f_int4, -7) from big_table where char_10 = '005'
 -----------
           0
```

However, when you enable `exception on rounding overflow`:

```
sp_configure 'exception on rounding', 1
```

and issue the same command, the server produces a arithmetic overflow when it attempts to convert the value from a `bigint` to an integer:

```
select round(f_int4, -7) from blah where k_char = '005'
Msg 3606, Level 16, State 4:
Line 1:
Arithmetic overflow occurred.
```

2.5.2.3 Resolving Arithmetic Overflow Errors from Character Conversions

SAP ASE may produce arithmetic errors during some character conversions and produce dissimilar transactional results.

For example, the first `select` query below hits the arithmetic overflow during normalization and the transaction is not rolled back. However, the second `select` query below hits the arithmetic overflow while executing the pan and aborts the transaction. Regardless, both transaction should produce the same value for `<@@trancount>`:

```
create table t1 (c1 int)
go
begin tran
go
insert t1 select 1
go
(1 row affected)
declare @int int
select @int=1111111111111111111111111
go
Msg 247, Level 16, State 1:
Server 'BIG_SERVER, Line 2:
Arithmetic overflow during implicit conversion of NUMERIC value
'1111111111111111111111111' to a INT field .
1> select @@trancount
2> go
 -----------
           1
(1 row affected)
1> select * from t1
2> go
 c1
 -----------
           1
(1 row affected)
1> select convert (int, 3333333333333333333333333)
2> go
Msg 247, Level 16, State 1:
Server 'BIG_SERVER, Line 1:
Arithmetic overflow during explicit conversion of NUMERIC value
'3333333333333333333333333' to a INT field .
1> select @@trancount
2> go
 -----------
           0
(1 row affected)
1> rollback
2> go
```

Enabling the `allow statement rollback` configuration parameter prevents the arithmetic overflow errors that cause dissimilar transactional results. Once enabled, the example above produces the same values for @@trancount:

```
sp_configure 'allow statement rollback', 1
go
 Parameter Name                                   Default
         Memory Used                Config Value
         Run Value                Unit         Type
 ------------------------------------------------ ----------------------
         -------------------------- ------------------------------
         ------------------------ ------------ --------------
```

```
 allow statement rollback                                   0
                  0                           1
                   1             number       dynamic
(1 row affected)
Configuration option changed. ASE need not be rebooted since the option is
dynamic.
Changing the value of 'allow statement rollback' does not increase the amount of
memory Adaptive Server uses.
(return status = 0)
drop table t1
go
create table t1 (c1 int)
go
begin tran
insert t1 select 1
go
(1 row affected)
declare @int int
select @int=1111111111111111111111111
go
Msg 247, Level 16, State 1:
Line 2:
Arithmetic overflow during implicit conversion of NUMERIC value
'1111111111111111111111111' to a INT field .
select @@trancount
go
 -----------
           1
(1 row affected)
select * from t1
go
 c1
 -----------
           1
(1 row affected)
select convert (int, 333333333333333333333333)
go
Msg 247, Level 16, State 1:
Line 1:
Arithmetic overflow during explicit conversion of NUMERIC value
'333333333333333333333333' to a INT field .
(0 rows affected)
select @@trancount
go
 -----------
           1
(1 row affected)
```

2.5.2.4 Resolving Arithmetic Overflow Errors Cause by a '?' Parameter Marker

SAP ASE creates a query tree for a lightweight procedure without regard for subsequent datatype binding when a prepared statement includes a `?` parameter marker as either an operand or a `case` statement result.

For example, if the parameter marker is resolved to a `smallint` datatype for a prepared statement that includes an expression similar to this:

```
( ? * smallint_column )
```

If the parameter is bound to an integer datatype and a value that is passed is greater than the maximum allowed for a `smallint`, the server raises an arithmetic overflow error when the prepared statement is executed:

```
Error 7332, Severity 15, State 1
The parameter marker ? is allowed only in an arithmetic expression when
configuration parameter 'restrict parameter markers' is OFF.
```

2.5.2.5 Resolving Scale Truncation Error Issues

The size of the result grows each time you apply a binary operator in an mathematical expression with data types like `decimal(38,14)`, regardless of the size of the actual data.

SAP ASE includes a precision and scale adjustment policy for binary operators stating that, if the precision of the result is greater than the maximum precision, the server automatically sets the scale to 6. However, the server issues a truncation error if the number of significant digits is greater than the adjusted scale of 6.

For example, the scale is 7 in this query (that is, 7 places to the right of the decimal point), resulting in a truncation error:

```
select power(cast (10 as decimal(38,14)), 0) * cast(1.1234567 as decimal(38, 14))
Truncation error occurred.
Command has been aborted.
 --------------------------------------------------------------------------------
```

This query succeeds if you remove the 7th digit:

```
select power(cast (10 as decimal(38,14)), 0) * cast(1.123456 as decimal(38, 14))
 --------------------------------------------------------------------------------
                                                                         1.123456
```

2.6 Datatypes and Encrypted Columns

Some SAP ASE datatypes support encrypted columns, as well as the on-disk length of encrypted columns.

Datatype	Input Data Length	Encrypted Column Type	Max Encrypted Data Length (No init_vector)	Actual Encrypted Data Length (No init_vector)	Max Encrypted Data Length (With init_vector)	Actual Encrypted Data Length (With init_vector)
`date`	4	`varbinary`	17	17	33	33
`time`	4	`varbinary`	17	17	33	33
`smalldatetime`	4	`varbinary`	17	17	33	33

Datatype	Input Data Length	Encrypted Column Type	Max Encrypted Data Length (No init_vector)	Actual Encrypted Data Length (No init_vector)	Max Encrypted Data Length (With init_vector)	Actual Encrypted Data Length (With init_vector)
`bigdatetime`	8	`varbinary`	17	17	33	33
`bigtime`	8	`varbinary`	17	17	33	33
`datetime`	8	`varbinary`	17	17	33	33
`smallmoney`	4	`varbinary`	17	17	33	33
`money`	8	`varbinary`	17	17	33	33
`bit`	8	`varbinary`	17	17	33	33
`bigint`	8	`varbinary`	17	17	33	33
`unsigned bigint`	8	`varbinary`	17	17	33	33
`unichar(10)`	2 (1 `unichar` character)	`varbinary`	33	17	49	33
`unichar(10)`	20 (10 `unichar` characters)	`varbinary`	33	33	49	49
`univarchar(20)`	20 (10 `unichar` characters)	`varbinary`	49	33	65	49

The `text`, `image`, and `unitext` datatypes do not support encrypted columns.

2.7 User-Defined Datatypes

User-defined datatypes are built from the system datatypes and from the `sysname` or `longsysname` user-defined datatypes.

After you create a user-defined datatype, you can use it to define columns, parameters, and variables. Objects that are created from user-defined datatypes inherit the rules, defaults, null type, and IDENTITY property of the user-defined datatype, as well as inheriting the defaults and null type of the system datatypes on which the user-defined datatype is based.

You must create user-defined datatypes in each database in which they are to be used. Create frequently used types in the `model` database. These types are automatically added to each new database (including `tempdb`, which is used for temporary tables) as it is created.

The SAP ASE server allows you to create user-defined datatypes, based on any system datatype, using `sp_addtype`. You cannot create a user-defined datatype based on another user-defined datatype, such as `timestamp` or the `tid` datatype in the `pubs2` database.

The `sysname` and `longsysname` datatypes are exceptions to this rule. Though `sysname` and `longsysname` are user-defined datatypes, you can use them to build user-defined datatypes.

You can create user-defined datatypes that are the maximum datatype length (versions of Adaptive Server earlier than 15.7 SP121 restricted the length to the server page size). Use the `@@maxvarlen` global variable to check the maximum possible variable length allowed when creating a user-defined datatype.

User-defined datatypes are database objects. Their names are case-sensitive and must conform to the rules for identifiers.

You can bind rules to user-defined datatypes with `sp_bindrule` and bind defaults with `sp_bindefault`.

By default, objects built on a user-defined datatype inherit the user-defined datatype's null type or IDENTITY property. You can override the null type or IDENTITY property in a column definition.

Use `sp_rename` to rename a user-defined datatype.

Use `sp_droptype` to remove a user-defined datatype from a database.

> **i Note**
>
> You cannot drop a datatype that is already in use in a table.

Use `sp_help` to display information about the properties of a system datatype or a user-defined datatype. You can also use `sp_help` to display the datatype, length, precision, and scale for each column in a table.

The ANSI SQL compliance level for user-defined datatypes are a Transact-SQL extension.

2.8 Standards and Compliance

Transact-SQL datatypes are either ANSI SQL standards or user-defined.

Transact-SQL – ANSI SQL standards are:

- `char`
- `varchar`
- `smallint`
- `int`
- `bigint`
- `decimal`
- `numeric`
- `float`
- `real`
- `date`
- `time`
- `double precision`

Transact-SQL Extensions – user-defined datatypes are:

- `binary`
- `varbinary`
- `bit`
- `nchar`
- `datetime`
- `smalldatetime`
- `bigdatetime`
- `bigtime`
- `tinyint`
- `unsigned smallint`
- `unsigned int`
- `unsigned bigint`
- `money`
- `smallmoney`
- `text`
- `unitext`
- `image`
- `nvarchar`
- `unichar`
- `univarchar`
- `sysname`
- `longsysname`
- `timestamp`

3 Transact-SQL Functions

Often used as part of a stored procedure or program, functions are allowed in the `select` list, in the `where` clause, and anywhere an expression is allowed, and are used to return information from the database.

See the *Using Transact-SQL Functions in Queries* in the *Transact-SQL Users Guide* for detailed information about how to use these functions.

See *XML Services* for detailed information about the XML functions: `xmlextract`, `xmlparse`, `xmlrepresentation`, `xmltable`, `xmltest`, and `xmlvalidate`.

The permission checks for Transact-SQL functions differ based on your granular permissions settings. See the *Security Administration Guide* for more information on granular permissions.

3.1 abs

Returns the absolute value of an expression.

Syntax

```
abs(<numeric_expression>)
```

Parameters

<numeric_expression>

is a column, variable, or expression with datatype that is an exact numeric, approximate numeric, money, or any type that can be implicitly converted to one of these types.

Examples

Example 1

Returns the absolute value of -1:

```
select abs(-1)
```

```
-----------
```

```
         1
```

Usage

`abs`, a mathematical function, returns the absolute value of a given expression. Results are of the same type and have the same precision and scale as the numeric expression.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `abs`.

Related Information

ceiling [page 89]
floor [page 180]
round [page 327]
sign [page 364]

3.2 acos

Returns the angle (in radians) of the specified cosine.

Syntax

```
acos(<cosine>)
```

Parameters

<cosine>

is the cosine of the angle, expressed as a column name, variable, or constant of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

Examples

Example 1

Returns the angle where the cosine is 0.52:

```
select acos(0.52)
```

```
--------------------
           1.023945
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `acos`.

Related Information

cos [page 117]
degrees [page 168]
radians [page 302]

3.3 allocinfo

Returns a list of allocation pages that are stored in an object allocation map (OAM) page.

Syntax

```
allocinfo(<db_id>, <page_id>, "help" | "alloc pages on oam")
```

Parameters

<db_id>
is the database ID.

<page_id>
is the page ID.

help
shows available options.

alloc pages on oam
provides allocation page information.

Examples

Example

Provides a list of allocation pages that are stored in an object allocation map (OAM) page:

```
select allocinfo(1,888,"alloc pages on oam")
```

```
-----------------------------------
00010000000003
```

Usage

Mechanism to retrieve all allocation pages for a particular partition or index. Returns NULL for an invalid page when using the `alloc pages on oam` option value.

Permissions

You must have sa_role to execute this command.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`allocinfo`	• *Roles* – Current active roles • *Keywords or options* – `ALLOCINFO` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.4 ascii

Returns the ASCII code for the first character in an expression.

Syntax

```
ascii(<char_expr> | <uchar_expr>)
```

Parameters

<char_expr>

is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr>

is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Returns the author's last names and the ACSII codes for the first letters in their last names, if the ASCII code is less than 70:

```
select au_lname, ascii(au_lname) from authors
where ascii(au_lname) < 70
```

```
au_lname
------------------------------ -----------
Bennet                                  66
Blotchet-Halls                          66
Carson                                  67
DeFrance                                68
Dull                                    68
```

Usage

When a string function accepts two character expressions but only one expression is `unichar`, the other expression is "promoted" and internally converted to `unichar`. This follows existing rules for mixed-mode expressions. However, this conversion may cause truncation, since `unichar` data sometimes takes twice the space.

If `<char_expr >`or `<uchar_expr >`is NULL, returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `ascii`.

Related Information

char [page 91]
to_unichar [page 418]

3.5 asehostname

Returns the physical or virtual host on which the SAP ASE server is running.

Syntax

```
asehostname
```

Examples

Example 1

Returns the SAP ASE server host name:

```
select asehostname()
```

```
----------------------------------- linuxkernel.sybase.com
```

Standards

SQL/92 and SQL/99 compliant

Permissions

The permission checks for `asehostname` differ based on your granular permissions settings.

Settings	Description
Granular permissions enabled	With granular permissions enabled, you must be granted `select` on `asehostname` or have `manage server` permission to execute `asehostname`.
Granular permissions disabled	With granular permissions disabled, you must be granted `select` on `asehostname` or be a user with sa_role to execute `asehostname`.

3.6 asin

Returns the angle (in radians) of the specified sine.

Syntax

```
asin(<sine>)
```

Parameters

<sine>

is the sine of the angle, expressed as a column name, variable, or constant of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

Examples

Example 1

Returns the angle of a sine of 0.52:

```
select asin(0.52)
```

```
--------------------
             0.546851
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `asin`.

Related Information

degrees [page 168]
radians [page 302]
sin [page 368]

3.7 atan

Returns the angle (in radians) of a tangent with the specified value.

Syntax

```
atan(<tangent> )
```

Parameters

`<tangent>`
is the tangent of the angle, expressed as a column name, variable, or constant of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

Examples

Example 1

Returns the angle of a tangent of 0.50:

```
select atan(0.50)
```

```
--------------------
            0.463648
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `atan`.

Related Information

atn2 [page 68]
degrees [page 168]
radians [page 302]
tan [page 412]

3.8 atn2

Returns the angle (in radians) of the specified sine and cosine.

Syntax

```
atn2(<sine>, <cosine>)
```

Parameters

`<sine>`

is the sine of the angle, expressed as a column name, variable, or constant of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

<cosine>

is the cosine of the angle, expressed as a column name, variable, or constant of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

Examples

Example 1

Returns the angle based on a sine of .50 and cosine of .48:

```
select atn2(.50, .48)
```

```
--------------------
            0.805803
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `atn2`.

Related Information

atan [page 67]
degrees [page 168]
radians [page 302]
tan [page 412]

3.9 avg

Calculates the numeric average of all (distinct) values.

Syntax

```
avg([all | distinct] <expression>)
```

Parameters

all

applies `avg` to all values. `all` is the default.

distinct

eliminates duplicate values before `avg` is applied. `distinct` is optional.

`<expression>`

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Example 1

Calculates the average advance and the sum of total sales for all business books. Each of these aggregate functions produces a single summary value for all of the retrieved rows:

```
select avg(advance), sum(total_sales)
from titles
where type = "business"
------------------------ -----------
                6,281.25       30788
```

Example 2

Used with a `group by` clause, the aggregate functions produce single values for each group, rather than for the entire table. This statement produces summary values for each type of book:

```
select type, avg(advance), sum(total_sales)
from titles
group by type
type
 ------------ ------------------------ -----------
 UNDECIDED                        NULL        NULL
```

```
 business                     6,281.25       30788
 mod_cook                     7,500.00       24278
 popular_comp                 7,500.00       12875
 psychology                   4,255.00        9939
 trad_cook                    6,333.33       19566
```

Example 3

Groups the `titles` table by publishers and includes only those groups of publishers who have paid more than $25,000 in total advances and whose books average more than $15 in price:

```
select pub_id, sum(advance), avg(price)
from titles
group by pub_id
having sum(advance) > $25000 and avg(price) > $15
pub_id
 ------ -------------------- --------------------
 0877             41,000.00                15.41
 1389             30,000.00                18.98
```

Usage

- `avg`, an aggregate function, finds the average of the values in a column. `avg` can only be used on numeric (integer, floating point, or money) datatypes. Null values are ignored in calculating averages.
- When you average (signed or unsigned) `int`, `smallint`, `tinyint` data, the SAP ASE server returns the result as an `int` value. When you average (signed or unsigned) `bigint` data, the SAP ASE server returns the result as a `bigint` value. To avoid overflow errors in DB-Library programs, declare variables used for results appropriately.
- You cannot use `avg` with the binary datatypes.
- Since the average value is only defined on numeric datatypes, using `avg` Unicode expressions generates an error.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `avg`.

Related Information

Expressions [page 468]
max [page 256]
min [page 259]

3.10 audit_event_name

Returns a description of an audit event.

Syntax

```
audit_event_name(<event_id>)
```

Parameters

<event_id>

is the number of an audit event.

Returns

audit_event_name returns Prepare Database Command when you include 157 as the <event_id>.

Examples

Example 1

Queries the audit trail for table creation events:

```
select * from audit_data where audit_event_name(event) = "Create Table"
```

Example 2

Obtains current audit event values. See the Usage section below for a complete list of audit values and their descriptions.

```
create table #tmp(event_id int, description varchar(255))
```

```
go
declare @a int
select @a=1
while (@a<120)
begin
      insert #tmp values (@a, audit_event_name(@a))
      select @a=@a + 1
end
select * from #tmp
go
```

```
-----------------------------------------
event_id    description
---------   --------------------
      1     Ad hoc Audit Record
      2     Alter Database
      ...
      104   Create Index
      105   Drop Index
```

Usage

The following lists the ID and name of each of the audit events:

- 1 Ad Hoc Audit record
- 2 Alter Database
- 3 Alter table
- 4 BCP In
- 5 NULL
- 6 Bind Default
- 7 Bind Message
- 8 Bind Rule
- 9 Create Database
- 10 Create Table
- 11 Create Procedure
- 12 Create Trigger
- 13 Create Rule
- 14 Create Default
- 15 Create Message
- 16 Create View
- 17 Access To Database
- 18 Delete Table
- 19 Delete View
- 20 Disk Init
- 21 Disk Refit
- 22 Disk Reinit
- 23 Disk Mirror
- 24 Disk Unmirror
- 25 Disk Remirror

- 26 Drop Database
- 27 Drop Table
- 28 Drop Procedure
- 29 Drop Trigger
- 30 Drop Rule
- 31 Drop Default
- 32 Drop Message
- 33 Drop View
- 34 Dump Database
- 35 Dump Transaction
- 36 Fatal Error
- 37 Nonfatal Error
- 38 Execution Of Stored Procedure
- 39 Execution Of Trigger
- 40 Grant Command
- 41 Insert Table
- 42 Insert View
- 43 Load Database
- 44 Load Transaction
- 45 Login
- 46 Logout
- 47 Revoke Command
- 48 RPC In
- 49 RPC Out
- 50 Server Boot
- 51 Server Shutdown
- 52 NULL
- 53 NULL
- 54 NULL
- 55 Role Toggling
- 56 NULL
- 57 NULL
- 58 Truncation of Audit Table
- 59 NULL
- 60 NULL
- 61 Access To Audit Table
- 62 Select Table
- 63 Select View
- 64 Truncate Table
- 65 NULL
- 66 NULL
- 67 Unbind Default
- 68 Unbind Rule
- 69 Unbind Message
- 70 Update Table

- 71 Update View
- 72 NULL
- 73 Auditing Enabled
- 74 Auditing Disabled
- 75 NULL
- 76 SSO Changed Password
- Table Change
- Audit Option Change
- 79 NULL
- 80 Role Check Performed
- 81 DBCC Command
- 82 Config
- 83 Online Database
- 84 Setuser Command
- 85 User-defined Function Command
- 86 Built-in Function
- 87 Disk Release
- 88 Set SSA Command
- 89 Kill/Terminate Command
- 90 Connect Command
- 91 Reference
- 92 Command Text
- 93 JCS Install Command
- 94 JCS Remove Command
- 95 Unlock Admin Account
- 96 Quiesce Database Command
- 97 Create SQLJ Function
- 98 Drop SQLJ Function
- 99 SSL Administration
- 100 Disk Resize
- 101 Mount Database
- 102 Unmount Database
- 103 Create Login
- 104 Create Index
- 105 Drop Index
- 106 Encrypted Column Admin
- 107 Create Encryption Key
- 108 AEK As/Not Default
- 109 Drop Encryption Key
- 110 Deploy UDWS
- 111 Undeploy UDWS
- 112 Login Locked
- 113 Quiesce Hold Sybsecurity
- 114 Quiesce Release Sybsecurity
- 115 Password Administration

- 116 Create Manifest_file
- 117 Generate Keypair
- 118 AEK Modify Encryption
- 119 AEK Add Encryption

> i Note
>
> The SAP ASE server does not log events if `audit_event_name` returns NULL.

See also:

- `select` in *Reference Manual: Commands*
- `sp_audit` in *Reference Manual: Procedures*

Standards

ANSI SQL – compliance level: Transact-SQL extension.

Permissions

Any user can execute `audit_event_name`.

3.11 authmech

Determines what authentication mechanism is used by a specified logged in server process ID.

Syntax

```
authmech ([<spid>])
```

Examples

Example 1

Returns the authentication mechanism for server process ID 42, whether KERBEROS, LDAP, or any other mechanism:

```
select authmech(42)
```

Example 2

Returns the authentication mechanism for the current login's server process ID:

```
select authmech()
```

or

```
select authmech(0)
```

Example 3

Prints the authentication mechanism used for each login session:

```
select suid, authmech(spid)
    from sysprocesses where suid!=0
```

Usage

- This function returns output of type `varchar` from one optional argument.
- If the value of the server process ID is 0, the function returns the authentication method used by the server process ID of the current client session.
- If no argument is specified, the output is the same as if the value of the server process ID is 0.
- Possible return values include `ldap`, `ase`, `pam`, and NULL.

Permissions

The permission checks for `authmech` differ based on your granular permissions settings.

Settings	Description
Granular permissions enabled	With granular permissions enabled, any user can execute `authmech` to query a current personal session. You must have `select` permission on `authmech` to query the details of another user's session.
Granular permissions disabled	With granular permissions disabled, any user can execute `authmech` to query a current personal session. You must be a user with `sso_role` or have `select` permission on `authmech` to query the details of another user's session.

Auditing

You can enable `security` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`authmech`	• *Roles* – Current active roles • *Keywords or options* – `AUTHMECH` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.12 biginttohex

Returns the platform-independent 8 byte hexadecimal equivalent of the specified integer.

Syntax

```
biginttohex (<integer_expression>)
```

Parameters

`<integer_expression>`
is the integer value to be converted to a hexadecimal string.

Examples

Example 1

Converts the big integer -9223372036854775808 to a hexadecimal string:

```
1> select biginttohex(-9223372036854775808)
2> go
```

```
-----------------
8000000000000000
```

Usage

- `biginttohex`, a datatype conversion function, returns the platform-independent hexadecimal equivalent of an integer, without a "0x" prefix.
- Use the `biginttohex` function for platform-independent conversions of integers to hexadecimal strings. `biginttohex` accepts any expression that evaluates to a `bigint`. It always returns the same hexadecimal equivalent for a given expression, regardless of the platform on which it is executed.

Permissions

Any user can execute `biginttohex`.

Related Information

convert [page 110]
hextobigint [page 199]
hextoint [page 200]
inttohex [page 215]

3.13 bintostr

Converts a sequence of hexadecimal digits to a string of its equivalent alphanumeric characters or `varbinary` data.

Syntax

```
select bintostr(<sequence of hexadecimal digits>)
```

Parameters

<sequence of hexadecimal digits>

is the sequence of valid hexadecimal digits, consisting of [0 – 9], [a – f] and [A – F], and which is prefixed with “0x”.

Examples

Example 1

Converts the hexadecimal sequence of “0x723ad82fe” to an alphanumeric string of the same value:

```
1> select bintostr(0x723ad82fe)
2> go
```

```
-----------------------------------
0723ad82fe
```

In this example, the in-memory representation of the sequence of hexadecimal digits and its equivalent alphanumeric character string are:

Hexadecimal digits (5 bytes)									
0	7	2	3	a	d	8	2	f	e

Alphanumeric character string (9 bytes)									
0	7	2	3	a	d	8	2	f	e

The function processes hexadecimal digits from right to left. In this example, the number of digits in the input is odd. For this reason, the alphanumeric character sequence has a prefix of “0” and is reflected in the output.

Example 2

Converts the hexadecimal digits of a local variable called `<@bin_data>` to an alphanumeric string equivalent to the value of “723ad82fe”:

```
declare @bin_data varchar(30)
select @bin_data = 0x723ad82fe
select bintostr(@bin_data)
go
```

```
----------
0723ad82fe
```

Usage

- Any invalid characters in the input results in null as the output.
- The input must be valid `varbinary` data.
- A NULL input results in NULL output.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `bintostr`.

Related Information

strtobin [page 398]

3.14 cache_usage

Returns cache usage as a percentage of all objects in the cache to which the table belongs.

Syntax

```
cache_usage(<table_name>)
```

Parameters

<table_name>

is the name of a table. The name can be fully qualified (that is, it can include the database and owner name).

Examples

Example 1

Returns percentage of the cache used by the titles tables:

```
select cache_usage("titles")
```

```
----------------------------
                     98.876953
```

Example 2

Returns, from the `master` database, the percentage of the cache used by the `authors` tables

```
select cache_usage ("pubs2..authors")
```

```
------------------------------------
                             98.876953
```

Usage

- `cache_usage` does not provide any information on how much cache the current object is using, and does not provide information for cache usages of indexes if they are bound to different cache.
- (In cluster environments) `cache_usage` provides cache usage of the cache the object is bound to in current node.

Permissions

Any user can execute `cache_usage`.

3.15 case

`case` expression simplifies standard SQL expressions by allowing you to express a search condition using a `when...then` construct instead of an `if` statement. It supports conditional SQL expressions; can be used anywhere a value expression can be used.

Syntax

`case` and `<expression>` syntax:

```
case
    when <search_condition> then <expression >
    [when <search_condition> then <expression>]...
    [else <expression>]
end
```

`case` and `<value>` syntax:

```
case <value>
    when <value> then <expression >
    [when <value> then <expression>]...
    [else <expression>]
end
```

Parameters

case

begins the `case` expression.

when

precedes the search condition or the expression to be compared.

`<search_condition>`

is used to set conditions for the results that are selected. Search conditions for `case` expressions are similar to the search conditions in a `where` clause. Search conditions are detailed in the *Transact-SQL User's Guide*.

then

precedes the expression that specifies a result value of `case`.

`<expression>` and **`<value>`**

is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators.

else

is optional. When not specified, `else null` is implied.

Examples

Example 1

Selects all the authors from the `authors` table and, for certain authors, specifies the city in which they live:

```
select au_lname, postalcode,
    case
            when postalcode = "94705"
                then "Berkeley Author"
            when postalcode = "94609"
                then "Oakland Author"
            when postalcode = "94612"
                then "Oakland Author"
            when postalcode = "97330"
                then "Corvallis Author"
        end
from authors
```

Example 2

Returns the first occurrence of a non-NULL value in either the `lowqty` or `highqty` column of the `discounts` table:

```
select stor_id, discount,
        coalesce (lowqty, highqty)
from discounts
```

You can also use the following format to produce the same result, since `coalesce` is an abbreviated form of a `case`expression:

```
select stor_id, discount,
        case
            when lowqty is not NULL then lowqty
            else highqty
        end
from discounts
```

Example 3

Selects the `<titles>` and `<type>` from the `titles` table. If the book type is UNDECIDED, `nullif` returns a NULL value:

```
select title,
        nullif(type, "UNDECIDED")
from titles
```

You can also use the following format to produce the same result, since `nullif` is an abbreviated form of a `case`expression:

```
select title,
        case
            when type = "UNDECIDED" then NULL
            else type
        end
from titles
```

Example 4

Produces an error message, because at least one expression must be something other than the null keyword:

```
select price, coalesce (NULL, NULL, NULL)
from titles
All result expressions in a CASE expression must not be NULL.
```

Example 5

Produces an error message, because at least two expressions must follow `coalesce`:

```
select stor_id, discount, coalesce (highqty) from discounts
A single coalesce element is illegal in a COALESCE expression.
```

Example 6

This `case` with `<values>` example updates salary information for employees:

```
update employees
    set salary =
        case dept
         when 'Video' then salary * 1.1
         when 'Music' then salary * 1.2
         else 0
        end
```

Example 7

In the `movie_titles` table, the `movie_type` column is encoded with an integer rather than the `cha(10)` needed to spell out “Horror,” “Comedy,” “Romance,” and “Western.” However, a text string is returned to applications through the use of `case` expression:

```
select title,
    case movie_type
        when 1 then 'Horror'
        when 2 then 'Comedy'
        when 3 then 'Romance'
        when 4 then 'Western'
        else null
    end,
    our_cost
from movie_titles
```

Usage

- Use `case` with `<value>` when comparing values, where `<value>` is the value desired. If `<value>` equals `<expression>`, then the value of the `case` is `<result>`. If `<value1>` does not equal `<expression>`, `<value>` is compared to `<value2>`. If `<value>` equals `<value2>`, then the value of the CASE is `<result2>`. If none of the `<value1 ... valuen>` are equal to the desired value, then the value of the CASE is `<resultx>`. All of the `<resulti>` can be either a value expression or the keyword NULL. All of the `<valuei>` must be comparable types, and all of the results must have comparable datatypes.
- If your query produces a variety of datatypes, the datatype of a `case` expression result is determined by datatype hierarchy. If you specify two datatypes that the SAP ASE server cannot implicitly convert (for example, `char` and `int`), the query fails.

See also `if...else`, `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `case`.

Related Information

Expressions [page 468]
Datatypes of Mixed-Mode Expressions [page 48]
coalesce [page 97]
nullif [page 267]

3.16 cast

Converts the specified value to another datatype.

Syntax

```
cast (<expression> as <datatype> [(<length> | <precision>[, <scale>])])
```

Parameters

`<expression>`

is the value to be converted from one datatype or date format to another. It includes columns, constants, functions, any combination of constants, and functions that are connected by arithmetic or bitwise operators orsubqueries.

When Java is enabled in the database, `<expression>` can be a value to be converted to a Java-SQL class.

When unichar is used as the destination datatype, the default length of 30 Unicode values is used if no length is specified.

<length>

is an optional parameter used with char, nchar, unichar, univarchar, varchar, nvarchar, binary and varbinary datatypes. If you do not supply a length, the SAP ASE server truncates the data to 30 characters for character types and 30 bytes for binary types. The maximum allowable length for character and binary expression is 64K.

<precision>

is the number of significant digits in a numeric or decimal datatype. For float datatypes, precision is the number of significant binary digits in the mantissa. If you do not supply a precision, the SAP ASE server uses the default precision of 18 for numeric and decimal datatypes.

<scale>

is the number of digits to the right of the decimal point in a numeric, or decimal datatype. If you do not supply a scale, the SAP ASE server uses the default scale of 0.

Examples

Example 1

Converts the date into a more readable datetime format:

```
select cast("01/03/63" as datetime)
go
```

```
 --------------------------
        Jan  3 1963 12:00AM
(1 row affected)
```

Example 2

Converts the total_sales column in the title database to a 12-character column:

```
select title, cast(total_sales as char(12))
```

Standards

ANSI SQL – Compliance level: ANSI compliant.

Permissions

Any user can execute cast.

3.16.1 Usage for cast

There are additional considerations for using `cast`.

- `cast` uses the default format for `date` and `time` datatypes.
- `cast` generates a domain error when the argument falls outside the range over which the function is defined. This should happen rarely.
- You cannot use `null/not null` keywords to specify the resulting datatype's nullability. You can, however, use `cast` with the null value itself to achieve a nullable result datatype. To convert a value to a nullable datatype, you the `convert` function, which does allow the use of `null/not null` keywords.
- You can use `cast` to convert an `image` column to `binary` or `varbinary`. You are limited to the maximum length of the `binary` datatypes that is determined by the maximum column size for your server's logical page size. If you do not specify the length, the converted value has a default length of 30 characters.
- You can use `unichar` expressions as a destination datatype, or they can be converted to another datatype. `unichar` expressions can be converted either explicitly between any other datatype supported by the server, or implicitly.
- If you do not specify length when `unichar` is used as a destination type, the default length of 30 Unicode values is used. If the length of the destination type is not large enough to accommodate the given expression, an error message appears.

3.16.1.1 Conversions Involving Java Classes

When Java is enabled in the database, you can use `cast` to change datatypes in a number of ways.

- Convert Java object types to SQL datatypes.
- Convert SQL datatypes to Java types.
- Convert any Java-SQL class installed in the SAP ASE server to any other Java-SQL class installed in the SAP ASE server if the compile-time datatype of the expression (the source class) is a subclass or superclass of the target class.

The result of the conversion is associated with the current database.

3.16.1.2 Implicit Conversion

Implicit conversion between types when the primary fields do not match may cause data truncation, the insertion of a default value, or an error message to be raised.

For example, when a datetime value is converted to a date value, the time portion is truncated, leaving only the date portion. If a time value is converted to a datetime value, a default date portion of Jan 1, 1900 is added to the new datetime value. If a date value is converted to a datetime value, a default time portion of 00:00:00:000 is added to the datetime value.

Example: Example of Implicit Conversion

```
DATE -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
TIME -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME -> DATE
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME  -> TIME
```

3.16.1.3 Explicit Conversion

If you attempt to explicitly convert a `date` to a `datetime`, and the value is outside the `datetime` range such as "Jan 1, 1000" the conversion is not allowed and an informative error message is raised.

Example: Example of Explicit Conversion

```
DATE -> UNICHAR, UNIVARCHAR
TIME -> UNICHAR, UNIVARCHAR
UNICHAR, UNIVARCHAR -> DATE
UNICHAR, UNIVARCHAR -> TIME
```

3.17 ceiling

Returns the smallest integer greater than or equal to the specified value.

Syntax

```
ceiling(<value>)
```

Parameters

`<value>`

is a column, variable, or expression with a datatype is exact numeric, approximate numeric, money, or any type that can be implicitly converted to one of these types.

Examples

Example 1

Returns a value of 124:

```
select ceiling(123.45)
```

```
124
```

Example 2

Returns a value of -123:

```
select ceiling(-123.45)
```

```
-123
```

Example 3

Returns a value of 24.000000:

```
select ceiling(1.2345E2)
```

```
24.000000
```

Example 4

Returns a value of -123.000000:

```
select ceiling(-1.2345E2)
```

```
-123.000000
```

Example 5

Returns a value of 124.00

```
select ceiling($123.45)
```

```
124.00
```

Example 6

Returns values of “discount” from the `salesdetail` table where `title_id` is the value “PS3333”:

```
select discount, ceiling(discount) from salesdetail where title_id = "PS3333"
```

```
discount
 -------------------- --------------------
           45.000000            45.000000
           46.700000            47.000000
           46.700000            47.000000
           50.000000            50.000000
```

Usage

`ceiling`, a mathematical function, returns the smallest integer that is greater than or equal to the specified value. The return value has the same datatype as the value supplied.

For `numeric` and `decimal` values, results have the same precision as the value supplied and a scale of zero.

See also:

- `set` in *Reference Manual: Commands*.
- *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `ceiling`.

Related Information

abs [page 59]
floor [page 180]
round [page 327]
sign [page 364]

3.18 char

Converts a single-byte integer value to a character value (`char` is usually used as the inverse of `ascii`), returning the character equivalent of an integer.

Syntax

```
char(<integer_expr>)
```

Parameters

<integer_expr>

is any integer (`tinyint`, `smallint`, or `int`) column name, variable, or constant expression between 0 and 255.

Examples

Example 1

```
select char(42)
```

```
-
*
```

Example 2

```
select xxx = char(65)
```

```
xxx
---
A
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `char`.

3.18.1 Usage for char

There are additional considerations for using `char`.

- `char` returns a `char` datatype. If the resulting value is the first byte of a multibyte character, the character may be undefined.
- If `<char_expr>` is NULL, returns NULL.

See also *Transact-SQL Users Guide*.

Related Information

ascii [page 63]
str [page 393]

3.18.1.1 Reformatting Output With char

You can use concatenation and `char` values to add tabs or carriage returns to reformat output. `char(10)` converts to a return; `char(9)` converts to a tab.

For example:

```
/* just a space */
select title_id +  " " + title from titles where title_id = "T67061"
/* a return */
select title_id + char(10) + title from titles where title_id = "T67061"
/* a tab */
select title_id + char(9) + title from titles where title_id = "T67061"
```

```
-----------------------------------------------------------------------
T67061 Programming with Curses
-----------------------------------------------------------------------
T67061
Programming with Curses
-----------------------------------------------------------------------
T67061      Programming with Curses
```

3.19 char_length

Returns the number of characters in an expression.

Syntax

```
char_length(<char_expr> | <uchar_expr>)
```

Parameters

<char_expr>

is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, `text_locator`, `unitext_locator`, or `nvarchar` type.

<uchar_expr>

is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Returns a number of characters from `titles` where the ID is PC9999:

```
select char_length(notes) from titles
    where title_id = "PC9999"
```

```
 -----------
          39
```

Example 2

Returns the number of characters from three variables:

```
declare @var1 varchar(20), @var2 varchar(20), @char char(20)
    select @var1 = "abcd", @var2 = "abcd    ", @char = "abcd"
    select char_length(@var1), char_length(@var2), char_length(@char)
```

```
 ----------- ----------- -----------
           4           8          20
```

Usage

For:

- Compressed large object (LOB) columns, `char_length` returns the number of original plain text characters.
- Variable-length columns and variables, `char_length` returns the number of characters (not the defined length of the column or variable). If explicit trailing blanks are included in variable-length variables, they are not stripped. For literals and fixed-length character columns and variables, `char_length` does not strip the expression of trailing blanks (see Example 2).
- `unitext`, `unichar`, and `univarchar` columns, `char_length` returns the number of Unicode values (16-bit), with one surrogate pair counted as two Unicode values. For example, this is what is returned if a `unitext` column `ut` contains row value U+0041U+0042U+d800dc00:

```
select char_length(ut) from unitable
------------
4
```

- Multibyte character sets, the number of characters in the expression is usually fewer than the number of bytes; use `datalength` to determine the number of bytes.
- Unicode expressions, returns the number of Unicode values (not bytes) in an expression. Surrogate pairs count as two Unicode values.

If <char_expr >or <uchar_expr >is NULL, `char_length` returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `char_length`.

Related Information

datalength [page 137]

3.20 charindex

Returns an integer representing the starting position of an expression.

Syntax

```
charindex(<expression1>, <expression2> [, <start>])
```

Parameters

<expression>

is a binary or character column name, variable, or constant expression. Can be `char`, `varchar`, `nchar`, `nvarchar`, `unichar`, `univarchar`, `binary`, `text_locator`, `unitext_locator`, `image_locator` or `varbinary`.

<start>

when specified, causes the search for `<expression1>` to start at the given offset in `<expression2>`. When `<start>` is not given, the search start at the beginning of `<expression2>`. `<start>` can be an expression, but must return an integer value.

Examples

Example 1

Returns the position at which the character expression “wonderful” begins in the `notes` column of the `titles` table:

```
select charindex("wonderful", notes)
from titles
where title_id = "TC3218"
```

```
-----------
         46
```

Example 2

This query executes successfully, returning zero rows. The column `spt_values.name` is defined as `varchar(35)`:

```
select <name>
from spt_values
where charindex( 'NO', name, 1000 ) > 0
```

In comparison, this query does not use `<start>`, returning the position at which the character expression “wonderful” begins in the `notes` column of the `titles` table:

```
select charindex("wonderful", notes)
from titles
where title_id = "TC3218"
```

```
-----------
         46
```

Usage

- `charindex`, a string function, searches `<expression2>` for the first occurrence of `<expression1>` and returns an integer representing its starting position. If `<expression1>` is not found, `charindex` returns 0.
- If `<expression1>` contains wildcard characters, `charindex` treats them as literals.
- If `<expression2 >`is NULL, returns 0.
- If a `varchar` expression is given as one parameter and a `unichar` expression as the other, the `varchar` expression is implicitly converted to `unichar` (with possible truncation).
- If only one of `<expression1>` or `<expression2>` is a locator, the datatype of the other expression must be implicitly convertible to the datatype of the LOB referenced by the locator.

- When `<expression1>` is a locator, the maximum length of the LOB referenced by the locator is 16KB.
- The `<start>` value is interpreted as the number of characters to skip before starting the search for `varchar`, `univarchar`, `text_locator`, and `unitext_locator` datatypes, and as the number of bytes for `binary` and `image_locator` datatypes.
- The maximum length of `<expression1>` is 16,384 bytes.
- If a `varchar` expression is given as one parameter and a `unichar` expression as the other, the `varchar` expression is implicitly converted to `unichar` (with possible truncation).

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `charindex`.

Related Information

patindex [page 293]

3.21 coalesce

Supports conditional SQL expressions; can be used anywhere a value expression can be used; alternative for a `case` expression. `coalesce` expression simplifies standard SQL expressions by allowing you to express a search condition as a simple comparison instead of using a `when...then` construct.

Syntax

```
coalesce(<expression>, <expression >[, <expression>]...)
```

Parameters

coalesce

evaluates the listed expressions and returns the first non-null value. If all expressions are null, `coalesce` returns NULL.

<expression>

is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators.

Examples

Example 1

Returns the first occurrence of a non-null value in either the `lowqty` or `highqty` column of the `discounts` table:

```
select stor_id, discount,
        coalesce (lowqty, highqty)
from discounts
```

Example 2

An alternative way of writing the previous example:

```
select stor_id, discount,
        case
            when lowqty is not NULL then lowqty
            else highqty
        end
from discounts
```

Usage

- You can use `coalesce` expressions anywhere an expression in SQL.
- At least one result of the `coalesce` expression must return a non-null value. This example produces the following error message:

  ```
  select price, coalesce (NULL, NULL, NULL)
  from titles
  ```

  ```
  All result expressions in a CASE expression must not be NULL.
  ```
- If your query produces a variety of datatypes, the datatype of a `case` expression result is determined by datatype hierarchy. If you specify two datatypes that the SAP ASE server cannot implicitly convert (for example, `char` and `int`), the query fails.
- `coalesce` is an abbreviated form of a `case` expression. Example 2 describes an alternative way of writing the `coalesce` statement.

- `coalesce` must be followed by at least two expressions. This example produces the following error message:

```
select stor_id, discount, coalesce (highqty)
from discounts
```

```
A single coalesce element is illegal in a COALESCE expression.
```

See also `case`, `nullif`, `select`, `if...else`, `where clause` in *Reference Manual: Commands*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `coalesce`.

Related Information

Expressions [page 468]
Datatypes of Mixed-Mode Expressions [page 48]

3.22 col_length

Returns the defined length of a column.

Syntax

```
col_length(<object_name>, <column_name>)
```

Parameters

<object_name>

is name of a database object, such as a table, view, procedure, trigger, default, or rule. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

<column_name>

is the name of the column.

Examples

Example 1

Finds the length of the `title` column in the `titles` table. The “x” gives a column heading to the result:

```
select x = col_length("titles", "title")
```

```
 x
----
   80
```

Usage

To find the actual length of the data stored in each row, use `datalength`.

For:

- `text`, `unitext`, and `image` columns – `col_length` returns 16, the length of the `binary(16)` pointer to the actual text page.
- `unichar` columns – the defined length is the number of Unicode values declared when the column was defined (not the number of bytes represented).

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `col_length`.

Auditing

You can enable func_obj_access auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_obj_access	86	col_length	• *Roles* – Current active roles • *Keywords or options* – COL_LENGTH • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

Related Information

datalength [page 137]

3.23 col_name

Returns the name of the column where the table and column IDs are specified, and can be up to 255 bytes in length.

Syntax

```
col_name(<object_id>,< column_id> [, <database_id>])
```

Parameters

<object_id>

is a numeric expression that is an object ID for a table, view, or other database object. These are stored in the id column of sysobjects.

<column_id>

is a numeric expression that is a column ID of a column. These are stored in the `colid` column of `syscolumns`.

<database_id>

is a numeric expression that is the ID for a database. These are stored in the `db_id` column of `sysdatabases`.

Examples

Example 1

Returns the name of the column for table 208003772 and column ID 2:

```
select col_name(208003772, 2)
```

```
------------------------------
title
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `col_name`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`col_name`	• *Roles* – Current active roles • *Keywords or options* – `COL_NAME` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

db_id [page 156]
object_id [page 273]

3.24 compare

Allows you to directly compare two character strings based on alternate collation rules.

Syntax

```
compare ({<char_expression1>|<uchar_expression1>},
     {<char_expression2>|<uchar_expression2>}),
     [{<collation_name> | <collation_ID>}]
```

Parameters

`<char_expression1>` or **`<uchar_expression1>`**

are the character expressions to compare to `<char_expression2>` or `<uchar_expression 2>`.

<char_expression2> or **<uchar_expression2>**

are the character expressions against which to compare `<char_expression1>` or `<uchar_expression1>`.

`<char_expression1>` and `<char_expression2>` can be:

- Character type (`char`, `varchar`, `nchar`, or `nvarchar`)
- Character variable, or
- Constant character expression, enclosed in single or double quotation marks

`<uchar_expression1>` and `<uchar_expression2>` can be:

- Character type (`unichar` or `univarchar`)
- Character variable, or
- Constant character expression, enclosed in single or double quotation marks

<collation_name> or **<collation_ID>**

`<collation_name>` can be a quoted string or a character variable that specifies the collation to use, while `<collation_ID>` is an integer constant or a variable that specifies the collation to use. The valid values are:

Description	Collation name	Collation ID
Default Unicode multilingual	default	20
Thai dictionary order	thaidict	21
ISO14651 standard	iso14651	22
UTF-16 ordering – matches UTF-8 binary ordering	utf8bin	24
CP 850 Alternative – no accent	altnoacc	39
CP 850 Alternative – lowercase first	altdict	45
CP 850 Western European – no case preference	altnocsp	46
CP 850 Scandinavian – dictionary ordering	scandict	47
CP 850 Scandinavian – case-insensitive with preference	scannocp	48
GB Pinyin	gbpinyin	n/a
Binary sort	binary	50
Latin-1 English, French, German dictionary	dict	51
Latin-1 English, French, German no case	nocase	52
Latin-1 English, French, German no case, preference	nocasep	53
Latin-1 English, French, German no accent	noaccent	54

Description	Collation name	Collation ID
Latin-1 Spanish dictionary	espdict	55
Latin-1 Spanish no case	espnocs	56
Latin-1 Spanish no accent	espnoac	57
ISO 8859-5 Russian dictionary	rusdict	58
ISO 8859-5 Russian no case	rusnocs	59
ISO 8859-5 Cyrillic dictionary	cyrdict	63
ISO 8859-5 Cyrillic no case	cyrnocs	64
ISO 8859-7 Greek dictionary	elldict	65
ISO 8859-2 Hungarian dictionary	hundict	69
ISO 8859-2 Hungarian no accents	hunnoac	70
ISO 8859-2 Hungarian no case	hunnocs	71
ISO 8859-9 Turkish dictionary	turdict	72
ISO 8859-9 Turkish no accents	turknoac	73
ISO 8859-9 Turkish no case	turknocs	74
Binary sort order that matches the Business Suite (and ABAP) binary sort order	binaryalt	99
CP932 binary ordering	cp932bin	129
Chinese phonetic ordering	dynix	130
GB2312 binary ordering	gb2312bn	137
Common Cyrillic dictionary	cyrdict	140
Turkish dictionary	turdict	155
EUCKSC binary ordering	euckscbn	161
Chinese phonetic ordering	gbpinyin	163
Russian dictionary ordering	rusdict	165
SJIS binary ordering	sjisbin	179
EUCJIS binary ordering	eucjisbn	192

Description	Collation name	Collation ID
BIG5 binary ordering	big5bin	194
Shift-JIS binary order	sjisbin	259

Examples

Example 1

Compares `aaa` and `bbb`:

```
1> select compare ("aaa","bbb")
2> go
 -----------
          -1
(1 row affected)
```

Alternatively, you can also compare `aaa` and `bbb` using this format:

```
1> select compare (("aaa"),("bbb"))
2> go
 -----------
          -1
(1 row affected)
```

Example 2

Compares `aaa` and `bbb` and specifies binary sort order:

```
1> select compare ("aaa","bbb","binary")
2> go
 -----------
          -1
(1 row affected)
```

Alternatively, you can compare `aaa` and `bbb` using this format, and the collation ID instead of the collation name:

```
1> select compare (("aaa"),("bbb"),(50))
2> go
 -----------
          -1
(1 row affected)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute compare.

3.24.1 Usage for compare

There are additional considerations for using compare.

- The compare function returns the following values, based on the collation rules that you chose:
  - 1 – indicates that <char_expression1> or <uchar_expression1> is greater than <char_expression2> or< uchar_expression2>.
  - 0 – indicates that <char_expression1> or <uchar_expression1> is equal to <char_expression2> or< uchar_expression2>.
  - -1 – indicates that <char_expression1> or <uchar_expression1> is less than <char_expression2 >or< uchar expression2>.
- <char_expression1>, <uchar_expression1>, and <char_expression2>, < uchar_expression2 >must be characters that are encoded in the server's default character set.
- <char_expression1>, <uchar_expression 1>, or <char_expression2>, <uchar_expression2>, or both, can be empty strings:
  - If <char_expression2> or <uchar_expression2> is empty, the function returns 1.
  - If both strings are empty, then they are equal, and the function returns 0.
  - If <char_expression1> or <uchar_expression 1> is empty, the function returns -1.

  The compare function does not equate empty strings and strings containing only spaces. compare uses the sortkey function to generate collation keys for comparison. Therefore, a truly empty string, a string with one space, or a string with two spaces do not compare equally.
- If either <char_expression1>, <uchar_expression1>; or <char_expression2>, <uchar_expression2 >is NULL, then the result is NULL.
- If a varchar expression is given as one parameter and a unichar expression is given as the other, the varchar expression is implicitly converted to unichar (with possible truncation).
- If you do not specify a value for <collation_name> or <collation_ID>, compare assumes binary collation.

Table 10: Valid Values for collation_name and collation_ID

Description	Collation Name	Collation ID
Default Unicode multilingual	default	20
Thai dictionary order	thaidict	21
ISO14651 standard	iso14651	22
UTF-16 ordering – matches UTF-8 binary ordering	utf8bin	24
CP 850 Alternative – no accent	altnoacc	39

Description	Collation Name	Collation ID
CP 850 Alternative – lowercase first	altdict	45
CP 850 Western European – no case preference	altnocsp	46
CP 850 Scandinavian – dictionary ordering	scandict	47
CP 850 Scandinavian – case-insensitive with preference	scannocp	48
GB Pinyin	gbpinyin	n/a
Binary sort	binary	50
Latin-1 English, French, German dictionary	dict	51
Latin-1 English, French, German no case	nocase	52
Latin-1 English, French, German no case, preference	nocasep	53
Latin-1 English, French, German no accent	noaccent	54
Latin-1 Spanish dictionary	espdict	55
Latin-1 Spanish no case	espnocs	56
Latin-1 Spanish no accent	espnoac	57
ISO 8859-5 Russian dictionary	rusdict	58
ISO 8859-5 Russian no case	rusnocs	59
ISO 8859-5 Cyrillic dictionary	cyrdict	63
ISO 8859-5 Cyrillic no case	cyrnocs	64
ISO 8859-7 Greek dictionary	elldict	65
ISO 8859-2 Hungarian dictionary	hundict	69
ISO 8859-2 Hungarian no accents	hunnoac	70
ISO 8859-2 Hungarian no case	hunnocs	71
ISO 8859-9 Turkish dictionary	turdict	72
ISO 8859-9 Turkish no accents	turknoac	73
ISO 8859-9 Turkish no case	turknocs	74
Binary sort order that matches the Business Suite (and ABAP) binary sort order	binaryalt	99

Description	Collation Name	Collation ID
CP932 binary ordering	cp932bin	129
Chinese phonetic ordering	dynix	130
GB2312 binary ordering	gb2312bn	137
Common Cyrillic dictionary	cyrdict	140
Turkish dictionary	turdict	155
EUCKSC binary ordering	euckscbn	161
Chinese phonetic ordering	gbpinyin	163
Russian dictionary ordering	rusdict	165
SJIS binary ordering	sjisbin	179
EUCJIS binary ordering	eucjisbn	192
BIG5 binary ordering	big5bin	194
Shift-JIS binary order	sjisbin	259

Related Information

sortkey [page 369]

3.24.1.1 Maximum Row and Column Length for APL and DOL

`compare` can generate up to six bytes of collation information for each input character. Therefore, the result from using `compare` may exceed the length limit of the `varbinary` datatype. If this happens, the result is truncated to fit.

The SAP ASE server issues a warning message, but the query or transaction that contained the `compare` function continues to run. Since this limit is dependent on the logical page size of your server, truncation removes result bytes for each input character until the result string is less than the following for DOL and APL tables:

Table 11: APL Tables

Page Size	Maximum Row Length	Maximum Column Length
2K (2048 bytes)	1962	1960 bytes

Page Size	Maximum Row Length	Maximum Column Length
4K (4096 bytes)	4010	4008 bytes
8K (8192 bytes)	8106	8104 bytes
16K (16384 bytes)	16298	16296 bytes

Table 12: DOL Tables

Page Size	Maximum Row Length	Maximum Column Length
2K (2048 bytes)	1964	1958 bytes
4K (4096 bytes)	4012	4006 bytes
8K (8192 bytes)	8108	8102 bytes
16K (16384 bytes)	16300	16294 bytes if table does not include any variable length columns
16K (16384 bytes)	16300 (subject to a max start offset of varlen = 8191)	8191-6-2 = 8183 bytes if table includes at least on variable length column.This size includes six bytes for the row overhead and two bytes for the row length field

3.25 convert

Converts the specified value to another datatype or a different `datetime` display format.

Syntax

```
convert (<datatype> [(<length>) | (<precision>[, <scale>])]
    [null | not null], <expression >[, <style>])
```

Parameters

<datatype>

is the system-supplied datatype (for example, `char(10)`, `unichar (10)`, `varbinary (50)`, or `int`) into which to convert the expression. You cannot use user-defined datatypes.

When Java is enabled in the database, `<datatype>` can also be a Java-SQL class in the current database.

`<length>`

is an optional parameter used with `char`, `nchar`, `unichar`, `univarchar`, `varchar`, `nvarchar`, `binary`, and `varbinary` datatypes. If you do not supply a length, the SAP ASE server truncates the data to 30 characters for the character types and 30 bytes for the binary types. The maximum allowable length for character and binary expression is 64K.

`<precision>`

is the number of significant digits in a `numeric` or `decimal` datatype. For `float` datatypes, precision is the number of significant binary digits in the mantissa. If you do not supply a precision, the SAP ASE server uses the default precision of 18 for `numeric` and `decimal` datatypes.

`<scale>`

is the number of digits to the right of the decimal point in a `numeric`, or `decimal` datatype. If you do not supply a scale, the SAP ASE server uses the default scale of 0.

null | not null

specifies the nullabilty of the result expression. If you do not supply either `null` or `not null`, the converted result has the same nullability as the expression.

`<expression>`

is the value to be converted from one datatype or date format to another.

When Java is enabled in the database, `<expression>` can be a value to be converted to a Java-SQL class.

When `unichar` is used as the destination datatype, the default length of 30 Unicode values is used if no length is specified.

`<style>`

is the display format to use for the converted data. When converting `money` or `smallmoney` data to a character type, use a `<style>` of 1 to display a comma after every 3 digits.

When converting `datetime` or `smalldatetime` data to a character type, use the style numbers in the following table to specify the display format. Values in the left-most column display 2-digit years (`<yy>`). For 4-digit years (`<yyyy>`), add 100, or use the value in the middle column.

When converting `date` data to a character type, use style numbers 1 through 7 (101 through 107) or 10 through 12 (110 through 112) in the following table to specify the display format. The default value is 100 (mon dd yyyy hh:miAM (or PM)). If `date` data is converted to a style that contains a time portion, that time portion reflects the default value of zero.

When converting `time` data to a character type, use style number 8 or 9 (108 or 109) to specify the display format. The default is 100 (mon dd yyyy hh:miAM (or PM)). If `time` data is converted to a style that contains a date portion, the default date of Jan 1, 1900 is displayed.

Table 13: Date Format Conversions Using the style Parameter

Without Century (yy)	With Century (yyyy)	Standard	Output
-	0 or 100	Default	`<mon dd yyyy hh:mm>` AM (or PM)
1	101	USA	`<mm/dd/yy>`
2	2	SQL standard	`<yy.mm.dd>`
3	103	English/French	`<dd/mm/yy>`
4	104	German	`<dd.mm.yy>`
5	105		`<dd-mm-yy>`
6	106		`<dd mon yy>`
7	107		`<mon dd, yy>`
8	108		`<HH:mm:ss>`
-	9 or 109	Default + millisec-onds	`<mon dd yyyy hh:mm:ss>` AM (or PM)
10	110	USA	`<mm-dd-yy>`
11	111	Japan	`<yy/mm/dd>`
12	112	ISO	`<yymmdd>`
13	113		`<yy/dd/mm>`
14	114		`<mm/yy/dd>`
14	114		`<hh:mi:ss:mmm>`AM(or PM)
15	115		`<dd/yy/mm>`
-	16 or 116		`<mon dd yyyy HH:mm:ss>`
17	117		`<hh:mmAM>`
18	118		`<HH:mm>`
19			`<hh:mm:ss:zzzAM>`
20			`<hh:mm:ss:zzz>`
21			`<yy/mm/dd> <HH:mm:ss>`
22			`<yy/mm/dd> <HH:mm>` AM (or PM)

Without Century (yy)	With Century (yyyy)	Standard	Output
23			<yyyy-mm-ddTHH:mm:ss>
36	136		<hh:mm:ss.zzzzzz>AM(PM)
37	137		<hh:mm.ss.zzzzzz>
38	138		<mon dd yyyy hh:mm:ss.zzzzzz>AM(PM)
39	139		<mon dd yyyy hh:mm:ss.zzzzzz>
40	140		<yyyy-mm-dd hh:mm:ss.zzzzzz>

"mon" indicates a month spelled out, "mm" the month number or minutes. "HH "indicates a 24-hour clock value, "hh" a 12-hour clock value. The last row, 23, includes a literal "T" to separate the date and time portions of the format.Styles 24–35 are undefined.

The default values (`<style>` 0 or 100), and `<style>` 9 or 109 return the century (`<yyyy>`). When converting to `char` or `varchar` from `smalldatetime`, styles that include seconds or milliseconds show zeros in those positions.

Examples

Example 1

Converts the specified value in `title` to another datatype display format:

```
select title, convert(char(12), total_sales)
from titles
```

Example 2

Converts the title and total sales from `title`:

```
select title, total_sales
from titles
where convert(char(20), total_sales) like "1%"
```

Example 3

Converts the current date to style 3, dd/mm/yy:

```
select convert(char(12), getdate(), 3)
```

Example 4

If the value `pubdate` can be null, you must use `varchar` rather than `char`, or errors may result:

```
select convert(varchar(12), pubdate, 3) from titles
```

Example 5

Returns the integer equivalent of the string “0x00000100”. Results can vary from one platform to another:

```
select convert(integer, 0x00000100)
```

Example 6

Returns the platform-specific bit pattern as an SAP binary type:

```
select convert (binary, 10)
```

Example 7

Returns 1, the bit string equivalent of $1.11:

```
select convert(bit, $1.11)
```

Example 8

Creates `#tempsales` with `total_sales` of datatype `char(100)`, and does not allow null values. Even if `titles.total_sales` was defined as allowing nulls, `#tempsales` is created with `#tempsales.total_sales` not allowing null values:

```
select title, convert (char(100) not null, total_sales) into #tempsales
from titles
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `convert`.

3.25.1 Usage for convert

There are additional considerations for using `convert`.

- `convert`, a datatype conversion function, converts between a wide variety of datatypes and reformats date/time and money data for display purposes.
- If they are compressed, `convert` decompresses large object (LOB) columns before converting them to other datatypes.
- `convert` – returns the specified value, converted to another datatype or a different datetime display format. When converting from unitext to other character and binary datatypes, the result is limited to the maximum length of the destination datatype. If the length is not specified, the converted value has a default size of 30 bytes. If you are using `enabled enable surrogate processing`, a surrogate pair is

returned as a whole. For example, this is what is returned if you convert a unitext column that contains data U+0041U+0042U+20acU+0043 (stands for “AB ı”) to a UTF-8 `varchar(3)` column:

```
select convert(varchar(3), ut) from untable
---
AB
```

- `convert` generates a domain error when the argument falls outside the range over which the function is defined. This should happen rarely.
- Use `null` or `not null` to specify the nullability of a target column. Specifically, this can be used with `select into` to create a new table and change the datatype and nullability of existing columns in the source table (See Example 8, above).
  The result is an undefined value if:
  - The expression being converted is to a `not null` result.
  - The expression’s value is null.

  Use the following `select` statement to generate a known non-NULL value for predictable results:

  ```
  select convert(int not null isnull(col2, 5)) from table1
  ```
- You can use `convert` to convert an `image` column to `binary` or `varbinary`. You are limited to the maximum length of the `binary` datatypes, which is determined by the maximum column size for your server’s logical page size. If you do not specify the length, the converted value has a default length of 30 characters.
- You can use `unichar` expressions as a destination datatype or you can convert them to another datatype. `unichar` expressions can be converted either explicitly between any other datatype supported by the server, or implicitly.
- If you do not specify the length when `unichar` is used as a destination type, the default length of 30 Unicode values is used. If the length of the destination type is not large enough to accommodate the given expression, an error message appears.

See also *Transact-SQL Users Guide*; *Java in Adaptive Server Enterprise* for a list of allowed datatype mappings and more information about datatype conversions involving Java classes.

Related Information

User-Defined Datatypes [page 56]
hextoint [page 200]
inttohex [page 215]

3.25.1.1 Conversions Involving Java classes

When Java is enabled in the database, you can use `convert` to change datatypes in a number of ways.

- Convert Java object types to SQL datatypes.
- Convert SQL datatypes to Java types.

- Convert any Java-SQL class installed in the SAP ASE server to any other Java-SQL class installed in the SAP ASE server if the compile-time datatype of the expression (the source class) is a subclass or superclass of the target class.

The result of the conversion is associated with the current database.

3.25.1.2 Implicit Conversion

Implicit conversion between types when the primary fields do not match may cause data truncation, the insertion of a default value, or an error message to be raised.

For example, when a datetime value is converted to a date value, the time portion is truncated, leaving only the date portion. If a time value is converted to a datetime value, a default date portion of Jan 1, 1900 is added to the new datetime value. If a date value is converted to a datetime value, a default time portion of 00:00:00:000 is added to the datetime value.

Example: Example of Implicit Conversion

```
DATE -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
TIME -> VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME -> DATE
VARCHAR, CHAR, BINARY, VARBINARY, DATETIME, SMALLDATETIME  -> TIME
```

3.25.1.3 Explicit Conversion

If you attempt to explicitly convert a `date` to a `datetime` and the value is outside the `datetime` range, such as "Jan 1, 1000" the conversion is not allowed and an informative error message is raised.

An example of explicit conversion:

```
DATE -> UNICHAR, UNIVARCHAR
TIME -> UNICHAR, UNIVARCHAR
UNICHAR, UNIVARCHAR -> DATE
UNICHAR, UNIVARCHAR -> TIME
```

3.26 cos

Returns the cosine of the angle specified in radians.

Syntax

```
cos(<angle>)
```

Parameters

<angle>

is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Returns the cosine of 44:

```
select cos(44)
```

```
 0.999843
```

Usage

`cos`, a mathematical function, returns the cosine of the specified angle, in radians.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `cos`.

3.27 cot

Returns the cotangent of the angle specified in radians.

Syntax

```
cot(<angle>)
```

Parameters

`<angle>`
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Returns the cotangent of 90:

```
select cot(90)
```

```
--------------------
           -0.501203
```

Usage

`cot`, a mathematical function, returns the cotangent of the specified angle, in radians.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `cot`.

Related Information

degrees [page 168]
radians [page 302]
sin [page 368]

3.28 count

Returns the number of (distinct) non-null values, or the number of selected rows as an integer.

Syntax

```
count([all | distinct] <expression>)
```

Parameters

all

applies `count` to all values. `all` is the default.

distinct

eliminates duplicate values before `count` is applied. `distinct` is optional.

`<expression>`

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Example 1

Finds the number of different cities in which authors live:

```
select count(distinct city)
from authors
```

Example 2

Lists the types in the titles table, but eliminates the types that include only one book or none:

```
select type
from titles
group by type
having count(*) > 1
```

Usage

- When distinct is specified, count finds the number of unique non-null values. count can be used with all datatypes, including unichar, but cannot be used with text and image. Null values are ignored when counting.
- count(<column_name>) returns a value of 0 on empty tables, on columns that contain only null values, and on groups that contain only null values.
- count(*) finds the number of rows. count(*) does not take any arguments, and cannot be used with distinct. All rows are counted, regardless of the presence of null values.
- When tables are being joined, include count(*) in the select list to produce the count of the number of rows in the joined results. If the objective is to count the number of rows from one table that match criteria, use count(<column_name>).
- You can use count as an existence check in a subquery. For example:

  ```
  select * from tab where 0 <
      (select count(*) from tab2 where ...)
  ```

  However, because count counts all matching values, exists or in may return results faster. For example:

  ```
  select * from tab where exists
      (select * from tab2 where ...)
  ```

See also *Transact-SQL Users Guide*, and compute, group by and having clauses, select, where in *Reference Manual: Commands*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `count`.

Related Information

Expressions [page 468]

3.29 count_big

Returns the number of (distinct) non-null values, or the number of selected rows as a `bigint`.

Syntax

```
count_big([all | distinct] <expression>)
```

Parameters

all

applies `count_big` to all values. `all` is the default.

distinct

eliminates duplicate values before `count_big` is applied. `distinct` is optional.

<expression>

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Example 1

Finds the number of occurrences of `<name>` in `systypes`:

```
1> select count_big(name) from systypes
2> go
```

```
--------------------
42
```

Usage

- When `distinct` is specified, `count_big` finds the number of unique non-null values. Null values are ignored when counting.
- `count_big(<column_name>)` returns a value of 0 on empty tables, on columns that contain only null values, and on groups that contain only null values.
- `count_big(*)` finds the number of rows. `count_big(*)` does not take any arguments, and cannot be used with `distinct`. All rows are counted, regardless of the presence of null values.
- When tables are being joined, include `count_big(*)` in the select list to produce the count of the number of rows in the joined results. If the objective is to count the number of rows from one table that match criteria, use `count_big(<column_name>)`.
- You can use `count_big` as an existence check in a subquery. For example:

  ```
  select * from tab where 0 <
      (select count_big(*) from tab2 where ...)
  ```

  However, because `count_big` counts all matching values, `exists` or `in` may return results faster. For example:

  ```
  select * from tab where exists
      (select * from tab2 where ...)
  ```

See also `compute clause`, `group by and having clauses`, `select`, `where clause` commands in *Reference Manual: Commands*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `count_big`.

3.30 create_locator

Explicitly creates a locator for a specified LOB then returns the locator.

The locator created by `create_locator` is valid only for the duration of the transaction containing the query that used `create_locator`. If no transaction was started, then the locator is valid only until the query containing the `create_locator` completes execution

Syntax

```
create_locator (<datatype>, <lob_expression>)
```

Parameters

<datatype>

is the datatype of the LOB locator. Valid values are:

- `text_locator`
- `unitext_locator`
- `image_locator`

<lob_expression>

is a LOB value of datatype `text`, `unitext`, or `image`.

Examples

Example 1

Creates a text locator from a simple text expression:

```
select create_locator(text_locator, convert (text, "abc"))
```

Example 2

Creates a local variable `<@v>` of type `text_locator`, and then creates a locator using `<@v>` as a handle to the LOB stored in the `textcol` column of `my_table`.

```
declare @v text_locator
    select @v = create_locator(text_locator, textcol) from my_table where
id=10
```

Usage

See also `deallocate locator`, `truncate lob` in *Reference Manual: Commands*.

Permissions

Any user can execute `create_locator`.

Related Information

locator_literal [page 236]
locator_valid [page 237]
return_lob [page 315]

3.31 current_bigdatetime

Finds the current date as it exists on the server, and returns a `bigtime` value representing the current time with microsecond precision. The accuracy of the current time portion is limited by the accuracy of the system clock.

Syntax

```
current_bigdatetime()
```

Examples

Example 1

Find the current bigdatetime:

```
select current_bigdatetime()
------------------------------
Nov 25 1995 10:32:00.010101AM
```

Example 2

Find the current bigdatetime:

```
select datepart(us, current_bigdatetime())
------------------------------
010101
```

Usage

See also `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute `current_date`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datediff [page 142]
datepart [page 148]
datename [page 145]
current_bigtime [page 126]

3.32 current_bigtime

Finds the current date as it exists on the server, and returns a bigtime value representing the current time with microsecond precision. The accuracy of the current time portion is limited by the accuracy of the system clock.

Syntax

```
current_bigtime()
```

Examples

Example 1

Finds the current bigtime:

```
select current_bigtime()
------------------------------
10:32:00.010101AM
```

Example 2

Finds the current bigtime:

```
select datepart(us, current_bigtime())
------------------------------
01010
```

Usage

See also `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute `current_date`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datediff [page 142]
datepart [page 148]
datename [page 145]
current_bigdatetime [page 124]

3.33 current_date

Finds and returns the current date as it exists on the server.

Syntax

```
current_date()
```

Examples

Example 1

Identifies the current date with `datename`:

```
1> select datename(month, current_date())
2> go
```

```
------------------------------
August
```

Example 2

Identifies the current date with `datepart`:

```
1> select datepart(month, current_date())
2> go
```

```
-----------
8
(1 row affected)
```

Usage

See also `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute `current_date`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datename [page 145]
datepart [page 148]
getdate [page 186]

3.34 current_time

Finds and returns the current time as it exists on the server.

Syntax

```
current_time()
```

Examples

Example 1

Finds the current time:

```
1> select current_time()
2> go
```

```
------------------------
            12:29PM
(1 row affected)
```

Example 2

Use with `datename`:

```
1> select datename(minute, current_time())
2> go
```

```
------------------------------
45
(1 row affected)
```

Usage

See also `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Entry-level compliant.

Permissions

Any user can execute `current_time`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datename [page 145]
datepart [page 148]

getdate [page 186]

3.35 curunreservedpgs

Displays the number of free pages in the specified disk piece.

Syntax

```
curunreservedpgs (dbid, lstart, unreservedpgs)
```

Parameters

dbid

is the ID for a database. These are stored in the `db_id` column of `sysdatabases`.

lstart

is the starting logical page number for the disk piece for which you are retrieving data. `lstart` uses an `unsigned int` datatype.

unreservedpgs

is the default value `curunreservedpgs` returns if no in-memory data is available. `unreservedpgs` uses an `unsigned int` datatype.

Examples

Example 1

Returns the database name, device name, and the number of unreserved pages for each device fragment

If a database is open, `curunreservedpgs` takes the value from memory. If it is not in use, the value is taken from the third parameter you specify in `curunreservedpgs`. In this example, the value comes from the `unreservedpgs` column in the `sysusages` table.

```
select db_name(dbid) DBName, d.name DeviceName,
curunreservedpgs(dbid, lstart, unreservedpgs) UnreservedPgs
from sysusages u, sysdevices d
where u.vdevno=d.vdevno
and d.status &2 = 2
DBName                         DeviceName                     unreservedpgs
------------------------------ ------------------------------ -------------
master                          master                        1634
tempdb                          master                         423
model                           master                         423
```

```
pubs2                            master                          72
sybsystemdb                      master                         399
sybsystemprocs                   master                        6577
sybsyntax                        master                         359
```

Example 2

Displays the number of free pages on the segment for `dbid` starting on `sysusages.lstart`:

```
select curunreservedpgs (dbid, sysusages.lstart, 0)
```

Example 3

Selects the number of free pages from `imrsdb`:

```
select db_name(dbid) DBName, d.name DeviceName,
curunreservedpgs(dbid, lstart, unreservedpgs) unreservedpgs
from sysusages u, sysdevices d
where u.vdevno=d.vdevno
and d.status2 &16 = 16
DBName                         DeviceName                     unreservedpgs
------------------------------ ------------------------------ -------------
imrsdb                         imrslog                        3059
```

Usage

If a database is open, the value returned by `curunreservedpgs` is taken from memory. If it is not in use, the value is taken from the third parameter you specify in `curunreservedpgs`.

`curunreservedpgs` returns the number of free pages for `imrslog` on-disk row storage devices.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `curunreservedpgs`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`curunreservedpgs`	• *Roles* – Current active roles • *Keywords or options* – `CURUNRESERVEDPGS` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

db_id [page 156]
lct_admin [page 226]

3.36 data_pages

Returns the number of pages used by the specified table, index, or a specific partition. The result does not include pages used for internal structures.

Syntax

```
data_pages(<dbid>, <object_id> [, <indid> [, <ptnid>]])
```

Parameters

`<dbid>`

is the database ID of the database that contains the data pages.

`<object_id>`

is an object ID for a table, view, or other database object. These are stored in the `id` column of `sysobjects`.

<indid>

is the index ID of the target index.

<ptnid>

is the partition ID of the target partition.

Examples

Example 1

Returns the number of pages used by the object with an object ID of 31000114 in the specified database (including any indexes):

```
select data_pages(5, 31000114)
```

Example 2

(In cluster environments) Returns the number of pages used by the object in the data layer, regardless of whether or not a clustered index exists:

```
select data_pages(5, 31000114, 0)
```

Example 3

(In cluster environments) Returns the number of pages used by the object in the index layer for a clustered index. This does not include the pages used by the data layer:

```
select data_pages(5, 31000114, 1)
```

Example 4

Returns the number of pages used by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select data_pages(5, 31000114, 0, 2323242432)
```

Usage

In the case of an APL (all-pages lock) table, if a clustered index exists on the table, then passing in an `<indid>` of:

- 0 – reports the data pages.
- 1 – reports the index pages.

All erroneous conditions return a value of zero, such as when the `<object_id>` does not exist in the current database, or the targeted `<indid>` or `<ptnid>` cannot be found.

Instead of consuming resources, `data_pages` discards the descriptor for an object that is not already in the cache.

This function replaces `data_pgs` and `ptn_data_pgs` from versions of SAP ASE earlier than 15.0.

See also `sp_spaceused` in *Reference Manual: Procedures*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `data_pages`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`data_pages`	• *Roles* – Current active roles • *Keywords or options* – `DATA_PAGES` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

object_id [page 273]
row_count [page 329]

3.37 datachange

Measures the amount of change in the data distribution since `update statistics` last ran. Specifically, it measures the number of `inserts`, `updates`, and `deletes` that have occurred on the given object, partition, or column, and helps you determine if invoking `update statistics` would benefit the query plan.

Syntax

```
datachange(<object_name>, <partition_name>, <column_name>)
```

Parameters

<object_name>
is the object name in the current database.

<partition_name>
is the data partition name. This value can be null.

<column_name>
is the column name for which the `datachange` is requested. This value can be null.

Examples

Example 1

Provides the percentage change in the `au_id` column in the `author_ptn` partition:

```
select datachange("authors", "author_ptn", "au_id")
```

Example 2

Provides the percentage change in the `authors` table on the `au_ptn` partition. The null value for the <column_name> parameter indicates that this checks all columns that have histogram statistics and obtains the maximum datachange value from among them.

```
select datachange("authors", "au_ptn", null)
```

Permissions

Any user can execute `datachange`.

3.37.1 Usage for datachange

There are additional considerations for using `datachange`.

- The `datachange` function requires all three parameters.
- `datachange` is a measure of the `inserts`, `deletes` and `updates` but it does not count them individually. `datachange` counts an `update` as a `delete` and an `insert`, so each `update` contributes a count of 2 towards the `datachange` counter.
- The datachange built-in returns the datachange count as a percent of the number of rows, but it bases this percentage on the number of rows remaining, not the original number of rows. For example, if a table has five rows and one row is deleted, `datachange` reports a value of 25 % since the current row count is 4 and the `datachange` counter is 1.
- `datachange` is expressed as a percentage of the total number of rows in the table, or partition if you specify a partition. The percentage value can be greater than 100 percent because the number of changes to an object can be much greater than the number of rows in the table, particularly when the number of deletes and updates happening to a table is very high.
- The value that `datachange` displays is the in-memory value. This can differ from the on-disk value because the on-disk value gets updated by the housekeeper, when you run `sp_flushstats`, or when an object descriptor gets flushed.
- The `datachange` values is not reset when histograms are created for global indexes on partitioned tables.
- Instead of consuming resources, `datachange` discards the descriptor for an object that is not already in the cache.

`datachange` is reset or initialized to zero when:

- New columns are added, and their `datachange` value is initialized.
- New partitions are added, and their `datachange` value is initialized.
- Data-partition-specific histograms are created, deleted or updated. When this occurs, the `datachange` value of the histograms is reset for the corresponding column and partition.
- Data is truncated for a table or partition, and its `datachange` value is reset
- A table is repartitioned either directly or indirectly as a result of some other command, and the `datachange` value is reset for all the table's partitions and columns.
- A table is unpartitioned, and the `datachange` value is reset for all columns for the table.

3.37.1.1 Restrictions for datachange

`datachange` has the following restrictions:

- `datachange` statistics are not maintained on tables in system `tempdb`s, user-defined `tempdb`s, system tables, or proxy tables.
- `datachange` updates are non-transactional. If you roll back a transaction, the `datachange` values are not rolled back, and these values can become inaccurate.
- If memory allocation for column-level counters fails, the SAP ASE server tracks partition-level `datachange` values instead of column-level values.
- If the SAP ASE server does not maintain column-level `datachange` values, it then resets the partition-level `datachange` values whenever the `datachange` values for a column are reset.

3.38 datalength

Returns the actual length, in bytes, of the specified column or string.

Syntax

```
datalength(<expression>)
```

Parameters

<expression>

is a column name, variable, constant expression, or a combination of any of these that evaluates to a single value. `<expression>` can be of any datatype, an is usually a column name. If `<expression>` is a character constant, it must be enclosed in quotes.

Examples

Example 1

Finds the length of the `pub_name` column in the `publishers` table:

```
select Length = datalength(pub_name)
from publishers
```

```
Length
-----------
         13
         16
         20
```

Usage

- `datalength` returns the uncompressed length of a large object column, even when the column is compressed.
- For columns defined for the Unicode datatype, `datalength` returns the actual number of bytes of the data stored in each row. For example, this is what is returned if a unitext column `ut` contains row value U+0041U +0042U+d800dc00:

```
select datalength(ut) from unitable
```

```
-------------
8
```

- `datalength` finds the actual length of the data stored in each row. `datalength` is useful on `varchar`, `univarchar`, `varbinary`, `text`, and `image` datatypes, since these datatypes can store variable lengths (and do not store trailing blanks). When a `char` or `unichar` value is declared to allow nulls, the SAP ASE server stores it internally as `varchar` or `univarchar`. For all other datatypes, `datalength` reports the defined length.
- `datalength` accepts the `text_locator`, `unitext_locator`, and `image_locator` LOB datatypes.
- `datalength` of any NULL data returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `datalength`.

Related Information

char_length [page 93]
col_length [page 99]

3.39 dateadd

Adds an interval to a specified date or time.

Syntax

```
dateadd(<date_part>, <integer>, {<date> | <time> | <bigtime> | <datetime>, |
<bigdatetime>})
```

Parameters

<date_part>

is a date part or abbreviation. For a list of the date parts and abbreviations recognized by the SAP ASE server, see *Transact-SQL Users Guide*.

<numeric>

is an integer expression.

<date expression>

is an expression of type `datetime`, `smalldatetime`, `bigdatetime`, `bigtime`, `date`, `time`, or a character string in a `datetime` format.

Examples

Example 1

Adds one million microseconds to a `bigtime`:

```
declare @a bigtime
select @a = "14:20:00.010101"
select dateadd(us, 1000000, @a)
```

```
------------------------------
2:20:01.010101PM
```

Example 2

Adds 25 hours to a `bigdatetime` and the day increments:

```
declare @a bigdatetime
select @a = "apr 12, 0001 14:20:00 "
select dateadd(hh, 25, @a)
------------------------------
Apr 13 0001   2:20PM
```

Example 3

Displays the new publication dates when the publication dates of all the books in the `titles` table slip by 21 days:

```
select newpubdate = dateadd(day, 21, pubdate)
from titles
```

Example 4

Adds one day to a date:

```
declare @a date
select @a = "apr 12, 9999"
select dateadd(dd, 1, @a)
--------------------------
Apr 13 9999
```

Example 5

Subtracts five minutes to a time:

```
select dateadd(mi, -5, convert(time, "14:20:00"))
--------------------------
2:15PM
```

Example 6

Adds one day to a time and the time remains the same:

```
declare @a time
select @a = "14:20:00"
select dateadd(dd, 1, @a)
--------------------------
2:20PM
```

Example 7

Adds higher values resulting in the values rolling over to the next significant field, even though there are limits for each `date_part`, as with `datetime` values:

```
--Add 24 hours to a datetime
select dateadd(hh, 24, "4/1/1979")
--------------------------
Apr  2 1979 12:00AM
--Add 24 hours to a date
select dateadd(hh, 24, "4/1/1979")
-------------------------
Apr  2 1979
```

Usage

- `dateadd`, a date function, adds an interval to a specified date. For information about dates, see *Transact-SQL Users Guide*.
- `dateadd` takes three arguments: the date part, a number, and a date. The result is a `datetime` value equal to the date plus the number of date parts. If the last argument is a `bigtime`, and the datepart is a year, month, or day, the result is the original `bigtime` argument.
  If the date argument is a `smalldatetime` value, the result is also a `smalldatetime`. You can use `dateadd` to add seconds or milliseconds to a `smalldatetime`, but such an addition is meaningful only if the result date returned by `dateadd` changes by at least one minute.
- If a string is given as an argument in place of the chronological value the server interprets it as a `datetime` value regardless of its apparent precision. This default behavior may be changed by setting the configuration parameter `builtin date strings` or the set option `builtin_date_strings`. When these options are set, the server interprets strings given to chronological builtins as bigdatetimes. See the *System Administration Guide* for more information.
- When a `datepart` of microseconds is given to this built-in string, values are always interpreted as `bigdatetime`.
- Use the `datetime` datatype only for dates after January 1, 1753. `datetime` values must be enclosed in single or double quotes. Use the `date` datatype for dates from January 1, 0001 to 9999. `date` must be enclosed in single or double quotes.Use `char`, `nchar`, `varchar`, or `nvarchar` for earlier dates. The SAP ASE server recognizes a wide variety of date formats.

The SAP ASE server automatically converts between character and `datetime` values when necessary (for example, when you compare a character value to a `datetime` value).

- Using the date part `weekday` or `dw` with `dateadd` is not logical, and produces spurious results. Use `day` or `dd` instead.

Table 14: date_part Recognized Abbreviations

Date part	Abbreviation	Values
Year	yy	1753 – 9999 (`datetime`) 1900 – 2079 (`smalldatetime`) 0001 – 9999 (`date`)
Quarter	qq	1 – 4
Month	mm	1 – 12
Week	wk	1054
Day	dd	1 – 7
dayofyear	dy	1 – 366
Weekday	dw	1 – 7
Hour	hh	0 – 23
Minute	mi	0 – 59
Second	ss	0 – 59
millisecond	ms	0 – 999
microsecond	us	0 – 999999

See also:

- *System Administration Guide*, *Transact-SQL Users Guide*
- `select`, `where` clause in *Reference Manual: Commands*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `dateadd`.

Related Information

User-Defined Datatypes [page 56]
Date and Time Datatypes [page 19]
datediff [page 142]
datename [page 145]
datepart [page 148]
getdate [page 186]

3.40 datediff

Calculates the number of date parts between two specified dates or times.

Syntax

```
datediff(<datepart>, {<date, date >| <time>, <time> | <bigtime>, <bigtime> |
<datetime>, <datetime> | <bigdatetime>, <bigdatetime>}])
```

Parameters

<datepart>

is a date part or abbreviation. For a list of the date parts and abbreviations recognized by the SAP ASE server, see *Transact-SQL Users Guide*.

<date expression1>

is an expression of type `datetime`, `smalldatetime, bigdatetime, bigtime`, `date`, `time`, or a character string in a `datetime` format.

<date expression2>

is an expression of type `datetime`, `smalldatetime, bigdatetime, bigtime`, `date`, `time`, or a character string in a `datetime` format.

Examples

Example 1

Returns the number of microseconds between two `bigdatetimes`:

```
declare @a bigdatetime
```

```
declare @b bigdatetime
select @a = "apr 1, 1999  00:00:00.000000"
select @b = "apr 2, 1999  00:00:00.000000"
select datediff(us, @a, @b)
--------------------------
86400000000
```

Example 2

Returns the overflow size of milliseconds return value:

```
select datediff(ms, convert(bigdatetime, "4/1/1753"), convert(bigdatetime,
"4/1/9999"))
Msg 535, Level 16, State 0:
Line 2:
Difference of two datetime fields caused overflow at runtime.
Command has been aborted
```

Example 3

Finds the number of days that have elapsed between `pubdate` and the current date (obtained with the `getdate` function):

```
select newdate = datediff(day, pubdate, getdate())
    from titles
```

Example 4

Finds the number of hours between two times:

```
declare @a time
declare @b time
select @a = "20:43:22"
select @b = "10:43:22"
select datediff(hh, @a, @b)
-----------
   -10
```

Example 5

Finds the number of hours between two dates:

```
declare @a date
declare @b date
select @a = "apr 1, 1999"
select @b = "apr 2, 1999"
select datediff(hh, @a, @b)
-----------
     24
```

Example 6

Finds the number of days between two times:

```
declare @a time
declare @b time
select @a = "20:43:22"
select @b = "10:43:22"
select datediff(dd, @a, @b)
-----------
     0
```

Example 7

Returns the overflow size of milliseconds return value:

```
select datediff(ms, convert(date, "4/1/1753"), convert(date, "4/1/9999"))
Msg 535, Level 16, State 0:
Line 2:
Difference of two datetime fields caused overflow at runtime.
Command has been aborted
```

Usage

- `datediff` takes three arguments. The first is a datepart. The second and third are chronological values. For `dates`, `times`, `datetimes` and `bigdatetimes`, the result is a signed integer value equal to date2 and date1, in date parts.
    - If the second or third argument is a date, and the datepart is an hour, minute, second, millisecond, or microsecond, the dates are treated as midnight.
    - If the second or third argument is a time, and the datepart is a year, month, or day, then zero is returned.
    - `datediff` results are truncated, not rounded when the result is not an even multiple of the datepart.
    - For the smaller time units, there are overflow values and the function returns an overflow error if you exceed these limits.
- `datediff` produces results of datatype `int`, and causes errors if the result is greater than 2,147,483,647. For milliseconds, this is approximately 24 days, 20:31.846 hours. For seconds, this is 68 years, 19 days, 3:14:07 hours.
- `datediff` results are always truncated, not rounded, when the result is not an even multiple of the date part. For example, using `hour` as the date part, the difference between “4:00AM” and “5:50AM” is 1. When you use `day` as the date part, `datediff` counts the number of midnights between the two times specified. For example, the difference between January 1, 1992, 23:00 and January 2, 1992, 01:00 is 1; the difference between January 1, 1992 00:00 and January 1, 1992, 23:59 is 0.
- The `month` datepart counts the number of first-of-the-months between two dates. For example, the difference between January 25 and February 2 is 1; the difference between January 1 and January 31 is 0.
- When you use the date part `week` with `datediff`, you see the number of Sundays between the two dates, including the second date but not the first. For example, the number of weeks between Sunday, January 4 and Sunday, January 11 is 1.
- If you use `smalldatetime` values, they are converted to `datetime` values internally for the calculation. Seconds and milliseconds in `smalldatetime` values are automatically set to 0 for the purpose of the difference calculation.
- If the second or third argument is a date, and the `datepart` is hour, minute, second, or millisecond, the dates are treated as midnight.
- If the second or third argument is a time, and the `datepart` is year, month, or day, then 0 is returned.
- `datediff` results are truncated, not rounded, when the result is not an even multiple of the date part.
- If a string is given as an argument in place of the chronological value the server interprets it as a `datetime` value regardless of its apparent precision. This default behavior may be changed by setting the configuration parameter `builtin date strings` or the set option `builtin_date_strings`. When these options are set, the server interprets strings given to chronological builtins as `bigdatetimes`. See the *System Administration Guide* for more information.

- When a `datepart` of microseconds is given to this built-in, string values are always interpreted as `bigdatetime`.
- For the smaller `time` units, there are overflow values, and the function returns an overflow error if you exceed these limits:
  - Microseconds:approx 3 days
  - Milliseconds: approx 24 days
  - Seconds: approx 68 years
  - Minutes: approx 4083 years
  - Others: No overflow limit

See also *System Administration Guide*, *Transact-SQL Users Guide*, and `select` and `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `datediff`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datename [page 145]
datepart [page 148]
getdate [page 186]

3.41 datename

Returns the specified `datepart` of the specified `date` or `time` as a character string.

Syntax

```
datename (<datepart> {<date> | <time> | <bigtime> | <datetime> | <bigdatetime>})
```

Parameters

<datepart>

is a date part or abbreviation. For a list of the date parts and abbreviations recognized by the SAP ASE server, see *Transact-SQL Users Guide*.

<date_expression>

is an expression of type `datetime`, `smalldatetime`, bigdatetime, bigtime, time or a character string in a `datetime` format.

Examples

Example 1

Finds the month name of a `bigdatetime`:

```
declare @a bigdatetime
select @a = "apr 12, 0001 00:00:00.010101"
select datename(mm, @a)
------------------------------
April
```

Example 2

Assumes a current date of November 20, 2000:

```
select datename(month, getdate())
```

```
November
```

Example 3

Finds the month name of a date:

```
declare @a date
select @a = "apr 12, 0001"
select datename(mm, @a)
------------------------------
    April
```

Example 4

Finds the seconds of a time:

```
declare @a time
select @a = "20:43:22"
select datename(ss, @a)
------------------------------
    22
```

Usage

- `datename`, a date function, returns the name of the specified part (such as the month "June") of a `datetime` or `smalldatetime` value, as a character string. If the result is numeric, such as "23" for the day, it is still returned as a character string.
- Takes a `date`, `time`, `bigdatetime`, `bigtime`, `datetime`, or `smalldatetime` value as its second argument
- The date part `weekday` or `dw` returns the day of the week (Sunday, Monday, and so on) when used with `datename`.
- Since `smalldatetime` is accurate only to the minute, when a `smalldatetime` value is used with `datename`, seconds and milliseconds are always 0.

See also `select`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `datename`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datename [page 145]
datepart [page 148]
getdate [page 186]

3.42 datepart

Returns the integer value of the specified part of a date expression

Syntax

```
datepart(<date_part> {<date> | <time> | <datetime> | <bigtime> | <bigdatetime>}))
```

Parameters

<date_part>

is a date part. The date parts, their abbreviations recognized by `datepart`, and their acceptable values are.

Date Part	Abbreviation	Values
`year`	`yy`	1753 – 9999 (2079 for `smalldatetime`). 0001 to 9999 for `date`
`quarter`	`qq`	1 – 4
`month`	`mm`	1 – 12
`week`	`wk`	1 – 54
`day`	`dd`	1 – 31
`dayofyear`	`dy`	1 – 366
`weekday`	`dw`	1 – 7 (Sun. – Sat.)
`hour`	`hh`	0 – 23
`minute`	`mi`	0 – 59
`second`	`ss`	0 – 59
`millisecond`	`ms`	0 – 999
`microsecond`	`us`	0 - 999999

Date Part	Abbreviation	Values
calweekofyear	cwk	1 – 53
calyearofweek	cyr	1753 – 9999 (2079 for smalldatetime). 0001 to 9999 for date
caldayofweek	cdw	1 – 7

When you enter a year as two digits (<yy>):

- Numbers less than 50 are interpreted as 20<yy>. For example, 01 is 2001, 32 is 2032, and 49 is 2049.
- Numbers equal to or greater than 50 are interpreted as 19<yy>. For example, 50 is 1950, 74 is 1974, and 99 is 1999.
  For datetime, smalldatetime, and time types milliseconds can be preceded by either a colon or a period. If preceded by a colon, the number means thousandths of a second. If preceded by a period, a single digit means tenths of a second, two digits mean hundredths of a second, and three digits mean thousandths of a second. For example, “12:30:20:1” means twenty and one-thousandth of a second past 12:30; “12:30:20.1” means twenty and one-tenth of a second past 12:30. Microseconds must be preceded by a decimal point and represent fractions of a second.

<date_expression>

is an expression of type datetime, smalldatetime, bigdatetime, bigtime, date, time, or a character string in a datetime format.

Examples

Example 1

Finds the microseconds of a bigdatetime:

```
declare @a bigdatetime
select @a = "apr 12, 0001 12:00:00.000001"
select datepart(us, @a)
-----------
1
```

Example 2

Assumes a current date of November 25, 1995:

```
select datepart(month, getdate())
-----------
          11
```

Example 3

Returns the year of publication from traditional cookbooks:

```
select datepart(year, pubdate) from titles
    where type = "trad_cook"
 -----------
        1990
        1985
        1987
```

Example 4

Returns the calendar week of January 1, 1993:

```
select datepart(cwk,'1993/01/01')
-----------
          53
```

Example 5

Returns the calendar year of the week January 1, 1993:

```
select datepart(cyr,’1993/01/01’)
-----------
        1992
```

Example 6

Returns the day of the year for January 1, 1993:

```
select datepart(cdw,’1993/01/01’)
-----------
           5
```

Example 7

Find the hours in a time:

```
declare @a time
select @a = "20:43:22"
select datepart(hh, @a)
-----------
    20
```

Example 8

Returns 0 (zero) if an hour, minute, or second portion is requested from a `date` using `datename` or `datepart` the result is the default time; Returns the default date of Jan 1 1990 if month, day, or year is requested from a `time` using `datename` or `datepart`:

```
--Find the hours in a date
declare @a date
select @a = "apr 12, 0001"
select datepart(hh, @a)
-----------
    0
--Find the month of a time
declare @a time
select @a = "20:43:22"
select datename(mm, @a)
------------------------------
January
```

When you give a null value to a `datetime` function as a parameter, NULL is returned.

Usage

- Returns the specified `datepart` in the first argument of the specified `date,` and the second argument, as an integer. Takes a `date`, `time`, `datetime`, `bigdatetime`, `bigtime`, or `smalldatetime` value as its second argument. If the `datepart` is hour, minute, second, millisecond, or microsecond, the result is 0.
- `datepart` returns a number that follows ISO standard 8601, which defines the first day of the week and the first week of the year. Depending on whether the `datepart` function includes a value for `calweekofyear`, `calyearofweek`, or `caldayorweek`, the date returned may be different for the same unit of time. For example, if the SAP ASE server is configured to use U.S. English as the default language, the following returns 1988:

  ```
  datepart(cyr, "1/1/1989")
  ```

  However, the following returns 1989:

  ```
  datepart(yy, "1/1/1989)
  ```

  This disparity occurs because the ISO standard defines the first week of the year as the first week that includes a Thursday *and* begins with Monday.
  For servers using U.S. English as their default language, the first day of the week is Sunday, and the first week of the year is the week that contains January 4th.
- The date part `weekday` or `dw` returns the corresponding number when used with `datepart`. The numbers that correspond to the names of weekdays depend on the `datefirst` setting. Some language defaults (including us_english) produce Sunday=1, Monday=2, and so on; others produce Monday=1, Tuesday=2, and so on.You can change the default behavior on a per-session basis with `set datefirst`. See the `datefirst` option of the `set` command for more information.
- `calweekofyear`, which can be abbreviated as `cwk`, returns the ordinal position of the week within the year. `calyearofweek`, which can be abbreviated as `cyr`, returns the year in which the week begins. `caldayofweek`, which can abbreviated as `cdw`, returns the ordinal position of the day within the week. You cannot use `calweekofyear`, `calyearofweek`, and `caldayofweek` as date parts for `dateadd`, `datediff`, and `datename`.
- Since `datetime` and `time` are only accurate to 1/300th of a second, when these datatypes are used with `datepart`, milliseconds are rounded to the nearest 1/300th second.
- Since `smalldatetime` is accurate only to the minute, when a `smalldatetime` value is used with `datepart`, seconds and milliseconds are always 0.
- The values of the weekday date part are affected by the language setting.

See also `select`, `where clause` in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `datepart`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datediff [page 142]
datename [page 145]
getdate [page 186]

3.43 day

Returns an integer that represents the day in the `datepart` of a specified date.

Syntax

```
day(<date_expression>)
```

Parameters

`<date_expression>`
is an expression of type `datetime`, `smalldatetime`, `date`, or a character string in a `datetime` format.

Examples

Example 1

Returns the integer 02:

```
select day("11/02/03")
----------
2
```

Usage

day(<date_expression>) is equivalent to datepart(dd,<date_expression>).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute day.

Related Information

System and User-Defined Datatypes [page 13]
datepart [page 148]
month [page 260]
year [page 453]

3.44 db_attr

Returns the durability, dml_logging, and template settings, and compression level for the specified database.

Syntax

```
db_attr('<database_name>' | <database_ID> | NULL, 'attribute')
```

Parameters

<database_name>

name of the database.

<database_ID>

ID of the database

NULL

if included, `db_attr` reports on the current database

attribute

is one of:

help	display `db_attr` usage information.
durability	returns durability of the given database: `full`, `at_shutdown`, or `no_recovery`.
dml_logging	returns the value for data manipulation language (DML) logging for specified database: `full` or `minimal`.
template	returns the name of the template database used for the specified database. If no database was used as a template to create the database, returns NULL.
inrow_lob_length	Returns the in-row storage length, in bytes, for LOBs.
lob_compression	Returns the compression level of the LOB.
index_compression	Returns `page` if page-level index compression is enabled; returns `none` otherwise.
compression	returns the compression level for the database.
list_dump_fs	identifies the features to be included in future dumps, including whether the dump includes in-memory row storage-enabled tables.You may not be able to load a database or transaction dumps that are generated in a later version into an earlier version. Captured in database and transaction dumps are the features that are in use in a database, and objects that are created using newer features. Before generating such dumps, use `list_dump_fs` to identify the features to be included in future dumps.
get_dump_fs	Returns a hexadecimal bitmap of features used in the database.

Examples

Example 1

Returns the syntax for `db_attr`:

```
select db_attr(0, "help")
```

```
------------------------------------------------------
Usage: db_attr('dbname' | dbid | NULL, 'attribute')
List of options in attributes table:
         0 : help
```

```
          1 : durability
          2 : dml_logging
          3 : template
          4 : inrow_lob_length
          5 : lob_compression
          6 : index_compression
          7 : compression
          8 : list_dump_fs

          9 : get_dump_fs
```

Example 2

Selects the name, `durability` setting, `dml_logging` setting and template used from `sysdatabases`:

```
select  name = convert(char(20), name),
durability = convert(char(15), db_attr(name,     "durability")),
     dml_logging = convert(char(15), db_attr(dbid,     "dml_logging")),
     template = convert(char(15), db_attr(dbid, "template"))
from sysdatabases
```

```
name               durability         dml_logging                  template
----------------    ----------------    ------------------------    --------
master               full               full                         NULL
model                full               full                         NULL
tempdb               no_recovery        full                         NULL
sybsystemdb          full               full                         NULL
sybsystemprocs       full               full                         NULL
repro                full               full                         NULL
imdb                 no_recovery        full                         db1
db                   full               full                         NULL
at_shutdown_db       at_shutdown        full                         NULL
db1                  full               full                         NULL
dml                  at_shutdown        minimal                      NULL
```

Example 3

Runs `db_attr` against the `DoesNotExist` database, which does not exist:

```
select db_attr("DoesNotExist", "durability")
```

```
-----------------------------------------------------
NULL
```

Example 4

Runs `db_attr` against a database with an ID of 12345, which does not exist:

```
select db_attr(12345, "durability")
```

```
-----------------------------------------------------
NULL
```

Example 5

Runs `db_attr` against an attribute that does not exist:

```
select db_attr(1, "Cmd Does Not Exist")
```

```
-----------------------------------------------------
NULL
```

Example 6

Returns the various features that are in use for the `<pubs2>` database, and the target server version, which can safely load such dumps. The last line in **bold** indicates that the optimized data load with parallel index updates was executed in this database, and is contained in the transaction log.

```
1> select db_attr('pubs2', 'list_dump_fs')
2> go
Features found active in the database that will be recorded in a subsequent dump
header:
ID= 3: 15.7.0.007: Database has compressed tables at version 1
ID= 4: 15.7.0.000: Database has system catalog changes made in 15.7 GA
ID= 7: 15.7.0.020: Database has system catalog changes made in 15.7 ESD#02
ID=11: 15.7.0.100: Database has the Sysdams catalog
ID=13: 15.7.0.100: Database has indexes sorted using RID value comparison
ID=14: 15.7.0.110: Log has transactions generating parallel index operations
```

Future dumps of `<pubs2>` will be loadable only in the target server version indicated. To load the dumps of such a database in a target version that is earlier than the version listed, downgrade the database to remove the footprint of newer features.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `db_attr`.

3.45 db_id

Displays the ID number of the specified database.

Syntax

```
db_id(<database_name>)
```

Parameters

`<database_name>`

is the name of a database. <database_name> must be a character expression. If it is a constant expression, it must be enclosed in quotes.

Examples

Example 1

Returns the ID number of `sybsystemprocs`:

```
select db_id("sybsystemprocs")
```

```
------
4
```

Usage

If you do not specify a <database_name>, `db_id` returns the ID number of the current database.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `db_id`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`db_id`	• *Roles* – Current active roles • *Keywords or options* – `DB_ID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

Example of `extrainfo` after executing `db_id`:

```
sa_role sso_role oper_role sybase_ts_role mon_role; DB_ID; ; ;
     ; ; sa/ase;
```

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

db_name [page 160]
object_id [page 273]

3.46 db_instanceid

(Cluster environments only) Returns the ID of the owning instance of a specified local temporary database. Returns NULL if the specified database is a global temporary database or a nontemporary database.

Syntax

```
db_instanceid(<database_id>)
db_instanceid(<database_name>)
```

Parameters

<database_id>

ID of the database.

<database_name>

name of the database

Examples

Example 1

Returns the owning instance for database ID 5

```
select db_instanceid(5)
```

Usage

Access to a local temporary database is allowed only from the owning instance. `db_instanceid` determines whether the specified database is a local temporary database, and the owning instance for the local temporary database.You can then connect to the owning instance and access its local temporary database.

You must include an parameter with `db_instanceid`.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can run `sdc_intempdbconfig`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`db_instanceid`	• *Roles* – Current active roles • *Keywords or options* – `DB_INSTANCEID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.47 db_name

Displays the name of the database with the specified ID number.

Syntax

```
db_name([<database_id>])
```

Parameters

`<database_id>`

is a numeric expression for the database ID (stored in `sysdatabases.dbid`).

Examples

Example 1

Returns the name of the current database:

```
select db_name()
```

Example 2

Returns the name of database ID 4:

```
select db_name(4)
```

```
------------------------------
sybsystemprocs
```

Usage

If you do not specify <database_id>, db_name returns the name of the current database.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute db_name.

Auditing

You can enable func_dbaccess auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_dbaccess	86	db_name	• *Roles* – Current active roles • *Keywords or options* – DB_NAME • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

col_name [page 101]
db_id [page 156]
object_name [page 275]

3.48 db_recovery_status

(Cluster environments only) Returns the recovery status of the specified database. Returns the recovery status of the current database if you do not include a value for <database_ID> or <database_name>.

Syntax

```
db_recovery_status([<database_ID> | <database_name>])
```

Parameters

<database_ID>
is the ID of the database whose recovery status you are requesting.

<database_name>
is the name of the database whose recovery status you are requesting.

Examples

Example 1

Returns the recovery status of the current database:

```
select db_recovery_status()
```

Example 2

Returns the recovery status of the database with named `test`:

```
select db_recovery_status("test")
```

Example 3

Returns the recovery status of a database with a database id of 8:

```
select db_recovery_status(8)
```

Usage

A return value of:

- 0 – indicates the database is not in node-failover recovery.
- 1 – indicates the database is in node-failover recovery.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `func_dbaccess`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`db_recovery_status`	• *Roles* – Current active roles • *Keywords or options* – `DB_RECOVERY_STATUS` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.49 dbencryption_status

Reports database encryption/decryption status and progress.

Syntax

```
dbencryption_status ('status'|'progress', <dbid>[,
    lstart])
```

Parameters

status

returns the encryption status of the database you specify in `<dbid>`. You must supply `<dbid>` to use `status`. The returned values are:

- 0 – indicates a normal database.
- 1 – indicates that a database is encrypted.
- 2 – indicates that a database is being encrypted.
- 3 – indicates that a database is partially encrypted (but not in the process of being encrypted).
- 4 – indicates that a database is being decrypted.
- 5 – indicates that a database is partially decrypted (but not in the process of being decrypted).

progress

reports on the percentage of encryption/decryption progress. If you supply:

- `<dbid>` – `progress` returns the percentage of processed pages in the whole database.
- Both `<dbid>` and `<lstart>` (the logical start page) – `progress` returns the percentage of processed pages in the fragment indicated by `<lstart>`.

<dbid>

is the database ID.

Usage

When you use "`progress`" and SAP ASE finds no progress information, such as when there is no encryption or decryption operation occurring, or if the encryption/decryption process is finished, SAP ASE returns "`-1`."

Auditing

You can enable func_dbaccess auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_dbaccess	86	dbencryption_status	• *Roles* – Current active roles • *Keywords or options* – DBENCRYPTION_STATUS • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.50 defrag_status

Returns metrics of any defragmentation operation that is started or ongoing on the named object or partition.

Syntax

```
defrag_status( <dbid>, <objid> [ , <ptnid> | -1 [, "<tag>" ] ]
```

Parameters

<dbid>

is the ID of the target database.

<objid>

is the ID of the target object.

<ptnid>

is the ID of the partition or enter -1.

-1 refers to all the partitions in the table. If <ptnid> is unspecified, -1 is the default value.

In case of invoking the built-in with four parameters, the third parameter 'ptnid' cannot be skipped. So, it has to be specified accordingly.

<tag>

is one of:

- `frag index` or `fragmentation index`– the fragmentation index is the number of times the size of the object is larger compared to the size of the same if it was completely defragmented.
  This index can be any number greater than or equal to zero. The lower the index, the less fragmented the table or partition is. The higher the index, the more fragmented the object is and is more likely to free up space with defragmentation. For example, a value of 0.2 , means the table occupies 20% more space than what it would be if the data were fully defragmented. This index can be any number > 0. For example, 1 means the table is occupying 100% more space than what a fully defragmented version of the data would occupy.
- `pct defrag` or `pct defragmented` – is the percentage of pages defragmented.
- `pages defrag` or `pages defragmented` – the number of pages defragmented.
- `pages gen` or `pages generated`– the number of new pages generated.
- `pages tbd` or `pages to be defragmented`– the number of pages still left to be processed and defragmented.
- `last run` – the start time of the most recent invocation of this command.
- `executing` – boolean, whether the command is executing currently.
- `elapsed mins` – the number of minutes elapsed since the start of the most recent invocation of this command. This value is non-zero when `executing` is 1, and is zero otherwise.

Examples

Example 1

executes `defrag_status` on the table mymsgs:

```
select defrag_status(db_id(), object_id('mymsgs'))
```

If defragmentation has not yet been performed, the output is:

```
------------------------------------------------------------------
frag index=0.20, pct defrag=0, pages defrag=0, pages gen=0,
pages tbd=1174, last run=, executing=0, elapsed mins=0
```

If defragmentation has been performed, the output is:

```
-----------------------------------------------------------------------
frag index=0.07, pct defrag=100, pages defrag=1167, pages gen=1072,
pages tbd=0, last run=Oct  9 2012  2:27:11:446PM, executing=0,
elapsed mins=0
```

Example 2

executes `defrag_status` on the data partition p1:

```
select defrag_status(db_id(), object_id('t1'), partition_id('t1', 'p1'))
```

If defragmentation has not yet been performed, the output is:

```
----------------------------------------------------------------------
frag index=0.75, pct defrag=0, pages defrag=0, pages gen=0, pages tbd=67,
last run=, executing=0, elapsed mins=0
```

If defragmentation is executed, the output is:

```
-----------------------------------------------------------------------
frag index=0.00, pct defrag=100, pages defrag=61, pages gen=32,
pages tbd=0, last run=Oct  9 2012  2:44:53:830PM, executing=0,
elapsed mins=0
```

If partial defragmentation is executed, the output is:

```
----------------------------------------------------------------------
frag index=0.02, pct defrag=41, pages defrag=135, pages gen=144,
pages tbd=190, last run=Oct 9 2012  3:17:56:070PM, executing=0,
elapsed mins=0
```

While defragmentation is in progress, the output is:

```
--------------------------------------------------------------------
frag index=0.90, pct defrag=10, pages defrag=40, pages gen=24,
pages tbd=360, last run=Oct 9 2012  3:01:01:233PM, executing=1,
elapsed mins=1
```

Example 3

executes the `pct defrag` parameter:

```
select defrag_status(db_id(), object_id('t1'), -1, 'pct defrag')
```

The output displays the percentage of the pages that have been defragmented.

```
-------------------------------------------------------------------
8
```

When 1 row is affected:

```
select defrag_status(db_id(), object_id('t1'), partition_id('t1', 'p1'),
   'pct defrag')
```

The output is:

```
--------------------------------------------------------------------
41
```

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`defrag_status`	• *Roles* – Current active roles • *Keywords or options* – `DEFRAG_STATUS` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.51 degrees

Converts the size of the angle from degrees to radians.

Syntax

```
degrees(<numeric>)
```

Parameters

`<numeric>`

is a number, in radians, to convert to degrees.

Examples

Example 1

Returns a radian of 45 degrees:

```
select degrees(45)
```

```
-----------
       2578
```

Usage

`degrees`, a mathematical function, converts radians to degrees. Results are of the same type as the numeric expression.

For numeric and decimal expressions, the results have an internal precision of 77 and a scale equal to that of the expression.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `degrees`.

Related Information

radians [page 302]

3.52 derived_stat

Returns derived statistics for the specified object and index.

Syntax

```
derived_stat("<object_name>" | <object_id>,
    <index_name> | <index_id>,
    ["<partition_name>" | <partition_id>,]
    "<statistic>")
```

Parameters

<object_name>

is the name of the object you are interested in. If you do not specify a fully qualified object name, `derived_stat` searches the current database.

<object_id>

is an alternative to `<object_name>`, and is the object ID of the object you are interested in. `<object_id>` must be in the current database

<index_name>

is the name of the index, belonging to the specified object that you are interested in.

<index_id>

is an alternative to `<index_name>`, and is the index ID of the specified object that you are interested in.

<partition_name>

is the name of the partition, belonging to the specific partition that you are interested in. `<partition_name>` is optional. When you use `<partition_name>` or `<partition_id>`, the SAP ASE server returns statistics for the target partition, instead of for the entire object.

<partition_id>

is an alternative to `<partition_name>`, and is the partition ID of the specified object that you are interested in. `<partition_id>` is optional.

"<statistic>"

the derived statistic to be returned. Available statistics are:

- `data page cluster ratio` or `dpcr` – the data page cluster ratio for the object/index pair
- `index page cluster ratio` or `ipcr` – the index page cluster ratio for the object/index pair

- `data row cluster ratio` or `drcr` – the data row cluster ratio for the object/index pair
- `large io efficiency` or `lgio` – the large I/O efficiency for the object/index pair
- `space utilization` or `sput` – the space utilization for the object/index pair

Examples

Example 1

Selects the space utilization for the `titleidind` index of the `titles` table:

```
select derived_stat("titles", "titleidind", "space utilization")
```

Example 2

Selects the data page cluster ratio for index ID 2 of the `titles` table. Note that you can use either `"dpcr"` or `"data page cluster ratio"`:

```
select derived_stat("titles", 2, "dpcr")
```

Example 3

Statistics are reported for the entire object, as neither the partition ID nor name is not specified:

```
1> select derived_stat(object_id("t1"), 2, "drcr")
2> go
```

```
---------------------------
                   0.576923
```

Example 4

Reports the statistic for the partition `t1_928003396`:

```
1> select derived_stat(object_id("t1"), 0, "t1_928003306", "drcr")
2> go
```

```
 ---------------------------
                   1.000000
(1 row affected)
```

Example 5

Selects derived statistics for all indexes of a given table, using data from `syspartitions`:

```
select convert(varchar(30), name) as name, indid,
    convert(decimal(5, 3), derived_stat(id, indid, 'sput')) as 'sput',
    convert(decimal(5, 3), derived_stat(id, indid, 'dpcr')) as 'dpcr',
    convert(decimal(5, 3), derived_stat(id, indid, 'drcr')) as 'drcr',
    convert(decimal(5, 3), derived_stat(id, indid, 'lgio')) as 'lgio'
from syspartitions where id = object_id('titles')
go
```

```
 name                           indid  sput     dpcr     drcr     lgio
 ------------------------------ ------ -------- -------- -------- --------
```

```
 titleidind_2133579608              1    0.895    1.000    1.000    1.000
 titleind_2133579608                2    0.000    1.000    0.688    1.000
(2 rows affected)
```

Example 6

Selects derived statistics for all indexes and partitions of a partitioned table. Here, `mymsgs_rr4` is a round-robin partitioned table that is created with a global index and a local index.

```
1> select * into mymsgs_rr4 partition by roundrobin 4 lock datarows
2> from master..sysmessages
2> go
```

```
(7597 rows affected)
```

```
1> create clustered index mymsgs_rr4_clustind on mymsgs_rr4(error, severity)
2> go
1> create index mymsgs_rr4_ncind1 on mymsgs_rr4(severity)
2> go
1> create index mymsgs_rr4_ncind2 on mymsgs_rr4(langid, dlevel) local index
2> go
2> update statistics mymsgs_rr4
1>
2> select convert(varchar(10), object_name(id)) as name,
3>      (select convert(varchar(20), i.name) from sysindexes i
4>       where i.id = p.id and i.indid = p.indid),
5> convert(varchar(30), name) as ptnname, indid,
6> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'sput')) as
'sput',
7> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'dpcr')) as
'dpcr',
8> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'drcr')) as
'drcr',
9> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'lgio')) as
'lgio'
10> from syspartitions p
11> where id = object_id('mymsgs_rr4')
```

```

name                         ptnname                    indid sput dpcr drcr l
gio
---------------------------- -------------------------- ----- ---- ---- ----
----
mymsgs_rr4 mymsgs_rr4         mymsgs_rr4_786098810         0 0.90 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4         mymsgs_rr4_802098867         0 0.90 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4         mymsgs_rr4_818098924         0 0.89 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4         mymsgs_rr4_834098981         0 0.90 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4_clustind mymsgs_rr4_clustind_850099038 2 0.83 0.995
1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind1   mymsgs_rr4_ncind1_882099152   3 0.99 0.445
0.88 1.000
mymsgs_rr4 mymsgs_rr4_ncind2   mymsgs_rr4_ncind2_898099209   4 0.15 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind2   mymsgs_rr4_ncind2_914099266   4 0.88 1.000
1.00 1.000
mymsgs_rr4 mymsgs_rr4_ncind2  mymsgs_rr4_ncind2_930099323  4 0.877 1.000
1.000 1.000
mymsgs_rr4 mymsgs_rr4_ncind2  mymsgs_rr4_ncind2_946099380  4 0.945 0.993
1.000 1.000
```

Example 7

Selects derived statistics for all allpages-locked tables in the current database:

```
2> select convert(varchar(10), object_name(id)) as name
3>     (select convert(varchar(20), i.name) from sysindexes i
4>      where i.id = p.id and i.indid = p.indid),
5> convert(varchar(30), name) as ptnname, indid,
6> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'sput')) as
'sput',
7> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'dpcr')) as
'dpcr',
8> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'drcr')) as
'drcr',
9> convert(decimal(5, 3), derived_stat(id, indid, partitionid, 'lgio')) as
'lgio'
10> from syspartitions p
11> where lockscheme(id) = "allpages"
12>   and (select o.type from sysobjects o where o.id = p.id) = 'U'
```

```
 name                        ptnname                     indid sput dpcr
drcr lgio
----------- ----------------- --------------------------- ----- ---- ----
---- ----
 stores     stores            stores_18096074              0 0.276 1.000
1.000 1.000
 discounts  discounts         discounts_50096188           0 0.075 1.000
1.000 1.000
 au_pix     au_pix            au_pix_82096302              0 0.000 1.000
1.000 1.000
 au_pix     tau_pix           tau_pix_82096302             255 NULL NULL NULL
NULL
 blurbs     blurbs            blurbs_114096416             0 0.055 1.000
1.000 1.000
 blurbs     tblurbs           tblurbs_114096416            255 NULL NULL NULL
NULL
 t1apl      t1apl             t1apl_1497053338             0 0.095 1.000
1.000 1.000
 t1apl      t1apl             t1apl_1513053395             0 0.082 1.000
1.000 1.000
 t1apl      t1apl             t1apl_1529053452             0 0.095 1.000
1.000 1.000
 t1apl      t1apl_ncind       t1apl_ncind_1545053509       2 0.149 0.000
1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1561053566 3 0.066 0.000
1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1577053623 3 0.057 0.000
1.000 1.000
 t1apl      t1apl_ncind_local t1apl_ncind_local_1593053680 3 0.066 0.000
1.000 1.000
 authors    auidind           auidind_1941578924           1 0.966 0.000
1.000 1.000
 authors    aunmind           aunmind_1941578924           2 0.303 0.000
1.000 1.000
 publishers pubind            pubind_1973579038            1 0.059 0.000
1.000 1.000
 roysched   roysched          roysched_2005579152          0 0.324 1.000
1.000 1.000
 roysched   titleidind        titleidind_2005579152        2 0.777 1.000
0.941 1.000
 sales      salesind          salesind_2037579266          1 0.444 0.000
1.000 1.000
 salesdetai salesdetail       salesdetail_2069579380       0 0.614 1.000
1.000 1.000
 salesdetai titleidind        titleidind_2069579380        2 0.518 1.000
0.752 1.000
```

```
 salesdetai salesdetailind    salesdetailind_2069579380    3 0.794 1.000
0.726 1.000
 titleautho taind             taind_2101579494             1 0.397 0.000
1.000 1.000
 titleautho auidind           auidind_2101579494           2 0.285 0.000
1.000 1.000
 titleautho titleidind        titleidind_2101579494        3 0.223 0.000
1.000 1.000
 titles     titleidind        titleidind_2133579608        1 0.895 1.000
1.000 1.000
 titles     titleind          titleind_2133579608          2 0.402 1.000
0.688 1.000
(27 rows affected)
```

Usage

- `derived_stat` returns a double precision value.
- The values returned by `derived_stat` match the values presented by the `optdiag` utility.
- If the specified object or index does not exist, `derived_stat` returns NULL.
- Specifying an invalid statistic type results in an error message.
- Using the optional `<partition_name>` or `<partition_id>` reports the requested statistic for the target partition; otherwise, `derived_stat` reports the statistic for the entire object.
- Instead of consuming resources, `derived_stat` discards the descriptor for an object that is not already in the cache.
- If you provide:
  - Four arguments – `derived_stat` uses the third argument as the partition, and returns derived statistics on the fourth argument.
  - Three arguments – `derived_stat` assumes you did not specify a partition, and returns derived statistic specified by the third argument.

See also:

- *Access Methods and Query Costing for Single Tables* and *Statistics Tables and Displaying Statistics with optdiag* in *Performance and Tuning Guide*
- `optdiag` in *Utility Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `derived_stat` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be the table owner or have `manage database` permission to execute `derived_stat`
Disabled	With granular permissions disabled, you must be the table owner or be a user with `sa_role` to execute `derived_stat`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`derived_stat`	• *Roles* – Current active roles • *Keywords or options* – `DERIVED_STAT` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.53 difference

Returns the difference between two `soundex` values.

Syntax

```
difference(<expr1>,<expr2>)
```

Parameters

`<expr1>`

is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, `nvarchar`, or `unichar` type.

`<expr2>`

is another character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, `nvarchar`, or `unichar` type.

Examples

Example 1

Returns the difference between "smithers" and "smothers":

```
select difference("smithers", "smothers")
```

```
---------
4
```

Example 2

Returns the difference between "smothers" and "brothers":

```
select difference("smothers", "brothers")
```

```
---------
2
```

Usage

- `difference`, a string function, returns an integer representing the difference between two `soundex` values.
- The `difference` function compares two strings and evaluates the similarity between them, returning a value from 0 to 4. The best match is 4.
  The string values must be composed of a contiguous sequence of valid single- or double-byte roman letters.
- If `<expr1>` or `<expr2>` is NULL, returns NULL.
- If you give a `varchar` expression is given as one parameter and a `unichar` expression as the other, the `varchar` expression is implicitly converted to `unichar` (with possible truncation).

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `difference`.

Related Information

soundex [page 375]

3.54 dol_downgrade_check

Returns the number of data-only-locked (DOL) tables in the specified database that contain variable-length columns wider than 8191 bytes. Returns 0 when there are no wide, variable-length columns and you can safely perform the downgrade.

Syntax

```
dol_downgrade_check('<database_name>', <target_version>)
```

Parameters

<database_name>
: name or ID of the database you are checking. <database_name> may be a qualified object name (for example, `mydb.dbo.mytable`).

<target_version>
: integer version of SAP ASE to which you are downgrading (for example, version 15.0.3 is 1503).

Examples

Example 1

Checks DOL tables in the `pubs2` database for wide, variable-length columns so you can downgrade to version 15.5:

```
select dol_downgrade_check('pubs2', 1550)
```

Usage

- Returns zero (success) if the target version is SAP ASE version 15.7 or later, indicating that no work is necessary.
- If you specify a qualified table, but do not indicate the database to which it belongs, `dol_downgrade_check` checks the current database.

Permissions

The permission checks for `dol_downgrade_check` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be the database owner or have `manage database` permission to execute `dol_downgrade_check`.
Disabled	With granular permissions disabled, you must be the database owner or be a user with `sa_role` to execute `dol_downgrade_check`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`dol_downgrade_check`	• *Roles* – Current active roles • *Keywords or options* – `DOL_RDOWNGRADE_CHECK` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.55 exp

Calculates the value that results from raising a constant to the specified power, and returns the exponential value of the specified value.

Syntax

```
exp(<approx_numeric>)
```

Parameters

`<approx_numeric>`
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Returns the exponential value of 3:

```
select exp(3)
```

```
--------------------
            20.085537
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `exp`.

Related Information

log [page 241]
log10 [page 242]
power [page 297]

3.56 floor

Returns the largest integer that is less than or equal to the specified value.

Syntax

```
floor(<numeric>)
```

Parameters

<numeric>

is any exact numeric (`numeric`, `dec`, `decimal`, `tinyint`, `smallint`, `int`, or `bigint`), approximate numeric (`float`, `real`, or `double precision`), or `money` column, variable, constant expression, or a combination of these.

Examples

Example 1

Returns the largest integer that is less than or equal to 123:

```
select floor(123)
```

```
-----------
        123
```

Example 2

Returns the largest integer that is less than or equal to the 123.45:

```
select floor(123.45)
```

```
-------
    123
```

Example 3

Returns the largest integer that is less than or equal to 1.2345E2:

```
select floor(1.2345E2)
```

```
--------------------
         123.000000
```

Example 4

Returns the largest integer that is less than or equal to -123.45:

```
select floor(-123.45)
```

```
-------
   -124
```

Example 5

Returns the largest integer that is less than or equal to -1.2345E2:

```
select floor(-1.2345E2)
```

```
--------------------
        -124.000000
```

Example 6

Returns the largest integer that is less than or equal to $123.45:

```
select floor($123.45)
```

```
------------------------
                 123.00
```

Usage

For numeric and decimal expressions, the results have a precision equal to that of the expression and a scale of 0.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `floor`.

Related Information

abs [page 59]
ceiling [page 89]
round [page 327]
sign [page 364]

3.57 generate_sqlscript

Returns SAP ASE stored procedures, triggers, and views that to migrate the objects into HANA SQL script procedures.

Syntax

To migrate a stored procedure, trigger, or view:

```
generate_sqlscript(<object_name>[, ‘verbose’])
```

To migrate a stored procedure, trigger, or view for an ASE database:

```
generate_sqlscript(<database_name>[, [‘verbose’][ | proc][ | view][ |tigger]']))
```

Parameters

<object_name>

is the name of the stored procedure, trigger, or view.

<database_name>

is the name of the database from which you want to migrate stored procedures, triggers, and views. Using this option allows you to migrate all of the objects in your specified type.

verbose
: specifies verbose mode.

proc
: specifies all stored procedures for the `<database_name>`.

view
: specifies all views for the `<database_name>`.

trigger
: specifies all triggers for the `<database_name>`.

Examples

Migrates single procedure

This example migrates a single stored procedure, called `myproc`:

```
select generate_sqlscript('myproc', 'verbose')
```

Migrates views

This example migrates all views for the database `mydb`:

```
select generate_sqlscript('mydb', 'verbose|view')
```

Migrates procedures and views

This example migrates all stored procedures and views for the database `mydb`:

```
select generate_sqlscript('mydb', 'verbose|proc|view')
```

3.58 get_appcontext

Returns the value of the attribute in a specified context. `get_appcontext` is provided by the Application Context Facility (ACF).

Syntax

```
get_appcontext ("<context_name>", "<attribute_name>")
```

Parameters

<context_name>

is a row specifying an application context name, saved as datatype `char(30)`.

<attribute_name>

is a row specifying an application context attribute name, saved as `char(30)`.

Examples

Example 1

Shows VALUE1 returned for ATTR1.

```
select get_appcontext("CONTEXT1", "ATTR1")
```

```
--------------
VALUE1
```

ATTR1 does not exist in CONTEXT2:

```
select get_appcontext("CONTEXT2", "ATTR1")
```

Example 2

Shows the result when a user without appropriate permissions attempts to get the application context.

```
select get_appcontext("CONTEXT1", "ATTR2", "VALUE1")
```

```
Select permission denied on built-in get_appcontext, database dbid
-----------
-1
```

Usage

- This function returns 0 for success and -1 for failure.
- If the attribute you require does not exist in the application context, `get_appcontext` returns NULL.
- `get_appcontext` saves attributes as `char` datatypes. If you are creating an access rule that compares the attribute value to other datatypes, the rule should convert the `char` data to the appropriate datatype.
- All arguments for this function are required.
- For more information on the ACF, see *Row-Level Access Control* in *System Administration Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `get_appcontext` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `select` permission on `get_appcontext` to execute the function.
Disabled	With granular permissions disabled, you must have `select` permission on `get_appcontext` or be a user with `sa_role` to execute the function.

Related Information

get_appcontext [page 183]
list_appcontext [page 234]
rm_appcontext [page 321]
set_appcontext [page 335]

3.59 get_internal_date

Returns the current date and time from the internal clock maintained by the SAP ASE server.

Syntax

```
get_internal_date
```

Examples

Example 1

The system clock is synchronized with the SAP ASE internal clock. Current system date: January 20, 2007, 5:04AM:

```
select get_internal_date()
```

```
Jan 20 2007 5:04AM
```

Example 2

The system clock is not synchronized with the SAP ASE internal clock. Current system date: August 27, 2007, 1:08AM.

```
select get_internal_date()
```

```
Aug 27 2007 1:07AM
```

Usage

`get_internal_date` may return a different value than `getdate`. `getdate` returns the system clock value, while `get_internal_date` returns the value of the server's internal clock.

At startup, the SAP ASE server initializes its internal clock with the current value of the operating system clock, and increments it based on regular updates from the operating system.

The SAP ASE server periodically synchronizes the internal clock with the operating system clock. The two typically differ by a maximum of one minute.

The SAP ASE server uses the internal clock value to maintain the date of object creation, timestamps for transaction log records, and so on. To retrieve such values, use `get_internal_date` rather than `getdate`.

Permissions

Any user can execute `get_internal_date`

Related Information

getdate [page 186]

3.60 getdate

Returns the current system date and time.

Syntax

```
getdate()
```

Examples

Example 1

Assumes a current date of November 25, 1995, 10:32 a.m.:

```
select getdate()
```

```
Nov 25 1995 10:32AM
```

Example 2

Assumes a current date of November:

```
select datepart(month, getdate())
```

```
11
```

Example 3

Assumes a current date of November:

```
select datename(month, getdate())
```

```
November
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `getdate`.

Related Information

Date and Time Datatypes [page 19]
dateadd [page 138]
datediff [page 142]
datename [page 145]
datepart [page 148]

3.61 getutcdate

Returns a date and time where the value is in Universal Coordinated Time (UTC). `getutcdate` is calculated each time a row is inserted or selected.

Syntax

```
getutcdate()
```

Examples

Example 1

Returns a date and time in Universal Coordinated Time:

```
insert t1 (<c1>, <c2>, <c3>) select c1, getutcdate(),
getdate() from t2
```

Permissions

Any user can execute `getutcdate`.

Related Information

biginttohex [page 78]
convert [page 110]

3.62 hadr_mode

Displays the mode of the HADR system.

Syntax

```
hadr_mode(<@@hadr_mode_return_value>)
```

Parameters

<@@hadr_mode_return_value>
the HADR mode that corresponds with the <@@hadr_mode> return value.

Returns

hadr_mode return values are:

- NoHADR – HADR is disabled.
- Primary – HADR is enabled. This is a primary server.
- Standby – HADR is enabled. This is a standby server
- Unreachable – HADR is enabled, but the server is unreachable.
- Starting – HADR is enabled, and the server is ready for initialization.

Examples

Example 1

Displays the current mode of the HADR system:

```
select hadr_mode()
------------------------------------------------------------
Starting
```

Example 2

Displays the HADR mode that corresponds to the <@@hadr_mode> return value of -1:

```
select hadr_mode(-1)
------------------------------------------------------------
No HADR
```

Usage

Permissions

Any user can execute `hadr_mode`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`hadr_mode`	• *Roles* – Current active roles • *Keywords or options* – `HADR_MODE` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.63 hadr_state

Displays the state of the HADR system

Syntax

```
hadr_state(<@@hadr_state_return_value>)
```

Parameters

`<@@hadr_state_return_value>`
the HADR state that corresponds with the `<@@hadr_state>` return value.

Returns

hadr_state return values are:

- Unknown – HADR is in an unknown state.
- Active – Primary server allows transaction processing from user applications.
- Inactive – Server is inactive, and does not allow transaction processing from user applications
- Deactivating – The server is changing from the active to the inactive state, and the log is being drained

Examples

Example 1

Displays the current state of the HADR system:

```
select hadr_state()
------------------------------------------------------------
Inactive
```

Example 2

Displays the HADR state that corresponds to the <@@hadr_state> return value of 1:

```
select hadr_state(1)
------------------------------------------------------------
Active
```

Usage

Permissions

Any user can execute hadr_state.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`hadr_state`	• *Roles* – Current active roles • *Keywords or options* – `HADR_STATE` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.64 has_role

Returns information about whether an invoking user has been granted, and has activated, the specified role.

Syntax

```
has_role ("<role_name>", <option>)
```

Parameters

`<role_name>`

is the name of a system or user-defined role.

`<option>`

allows you to limit the scope of the information returned. Currently, the only option supported is 1, which suppresses auditing.

Examples

Example 1

Creates a procedure to check if the user is a System Administrator:

```
create procedure sa_check as
if (has_role("sa_role", 0) > 0)
begin
    print "You are a System Administrator."
    return(1)
end
```

Example 2

Checks that the user has been granted the System Security Officer role:

```
select has_role("sso_role", 1)
```

Example 3

Checks that the user has been granted the Operator role:

```
select has_role("oper_role", 1)
```

Usage

- `has_role` functions the same way `proc_role` does. In SAP ASE versions 15.0 and later, we recommend that you use `has_role` instead of `proc_role`. You need not, however, convert all of your existing uses of `proc_role` to `has_role`.
- `has_role` returns 0 if the user has:
    - Not been granted the specified role
    - Not been granted a role which contains the specified role
    - Been granted, but has not activated, the specified role
- `has_role` returns:
    - 1 – if the invoking user has been granted, and has activated, the specified role.
    - 2 – if the invoking user has a currently active role, which contains the specified role.

See also:

- `alter role`, `create role`, `drop role`, `grant`, `revoke`, `set` in *Reference Manual: Commands*
- *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `has_role`.

Related Information

mut_excl_roles [page 262]
role_contain [page 323]
role_id [page 324]
role_name [page 326]
show_role [page 360]

3.65 hash

Produces a fixed-length hash value expression.

Syntax

```
hash(<expression> , [<algorithm>])
```

Parameters

`<expression>`

is the value to be hashed. This can be a column name, variable, constant expression, or any combination of these that evaluates to a single value. It cannot be `image`, `text`, `unitext`, or off-row Java datatypes. Expression is usually a column name. If expression is a character constant, it must be enclosed in quotes.

`<algorithm>`

is the algorithm used to produce the hash value. A character literal (not a variable or column name) that can take the values of either `md5` or `sha1`, `2` (meaning `md5` binary), or `3` (meaning `sha1` binary). If omitted, `md5` is used.

Algorithm	Results in
hash(<expression>, 'md5')	A varchar 32-byte string. md5 (Message Digest Algorithm 5) is the cryptographic hash function with a 128-bit hash value.
hash(<expression>)	A varchar 32-byte string
hash(<expression>, 'sha1')	A varchar 40-byte string sha1 (Secure Hash Algorithm) is the cryptographic hash function with a 160-bit hash value.
hash(<expression>, 2)	A varbinary 16-byte value (using the md5 algorithm)
hash(<expression>, 3)	A varbinary 20-byte value (using the sha1 algorithm)

Examples

Example 1

This example shows how a seal is implemented. The existence of a table called "atable" and with columns id, sensitive_field and tamper seal.

```
update atable set tamper_seal=hash(convert(varchar(30),
id) + sensitive_field+@salt, 'sha1')
```

Usage

When specified as a character literal, <algorithm> is not case-sensitive—"md5", "Md5" and "MD5" are equivalent. However, if <expression> is specified as a character datatype then the value is case sensitive. "Time," "TIME," and "time" produce different hash values.

If <algorithm> is a character literal, the result is a varchar string. For "md5" this is a 32-byte string containing the hexadecimal representation of the 128-bit result of the hash calculation. For "sha1" this is a 40-byte string containing the hexadecimal representation of the 160-bit result of the hash calculation.

If <algorithm> is an integer literal, the result is a varbinary value. For 2, this is a 16-byte value containing the 128-bit result of the hash calculation. For 3, this is a 20-byte value containing the 160-bit result of the hash calculation.

> **i Note**
>
> Trailing null values are trimmed by the SAP ASE server when inserted into varbinary columns.

Individual bytes that form `<expression>` are fed into the hash algorithm in the order they appear in memory. For many datatypes order is significant. For example, the binary representation of the 4-byte INT value 1 will be 0x00, 0x00, 0x00, 0x01 on MSB-first (big-endian) platforms and 0x01, 0x00, 0x00, 0x00 on LSB-first (little-endian) platforms. Because the stream of bytes is different between platforms, the hash value is different as well. Use `hashbytes` function to achieve platform independent hash value.

> **i Note**
>
> The hash algorithms MD5 and SHA1 are no longer considered entirely secure by the cryptographic community. As for any such algorithm, you should be aware of the risks of using MD5 or SHA1 in a security-critical context.

Standards

SQL92- and SQL99-compliant

Permissions

Any user can execute `hash`.

Related Information

hashbytes [page 196]

3.66 hashbytes

Produces a fixed-length, hash value expression.

Syntax

```
hashbytes(<algorithm>, <expression>[, <expression><...>] [, using <options>])
```

Parameters

<expression>[, **<expression>**...]

is the value to be hashed. This value can be a column name, variable, constant expression, or a combination of these that produces a single value. It cannot be `image`, `text`, `unitext`, or off-row Java datatypes.

<algorithm>

is the algorithm used to produce the hash value. A character literal (not a variable or a column name) that can take the values "md5", "sha", "sha1", or "ptn".

- `Md5` (Message Digest Algorithm 5) – is the cryptographic hash algorithm with a 128 bit hash value. `hashbytes('md5', <expression>[,...])` results in a `varbinary` 16-byte value.
- `Sha-Sha1` (Secure Hash Algorithm) – is the cryptographic hash algorithm with a 160-bit hash value. `hashbytes('sha1', <expression>[,...])` results in a `varbinary` 20-byte value.
- `Ptn` – The partition hash algorithm with 32-bit hash value. The `<using>` clause is ignored for the 'ptn' algorithm. `hashbytes(<'ptn'>, <expression>[,...])` results in an `unsigned int` 4-byte value.
- `using` – Orders bytes for platform independence. The optional `using` clause can precede the following `option` strings:
  - `lsb` – all byte-order dependent data is normalized to little-endian byte-order before being hashed.
  - `msb` – all byte-order dependent data is normalized to big-endian byte-order before being hashed.
  - `unicode` – character data is normalized to unicode (UTF–16) before being hashed.

    > **i Note**
    >
    > A UTF – 16 string is similar to an array of short integers. Because it is byte-order dependent, use `lsb` or `msb` in conjunction with UNICODE for platform independence.

  - `unicode_lsb` – a combination of `unicode` and `lsb`.
  - `unicode_msb` – a combination of `unicode` and `msb`.

Examples

Example 1

Seals each row of a table against tampering. This example assumes the existence of a user table called "`xtable`" and `col1`, `col2`, `col3` and `tamper_seal`.

```
update xtable set tamper_seal=hashbytes('sha1', col1,
col2, col4, @salt)
--
```

```
declare @nparts unsigned int
select @nparts= 5
select hashbytes('ptn', col1, col2, col3) % nparts from xtable
```

Example 2

Shows how col1, col2, and col3 are used to partition rows into five partitions.

```
alter table xtable partition by hash(col1, col2, col3) 5
```

Usage

The algorithm parameter is not case-sensitive; "md5," "Md5" and "MD5" are all equivalent. However, if the <expression> is specified as a character datatype, the value is case sensitive. "Time," "TIME," and "time" produce different hash values.

> i Note
>
> Trailing null values are trimmed by the SAP ASE server when inserting into varbinary columns.

In the absence of a using clause, the bytes that form <expression >are fed into the hash algorithm in the order they appear in memory. For many datatypes, order is significant. For example, the binary representation of the 4-byte INT value 1 will be 0x00, 0x00, 0x00, 0x01, on MSB-first (big-endian) platforms and 0x01, 0x00, 0x00, 0x00 on LSB-first (little-endian) platforms. Because the stream of bytes is different for different platforms, the hash value is different as well.

With the using clause, the bytes that form <expression> can be fed into the hashing algorithm in a platform-independent manner. The using clause can also be used to transform character data into Unicode so that the hash value becomes independent of the server's character configuration.

> i Note
>
> The hash algorithms MD5 and SHA1 are no longer considered entirely secure by the cryptographic community. Be aware of the risks of using MD5 or SHA1 in a security-critical context.

Standards

SQL92- and SQL99-compliant

Permissions

Any user can execute hashbyte.

Related Information

hash [page 194]

3.67 hextobigint

Returns the platform-independent `bigint` value equivalent of a hexadecimal string

Syntax

```
hextobigint(<hexadecimal_string>)
```

Parameters

`<hexadecimal_string>`
is the hexadecimal value to be converted to an big integer; must be a character-type column, variable name, or a valid hexadecimal string, with or without a “0x” prefix, enclosed in quotes.

Examples

Example 1

The following example converts the hexadecimal string 0x7fffffffffffffff to a big integer.

```
1> select hextobigint("0x7fffffffffffffff")
2> go
---------------------
9223372036854775807
```

Usage

Use the `hextobigint` function for platform-independent conversions of hexadecimal data to integers. `hextobigint` accepts a valid hexadecimal string, with or without a “0x” prefix, enclosed in quotes, or the name of a character-type column or variable.

hextobigint returns the bigint equivalent of the hexadecimal string. The function always returns the same bigint equivalent for a given hexadecimal string, regardless of the platform on which it is executed.

Related Information

biginttohex [page 78]
convert [page 110]
inttohex [page 215]
hextoint [page 200]

3.68 hextoint

Returns the platform-independent integer equivalent of a hexadecimal string.

Syntax

```
hextoint(<hexadecimal_string>)
```

Parameters

<hexadecimal_string>

is the hexadecimal value to be converted to an integer; must be a character-type column, variable name, or a valid hexadecimal string, with or without a "0x" prefix, enclosed in quotes.

Examples

Example 1

Returns the integer equivalent of the hexadecimal string "0x00000100". The result is always 256, regardless of the platform on which it is executed:

```
select hextoint ("0x00000100")
```

Usage

Use the `hextoint` function for platform-independent conversions of hexadecimal data to integers. `hextoint` accepts a valid hexadecimal string, with or without a “0x” prefix, enclosed in quotes, or the name of a character-type column or variable.

`hextoint` returns the integer equivalent of the hexadecimal string. The function always returns the same integer equivalent for a given hexadecimal string, regardless of the platform on which it is executed.

See the *Transact-SQL Guide* for more information about datatype conversion.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `hextoint`.

Related Information

biginttohex [page 78]
convert [page 110]
inttohex [page 215]

3.69 host_id

Returns the client computer’s operating system process ID for the current SAP ASE client (not the server process).

Syntax

```
host_id()
```

Examples

Example 1

The name of the client computer, “ephemeris” and the process ID on the computer, “ephemeris” for the SAP ASE client process, 2309:

```
select host_name(), host_id()
----------------------------- -----------------------
 ephemeris                     2309
```

The following is the process information, gathered using the UNIX `ps` command, from the computer “ephemeris” showing that the client in this example is “isql” and its process ID is 2309:

```
2309 pts/2    S   0:00 /work/as125/OCS-12_5/bin/isql
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `host_id`.

Related Information

host_name [page 203]

3.70 host_name

Displays the current host computer name of the client process (not the server process).

Syntax

```
host_name()
```

Examples

Example 1

Displays the current host computer name:

```
select host_name()
```

```
------------------------------
violet
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `host_name`.

Related Information

host_id [page 201]

3.71 identity_burn_max

Tracks the identity burn max value for a given table. This function returns only the value; it does not perform an update.

Syntax

```
identity_burn_max(<table_name>)
```

Parameters

<table_name>

is the name of the table selected.

Examples

Example 1

Returns the identity burn max value of t1:

```
select identity_burn_max("t1")
```

```
t1
------------
51
```

Permissions

The permission checks for `identity_burn_max` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be the table owner or have `manage database` permission to execute `identity_burn_max`.
Disabled	With granular permissions disabled, you must be the database owner or table owner, or be a user with `sa_role` to execute `identity_burn_max`.

Auditing

You can enable func_obj_access auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_obj_access	86	identity_burn_max	• *Roles* – Current active roles • *Keywords or options* – IDENTITY_BURN_MAX • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.72 imrs_rowinfo

Provides row details such as row length, number of versions, and several memory usage metrics.

Syntax

```
imrs_rowinfo(<column_name>, '<tag>')
```

Parameters

<column_name>

Name of the column.

<tag>

Details about the specified column. Options include:

- status – Status of the row version
- log record size – amount of memory required to log this version of the row.
- row length – actual row length of data row in page-oriented row format.
- number of versions – number of IMRS versions for a row, regardless of type.
- number of committed versions – not supported for this release.
- number of uncommitted versions – must be less than or equal to 1

- `memory required for row` – amount of memory required for the row metadata structures and for the latest-committed version of the row.
- `memory required for version` – amount of memory required just for the latest-committed version of the row.
- `memusage for row` – amount of memory actually used in excess of what was required. This accounts for kernel overheads due to rounding and such. `for row` indicates the amount of memory required for the row metadata structures plus the latest-committed version of the row.
- `memusage for version` – amount of memory required for the latest-committed version of the row
- `memusage for row with overhead` – amount of memory required just for the latest-committed version of the row in addition to the kernel fragment memory overhead, and any rounding overheads already included in `memusage` metric.
- `memusage for version with overhead` – memory usage for this version of the row, including kernel overhead.
- `memusage for all versions` – amount of memory required for all committed and uncommitted versions of the row
- `memusage for all versions with overhead` – amount of memory required for all committed and uncommitted versions of the row in addition to the kernel fragment memory overhead, and any rounding overheads already included in `memusage` metric
- `memusage for all uncommitted versions` – not supported for this release.
- `memusage for all uncommitted versions with overhead` – not supported for this release.
- `memusage for all committed versions` – amount of memory required for all committed versions of the row. This metric is the same as the value for `memusage for all versions` when no active transactions are updating the row.
- `memusage for all committed versions with overhead` – amount of memory required for all committed versions of the row in addition to the kernel fragment memory overhead, and any rounding overheads already included in `memusage` metric. This metric is the same as the value for `memusage for all versions with overhead` when no active transactions are updating the row.

Examples

Example 1

Selects the metrics for `row length` and `memusage for row` from the `t2_imrs` table:

```
select c1, rowlen = imrs_rowinfo(c2, "row length"), memoryusg =
imrs_rowinfo(c2, "memusage for row")
from t2_imrs
c1          rowlen                memoryusg
----------- -------------------- --------------------
          1                  231                  416
```

Usage

To obtain an aggregate metric for all rows in the IMRS (for example, `number of versions`, `memusage for row with overhead`, and so on), use the `SUM` aggregate on the individual metric across all rows in the IMRS.

3.73 index_col

Displays the name of the indexed column in the specified table or view to a maximum of 255 bytes in length.

Syntax

```
index_col(<object_name>, <index_id>, <key_#>[, <user_id>])
```

Parameters

<object_name>
: is the name of a table or view. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

<index_id>
: is the number of `<object_name>`'s index. This number is the same as the value of `sysindexes.indid`.

<key_#>
: is a key in the index. This value is between 1 and `sysindexes.keycnt` for a clustered index and between 1 and `sysindexes.keycnt`+1 for a nonclustered index.

<user_id>
: is the owner of `<object_name>`. If you do not specify `<user_id>`, it defaults to the caller's user ID.

Examples

Example 1

Finds the names of the keys in the clustered index on table `t4`:

```
declare @keycnt integer
select @keycnt = keycnt from sysindexes
     where id = object_id("t4")
```

```
     and indid = 1
while @keycnt > 0
begin
     select index_col("t4", 1, @keycnt)
     select @keycnt = @keycnt - 1
end
```

Usage

index_col returns NULL if <object_name> is not a table or view name.

See also:

- *Transact-SQL Users Guide*
- sp_helpindex in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute index_col.

Auditing

You can enable func_obj_access auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_obj_access	86	index_col	• *Roles* – Current active roles • *Keywords or options* – INDEX_COL • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

object_id [page 273]

3.74 index_colorder

Returns the column order.

Syntax

```
index_colorder(<object_name>, <index_id>, <key_#>[, <user_id>])
```

Parameters

<object_name>
is the name of a table or view. The name can be fully qualified (that is, it can include the database and owner name). It must be enclosed in quotes.

<index_id>
is the number of <object_name>'s index. This number is the same as the value of sysindexes.indid.

<key_#>
is a key in the index. Valid values are 1 and the number of keys in the index. The number of keys is stored in sysindexes.keycnt.

<user_id>
is the owner of <object_name>. If you do not specify <user_id>, it defaults to the caller's user ID.

Examples

Example 1

Returns "DESC" because the salesind index on the sales table is in descending order:

```
select name, index_colorder("sales", indid, 2)
from sysindexes
where id = object_id ("sales")
```

```
and indid > 0
```

```
name
------------------------- -------------------------
salesind                  DESC
```

Usage

`index_colorder` returns:

- "ASC" for columns in ascending order
- "DESC" for columns in descending order.
- NULL if <object_name> is not a table name or if <key_#> is not a valid key number.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `index_colorder`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`index_colorder`	• *Roles* – Current active roles • *Keywords or options* – `INDEX_COLORDER` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.75 index_name

Returns an index name, when you provide the index ID, the database ID, and the object on which the index is defined.

Syntax

```
index_name(<dbid>, <objid>, <indid>)
```

Parameters

<dbid>
is the ID of the database on which the index is defined.

<objid>
is the ID of the table (in the specified database) on which the index is defined.

<indid>
is the ID of the index for which you want a name.

Examples

Example 1

Illustrates the normal usage of this function.

```
select index_name(db_id("testdb"),
    object_id("testdb...tab_apl"),1)
------------
```

Example 2

Illustrates the output if the database ID is NULL and you use the current database ID.

```
select index_name(NULL,object_id("testdb..tab_apl"),1)
--------------------------
```

Example 3

Displays the table name if the index ID is 0, and the database ID and object ID are valid.

```
select index_name(db_id("testdb"),
    object_id("testdb..tab_apl"),1)
-----------------------------
```

Usage

`index_name`:

- Uses the current database ID, if you pass a NULL value in the `<dbid>` parameter
- Returns NULL if you pass a NULL value in the `<dbid>` parameter.
- Returns the object name, if the index ID is 0, and you pass valid inputs for the object ID and the database ID.

Permissions

Any user can execute `index_name`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`index_name`	• *Roles* – Current active roles • *Keywords or options* – `INDEX_NAME` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

db_id [page 156]
object_id [page 273]

3.76 instance_id

(Cluster environments only) Returns the ID of the named instance, or the instance from which it is issued if you do not provide a value for `<name>`.

Syntax

```
instance_id([<name>])
```

Parameters

`<name>`
name of the instance for which you are searching the ID.

Examples

Example 1

Returns the ID of the local instance:

```
select instance_id()
```

Example 2

Returns the ID of the instance named “myserver1”:

```
select instance_id(myserver1)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `instance_id`.

3.77 instance_name

(Cluster environments only) Returns the name for the SAP ASE with an ID that you provide, or the name of the SAP ASE from which it is issued if you do not provide a value for `<id>`.

Syntax

```
instance_name([<id>])
```

Parameters

`<id>`

is the ID of the SAP ASE with the name you are researching.

Examples

Example 1

Returns the name of the instance with an ID of 12:

```
select instance_name(12)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `instance_name`.

3.78 inttohex

Returns the platform-independent hexadecimal equivalent of the specified integer, without a “0x” prefix.

Syntax

```
inttohex(<integer_expression>)
```

Parameters

<integer_expression>

is the integer value to be converted to a hexadecimal string.

Examples

Example 1

Returns the hexadecimal equivalent of 10:

```
select inttohex (10)
```

```
--------
0000000A
```

Usage

Use the `inttohex` function for platform-independent conversions of integers to hexadecimal strings. `inttohex` accepts any expression that evaluates to an integer. It always returns the same hexadecimal equivalent for a given expression, regardless of the platform on which it is executed.

See the *Transact-SQL Guide* for more information about datatype conversion..

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `inttohex`.

Related Information

convert [page 110]
hextobigint [page 199]
hextoint [page 200]

3.79 isdate

Determines whether an input expression is a valid `datetime` value.

Syntax

```
isdate(<character_expression>)
```

Parameters

<character_expression>
is a character-type variable, constant expression, or column name.

Examples

Example 1

Determines if the string 12/21/2005 is a valid `datetime` value:

```
select isdate('12/21/2005')
```

Example 2

Determines if `stor_id` and `date` in the `sales` table are valid `datetime` values:

```
select isdate(stor_id), isdate(date) from sales
```

```
---- ----
0    1
```

`store_id` is not a valid `datetime` value, but `date` is.

Usage

Returns:

- 1 – if the expression is a valid `datetime` value
- 0 – if it is not. Returns 0 for NULL input.

3.80 is_quiesced

Indicates whether a database is in `quiesce database` mode. `is_quiesced` returns 1 if the database is quiesced and 0 if it is not.

Syntax

```
is_quiesced(<dbid>)
```

Parameters

`<dbid>`

is the database ID of the database.

Returns

`is_quiesced` returns a value of 1 when the database has been quiesced using `prepare database ... with quiesce`.

Examples

Example 1

Uses the `test` database, which has a database ID of 4, and which is not quiesced:

```
1> select is_quiesced(4)
2> go
```

```
-----------
          0
(1 row affected)
```

Example 2

Uses the `test` database after running `quiesce database` to suspend activity:

```
1> quiesce database tst hold test
2> go
1> select is_quiesced(4)
2> go
```

```
-----------
          1
(1 row affected)
```

Example 3

Uses the `test` database after resuming activity using `quiesce database`:

```
1> quiesce database tst release
2> go
1> select is_quiesced(4)
2> go
```

```
 -----------
          0
(1 row affected)
```

Example 4

Executes a `select` statement with `is_quiesced` using an invalid database ID:

```
1>select is_quiesced(-5)
2> go
```

```
 -----------
       NULL
(1 row affected)
```

Usage

`is_quiesced`:

- Has no default values. You see an error if you execute `is_quiesced` without specifying a database.

- Returns NULL if you specify a database ID that does not exist.

See also `quiesce database` in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `is_quiesced`.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`is_quiesced`	• *Roles* – Current active roles • *Keywords or options* – `IS_QUIESCED` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.81 is_sec_service_on

Determines whether a particular security service is active during the session.

Syntax

```
is_sec_service_on(<security_service_nm>)
```

Parameters

<security_service_nm>

is the name of the security service.

Examples

Example 1

Indicates whether unifiedlogin is active:

```
select is_sec_service_on("unifiedlogin")
```

Usage

- Returns 1 if the service is enabled; otherwise, returns 0.
- To find valid names of security services, execute:

```
select * from syssecmechs
```

The result might look something like:

```
sec_mech_name available_service
------------- --------------------
dce           unifiedlogin
dce           mutualauth
dce           delegation
dce           integrity
dce           confidentiality
dce           detectreplay
dce           detectseq
```

The `available_service` column displays the security services that are supported by the SAP ASE server.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `is_sec_service_on`.

Related Information

show_sec_services [page 361]

3.82 is_singleusermode

Determines whether the SAP ASE server is running in single-user mode.

Syntax

```
is_singleusermode()
```

Examples

Example 1

Shows a server running in single-user mode:

```
select is_singleusermode()
-----------
          1
```

Usage

Returns:

- 0 – if the SAP ASE server is not running in single-user mode.
- 1 – if the SAP ASE server is running in single-user mode.

Permissions

Any user can run `is_singleusermode`.

3.83 isnull

Substitutes the value specified in `<expression2 >`when `<expression1>` evaluates to NULL.

Syntax

```
isnull(<expression1>, <expression2>)
```

Parameters

`<expression>`

is a column name, variable, constant expression, or a combination of any of these that evaluates to a single value. It can be of any datatype, including `unichar`. `<expression>` is usually a column name. If `<expression>` is a character constant, it must be enclosed in quotes.

Examples

Example 1

Returns all rows from the `titles` table, replacing null values in `price` with 0:

```
select isnull(price,0)
from titles
```

Usage

- `isnull`, a system function, substitutes the value specified in `<expression2 >`when `<expression1>` evaluates to NULL. For general information about system functions, see *Transact-SQL Users Guide*.
- The datatypes of the expressions must convert implicitly, or you must use the `convert` function.
- If `<expression1>` parameter is a `char` datatype and `<expression2>` is a literal parameter, the results from your `select` statement that includes `isnull` differ based on whether you enable literal autoparameterization. To avoid this situation, do not autoparameterize `char` datatype literals within `isnull()`.
  Stored procedures that use `isnull()` with the same expression settings may also exhibit unexpected behavior. If this occurs, re-create the corresponding autoparameterizations.

See also *Controlling Literal Parameterization* in *Performance and Tuning Series: Query Processing and Abstract Plans*; *System Administration Guide: Volume 1*; *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `isnull`.

Related Information

convert [page 110]

3.84 isnumeric

Determines if an expression is a valid `numeric` datatype.

Syntax

```
isnumeric (<character_expression>)
```

Parameters

<character_expression>

is a character-type variable, constant expression, or a column name.

Examples

Example 1

Determines if the values in the `postalcode` column of the `authors` table contains valid `numeric` datatypes:

```
select isnumeric(postalcode) from authors
```

Example 2

Determines if the value $100.12345 is a valid numeric datatype:

```
select isnumeric("$100.12345")
```

Usage

- Returns 1 if the input expression is a valid integer, floating point number, money or decimal type; returns 0 if it does not or if the input is a NULL value. A return value of 1 guarantees that you can convert the expression to one of these numeric types.
- You can include currency symbols as part of the input.

3.85 lc_id

(Cluster environments only) Returns the ID of the logical cluster whose name you provide, or the current logical cluster if you do not provide a name.

Syntax

```
lc_id(<logical_cluster_name>)
```

Parameters

<logical_cluster_name>

is the name of the logical cluster.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `lc_id`

3.86 lc_name

(Cluster environments only) Returns the name of the logical cluster with the ID you provide, or the current logical cluster if you do not provide an ID.

Syntax

```
lc_name([<logical_cluster_ID>])
```

Parameters

`<logical_cluster_ID>`
is the ID of the logical cluster.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `lc_name`.

3.87 lct_admin

Manages the last-chance threshold (LCT). It returns the current value of the LCT and aborts transactions in a transaction log that has reached its LCT.

Syntax

```
lct_admin({{"lastchance" | "logfull" | "reserved_for_rollbacks"},
    <database_id>
    |"reserve", {<log_pages> | 0 }
    | "abort", <process-id> [,< database-id>]})
```

Parameters

lastchance

creates a LCT in the specified database.

logfull

returns 1 if the LCT has been crossed in the specified database and 0 if it has not.

reserved_for_rollbacks

determines the number of pages a database currently reserved for rollbacks.

<database_id>

specifies the database.

reserve

obtains either the current value of the LCT or the number of log pages required for dumping a transaction log of a specified size.

<log_pages>

is the number of pages for which to determine a LCT.

0

returns the current value of the LCT. The size of the LCT in a database with separate log and data segments does not vary dynamically. It has a fixed value, based on the size of the transaction log. The LCT varies dynamically in a database with mixed log and data segments.

abort

aborts transactions in a database where the transaction log has reached its last-chance threshold. Only transactions in log-suspend mode can be aborted.

logsegment_freepages

describes the free space available for the log segment. This is the total value of free space, not per-disk.

<process-id>

is the ID (<spid>) of a process in log-suspend mode. A process is placed in log-suspend mode when it has open transactions in a transaction log that has reached its last-chance threshold (LCT).

<database-id>

is the ID of a database with a transaction log that has reached its LCT. If <process-id> is `0`, all open transactions in the specified database are terminated.

Examples

Example 1

Creates the log segment last-chance threshold for the database with `dbid` 1. It returns the number of pages at which the new threshold resides. If there was a previous last-chance threshold, it is replaced:

```
select lct_admin("lastchance", 1)
```

Example 2

Returns 1 if the last-chance threshold for the database with `dbid` of 6 has been crossed, and 0 if it has not:

```
select lct_admin("logfull", 6)
```

Example 3

Calculates and returns the number of log pages that would be required to successfully dump the transaction log in a log containing 64 pages:

```
select lct_admin("reserve", 64)
```

```
-----------
         16
```

Example 4

Returns the current last-chance threshold of the transaction log in the database from which the command was issued:

```
select lct_admin("reserve", 0)
```

Example 5

Aborts transactions belonging to process 83. The process must be in log-suspend mode. Only transactions in a transaction log that has reached its LCT are terminated:

```
select lct_admin("abort", 83)
```

Example 6

Aborts all open transactions in the database with `dbid` of 5. This form awakens any processes that may be suspended at the log segment last-chance threshold:

```
select lct_admin("abort", 0, 5)
```

Example 7

Determines the number of pages reserved for rollbacks in the `pubs2` database, which has a `dbid` of 5:

```
select lct_admin("reserved_for_rollbacks", 5, 0)
```

Example 8

Describes the free space available for a database with a dbid of 4:

```
select lct_admin("logsegment_freepages", 4)
```

Usage

- `lct_admin`, a system function, manages the last-chance threshold of the log segment's, including that of `sysimrslog`. For general information about system functions, see *Transact-SQL Users Guide*.
  `lct_admin`, a system function, manages the log segment's last-chance threshold. For general information about system functions, see *Transact-SQL Users Guide*.
- If `lct_admin("lastchance", <dbid>)` returns zero, the log is not on a separate segment in this database, so no last-chance threshold exists.
- Whenever you create a database with a separate log segment, the server creates a default last-chance threshold that defaults to calling `sp_thresholdaction`. This happens even if a procedure called `sp_thresholdaction` does not exist on the server at all.
  If your log crosses the last-chance threshold, the SAP ASE server suspends activity, tries to call `sp_thresholdaction`, finds it does not exist, generates an error, then leaves processes suspended until the log can be truncated.
- To terminate:
  - The oldest open transaction in a transaction log that has reached its LCT, enter the ID of the process that initiated the transaction.
  - All open transactions in a transaction log that has reached its LCT, enter `0` as the `<process-id>`, and specify a database ID in the `<database-id>` parameter.

See also:

- `dump transaction` in *Reference Manual: Commands*
- `sp_thresholdaction` in *Reference Manual: Procedures*
- *System Administration Guide*; *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `lct_admin` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `manage database` permission to execute `lct_admin abort`. Any user can execute the other `lct_admin` options.
Disabled	With granular permissions disabled, you must be a user with `sa_role` to execute `lct_admin abort`. Any user can execute the other `lct_admin` options.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`func_dbaccess`	• *Roles* – Current active roles • *Keywords or options* – `LCT_ADMIN` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

curunreservedpgs [page 130]

3.88 left

Returns a specified number of characters on the left end of a character string.

Syntax

```
left(<character_expression>, <integer_expression>)
```

Parameters

<character_expression>

is the character string from which the characters on the left are selected.

<integer_expression>

is the positive integer that specifies the number of characters returned. An error is returned if `<integer_expression>` is negative.

Examples

Example 1

Returns the five leftmost characters of each book title:

```
use pubs
select left(title, 5) from titles
order by title_id
-----
The B
Cooki
You C
.....
Sushi
(18 row(s) affected)
```

Example 2

Returns the two leftmost characters of the character string “abcdef”:

```
select left("abcdef", 2)
---------
ab
(1 row(s) affected)
```

Usage

- <character_expression> can be of any datatype (except text or image) that can be implicitly converted to varchar or nvarchar. <character_expression> can be a constant, variable, or a column name. You can explicitly convert character_expression using convert.
- left is equivalent to substring(<character_expression>, <1>, <integer_expression>).

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute left.

Related Information

Transact-SQL Functions [page 59]
len [page 231]
str_replace [page 395]
substring [page 402]

3.89 len

Returns the number of characters, not the number of bytes, of a specified string expression, excluding trailing blanks.

Syntax

```
len(<string_expression>)
```

Parameters

<string_expression>
is the string expression to be evaluated.

Examples

Example 1

Returns the characters:

```
select len(notes) from titles
where title_id = "PC9999"
-----------
39
```

Usage

This function is the equivalent of `char_length(<string_expression>)`.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `len`.

Related Information

Transact-SQL Functions [page 59]
char_length [page 93]
left [page 230]
str_replace [page 395]

3.90 license_enabled

Returns 1 if a feature's license is enabled, 0 if the license is not enabled, or NULL if you specify an invalid license name.

Syntax

```
license_enabled("ase_server" | "ase_ha" | "ase_dtm" | "ase_java" |
    "ase_asm")
```

Parameters

ase_server
: specifies the license for the SAP ASE server.

ase_ha
: specifies the license for the SAP ASE high-availability feature.

ase_dtm
: specifies the license for the SAP ASE distributed transaction management features.

ase_java
: specifies the license for the Java in Adaptive Server feature.

ase_asm
: specifies the license for the SAP ASE advanced security mechanism.

Examples

Example 1

Indicates that the license for the SAP ASE distributed transaction management feature is enabled:

```
select license_enabled("ase_dtm")
```

```
--------------
             1
```

Usage

For information about installing license keys for SAP ASE features, see your installation guide.

See also:

- Installation guide for your platform
- `sp_configure` system procedure

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `license_enabled`.

3.91 list_appcontext

Lists all the attributes of all the contexts in the current session. `list_appcontext` is provided by the ACF.

Syntax

```
list_appcontext(["<context_name>"])
```

Parameters

<context_name>
is an optional argument that names all the application context attributes in the session.

Examples

Example 1

Shows the results when a user with appropriate permissions attempts to list the application contexts:

```
select list_appcontext ([context_name])
```

```
Context Name: (CONTEXT1)
Attribute Name: (ATTR1) Value: (VALUE2)
Context Name: (CONTEXT2)
Attribute Name: (ATTR1) Value: (VALUE1)
```

Example 2

Shows the results when a user without appropriate permissions attempts to list the application contexts:

```
select list_appcontext()
```

```
Select permission denied on built-in list_appcontext, database DBID
--------
-1
```

Usage

- This function returns 0 for success.
- Since built-in functions do not return multiple result sets, the client application receives `list_appcontext` returns as messages.

See also *Row-Level Access Control* in *System Administration Guide* for more information on the ACF.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

The permission checks for `list_appcontext` differ based on your granular permissions settings.

Settings	Description
Granular permissions enabled	With granular permissions enabled, you must have `select` permission on `list_appcontext` to execute the function.

Settings	Description
Granular permissions disabled	With granular permissions disabled, you must have `select` permission on list_appcontext or be a user with `sa_role` to execute the function.

Related Information

get_appcontext [page 183]
list_appcontext [page 234]
rm_appcontext [page 321]
set_appcontext [page 335]

3.92 locator_literal

Identifies a binary value as a locator literal.

Syntax

```
locator_literal(<locator_type>, <literal_locator>)
```

Parameters

<locator_type>
is the type of locator. One of `text_locator`, `image_locator`, or `unitext_locator`.

<literal_locator>
is the actual binary value of a LOB locator.

Examples

Example 1

This example inserts an image LOB that is stored in memory and identified by its locator in the `imagecol` column of `my_table`. Use of the `locator_literal` function ensures that the SAP ASE server correctly interprets the binary value as a LOB locator.

```
insert my_table (imagecol) values
    (locator_literal(image_locator,
0x9067ef4501000000001000000040100400800000000))
```

Usage

Use `locator_literal` to ensure that the SAP ASE server correctly identifies the literal locator value and does not misinterpret it as an image or other binary.

See also `deallocate locator`, `truncate lob` in *Reference Manual: Commands*.

Permissions

Any user can execute `locator_literal`.

Related Information

locator_valid [page 237]
return_lob [page 315]
create_locator [page 123]

3.93 locator_valid

Determines whether a LOB locator is valid.

Syntax

```
locator_valid (<locator_descriptor>)
```

Parameters

<locator_descriptor>

is a valid representation of a LOB locator: a host variable, a local variable, or the literal binary value of a locator.

Examples

Example 1

Validates the locator value 0x9067ef4501000000001000000401004008000000000:

```
locator_valid (0x9067ef4501000000001000000401004008000000000)
-------------------
                   1
```

Usage

- `locator_valid` returns 1 if the specified locator is valid. Otherwise, it returns 0 (zero).
- A locator becomes invalid if invalidated by the `deallocate lob` command, or at the termination of a transaction.

See also `deallocate locator`, `truncate lob` in *Reference Manual: Commands*.

Permissions

Any user can execute `locator_valid`.

Related Information

create_locator [page 123]
locator_literal [page 236]
return_lob [page 315]

3.94 lockscheme

Returns the locking scheme of the specified object as a string.

Syntax

```
lockscheme(<object_name>)
```

```
lockscheme(<object_id> [<, db_id>])
```

Parameters

<object_name>

is the name of the object that the locking scheme returns. <object_name> can also be a fully qualified name.

<db_id>

the ID of the database specified by <object_id>.

<object_id>

the ID of the object that the locking scheme returns.

Examples

Example 1

Selects the locking scheme for the titles table in the current database:

```
select lockscheme("titles")
```

Example 2

Selects the locking scheme for <object_id> 224000798 (in this case, the titles table) from database ID 4 (the pubs2 database):

```
select lockscheme(224000798, 4)
```

Example 3

Returns the locking scheme for the titles table (<object_name> in this example is fully qualified):

```
select lockscheme(tempdb.ownerjoe.titles)
```

Usage

- lockscheme returns varchar(11) and allows NULLs.
- lockscheme defaults to the current database if you:
  - Do not provide a fully qualified <object_name>.
  - Do not provide a <db_id>.
  - Provide a null for <db_id>.
- If the specified object is not a table, lockscheme returns the string “not a table.”

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute lockscheme.

Auditing

You can enable func_obj_access auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_obj_access	86	lockscheme	• *Roles* – Current active roles • *Keywords or options* – LOCKSCHEME • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.95 log

Calculates the natural logarithm of the specified number.

Syntax

```
log(<approx_numeric>)
```

Parameters

<approx_numeric>
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Calculates the log of 20:

```
select log(20)
```

```
--------------------
             2.995732
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `log`.

Related Information

log10 [page 242]
power [page 297]

3.96 log10

Calculates the base 10 logarithm of the specified number.

Syntax

```
log10(<approx_numeric>)
```

Parameters

<approx_numeric>
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Calculates the base 10 log of 20:

```
select log10(20)
```

```
--------------------
           1.301030
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `log10`.

Related Information

log [page 241]
power [page 297]

3.97 loginfo

Returns information about a transaction log.

Syntax

```
loginfo (<dbid> | '<dbname>', '<option>']
```

```
loginfo (<dbid> | '<dbname>', '<option>', '<option1>']
```

Parameters

<dbid>

is the database ID.

<dbname>

is the database name.

<option>

is the specific information you need about the transaction log. Valid options are:

- active_pages – the total number of pages between the oldest active transaction and the end of the log.
- can_free_using_dump_tran – returns a number from 0 to 100 indicating the span of transaction log which can be truncated with the dump transaction command without having to abort oldest active transaction. If there is a secondary truncation point before the start of the oldest active transaction, then this is the span in the log (in percent) between the start of the log (first log page) and the secondary truncation point. If the secondary truncation point is not before the oldest active transaction, then this is the span in the log (in percent) between the start of the log (first log page) and start of the oldest active transaction.
- checkpoint_date – returns the date of the most recent checkpoint log record.
- checkpoint_marker – returns the record ID (RID) in the log that contains the most recent checkpoint log record.
- checkpoint_page – returns the page number in the log that contains the most recent checkpoint log record.
- database_has_active_transaction – returns 0 if there are no active transactions in the log. Returns 1 if there is an active transaction in the log.
- first_page – returns the page number of the first log page.
- help – shows a message with the different options.
- in-memory row storage options:
    - imrs_active_pages – returns the number of pages btween the allocation unit that contains the oldest inserted RID (truncation point) and the last page of sysimrslogs. This part of the imrslog cannot be truncated without moving the corresponding IMRS content to disk.
    - imrs_available_space – returns the number of unreserved pages (free pages) in the imrslog segment that can be used for logging.
    - imrs_can_free_using_dump_tran – returns the percentage of total imrslog pages that can be freed using dump transaction. dump transaction moves the first page of sysimrslogs to the first page of the allocation unit that contain the oldest active RID, freeing inactive pages.
    - imrs_first_page – returns the first page of sysimrslogs of the IMRS-enabled database, which specifies the start of imrslog. The first page of sysimrslogs always points to the first page of the allocation unit, which is the page next to the allocation page.
    - imrs_flush_sysdb – does not return anything, but updates the imrslogptr and imrsloglastptr columns in sysdatabases.
    - imrs_inactive_pages – returns the number of pages between the first page of sysimrslogs and the last allocation unit that does not contain the oldest inserted RID (which is just before the truncation point). This part of imrslog can be truncated.
    - imrs_in_memory_lct – returns the current value of the last-chance threshold for the specified segment in a given database.

    - `imrs_lct_size` – returns the last chance threshold for the `imrslog`. All the transactions on `imrslog` are suspended if the `imrslog` extends beyond this threshold.
    - `imrs_logpages_needed_to_pack` – returns the same information as `imrs_numrows_to_pack`, but in terms of the number of `imrslog` pages.
    - `imrs_numrows_to_pack` – returns the number of IMRS rows that must be packed to accommodate the number of requested allocation units in `imrslog`.
    - `imrs_oldest_transaction_page` – returns the RID of the oldest transaction that performed an `insert` on the IMRS. This is the first RID of the active `imrslog` that must be recovered. The pages between the first page of `sysimrslogs` and the oldest inserted RID need not be recovered, but are part of `imrslog`.
    - `imrs_root_page` – returns the last page of `sysimrslogs` in the IMRS-enabled database, indicating the end of the `imrslog`.
    - `imrs_rowver_ximrs` – returns the number of IMRS row versions that must be freed to move the truncation point.
    - `imrs_total_pages` – returns the total number of `imrslog` pages in use. That is, the total number of pages between the first page of sysimrslogs and the last page of sysimrslog allocation units, inclusive
- `inactive_pages` – the total number of log pages between `first_page` and either `stp_page` or `oldest_transaction`, whichever comes first. This is the number of log pages that will be truncated by the `dump transaction` command.
- `is_dump_in_progress` – returns 1 if `dump transaction` command is in progress, or returns 0 if no dump command is in progress.
- `is_stp_blocking_dump` – returns 1 if there is a secondary truncation point before the start of the oldest active transaction, otherwise, returns 0.
- `oldest_active_transaction_date` – returns the start time of oldest active transaction. Returns binary(8) number which needs to be converted to date as shown in the example below:

```
select (convert(datetime, convert(binary(8),
    loginfo(4, 'oldest_active_transaction_date')), 109))
```

- `oldest_active_transaction_page` – returns the logical page number of start of oldest active transaction in the log, or returns 0 if there is no active transaction.
- `oldest_active_transaction_pct` – returns a number from 0 to 100 indicating the span of the oldest active transaction in percentage of total log space.
- `oldest_active_transaction_spid` – returns the spid of the session having the oldest active transaction in the log of the SAP ASE.
- `oldest_transaction_date` – is the date at which the oldest active transaction started.
- `oldest_transaction_marker` – returns the RID (page number and row ID) in the log on which the oldest active transaction at the time of the most recent checkpoint, started. If there was no active transaction at the time of the most recent checkpoint, `oldest_transaction_marker` returns the same value as `checkpoint_marker`.
- `oldest_transaction_page` – returns the page number in the log on which the oldest active transaction at the time of the most recent checkpoint, started. If there

was no active transaction at the time of the most recent checkpoint, `oldest_transaction_page` returns the same value as `checkpoint_page`.

- `root_page` – returns the page number of the last log page.
- `stp_page` – returns the page number of the secondary truncation point (STP), if it exists. The secondary truncation point (or STP) is the point in the log of the oldest transaction yet to be processed for replication. The transaction may or may not be active. In cases where the transaction is no longer active, the STP by definition precedes the oldest active transaction.
- `stp_pages` – the total number of log pages between the STP and the oldest active transaction.
- `stp_span_pct` – returns a number from 0 to 100 indicating the span of secondary truncation point to the end of log with respect to total log space.
- `total_pages` – is the total number of log pages in the log chain, from `first_page` to `root_page`.
- `until_time_date` – is the latest time that could be encapsulated in the dump that is usable by the `until_time` clause of `load transaction`.
- `until_time_marker` – is the RID (page number and row ID) of the log record associated with `until_time_date`.
- `until_time_page` – is the log page on which the log record associated with `until_time_date` resides.
- `xactspanbyspid` – This option is to be used only with the third parameter, which is the SPID of the task. Returns the transaction span if the SPID has an active transaction in the log. Returns 0 otherwise.

> **i Note**
>
> For a Mixed Log Data (MLD) database, this function returns a value equivalent to 0. The new options for this function are not supported or meant to be used for MLD databases.

Examples

Example 1

Shows how to display transaction log information for "testdb" database:

```
select loginfo('testdb', 'database_has_active_transaction') as has_act_tran,
       loginfo('testdb', 'oldest_active_transaction_spid') as OA_tran_spid,
       loginfo('testdb', 'oldest_active_transaction_pct') as Act_log_portion_pct,
       loginfo('testdb', 'can_free_using_dump_tran') as dump_tran_free_pct,
       loginfo('testdb', 'is_stp_blocking_dump') as is_stp_blocking,
       loginfo('testdb', 'stp_span_pct') as stp_span_pct
```

```
has_act_tran OAtran_spid Act_log_portion_pct dump_tran_free_pct is_stp_blocking
stp_span_pct
------------ ------------ ------------------- ------------------ ---------------
------------
     1             14                 17                   7
0             25
```

The function returns the transaction log information:

- 1 active transaction
- 14 is the SPID of the oldest transaction
- 17 percent of the log that is occupied by an active transaction
- 7 percent of the transaction log that can be freed by using the dump transaction command
- 0 blocking secondary truncation points
- 25 percent of the log that is occupied by the span of the secondary truncation point

Example 2

Returns the amount of log space that is spanned for a particular transaction in "testdb" identified by spid = 15.

```
select loginfo ('testdb', 'xactspanbyspid', 15)
go
 --------------------
     5
```

Permissions

- Granular permissions disabled – sa role or database owner
- Granular permissions enabled – sa role, techsupport_role, or database owner.

The permission checks for `loginfo` differ based on your granular permissions settings.

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Enabled</td><td>With granular permissions enabled, for:
<code>imrs_free_using_dumptran</code> and <code>imrs_numrows_to_pack</code> – requires the sa_role, Technical Support role, or be the database owner.
All other options – database_access role</td></tr>
<tr><td>Disabled</td><td>With granular permissions disabled, for:
<code>imrs_free_using_dumptran</code> and <code>imrs_numrows_to_pack</code> – requires the sa_role or be the database owner.
All other options – database_access role</td></tr>
</table>

3.98 lower

Converts uppercase characters to lowercase, returning a character value.

Syntax

```
lower(<char_expr> | <uchar_expr>)
```

Parameters

<char_expr>
is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr>
is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Converts the cities in the `publishers` database to lowercase:

```
select lower(city) from publishers
```

```
--------------------
boston
washington
berkeley
```

Usage

- `lower` is the inverse of `upper`.
- If `<char_expr>` or `<uchar_expr >`is NULL, returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `lower`.

Related Information

upper [page 426]

3.99 lpad

Returns the string indicated, left-padded, and includes the specified padding to the left of the string to a length of ten characters.

Syntax

```
LPAD(<string>, <length>, <string_padding>)
```

Parameters

`<string>`
Is the string you are returning.

`<length>`
Is the length, in characters, used for padding.

`<string_padding>`
Are the characters used for padding.

Returns

If the value for `<string>` is longer than the value specified by `<length>`, the return value is truncated to the number of characters specified by`<length>`.

Examples

Four characters

Returns a string of four characters, left-padded with `??`:

```
select lpad('hi', 4, '??')
??hi
```

Nine characters

Returns a string of nine characters, left-padded with `*.`:

```
select lpad('hi', 9, '*.')
*.*.*.*hi
```

Single character

Returns a string of a single character, left-padded with `??`:

```
select lpad('hi',1,'??')
h
```

Usage

- The return value is truncated to the value specified for length if `<string>` is longer than `<length>`.
- The maximum length that `lpad` can return depends on:
  - The size of the characters. Generally, the maximum length of the string is greater for single-byte character sets (1 byte per character) than for unichar or for multibyte character sets (less than 1 byte per character).
  - If trace flag 244 is disabled, SAP ASE limits the number of bytes to 1024 (about 512 Unicode characters), up to to 1024 single byte characters, and between 256 and 1024 multibyte characters.
  - If trace flag 244 is enabled, SAP ASE limits the number of bytes to 16384 (with pro-rata characters based on character type).
- String length is calculated in characters, not in bytes. For multibyte characters (for example, `utf8`), output buffer sizes (in bytes) may need to be adjusted accordingly, depending on the values of the `string` and `string_padding` parameters.

3.100 lprofile_id

Returns the login profile ID of the specified login profile name, or the login profile ID of the login profile associated with the current login or the specified login name.

Syntax

```
lprofile_id(<name>)
```

Parameters

<name>

(Optional) login profile name or a login name.

Examples

Example 1

Returns the login profile ID of the specified login profile name:

```
select lprofile_id('intern_lr')
```

```
------------------
      3
```

Example 2

Returns the login profile ID of the current login:

```
select lprofile_id()
```

```
------------------
      4
```

Example 3

Returns the login profile ID of a specified login name:

```
select lprofile_id('jon')
```

```
------------------
      5
```

Usage

If you:

- Specify a login profile name – `lprofile_id` returns the corresponding login profile ID. If you specify a login name, `lprofile_id` returns the associated (if any) login profile ID.
- Do not specify `<name>` – `lprofile_id` returns the login profile ID of the current login.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `lprofile_id` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, any user can execute `lprofile_id` to return the ID of their own profile. You must have `manage any login profile` permission to execute `lprofile_id` and retrieve the profile ID of other users.
Disabled	With granular permissions disabled, any user can execute `lprofile_id` to return the ID of their own profile. You must be a user with `sso_role` to execute `lprofile_id` and retrieve the profile ID of other users.

Related Information

lprofile_name [page 253]

3.101 lprofile_name

Returns the login profile name of the specified login profile ID, or the login profile name of the login profile associated with the current login or the specified login suid.

Syntax

```
lprofile_id(<ID>)
```

Parameters

<ID>

(Optional) login profile ID or a login suid.

Examples

Example 1

Returns the login profile name of a specified login:

```
select lprofile_name(lprofile_id('jon') )
```

```
------------------
admin_lr
```

Example 2

Returns the login profile name of the specified login profile ID:

```
select lprofile_name(3)-------------intern_lr
```

Example 3

Returns login profile name of the current login:

```
select lprofile_name()
```

```
------------------
supervisor_lr
```

Usage

If you:

- Specify a login profile ID – `lprofile_name` returns its corresponding login profile name. If you specify a login suid, `lprofile_name` returns the associated (if any) login profile name.
- Do not specify `<ID>` – `lprofile_name` returns the login profile name of the current login.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `lprofile_name` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, any user can execute `lprofile_name` to return the profile name of their own profile. You must have `manage any login profile` permission to execute `lprofile_name` and retrieve the profile name of other users.
Disabled	With granular permissions disabled, any user can execute `lprofile_name` to return the profile name of their own profile. You must have `sso_role` to execute `lprofile_name` and retrieve the profile name of other users.

Related Information

lprofile_id [page 251]

3.102 ltrim

Removes leading blanks from the character expression. Only values equivalent to the space character in the current character set are removed.

Syntax

```
ltrim(<char_expr> | <uchar_expr>)
```

Parameters

<char_expr>
: is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr>
: is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Removes the leading blanks before "123":

```
select ltrim("     123")
```

```
-------
123
```

Usage

- If `<char_expr>` or `<uchar_expr>` is NULL, returns NULL.
- For Unicode expressions, returns the lowercase Unicode equivalent of the specified expression. Characters in the expression that have no lowercase equivalent are left unmodified.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `ltrim`.

Related Information

rtrim [page 332]

3.103 max

Returns the maximum value in a column or expression.

Syntax

```
max(<expression>)
```

Parameters

`<expression>`

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery.

Examples

Example 1

Returns the maximum value in the `discount` column of the `salesdetail` table as a new column:

```
select max(discount) from salesdetail
```

```
--------------------
            62.200000
```

Example 2

Returns the maximum value in the `discount` column of the `salesdetail` table as a new row:

```
select discount from salesdetail
compute max(discount)
```

Usage

- You can use `max` with exact and approximate numeric, character, and `datetime` columns; you cannot use it with `bit` columns. With character columns, `max` finds the highest value in the collating sequence. `max` ignores null values. `max` implicitly converts `char` datatypes to `varchar`, and `unichar` datatypes to `univarchar`, stripping all trailing blanks.
- `unichar` data is collated according to the default Unicode sort order.
- `max` preserves the trailing zeros in `varbinary` data.
- `max` returns a `varbinary` datatype from queries on `binary` data.
- The SAP ASE server goes directly to the end of the index to find the last row for `max` when there is an index on the aggregated column, unless:
    - The `<expression>` not a column.
    - The column is not the first column of an index.
    - There is another aggregate in the query.
    - There is a `group by` or `where` clause.

See also:

- `compute`, `group by and having` clauses, `select`, `where` clause in *Reference Manual: Commands*
- For general information about aggregate functions, see *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `max`.

Related Information

avg [page 70]
min [page 259]

3.104 migrate_instance_id

If issued in the context of a migrated task, `migrate_instance_id` returns the instance ID of the instance from which the caller migrated. If issued in the context of a nonmigrated task, `migrate_instance_id` returns the ID of the current instance.

Syntax

```
migrate_instance_id()
```

Usage

You may issue `migrate_instance_id` from a login trigger to determine which statements in the trigger should be executed in case a task is migrated.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `migrate_instance_id`.

3.105 min

Returns the lowest value in a column.

Syntax

```
min(<expression>)
```

Parameters

<expression>

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Example 1

Returns the lowest value in the `price` column:

```
select min(price) from titles
    where type = "psychology"
```

```
------------------------
                   7.00
```

Usage

- You can use `min` with numeric, character, `time`, and `datetime` columns, but not with `bit` columns. With character columns, `min` finds the lowest value in the sort sequence. `min` implicitly converts `char` datatypes to `varchar`, and `unichar` datatypes to `univarchar`, stripping all trailing blanks. `min` ignores null values. `distinct` is not available, since it is not meaningful with `min`.
- `min` preserves the trailing zeros in `varbinary` data.
- `min` returns a `varbinary` datatype from queries on `binary` data.
- `unichar` data is collated according to the default Unicode sort order.
- The SAP ASE server goes directly to the first qualifying row for `min` when there is an index on the aggregated column, unless:

- The `<expression>` is not a column.
  - The column is not the first column of an index.
  - There is another aggregate in the query.
  - There is a `group by` clause.

See also:

- `compute`, `group by and having` clauses, `select`, `where` clause in *Reference Manual: Commands*
- *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `min`.

Related Information

Expressions [page 468]
avg [page 70]
max [page 256]

3.106 month

Returns an integer that represents the month in the `datepart` of a specified date.

Syntax

```
month(<date_expression>)
```

Parameters

<date_expression>

is an expression of type `datetime`, `smalldatetime`, `date`, or a character string in a `datetime` format.

Examples

Example 1

Returns the integer 11:

```
select month("11/02/03")
----------
11
```

Usage

`month(<date_expression>)` is equivalent to `datapart(<mm>, <date_expression>)`.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `month`.

Related Information

System and User-Defined Datatypes [page 13]
datepart [page 148]
day [page 152]
year [page 453]

3.107 mut_excl_roles

Returns information about the mutual exclusivity between two roles.

Syntax

```
mut_excl_roles (<role1, role2 >[membership | activation])
```

Parameters

<role1>
is one user-defined role in a mutually exclusive relationship.

<role2>
is the other user-defined role in a mutually exclusive relationship.

<level>
is the level (`membership` or `activation`) at which the specified roles are exclusive.

Examples

Example 1

Shows that the `admin` and `supervisor` roles are mutually exclusive:

```
alter role admin add exclusive membership supervisor
select
mut_excl_roles("admin", "supervisor", "membership")
```

```
-----------
          1
```

Usage

`mut_excl_roles`, a system function, returns information about the mutual exclusivity between two roles. If the System Security Officer defines `role1` as mutually exclusive with `role2` or a role directly contained by `role2`, `mut_excl_roles` returns 1. If the roles are not mutually exclusive, `mut_excl_roles` returns 0.

See also:

- `alter role`, `create role`, `drop role`, `grant`, `set`, `revoke` in *Reference Manual: Commands*
- *Transact-SQL Users Guide*
- `sp_activeroles`, `sp_displayroles` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute `mut_excl_roles`.

Related Information

proc_role [page 298]
role_contain [page 323]
role_id [page 324]
role_name [page 326]

3.108 newid

Generates human-readable, globally unique IDs (GUIDs) in two different formats, based on arguments you provide. The length of the human-readable format of the GUID value is either 32 bytes (with no dashes) or 36 bytes (with dashes).

Syntax

```
newid([<optionflag>])
```

Parameters

`<option flag>`

- 0, or no value – the GUID generated is human-readable (`varchar`), but does not include dashes. This argument, which is the default, is useful for converting values into `varbinary`.
- -1 – the GUID generated is human-readable (`varchar`) and includes dashes.
- -0x0 – returns the GUID as a `varbinary`.
- Any other value for `newid` returns NULL.

Examples

Example 1

Creates a table with `varchar` columns 32 bytes long, then uses `newid` with no arguments with the `insert` statement:

```
create table t (UUID varchar(32))
go
insert into t values (newid())
insert into t values (newid())
go
select * from t
```

```
UUID
--------------------------------
f81d4fae7dec11d0a76500a0c91e6bf6
7cd5b7769df75cefe040800208254639
```

Example 2

Produces a GUID that includes dashes:

```
select newid(1)
```

```
------------------------------------
b59462af-a55b-469d-a79f-1d6c3c1e19e3
```

Example 3

Creates a default that converts the GUID format without dashes to a `varbinary(16)` column:

```
create table t (UUID_VC varchar(32), UUID varbinary(16))
go
create default default_guid
as
strtobin(newid())
go
sp_bindefault default_guid, "t.UUID"
go
insert t (UUID_VC) values (newid())
go
```

Example 4

Returns a new GUID of type `varbinary` for every row that is returned from the query:

```
select newid(0x0) from sysobjects
```

Example 5

Uses newid with the varbinary datatype:

```
sp_addtype binguid, "varbinary(16)"
create default binguid_dflt
as
newid(0x0)
sp_bindefault "binguid_dflt","binguid"
create table T1 (empname char(60), empid int, emp_guid binguid)
insert T1 (empname, empid) values ("John Doe", 1)
insert T1 (empname, empid( values ("Jane Doe", 2)
```

Usage

- newid generates two values for the globally unique ID (GUID) based on arguments you pass to newid. The default argument generates GUIDs without dashes. By default newid returns new values for every filtered row.
- You can use newid in defaults, rules, and triggers, similar to other functions.
- Make sure the length of the varchar column is at least 32 bytes for the GUID format without dashes, and at least 36 bytes for the GUID format with dashes. The column length is truncated if it is not declared with these minimum required lengths. Truncation increases the probability of duplicate values.
- An argument of zero is equivalent to the default.
- You can use the GUID format without dashes with the strtobin function to convert the GUID value to 16-byte binary data. However, using strtobin with the GUID format with dashes results in NULL values.
- Because GUIDs are globally unique, they can be transported across domains without generating duplicates.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute newid.

3.109 next_identity

Retrieves the next identity value that is available for the next `insert`.

Syntax

```
next_identity(<table_name>)
```

Parameters

<table_name>
identifies the table being used.

Examples

Example 1

Updates the value of c2 to 10. The next available value is 11.

```
select next_identity ("t1")
t1
--------
11
```

Usage

`next_identity` returns:

- The next value to be inserted by this task. In some cases, if multiple users are inserting values into the same table, the actual value reported as the next value to be inserted is different from the actual value inserted if another user performs an intermediate insert. If you insert identity values yourself via the `set identity_insert table on` statement then `next_identity` will not get updated by the insert. Only update will be the `reserve_identity()` function until `identity_insert` is turned off again.
- A `varchar` character to support any precision of the identity column. If the table is a proxy table, a non-user table, or the table does not have identity property, NULL is returned.

Permissions

The permission checks for `next_identity` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be the table owner, or be a user with `select` permission on the identity column of the table, or have `manage database` permission to execute `next_identity`.
Disabled	With granular permissions disabled, you must be the database owner or table owner, or be a user with `sa_role`, or have `select` permission on the identity column of the table to execute `next_identity`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`next_identity`	• *Roles* – Current active roles • *Keywords or options* – `NEXT_IDENTITY` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.110 nullif

Allows SQL expressions to be written for conditional values. `nullif` expressions can be used anywhere a value expression can be used; alternative for a `case` expression.

Syntax

```
nullif(<expression>, <expression>)
```

Parameters

nullif

compares the values of the two expressions. If the first expression equals the second expression, `nullif` returns NULL. If the first expression does not equal the second expression, `nullif` returns the first expression.

<expression>

is a column name, a constant, a function, a subquery, or any combination of column names, constants, and functions connected by arithmetic or bitwise operators.

Examples

Example 1

Selects the `titles` and `type` from the `titles` table. If the book type is UNDECIDED, `nullif` returns a NULL value:

```
select title,
    nullif(type, "UNDECIDED")
from titles
```

Alternately, you can also write:

```
select title,
    case
        when type = "UNDECIDED" then NULL
        else type
    end
from titles
```

Usage

- `nullif` expression alternate for a `case` expression.
- `nullif` expression simplifies standard SQL expressions by allowing you to express a search condition as a simple comparison instead of using a `when...then` construct.
- You can use `nullif` expressions anywhere an expression can be used in SQL.
- At least one result of the `case` expression must return a non-null value. For example the following results in an error message:

```
select price, coalesce (NULL, NULL, NULL)
from titles
```

```
All result expressions in a CASE expression must not be NULL.
```

- If your query produces a variety of datatypes, the datatype of a `case` expression result is determined by datatype hierarchy. If you specify two datatypes that the SAP ASE server cannot implicitly convert (for example, `char` and `int`), the query fails.

See also `case`, `coalesce`, `select`, `if...else`, `where` clause in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `nullif`.

Related Information

Expressions [page 468]

3.111 object_attr

Reports the table's current logging mode, depending on the session, table and database-wide settings.

Syntax

```
object_attr(<table_name>, <string>)
```

Parameters

<table_name>

name of a table.

<string>

is the name of the table property that has been queried. The supported string values are:

dml_logging — Returns the DML logging level for the requested object in effect, based on the explicitly set table or database's DML logging level.

dml_logging for session	Returns the DML logging level for the current session, taking into account the user running `object_attr`, the table's schema, and rules regarding multistatement transactions, and so on. The return value from this argument can be different for different users, and different for statements or transactions for the same user.
compression	Returns the compression type for the requested object.
help	Prints a list of supported string arguments.

Examples

Example 1

To determine which properties he or she can query, the user runs:

```
select object_attr('sysobjects', 'help')
```

```
Usage: object_attr('tabname', 'attribute')
List of options in attributes table:
     0 : help
     1 : dml_logging
     2 : dml_logging for session
     3 : compression
```

`dml_logging` reports the statically defined `dml_logging` level for the object, and `dml_logging for session` reports the runtime logging level chosen for the object, depending on the database-specific and session settings.

Example 2

The default logging mode of a table with durability set to `full`:

```
select object_attr("pubs2..authors",
         "dml_logging")
Returns: FULL
```

Example 3

If the session has logging disabled for all tables, the logging mode returned for tables owned by this user is `minimal`.

```
select object_attr("pubs2..authors",
         "dml_logging")
Returns: FULL
SET DML_LOGGING MINIMAL
go
select object_attr("pubs2..authors",
         "dml_logging for session")
Returns: MINIMAL
```

Example 4

If a table has been altered to explicitly select minimal logging, `object_attr` returns a value of `minimal`, even if the session and database-wide logging is FULL.

```
create database testdb WITH DML_LOGGING = FULL
go
create table non_logged_table (...)
WITH DML_LOGGING = MINIMAL
go
select object_attr("non_logged_table",
         "dml_logging")
Returns: MINIMAL
```

Example 5

Changes a table's logging from full to minimal. If you explicitly create a table with `full` logging, you can reset the logging to `minimal` during a session if you are the table owner or a user with the `sa_role`:

1. Create the `testdb` database with minimal logging:

   ```
   create database testdb
   with dml_logging = minimal
   ```

2. Create a table with `dml_logging` set to `full`:

   ```
   create table logged_table(...)
   with dml_logging = full
   ```

3. Reset the logging for the session to `minimal`:

   ```
   set dml_logging minimal
   ```

4. The logging for the table is minimal:

   ```
   select object_attr("logged_table",
            "dml_logging for session")
   --------------------
   ```

   ```
   minimal
   ```

Example 6

If you create a table without specifying the logging mode, changing the session's logging mode also changes the table's logging mode:

- Create the table normal_table:

  ```
  create table normal_table
  ```

- Check the session's logging:

  ```
  select object_attr("normal_table", "dml_logging")
  -------------------------
  FULL
  ```

- Set the session logging to `minimal`:

  ```
  set dml_logging minimal
  ```

- The table's logging is set to `minimal`:

```
select object_attr("normal_table",
         "dml_logging for session")
-----------------------------
minimal
```

Example 7

The logging mode returned by `object_attr` depends on the table you run it against. In this example, user joe runs a script, but the logging mode the SAP ASE server returns changes. The tables `joe.own_table` and `mary.other_table` use a `full` logging mode:

```
select object_attr("own_table","dml_logging")
```

```
--------------
          FULL
```

When joe runs `object_attr` against `mary.other_table`, this table is also set to full:

```
select object_attr("mary.other_table", "dml_logging")
```

```
--------------
          FULL
```

If joe changes the dml_logging to minimal, only the logging mode of the tables he owns are affected:

```
set dml_logging minimal
```

```
select object_attr("own_table", "dml_logging for session")
```

```
--------------
       MINIMAL
```

Tables owned by other users continue to operate in their default logging mode:

```
Select object_attr("mary.other_table", "dml_logging for session")
```

```
--------------
          FULL
```

Example 8

Identify the run-time choices of logging a new `show_exec_info`, and use it in the SQL batch:

1. Enable `set showplan`:

   ```
   set showplan on
   ```

2. Enable the `set` command:

   ```
   set show_exec_info on
   ```

3. Set `dml_logging` to `minimal` and check the logging with `object_attr`:

   ```
   set dml_logging minimal
   select object_attr("logged_table", "dml_logging for session")
   ```

4. Delete rows from the table:

```
delete logged_table
```

The SAP ASE server reports the table's logging mode at run-time with `show_exec_info` parameter.

Usage

- The return type is a `varchar`, which appropriately returns the value of the property (for example, on or off) depending on the property queried for.
- The logging mode as reported by extensions to showplan output might be affected at run-time, if there are `set` statements in the same batch, preceding the execution of the DML, which changes the logging mode of the table
- The return value is the value NULL (not the string "NULL") for an unknown property.
- A special-type of string parameter, `help` prints to the session's output all the currently supported properties for `object_attr`. This allows you to quickly identify which properties are supported by `object_attr`.

3.112 object_id

Returns the object ID of the specified object.

Syntax

```
object_id(<object_name>)
```

Parameters

<object_name>

is the name of a database object, such as a table, view, procedure, trigger, default, or rule. The name can be fully qualified (that is, it can include the database and owner name). Enclose the `<object_name>` in quotes.

Examples

Example 1

Returns the object IDs from `titles`:

```
select object_id("titles")
```

```
-----------
  208003772
```

Example 2

Returns the object ID from `sysobjects`:

```
select object_id("master..sysobjects")
```

```
-----------
          1
```

Usage

- `object_id`, a system function, returns the object's ID. Object IDs are stored in the `id` column of `sysobjects`.
- Instead of consuming resources, `object_id` discards the descriptor for an object that is not already in the cache.

See also:

- *Transact-SQL Users Guide*
- `sp_help` in *Reference Manual: Procedures*
- `sysobjects` in *Reference Manual: Tables*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `object_id`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`object_id`	• *Roles* – Current active roles • *Keywords or options* – `OBJECT_ID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

col_name [page 101]
db_id [page 156]
object_name [page 275]

3.113 object_name

Returns the name of the object with the object ID you specify; up to 255 bytes in length.

Syntax

```
object_name(<object_id>[, <database_id>])
```

Parameters

`<object_id>`

is the object ID of a database object, such as a table, view, procedure, trigger, default, or rule. Object IDs are stored in the `id` column of `sysobjects`.

<database_id>

is the ID for a database if the object is not in the current database. Database IDs are stored in the `db_id` column of `sysdatabases`.

Examples

Example 1

```
select object_name(208003772)
```

```
------------------------------
titles
```

Example 2

```
select object_name(1, 1)
```

```
------------------------------
sysobjects
```

Usage

See also:

- *Transact-SQL Users Guide*
- `sp_help` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `object_name`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`object_name`	• *Roles* – Current active roles • *Keywords or options* – `OBJECT_NAME` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

Related Information

col_name [page 101]
db_id [page 156]
object_id [page 273]

3.114 object_owner_id

Returns an object's owner ID.

Syntax

```
object_owner_id(<object_id>[, <database_id>])
```

Parameters

<object_id>

is the ID of the object you are investigating.

<database_id>

is the ID of the database in which the object resides.

Examples

Example 1

Selects the owner's ID for an object with an ID of 1, in the database with the ID of 1 (the master database):

```
select object_owner_id(1,1)
```

Permissions

Any user can execute `object_owner_id`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`object_owner_id`	• *Roles* – Current active roles • *Keywords or options* – `OBJECT_OWNER_ID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.115 pageinfo

Returns information from the page header or extent structure for a given object. This function is used to programatically retrieve data from a page or extent for a given object and to build troubleshooting scripts using SQL interfaces.

Syntax

```
pageinfo(<db_id>, <page_number>, "field_name" | "help"  )
```

Parameters

<database_id>

is the ID of the database in which the page resides.

<page_number>

page number for which the information is to be fetched.

field name

name of fields that can be fetched from either the page header, or the associated extent structure from the allocation page.

- page number – current page number field on the page header.
- next page – next page number field on the page header.
- previous page – previous page number value on the page header.
- partition id – partition ID for which this page belongs.
- index id – index ID value on the page header.

Following are the semantics of the value returned for data pages. For other types of page formats, the values reported by these fields is interpreted depending on the page type:

- free offset – offset of first unused byte on page header.
- status word – status word describing internal properties of a page.
- min row length – minimum row-length of rows on this page.
- next row number – next row number that can be inserted on this page.
- index level – index level of a valid data page or index page. Datapages return a value of 0.

The following fields retrieve information about the extent that controls the given page number from the corresponding allocation page:

- object id on extent – object ID for which the page belongs.
- index id on extent – index ID for which the page belongs.
- partition id on extent – partition ID for which the page belongs.

- extent oam page – OAM page ID that contains the allocation page entry for the allocation page containing the extent for which the page belongs.
- page allocated – checks whether the page number is currently allocated. Returns the partition ID if the page number is currently allocated; otherwise returns 0.
- extent allocated – given the allocation unit/allocation page number, checks whether the extent is currently allocated. Returns the object ID if the extent is currently allocated; otherwise returns 0.
- allocated extents – returns the number of extents allocated, to any object or index, on the allocation page controlling the given page number.
- allocated objects – returns the distinct object IDs allocated on the allocation unit corresponding to the page. A specified allocation unit or allocation page number returns the number of distinct objects (as an object ID) in the allocation unit.
- allocated partitions – returns distinct ptnid and indid combination on the allocation unit corresponding to the page. A specified allocation unit or allocation page number returns the number of distinct partitions (as a partition ID and index ID) in the allocation unit.

help

lists the possible options for the `field name` parameter.

Examples

Example 1

Lists the possible options for the `field name` parameter for database <db_id> 1 and <page_number> 1:

```
select pageinfo(1,1,"help")
List of options in Page_fields table:
         0 : help
         1 : page number
         2 : next page
         3 : previous page
         4 : partition id
         5 : index id
         6 : free offset
         7 : status word
         8 : min row length
         9 : next row number
        10 : index level
        11 : object id on extent
        12 : index id on extent
        13 : partition id on extent
        14 : extent oam page
        15 : lob compression level
        16 : page allocated
        17 : extent allocated
        18 : allocated extents
        19 : allocated objects
        20 : allocated partitions
        21 : number of alloc units
        22 : allocated pages
-----------
        NULL
(1 row affected)
```

Example 2

Returns the index level of index page 3552 of the database with a <db_id> of 1:

```
select pageinfo(1,3552,"index level")
 -----------
     2
(1 row affected)
```

Example 3

Returns the number of distinct object (using object_id) that are allocated on allocation unit 0 of the database with a <db_id> of 1:

```
select pageinfo(1,0,"allocated objects")
 -----------
     11
(1 row affected)
```

Example 4

Returns the distinct partitions (as a partition ID and index ID) that are allocated on allocation unit 0 of the database with a <db_id> of 1:

```
select pageinfo(1,0,"allocated partitions")
 -----------
     24
(1 row affected)
```

Usage

- If a NULL value is passed for the database ID, uses the current database ID.
- Returns NULL if a NULL value is passed for the page number or field name.
- Return NULL if an invalid or non-existent page number is provided, or an unknown field name is requested.
- `pageinfo` is provided as a diagnostic interface. In a busy system, where page identities are constantly changing, or pages are being deallocated and re-allocated to other objects repeatedly, using `pageinfo` might result in either inconsistent results, or result in errors during accessing pages. The recommended use is in situations where the affected pages are not undergoing frequent accesses or modifications.

Permissions

Requires`sybase_ts_role`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`pageinfo`	• *Roles* – Current active roles • *Keywords or options* – `PAGEINFO` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.116 pagesize

Returns the page size, in bytes, for the specified object.

Syntax

```
pagesize (<object_name> [,< index_name>]  |  <object_id>
[,<db_id> [, <index_id> ] ] )
```

Parameters

<object_name>
: is the object name of the page size of this function returns.

<index_name>
: indicates the index name of the page size you want returned.

<object_id>
: is the object ID of the page size this function returns.

<db_id>
: is the database ID of the object.

<index_id>
: is the index ID of the object you want returned.

Examples

Example 1

Selects the page size for the `title_id` index in the current database.

```
select pagesize("title", "title_id")
```

Example 2

Returns the page size of the data layer for the object with `<object_id>` 1234 and the database with a `<db_id>` of 2 (the previous example defaults to the current database):

```
select pagesize(1234,2, null)
select pagesize(1234,2)
select pagesize(1234)
```

Example 3

All default to the current database:

```
select pagesize(1234, null, 2)
select pagesize(1234)
```

Example 4

Selects the page size for the `titles` table (`object_id` 224000798) from the `pubs2` database (`db_id` 4):

```
select pagesize(224000798, 4)
```

Example 5

Returns the page size for the nonclustered index's pages table `mytable`, residing in the current database:

```
pagesize(object_id('mytable'), NULL, 2)
```

Example 6

Returns the page size for object `titles_clustindex` from the current database:

```
select pagesize("titles", "titles_clustindex")
```

Usage

- `pagesize` defaults to the data layer if you do not provide an index name or `<index_id>` (for example, `select pagesize("t1")`) if you use the word "null" as a parameter (for example, `select pagesize("t1", null)`.
- If the specified object is not an object requiring physical data storage for pages (for example, if you provide the name of a view), `pagesize` returns 0.
- If the specified object does not exist, `pagesize` returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `pagesize`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`pagesize`	• *Roles* – Current active roles • *Keywords or options* – `PAGESIZE` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.117 partition_id

Returns the partition ID of the specified data or index partition name.

Syntax

```
partition_id(<table_name>, <partition_name>[,<index_name>])
```

Parameters

`<table_name>`

is the name for a table.

`<partition_name>`

is the partition name for a table partition or an index partition.

`<index_name>`

is the name of the index of interest.

Examples

Example 1

Returns the partition ID corresponding to the partition name `testtable_ptn1` and index id 0 (the base table). The `testtable` must exist in the current database:

```
select partition_id("testtable", "testtable_ptn1")
```

Example 2

Returns the partition ID corresponding to the partition name `testtable_clust_ptn1` for the index name clust_index1. The `testtable` must exist in the current database:

```
select partition_id("testtable", "testtable_clust_ptn1", "clust_index1")
```

Example 3

This is the same as the previous example, except that the user need not be in the same database as where the target table is located:

```
select partition_id("mydb.dbo.testtable", "testtable_clust_ptn1",
    "clust_index1")
```

Usage

You must enclose `<table_name>`, `<partition_name>` and `<index_name>` in quotes.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`partition_id`	• *Roles* – Current active roles • *Keywords or options* – `PARTITION_ID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

data_pages [page 132]
object_id [page 273]
partition_name [page 286]
reserved_pages [page 311]
row_count [page 329]
used_pages [page 386]

3.118 partition_name

Returns the explicit name of a new partition, `partition_name` returns the partition name of the specified data or index partition id.

Syntax

```
partition_name(<indid>, <ptnid>[, <dbid>])
```

Parameters

<indid>

is the index ID for the target partition.

<ptnid>

is the ID of the target partition.

<dbid>

is the database ID for the target partition. If you do not specify this parameter, the target partition is assumed to be in the current database.

Examples

Example 1

Returns the partition name for the given partition ID belonging to the base table (with an index ID of 0). The lookup is done in the current database because it does not specify a database ID:

```
select partition_name(0, 1111111111)
```

Example 2

Returns the partition name for the given partition ID belonging to the clustered index (index ID of 1 is specified) in the `testdb` database.

```
select partition_name(1, 1212121212, db_id("testdb")
```

Usage

If the search does not find the target partition, the return is NULL.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`partition_name`	• *Roles* – Current active roles • *Keywords or options* – `PARTITION_NAME` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

data_pages [page 132]
object_id [page 273]
partition_id [page 284]
reserved_pages [page 311]
row_count [page 329]

3.119 partition_object_id

Displays the object ID for a specified partition ID and database ID.

Syntax

```
partition_object_id(<partition_id> [, <database_id> ] )
```

Parameters

<partition_id>

is the ID of the partition whose object ID is to be retrieved.

<database_id>

is the database ID of the partition.

Examples

Example 1

Displays the object ID for partition ID 2:

```
select partition_object_id(2)
```

Example 2

Displays the object ID for partition ID 14 and database ID 7:

```
select partition_object_id(14,7)
```

Example 3

Returns a NULL value for the database ID because a NULL value is passed to the function:

```
select partition_object_id( 1424005073, NULL)
```

```
 -----------
NULL
(1 row affected)
```

Usage

- `partition_object_id` uses the current database ID if you do not include a database ID.
- `partition_object_id` returns NULL if you:
    - Use a NULL value for the `<partition_id>`.
    - Include a NULL value for `<database_id>`.
    - Provide an invalid or non-existent `<partition_id>` or `<database_id>`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`partition_object_id`	• *Roles* – Current active roles • *Keywords or options* – `PARTITION_OBJECT_ID` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.120 password_random

Generates a pseudorandom password that satisfies the global password complexity checks defined on the SAP ASE server. "Pseudorandom" indicates that the SAP ASE server is simulating random-like numbers, since no computer generates truly random numbers.

Syntax

```
password_random ([<pwdlen> | null])
```

```
password_random ({<pwdlen> | null}, {<substring> | null})
```

Parameters

`<pwdlen>`

is an integer that specifies the length of the random password. If you omit `<pwdlen>`, the SAP ASE server generates a password with a length determined by the "`<minimum password length>`" global option, for which the default value is 6.

`<substring>`

is a string that will not be included in the generated random password. Pass the name of the login the password is being generated for to avoid violating the `disallow simple passwords` password complexity check.

Examples

Example 1

Shows the password complexity checks stored in the server:

```
minimum password length:           10
disallow simple passwords:          1
min digits in password:             2
min alpha in password:              4
min upper char in password:         1
min special char in password:      -1
min lower char in password:         1
select password_random()
----------------------
6pY5l6UT]Q
```

Example 2

Shows password complexity checks stored in the server:

```
minimum password length:                   15
disallow simple passwords:                 1
minimum digits in password:                4
minimum alpha in password:                 4
minimum upper-case characters in password: 1
minimum lower-case characters in password: 2
minimum special characters in password:    4
select password_random(25)
-----------------
S/03iuX[ISi:Y=?8f.[eH%P51
```

Example 3

Updates the `password` column with random passwords for all employees who have names that begin with “A”:

```
update employee
set password = password_random()
where name like 'A%'
```

Example 5

Enclose the random password generated in single or double quotes if using it directly:

```
select @password = password_random(11)
-----------
%k55Mmf/2U2
sp_addlogin 'jdoe','%k55Mmf/2U2'
```

Example 6

Generates a random password with the length 4 that does not contain the sub-string `am3`.

```
disallow simple passwords:   1
minimum password length:     3
```

```
select password_random(4,"am3")
-----------
E=Ij
```

Example 7

Generates a random password with the default length that does not contain the sub-string `am3`.

```
disallow simple passwords:   1
minimum password length:     3
select password_random(null,"am3")
-----------
9v+
```

Example 8

Generates a random password with the default length that does not contain the sub-string `am3%$a`.

```
disallow simple passwords:   1
minimum password length:     3
select password_random(null,"am3%$a")
-----------
gLG
```

Usage

The passwords generated by `password_random()` are pseudorandom; to generate truly random passwords, use a stronger random generator.

The complexity checks are:

- Minimum password length
- Disallow simple passwords
- Minimum number of:
  - Digits in password
  - Special characters in password
  - Alphabetic characters in password
  - Uppercase characters in password
  - Lowercase characters in password

See *Security Administration Guide > Manage SAP ASE Logins and Database Users > Choose and Create a Password > Password Complexity Checks*.

3.121 patindex

Returns the starting position of the first occurrence of a specified pattern.

Syntax

```
patindex("%<pattern>%", <char_expr>|<uchar_expr>[, using
    {bytes | characters | chars}])
```

Parameters

<pattern>

is a character expression of the char or varchar datatype that may include any of the pattern-match wildcard characters supported by the SAP ASE server. The % wildcard character must precede and follow <pattern> (except when searching for first or last characters)..

<char_expr>

is a character-type column name, variable, or constant expression of char, varchar, nchar, nvarchar, text_locator, or unitext_locator type.

<uchar_expr>

is a character-type column name, variable, or constant expression of unichar, or univarchar type.

using

specifies a format for the starting position.

bytes

returns the offset in bytes.

chars or characters

returns the offset in characters (the default).

Examples

Example 1

Selects the author ID and the starting character position of the word “circus” in the copy column:

```
select au_id, patindex("%circus%", copy)
from blurbs
```

```
au_id
```

```
----------- -----------
486-29-1786           0
648-92-1872           0
998-72-3567          38
899-46-2035          31
672-71-3249           0
409-56-7008           0
```

Example 3

Finds all the rows in `sysobjects` that start with “sys” with a fourth character that is “a”, “b”, “c”, or “d”:

```
select name
from sysobjects
where patindex("sys[a-d]%", name) > 0
```

```
name
------------------------------
sysalternates
sysattributes
syscharsets
syscolumns
syscomments
sysconfigures
sysconstraints
syscurconfigs
sysdatabases
sysdepends
sysdevices
```

Usage

- `patindex`, a string function, returns an integer representing the starting position of the first occurrence of `<pattern>` in the specified character expression, or a 0 if `<pattern>` is not found.
- You can use `patindex` on all character data, including `text` and `image` data.
- For `text`, `unitext`, and `image` data, if `ciphertext` is set to `1`, then `patindex` is not supported. An error message appears.
- For `text`, `unitext`, and `image` data, if `ciphertext` is set to `0`, then the byte or character index of the pattern within the plaintext is returned.
- For `unichar`, `univarchar`, and `unitext`, `patindex` returns the offset in Unicode characters. The pattern string is implicitly converted to UTF-16 before comparison, and the comparison is based on the `default unicode sort order` configuration. For example, this is what is returned if a unitext column contains row value U+0041U+0042U+d800U+dc00U+0043:

```
select patindex("%C%", ut) from unitable
-----------
4
```

- By default, `patindex` returns the offset in characters; to return the offset in bytes (multibyte character strings), specify `using bytes`.
- Include percent signs before and after `<pattern>`. To look for `<pattern>` as the first characters in a column, omit the preceding %. To look for `<pattern>` as the last characters in a column, omit the trailing %.
- If `<char_expr>` or `<uchar_expr>` is NULL, `patindex` returns 0.

- If you give a `varchar` expression as one parameter and a `unichar` expression as the other, the `varchar` expression is implicitly converted to `unichar` (with possible truncation).

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `patindex`.

Related Information

Pattern Matching with Wildcard Characters [page 489]
charindex [page 95]
substring [page 402]

3.122 pi

Returns the constant value 3.1415926535897936.

Syntax

```
pi()
```

Examples

Example 1

Returns pi:

```
select pi()
```

```
--------------------
          3.141593
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `pi`.

Related Information

degrees [page 168]
radians [page 302]

3.123 power

Returns the value that results from raising the specified number to a given power. `power`, a mathematical function, returns the value of `<value>` raised to the power `<power>`. Results are of the same type as `<value>`.

Syntax

```
power(<value>, <power>)
```

Parameters

`<value>`
is a numeric value.

`<power>`
is an exact numeric, approximate numeric, or money value.

Examples

Example 1

Returns the value that results from raising 2 to the power of 3:

```
select power(2, 3)
```

```
-----------
          8
```

Usage

In expressions of type `numeric` or `decimal`, this function returns precision:38, scale 18.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `power`.

Related Information

exp [page 179]
log [page 241]
log10 [page 242]

3.124 proc_role

Returns information about whether the user has been granted a specified role.

> **i Note**
>
> SAP recommends that you use `has_role` instead of `proc_role`. You need not, however, convert your existing uses of `proc_role` to `has_role`.

Syntax

```
proc_role("<role_name>")
```

Parameters

<role_name>

is the name of a system or user-defined role.

Examples

Example 1

Creates a procedure to check if the user is a system administrator:

```
create procedure sa_check as
if (proc_role("sa_role") > 0)
begin
    print "You are a System Administrator."
    return(1)
end
```

Example 2

Checks that the user has been granted the system security officer role:

```
select proc_role("sso_role")
```

Example 3

Checks that the user has been granted the operator role:

```
select proc_role("oper_role")
```

Usage

- Using `proc_role` with a procedure that starts with “sp_” returns an error.
- `proc_role`, a system function, checks whether an invoking user has been granted, and has activated, the specified role.
- `proc_role` returns 0 if the user has:
    - Not been granted the specified role
    - Not been granted a role which contains the specified role
    - Been granted, but has not activated, the specified role
- `proc_role` returns 1 if the invoking user has been granted, and has activated, the specified role.
- `proc_role` returns 2 if the invoking user has a currently active role, which contains the specified role.

See also:

- `alter role`, `create role`, `drop role`, `grant`, `revoke`, `set` in *Reference Manual: Commands*
- *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `proc_role`.

Auditing

Only the execution of `proc_role` from within a system stored procedure is audited.

You can enable `security` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	80	`proc_role`	• *Roles* – current active roles • *Keywords or options* – NULL • *Previous value* – NULL • *Current value* – NULL • *Other information* – Required roles • *Proxy information* – original login name, if a `set proxy` is in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

mut_excl_roles [page 262]
role_contain [page 323]
role_id [page 324]
role_name [page 326]
show_role [page 360]

3.125 pssinfo

Returns information from the SAP ASE process status structure (pss).

Syntax

```
pssinfo(<spid> | 0, '<pss_field>' [,<database_name>])
```

Parameters

<spid>

is the process ID. When you enter 0, the current process is used.

<pss_field>

is the process status structure field. Valid values are:

- `dn` – distinguished name when using LDAP authentication.
- `extusername` – when using external authentication like (PAM, LDAP), `extusername` returns the external PAM or LDAP user name used.
- `ipaddr` – client IP address.
- `ipport` – client IP port number used for the client connection associated with the user task being queried.
- `isolation_level` – isolation level for the current session.
- `tempdb_pages` – number of `tempdb` pages used.
- `trace_spid` – returns the spid the `set tracefile` command is tracing.
- `tracefile_is_set` – returns a non-zero value if the spid is being traced.
- `trace_fname` – returns the tracefile opened for capture.
- `suid` – SUID of the spid.
- `progname` – name of the client driver program, supplied at log in.
- `progvers` – version of the client driver program, supplied at log in.
- `tdsvers` – version of the client TDS, as an SAP ASE client.
- `client_progname` – version of the currently active client program.
- `client_progvers` – version of the currently active client program.
- `client_tdsvers` – version of the currently active client TDS.
- `retstat` – return status of the last executed stored procedure.
- `client_cap_largeident` – returns 1 if the client supports large identifiers.
- `has_sysversions_tran` – returns NULL if <database_name> is not found. Returns 1 if the process includes any on-disk, multi-version concurrency control (on-disk MVCC) transactions for <database_name>.

Examples

Example 1

Displays the port number for `spid` number 14:

```
select pssinfo(14,'ipport')
```

```
----------------
           52039
```

Usage

- `<database_name>` is ignored for all `<pss_field>` invocations except the `has_sysversions_tran` option.
- The `pssinfo` function also includes the option to display the external user name and the distinguished name.
- `ipport` output, combined with `ipaddr` output, allows you to uniquely identify network traffic between the SAP ASE server and the client.

Permissions

The permission checks for `pssinfo` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be the owner of the process ID, or have `manage server` permission to execute `pssinfo`.
Disabled	With granular permissions disabled, you must be the owner of the process ID, or be a user with `sa_role` or `sso_role` to execute `pssinfo`.

3.126 radians

Converts degrees to radians. Returns the size, in radians, of an angle with the specified number of degrees.

Syntax

```
radians(<numeric>)
```

Parameters

`<numeric>`

is any exact numeric (`numeric`, `dec`, `decimal`, `tinyint`, `smallint`, or `int`), approximate numeric (`float`, `real`, or `double precision`), or `money` column, variable, constant expression, or a combination of these.

Examples

Example 1

Returns the size, in radians, of 2578:

```
select radians(2578)
```

```
-----------
         44
```

Usage

- `radians`, a mathematical function, converts degrees to radians. Results are of the same type as `<numeric>`.
- To express numeric or decimal datatypes, this function returns precision: 38, scale 18.
- When money datatypes are used, internal conversion to `float` may cause loss of precision.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `radians`.

Related Information

degrees [page 168]

3.127 rand

Returns a random float value between 0 and 1 using the specified (optional) integer as a seed value.

Syntax

```
rand([<integer>])
```

Parameters

<integer>

is any integer (`tinyint`, `smallint`, or `int`) column name, variable, constant expression, or a combination of these.

Examples

Example 1

Returns a random float value:

```
select rand()
```

```
--------------------
           0.395740
```

Example 2

Returns a random float value for a seed value of 100:

```
declare @seed int
select @seed=100
select rand(@seed)
```

```
--------------------
             0.000783
```

Usage

The `rand` function uses the output of a 32-bit pseudorandom integer generator. The integer is divided by the maximum 32-bit integer to give a double value between 0.0 and 1.0. The `rand` function is seeded randomly at server start-up, so getting the same sequence of random numbers is unlikely, unless the user first initializes this function with a constant seed value.

The `rand` function is a global resource.

Multiple users calling the `rand` function progress along a single stream of pseudorandom values. If a repeatable series of random numbers is needed, the user must assure that the function is seeded with the same value initially and that no other user calls `rand` while the repeatable sequence is desired.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `rand`.

Related Information

Approximate Numeric Datatypes [page 16]
rand2 [page 305]

3.128 rand2

Returns a random value between 0 and 1, which is generated using the specified seed value, and computed for each returned row when used in the `select` list. Unlike `rand`, it is computed for each returned row when it is used in the `select` list.

Syntax

```
rand2([<integer>])
```

Parameters

<integer>

is any integer (`tinyint`, `smallint`, or `int`) column name, variable, constant expression, or a combination of these.

Examples

Example 1

If there are n rows is table `t`, the following select statement returns n different random values, not just one.

```
select rand2() from t
------------
```

Usage

- The behavior of `rand2` in places other than the `select` list is undefined.
- The `rand` and `rand2` functions use the output of a 32-bit pseudorandom integer generator. The integer is divided by the maximum 32-bit integer to give a double value between 0.0 and 1.0. `and2` is seeded randomly at server start-up, so getting the same sequence of random numbers is unlikely, unless the user first initializes this function with a constant seed value.
  The `rand2` function is a global resource.
  Multiple users calling the `rand2` function progress along a single stream of pseudorandom values. If a repeatable series of random numbers is needed, the user must assure that the function is seeded with the same value initially and that no other user calls `rand` while the repeatable sequence is desired.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `rand2`.

Related Information

Approximate Numeric Datatypes [page 16]
rand [page 304]

3.129 replicate

Returns a string with the same datatype as <char_expr> or <uchar_expr> containing the same expression repeated the specified number of times or as many times as fits into 16K, whichever is less.

Syntax

```
replicate(<char_expr> | <uchar_expr>, <i><nteger_expr>)
```

Parameters

<char_expr>
is a character-type column name, variable, or constant expression of char, varchar, nchar, or nvarchar type.

<uchar_expr>
is a character-type column name, variable, or constant expression of unichar or univarchar type.

<integer_expr>
is any integer (tinyint, smallint, or int) column name, variable, or constant expression.

Examples

Example 1

Returns a string consisting of "abcd" three times:

```
select replicate("abcd", 3)
```

```
------------
abcdabcdabcd
```

Usage

If <char_expr> or <uchar_expr >is NULL, returns a single NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `replicate`.

Related Information

stuff [page 400]

3.130 reserve_identity

`reserve_identity` allows a process to reserve a block of identity values for use by that process.

Syntax

```
reserve_identity (<table_name>, <number_of_values>)
```

Parameters

<table_name>

is the name of the table for which the reservation are made. The name can be fully qualified; that is, it can include the <database_name>, <owner_name>, and <object_name> (in quotes).

<number_of_values>

is the number of sequential identity values reserved for this process. This must be a positive value that does not cause any of the reserved values to exceed the maximum values for the datatype of the identity column.

Examples

Example 1

Describes a typical usage scenario for `reserve_identity`, and assumes that `table1` includes `col1` (with a datatype of `int`) and a `col2` (an identity column with a datatype of `int`). This process is for spid 3:

```
select reserve_identity("table1", 5 )
```

```
---------------
10
```

Insert values for spids 3 and 4:

```
Insert table1 values(56) -> spid 3
Insert table1 values(48) -> spid 3
Insert table1 values(96) -> spid 3
Insert table1 values(02) -> spid 4
Insert table1 values(84) -> spid 3
```

Select from table `table1`:

```
select * from table1
```

```
Col1           col2
--------        -----
3               1-> spid 3 reserved 1-5
3               2-> spid 3
3               3-> spid 3
4               6<= spid 4 gets next unreserved value
3               4<= spid 3 continues with reservation
```

The result set shows that spid 3 reserved identity values 1 – 5, spid 4 receives the next unreserved value, and then spid 3 reserves the subsequent identity values.

Usage

- After a process calls `reserve_identity` to reserve the block of values, subsequent identity values needed by this process are drawn from this reserved pool. When these reserved numbers are exhausted, or if you insert data into a different table, the existing identity options apply. `reserve_identity` can retain more than one block of identity values, so if inserts to different tables are interleaved by a single process, the next value in a table's reserved block is used.
  Reserves a specified size block of identity values for the specified table, which are used exclusively by the calling process. Returns the reserved starting number, and subsequent `insert`s into the specified table by this process use these values. When the process terminates, any unused values are eliminated.

- The sp_configure system procedure's "identity reservation size" parameter specifies a server-wide limit on the value passed to the <number_of_values> parameter.
- The return value, <start_value>, is the starting value for the block of reserved identity values. The calling process uses this value for the next insert into the specified table
- reserve_identity allows a process to:
    - Reserve identity values without issuing an insert statement.
    - Know the values reserved prior issuing the insert statement
    - "Grab" different size blocks of identity values, according to need.
    - Better control "over gaps" by reserving only what is needed (that is, they are not restricted by preset server grab size
- Values are automatically used with no change to the insert syntax.
- NULL values are returned if:
    - A negative value or zero is specified as the block size.
    - The table does not exist.
    - The table does not contain an identity column.
- If you issue reserve_identity on a table in which this process has already reserved these identity values, the function succeeds and the most recent group of values is used.
- You cannot use reserve_identity to reserve identity values on a proxy table. Local servers can use reserve_identity on a remote table if the local server calls a remote procedure that calls reserve_identity. Because these reserved values are stored on the remote server but in the session belonging to the local server, subsequent inserts to the remote table use the reserved values.
- If the identity_gap is less than the reserved block size, the reservation succeeds by reserving the specified block size (not an identity_gap size) of values. If these values are not used by the process, this results in potential gaps of up to the specified block size regardless of the identity_gap setting.

See also sp_configure in *Reference Manual: Procedures*.

Permissions

You must have insert permission on the table to reserve identity values. Permission checks do not differ based on the granular permissions settings.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`reserve_identity`	• *Roles* – Current active roles • *Keywords or options* – `RESERVE_IDENTITY` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.131 reserved_pages

Reports the number of pages reserved for a database, object, or index. The result includes pages used for internal structures.

This function replaces the `reserved_pgs` function used in SAP ASE versions earlier than 15.0.

Syntax

```
reserved_pages(<dbid>, <object_id>[, <indid>[, <ptnid>]])
```

Parameters

<dbid>

is the database ID of the database where the target object resides.

<object_id>

is an object ID for a table.

<indid>

is the index ID of target index.

<ptnid>

is the partition ID of target partition.

Examples

Example 1

Returns the number of pages reserved by the object with a object ID of 31000114 in the specified database (including any indexes):

```
select reserved_pages(5, 31000114)
```

Example 2

Returns the number of pages reserved by the object in the data layer, regardless of whether or not a clustered index exists:

```
select reserved_pages(5, 31000114, 0)
```

Example 3

Returns the number of pages reserved by the object in the index layer for a clustered index. This does not include the pages used by the data layer:

```
select reserved_pages(5, 31000114, 1)
```

Example 4

Returns the number of pages reserved by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select reserved_pages(5, 31000114, 0, 2323242432)
```

Usage

- Use one of the following three methods to calculate space in a database with `reserved_pages`:
  - Use case expressions to select a value appropriate for the index you are inspecting, selecting all non-log indexes in `sysindexes` for this database. In this query:
    - The data has a value of “index 0”, and is available when you include the statements `when sysindexes.indid = 0` or `sysindexes.indid = 1`.
    - `indid` values greater than 1 for are indexes. Because this query does not sum the data space into the index count, it does not include a page count for `indid` of 0.
    - Each object has an index entry for index of 0 or 1, never both.
    - This query counts index 0 exactly once per table.

    ```
    select
    'data rsvd' = sum( case
              when indid > 1 then 0
              else reserved_pages(db_id(), id, 0)
              end ),
    'index rsvd' = sum( case
              when indid = 0 then 0
              else reserved_pages(db_id(), id, indid)
              end )
    from sysindexes
    where id != 8
    ```

```
data rsvd   index rsvd
----------   -----------
       812           1044
```

- Query `sysindexes` multiple times to display results after all queries are complete:

```
declare @data int,
@dbsize int,
@dataused int,
@indices int,
@indused int
select @data = sum( reserved_pages(db_id(), id, 0) ),
     @dataused = sum( used_pages(db_id(), id, 0) )
from sysindexes
where id != 8
and indid <= 1
select @indices = sum( reserved_pages(db_id(), id, indid) ),
     @indused = sum( used_pages(db_id(), id, indid) )
from sysindexes
where id != 8 and indid > 0
select @dbsize   as 'db size',
@data as 'data rsvd'
```

```
db size    data rsvd
----------- -----------
       NULL         820
```

- Query `sysobjects` for data space information and `sysindexes` for index information. From `sysobjects`, select table objects: [S]ystem or [U]ser:

```
declare   @data int,
          @dbsize int,
          @dataused int,
          @indices int,
          @indused int
select @data = sum( reserved_pages(db_id(), id, 0) ),
@dataused = sum( used_pages(db_id(), id, 0) )
from sysobjects
where id != 8
and type in ('S', 'U')
select @indices = sum( reserved_pages(db_id(), id, indid) ),
       @indused = sum( used_pages(db_id(), id, indid) )
from sysindexes
where id != 8
and indid > 0
select   @dbsize as 'db size',
         @data as 'data rsvd',
         @dataused as 'data used',
         @indices as 'index rsvd',
         @indused as 'index used'
```

```
db size    data rsvd    data used    index rsvd    index used
---------  -----------  -----------  -----------   ----------
     NULL          812          499         1044          381
```

- If a clustered index exists on an all-pages locked table, passing an index ID of 0 reports the reserved data pages, and passing an index ID of 1 reports the reserved index pages. All erroneous conditions result in a value of zero being returned.
- `reserved_pages` counts whatever you specify; if you supply a valid database, object, index (data is "index 0" for every table), it returns the reserved space for this database, object, or index. However, it can also count a database, object, or index multiple times. If you have it count the data space for every index in a table with multiple indexes, you get it counts the data space once for every index. If you sum these results,

you get the number of indexes multiplied by the total data space, not the total number of data pages in the object.

- Instead of consuming resources, `reserved_pages` discards the descriptor for an object that is not already in the cache.
- `reserved_pages` replaces the `reserved_pgs` function from versions of SAP ASE earlier than 15.0. These are the differences between `reserved_pages` and `reserved_pgs`.
  - In SAP ASE versions 12.5 and earlier, the SAP ASE server stored OAM pages for the data and index in `sysindexes`. In SAP ASE versions 15.0 and later, this information is stored per-partition in `syspartions`. Because this information is stored differently, `reserved_pages` and `reserved_pgs` require different parameters and have different result sets.
  - `reserved_pgs` required a page ID. If you supplied a value that did not have a matching `sysindexes` row, the supplied page ID was 0 (for example, the data OAM page of a nonclustered index row). Because 0 was never a valid OAM page, if you supplied a page ID of 0, `reserved_pgs` returned 0; because the input value is invalid, `reserved_pgs` could not count anything.
    However, `reserved_pages` requires an index ID, and 0 is a valid index ID (for example, data is "index 0" for every table). Because `reserved_pages` can not tell from the context that you do not require it to recount the data space for any index row except indid 0 or 1, it counts the data space every time you pass 0 as an index ID. Because `reserved_pages` counts this data space once per row, its yields a sum many times the true value.
    These differences are described as:
    - `reserved_pgs` does not affect the sum if you supply 0 as a value for the page ID for the OAM page input; it just returns a value of 0.
    - If you supply `reserved_pages` with a value of 0 as the index ID, it counts the data space. Issue `reserved_pages` only when you want to count the data, or you affect the sum.

See also `update statistics` in *Reference Manual: Commands*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `reserved_pgs`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`reserved_pages`	• *Roles* – Current active roles • *Keywords or options* – `RESERVED_PAGES` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

Related Information

data_pages [page 132]
reserved_pages [page 311]
row_count [page 329]
used_pages [page 386]

3.132 return_lob

Dereferences a locator, and returns the LOB referenced by that locator.

Syntax

```
return_lob (<datatype>, <locator_descriptor>)
```

Parameters

<datatype>

is the datatype of the LOB. Valid datatypes are:

- `text`
- `unitext`
- `image`

<locator_descriptor>

is a valid representation of a LOB locator: a host variable, a local variable, or the literal binary value of a locator.

Examples

Example 1

This example dereferences the locator and returns the LOB referenced by the literal locator value 0x9067ef4501000000001000000040100400800000000.

```
return_lob (text, locator_literal(text_locator,
0x9067ef4501000000001000000040100400800000000))
```

Usage

`return_lob` overrides the `set send_locator on` command, and always returns a LOB.

See also `deallocate locator`, `truncate lob` in *Reference Manual: Commands*.

Permissions

Any user can execute `return_lob`.

Related Information

create_locator [page 123]
locator_literal [page 236]
locator_valid [page 237]

3.133 reverse

Returns the specified string with characters listed in reverse order.

Syntax

```
reverse(<expression >| <uchar_expr>)
```

Parameters

<expression>
is a character or binary-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, `nvarchar`, `binary`, or `varbinary` type.

<uchar_expr>
is a character or binary-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Returns "abcd" in reverse:

```
select reverse("abcd")
```

```
----
dcba
```

Example 2

Returns the reverse of 0x12345000:

```
select reverse(0x12345000)
```

```
----------
0x00503412
```

Usage

- `reverse`, a string function, returns the reverse of `<expression>`.
- If `<expression>` is NULL, reverse returns NULL.
- Surrogate pairs are treated as indivisible and are not reversed.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `reverse`.

Related Information

lower [page 248]
upper [page 426]

3.134 right

Returns the part of the character or binary expression starting at the specified number of characters from the right. Return value has the same datatype as the character expression.

Syntax

```
right(<expression>, <integer_expr>)
```

Parameters

`<expression>`

is a character or binary-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, `unichar`, `nvarchar`, `univarchar`, `binary`, or `varbinary` type.

<integer_expr>

is any integer (`tinyint`, `smallint`, or `int`) column name, variable, or constant expression.

Examples

Example 1

Returns the part of "abcde" starting at three characters from the right:

```
select right("abcde", 3)
```

```
 ---
 cde
```

Example 2

Returns the part of "abcde" starting at two characters from the right:

```
select right("abcde", 2)
```

```
 --
 de
```

Example 3

Returns the part of "abcde" starting at six characters from the right:

```
select right("abcde", 6)
```

```
 -----
 abcde
```

Example 4

Returns the part of "0x12345000" starting at three characters from the right:

```
select right(0x12345000, 3)
```

```
 -------
 0x345000
```

Example 5

Returns the part of "0x12345000" starting at two characters from the right:

```
select right(0x12345000, 2)
```

```
 ------
 0x5000
```

Example 6

Returns the part of "0x12345000" starting at six characters from the right:

```
select right(0x12345000, 6)
```

```
 ---------
 0x12345000
```

Usage

- `right`, a string function, returns the specified number of characters from the rightmost part of the character or binary expression.
- If the specified rightmost part begins with the second surrogate of a pair (the low surrogate), the return value starts with the next full character. Therefore, one less character is returned.
- The return value has the same datatype as the character or binary expression.
- If `<expression>` is NULL, right returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute `right`.

Related Information

rtrim [page 332]
substring [page 402]

3.135 rm_appcontext

Removes a specific application context, or all application contexts. `rm_appcontext` is provided by the Application Context Facility (ACF).

Syntax

```
rm_appcontext("<context_name>", "<attribute_name>")
```

Parameters

<context_name>
: is a row specifying an application context name. It is saved as datatype `char(30)`.

<attribute_name>
: is a row specifying an application context attribute name. It is saved as datatype `char(30)`.

Examples

Example 1

Removes an application context by specifying some or all attributes:

```
select rm_appcontext("CONTEXT1", "*")
```

```
----------
0
```

```
select rm_appcontext("*", "*")
```

```
---------
0
```

```
select rm_appcontext("NON_EXISTING_CTX","ATTR")
```

```
---------
-1
```

Example 2

Shows the result when a user without appropriate permissions attempts to remove an application context:

```
select rm_appcontext("CONTEXT1","ATTR2")
```

```
----------
```

```
-1
```

Usage

- This function always returns 0 for success.
- All the arguments for this function are required.

For more information on the ACF see *Row-Level Access Control* in *System Administration Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `rm_appcontext` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `select` permission on `rm_appcontext` to execute the function.
Disabled	With granular permissions disabled, you must be a user with `sa_role`, or have `select` permission on `rm_appcontext` to execute the function.

Related Information

get_appcontext [page 183]
list_appcontext [page 234]
set_appcontext [page 335]

3.136 role_contain

Determines whether a specified role is contained within another specified role.

Syntax

```
role_contain("<role1>", "<role2>")
```

Parameters

<role1>

is the name of a system or user-defined role.

<role2>

is the name of another system or user-defined role.

Examples

Example 1

Determines whether intern_role is contained within doctor_role:

```
select role_contain("intern_role", "doctor_role")
```

```
-----------
1
```

Example 2

Determines whether specialist_role is contained within intern_role:

```
select role_contain("specialist_role", "intern_role")
```

```
-----------
0
```

Usage

`role_contain`, a system function, returns 1 if `<role1>` is contained by `<role2>`. Otherwise, role_contain returns 0.

See also:

- `alter role` in *Reference Manual: Commands*
- For more information about contained roles and role hierarchies, see the *System Administration Guide*. For system functions, see *Transact-SQL Users Guide*.
- `sp_activeroles`, `sp_displayroles` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `role_contain`.

Related Information

mut_excl_roles [page 262]
proc_role [page 298]
role_id [page 324]
role_name [page 326]

3.137 role_id

Returns the role ID of the specified role name.

Syntax

```
role_id("<role_name>")
```

Parameters

<role_name>

is the name of a system or user-defined role. Role names and role IDs are stored in the `syssrvroles` system table.

Examples

Example 1

Returns the system role ID of sa_role:

```
select role_id("sa_role")
```

```
------
0
```

Example 2

Returns the system role ID of the intern_role:

```
select role_id("intern_role")
```

```
------
6
```

Usage

- `role_id`, a system function, returns the system role ID (srid). System role IDs are stored in the `srid` column of the `syssrvroles` system table.
- If the <role_name> is not a valid role in the system, the SAP ASE server returns NULL.

See also:

- Roles – see the *System Administration Guide*
- System functions – see *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `role_id`.

Related Information

mut_excl_roles [page 262]
proc_role [page 298]
role_contain [page 323]
role_name [page 326]

3.138 role_name

Returns the role name of the specified role ID.

Syntax

```
role_name(<role_id>)
```

Parameters

<role_id>
is the system role ID (`srid`) of the role. Role names are stored in `syssrvroles`.

Examples

Example 1

Returns the role name of ID 01:

```
select role_name(01)
```

```
------------------------------
sso_role
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute `role_name`.

Related Information

mut_excl_roles [page 262]
proc_role [page 298]
role_contain [page 323]
role_id [page 324]

3.139 round

Returns the value of the specified number, rounded to the specified number of decimal places.

Syntax

```
round(<number>, <decimal_places>)
```

Parameters

<number>
is any exact numeric (`numeric`, `dec`, `decimal`, `tinyint`, `smallint`, `int`, or `bigint`), approximate numeric (`float`, `real`, or `double precision`), `money` column, variable, constant expression, or a combination of these.

<decimal_places>
is the number of decimal places to round to.

Examples

Example 1

Returns the value of 123.4545, rounded to 2 decimal places:

```
select round(123.4545, 2)
```

```
----------
  123.4500
```

Example 2

Returns the value of 123.45, rounded to -2 decimal places:

```
select round(123.45, -2)
```

```
----------
  100.00
```

Example 3

Returns the value of 1.2345E2, rounded to 2 decimal places:

```
select round(1.2345E2, 2)
```

```
-----------------
       123.450000
```

Example 4

Returns the value of 1.2345E2, rounded to -2 decimal places:

```
select round(1.2345E2, -2)
```

```
-----------------
      100.000000
```

Usage

- `round`, a mathematical function, rounds the `<number>` so that it has `<decimal_places>` significant digits.
- A positive value for `<decimal_places>` determines the number of significant digits to the right of the decimal point; a negative value for `<decimal_places>` determines the number of significant digits to the left of the decimal point.
- Results are of the same type as `<number>` and, for numeric and decimal expressions, have an internal precision equal to the precision of the first argument plus 1 and a scale equal to that of `<number>`.
- `round` always returns a value. If `<decimal_places>` is negative and exceeds the number of significant digits specified for `<number>`, the SAP ASE server returns 0. (This is expressed in the form 0.00, where the

number of zeros to the right of the decimal point is equal to the scale of `numeric`.) For example, the following returns a value of 0.00:

```
select round(55.55, -3)
```

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `round`.

Related Information

abs [page 59]
ceiling [page 89]
floor [page 180]
sign [page 364]
str [page 393]

3.140 row_count

Returns an estimate of the number of rows in the specified table.

Syntax

```
row_count(<dbid>, <object_id> [,<ptnid>] [, "<option>"])
```

Parameters

<dbid>

is the database ID where target object resides.

<object_id>

is the object ID of table.

<ptnid>

is the partition ID of interest.

<option>

allows you to limit the scope of the information returned. One of:

- 1 – suppresses auditing.
- `rowcompressed` – returns the number of row-compressed rows
- `pagecompressed` – returns the number of page-compressed rows
- `uncompressed` – returns the number of uncompressed rows
- `compressed` – returns the number of compressed rows

The in-memory row storage (IMRS) supports these options:

- `imrs_inserted_rows` – returns the number of inserted rows that are still in memory. For example, if there are initially 1000 in memory, and 500 were packed later, so now `imrs_inserted_rows` would return 500.
- `imrs_migrated_rows` – returns the number of migrated rows.
- `imrs_inserted_del_rows` – returns the number of inserted rows that are committed, then deleted, but remain in the IMRS.
- `imrs_migrated_del_rows` – returns the number of migrated rows that are committed, then deleted, but remain in the IMRS.

See *In-Memory Database Users Guide > In-Memory Row Storage* for a discussion of types of rows (inserted, migrated, and cached) in the IMRS.

Examples

Example 1

Returns an estimate of the number of rows in the given object:

```
select row_count(5, 31000114)
```

Example 2

Returns an estimate of the number of rows in the specified partition (with partition ID of 2323242432) of the object with object ID of 31000114:

```
select row_count(5, 31000114, 2323242432)
```

Example 3

Returns an estimate of the number of rows in the specified partition from an in-memory enabled table (with an object ID of 12, a partition ID of 56000997, and an object ID of 56000997

```
select row_count(12, 292556, 56000997, 'imrs_migrated_rows')
```

Usage

- All erroneous conditions return in a value of zero being returned.
- The sum of the `row_count inserted`, `migrated` and `cached` options should equal the row count returned by the `in imrs` option
- `imrs_inserted_rows` returns the number of inserted rows that are still in memory. For example, if there are initially 1000 inserted rows that are in-memory, but 500 of these are packed, `imrs_inserted_rows` returns a value of 500.
- The rows `row_count` returns include all rows in the in-memory row storage.
- Instead of consuming resources, `row_count` discards the descriptor for an object that is not already in the cache.

Standards

ANSI SQL – Compliance level: Transact-SQL extension

Permissions

Any user can execute `row_count`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`row_count`	• *Roles* – Current active roles • *Keywords or options* – `ROW_COUNT` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

Related Information

reserved_pages [page 311]
used_pages [page 386]

3.141 rtrim

Trims the specified expression of trailing blanks.

Syntax

```
rtrim(<char_expr> | <uchar_expr>)
```

Parameters

<char_expr>
is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr>
is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Trims the trailing blanks off after "abcd":

```
select rtrim("abcd    ")
```

```
--------
abcd
```

Usage

- For Unicode, a blank is defined as the Unicode value U+0020.
- If `<char_expr>` or `<uchar_expr>` is NULL, returns NULL.
- Only values equivalent to the space character in the current character set are removed.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `rtrim`.

Related Information

ltrim [page 255]

3.142 sdc_intempdbconfig

(Cluster environments only) Returns 1 if the system is currently in temporary database configuration mode; if not, returns 0.

Syntax

```
sdc_intempdbconfig()
```

Examples

Example 1

Displays whether the system is in temporary database configuration mode or not:

```
select sdc_intempdbconfig()
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sdc_intempdbconfig`.

3.143 session_context

Returns the value of <session_variable> assigned to the current session.

Syntax

```
session_context(<session_variable>)
```

Parameters

<session_variable>

is the name of session variable.

Examples

Example 1

Returns the value of the application variable for the current session.

Declare session variable `session_12` and set its value to `ase_session`:

```
set 'session_12' = 'ase_session'
```

Returns the value for the session variable:

```
select session_context('session_12')
------------------------------------
ase_session
```

Usage

- The maximum length for the value is 512 characters.

Permissions

The permission checks for `session_context` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `select` permission on `session_context` to execute the function.
Disabled	With granular permissions disabled, you must be a user with `sa_role`, or have `select` permission on `session_context` to execute the function.

3.144 set_appcontext

Sets an application context name, attribute name, and attribute value for a user session, defined by the attributes of a specified application. `set_appcontext` is a provided by the Application Context Facility (ACF).

Syntax

```
set_appcontext("<context_name>, "<attribute_name>", "<attribute_value>")
```

Parameters

<context_name>
is a row that specifies an application context name. It is saved as the datatype `char(255)`.

<attribute_name>
is a row that specifies an application context attribute name. It is saved as the datatype `char(255)`.

<attribute_value>
is a row that specifies and application attribute value. It is saved as the datatype `char(512)`.

Examples

Example 1

Creates an application context called CONTEXT1, with an attribute ATTR1 that has the value VALUE1.

```
select set_appcontext ("CONTEXT1", "ATTR1", "VALUE1")
```

```
---------------
0
```

Example 2

Shows `set_appcontext` including a datatype conversion in the value.

```
declare@numericvarchar varchar(25)
select @numericvar = "20"
select set_appcontext ("CONTEXT1", "ATTR2",
convert(char(20), @numericvar))
```

```
------------
0
```

Example 3

Shows the result when a user without appropriate permissions attempts to set the application context.

```
select set_appcontext("CONTEXT1", "ATTR2", "VALUE1")
```

```
--------------
-1
```

Usage

- `set_appcontext` returns 0 for success and -1 for failure.

- If you set values that already exist in the current session, `set_appcontext` returns -1.
- This function cannot override the values of an existing application context. To assign new values to a context, remove the context and re-create it using new values.
- `set_appcontext` saves attributes as `char` datatypes. If you are creating an access rule that must compare the attribute value to another datatype, the rule should convert the `char` data to the appropriate datatype.
- All the arguments for this function are required.
- For more information on the Application Context Facility see *Security Administration Guide* > *Getting Started with Security Administration in Adaptive Server* > *Security features in Adaptive Server* > *Discretionary access control*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `set_appcontext` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `select` permission on `set_appcontext` to execute the function.
Disabled	With granular permissions disabled, you must be a user with `sa_role`, or have `select` permission on `set_appcontext` to execute the function.

Related Information

get_appcontext [page 183]
list_appcontext [page 234]
rm_appcontext [page 321]

3.145 setdata

Overwrites some or all of a large object (LOB).

Syntax

```
setdata(<locator_name>, <offset_value>, <new_value>)
```

Parameters

`<locator_name>`

is a locator that references the LOB value you are modifying.

`<offset_value>`

is a position within the LOB to which `<locator_name>` points. This is the position where the SAP ASE server begins writing the contents of `<new_value>`. The value for `<offset_value>` is in characters for `text_locator` and `unitext_locator`, and in bytes for `image_locator`. The first character or byte of the LOB has an `<offset_value>` of 1.

`<new_value>`

is the data with which you are overwriting the old data.

Examples

Example 1

The final select statement in this example returns the string “SAP ABC/IQ/ASA” instead of the original string, “SAP “ASE/IQ/ASA”:

```
declare @v text_locator
  select @v = create_locator
    (text_locator, convert(text, "SAP ASE/IQ/ASA")
  select setdata(@v, 8, "ABC")
  select return_lob(text, @v)
```

Usage

- `setdata` modifies the LOB value in-place. That is, the SAP ASE server does not copy the LOB before it is modified.

- If the length of `<new_value>` is longer than the remaining length of the LOB after skipping the `<offset_value>`, the SAP ASE server extends the LOB to hold the entire length of `<new_value>`.
- If the sum of `<new_value>` and `<offset_value>` is shorter than the length of the LOB, the SAP ASE server does not change or truncate the data at the end of the LOB.
- `setdata` returns NULL if the `<offset_value>` is longer than the LOB value you are updating.

See also `deallocate locator`, `truncate lob` in *Reference Manual: Commands*.

Permissions

Any user can execute `setdata`.

Related Information

create_locator [page 123]
locator_valid [page 237]
return_lob [page 315]

3.146 show_cached_plan_in_xml

Displays, in XML, the executing query plan for queries in the statement cache.

`show_cached_plan_in_xml` returns sections of the `showplan` utility output in XML format.

Syntax

```
show_cached_plan_in_xml(<statement_id>, <plan_id>, [<level_of_detail>])
```

Parameters

`<statement_id>`

is the object ID of the lightweight procedure. A lightweight procedure is one that can be created and invoked internally by the SAP ASE server. This is the `SSQLID` column from `monCachedStatement`, which contains a unique identifier for each cached statement.

`<plan_id>`

is the unique identifier for the plan. This is the PlanID from monCachedProcedures. A value of zero for <plan_id> displays the showplan output for all cached plans for the indicated SSQLID.

<level_of_detail>

is a value from 0 – 6 indicating the amount of detail show_cached_plan_in_xml returns, and determines which sections of showplan are returned by show_cached_plan_in_xml. The default value is 0.

Table 15: Level of Detail

<level_of_detail>	Parameter	opTree	execTree
0 (the default)	X	X	
1	X		
2		X	
3			X
4		X	X
5	X		X
6	X	X	X

The output of show_cached_plan_in_xml includes the <plan_id> and these sections:

- parameter – contains the parameter values used to compile the query and the parameter values that caused the slowest performance. The compile parameters are indicated with the <compileParameters> and </compileParameters> tags. The slowest parameter values are indicated with the <execParameters> and </execParameters> tags. For each parameter, show_cached_plan_in_xml displays the:
    - Number
    - Datatype
    - Value – values that are larger than 500 bytes and values for insert-value statements do not appear. The total memory used to store the values for all parameters is 2KB for each of the two parameter sets.

Examples

Example 1

Shows a query plan rendered in XML:

```
select show_cache_plan_in_xml(1328134997,0)
go
-------------------------------------------
```

```
<?xml version="1.0" encoding="UTF-8"?>
<query>
    <statementId>1328134997</statementId>
<text>
    <![CDATA[SQL Text: select name from sysobjects where id = 10]]>
</text>
<plan>
    <planId>11</planId>
    <planStatus> available </planStatus>
    <execCount>1371</execCount>
    <maxTime>3</maxTime>
    <avgTime>0</avgTime>
    <compileParameters/>
    <execParameters/>
    <opTree>
        <Emit>
        <VA>1</VA>
        <est>
            <rowCnt>10</rowCnt>
            <lio>0</lio>
            <pio>0</pio>
            <rowSz>22.54878</rowSz>
        </est>
        <act>
            <rowCnt>1</rowCnt>
        </act>
        <arity>1</arity>
            <IndexScan>
                <VA>0</VA>
                <est>
                    <rowCnt>10</rowCnt>
                    <lio>0</lio>
                    <pio>0</pio>
                    <rowSz>22.54878</rowSz>
                </est>
                <act>
                    <rowCnt>1</rowCnt>
                    <lio>3</lio>
                    <pio>0</pio>
                </act>
                <varNo>0</varNo>
                <objName>sysobjects</objName>
                <scanType>IndexScan</scanType>
                <indName>csysobjects</indName>
                <indId>3</indId>
                <scanOrder> ForwardScan </scanOrder>
                <positioning> ByKey </positioning>
                <perKey>
                    <keyCol>id</keyCol>
                    <keyOrder> Ascending </keyOrder>
                </perKey>
                <indexIOSizeInKB>2</indexIOSizeInKB>
                <indexBufReplStrategy> LRU </indexBufReplStrategy>
                <dataIOSizeInKB>2</dataIOSizeInKB>
                <dataBufReplStrategy> LRU </dataBufReplStrategy>
             </IndexScan>
        </Emit>
    </opTree>
</plan>
```

Example 2

Shows enhanced `<est>`, `<act>`, and `<scanCoverage>` tags available in 15.7.1 and later versions of SAP ASE:

```
select show_cached_plan_in_xml(1123220018, 0)
```

```
go
```

```
<?xml version="1.0" encoding="UTF-8"?>
<query>
   <statementId>1123220018</statementId>
   <text>
   <![CDATA[
   SQL Text: select distinct c1, c2 from t1, t2 where c1 = d1 PLAN
'( distinct_hashing ( nl_join ( t_scan t2 ) ( i_scan i1t1 t1 ) ) )']]>
   </text>
   <plan>
      <planId>6</planId>
      <planStatus> available </planStatus>
      <execCount>1</execCount>
      <maxTime>16</maxTime>
      <avgTime>16</avgTime>
      <compileParameters/>
      <execParameters/>
      <opTree>
         <Emit>
            <VA>4</VA>
            <est>
               <rowCnt>1</rowCnt>
               <lio>0</lio>
               <pio>0</pio>
               <rowSz>10</rowSz>
            </est>
            <arity>1</arity>
            <HashDistinct>
               <VA>3</VA>
               <est>
                  <rowCnt>1</rowCnt>
                  <lio>5</lio>
                  <pio>0</pio>
                  <rowSz>10</rowSz>
               </est>
               <arity>1</arity>
               <WorkTable>
                  <wtObjName>WorkTable1</wtObjName>
               </WorkTable>
               <NestLoopJoin>
                  <VA>2</VA>
                  <est>
                     <rowCnt>1</rowCnt>
                     <lio>0</lio>
                     <pio>0</pio>
                     <rowSz>10</rowSz>
                  </est>
                  <arity>2</arity>
                  <TableScan>
                     <VA>0</VA>
                     <est>
                        <rowCnt>1</rowCnt>
                        <lio>1</lio>
                        <pio>0.9999995</pio>
                        <rowSz>6</rowSz>
                     </est>
                     <varNo>0</varNo>
                     <objName>t2</objName>
                     <scanType>TableScan</scanType>
                     <scanOrder> ForwardScan </scanOrder>
                     <positioning> StartOfTable </positioning>
                     <scanCoverage> NonCovered </scanCoverage>
                     <dataIOSizeInKB>16</dataIOSizeInKB>
                     <dataBufReplStrategy> LRU </dataBufReplStrategy>
                  </TableScan>
                  <IndexScan>
```

```
                     <VA>1</VA>
                     <est>
                        <rowCnt>1</rowCnt>
                        <lio>0</lio>
                        <pio>0</pio>
                        <rowSz>10</rowSz>
                     </est>
                     <varNo>1</varNo>
                     <objName>t1</objName>
                     <scanType>IndexScan</scanType>
                     <indName>i1t1</indName>
                     <indId>1</indId>
                     <scanOrder> ForwardScan </scanOrder>
                     <positioning> ByKey </positioning>
                     <scanCoverage> NonCovered </scanCoverage>
                     <perKey>
                        <keyCol>c1</keyCol>
                        <keyOrder> Ascending </keyOrder>
                     </perKey>
                     <dataIOSizeInKB>16</dataIOSizeInKB>
                     <dataBufReplStrategy> LRU </dataBufReplStrategy>
                  </IndexScan>
               </NestLoopJoin>
            </HashDistinct>
         </Emit>
         <est>
            <totalLio>6</totalLio>
            <totalPio>0.9999995</totalPio>
         </est>
         <act>
            <totalLio>0</totalLio>
            <totalPio>0</totalPio>
         </act>
      </opTree>
   </plan>
</query>
```

Usage

- Enable the statement cache before you use `show_cached_plan_in_xml`.
- Use `show_cached_plan_in_xml` for cached statements only.
- The plan does not print if it is in use. Plans with the status of `available` print plan details. Plans with the status of `in use` show only the process ID.

Permissions

The permission checks for `show_cached_plan_in_xml` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be a user with `mon_role`, or have `monitor qp performance` permission to execute `show_cached_plan_in_xml`.

Granular Permissions	Description
Disabled	With granular permissions disabled, you must be a user with mon_role or sa_role to execute show_cached_plan_in_xml.

Auditing

You can enable security auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
security	86	show_cached_plan_in_xml	• *Roles* – Current active roles • *Keywords or options* – SHOW_CACHED_PLAN_IN_XML • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.147 show_cached_text

Displays the SQL text of a cached statement.

Syntax

```
show_cached_text(<statement_id>)
```

Parameters

<statement_id>

is the ID of the statement. Derived from the SSQLID column of monCachedStatement.

Examples

Example 1

Displays the contents of monCachedStatement, then uses the show_cached_text function to show the SQL text:

```
select InstanceID, SSQLID, Hashkey, UseCount, StmtType
from monCachedStatement
```

```
InstanceID  SSQLID     Hashkey      UseCount  StmtType
----------  ---------- ---------- ----------- --------
0           329111220  1108036110           0        2
0           345111277  1663781964           1        1
```

```
select show_cached_text(329111220)
```

```
--------------------------------------
select id from sysroles
```

Usage

- show_cached_text displays up to 16K of SQL text, and truncates text longer than 16K. Use show_cached_text_long for text longer than 16K.
- show_cached_text returns a varchar datatype.

Permissions

The permission checks for show_cached_text differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be a user with mon_role, or have monitor qp performance permission to execute show_cached_text.
Disabled	With granular permissions disabled, you must be a user with mon_role or sa_role to execute show_cached_text.

Auditing

You can enable `security` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`show_cached_text`	• *Roles* – Current active roles • *Keywords or options* – `SHOW_CACHED_TEXT` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.148 show_cached_text_long

Displays the SQL text for cached statements longer than 16K.

Syntax

```
show_cached_text_long(<statement_id>)
```

Parameters

<statement_id>
is the ID of the statement. Derived from the `SSQLID` column of `monCachedStatement`.

Examples

Example 1

This selects the SQL text from the monCachedStatement monitoring table (the result set has been shortened for easier readability):

```
select show_cached_text_long(SSQLID) as sql_text, StatementSize from
monCachedStatement
```

```
sql_text
                                                      StatementSize
-----------------------------------------------------------------------------
----------------------------------------
SELECT first_column ......
188888
```

Usage

- show_cached_text_long displays up to 2M of SQL text.
- show_cached_text_long returns a text datatype.
- Using show_cached_text_long requires you to configure set textsize <value> at a large value. If you configure a value that is too small, SAP ASE clients (for example, isql) truncate the show_cached_text_long result set.

Permissions

The permission checks for show_cached_text_long differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be a user with mon_role, or have monitor qp performance permission to execute show_cached_text_long.
Disabled	With granular permissions disabled, you must be a user with mon_role or sa_role to execute show_cached_text_long.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`show_cached_text_long`	• *Roles* – Current active roles • *Keywords or options* – `SHOW_CACHED_TEXT_LONG` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.149 show_condensed_text

Returns the unified SQL text for cached statements.

Syntax

```
show_condensed_text(<statement_id, option>)
```

Parameters

`<statement_id>`
is ID of the statement. Derived from the SSQLID column of `monCachedStatement`.

`<option>`
is a string constant, enclosed in quotes. One of:

- text – returns the condensed text
- hash – return the hash value for the condensed text

Examples

Example 1

displays condensed text for cached SQL text:

```
select show_condensed_text(SSQLID, 'text') from monCachedStatement
 -------------------------------------------------------------
 SELECT SHOW_CONDENSED_TEXT(SSQLID,$) FROM monCachedStatement
```

Example 2

displays the hash value of the condensed text for cached SQL text: 1:

```
 select show_condensed_text(SSQLID, 'hash') from monCachedStatement
 -------------------------------------------------------------
1331016445
```

Usage

`show_condensed_text`:

- Returns a `text` datatype
- Supports long SQL text (greater than 16KB)
- Returns NULL for invalid `<option>` values

Permissions

The permission checks for `show_condensed_text` depend on your granular permissions settings:

- Granular permissions enabled – you must have the `mon_role`, or have `monitor qp performance` permission to execute `show_condensed_text`.
- Granular permissions disabled – you must have the `mon_role` or `sa_role` to execute `show_condensed_text`.

Auditing

You can enable `security` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`show_condensed_text`	• *Roles* – Current active roles • *Keywords or options* – `SHOW_CONDENSED_TEXT` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.150 show_dynamic_params_in_xml

Returns parameter information for a dynamic SQL query (a prepared statement) in XML format.

Syntax

```
show_dynamic_params_in_xml(<object_id>)
```

Parameters

`<object_id>`

ID of the dynamic, SQL lightweight stored procedure you are investigating. Usually the return value of the `<@@plwpid>` global variable.

Examples

Example 1

In this example, first find the object ID:

```
select @@plwpid
```

```
----------------
707749902
```

Then use the ID as the input parameter for `show_dynamic_params_in_xml`:

```
select show_dynamic_params_in_xml(707749902)
```

```
<?xml version="1.0" encoding="UTF-8"?>
<query>
    <parameter>
        <number>1</number>
        <type>INT</type>
        <column>tab.col1</column>
    </parameter>
</query>
```

Parameter	Value	Definition
number	1	Dynamic parameter is in the statement's first position
type	INT	Table uses the int datatype
column	tab.col1	Query use the col1 column of the tab table

Usage

- show_dynamic_params_in_xml allows dynamic parameters in where clauses, the set clause of an update, and the <values> list of an insert.
- For where clauses, show_dynamic_params_in_xml determines associations according to the smallest subtree involving an expression with a column, a relational operator, and an expression with a parameter. For example:

  ```
  select * from tab where col1 + 1 = ?
  ```

  If the query has no subtree, show_dynamic_params_in_xml omits the <column> element. For example:

  ```
  select * from tab where ? < 1000
  ```

- show_dynamic_params_in_xml selects the first column it encounters for expressions involving multiple columns:

  ```
  delete tab where col1 + col2 > ?
  ```

- The association is unambiguous for `update . . . set` statements. For example:

```
update tab set col1 = ?
```

3.151 show_plan

Displays a cached plan from the procedure cache. This function is called several times by `sp_showplan` because a built-in function can return just one value per call, but `sp_showplan` must return several values to the client.

Syntax

```
show_plan(<DBID>, <procedure_ID>, <plan_ID> [, <statement_number>])
```

Parameters

<DBID>

unique identifier for the database in which the object exists.

<procedure_ID>

ID of the procedure that is running.

<plan_ID>

unique identifier for the query plan for the object in the procedure cache. Use a value of 0 to display the first valid plan.

<statement_number>

is the number of the current statement within a batch. Use a value of -1 to display all plans for all statements.

> **i Note**
>
> The values you include can change how `show_plan` interprets the parameters. If you include:
>
> - A value of 0 for the first parameter (for example, `show_plan(0, 27, 237)`), `show_plan` treats the 2nd parameter as the statement ID for the cached statements, and retrieves a cached plan from the procedure cache.
> - A negative value for the 1st parameter (for example, `show_plan(-2, 27, 237)`), `show_plan` treats the 1st parameter as the DBID multiplied by -1, the 2nd parameter as the `<procedure_ID>` for the cached statements, the 3rd parameter as the `<plan_ID>`, and the 4th parameter as `<statement_number>`, and retrieves a cached plan from the procedure cache.

Examples

Example 1

displays the cached query plan for the procedure with:

- Database ID – 4
- Procedure ID – 1056003762
- Plan ID – 0
- Statement number – 1

```
select show_plan (-4,1056003762, 0, -1)
====
QUERY PLAN FOR STATEMENT 1 (at line 2).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
       |   |   |SCAN Operator (VA = 0)
       |   |   |  FROM TABLE
       |   |   |  sysobjects
       |   |   |  Index : ncsysobjects
       |   |   |  Forward Scan.
       |   |   |  Positioning at index start.
       |   |   |  Index contains all needed columns. Base table will not be
read.
       |   |   |  Using I/O Size 16 Kbytes for index leaf pages.
       |   |   |  With LRU Buffer Replacement Strategy for index leaf pages.
QUERY PLAN FOR STATEMENT 2 (at line 3).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
QUERY PLAN FOR STATEMENT 3 (at line 4).
    STEP 1
        The type of query is SET OPTION ON.
QUERY PLAN FOR STATEMENT 4 (at line 5).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
QUERY PLAN FOR STATEMENT 5 (at line 6).
    STEP 1
        The type of query is SET OPTION OFF.
QUERY PLAN FOR STATEMENT 6 (at line 7).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
```

```
        |   |   |SCAN Operator (VA = 0)
        |   |   |  FROM TABLE
        |   |   |  syscomments
        |   |   |  Using Clustered Index.
        |   |   |  Index : csyscomments
        |   |   |  Forward Scan.
        |   |   |  Positioning at index start.
        |   |   |  Index contains all needed columns. Base table will not be
read.
        |   |   |  Using I/O Size 16 Kbytes for index leaf pages.
        |   |   |  With LRU Buffer Replacement Strategy for index leaf pages.
0
(1 row affected)
sqlsa command {select show_plan (-4,1056003762, 0, 1)}
select show_plan (-4,1056003762, 0, 1)

====
QUERY PLAN FOR STATEMENT 1 (at line 2).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
       |   |   |SCAN Operator (VA = 0)
       |   |   |  FROM TABLE
       |   |   |  sysobjects
       |   |   |  Index : ncsysobjects
       |   |   |  Forward Scan.
       |   |   |  Positioning at index start.
       |   |   |  Index contains all needed columns. Base table will not be
read.
       |   |   |  Using I/O Size 16 Kbytes for index leaf pages.
       |   |   |  With LRU Buffer Replacement Strategy for index leaf pages.
0
(1 row affected)
sqlsa command {select show_plan (-4,1056003762, 0, 2)}
select show_plan (-4,1056003762, 0, 2)

====
QUERY PLAN FOR STATEMENT 2 (at line 3).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
0
(1 row affected)
show_plan with plan id and various line number:
select show_plan (-4,1056003762, 84, -1)

====
QUERY PLAN FOR STATEMENT 1 (at line 2).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
       |   |   |SCAN Operator (VA = 0)
```

```
        |   |   |  FROM TABLE
        |   |   |  sysobjects
        |   |   |  Index : ncsysobjects
        |   |   |  Forward Scan.
        |   |   |  Positioning at index start.
        |   |   |  Index contains all needed columns. Base table will not be
read.
        |   |   |  Using I/O Size 16 Kbytes for index leaf pages.
        |   |   |  With LRU Buffer Replacement Strategy for index leaf pages.
QUERY PLAN FOR STATEMENT 2 (at line 3).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
QUERY PLAN FOR STATEMENT 3 (at line 4).
    STEP 1
        The type of query is SET OPTION ON.
QUERY PLAN FOR STATEMENT 4 (at line 5).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
QUERY PLAN FOR STATEMENT 5 (at line 6).
    STEP 1
        The type of query is SET OPTION OFF.
QUERY PLAN FOR STATEMENT 6 (at line 7).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
       |   |   |SCAN Operator (VA = 0)
       |   |   |  FROM TABLE
       |   |   |  syscomments
       |   |   |  Using Clustered Index.
       |   |   |  Index : csyscomments
       |   |   |  Forward Scan.
       |   |   |  Positioning at index start.
       |   |   |  Index contains all needed columns. Base table will not be
read.
       |   |   |  Using I/O Size 16 Kbytes for index leaf pages.
       |   |   |  With LRU Buffer Replacement Strategy for index leaf pages.
0
(1 row affected)
select show_plan (-4,1056003762, 84, 1)

====
QUERY PLAN FOR STATEMENT 1 (at line 2).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    2 operator(s) under root
       |ROOT:EMIT Operator (VA = 2)
       |
       |   |SCALAR AGGREGATE Operator (VA = 1)
       |   |  Evaluate Ungrouped COUNT AGGREGATE.
       |   |
       |   |   |SCAN Operator (VA = 0)
```

```
        |    |    |  FROM TABLE
        |    |    |  sysobjects
        |    |    |  Index : ncsysobjects
        |    |    |  Forward Scan.
        |    |    |  Positioning at index start.
        |    |    |  Index contains all needed columns. Base table will not be
read.
        |    |    |  Using I/O Size 16 Kbytes for index leaf pages.
        |    |    |  With LRU Buffer Replacement Strategy for index leaf pages.
0
(1 row affected)
select show_plan (-4,1056003762, 84, 2)

====
QUERY PLAN FOR STATEMENT 2 (at line 3).
Optimized using Serial Mode
    STEP 1
        The type of query is SELECT.
    1 operator(s) under root
       |ROOT:EMIT Operator (VA = 1)
       |
       |   |SCALAR Operator (VA = 0)
0
(1 row affected)
```

Example 2

In this example, `show_plan` performs the following:

- Validates parameter values that `sp_showplan` cannot validate. -1 is passed in when the user executes`sp_showplan` without a value for a parameter. Only the `<spid>` value is required.
- If just a process ID is received, then `show_plan` returns the batch ID, the context ID, and the statement number in three successive calls by `sp_showplan`.
- Find the E_STMT pointer for the specified SQL statement number.
- Retrieves the target process's query plan for the statement. For parallel worker processes the equivalent parent plan is retrieved to reduce performance impact.
- Synchronizes access to the query plan with the target process.

```
if (@batch_id is NULL)
  begin
    /* Pass -1 for unknown values. */
    select @return_value = show_plan(@spid, -1, -1, -1)
    if (@return_value < 0)
        return (1)
    else
    select @batch_id = @return_value
    select @return_value = show_plan(@spid, @batch_id, -1, -1)
    if (@return_value < 0)
        return (1)
    else
      select @context_id = @return_value
    select @return_value = show_plan(@spid, @batch_id, @context_id, -1)
    if (@return_value < 0)
        return (1)
    else
    begin
       select @stmt_num = @return_value
      return (0)
    end
  end
```

As the example shows, call `show_plan` three times for a `<spid>` :

- The first returns the batch ID
- The second returns the context ID
- The third displays the query plan, and returns the current statement number.

Usage

- For a statement that is not performing well, you can change the plans by altering the optimizer settings or specifying an abstract plan.
- When you specify the first int variable in the existing `show_plan` argument as “-”, `show_plan` treats the second parameter as a SSQLID.

> **i Note**
>
> A single entry in the statement cache may be associated with multiple, and possibly different, SQL plans. show_plan displays only one of them.

See also `sp_showplan` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `show_plan` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be a user with `monitor qp performance` privilege or the same user that issued the target process to issue `show_plan`.
Disabled	With granular permissions disabled, you must be a user with `sa_role` or the same user that issued the target process to issue `show_plan`.

Auditing

You can enable `security`if (@batch_id is NULL) auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`show_plan`	• *Roles* – Current active roles • *Keywords or options* – `SHOW_PLAN` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.152 show_prepared_statements

Displays the SQL text of prepared statements for a specified server process ID (spid) or for all active spids.

Syntax

```
show_prepared_statements (<spid>)
```

Parameters

<spid> Server process ID (spid) of the prepared statement. You can retrieve spid by running `sp_who` or `select spid from master..sysprocesses`.

Examples

Example 1

Displays the SQL text of all prepared statements in all active sessions (the output is shortened for easier readability):

```
select show_prepared_statements(spid) as lwp_text, spid from master..sysprocesses
```

```
go
lwp_text                                                                  spid
-------------------------------------------------------------             ----
create proc dyn100 as insert into numeric_test ( c1)values (?)            20
create proc dyn100 as set statement_cache on
create proc dyn101 as insert into numeric_test ( c1)values (.1)           21
.......
```

Example 2

Displays the SQL text for spid 20 (the output is shortened for easier readability):

```
select show_prepared_statements(20) as lwp_text
go
lwp_text


---------------------------------------------------------------
create proc dyn102 as insert into numeric_test ( c1)values (?))
......
```

Usage

- To display the prepared statements for an active spid, run:

  ```
  show_prepared_statement(<spid>)
  ```

  To display prepared statements of all active spids, run:

  ```
  select show_prepared_statements(spid) from master..sysprocesses
  ```
- The data type of the result is `text`.
- Set the `textsize` value at a large value to avoid result set truncation. See *Global Variables Affected by set Options* in the *Reference Manual: Commands* for how to change the `textsize` value.

Permissions

The permission checks for `show_prepared_statements` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must be a user with `mon_role`, or have `monitor qp performance` permission to execute `show_prepared_statements`.
Disabled	With granular permissions disabled, you must be a user with `mon_role` or `sa_role` to execute `show_prepared_statements`.

3.153 show_role

Displays the currently active system-defined roles of the current login.

Syntax

```
show_role()
```

Examples

Example 1

Displays the currently active system-defined roles of the current login:

```
select show_role()
```

```
sa_role sso_role oper_role replication_role
```

Example 2

Displays "You have sa_role" if sa_role is the first role in the currently active system-defined roles:

```
if charindex("sa_role", show_role()) >0
begin
    print "You have sa_role"
end
```

Usage

- `show_role`, a system function, returns the login's current active system-defined roles, if any (`sa_role`, `sso_role`, `oper_role`, or `replication_role`). If the login has no roles, `show_role` returns NULL.
- When a Database Owner invokes `show_role` after using `setuser`, `show_role` displays the active roles of the Database Owner, not the user impersonated with `setuser`.

See also:

- *Transact-SQL Users Guide*
- `alter role`, `create role`, `drop role`, `grant`, `revoke`, `set` in *Reference Manual: Commands*
- `sp_activeroles`, `sp_displayroles` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `show_role`.

Related Information

proc_role [page 298]
role_contain [page 323]

3.154 show_sec_services

Lists the security services that are active for the session.

Syntax

```
show_sec_services()
```

Examples

Example 1

Shows that the user's current session is encrypting data and performing replay detection checks:

```
select show_sec_services()
```

```
encryption, replay_detection
```

Usage

If no security services are active, `show_sec_services` returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `show_sec_services`.

Related Information

is_sec_service_on [page 219]

3.155 shrinkdb_status

Determines the status of a shrink operation.

Syntax

```
shrinkdb_status(<database_name>, <query>)
```

Parameters

`<database_name>`

is the name of the database you are checking.

`<query>`

is one of:

- `in_progress` – determines if a shrink database is in progress on this database. Returns a value of 0 for no, a value of 1 for yes.

- owner_instance – determines which instance in a cluster is running a shrink operation. Returns:
  - 0 – if no shrink is in progress.
  - The owning instance ID – if an instance has a shrink operation running. For a nonclustered server, the "owning instance" is always 1.
- au_total – returns the total number of allocation units (that is, groups of 256 pages) the shrink operation affects.
- au_current – returns the total number of allocation units processed by the shrink operation.
- pages_moved – returns the number of index or data pages moved during the current shrink operation. pages_moved does not include empty pages that were released during the shrink operation.
- begin_date – the date and time the current shrink operation began, returned as an unsigned bigint.
- end_date – returns the date and time the shrink operation ended. Returns 0 when the shrink operation is ongoing or completed but not waiting for a restart.
- requested_end_date – returns the date and time the active shrink operation is requested to end.
- time_move – returns the amount of time, in microseconds, spent moving pages. time_move includes the time spent updating page references to the moved pages, but does not include the time spent performing administrative tasks that happen at the end of individual move blocks.
- time_repair – returns the amount of time, in microseconds, spent on administrative tasks for moving blocks. time_repair plus the value for time_move indicates the approximate amount of time Adaptive Server spent working on the current shrink operation.
- last_error – returns the error the shrink operation encountered when it came to abnormal stop.
- current_object_id – Object ID of the table being shrunk
- current_page – number of the page most recently, or currently, being moved
- buffer_read_wait – amount of time, in microseconds, spent waiting for buffers to be read
- buffer_write_wait – amount of time, in microseconds, spent waiting for buffers to be written
- pages_read – number of pages read by the shrink operation
- pages_written – number of pages written by the shrink operation
- index_sort_count – number of times the shrink operation sorted duplicated indexes

Examples

Example 1

checks the progress of the pubs2 database shrink operation:

```
select shrinkdb_status("pubs2", "in_progress")
```

Example 2

returns the amount of time Adaptive Server spent moving the pages of the pubs2 database:

```
select shrinkdb_status("pubs2", "time_move")
```

Example 3

returns the amount of time Adaptive Server spent shrinking the pubs2 database:

```
select shrinkdb_status("pubs2", "time_move")
```

Usage

shrinkdb_status returns 0 if no shrink operations are currently running on the database.

Auditing

You can enable func_obj_access auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
func_dbaccess	86	shrinkdb_status	• *Roles* – Current active roles • *Keywords or options* – SHRINKDB_STATUS • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.156 sign

Returns the sign (1 for positive, 0, or -1 for negative) of the specified value.

Syntax

```
sign(<numeric>)
```

Parameters

<numeric>

is any exact numeric (`numeric`, `dec`, `decimal`, `tinyint`, `smallint`, `int`, or `bigint`), approximate numeric (`float`, `real`, or `double precision`), or `money` column, variable, constant expression, or a combination of these.

Examples

Example 1

Returns the sign for -123:

```
select sign(-123)
```

```
-----------
         -1
```

Example 2

Returns the sign for 0:

```
select sign(0)
```

```
-----------
          0
```

Example 3

Returns the sign for 123:

```
select sign(123)
```

```
-----------
          1
```

Usage

Results are of the same type, and have the same precision and scale, as the numeric expression.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sign`.

Related Information

abs [page 59]
ceiling [page 89]
floor [page 180]
round [page 327]

3.157 sign_pages

Performs operations related to page diagnostic signatures.

Syntax

```
sign_pages('<database_name>', {'sign'|'clear'|'test'})
```

Parameters

<database_name>expr1
: Is the name of the database you are checking

sign
: Ensures that every page in <database_name> is signed. A return value of 1 means the pages are signed. A return value of 0 indicates the signed state of the pages is ambiguous.

clear
: Ensures that every page in <database_name> is unsigned. A return value of 0 means the database does not contain any signed pages. A return value of 1 indicates the signed state of the pages is ambiguous.

test
: Checks if any pages in <database_name> are signed. A return value of 0 means the database does not contain any signed pages. A return value of 1 indicates the signed state of the pages is ambiguous.

Examples

Signed pages

Tests the pubs2 database for signed pages:

```
select sign_pages('pubs2', 'test')
```

Signed pages in database

Ensures that all pages in the pubs2 database are signed:

```
select sign_pages('pubs2', 'sign')
```

Unsigned pages in database

Ensures that all pages in the pubs2 database are not signed:

```
select sign_pages('pubs2', 'clear')
```

Usage

- sign_pages can take a long time to return a result because it may need to check every page in the database.
- Databases cannot have any signed pages prior to downgrade. That is, before downgrading a database, sign_pages(database_name, 'test') must return a value of 0.
- If you include the sign option, and the database does not currently have allow page signing enabled, sign_pages enables this function.
- If you include the clear option, and the database has allow page signing enabled, sign_pages disables this function.
- Trace flag 12339 forces SAP ASE to sign every page in every database. If trace flag 12339 is set, you cannot issue sign_pages(<database_name>), 'clear') and sign_pages(<database_name>), 'text') always returns 1.

Permissions

You must have the sa_role to run sign_pages.

Auditing

You can enable `func_dbaccess` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_dbaccess`	86	`sign_pages`	• *Roles* – Current active roles • *Keywords or options* – `SIGN_PAGES` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.158 sin

Returns the sine of the angle-specified in radians.

Syntax

```
sin(<approx_numeric>)
```

Parameters

`<approx_numeric>`
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

Examples

Example 1

Returns the sine of 45:

```
select sin(45)
```

```
--------------------
           0.850904
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sin`.

Related Information

cos [page 117]
degrees [page 168]
radians [page 302]

3.159 sortkey

Generates values that can be used to order results based on collation behavior, which allows you to work with character collation behaviors beyond the default set of Latin character-based dictionary sort orders and case- or accent-sensitivity.

Syntax

```
sortkey(<char_expression >| <uchar_expression> [, {<collation_name> |
    <collation_ID>}])
```

Parameters

<char_expression>
is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expression>
is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

<collation_name>
is a quoted string or a character variable that specifies the collation to use.

<collation_ID>
is an integer constant or a variable that specifies the collation to use.

Examples

Example 1

Shows sorting by European language dictionary order:

```
select * from cust_table where cust_name like "TI%" order by
    sortkey(cust_name, "dict")
```

Example 2

Shows sorting by simplified Chinese phonetic order:

```
select *from cust_table where cust name like "TI%" order by
    sortkey(cust-name, "gbpinyin")
```

Example 3

Shows sorting by European language dictionary order using the in-line option:

```
select *from cust_table where cust_name like "TI%" order by cust_french_sort
```

Example 4

Shows sorting by Simplified Chinese phonetic order using preexisting keys:

```
select * from cust_table where cust_name like "TI%" order by
    cust_chinese_sort
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sortkey`.

3.159.1 Usage for sortkey

There are additional considerations for `sortkey`.

- `sortkey`, a system function, generates values that can be used to order results based on collation behavior. This allows you to work with character collation behaviors beyond the default set of Latin-character-based dictionary sort orders and case- or accent-sensitivity. The return value is a `varbinary` datatype value that contains coded collation information for the input string that is returned from the `sortkey` function.
  For example, you can store the values returned by `sortkey` in a column with the source character string. Ro retrieve the character data in the desired order, include in the `select` statement an `order by` clause on the columns that contain the results of running `sortkey`.
  `sortkey` guarantees that the values it returns for a given set of collation criteria work for the binary comparisons that are performed on `varbinary` datatypes.
- `sortkey` can generate up to six bytes of collation information for each input character. Therefore, the result from using `sortkey` may exceed the length limit of the `varbinary` datatype. If this happens, the result is truncated to fit. Since this limit is dependent on the logical page size of your server, truncation removes result bytes for each input character until the result string is less than the following for DOL and APL tables:

Table 16: Maximum Row and Column Length—APL and DOL Tables

Locking Scheme	Page Size	Maximum Row Length	Maximum Column Length
APL tables	2K (2048 bytes)	1962	1960 bytes
	4K (4096 bytes)	4010	4008 bytes
	8K (8192 bytes)	8106	8104 bytes
	16K (16384 bytes)	16298	16296 bytes
DOL tables	2K (2048 bytes)	1964	1958 bytes
	4K (4096 bytes)	4012	4006 bytes
	8K (8192 bytes)	8108	8102 bytes
	16K (16384 bytes)	16300	16294 bytes If table does not include any variable length columns

Locking Scheme	Page Size	Maximum Row Length	Maximum Column Length
	16K (16384 bytes)	16300 (subject to a max start offset of varlen = 8191)	8191-6-2 = 8183 bytes If table includes at least on variable length column.*
* This size includes six bytes for the row overhead and two bytes for the row length field.			

If this occurs, the SAP ASE server issues a warning message, but the query or transaction that contained the `sortkey` function continues to run.

- <char_expression> or< uchar_expression> must be composed of characters that are encoded in the server's default character set.
- <char_expression> or <uchar_expression> can be an empty string. If it is an empty string, `sortkey` returns a zero-length `varbinary` value, and stores a blank for the empty string.
  An empty string has a different collation value than an NULL string from a database column.
- If <char_expression> or< uchar_expression> is NULL, `sortkey` returns a null value.
- If a unicode expression has no specified sort order, the SAP ASE server uses the `binary` sort order.
- If you do not specify a value for <collation_name> or <collation_ID>, `sortkey` assumes binary collation.
- The binary values generated from the `sortkey` function can change from one major version to another major version of SAP ASE, such as version 12.0 to 12.5, version 12.9.2 to 12.0, and so on. If you are upgrading to the current version of SAP ASE, regenerate keys and repopulate the shadow columns before any binary comparison takes place.

  > **i Note**
  >
  > Upgrades from version 12.5 to 12.5.0.1 do not require this step, and the SAP ASE server does not generate any errors or warning messages if you do not regenerate the keys. Although a query involving the shadow columns should work fine, the comparison result may differ from the pre-upgrade server.

Related Information

compare [page 103]

3.159.1.1 Collation Tables

There are two types of collation tables you can use to perform multilingual sorting.

- A "built-in" collation table created by the `sortkey` function. This function exists in versions of SAP ASE later than 11.5.1. You can use either the collation name or the collation ID to specify a built-in table.
- An external collation table that uses the Unilib library sorting functions. You must use the collation name to specify an external table. These files are located in `$SYBASE/collate/unicode`.

Both of these methods work equally well, but a “built-in” table is tied to a SAP ASE database, while an external table is not. If you use an SAP ASE database, a built-in table provides the best performance. Both methods can handle any mix of English, European, and Asian languages.

The two ways to use `sortkey` are:

- In-line – this uses `sortkey` as part of the `order by` clause and is useful for retrofitting an existing application and minimizing the changes. However, this method generates sort keys on-the-fly, and therefore does not provide optimum performance on large data sets of more than 1000 records.
- Pre-existing keys – this method calls `sortkey` whenever a new record requiring multilingual sorting is added to the table, such as a new customer name. Shadow columns (`binary` or `varbinary` type) must be set up in the database, preferably in the same table, one for each desired sort order such as French, Chinese, and so on. When a query requires output to be sorted, the `order by` clause uses one of the shadow columns. This method produces the best performance since keys are already generated and stored, and are quickly compared only on the basis of their binary values.

You can view a list of available collation rules. Print the list by executing either `sp_helpsort`, or by querying and selecting the `name`, `id`, and `description` from `syscharsets` (`type` is between 2003 and 2999).

3.159.1.2 Collation Names and IDs

The valid values for collation name and ID, and their descriptions.

Collation Name	Collation ID	Description
default	20	Default Unicode multilingual
thaidict	21	Thai dictionary order
iso14651	22	ISO14651 standard
utf8bin	24	UTF-16 ordering – matches UTF-8 binary ordering
altnoacc	39	CP 850 Alternative – no accent
altdict	45	CP 850 Alternative – lowercase first
altnocsp	46	CP 850 Western European – no case preference
scandict	47	CP 850 Scandinavian – dictionary ordering
scannocp	48	CP 850 Scandinavian – case-insensitive with preference
gbpinyin	n/a	GB Pinyin
binary	50	Binary sort
dict	51	Latin-1 English, French, German dictionary
nocase	52	Latin-1 English, French, German no case

Collation Name	Collation ID	Description
nocasep	53	Latin-1 English, French, German no case, preference
noaccent	54	Latin-1 English, French, German no accent
espdict	55	Latin-1 Spanish dictionary
espnocs	56	Latin-1 Spanish no case
espnoac	57	Latin-1 Spanish no accent
rusdict	58	ISO 8859-5 Russian dictionary
rusnocs	59	ISO 8859-5 Russian no case
cyrdict	63	ISO 8859-5 Cyrillic dictionary
cyrnocs	64	ISO 8859-5 Cyrillic no case
elldict	65	ISO 8859-7 Greek dictionary
hundict	69	ISO 8859-2 Hungarian dictionary
hunnoac	70	ISO 8859-2 Hungarian no accents
hunnocs	71	ISO 8859-2 Hungarian no case
turdict	72	ISO 8859-9 Turkish dictionary
turknoac	73	ISO 8859-9 Turkish no accents
turknocs	74	ISO 8859-9 Turkish no case
binaryalt	99	Binary sort order that matches the Business Suite (and ABAP) binary sort order
cp932bin	129	CP932 binary ordering
dynix	130	Chinese phonetic ordering
gb2312bn	137	GB2312 binary ordering
cyrdict	140	Common Cyrillic dictionary
turdict	155	Turkish dictionary
euckscbn	161	EUCKSC binary ordering
gbpinyin	163	Chinese phonetic ordering
rusdict	165	Russian dictionary ordering

Collation Name	Collation ID	Description
sjisbin	179	SJIS binary ordering
eucjisbn	192	EUCJIS binary ordering
big5bin	194	BIG5 binary ordering
sjisbin	259	Shift-JIS binary order

3.160 soundex

Returns a four-character `soundex` code for character strings that are composed of a contiguous sequence of valid single- or double-byte Roman letters.

Syntax

```
soundex(<char_expr >| <uchar_expr>)
```

Parameters

`<char_expr>`

is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

`<uchar_expr>`

is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Returns the four-character soundex codes for "smith" and "smythe":

```
select soundex ("smith"), soundex ("smythe")
```

```
----- -----
S530  S530
```

Usage

- soundex, a string function, returns a four-character soundex code for character strings that are composed of a contiguous sequence of valid single- or double-byte roman letters.
- The soundex function converts an alphabetic string to a four-digit code for use in locating similar-sounding words or names. All vowels are ignored unless they constitute the first letter of the string.
- If <char_expr> or <uchar_expr> is NULL, returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute soundex.

Related Information

difference [page 175]

3.161 space

Returns a string consisting of the specified number of single-byte spaces.

Syntax

```
space (<integer_expr>)
```

Parameters

<integer_expr>

is any integer (`tinyint`, `smallint`, or `int`) column name, variable, or constant expression.

Examples

Example 1

Returns a string with four spaces between "aaa" and "bbb":

```
select "aaa", space(4), "bbb"
```

```
--- ---- ---
aaa      bbb
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `space`.

Related Information

isnull [page 222]
rtrim [page 332]

3.162 spaceusage

Returns metrics for space use in SAP ASE as a comma-separated string.

Syntax

```
spaceusage(<db_id> [, <object_id> [, <index_id >[, <partition_id> ] ] ] )
```

Parameters

<db_id >

a numeric expression that is the ID for a database. These are stored in the dbid column of `sysdatabases`.

<object_id >

a numeric expression that is an object ID for a table object. These are stored in the id column of `sysobjects`..

<index_id>

is the index ID of the object you are investigating. Depending on the `<index_id>` you use, `spaceusage` reports:

- `<index_id>` = 0 – returns the space metrics for only the data layer of an object, including all its data partitions.
- `<index_id>` = 1 – is applicable only for allpages-locked tables with a clustered index and returns the space metrics for only the index layer of the clustered index.
- `<index_id>` > 1 – returns the space metrics for the index layer of the corresponding index.
- `<index_id>` = 255 – returns the space metrics for off-row, large object page chains.

<partition_id>

the ID of the partition for which space usage metrics are to be retrieved.

Examples

Example 1

Returns space usage information for the entire database:

```
select spaceusage()
"reserved pages=1163, used pages=494, data pages=411, index pages=78,
oam pages=83, allocation units=94, row count=50529, tables=33,
```

```
LOB pages=3, syslog pages=8"
```

Example 2

Returns space metrics for all the indexes on the object specified by `object_id`, including all partitions, if any, on each index, and the space used by off-row large object page chains:

```
select spaceusage(dbid, objid)
```

Example 3

Returns space metrics for the specified partition for the listed <object_id> and <index_id>:

```
select spaceusage(database_id, object_id, index_id)
```

The output from `spaceusage` run against a database containing numerous user objects is shown below. `spaceusage` reports the space metrics for the data layer and all the indexes on this table.

```
select spaceusage(db_id(), object_id('syspartitions'))
----------------------------------------------------------------------
reserved pages=2220, used pages=2104, data pages=2100, index pages=1096, oam
pages=4, allocation units=373, row count=174522, tables=1, LOB pages=0
```

In this result, the reserved pages, used pages, and data pages values report the respective page counts for data and index pages. Because `index pages` reports the page counts for only the index pages of the three indexes on `syspartitions`, determine the number of data pages for only the data layer of this table by subtracting the value for index pages from the value for the data pages: 2100 - 1096 = 1004 pages.

Confirm the number of data pages for only the data layer of this table by executing `spaceusage` with a value for the <index_id> parameter of 0:

```
select spaceusage(db_id(), object_id('syspartitions'), 0)
----------------------------------------------------------------------
reserved pages=1064, used pages=1005, data pages=1004, index pages=0, oam
pages=1, allocation units=229, row count=174522, tables=1, LOB pages=0
```

`spaceusage` reports a value for data pages (1004), which is consistent with the equation above, and because the query requests space metrics for only the data layer, it returns a value of 0 for the index pages.

Example 4

Returns the aggregate space metrics for all objects, including user and system catalogs, that occupy space in the database:

```
select spaceusage(database_id)
```

However, `spaceusage` does not report on tables that do not occupy space (for example, fake and proxy tables). Currently, `spaceusage` also does not report on `syslogs`.

Usage

Depending on which parameters you include, `spaceusage` may report on any or all of the following:

- `reserved pages` – number of pages reserved for an object, which may include index pages if you selected index IDs based on the input parameters.

- `used pages` – number of pages used by the object, which may include index pages if you selected index IDs based on the input parameters.
  The value for used pages that `spaceusage` returns when you specify <index_id> = 1 (that is, for all-pages clustered indexes) is the used page count for the index layer of the clustered index. However, the value the `used_pages` function returns when you specify <index_id> = 1 includes the used page counts for the data and the index layers.
- `data pages` – number of data pages used by the object, which may include index pages if you selected index IDs based on the input parameters.
- `index pages` – number of index-only pages, if the input parameters specified processing indexes on the objects. To determine the number of pages used for only the index-level pages, subtract the number of large object (LOB) pages from the number of index pages.
- `oam pages` – number of OAM pages for all OAM chains, as selected by the input parameters.
  For example, if you specify:

  ```
  spaceusage(<database_id>, <object_id>, <index_id>)
  ```

  `oam pages` indicates the number of OAM pages found for this index and any of its local index partitions. If you run `spaceusage` against a specific object, `oam pages` returns the amount of overhead for the extra pages used for this object's space management.
  When you execute `spaceusage` for an entire database, `oam pages` returns the total overhead for the number of OAM pages needed to track space across all objects, and their off-row LOB columns.
- `allocation units` – number of allocation units that hold one or more extents for the specified object, index, or partition. `allocation units` indicates how many allocation units (or pages) SAP ASE must scan while accessing all the pages of that object, index, or partition.
  When you run `spaceusage` against the entire database, `allocation units` returns the total number of allocation units reserving space for an object. However, because the server can share allocation units across objects, this field might show a number greater than the total number of allocation units in the entire database.
- `row count` – number of rows in the object or partition. `spaceusage` reports this row count as 0 when you specify the <index_id> parameter.
- `tables` – total number of tables processed when you execute `spaceusage` and include only the <database_id> parameter (that is, when you are investigating space metrics for the entire database).
- `LOB pages` – number of off-row large object pages for which the index ID is 255.
  `LOB pages` returns a nonzero value only when you use `spaceusage` to determine the space metrics for all indexes, or only the LOB index, on objects that contain off-row LOB data. `LOB pages` returns 0 when you use `spaceusage` to examine the space metrics only for tables (which have index IDs of 0).
  When you run `spaceusage` against the entire database, `LOB pages` displays the aggregate page counts for all LOB columns occupying off-row storage in all objects.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`spaceusage`	• *Roles* – Current active roles • *Keywords or options* – `SPACEUSAGE` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.163 spid_instance_id

(Cluster environments only) Returns the instance ID on which the specified process ID (spid) is running.

Syntax

```
spid_instance_id(<spid_value>)
```

Parameters

<spid_value>

the spid number for which you are requesting the instance ID.

Examples

Example 1

Returns the ID of the instance that is running process ID number 27:

```
select spid_instance_id(27)
```

Usage

- If you do not include a spid value, `spid_instance_id` returns NULL.
- If you enter an invalid or nonexisting process ID value, `spid_instance_id` returns NULL.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `spid_instance_id`.

3.164 square

Calculates the square of a specified value expressed as a `float`.

Syntax

```
square(<numeric_expression>)
```

Parameters

`<numeric_expression>`
is a numeric expression of type `float`.

Examples

Example 1

Returns the square from an integer column:

```
select square(total_sales)from titles
```

```
------------
16769025.00000
15023376.00000
350513284.00000
...
16769025.00000
(18 row(s) affected)
```

Example 2

Returns the square from a money column:

```
select square(price) from titles
-----------
399.600100
142.802500
8.940100
NULL
...
224.700100
(18 row(s) affected)
```

Usage

This function is the equivalent of `power(<numeric_expression>,2)`, but it returns type `float` rather than `int`.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `square`.

Related Information

System and User-Defined Datatypes [page 13]
power [page 297]

3.165 sqrt

Calculates the square root of the specified number.

Syntax

```
sqrt(<approx_numeric>)
```

Parameters

<approx_numeric>
is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression that evaluates to a positive number.

Examples

Example 1

Calculates the square root of 4:

```
select sqrt(4)
```

```
 2.000000
```

Usage

If you attempt to select the square root of a negative number, the SAP ASE server returns an error message similar to:

```
Domain error occurred.
```

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sqrt`.

Related Information

power [page 297]

3.166 stddev

Computes the standard deviation of a sample consisting of a numeric expression, as a `double`.

> **Note**
>
> `stddev` and `stdev` are aliases for `stddev_samp`.

Syntax

See `stddev_samp`.

Related Information

stddev_samp [page 391]

3.167 used_pages

Reports the number of pages used by a table, an index, or a specific partition. Unlike `data_pages`, `used_pages` does include pages used for internal structures. This function replaces the `used_pgs` function used in versions of SAP ASE earlier than 15.0.

Syntax

```
used_pages(<dbid>, <object_id>[, <indid>[, <ptnid>]])
```

Parameters

`<dbid>`

is the database id where target object resides.

`<object_id>`

is the object ID of the table for which you want to see the used pages. To see the pages used by an index, specify the object ID of the table to which the index belongs.

`<indid>`

is the index id of interest.

`<ptnid>`

is the partition id of interest.

Examples

Example 1

Returns the number of pages used by the object with a object ID of 31000114 in the specified database (including any indexes):

```
select used_pages(5, 31000114)
```

Example 2

Returns the number of pages used by the object in the data layer, regardless of whether or not a clustered index exists:

```
select used_pages(5, 31000114, 0)
```

Example 3

Returns the number of pages used by the object in the index layer for an index with index ID 2. This does not include the pages used by the data layer (See the first bullet in the Usage section for an exception):

```
select used_pages(5, 31000114, 2)
```

Example 4

Returns the number of pages used by the object in the data layer of the specific partition, which in this case is 2323242432:

```
select used_pages(5, 31000114, 0, 2323242432)
```

Usage

- In an all-pages locked table with a clustered index, the value of the last parameter determines which pages used are returned:
    - `used_pages(dbid, objid, 0)` – which explicitly passes 0 as the index ID, returns only the pages used by the data layer.
    - `used_pages(dbid, objid, 1)` – returns the pages used by the index layer as well as the pages used by the data layer.

  To obtain the index layer used pages for an all-pages locked table with a clustered index, subtract `used_pages(dbid, objid, 0)` from `used_pages(dbid, objid, 1)`.
- Instead of consuming resources, `used_pages` discards the descriptor for an object that is not already in the cache.
- In in an all-pages-locked table with a clustered index, `used_pages` is passed only the used pages in the data layer, for a value of `indid = 0`. When `indid=1` is passed, the used pages at the data layer and at the clustered index layer are returned, as in previous versions.
- `used_pages` is similar to the old `used_pgs(objid, doampg, ioampg)` function.
- All erroneous conditions result in a return value of zero.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `used_pgs`.

Auditing

You can enable `func_obj_access` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`func_obj_access`	86	`used_pages`	• *Roles* – Current active roles • *Keywords or options* – `USED_PAGES` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

Related Information

data_pages [page 132]
object_id [page 273]

3.168 stdev

Computes the standard deviation of a sample consisting of a numeric expression, as a `double`.

> **i Note**
>
> `stddev` and `stdev` are aliases for `stddev_samp`.

Syntax

See `stddev_samp`.

Related Information

stddev_samp [page 391]

3.169 stdevp

Computes the standard deviation of a population consisting of a numeric expression, as a `double`.

> **i Note**
>
> `stdevp` is an alias for `stddev_pop`.

Syntax

See `stddev_pop`.

Related Information

stddev_pop [page 389]

3.170 stddev_pop

Computes the standard deviation of a population consisting of a numeric expression, as a `double`. `stdevp` is an alias for `stddev_pop`, and uses the same syntax.

Syntax

```
stddev_pop ( [ all | distinct ] <expression> )
```

Parameters

all

applies `stddev_pop` to all values. `all` is the default.

distinct

eliminates duplicate values before `stddev_pop` is applied.

<expression>

is the expression—commonly a column name—in which its population-based standard deviation is calculated over a set of rows.

Examples

Example 1

The following statement lists the average and standard deviation of the advances for each type of book in the `pubs2` database.

```
select type, avg(advance) as "avg", stddev_pop(advance)
  as "stddev" from titles group by type order by type
```

Usage

Computes the population standard deviation of the provided value expression evaluated for each row of the group (if `distinct` was specified, then each row that remains after duplicates have been eliminated), defined as the square root of the population variance.

The formula that defines the variance of population of size *n* having mean μ (var_pop) is presented below. The population standard deviation (stddev_pop) is the positive square root of this number.

$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{n}$$

σ^2	Variance
n	Population size
μ	Mean of the values x_i

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `stddev_pop`.

Related Information

stddev_samp [page 391]
var_pop [page 437]
var_samp [page 439]

3.171 stddev_samp

Computes the standard deviation of a sample consisting of a numeric expression as a `double`. `stdev` and `stddev` are aliases for `stddev_samp`, and use the same syntax.

Syntax

```
stddev_samp ( [ all | distinct ] <expression> )
```

Parameters

all
: applies `stddev_samp` to all values. `all` is the default.

distinct
: eliminates duplicate values before `stddev_samp` is applied.

<expression>
: is any numeric datatype (`float`, `real`, or `double precision`) expression.

Examples

Example 1

The following statement lists the average and standard deviation of the advances for each type of book in the `pubs2` database.

```
select type, avg(advance) as "avg",
  stddev_samp(advance) as "stddev" from titles
  where total_sales > 2000 group by type order by type
```

Usage

Computes the sample standard deviation of the provided value expression evaluated for each row of the group (if `distinct` was specified, then each row that remains after duplicates have been eliminated), defined as the square root of the sample variance.

The formula that defines the variance of population of size n having mean $\overline{x}$ (var_samp) is presented below. The population standard deviation (stddev_samp) is the positive square root of this number.

$$s^2 = \frac{\sum (x_i - \overline{x})^2}{n-1}$$

s^2	Variance
n	Population size
$\overline{x}$	Mean of the values x_i

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `stddev_samp`.

Related Information

stddev_pop [page 389]
var_pop [page 437]
var_samp [page 439]

3.172 str

Returns the character equivalent of the specified number, and pads the output with a character or numeric to the specified length.

Syntax

```
str(<approx_numeric>[, <length >[, <decimal>]])
```

Parameters

<approx_numeric>

is any approximate numeric (`float`, `real`, or `double precision`) column name, variable, or constant expression.

<length>

sets the number of characters to be returned (including the decimal point, all digits to the right and left of the decimal point, and blanks). The default is 10.

<decimal>

sets the number of decimal digits to be returned. The default is 0. Also can be used to pad the output with a character or numeric to the specified length.

When you specify a character or numeric as a literal string, the character or numeric is used as padding for the field. When you specify a numeric value, sets the number of decimal places. The default is 0. When `<decimal>` is not set, the field is padded with blanks to the value specified by `<length>`.

Examples

Example 1

When `<decimal>` is set as the string literal '0', the field is padded with 0 to a length of 10 spaces.

```
select str(5,10,'0')
```

```
----------------
  0000000005
```

Example 2

When `<decimal>` is a numeric of 5, the number of decimal places is set to 5.

```
select str(5,10,5)
```

```
----------------
   5.00000
```

Example 3

When <decimal> is set to the character of '_', the original value is maintained and the field is padded with the specified character to a length of 16 spaces.

```
select str(12.34500,16,'_')
```

```
----------------
________12.34500
```

Example 4

Without <decimal> set, the floating number is set to zero decimal places and the field is padded with blanks to a length of 16 spaces.

```
select str(12.34500e,16)
```

```
----------------
              12
```

Example 5

With <decimal> set to a numeric, the floating number is processed to 7 decimal places and the field is padded with blanks to a length of 16 spaces.

```
select str(12.34500e,16,7)
```

```
----------------
      12.3450000
```

Example 6

Specify a prefix character and process a floating number to a specified number of decimal places using these examples:

```
select str(convert(numeric(10,2),12.34500e),16,'-')
```

```
----------------
-----------12.35
```

```
select str(convert(numeric(10,8),12.34500e),16,'-')
```

```
----------------
-----12.34500000
```

Usage

<length> and <decimal> are optional, but if used, must be positive integers. `str` rounds the decimal portion of the number so that the results fit within the specified length. The length should be long enough to accommodate the decimal point and, if the number is negative, the number's sign. The decimal portion of the

result is rounded to fit within the specified length. If the integer portion of the number does not fit within the length, however, `str` returns a row of asterisks of the specified length. For example:

```
select str(123.456, 2, 4)
```

```
--
**
```

If <approx_numeric> is NULL, returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `str`.

Related Information

abs [page 59]
ceiling [page 89]
floor [page 180]
round [page 327]
sign [page 364]

3.173 str_replace

Replaces any instances of the second string expression (<string_expression2>) that occur within the first string expression (<string_expression1>) with a third expression (<string_expression3>).

Syntax

```
str_replace("<string_expression1>", "<string_expression2>",
"<string_expression3>")
```

Parameters

<string_expression1>

is the source string, or the string expression to be searched, expressed as `char`, `varchar`, `unichar`, `univarchar`, `varbinary`, or `binary` datatype.

<string_expression2>

is the pattern string, or the string expression to find within the first expression (`<string_expression1>`). `<string_expression2>` is expressed as `char`, `varchar`, `unichar`, `univarchar`, `varbinary`, or `binary` datatype.

<string_expression3>

is the replacement string expression, expressed as `char`, `varchar`, `unichar`, `univarchar`, `binary`, or `varbinary` datatype.

Examples

Example 1

Replaces the string *def* within the string *cdefghi* with *yyy*.

```
select str_replace("cdefghi","def","yyy")
-------------
cyyyghi
(1 row(s) affected)
```

Example 2

Replaces all spaces with "toyota".

```
select str_replace("chevy, ford, mercedes", "","toyota")
----------
chevy,toyotaford,toyotamercedes
(1 row(s) affected)
```

> **i Note**
>
> The SAP ASE server converts an empty string constant to a string of one space automatically, to distinguish the string from NULL values.

Example 3

Returns “abcghijklm”:

```
select str_replace("abcdefghijklm", "def", NULL)
```

```
----------
abcghijklm
(1 row affected)
```

Usage

- Returns `varchar` data if <string_expression> (`1`, `2`, or `3`) is `char` or `varchar`.
- Returns `univarchar` data if <string_expression> (`1, 2`, or `3`) is `unichar` or `univarchar`.
- Returns `varbinary` data if <string_expression> (`1`, `2`, or `3`) is `binary` or `varbinary`.
- All arguments must share the same datatype.
- If any of the three arguments is NULL, the function returns null.
  `str_replace` accepts NULL in the third parameter and treats it as an attempt to replace <string_expression2> with NULL, effectively turning `str_replace` into a "string cut" operation.
  For example, the following returns "abcghijklm":

  ```
  str_replace("abcdefghijklm", "def", NULL)
  ```

- The result length may vary, depending upon what is known about the argument values when the expression is compiled. If all arguments are variables with known constant values, the SAP ASE server calculates the result length as:

  ```
  result_length = ((s/p)*(r-p)+s)
  where
  s = length of source string
  p = length of pattern string
  r = length of replacement string
  if (r-p) <= 0, result length = s
  ```

- If the source string (<string_expression1>) is a column, and <string_expression2> and <string_expression3> are constant values known at compile time, the SAP ASE server calculates the result length using the formula above.
- If the SAP ASE server cannot calculate the result length because the argument values are unknown when the expression is compiled, the result length used is 255, unless traceflag 244 is on. In that case, the result length is 16384.
- result_len never exceeds 16384.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `str_replace`.

Related Information

System and User-Defined Datatypes [page 13]

3.174 strtobin

Converts a sequence of alphanumeric characters to their equivalent hexadecimal digits.

Syntax

```
select strtobin("<string of valid alphanumeric characters>")
```

Parameters

<string of valid alphanumeric characters>
is string of valid alphanumeric characters, which consists of [1 – 9], [a – f] and [A – F].

Examples

Example 1

Converts the alphanumeric string of “723ad82fe” to a sequence of hexadecimal digits:

```
select strtobin("723ad82fe")
go
```

```
-----------------------------------
0x0723ad82fe
```

The in-memory representation of the alphanumeric character string and its equivalent hexadecimal digits are:

Alphanumeric character string (9 bytes)									
0	7	2	3	a	d	8	2	f	e

Hexadecimal digits (5 bytes)									
0	7	2	3	a	d	8	2	f	e

The function processes characters from right to left. In this example, the number of characters in the input is odd. For this reason, the hexadecimal sequence has a prefix of “0” and is reflected in the output.

Example 2

Converts the alphanumeric string of a local variable called `<@str_data>` to a sequence of hexadecimal digits equivalent to the value of “723ad82fe”:

```
declare @str_data varchar(30)
select @str_data = "723ad82fe"
select strtobin(@str_data)
go
```

```
----------
0x0723ad82fe
```

Usage

- Any invalid characters in the input results in NULL as the output.
- The input sequence of hexadecimal digits must have a prefix of “0x”.
- A NULL input results in NULL output.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `strtobin`.

Related Information

bintostr [page 79]

3.175 stuff

Returns the string formed by deleting a specified number of characters from one string and replacing them with another string.

Syntax

```
stuff(<char_expr1> | <uchar_expr1>, <start>, <length>, <char_expr2> |
<uchar_expr2>)
```

Parameters

<char_expr1>
is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr1>
is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

<start>
specifies the character position at which to begin deleting characters.

<length>
specifies the number of characters to delete.

<char_expr2>
is another character-type column name, variable, or constant expression of `char`, `varchar`, `nchar`, or `nvarchar` type.

<uchar_expr2>
is another character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

Examples

Example 1

Returns a string formed by deleting from the second character for three characters, and replacing them with "x," "y," and "z":

```
select stuff("abc", 2, 3, "xyz")
```

```
----
axyz
```

Example 2

Returns a string formed by deleting from the second character for three characters, and replacing the deleted characters with NULL:

```
select stuff("abcdef", 2, 3, null)
```

```
go
---
aef
```

Example 3

Returns a string formed by deleting from the second character for three characters, and replacing the deleted characters with nothing else:

```
select stuff("abcdef", 2, 3, "")
```

```
----
a ef
```

Usage

- stuff, a string function, deletes <length >characters from< char_expr1> or <uchar_expr1> at <start>, then inserts <char_expr2> or <uchar_expr2 >into <char_expr1 >or <uchar_expr2> at <start>. For general information about string functions, see *Transact-SQL Users Guide*.
- If the start position or the length is negative, a NULL string is returned. If the start position is zero or longer than <expr1>, a NULL string is returned. If the length to be deleted is longer than <expr1>, <expr1> is deleted through its last character (see Example 1).
- If the start position falls in the middle of a surrogate pair, start is adjusted to be one less. If the start length position falls in the middle of a surrogate pair, length is adjusted to be one less.
- To use stuff to delete a character, replace <expr2> with NULL rather than with empty quotation marks. Using ‘‘ ‘‘ to specify a null character replaces it with a space (see examples 2 and 3).
- If <char_expr1> or <uchar_expr1> is NULL, stuff returns NULL. If <char_expr1> or <uchar_expr1> is a string value and <char_expr2> or< uchar_expr2> is NULL, stuff replaces the deleted characters with nothing.
- If you give a varchar expression as one parameter and a unichar expression as the other, the varchar expression is implicitly converted to unichar (with possible truncation).

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `stuff`.

Related Information

replicate [page 307]
substring [page 402]

3.176 substring

Returns the string formed by extracting the specified number of characters from another string.

Syntax

```
substring(<expression>, <start, length>)
```

Parameters

`<expression>`
: is a binary or character column name, variable, or constant expression. Can be `char`, `nchar`, `unichar`, `varchar`, `univarchar`, or `nvarchar` data, `binary`, or `varbinary`.

`<start>`
: specifies the character position at which the substring begins.

`<length>`
: specifies the number of characters in the substring.

Examples

Example 1

Displays the last name and first initial of each author, for example, “Bennet A.”:

```
select au_lname, substring(au_fname, 1, 1)
```

```
from authors
```

Example 2

Converts the author's last name to uppercase, then displays the first three characters:

```
select substring(upper(au_lname), 1, 3)
from authors
```

Example 3

Concatenates `pub_id` and `title_id`, then displays the first six characters of the resulting string:

```
select substring((pub_id + title_id), 1, 6)
from titles
```

Example 4

Extracts the lower four digits from a binary field, where each position represents two binary digits:

```
select substring(xactid,5,2)
from syslogs
```

Usage

- `substring`, a string function, returns part of a character or binary string. For general information about string functions, see *Transact-SQL Users Guide*.
- If `substring`'s second argument is NULL, the result is NULL. If `substring`'s first or third argument is NULL, the result is blank..
- If the start position from the beginning of `<uchar_expr1>` falls in the middle of a surrogate pair, `<start>` is adjusted to one less. If the start length position from the beginning of `<uchar_expr1>` falls in the middle of a surrogate pair, `<length>` is adjusted to one less.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `substring`.

Related Information

charindex [page 95]
patindex [page 293]
stuff [page 400]

3.177 sum

Returns the total of the values.

Syntax

```
sum([all | distinct] <expression>)
```

Parameters

all

applies `sum` to all values. `all` is the default.

distinct

eliminates duplicate values before `sum` is applied. `distinct` is optional.

<expression>

is a column name, constant, function, any combination of column names, constants, and functions connected by arithmetic or bitwise operators, or a subquery. With aggregates, an expression is usually a column name.

Examples

Example 1

Calculates the average advance and the sum of total sales for all business books. Each of these aggregate functions produces a single summary value for all of the retrieved rows:

```
select avg(advance), sum(total_sales)
from titles
where type = "business"
```

Example 2

Used with a `group by` clause, the aggregate functions produce single values for each group, rather than for the entire table. This statement produces summary values for each type of book:

```
select type, avg(advance), sum(total_sales)
from titles
group by type
```

Example 3

Groups the `titles` table by publishers, and includes only those groups of publishers who have paid more than $25,000 in total advances and whose books average more than $15 in price:

```
select pub_id, sum(advance), avg(price)
from titles
group by pub_id
having sum(advance) > $25000 and avg(price) > $15
```

Usage

- `sum`, an aggregate function, finds the sum of all the values in a column. `sum` can only be used on numeric (integer, floating point, or money) datatypes. Null values are ignored in calculating sums.
- When you sum integer data, the SAP ASE server treats the result as an `int` value, even if the datatype of the column is `smallint` or `tinyint`.When you sum `bigint` data, the SAP ASE server treats the result as a `bigint`.To avoid overflow errors in DB-Library programs, declare all variables for results of averages or sums appropriately.
- You cannot use `sum` with the binary datatypes.
- This function defines only numeric types; use with Unicode expressions generates an error.

See also:

- `compute` clause, `group by` and `having` clauses, `select`, `where` clause in *Reference Manual: Commands*
- *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `sum`.

Related Information

Expressions [page 468]
count [page 119]
max [page 256]
min [page 259]

3.178 suser_id

Returns the server user's ID number from the `syslogins` table.

Syntax

```
suser_id([<server_user_name]>)
```

Parameters

<server_user_name>
is an SAP ASE login name.

Examples

Example 1

Returns the server user's ID number:

```
select suser_id()
```

```
------
     1
```

Example 2

Returns the ID number for margaret:

```
select suser_id("margaret")
```

```
------
     5
```

Usage

- suser_id, a system function, returns the server user's ID number from syslogins. For general information about system functions, see *Transact-SQL Users Guide*.
- To find the user's ID in a specific database from the sysusers table, use the user_id system function.
- If no <server_user_name> is supplied, suser_id returns the server ID of the current user.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute suser_id.

Related Information

suser_name [page 407]
user_id [page 430]

3.179 suser_name

Returns the name of the current server user, or the user whose server ID is specified.

Syntax

```
suser_name([<server_user_id>])
```

Parameters

<server_user_id>

is an SAP ASE user ID.

Examples

Example 1

Returns the name of the current user:

```
select suser_name()
```

```
------------------------------
sa
```

Example 2

Returns the name of the user whose server ID is 4:

```
select suser_name(4)
```

```
------------------------------
margaret
```

Usage

See also*Transact-SQL Users Guide* .

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `suser_name`.

Related Information

suser_id [page 406]
user_name [page 431]

3.180 syb_quit

Terminates the connection.

Syntax

```
syb_quit()
```

Examples

Example 1

Terminates the connection in which the function is executed and returns an error message.

```
select syb_quit()
```

```
-------------
CT-LIBRARY error:
    ct_results(): network packet layer:
internal net library error: Net-Library operation terminated due to disconnect
```

Usage

You can use `syb_quit` to terminate a script if the `isql` preprocessor command `exit` causes an error.

Permissions

Any user can execute `syb_quit`.

3.181 syb_sendmsg

(UNIX only) Sends a message to a User Datagram Protocol (UDP) port.

Syntax

```
syb_sendmsg <ip_address>, <port_number>, <message>
```

Parameters

<ip_address>
is the IP address of the machine where the UDP application is running.

<port_number>
is the port number of the UDP port.

<message>
is the message to send. It can be up to 255 characters in length.

Examples

Example 1

Sends the message "Hello" to port 3456 at IP address 120.10.20.5:

```
select syb_sendmsg("120.10.20.5", 3456, "Hello")
```

Example 2

Reads the IP address and port number from a user table, and uses a variable for the message to be sent:

```
declare @msg varchar(255)
    select @msg = "Message to send"
    select syb_sendmsg (ip_address, portnum, @msg)
    from sendports
    where username = user_name()
```

Usage

- To enable the use of UDP messaging, a System Security Officer must set the configuration parameter `allow sendmsg` to 1.

- No security checks are performed with `syb_sendmsg`. We strongly recommend that you not use `syb_sendmsg` to send sensitive information across the network. By enabling this functionality, the user accepts any security problems that result from its use.
- For a sample C program that creates a UDP port, see `sp_sendmsg`.
- See also `sp_sendmsg` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `syb_sendmsg`.

3.182 sys_tempdbid

(Cluster environments only) Returns the id of the effective local system temporary database of the specified instance. Returns the id of the effective local system temporary database of the current instance when `<instance_id>` is not specified.

Syntax

```
sys_tempdbid(<instance_id>)
```

Parameters

`<instance_id>`

ID of the instance.

Examples

Example 1

Returns the effective local system temporary database id for the instance with an instance id of 3:

```
select sys_tempdbid(3)
```

Usage

If you do not specify an instance ID, `sys_tempdbid` returns the ID of the effective local system temporary database for the current instance.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can run `sys_tempdbid`.

3.183 tan

Calculates the tangent of the angle, specified in radians.

Syntax

```
tan(<angle>)
```

Parameters

`<angle>`

is the size of the angle in radians, expressed as a column name, variable, or expression of type `float`, `real`, `double precision`, or any datatype that can be implicitly converted to one of these types.

Examples

Example 1

Calculates the tangent of 60:

```
select tan(60)
```

```
--------------------
           0.320040
```

Usage

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `tan`.

Related Information

atan [page 67]
atn2 [page 68]
degrees [page 168]
radians [page 302]

3.184 tempdb_id

Reports the temporary database to which a given session is assigned. The input of the `tempdb_id` function is a server process ID, and its output is the temporary database to which the process is assigned. If you do not provide a server process, `tempdb_id` reports the `dbid` of the temporary database assigned to the current process.

Syntax

```
tempdb_id()
```

Examples

Example 1

Finds all the server processes that are assigned to a given temporary database:

```
select spid from master..sysprocesses
    where tempdb_id(spid) = db_id("tempdatabase")
```

Usage

`select tempdb_id` gives the same result as `select <@@tempdbid>`.

See also `select` in *Reference Manual: Commands*.

3.185 textptr

Returns a pointer to the first page, or ID of the home data row that references the first page, of a `text`, `image`, or `unitext` column.

Syntax

```
textptr(<column_name> [, "ftp" ])
```

Parameters

<column_name>

is the name of a `text` column.

ftp

Returns a NULL text pointer, or a pointer to the first page.

Examples

Example 1

Uses the `textptr` function to locate the `text` column, `copy`, associated with `au_id` 486-29-1786 in the author's `blurbs` table. The text pointer is placed in local variable `@<val>` and supplied as a parameter to the `readtext` command, which returns 5 bytes, starting at the second byte (offset of 1):

```
declare @val binary(16)
    select @val = textptr(copy) from blurbs
    where au_id = "486-29-1786"
    readtext blurbs.copy @val 1 5
```

Example 2

Selects the `title_id` column and the 16-byte text pointer of the `copy` column from the `blurbs` table:

```
select au_id, textptr(copy) from blurbs
```

Usage

- `textptr`, a text and image function, returns the text pointer value, a 16-byte `varbinary` value.
- The `textptr` value returned for an in-row LOB column residing in a data-only-locking data row that is row-forwarded remains unchanged and valid after the forwarding.
- `textptr` returns a pointer to the ID of home data row for a `text`, `unitext`, or `image` column:

If no non-null values are inserted into the column by `insert` or `update` statements.	For example:
	`create table mytab(c_int int, c_text text null)`
	`go`
	`insert into mytab(c_int) values(1)`
	`go`

If the column is updated to NULL by an `update` statement, while the table's `dealloc_first_txtpg` attribute is set to 1.	For example:
	`create table mytab(c_int int, c_text text null)`
	`go`
	`sp_chgattribute mytab, "dealloc_first_txtpg", 1`

<table>
<tr><td></td><td><pre>go
insert into mytab values(1, 'aaa')
go
update mytab set c_text = NULL where c_int = 1
go
select textptr(c_text) from mytab
go</pre></td></tr>
<tr><td>If the column is updated to NULL by an <code>update</code> statement, while:
◦ The table's <code>dealloc_first_txtpg</code> attribute is not set to 2, and
◦ The database option <code>deallocate first text page</code> is set to <code>true</code>.</td><td>For example:<pre>sp_dboption mydb, "deallocate first text
page", TRUE
go
use mydb
go
create table mytab(c_int int, c_text text null)
go
insert into mytab values(1, 'aaa')
go
update mytab set c_text = NULL where c_int = 1
go
select textptr(c_text) from mytab
go</pre></td></tr>
<tr><td>The column has non-NULL values, but replication is enabled for the table to which this column belongs.</td><td></td></tr>
</table>

In all other cases, `textptr` returns a pointer to the first page of a `text`, `image`, or `unitext` column.

> **i Note**
>
> Trailing `f` in `varbinary` values are truncated when they are stored in tables. If storing text pointer values in a table, use `binary` as the column's datatype.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `textptr`.

Related Information

text, image, and unitext Datatypes [page 33] textvalid [page 417]

3.186 textvalid

Returns 1 if the pointer to the specified `text`, `unitext`, in-row, and off-row LOB columns is valid; 0 if it is not.

Syntax

```
textvalid("<table_name>.<column_name>", <textpointer>)
```

Parameters

<table_name>.<column_name>
is the name of a table and its `text` column.

<textpointer>
is a text pointer value.

Examples

Example 1

Reports whether a valid text pointer exists for each value in the `blurb` column of the `texttest` table:

```
select textvalid ("texttest.blurb", textptr(blurb)) from texttest
```

Usage

- `textvalid` checks that a given text pointer is valid. Returns 1 if the pointer is valid, or 0 if it is not.
- The identifier for the column must include the table name.

For general information about text and image functions, see *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `textvalid`.

Related Information

text, image, and unitext Datatypes [page 33]
textptr [page 414]

3.187 to_unichar

Returns a `unichar` expression having the value of the specified integer expression.

Syntax

```
to_unichar(<integer_expr>)
```

Parameters

<integer_expr>
is any integer (`tinyint`, `smallint`, or `int`) column name, variable, or constant expression.

Usage

- `to_unichar`, a string function, converts a Unicode integer value to a Unicode character value.
- If a `unichar` expression refers to only half of a surrogate pair, an error message appears and the operation is aborted.

- If a <integer_expr> is NULL, `to_unichar` returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `to_unichar`.

Related Information

text, image, and unitext Datatypes [page 33]
char [page 91]

3.188 tran_dumpable_status

Returns a true/false indication of whether `dump transaction` is allowed.

Syntax

```
tran_dumpable_status("<database_name>")
```

Parameters

<database_name>

is the name of the target database.

Examples

Example 1

Checks to see if the `pubs2` database can be dumped:

```
1> select tran_dumpable_status("pubs2")
2> go
```

```
 -----------
         106
(1 row affected)
```

In this example, you cannot dump `pubs2`. The return code of 106 is a sum of all the conditions met (2, 8, 32, 64). See the Usage section for a description of the return codes.

Usage

`tran_dumpable_status` allows you to determine if dump transaction is allowed on a database without having to run the command. `tran_dumpable_status` performs all of the checks that the SAP ASE server performs when dump transaction is issued.

If `tran_dumpable_status` returns 0, you can perform the `dump transaction` command on the database. If it returns any other value, it cannot. The non-0 values are:

- 1 – A database with the name you specified does not exist.
- 2 – A log does not exist on a separate device.
- 4 – The log first page is in the bounds of a data-only disk fragment.
- 8 – the `trunc log on chkpt` option is set for the database.
- 16 – Non-logged writes have occurred on the database.
- 32 – Truncate-only `dump tran` has interrupted any coherent sequence of dumps to dump devices.
- 64 – Database is newly created or upgraded. Transaction log may not be dumped until a `dump database` has been performed.
- 128 – Database durability does not allow transaction dumps.
- 256 – Database is read-only. `dump transaction` started a transaction, which is not allowed on read-only databases.
- 512 – Database is online for standby access. `dump transaction` started a transaction, which is not allowed on databases in standby access because the transaction would disturb the load sequence.
- 1024 – Database is an archive database, which do not support `dump transaction`.

See also: `dump transaction` in *Reference Manual: Commands*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute tran_dumpable_status.

3.189 tsequal

Compares `timestamp` values to prevent update on a row that has been modified since it was selected for browsing.

Syntax

```
tsequal(<browsed_row_timestamp>, <stored_row_timestamp>)
```

Parameters

<browsed_row_timestamp>
is the `timestamp` column of the browsed row.

<stored_row_timestamp>
is the `timestamp` column of the stored row.

Examples

Example 1

Retrieves the `timestamp` column from the current version of the `publishers` table and compares it to the value in the `timestamp` column that has been saved. To add the `timestamp` column:

```
alter table publishers add timestamp
```

If the values in the two `timestamp` columns are equal, `tsequal` updates the row. If the values are not equal, `tsequal` returns the error message below:

```
update publishers
set city = "Springfield"
where pub_id = "0736"
and tsequal(timestamp, 0x0001000000002ea8)
```

```
Msg 532, Level 16, State 2:
Server '<server_name>', Line 1:
```

```
The timestamp (changed to 0x0001000000002ea8) shows that the row has been
updated by another user.
Command has been aborted.
(0 rows affected)
```

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `tsequal`.

3.189.1 Usage for `tsequal`

There are additional considerations for using `tsequal`.

- `tsequal`, a system function, compares the `timestamp` column values to prevent an update on a row that has been modified since it was selected for browsing. For general information about system functions, see *Transact-SQL Users Guide*.
- `tsequal` allows you to use browse mode without calling the `dbqual` function in DB-Library. Browse mode supports the ability to perform updates while viewing data. It is used in front-end applications using Open Client and a host programming language. A table can be browsed if its rows have been timestamped.
- To browse a table in a front-end application, append the `for browse` keywords to the end of the `select` statement sent to the SAP ASE server. For example:

  ```
  <Start of select statement in an Open Client application>
  ...
     for browse
  <Completion of the Open Client application routine>
  ```
- Do not use `tsequal` in the `where` clause of a `select` statement; only in the `where` clause of `insert` and `update` statements where the rest of the `where` clause matches a single unique row.
  If you use a `timestamp` column as a search clause, compare it like a regular `varbinary` column; that is, `timestamp1 = timestamp2`.

See also *Transact-SQL Users Guide*.

Adding a Timestamp to an Existing Table

To prepare an existing table for browsing, add a column named `timestamp` using `alter table`. For example, to add a `timestamp` column with a NULL value to each existing row:

```
alter table oldtable add timestamp
```

To generate a timestamp, update each existing row without specifying new column values:

```
update oldtable
set col1 = col1
```

Related Information

timestamp Datatype [page 19]

3.189.1.1 Adding a Timestamp to a New Table for Browsing

When creating a new table for browsing, include a column named `timestamp` in the table definition.

The column is automatically assigned a datatype of `timestamp`; you do not have to specify its datatype.

For example:

```
create table newtable(col1 int, timestamp, col3 char(7))
```

Whenever you insert or update a row, the SAP ASE server timestamps it by automatically assigning a unique `varbinary` value to the `timestamp` column.

3.190 uhighsurr

Returns 1 if the Unicode value at position `start` is the higher half of a surrogate pair (which should appear first in the pair). Otherwise, returns 0. This function allows you to write explicit code for surrogate handling.

Syntax

```
uhighsurr(<uchar_expr>, start)
```

Parameters

<uchar_expr>

is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

start

specifies the character position to investigate.

Usage

- `uhighsurr`, a string function, allows you to write explicit code for surrogate handling. Specifically, if a substring starts on a Unicode character where `uhighsurr` is true, extract a substring of at least 2 Unicode values (`<substr>` does not extract half of a surrogate pair).
- If `<uchar_expr>< >`is NULL, `uhighsurr` returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `uhighsurr`.

Related Information

ulowsurr [page 425]

3.191 ulowsurr

Returns 1 if the Unicode value at `<start>` is the low half of a surrogate pair (which should appear second in the pair). Otherwise, returns 0. This function allows you to explicitly code around the adjustments performed by `substr()`, `stuff()`, and `right()`.

Syntax

```
ulowsurr(<uchar_expr>, start)
```

Parameters

`<uchar_expr>`
is a character-type column name, variable, or constant expression of `unichar` or `univarchar` type.

start
specifies the character position to investigate.

Usage

- `ulowsurr`, a string function, allows you to write explicit code around adjustments performed by `substr`, `stuff`, and `right`. Specifically, if a substring ends on a Unicode value where `ulowsurr` is true, the user knows to extract a substring of 1 less characters (or 1 more). `substr` does not extract a string that contains an unmatched surrogate pair.
- If `<uchar_expr>< >`is NULL, `ulowsurr` returns NULL.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `ulowsurr`.

Related Information

uhighsurr [page 423]

3.192 upper

Converts specified lowercase string to the uppercase equivalent.

Syntax

```
upper(<char_expr>)
```

Parameters

<char_expr>

is a character-type column name, variable, or constant expression of `char`, `unichar`, `varchar`, `nchar`, `nvarchar`, or `univarchar` type.

Examples

Example 1

Converts "abcd" to uppercase letters:

```
select upper("abcd")
```

```
----
ABCD
```

Usage

- `upper`, a string function, converts lowercase to uppercase, returning a character value.
- If <char_expr >or< uchar_expr >is NULL, `upper` returns NULL.
- Characters that have no upper-ase equivalent are left unmodified.
- If a `unichar` expression is created containing only half of a surrogate pair, an error message appears and the operation is aborted.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `upper`.

Related Information

lower [page 248]

3.193 uscalar

Returns the Unicode scalar value for the first Unicode character in an expression.

Syntax

```
uscalar(<uchar_expr>)
```

Parameters

<uchar_expr>

is a character-type column name, variable, or constant expression of `unichar`, or `univarchar` type.

Usage

- `uscalar`, a string function, returns the Unicode value for the first Unicode character in an expression.
- If `<uchar_expr>` is NULL, returns NULL.
- If `uscalar` is called on a `<uchar_expr>` containing an unmatched surrogate half, and error occurs and the operation is aborted.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `uscalar`.

Related Information

ascii [page 63]

3.194 user

Returns the name of the current user.

Syntax

```
user
```

Examples

Example 1
Returns the name of the current user:

```
select user
```

```
------
dbo
```

Usage

If the `sa_role` is active, you are automatically the database owner in any database you are using. Inside a database, the user name of the database owner is always “dbo”.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `user`.

Related Information

user_name [page 431]

3.195 user_id

Returns the ID number of the specified user or of the current user in the database.

Syntax

```
user_id([<user_name>])
```

Parameters

<user_name>

is the name of the user.

Examples

Example 1

Returns the ID number of the current user:

```
select user_id()
```

```
------
     1
```

Example 2

Returns the ID number for user margaret:

```
select user_id("margaret")
```

```
------
     4
```

Usage

- `user_id`, a system function, returns the user's ID number. For general information about system functions, see *Transact-SQL Users Guide*.
- `user_id` reports the number from `sysusers` in the current database. If no `<user_name>` is supplied, `user_id` returns the ID of the current user. To find the server user ID, which is the same number in every database on the SAP ASE server, use `suser_id`.

- Inside a database, the “guest” user ID is always 2.
- Inside a database, the `user_id` of the database owner is always 1. If you have the `sa_role` active, you are automatically the database owner in any database you are using. To return to your actual user ID, use `set sa_role off` before executing `user_id`. If you are not a valid user in the database, the SAP ASE server returns an error when you use `set sa_role off`.

See also:

- `setuser` in *Reference Manual: Commands*
- *Transact-SQL Users Guide*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `user_id`.

Related Information

suser_id [page 406]
user_name [page 431]

3.196 user_name

Returns the name within the database of the specified user or of the current user.

Syntax

```
user_name([<user_id>])
```

Parameters

<user_id>

is the ID of a user.

Examples

Example 1

Returns the name within the database of the current user:

```
select user_name()
```

```
------------------------------
dbo
```

Example 2

Returns the name within the database with user ID 4:

```
select user_name(4)
```

```
------------------------------
margaret
```

Usage

If the `sa_role` is active, you are automatically the database owner in any database you are using. Inside a database, the `user_name` of the database owner is always “dbo”.

See also *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

You must be a user with `sa_role` or `sso_role` to use this function on a `user_id` other than your own.

Related Information

suser_name [page 407]
user_id [page 430]

3.197 valid_name

Returns 0 if the specified string is not a valid identifier or a number other than 0 if the string is a valid identifier, and can be up to 255 bytes in length.

Syntax

```
valid_name(<character_expression>[, <maximum_length>])
```

Parameters

<character_expression>
is a character-type column name, variable, or constant expression of `char`, `varchar`, `nchar` or `nvarchar` type. Constant expressions must be enclosed in quotation marks.

<maximum_length>
is an integer larger than 0 and less than or equal to 255. The default value is 30. If the identifier length is larger than the second argument, `valid_name` returns 0, and returns a value greater than zero if the identifier length is invalid.

Examples

Example 1

Creates a procedure to verify that identifiers are valid:

```
create procedure chkname
@name varchar(30)
as
     if valid_name(@name) = 0
     print "name not valid"
```

Usage

- `valid_name`, a system function, returns 0 if the `<character_expression>` is not a valid identifier (illegal characters, more than 30 bytes long, or a reserved word), or a number other than 0 if it is a valid identifier.
- The SAP ASE server identifiers can be a maximum of 16384 bytes in length, whether single-byte or multibyte characters are used. The first character of an identifier must be either an alphabetic character, as defined in the current character set, or the underscore (_) character. Temporary table names, which begin with the pound sign (#), and local variable names, which begin with the at sign (@), are exceptions to this rule. `valid_name` returns 0 for identifiers that begin with the pound sign (#) and the at sign (@).

See also:

- *Transact-SQL Users Guide*
- `sp_checkreswords` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `valid_name`.

3.198 valid_user

Returns 1 if the specified ID is a valid user or alias in at least one database.

Syntax

```
valid_user(<server_user_id> [, <database_id>])
```

Parameters

`<server_user_id>`

is a server user ID. Server user IDs are stored in the `suid` column of `syslogins`.

`<database_id>`

is the ID of the database on which you are determining if the user is valid. Database IDs are stored in the `dbid` column of `sysdatabases`.

Examples

Example 1

Shows that the user with an `suid` of 4 is a valid user or alias in at least one database:

```
select valid_user(4)
```

```
---------------
              1
```

Example 2

Shows that the user with an `suid` of 4 is a valid user or alias in the database with an ID of 6.

```
select valid_user(4,6)
```

```
---------------
              1
```

Usage

- `valid_user` returns 1 if the specified `<server_user_id>` is a valid user or alias in the specified `<database_id>`.
- If you do not specify a `<database_id>`, or if it is 0, `valid_user` determines if the user is a valid user or alias on at least one database.

See also:

- *Transact-SQL Users Guide*
- `sp_adduser` in *Reference Manual: Procedures*

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `valid_user` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have manage any login or manage server permission to execute valid_user on a server_user_id other than your own.
Disabled	With granular permissions disabled, you must be a user with sa_role or sso_role to execute valid_user on a server_user_id other than your own.

Auditing

You can enable security auditing option to audit this function. Values in event and extrainfo columns from the sysaudits table are:

Audit option	Event	Command or access audited	Information in extrainfo:
security	86	valid_user	• *Roles* – Current active roles • *Keywords or options* – VALID_USER • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if set proxy in effect

For more information about auditing, see *Security Administration Guide* > *Auditing*.

3.199 var

Computes the statistical variance of a sample consisting of a numeric expression, as a double, and returns the variance of a set of numbers.

> i Note
>
> var and variance are aliases of var_samp.

Syntax

See var_samp.

Related Information

var_samp [page 439]

3.200 var_pop

Computes the statistical variance of a population consisting of a numeric expression, as a `double`. `varp` is an alias for `var_pop`, and uses the same syntax.

Syntax

```
var_pop ( [all | distinct] <expression> )
```

Parameters

all
: applies `var_pop` to all values. `all` is the default.

distinct
: eliminates duplicate values before `var_pop` is applied.

`<expression>`
: is an expression—commonly a column name—in which its population-based variance is calculated over a set of rows.

Examples

Example 1

Lists the average and variance of the advances for each type of book in the `pubs2` database:

```
select type, avg(advance) as "avg", var_pop(advance)
  as "variance" from titles group by type order by type
```

Usage

Computes the population variance of the provided value expression evaluated for each row of the group (if `distinct` was specified, then each row that remains after duplicates have been eliminated), defined as the sum of squares of the difference of value expression, from the mean of value expression, divided by the number of rows in the group or partition.

The formula that defines the variance of population of size *n* having mean μ (var_pop) is presented below. The population standard deviation (stddev_pop) is the positive square root of this number.

$$\sigma^2 = \frac{\sum (x_i - \mu)^2}{n}$$

σ^2 Variance

n Population size

μ Mean of the values x_i

For general information about aggregate functions, see *Aggregate Functions* in *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `var_pop`.

Related Information

stddev_pop [page 389]
stddev_samp [page 391]
var_samp [page 439]

3.201 var_samp

Computes the statistical variance of a sample consisting of a numeric-expression, as a `double`, and returns the variance of a set of numbers. `var` and `variance` are aliases of `var_samp`, and use the same syntax.

Syntax

```
var_samp ( [ all | distinct] <expression> )
```

Parameters

all
: applies `var_samp` to all values. `all` is the default.

distinct
: eliminates duplicate values before `var_samp` is applied.

<expression>
: is any numeric datatype (`float`, `real`, or `double`) expression.

Examples

Example 1

Lists the average and variance of the advances for each type of book in the `pubs2` database:

```
select type, avg(advance) as "avg", var_samp(advance)
  as "variance" from titles where
  total_sales > 2000 group by type order by type
```

Usage

`var_samp` returns a result of double-precision floating-point datatype. If applied to the empty set, the result is NULL.

The formula that defines the variance of population of size *n* having mean $\overline{x}$ (var_samp) is presented below. The population standard deviation (stddev_samp) is the positive square root of this number.

$$s^2 = \frac{\sum (x_i - \overline{x})^2}{n-1}$$

s^2 Variance

n Population size

$\overline{x}$ Mean of the values x_i

For general information about aggregate functions, see *Aggregate Functions* in *Transact-SQL Users Guide*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `var_samp`.

Related Information

stddev_pop [page 389]
stddev_samp [page 391]
var_pop [page 437]

3.202 variance

Computes the statistical variance of a sample consisting of a numeric expression, as a `double`, and returns the variance of a set of numbers.

> i Note
>
> `var` and `variance` are aliases of `var_samp`.

Syntax

See `var_samp`.

Related Information

var_samp [page 439]

3.203 varp

Computes the statistical variance of a population consisting of a numeric expression, as a `double`.

> **i Note**
>
> `varp` is an alias of `var_pop`.

Syntax

See `var_pop`.

Related Information

var_pop [page 437]

3.204 workload_metric

(Cluster environments only) Queries the current workload metric for the instance you specify, or updates the metric for the instance you specify.

Syntax

```
workload_metric( <instance_id> | <instance_name> [, <new_value> ] )
```

Parameters

<instance_id>
: ID of the instance.

<instance_name>
: name of the instance.

<new_value>
: float value representing the new metric.

Examples

Example 1

Sees the user metric on the current instance:

```
select workload_metric()
```

Example 2

Sees the user metric on instance "ase2":

```
select workload_metric("ase2")
```

Example 3

Sets the value of the user metric on "ase3" to 27.54:

```
select workload_metric("ase3", 27.54)
```

Usage

- A NULL value indicates the current instance.
- If a value is specified for `<new_value>`, the specified value becomes the current user metric. If a value is not specified for `<new_value>`, the current workload metric is returned.
- The value of `<new_value>` must be zero or greater.
- If a value is supplied for `<new_value>`, `workload_metric` returns that value if the operation is successful. Otherwise, `workload_metric` returns -1.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

The permission checks for `workload_metric` differ based on your granular permissions settings.

Granular Permissions	Description
Enabled	With granular permissions enabled, you must have `manage cluster` permission or be a user with `ha_role` to execute `workload_metric`.
Disabled	With granular permissions disabled, you must be a user with `sa_role` or `ha_role` to execute `workload_metric`.

Auditing

You can enable `security` auditing option to audit this function. Values in `event` and `extrainfo` columns from the `sysaudits` table are:

Audit option	Event	Command or access audited	Information in `extrainfo`:
`security`	86	`workload_metric`	• *Roles* – Current active roles • *Keywords or options* – `WORKLOAD_METRIC` • *Previous value* – NULL • *Current value* – NULL • *Other information* – NULL • *Proxy information* – Original login name, if `set proxy` in effect

For more information about auditing, see *Security Administration Guide > Auditing*.

3.205 xa_bqual

Returns the binary version of the `bqual` component of an ASCII XA transaction ID.

Syntax

```
xa_bqual(<xid>, 0)
```

Parameters

<xid>

is the ID of an SAP ASE transaction, obtained from the `xactname` column in `systransactions` or from `sp_transactions`.

0

is reserved for future use

Examples

Example 1

Returns “0x227f06ca80”, the binary translation of the branch qualifier for the SAP ASE transaction ID “0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0”. The SAP ASE transaction ID is first obtained using `sp_transactions`:

```
1> sp_transactions
```

```
xactkey                        type      coordinator starttime           state
     connection dbid  spid  loid  failover    srvname  namelen  xactname
------------------------------ --------- ----------- -------------------
---------- ---------- ----- ----- ----- ----------- -------  --------
---------------------------------------
0x531600000600000017e4885b0700 External XA          Dec 9 2005  5:15PM In
Command  Attached     7   20    877  Resident Tx  NULL         39
0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0
```

```
1> select xa_bqual("0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0", 0)
2> go
```

```
...
--------------------------------------------------------------------
0x227f06ca80
```

Example 2

`xa_bqual` is often used together with `xa_gtrid`. This example returns the global transaction IDs and branch qualifiers from all rows in `systransactions` where its `coordinator` column is the value of “3”:

```
1> select gtrid=xa_gtrid(xactname,0),
    bqual=xa_bqual(xactname,0)
    from systransactions where coordinator = 3
2> go
```

```
        gtrid
        bqual
--------------------------------------------------------------------------
         0xb1946cdc52464a61cba42fe4e0f5232b
         0x227f06ca80
```

Usage

If an external transaction is blocked on the SAP ASE server and you are using `sp_lock` and `sp_transactions` to identify the blocking transaction, you can use the XA transaction manager to terminate the global transaction. However, when you execute `sp_transactions`, the value of `<xactname>` it returns is in ASCII string format, while XA Server uses an undecoded binary value. Using `xa_bqual` thus allows you to determine the `bqual` portion of the transaction name in a format that can be understood by the XA transaction manager.

`xa_bqual` returns:

- The translated version of this string that follows the second "_" (underscore) and precedes either the third "_" or end-of-string value, whichever comes first.
- NULL if the transaction ID cannot be decoded, or is in an unexpected format.

> **i Note**
>
> `xa_bqual` does not perform a validation check on the `xid`, but only returns a translated string.

See also `sp_lock`, `sp_transactions` in *Reference Manual: Procedures*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can use `xa_bqual`.

Related Information

xa_gtrid [page 446]

3.206 xa_gtrid

Returns the binary version of the `gtrid` component of an ASCII XA transaction ID.

Syntax

```
xa_gtrid(<xactname>, <int>)
```

Parameters

<xid>

is the ID of an SAP ASE transaction, obtained from the `xactname` column in `systransactions` or from `sp_transactions`.

0

is reserved for future use

Examples

Example 1

In this typical situation, returns "0x227f06ca80," the binary translation of the branch qualifier, and "0xb1946cdc52464a61cba42fe4e0f5232b," the global transaction ID, for the SAP ASE transaction ID "0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0":

```
1> select xa_gtrid("0000000A_IphIT596iC7bF2#AUfkzaM_8DY6OE0", 0)
2> go
```

```
       ...
------------------------------------------------------------
          0xb1946cdc52464a61cba42fe4e0f5232b
(1 row affected)
```

Example 2

`xa_bqual` is often used together with `xa_gtrid`. This example returns the global transaction IDs and branch qualifiers from all rows in `systransactions` where its `coordinator` column is the value of "3":

```
1> select gtrid=xa_gtrid(xactname,0),
    bqual=xa_bqual(xactname,0)
    from systransactions where coordinator = 3
2> go
```

```
         gtrid
```

```
        bqual
------------------------------------------------------------
         0xb1946cdc52464a61cba42fe4e0f5232b
         0x227f06ca80
```

Usage

If an external transaction is blocked on the SAP ASE server and you are using `sp_lock` and `sp_transactions` to identify the blocking transaction, you can use the XA transaction manager to terminate the global transaction. However, when you execute `sp_transactions`, the value of `<xactname>` it returns is in ASCII string format, while XA Server uses an undecoded binary value. Using `xa_gtrid` thus allows you to determine the `gtrid` portion of the transaction name in a format that can be understood by the XA transaction manager.

`xa_gtrid` returns:

- The translation version of tis string that follows the first "_" (underscore) and precedes either the second "_" or end-of-string value, whichever comes first.
- NULL if the transaction ID cannot be decoded, or is in an unexpected format.

> **i Note**
>
> `xa_gtrid` does not perform a validation check on the `xid`, but only returns a translated string.

See also `sp_lock`, `sp_transactions` in *Reference Manual: Procedures*.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can use `xa_gtrid`.

Related Information

xa_bqual [page 443]

3.207 xact_connmigrate_check

(Cluster environments only) Determines whether or not a connection can process an external transaction.

Syntax

```
xact_connmigrate_check("<txn_name>")
```

Parameters

<txn_name>

(optional) is a transaction ID.

Examples

Example 1

Shows an XA transaction "txn_name" running on instance "ase1".

```
select xact_connmigrate_check("txn_name")
```

```
--------
    1
```

Example 2

Shows an XA transaction "txn_name" running on instance "ase2". The connection can migrate.

```
select xact_connmigrate_check("txn_name")
```

```
--------
    1
```

Example 3

Shows an XA transaction "txn_name" running on instance "ase2". The connection cannot migrate.

```
select xact_connmigrate_check("txn_name")
```

```
--------
    0
```

Usage

If an XID is specified, `xact_connmigrate_check` returns:

- 1 if the connection is to the instance running the specified transaction, or the connection is to another instance in a migratable state
- 0 if the connection or transaction ID does not exist, or the connection is to another instance that is not in a migratable state

If an XID is not specified, `xact_connmigrate_check` returns:

- 1 if the connection is in a migratable state
- 0 if the connection does not exist or is not in a migratable state

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `xact_connmigrate_check`.

Related Information

xact_owner_instance [page 449]

3.208 xact_owner_instance

(Cluster environments only) Returns the instance ID on which the distributed transaction is running.

Syntax

```
xact_owner_instance("<txn_name>")
```

Parameters

<txn_name>

is a transaction ID.

Examples

Example 1

Shows an XA transaction “txn_name” running on instance “ase1”:

```
select xact_owner_instance(txn_name)
```

```
-------
    1
```

Example 2

Shows an XA transaction “txn_name” not running:

```
select xact_owner_instance(txn_name)
```

```
-------
  NULL
```

Usage

`xact_owner_instance` returns:

- The instance ID of the instance running the transaction, or
- Null, if the transaction is not running

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `xact_owner_instance`.

Related Information

xact_connmigrate_check [page 448]

3.209 xmlextract

Applies an XML query expression to an XML document and returns the specified result. Information can be returned with or without the XML tags.

Usage

See *XML Services* for syntax, examples, and usage information for `xmlextract` and all other Transact-SQL functions that support XML in the database.

3.210 xmlparse

Parses an XML document passed as a parameter, and returns an `image` (default), `binary`, or `varbinary` value that contains a parsed form of the document.

Usage

See *XML Services* for syntax, examples, and usage information for `xmlparse` and all other Transact-SQL functions that support XML in the database.

3.211 xmlrepresentation

Examines the `image` parameter of an expression, and returns an integer value that indicates whether the parameter contains parsed XML data or another sort of `image` data.

Usage

See *XML Services* for syntax, examples, and usage information for `xmlrepresentation` and all other Transact-SQL functions that support XML in the database.

3.212 xmltable

Extracts data from an XML document and returns it as a SQL table.

Usage

See *XML Services* for syntax, examples, and usage information for `xmltable` and all other Transact-SQL functions that support XML in the database.

3.213 xmltest

Is a SQL predicate that evaluates an XML query expression, which can reference the XML document parameter, and returns a Boolean result. `xmltest` resembles a SQL `like` predicate.

Usage

See *XML Services* for syntax, examples, and usage information for `xmltest` and all other Transact-SQL functions that support XML in the database.

3.214 xmlvalidate

Validates an XML document.

Usage

See *XML Services* for syntax, examples, and usage information for `xmlvalidate` and all other Transact-SQL functions that support XML in the database.

3.215 year

Returns an integer that represents the year in the `datepart` of a specified date.

Syntax

```
year(<date_expression>)
```

Parameters

`<date_expression>`
is an expression of type `datetime`, `smalldatetime`, `date`, `time` or a character string in a `datetime` format.

Examples

Example 1

Returns the integer 03:

```
select year("11/02/03")
----------
2003
(1 row(s) affected)
```

Usage

`year(<date_expression>)` is equivalent to `datepart(<yy>, <date_expression>)`.

Standards

ANSI SQL – Compliance level: Transact-SQL extension.

Permissions

Any user can execute `year`.

Related Information

System and User-Defined Datatypes [page 13]
datepart [page 148]
day [page 152]
month [page 260]

4 User-Defined Functions (UDFs)

The `create function` command allows you to create user-defined functions that return inline and multi-statement tables.

Using table SQL UDFs offers improved modularity and encapsulation in SQL programming, allowing you to use parameterized views or multi-statement views.

You can create these types of table user-defined functions with the `create function` command:

- Multi-statement table UDFs – these contains one or more statements, and will not be merged when called with the caller statement.
- Inline table UDFs – these contain one statement when the function is called.
  SAP ASE does not merge inline table UDFs.

A table UDF takes zero or more input parameters and returns table, multi-set rows. A table UDF can include up to 1023 input parameters. You must specify the keyword DEFAULT when calling the function for the default value if a parameter of the function has a default value. You cannot use output parameters in UDFs.

UDFs cannot:

- Make changes to database objects; they can only modify local variables inside the UDF.
- Print the result set.
- Call stored procedures (they can call only extended stored procedures)
- Perform DDL.
- Perform DMS, except selecting data into variables.
- Perform transaction management.
- Perform modifications to database tables.
- Perform operations on cursors that are not local to the function.
- Perform catalog modifications.
- Generate a result set that is returned to the user.

Statement similar to these are valid in UDFs:

- `declare` statements used to define data variables and cursors that are local to the function.
- Assigning values to objects local to the function, such as using `select` or `set` to assign values to scalar and table local variables.
- Cursor operations that reference local cursors that are declared, opened, closed, and de-allocated in the function. `fetch` statements that return data to the client are not allowed. Only `fetch` statements that assign values to local variables using the `into` clause are allowed.
- Control-of-flow statements.
- `set` parameters that are valid only within the scope of the function, unless they are exportable options (for example, the `export` parameter is enabled and is part of the exportable parameter list).
- `insert` and `update` statements on a table variable that are returned to the caller.

For example, if you create this table:

```
Create table Emp_mails
```

```
(emp_id int, name varchar(30), dept_id int, email varchar(1000), WeekDay
datetime)
```

Insert these values:

```
insert Emp_mails values (02993, 'Alex Kospar' , 14, ' ', getdate())
insert Emp_mails values (02994, 'Ahmed ben Ahmed', 45, ' ', '2007-11-02')
insert Emp_mails values (02995, 'Roger Mila', 43, ' ', '2007-10-30')
insert Emp_mails values (02996, 'Amida Sountra', 45, ' ', '2007-10-30')
insert Emp_mails values (02997, 'Sustra Cheng', 14, ' ', '2007-10-30')
insert Emp_mails values (02998, 'Olive Pressee', 56, ' ', '2007-10-29')
insert Emp_mails values (03000, 'Yousri Kapa', 14, ' ', '2007-10-29')
insert Emp_mails values (03001, 'Lynn Paris', 36, ' ', '2007-10-28')
insert Emp_mails values (03002, 'Shella Labella', 87, ' ' , '2007-10-28')
```

And create this table UDF:

```
create function Emp_dept (@dptid int) returns table
(emp_id int, name varchar(30))
as
return select emp_id, name from Emp_mails where dept_id = @dptid
```

This table UDF returns all the employees of a given department that sent an email (these rows are sent to the calling statement, not to the user):

```
select * from dbo.Emp_dept(14)
 emp_id      name
 ----------- ------------------------------
        2993 Alex Kospar
        2997 Sustra Cheng
        3000 Yousri Kapa
```

You can also filter the results:

```
select name from dbo.Emp_dept(14) where emp_id > 2995
 name
 ------------------------------
 Sustra Cheng
 Yousri Kapa
```

See *Transact-SQL Users Guide > User-Created Functions > Table User-Defined Functions* and `create function` in the *Reference Manual: Commands*.

5 Global Variables

Global variables are system-defined variables that are updated by the SAP ASE server while the system is running.

Some global variables are session-specific, while others are server instance-specific. For example, `@@error` contains the last error number generated by the system for a given user connection.

To specify application context variables, use `get_appcontext` and `set_appcontext`.

To view the value for any global variable, enter:

```
select <variable_name>
```

For example:

```
select @@char_convert
```

Many global variables report on system activity occurring from the last time the SAP ASE server was started. `sp_monitor` displays the current values of some of the global variables.

The global variables available for SAP ASE are:

Global Variable	Definition
`@@active_instances`	Returns the number of active instances in the cluster
`@@authmech`	A read-only variable that indicates the mechanism used to authenticate the user.
`@@bootcount`	Returns the number of times an SAP ASE server installation has been started.
`@@boottime`	Returns the date and time the SAP ASE server was last started.
`@@bulkarraysize`	Returns the number of rows to be buffered in local server memory before being transferred using the bulk copy interface Used only with Component Integration Services for transferring rows to a remote server using `select into`. See the *Component Integration Services User's Guide*.
`@@bulkbatchsize`	Returns the number of rows transferred to a remote server via `select into <proxy_table>` using the bulk interface. Used only with Component Integration Services for transferring rows to a remote server using `select into`. See the *Component Integration Services User's Guide*.
`@@char_convert`	Returns 0 if character set conversion is not in effect. Returns 1 if character set conversion is in effect.
`@@cis_rpc_handling`	Returns 0 if `cis rpc handling` is off. Returns 1 if `cis rpc handling` is on. See the *Component Integration Services User's Guide*.

Global Variable	Definition
`@@cis_version`	Returns the date and version of Component Integration Services.
`@@client_csexpansion`	Returns the expansion factor used when converting from the server character set to the client character set. For example, if it contains a value of 2, a character in the server character set could take up to twice the number of bytes after translation to the client character set.
`@@client_csid`	Returns -1 if the client character set has never been initialized; returns the client character set ID from `syscharsets` for the connection if the client character set has been initialized.
`@@client_csname`	Returns NULL if client character set has never been initialized; returns the name of the character set for the connection if the client character set has been initialized.
`@@clusterboottime`	Returns the date and time the cluster was first started, even if the instance that originally started the cluster start has shut down.
`@@clustercoordid`	Returns the instance id of the current cluster coordinator.
`@@clustermode`	Returns the string: "shared-disk cluster".
`@@clustername`	Returns the name of the cluster.
`@@cmpstate`	Returns the current mode of the SAP ASE server in a high availability environment. Not used in a non-high availability environment.
`@@compiletime`	Returns the compilation time of the last compiled query. If the statement cache is on (that is, when the `enable stmt cache monitoring` option is on and the `statement cache size` is configured), the query might be stored in the system cache itself, and as a result, it's not compiled. In this scenario, the `@@compiletime` calculates the compilation time of the last compiled query.
`@@connections`	Returns the number of user logins attempted.
`@@cpu_busy`	Returns the amount of time, in ticks, that the CPU has spent working since the last time the server was started. The value of `@@user_busy` + `@@system_busy` should equal the value of `@@cpu_busy`.
`@@cputime`	Returns the CPU time required to complete the query execution and get the final result. However, this does not take into account the time spent in waiting for I/O and other factors.

<table>
<tr><th>Global Variable</th><th>Definition</th></tr>
<tr><td><code>@@cursor_rows</code></td><td>A global variable designed specifically for scrollable cursors. Displays the total number of rows in the cursor result set. Returns:
-1 – the cursor is:
Dynamic – because dynamic cursors reflect all changes, the number of rows that qualify for the cursor is constantly changing. You can never be certain that all the qualified rows are retrieved.
<code>semi_sensitive</code> and scrollable, but the scrolling worktable is not yet fully populated – the number of rows that qualify the cursor is unknown at the time this value is retrieved.
0 – either no cursors are open, no rows qualify for the last opened cursor, or the last open cursor is closed or deallocated.
<code><n></code> – the last opened or fetched cursor result set is fully populated. The value returned is the total number of rows in the cursor result set.</td></tr>
<tr><td><code>@@curloid</code></td><td>Returns the current session’s lock owner ID.</td></tr>
<tr><td><code>@@datefirst</code></td><td>Set using <code>set datefirst <n></code> where <code><n></code> is a value between 1 and 7. Returns the current value of <code>@@datefirst</code>, indicating the specified first day of each week, expressed as <code>tinyint</code>.

The default value in the SAP ASE server is Sunday (based on the us_language default), which you set by specifying <code>set datefirst 7</code>. See the <code>datefirst</code> option of the <code>set</code> command for more information on settings and values.</td></tr>
<tr><td><code>@@dbts</code></td><td>Returns the timestamp of the current database.

Timestamp columns always display values in big-endian byte order, but on little-endian platforms, <code>@@dbts</code> is displayed in little-endian byte order. To convert a little-endian <code>@@dbts</code> value to a big-endian value that can be compared with timestamp column values, use:<pre>reverse(substring(@@dbts,1,2)) + 0x0000 +
reverse(substring(@@dbts,5,4))</pre></td></tr>
<tr><td><code>@@elapsedtime</code></td><td>Returns the total time required to execute the task. <code>@@elapsedtime</code>

includes <code>@@cputime</code> for the time spent waiting for CPU and performing I/O operations such as reading files from the disk.</td></tr>
<tr><td><code>@@error</code></td><td>Returns the error number most recently generated by the system.

The <code><@@error></code> global variable is commonly used to check the error status of the most recently executed statement in the current user session. <code><@@error></code> contains 0 if the last statement succeeded; otherwise, <code><@@error></code> contains the last error number generated by the system.

<code>@@error</code> is not set for severity level 10 messages.</td></tr>
<tr><td><code>@@errorlog</code></td><td>Returns the full path to the directory in which the SAP ASE server error log is kept, relative to <code>$SYBASE</code> directory (<code>%SYBASE%</code> on Windows).</td></tr>
</table>

Global Variable	Definition
`@@failedoverconn`	Returns a value greater than 0 if the connection to the primary companion has failed over and is executing on the secondary companion server. Used only in a high availability environment, and is session-specific.
`@@fetch_status`	Returns: • 0 – fetch operation successful. • -1 – fetch operation unsuccessful. • -2 – value reserved for future use.
`@@fips_crypto_is_active`	Returns 1 if the FIPS Certified Crypto Libraries are active; otherwise returns 0.
`@@guestuserid`	Returns the ID of the guest user.
`@@hacmpservername`	Returns the name of the companion server in a high availability setup.
`@@haconnection`	Returns a value greater than 0 if the connection has the failover property enabled. This is a session-specific property.
`@@heapmemsize`	Returns the size of the heap memory pool, in bytes. See the *System Administration Guide* for more information on heap memory.
`@@identity`	Returns the most recently generated IDENTITY column value.
`@@idle`	Returns the amount of time, in ticks, that the SAP ASE server has been idle since it was last started.
`@@instanceid`	Returns the ID of the instance from which it was executed.
`@@instancename`	Returns the name of the instance from which it was executed.
`@@invaliduserid`	Returns a value of -1 for an invalid user ID.
`@@io_busy`	Returns the amount of time, in ticks, that the SAP ASE server has spent doing input and output operations.
`@@isolation`	Returns the value of the session-specific isolation level (0, 1, or 3) of the current Transact-SQL program.
`@@isolation_level_name`	Returns the name of the session-specific isolation level of the current Transact-SQL program. One of: read uncommitted, read committed, repeatable read, serializable read, committed snapshot, or serializable snapshot
`@@jsinstanceid`	ID of the instance on which the Job Scheduler is running, or run once enabled.
`@@kernel_addr`	Returns the starting address of the first shared memory region that contains the kernel region. The result is in the form of 0x`<address pointer value>`.

Global Variable	Definition
`@@kernel_size`	Returns the size of the kernel region that is part of the first shared memory region.
`@@kernelmode`	Returns the mode (threaded or process) for which the SAP ASE server is configured.
`@@langid`	Returns the server-wide language ID of the language in use, as specified in `syslanguages.langid`.
`@@language`	Returns the name of the language in use, as specified in `syslanguages.name`.
`@@lastkpgendate`	Returns the date and time of when the last key pair was generated as set by `sp_passwordpolicy's` "`keypair regeneration period`" policy option.
`@@lastlogindate`	Available to each user login session, `@@lastlogindate` includes a `datetime` datatype, its value is the `lastlogindate` column for the login account before the current session was established. This variable is specific to each login session and can be used by that session to determine the previous login to the account. If the account has not been used previously or "`sp_passwordpolicy 'set', enable last login updates`" is 0, then the value of `@@lastlogindate` is NULL.
`@@lock_timeout`	Set using `set lock wait n`. Returns the current <lock_timeout> setting, in milliseconds. `@@lock_timeout` returns the value of `n`. The default value is no timeout. If no `set lock wait n` is executed at the beginning of the session, `@@lock_timeout` returns -1.
`@@lwpid`	Returns the object ID of the next most recently run lightweight procedure.
`@@max_connections`	Returns the maximum number of simultaneous connections that can be made with the SAP ASE server in the current computer environment. You can configure the SAP ASE server for any number of connections less than or equal to the value of `@@max_connections` with the `number of user connections` configuration parameter.
`@@max_precision`	Returns the precision level used by `decimal` and `numeric` datatypes set by the server. This value is a fixed constant of 38.
`@@maxcharlen`	Returns the maximum length, in bytes, of a character in the SAP ASE server's default character set.
`@@maxgroupid`	Returns the highest group user ID. The highest value is 1048576.
`@@maxpagesize`	Returns the server's logical page size.
`@@maxspid`	Returns maximum valid value for the `spid`.
`@@maxsuid`	Returns the highest server user ID. The default value is 2147483647.
`@@maxuserid`	Returns the highest user ID. The highest value is 2147483647.
`@@maxvarlen`	Returns the maximum possible variable length allowed for a user-defined datatype.

Global Variable	Definition
`@@mempool_addr`	Returns the global memory pool table address. The result is in the form 0x`<address pointer value>`. This variable is for internal use.
`@@min_poolsize`	Returns the minimum size of a named cache pool, in kilobytes. It is calculated based on the DEFAULT_POOL_SIZE, which is 256, and the current value of `max database page size`.
`@@mingroupid`	Returns the lowest group user ID. The lowest value is 16384.
`@@minspid`	Returns 1, which is the lowest value for spid.
`@@minsuid`	Returns the minimum server user ID. The lowest value is -32768.
`@@minuserid`	Returns the lowest user ID. The lowest value is -32768.
`@@monitors_active`	Reduces the number of messages shown by `sp_sysmon`.
`@@ncharsize`	Returns the maximum length, in bytes, of a character set in the current server default character set.
`@@nestlevel`	Returns the current nesting level.
`@@nextkpgendate`	Returns the date and time of when the next key pair scheduled to be generated, as set by `sp_passwordpolicy` "`keypair regeneration period`" policy option.
`@@nodeid`	Returns the current installation's 48-bit node identifier. The SAP ASE server generates a nodeid the first time the master device is first used, and uniquely identifies an SAP ASE installation.
`@@optgoal`	Returns the current optimization goal setting for query optimization.
`@@optoptions`	Returns a bitmap of active options.
`@@options`	Returns a hexadecimal representation of the session's `set` options.
`@@optlevel`	Returns the currently optimization level setting.
`@@opttimeoutlimit`	Returns the current optimization timeout limit setting for query optimization
`@@ospid`	(Threaded mode only) Returns the operating system ID for the server.
`@@pack_received`	Returns the number of input packets read by the SAP ASE server.
`@@pack_sent`	Returns the number of output packets written by the SAP ASE server.
`@@packet_errors`	Returns the number of errors detected by the SAP ASE server while reading and writing packets.
`@@pagesize`	Returns the server's virtual page size.

Global Variable	Definition
`@@parallel_degree`	Returns the current maximum parallel degree setting.
`@@plwpid`	Returns the object ID of the most recently prepared lightweight procedure.
`@@probesuid`	Returns a value of 2 for the probe user ID.
`@@procid`	Returns the stored procedure ID of the currently executing procedure.
`@@prev_batch_encrypted`	Returns 0 if the last packet batch of a command was received as plain text; 1 if the last packet batch of a command was received encrypted.
`@@quorum_physname`	Returns the physical path for the quorum device
`@@recovery_state`	Indicates whether the SAP ASE server is in recovery based on these returns: • NOT_IN_RECOVERY – the SAP ASE server is not in start-up recovery or in failover recovery. Recovery has been completed and all databases that can be online are brought online. • RECOVERY_TUNING – the SAP ASE server is in recovery (either startup or failover) and is tuning the optimal number of recovery tasks. • BOOTIME_RECOVERY – the SAP ASE server is in startup recovery and has completed tuning the optimal number of tasks. Not all databases have been recovered. • FAILOVER_RECOVER – the SAP ASE server is in recovery during an HA failover and has completed tuning the optimal number of recovery tasks. All databases are not brought online yet.
`@@remotestate`	Returns the current mode of the primary companion in a high availability environment. For values returned, see *Using Failover in a High Availability Environment*.
`@@repartition_degree`	Returns the current dynamic repartitioning degree setting.
`@@resource_granularity`	Returns the maximum resource usage hint setting for query optimization.

Global Variable	Definition
`@@rowcount`	Returns the number of rows affected by the last query. The value of `@@rowcount` is affected by whether the specified cursor is forward-only or scrollable. If the cursor is the default, non-scrollable cursor, the value of `@@rowcount` increments one by one, in the forward direction only, until the number of rows in the result set are fetched. These rows are fetched from the underlying tables to the client. The maximum value for `@@ rowcount` is the number of rows in the result set. In the default cursor, `@@rowcount` is set to 0 by any command that does not return or affect rows, such as an `if` or `set` command, or an `update` or `delete` statement that does not affect any rows. If the cursor is scrollable, there is no maximum value for `@@rowcount`. The value continues to increment with each `fetch`, regardless of direction, and there is no maximum value. The `@@rowcount` value in scrollable cursors reflects the number of rows fetched from the result set, not from the underlying tables, to the client.
`@@runtime`	Returns the time taken to execute the query.
`@@scan_parallel_degree`	Returns the current maximum parallel degree setting for nonclustered index scans.
`@@servername`	Returns the name of the SAP ASE server.
`@@setrowcount`	Returns the current value for `set rowcount`.
`@@shmem_flags`	Returns the shared memory region properties. This variable is for internal use. There are a total of 13 different properties values corresponding to 13 bits in the integer. The valid values represented from low to high bit are: MR_SHARED, MR_SPECIAL, MR_PRIVATE, MR_READABLE, MR_WRITABLE, MR_EXECUTABLE, MR_HWCOHERENCY, MR_SWCOHERENC, MR_EXACT, MR_BEST, MR_NAIL, MR_PSUEDO, MR_ZERO.
`@@spid`	Returns the server process ID of the current process.
`@@sqlstatus`	Returns status information (warning exceptions) resulting from the execution of a `fetch` statement.
`@@ssl_ciphersuite`	Returns NULL if SSL is not used on the current connection; otherwise, it returns the name of the cipher suite you chose during the SSL handshake on the current connection.
`@@ssl_protocol`	Returns the protocol negotiated during a session.
`@@stringsize`	Returns the amount of character data returned from a `toString()` method. The default is 50. Max values may be up to 2GB. A value of zero specifies the default value. See the *Component Integration Services User's Guide* for more information.
`@@sys_tempdbid`	Returns the database ID of the executing instance's effective local system temporary database.

Global Variable	Definition
`@@system_busy`	Number of ticks during which the SAP ASE server was running a system task. The value of `@@user_busy` + `@@system_busy` should equal the value of `@@cpu_busy`.
`@@system_view`	Returns the session-specific system view setting, either “instance” or “cluster.”
`@@tempdbid`	Returns a valid temporary database ID (`dbid`) of the session’s assigned temporary database.
`@@textcolid`	Returns the column ID of the column referenced by `@@textptr`.
`@@textdataptnid`	Returns the partition ID of a text partition containing the column referenced by `@@textptr`.
`@@textdbid`	Returns the database ID of a database containing an object with the column referenced by `@@textptr`.
`@@textobjid`	Returns the object ID of an object containing the column referenced by `@@textptr`.
`@@textptnid`	Returns the partition ID of a data partition containing the column referenced by @@textptr.
`@@textptr`	Returns the text pointer of the last `text`, `unitext`, or `image` column inserted or updated by a process (Not the same as the `textptr` function).
`@@textptr_parameters`	Returns 0 if the current status of the `textptr_parameters` configuration parameter is off. Returns 1 if the current status of the `textptr_parameters` if on. See the *Component Integration Services User’s Guide* for more information.
`@@textsize`	Returns the limit on the number of bytes of `text`, `unitext`, or `image` data a `select` returns. Default limit is 32K bytes for `isql`; the default depends on the client software. Can be changed for a session with `set textsize`.
`@@texttts`	Returns the text timestamp of the column referenced by `@@textptr`.
`@@thresh_hysteresis`	Returns the decrease in free space required to activate a threshold. This amount, also known as the hysteresis value, is measured in 2K database pages. It determines how closely thresholds can be placed on a database segment.
`@@timeticks`	Returns the number of microseconds per tick. The amount of time per tick is machine-dependent.
`@@total_errors`	Returns the number of errors detected by the SAP ASE server while reading and writing.
`@@total_read`	Returns the number of disk reads by the SAP ASE server.
`@@total_write`	Returns the number of disk writes by the SAP ASE server.
`@@tranchained`	Returns 0 if the current transaction mode of the Transact-SQL program is unchained. Returns 1 if the current transaction mode of the Transact-SQL program is chained.
`@@trancount`	Returns the nesting level of transactions in the current user session.

Global Variable	Definition

`@@tranrollback`	Returns the type of rollback encountered, if any. If the return value is:
	• < 0 – a server induced implicit rollback of a multistatement transaction. `@@tranrollback` stores the negation of the error number that resulted in the implicit transaction rollback.
	• 0 – this session of the currently active transaction encountered no implicit rollbacks.
	• > 0 < 10 – the most-recent occurrence of a transaction rollback was a user-issued rollback from one of these SQL commands:
	  ○ `rollback tran` in a SQL batch, procedure or trigger
	  ○ `rollback trigger` outside a trigger's scope.
	  The return value for `@@transtate` describes which `rollback` command the user issued:
	  ○ 1 – user issued an explicit `rollback tran` command
	  ○ 2 – user issued a `rollback tran to <savepoint>`. The transaction is still active.
	• > 100 – The most recent occurrence of a transaction rollback was invoked on a single-statement transaction. `@@transtate` stores the error number that caused the statement to rollback.
	
	SAP ASE does not change a negative value for `@@tranrollback` until the next `rollback tran` or `commit tran` is issued, indicating that the session has encountered an implicit transaction rollback. SAP ASE resets the value for `@@tranrollback` to 0 once it successfully applies the next `rollback tran` or `commit tran`. The value for `@@tranrollback` is 0 at the end of this example:
	
	`set chained on`
	`go`
	`<... Execute a DML statement ...>`
	`if (@@error != 0) and (@@tranrollback < 0)`
	`begin`
	`     rollback tran`
	`end`
	`go`

`@@transactional_rpc`	Returns 0 if RPCs to remote servers are transactional. Returns 1 if RPCs to remote servers are not transactional. See `enable xact coordination` and `set option transactional_rpc` in the *Reference Manual*. Also, see the *Component Integration Services User's Guide*.
`@@transtate`	Returns the current state of a transaction after a statement executes in the current user session.
`@@trigger_name`	Returns the name of the trigger currently executing.
`@@unicharsize`	Returns 2, the size of a character in `unichar`.
`@@user_busy`	Number of ticks during which the SAP ASE server was running a user task The value of `@@user_busy` + `@@system_busy` should equal the value of `@@cpu_busy`
`@@version`	Returns the date, version string, and so on of the current release of the SAP ASE server.

Global Variable	Definition
@@version_as_integer	Returns the number of the last upgrade version of the current release of the SAP ASE server as an integer. For example, @@version_as_integer returns 12500 if you are running SAP ASE version 12.5, 12.5.0.3, or 12.5.1.
@@version_number	Returns the entire version of the current release of the SAP ASE server as an integer.

Related Information

get_appcontext [page 183]
set_appcontext [page 335]
textptr [page 414]

5.1 Using Global Variables in a Clustered Environment

For @@servername, the Cluster Edition returns the name of the cluster, not the instance name. Use @@instancename to return the name of the instance.

In a non-clustered SAP ASE environment, the value for @@identity changes for every record inserted. If the most recent record inserted contains a column with the IDENTITY property, @@identity is set to the value of this column, otherwise it is set to "0" (an invalid value). This variable is session-specific, and takes its value based on the last insert that occurred during this session.

In a clustered environment, multiple nodes perform inserts on tables, so the session-specific behavior is not retained for @@identity. In a clustered environment, the value for @@identity depends on the last record inserted in the node for the current session and not on the last record inserted in the cluster.

6 Expressions, Identifiers, and Wildcard Characters

This section describes Transact-SQL expressions, valid identifiers, and wildcard characters.

6.1 Expressions

An expression is a combination of one or more constants, literals, functions, column identifiers and/or variables, separated by operators, that returns a single value.

Expressions can be of several types, including arithmetic, relational, logical (or Boolean), and character string. In some Transact-SQL clauses, a subquery can be used in an expression. A `case` expression can be used in an expression.

The types of expressions that are used in SAP ASE syntax statements are:

Usage	Definition
expression	Can include constants, literals, functions, column identifiers, variables, or parameters
logical expression	An expression that returns TRUE, FALSE, or UNKNOWN
constant expression	An expression that always returns the same value, such as “5+3” or “ABCDE”
<float_expr>	Any floating-point expression or an expression that implicitly converts to a floating value
<integer_expr>	Any integer expression or an expression that implicitly converts to an integer value
<numeric_expr>	Any numeric expression that returns a single value
<char_expr>	Any expression that returns a single character-type value
<binary_expression>	An expression that returns a single `binary` or `varbinary` value

6.1.1 Size of Expressions

Expressions returning binary or character data can be up to 16384 bytes in length.

If you upgraded from an earlier release of SAP ASE that only allowed expressions up to 255 bytes in length, and your stored procedures or scripts stored a result string of up to 255 bytes, the remainder was truncated. You may have to rewrite these stored procedures and scripts to account for the additional length of the expressions.

6.1.2 Arithmetic and Character Expressions

The general pattern for arithmetic and character expressions is:

```
{<constant >|< column_name >|< function >|< >(<subquery>)
    | (<case_expression>)}
        [{<arithmetic_operator> |< bitwise_operator >|
        <string_operator> |< comparison_operator >}
    {<constant >| <column_name >|< function >| (<subquery>)
    | <case_expression>}]<...>
```

6.1.3 Relational and Logical Expressions

A logical expression or relational expression returns TRUE, FALSE, or UNKNOWN.

The general patterns are:

```
expression <comparison_operator> [any | all] <expression>
```

```
expression [not] in <expression>
```

```
[not]exists <expression>
```

```
expression [not] between expression and <expression>
```

```
expression [not] like "<match_string>" [escape "<escape_character> "]
```

```
not expression like "<match_string>" [escape "<escape_character> "]
```

```
<expression> is [not] null
```

```
not <logical_expression>
```

```
logical_expression {and | or} <logical_expression>
```

6.1.4 Operator Precedence

Operators have the following precedence levels, where 1 is the highest level and 6 is the lowest.

1. unary (single argument) `- + ~`
2. `* / %`
3. binary (two argument) `+ - & | ^`
4. `not`
5. `and`
6. `or`

When all operators in an expression are at the same level, the order of execution is left to right. You can change the order of execution with parentheses—the most deeply nested expression is processed first.

6.1.5 Arithmetic Operators

The SAP ASE server uses the following arithmetic operators:

Operator	Meaning
+	Addition
–	Subtraction
*	Multiplication
/	Division
%	Modulo (Transact-SQL extension)

Addition, subtraction, division, and multiplication can be used on exact numeric, approximate numeric, and money type columns.

The modulo operator cannot be used on `smallmoney` or `money` columns. Modulo finds the integer remainder after a division involving two whole numbers. For example, 21 % 11 = 10 because 21 divided by 11 equals 1 with a remainder of 10.

In TSQL, the results of modulo has the same sign as the dividend. For example:

```
1> select -11 % 3, 11 % -3, -11 % -3
2> go
```

```
-------------- ----------- ----------- -----------
          -2            2           -2
(1 row affected)
```

When you perform arithmetic operations on mixed datatypes, for example `float` and `int`, the SAP ASE server follows specific rules for determining the type of the result.

Related Information

System and User-Defined Datatypes [page 13]

6.1.6 Bitwise Operators

The bitwise operators are a Transact-SQL extension for use with integer type data. These operators convert each integer operand into its binary representation, then evaluate the operands column by column. A value of 1 corresponds to true; a value of 0 corresponds to false.

This table summarizes the results for operands of 0 and 1. If either operand is NULL, the bitwise operator returns NULL:

Table 17: Truth Tables for Bitwise Operations

`& ( and)`	1	0
1	1	0
0	0	0

`| ( or)`	1	0
1	1	1
0	1	0

`^ (exclusive or)`	1	0
1	0	1
0	1	0

`~ (not)`	
1	FALSE
0	0

The examples in this table use two `tinyint` arguments, A = 170 (10101010 in binary form) and B = 75 (01001011 in binary form):

Table 18: Examples of Bitwise Operations

Operation	Binary Form	Result	Explanation
(A & B)	10101010 01001011 ------------ 00001010	10	Result column equals 1 if both A and B are 1. Otherwise, result column equals 0.

Operation	Binary Form	Result	Explanation
(A | B)	10101010 01001011 ------------ 11101011	235	Result column equals 1 if either A or B, or both, is 1. Otherwise, result column equals 0
(A ^ B)	10101010 01001011 ------------ 11100001	225	Result column equals 1 if either A or B, but not both, is 1
(~A)	10101010 ------------ 01010101	85	All 1s are changed to 0s and all 0s to 1s

6.1.7 String Concatenation Operator

You can use both the `+` and `||` (double-pipe) string operators to concatenate two or more character or binary expressions.

For example, the following displays author names under the column heading `Name` in last-name first-name order, with a comma after the last name; for example, "Bennett, Abraham.":

```
select Name = (au_lname + ", " + au_fname)
    from authors
```

This example results in `"abcdef", "abcdef"`:

```
select "abc" + "def", "abc" || "def"
```

The following returns the string "abc def". The empty string is interpreted as a single space in all `char`, `varchar`, `unichar`, `nchar`, `nvarchar`, and `text` concatenation, and in `varchar` and `univarchar` insert and assignment statements:

```
select "abc" + "" + "def"
```

When concatenating non-character, non-binary expressions, always use `convert`:

```
select "The date is " +
    convert(varchar(12), getdate())
```

A string concatenated with NULL evaluates to the value of the string. This is an exception to the SQL standard, which states that a string concatenated with a NULL should evaluate to NULL.

6.1.8 Comparison Operators

The SAP ASE server uses these comparison operators:

Operator	Meaning
=	Equal to
>	Greater than
<	Less than
>=	Greater than or equal to
<=	Less than or equal to
<>	Not equal to
`!=`	(Transact-SQL extension) Not equal to
`!>`	(Transact-SQL extension) Not greater than
`!<`	(Transact-SQL extension) Not less than

In comparing character data, < means closer to the beginning of the server's sort order and > means closer to the end of the sort order. Uppercase and lowercase letters are equal in a case-insensitive sort order. Use `sp_helpsort` to see the sort order for your SAP ASE server. Trailing blanks are ignored for comparison purposes. So, for example, "Dirk" is the same as "Dirk ".

In comparing dates, < means earlier and > means later.

Put single or double quotes around all character and `datetime` data used with a comparison operator:

```
= "Bennet"
> "May 22 1947"
```

6.1.9 Nonstandard Operators

These operators are Transact-SQL extensions.

- Modulo operator: `%`
- Negative comparison operators: `!>`, `!<`, `!=`
- Bitwise operators: `~`, `^`, `|`, `&`
- Join operators: `*=` and `=*`

6.1.10 Using any, all, and in

Use any, all, and in in your queries to return different results.

any is used with <, >, or = and a subquery. It returns results when any value retrieved in the subquery matches the value in the where or having clause of the outer statement. For more information, see the *Transact-SQL User's Guide*.

all is used with < or > and a subquery. It returns results when all values retrieved in the subquery are less than (<) or greater than (>) the value in the where or having clause of the outer statement. For more information, see the *Transact-SQL User's Guide*.

in returns results when any value returned by the second expression matches the value in the first expression. The second expression must be a subquery or a list of values enclosed in parentheses. in is equivalent to = any. For more information, see the reference page for the where clause in *Reference Manual: Commands*.

6.1.11 Negating and Testing

not negates the meaning of a keyword or logical expression.

Use exists, followed by a subquery, to test for the existence of a particular result.

6.1.12 Ranges

between is the range-start keyword; and is the range-end keyword.

The following range is inclusive:

```
where column1 between x and y
```

The following range is not inclusive:

```
where column1 > x and column1 < y
```

6.1.13 Using Nulls in Expressions

Use is null or is not null in queries on columns defined to allow null values.

An expression with a bitwise or arithmetic operator evaluates to NULL if any of the operands are null. For example, the following evaluates to NULL if <column1> is NULL:

```
1 + column1
```

6.1.13.1 Comparisons That Return TRUE

In general, the result of comparing null values is UNKNOWN, since it is not possible to determine whether NULL is equal (or not equal) to a given value or to another NULL.

However, the following cases return TRUE when `<expression>` is any column, variable or literal, or combination of these, which evaluates as NULL:

- `<expression>` `is null`
- `<expression>` = `null`
- `<expression>` = @`<x,>` where @`<x>` is a variable or parameter containing NULL. This exception facilitates writing stored procedures with null default parameters.
- `<expression>` != `<n,>` where `<n>` is a literal that does not contain NULL, and `<expression>` evaluates to NULL.

The negative versions of these expressions return TRUE when the expression does not evaluate to NULL:

- `<expression>` `is not null`
- `<expression>` != `null`
- `<expression>` != @`<x>`

> **i Note**
>
> The far right side of these exceptions is a literal null, or a variable or parameter containing NULL. If the far right side of the comparison is an expression (such as @`<nullvar>` + 1), the entire expression evaluates to NULL.

Following these rules, null column values do not join with other null column values. Comparing null column values to other null column values in a `where` clause always returns UNKNOWN for null values, regardless of the comparison operator, and the rows are not included in the results. For example, this query returns no result rows where column1 contains NULL in both tables (although it may return other rows):

```
select column1
from table1, table2
where table1.column1 = table2.column1
```

6.1.13.2 Difference Between FALSE and UNKNOWN

Although neither FALSE nor UNKNOWN returns values, there is an important logical difference between FALSE and UNKNOWN, because the opposite of false (“not false”) is true. For example, “1 = 2” evaluates to false and its opposite, “1 != 2”, evaluates to true. But “not unknown” is still unknown. If null values are included in a comparison, you cannot negate the expression to get the opposite set of rows or the opposite truth value.

6.1.13.3 Using “NULL” as a Character String

Only columns for which NULL was specified in the create table statement and into which you have explicitly entered NULL (no quotes), or into which no data has been entered, contain null values. Avoid entering the character string “NULL” (with quotes) as data for a character column. It can only lead to confusion. Use “N/A”, “none”, or a similar value instead. When you want to enter the value NULL explicitly, do not use single or double quotes.

6.1.13.4 NULL Compared to the Empty String

The empty string (“ ”or ‘ ’) is always stored as a single space in variables and column data.

This concatenation statement is equivalent to “abc def”, not to “abcdef”:

```
"abc" + "" + "def"
```

The empty string is never evaluated as NULL.

6.1.14 Connecting Expressions

`and` connects two expressions and returns results when both are true. `or` connects two or more conditions and returns results when either of the conditions is true.

When more than one logical operator is used in a statement, `and` is evaluated before `or`. You can change the order of execution with parentheses.

This table shows the results of logical operations, including those that involve null values.

Table 19: Truth Tables for Logical Expressions

`and`	`TRUE`	`FALSE`	`NULL`
`TRUE`	TRUE	FALSE	UNKNOWN
`FALSE`	FALSE	FALSE	FALSE
`NULL`	UNKNOWN	FALSE	UNKNOWN
`or`	`TRUE`	`FALSE`	`NULL`
`TRUE`	TRUE	TRUE	TRUE
`FALSE`	TRUE	FALSE	UNKNOWN
`NULL`	TRUE	UNKNOWN	UNKNOWN
`not`			
`TRUE`	FALSE		
`FALSE`	TRUE		

`NULL`	UNKNOWN

The result UNKNOWN indicates that one or more of the expressions evaluates to NULL, and that the result of the operation cannot be determined to be either TRUE or FALSE.

Related Information

Using Nulls in Expressions [page 474]

6.1.15 Using Parentheses in Expressions

Parentheses can be used to group the elements in an expression. When “expression” is given as a variable in a syntax statement, a simple expression is assumed. “Logical expression” is specified when only a logical expression is acceptable.

6.1.16 Comparing Character Expressions

Character constant expressions are treated as `varchar`. If they are compared with non-`varchar` variables or column data, the datatype precedence rules are used in the comparison (that is, the datatype with lower precedence is converted to the datatype with higher precedence). If implicit datatype conversion is not supported, you must use the `convert` function.

Comparison of a `char` expression to a `varchar` expression follows the datatype precedence rule; the “lower” datatype is converted to the “higher” datatype. All `varchar` expressions are converted to `char` (that is, trailing blanks are appended) for the comparison. If a `unichar` expression is compared to a `char` (`varchar`, `nchar`, `nvarchar`) expression, the latter is implicitly converted to `unichar`.

6.1.17 Using the Empty String

The empty string (`""`) or (`''`) is interpreted as a single blank in `insert` or assignment statements on `varchar` or `univarchar` data.

In concatenation of `varchar`, `char`, `nchar`, `nvarchar` data, the empty string is interpreted as a single space; for following example is stored as “abc def”:

```
"abc" + "" + "def"
```

The empty string is never evaluated as NULL.

6.1.18 Including Quotation Marks in Character Expressions

There are two ways to specify literal quotes within a `char`, or `varchar` entry.

The first method is to double the quotes. For example, if you begin a character entry with a single quote and you want to include a single quote as part of the entry, use two single quotes:

```
'I don''t understand.'
```

With double quotes:

```
"He said, ""It's not really confusing."""
```

The second method is to enclose a quote in the opposite kind of quote mark. In other words, surround an entry containing a double quote with single quotes (or vice versa). Here are some examples:

```
'George said, "There must be a better way."'
"Isn't there a better way?"
'George asked, "Isn"t there a better way?"'
```

6.1.19 Using the Continuation Character

To continue a character string to the next line on your screen, enter a backslash (`\`) before going to the next line.

6.2 Identifiers

Identifiers are names for database objects such as databases, tables, views, columns, indexes, triggers, procedures, defaults, rules, and cursors.

The limit for the length of object names or identifiers is 255 bytes for regular identifiers, and 253 bytes for delimited identifiers. The limit applies to most user-defined identifiers including table name, column name, index name and so on. Due to the expanded limits, some system tables (catalogs) and built-in functions have been expanded.

For variables, “@” count as 1 byte, and the allowed name for it is 254 bytes long.

Listed below are the identifiers, system tables, and built-in functions that are affected these limits.

The maximum length for these identifiers is now 255 bytes.

- Table name
- Column name
- Index name
- View name
- User-defined datatype
- Trigger name

- Default name
- Rule name
- Constraint name
- Procedure name
- Variable name
- JAR name
- Name of LWP or dynamic statement
- Function name
- Name of the time range
- Application context name

Most user-defined SAP ASE identifiers can be a maximum of 255 bytes in length, whether single-byte or multibyte characters are used. Others can be a maximum of 30 bytes. Refer to the *Transact-SQL User's Guide* for a list of both 255-byte and 30-byte identifiers.

The first character of an identifier must be either an alphabetic character, as defined in the current character set, or the underscore (_) character.

> **i Note**
>
> Temporary table names, which begin with the pound sign (#), and variable names, which begin with the at sign (@), are exceptions to this rule.

Subsequent characters can include letters, numbers, the symbols #, @, _, and currency symbols such as $ (dollars), ¥ (yen), and £ (pound sterling). Identifiers cannot include special characters such as !, %, ^, &, *, and . or embedded spaces.

You cannot use a reserved word, such as a Transact-SQL command, as an identifier.

You cannot use the dash symbol (–) as an identifier.

Related Information

Reserved Words [page 495]

6.2.1 Short Identifiers

The maximum length for these identifiers is 30 bytes:

- Cursor name
- Server name
- Host name
- Login name
- Password
- Host process identification
- Application name

- Initial language name
- Character set name
- User name
- Group name
- Database name
- Logical device name
- Segment name
- Session name
- Execution class name
- Engine name
- Quiesce tag name
- Cache name

6.2.2 Tables Beginning With # (Temporary Tables)

Tables with names that begin with the pound sign (#) are temporary tables. You cannot create other types of objects with names that begin with the pound sign.

The SAP ASE server performs special operations on temporary table names to maintain unique naming on a per-session basis. When you create a temporary table with a name of fewer than 238 bytes, the `sysobjects` name in the `tempdb` adds 17 bytes to make the table name unique. If the table name is more than 238 bytes, the temporary table name in `sysobjects` uses only the first 238 bytes, then adds 17 bytes to make it unique.

In versions of SAP ASE earlier than 15.0, temporary table names in `sysobjects` were 30 bytes. If you used a table name with fewer than 13 bytes, the name was padded with underscores (_) to 13 bytes, then another 17 bytes of other characters to bring the name up to 30 bytes.

6.2.3 Case Sensitivity and Identifiers

Sensitivity to the case (upper or lower) of identifiers and data depends on the sort order installed on your SAP ASE server.

Case sensitivity can be changed for single-byte character sets by reconfiguring SAP ASE's sort order; see the *System Administration Guide* for more information. Case is significant in utility program options.

If the SAP ASE server is installed with a case-insensitive sort order, you cannot create a table named `MYTABLE` if a table named MyTable or mytable already exists. Similarly, the following command returns rows from `MYTABLE`, MyTable, or mytable, or any combination of uppercase and lowercase letters in the name:

```
select * from MYTABLE
```

6.2.4 Uniqueness of Object Names

Object names need not be unique in a database. However, column names and index names must be unique within a table, and other object names must be unique for each *owner* within a *database*. Database names must be unique on the SAP ASE server.

6.2.5 Using Delimited Identifiers

Delimited identifiers are object names enclosed in double quotes. Using delimited identifiers allows you to avoid certain restrictions on object names. In earlier versions of SAP ASE, only table, view, and column names could be delimited by quotes; other object names could not. This changed beginning with SAP ASE version 15.7, although enabling the ability requires setting a configuration parameter.

Delimited identifiers can be reserved words, can begin with non-alphabetic characters, and can include characters that would not otherwise be allowed. They cannot exceed 253 bytes.

> ⚠ Caution
>
> Delimited identifiers may not be recognized by all front-end applications and should not be used as parameters to system procedures.

Before creating or referencing a delimited identifier, you must execute:

```
set quoted_identifier on
```

Each time you use the delimited identifier in a statement, you must enclose it in double quotes. For example:

```
create table "1one"(col1 char(3))
create table "include spaces" (col1 int)
```

```
create table "grant"("add" int)
insert "grant"("add") values (3)
```

While the `quoted_identifier` option is turned on, do not use double quotes around character or date strings; use single quotes instead. Delimiting these strings with double quotes causes the SAP ASE server to treat them as identifiers. For example, to insert a character string into `<col1>` of `<1table>`, use:

```
insert "1one"(col1) values ('abc')
```

Do not use:

```
insert "1one"(col1) values ("abc")
```

To insert a single quote into a column, use two consecutive single quotation marks. For example, to insert the characters “a’b” into `<col1>` use:

```
insert "1one"(col1) values('a''b')
```

Syntax That Includes Quotes

When the `quoted_identifier` option is set to `on`, you do not need to use double quotes around an identifier if the syntax of the statement requires that a quoted string contain an identifier. For example:

```
set quoted_identifier on
create table '1one' (c1 int)
```

However, `object_id()` requires a string, so you must include the table name in quotes to select the information:

```
select object_id('1one')
```

```
-----------------------
  896003192
```

You can include an embedded double quote in a quoted identifier by doubling the quote:

```
create table "embedded""quote" (c1 int)
```

However, there is no need to double the quote when the statement syntax requires the object name to be expressed as a string:

```
select object_id('embedded"quote')
```

6.2.5.1 Enabling Quoted Identifiers

The `quoted identifier enhancement` configuration parameter allows the SAP ASE server to use quoted identifiers for:

- Tables
- Views
- Column names
- Index names (SAP ASE version 15.7 and later)
- System procedure parameters (SAP ASE version 15.7 and later)

`quoted identifier enhancement` is part of the enable functionality group, and its default settings depends on the settings for `enable functionality group` configuration parameter. See the *System Administration Guide, Volume 1*.

To enable quoted identifiers:

1. Set the `enable functionality group` or `quoted identifier enhancement` configuration parameter to 1. For example:

   ```
   sp_configure "enable functionality group", 1
   ```

2. Restart the SAP ASE server so the change takes effect.
3. Turn on `quoted_identifier` for the current session:

   ```
   set quoted_identifier on
   ```

Once you enable `quoted identifier enhancement`, the query processor removes delimiters and trailing spaces from object definitions when you include quoted identifiers. For example, the SAP ASE server considers `"ident"`, `[ident]`, and `ident` to be identical. If `quoted identifier enhancement` is not enabled, `"ident"` is considered distinct from the other two.

When you start the SAP ASE server with `quoted identifier enhancement` enabled:

- Objects you create with quoted identifiers before restarting the SAP ASE server with the `enable functionality group` configuration parameter enabled are not automatically accessible when you use quoted identifiers after starting the server with this parameter enabled, and vice versa. That is, the SAP ASE server does not automatically rename all database objects.
  However, you can use `sp_rename` to manually rename objects. For example, if you create an object named `"ident"` and then restart the SAP ASE server with `enable functionality group` enabled, rename the object by issuing:

  ```
  sp_rename '"ident"', 'ident'
  ```
- The SAP ASE server treats `[tab.dba.ident]` and `"tab.dba.ident"` as fully qualified names.
- Any Transact-SQL statements, functions, and system or stored procedures that accept identifiers for objects also work with delimited identifiers.
- The `valid_name` function distinguishes strings that are valid for identifiers under regular rules from those that are valid under the rules for delimited identifiers, with a nonzero return indicating a valid name.
  For example, `valid_name('ident/v1')` returns true (zero) since `'ident/v1'` is valid only as a delimited identifier. However, `valid_name('ident')` returns a nonzero value because `'ident'` is valid as a delimited identifier or as a normal identifier.
- Identifiers are limited to 253 characters (28 bytes) (without `quoted identifier enhancement` enabled these are 255 characters (30 bytes) long). Valid lengths for delimited identifiers include the delimiters and any embedded or trailing spaces.

  > **i Note**
  >
  > We recommend that you avoid conventional identifiers that cannot be represented as delimited identifiers zones (254–255 or 29–30 bytes in length). The SAP ASE server and its subsystems occasionally construct internal SQL statements with delimiters added to identifiers.
- Do not use dots and delimiters as part of identifiers because of how the SAP ASE server interprets double quotes in `varchar` strings referring to identifiers.
- Identifiers have these additional constraints if they relate to items outside the SAP ASE server:
  - Identifiers must begin with an alphabetic character followed by alphanumeric characters or several special characters ($, #, @, _, ¥, £). Additionally:
    - SQL variables can include @ as the first character.
    - Temporary objects (objects in `tempdb`) can include # as the first character.
  - You cannot use reserved words as identifiers.
  - Delimited identifiers need not conform to the rules for conventional identifiers, but must be delimited with matching square brackets or with double quotes.
  - You cannot use delimited identifiers for variables or labels.
  - You must enable `set quoted_identifier` to use quoted identifiers. Once you enable `set quoted_identifier`, you must enclose `varchar` string literals in single, not double, quotes.
  - `varchar` string literals that contain identifiers cannot include delimiter characters.
  - Delimited identifiers cannot begin with the pound-sign (#). They should also not:

    ◦ Begin with (@)
    ◦ Include spaces
    ◦ Contain the dot character (.), or the delimiter characters: “, [, or]
  ◦ Trailing spaces are stripped from delimited identifiers, and zero-length identifiers are not allowed.

Related Information

Reserved Words [page 495]

6.2.5.2 Using Quoted Identifiers on Temporary Tables

SAP ASE allows you to use quoted identifiers on temporary tables.

Quoted identifiers allow you to use nonalphanumeric characters as table name, view names, column names, and so on. Specify quoted identifiers by adding double quotes or square brackets around the identifiers.

To enable SAP ASE to use quoted identifiers on temporary tables:

- Enable the quoted identifier enhancements configuration parameter:

  ```
  sp_configure 'quoted identifier enhancements', 1
  ```

  You must restart SAP ASE to enable this parameter.
- Enable quoted identifiers for the session:

  ```
  set quoted_identifier on
  ```

This example creates a temporary table named `#temp_table`:

```
create table "#temp_table" ("c" int)
```

This example inserts data into `#temp_table`:

```
insert "#temp_table" values (1)
```

`#temp_table` contains:

```
select * from "#temp_table"
 c
 -----------
           1
(1 row affected)
```

When naming a temporary table, consider:

- SAP ASE treats any table whose first character is not ‘#’ as an ordinary table and not a temporary table.
- SAP ASE treats a table named “ #table” (which includes a space before the # sign) as a regular table because the first character is not "#", but a space.
- SAP ASE considers tables with special characters in the table name after the "#" as having valid temporary table names (for example"#$$temp_table").

A number of command support using quoted identifiers on temporary tables, including:

- `create table #temp (c int)`
- `create table “#temp1” (c int)`
- `insert #temp1 values (1)`
- `insert “#temp1” values (1)`
- `select * into “#temp2” from table2`
- `select * from “#temp”, “#temp2” where “#temp”.c <> “#temp2”.c`
- `create table “#@#$%^%&temp” (c int)`
- `create procedure create_tmp as create table “#temp1” (c int)`

6.2.6 Identifying Tables or Columns by Their Qualified Object Name

You can uniquely identify a table or column by adding other names that qualify it—the database name, owner’s name, and (for a column) the table or view name.

Each qualifier is separated from the next one by a period. For example:

```
<database.owner.table_name.column_name>
```

```
<database.owner.view_name.column_name>
```

The naming conventions are:

```
[[<database>.]<owner>.]<table_name>
```

```
[[<database>.]<owner>.]<view_name>
```

6.2.6.1 Using Delimited Identifiers Within an Object Name

If you use `set quoted_identifier on`, you can use double quotes around individual parts of a qualified object name.

Use a separate pair of quotes for each qualifier that requires quotes. For example, use:

```
<database>.<owner>."<table_name>"."<column_name>"
```

Do not use:

```
<database>.<owner>."<table_name>.<column_name>"
```

6.2.6.2 Omitting the Owner Name

You can omit the intermediate elements in a name and use dots to indicate their positions, as long as the system is given enough information to identify the object:

For example:

```
<database..table_name>
```

```
<database..view_name>
```

6.2.6.3 Referencing Your Own Objects in the Current Database

You need not use the database name or owner name to reference your own objects in the current database. The default value for `<owner>` is the current user, and the default value for `<database>` is the current database.

If you reference an object without qualifying it with the database name and owner name, the SAP ASE server tries to find the object in the current database among the objects you own.

6.2.6.4 Referencing Objects Owned by the Database Owner

If you omit the owner name and you do not own an object by that name, the SAP ASE server looks for objects of that name owned by the Database Owner.

You must qualify objects owned by the Database Owner only if you own an object of the same name, but you want to use the object owned by the Database Owner. However, you must qualify objects owned by other users with the user's name, whether or not you own objects of the same name.

6.2.6.5 Using Qualified Identifiers Consistently

When qualifying a column name and table name in the same statement, be sure to use the same qualifying expressions for each; they are evaluated as strings and must match; otherwise, an error is returned.

Example: Example 1

```
select demo.mary.publishers.city from demo.mary.publishers
```

```
city ---------------------- Boston Washington Berkeley
```

Example: Example 2

This example is incorrect because the syntax style for the column name does not match the syntax style used for the table name.

```
select demo.mary.publishers.city from demo..publishers
```

```
The column prefix "demo.mary.publishers" does not match a table name or alias
name used in the query.
```

6.2.7 Determining Whether an Identifier is Valid

Use the system function `valid_name`, after changing character sets or before creating a table or view, to determine whether the object name is acceptable to the SAP ASE server.

The syntax is:

```
select valid_name("<object_name>")
```

If <object_name> is not a valid identifier (for example, if it contains illegal characters or is more than 30 bytes long), the SAP ASE server returns 0. If <object_name> is a valid identifier, the SAP ASE server returns a nonzero number.

6.2.8 Renaming Database Objects

Rename user objects (including user-defined datatypes) with `sp_rename`.

⚠ Caution

After you rename a table or column, you must redefine all procedures, triggers, and views that depend on the renamed object.

6.2.9 Using Multibyte Character Sets

In multibyte character sets, a wider range of characters is available for use in identifiers. For example, on a server with the Japanese language installed, the following types of characters may be used as the first character of an identifier: Zenkaku or Hankaku Katakana, Hiragana, Kanji, Romaji, Greek, Cyrillic, or ASCII.

Although Hankaku Katakana characters are legal in identifiers on Japanese systems, they are not recommended for use in heterogeneous systems. These characters cannot be converted between the EUC-JIS and Shift-JIS character sets.

The same is true for some 8-bit European characters. For example, the OE ligature, is part of the Macintosh character set (codepoint 0xCE). This character does not exist in the ISO 8859-1 (iso_1) character set. If the OE ligature exists in data being converted from the Macintosh to the ISO 8859-1 character set, it causes a conversion error.

If an object identifier contains a character that cannot be converted, the client loses direct access to that object.

6.3 like Pattern Matching

The SAP ASE server allows you to treat square brackets individually in `like` pattern-matching algorithms.

For example, if you create this table:

```
create table t1 (col1 char(10))
insert t1 values("x[x")
insert t1 values("x]x")
insert t1 values("x{x")
insert t1 values("x}x")
insert t1 values("[xx]")
insert t1 values("xx")
```

Use the wild card character, "%", with the `like` parameter to find matches for the brackets. For example, this finds the rows with curly brackets:

```
select * from t1 where col1 like "%{%"
 col1
 ----------
 x{x
```

Matching square brackets (that is, the "[ ]" characters) in a `like` clause requires special consideration. There are query constructs using brackets that result in erroneous result sets. For example, in this query the user is looking for a result set that only includes the rows with `xx`:

```
select * from t1 where col1 not like "%[(){}[]]%"
 col1
 ----------
 x[x
 x]x
 x{x
 x}x
 [xx]
 xx
```

However, the result set includes all rows because the `[...]` construct finishes with the first `]` encountered after the `[`. Consequently, this `like` pattern has four elements instead of the expected three: the `%` wild card character, followed by the character grouping `[(){}[]` which matches `(){}[` characters, then a singular `]` and finally another `%` wild card. This construct results in all rows in table `t1` being displayed.

Likewise, an `escape` clause does not affect characters in a [ ] set because the query processor considers them already "escaped" and having no special meaning. However, the`]` character must retain its special meaning for the `[ ]` pattern to work. Again, this query returns all rows from the `t1` table instead of only those without brackets:

```
select * from t1 where col1 not like "%[(){}[\]]%" escape "\"
 col1
```

```
 ----------
 x[x
 x]x
 x{x
 x}x
 [xx]
 xx
```

Writing queries that exclude rows that have brackets from the result set requires that you use two separate `like` clauses. For example, this selects all rows from `t1` that do not include brackets:

```
select * from t1 where col1 not like "%[(){}[]%" and col1 not like "%]%"
col1
----------
xx
```

6.4 Pattern Matching with Wildcard Characters

Wildcard characters represent one or more characters, or a range of characters, in a `<match_string>`.

A `<match_string>` is a character string containing the pattern to find in the expression. It can be any combination of constants, variables, and column names or a concatenated expression, such as:

```
like @variable + "%".
```

If the match string is a constant, it must always be enclosed in single or double quotes.

Use wildcard characters with the keyword `like` to find character and date strings that match a particular pattern. You cannot use `like` to search for seconds or milliseconds.

Use wildcard characters in `where` and `having` clauses to find character or date/time information that is `like` —or `not like`—the match string:

```
{where | having} [not]
    <expression> [not] like <match_string>
        [escape "<escape_character> "]
```

`<expression>` can be any combination of column names, constants, or functions with a character value.

Wildcard characters used without `like` have no special meaning. For example, this query finds any phone numbers that start with the four characters “415%”:

```
select phone
from authors
where phone = "415%"
```

Related Information

Using Wildcard Characters With datetime Data [page 494]

6.4.1 Case and Accent Insensitivity

If your SAP ASE server uses a case-insensitive sort order, case is ignored when comparing <expression> and <match_string>.

For example, this clause would return “Smith,” “smith,” and “SMITH” on a case-insensitive SAP ASE server:

```
where col_name like "Sm%"
```

If your SAP ASE server is also accent-insensitive, it treats all accented characters as equal to each other and to their unaccented counterparts, both uppercase and lowercase. The `sp_helpsort` system procedure displays the characters that are treated as equivalent, displaying an “=” between them.

6.4.2 Using Wildcard Characters

You can use the match string with a number of wildcard characters.

The summary of wildcard characters is:

Symbol	Meaning
%	Any string of 0 or more characters.
–	Any single character.
[ ]	Any single character within the specified range ([a-f]) or set ([abcdef]).
[^]	Any single character not within the specified range ([^a-f]) or set ([^abcdef]).

Enclose the wildcard character and the match string in single or double quotes (`like` “[dD]eFr_nce”).

6.4.2.1 The Percent Sign (%) Wildcard Character

Use the % wildcard character to represent any string of zero or more characters.

For example, to find all the phone numbers in the `authors` table that begin with the 415 area code:

```
select phone
from authors
where phone like "415%"
```

To find names that have the characters “en” in them (Bennet, Green, McBadden):

```
select au_lname
from authors
where au_lname like "%en%"
```

Trailing blanks following “%” in a `like` clause are truncated to a single trailing blank. For example, “%” followed by two spaces matches “X ”(one space); “X ” (two spaces); “X   ” (three spaces), or any number of trailing spaces.

6.4.2.2 The Underscore (_) Wildcard Character

Use the underscore (_) wildcard character to represent any single character.

For example, to find all six-letter names that end with “heryl” (for example, Cheryl):

```
select au_fname
from authors
where au_fname like "_heryl"
```

6.4.2.3 Bracketed ([ ]) Characters

Use brackets to enclose a range of characters, such as [a-f], or a set of characters such as [a2Br]. When ranges are used, all values in the sort order between (and including) `<rangespec1>` and `<rangespec2>` are returned.

For example, “[0-z]” matches 0-9, A-Z and a-z (and several punctuation characters) in 7-bit ASCII.

To find names ending with “inger” and beginning with any single character between M and Z:

```
select au_lname
from authors
where au_lname like "[M-Z]inger"
```

To find both “DeFrance” and “deFrance”:

```
select au_lname
from authors
where au_lname like "[dD]eFrance"
```

When using bracketed identifiers to create objects, such as with `create table [<table_name>]` or `create database [<dbname>]`, you must include at least one valid character.

All trailing spaces within bracketed identifiers are removed from the object name. For example, you achieve the same results executing the following `create table` commands:

- `create table [tab1<space><space>]`
- `create table [tab1]`
- `create table [tab1<space><space><space>]`
- `create table tab1`

This rule applies to all objects you can create using bracketed identifiers.

6.4.2.4 The Caret (^) Wildcard Character

The caret is the negative wildcard character. Use it to find strings that do not match a particular pattern.

For example, “[^a-f]” finds strings that are not in the range a-f and “[^a2bR]” finds strings that are not “a,” “2,” “b,” or “R.”

To find names beginning with “M” where the second letter is not “c”:

```
select au_lname
from authors
where au_lname like "M[^c]%"
```

When ranges are used, all values in the sort order between (and including) `<rangespec1>` and `<rangespec2>` are returned. For example, “[0-z]” matches 0-9, A-Z , a-z, and several punctuation characters in 7-bit ASCII.

6.4.3 Using Multibyte Wildcard Characters

If the multibyte character set configured on your SAP ASE server defines equivalent double-byte characters for the wildcard characters _, %, - [,], and ^, you can substitute the equivalent character in the match string. The underscore equivalent represents either a single- or double-byte character in the match string.

6.4.4 Using Wildcard Characters as Literal Characters

To search for the occurrence of %, _, [,], or ^ within a string, you must use an escape character. When a wildcard character is used in conjunction with an escape character, the SAP ASE server interprets the wildcard character literally, rather than using it to represent other characters.

The SAP ASE server provides two types of escape characters:

- Square brackets, a Transact-SQL extension
- Any single character that immediately follows an `escape` clause, compliant with the SQL standards

6.4.4.1 Using Square Brackets ([ ]) as Escape Characters

Use square brackets as escape characters for the percent sign, the underscore, and the left bracket. The right bracket does not need an escape character; use it by itself. If you use the hyphen as a literal character, it must be the first character inside a set of square brackets.

Examples of square brackets used as escape characters with `like` are:

Table 20: Using Square Brackets to Search for Wildcard Characters

`like` **predicate**	**Meaning**
`like "5%"`	5 followed by any string of 0 or more characters
`like "5[%]"`	5%
`like "_n"`	an, in, on (and so on)
`like "[_]n"`	_n

like predicate	Meaning
like "[a-cdf]"	a, b, c, d, or f
like "[-acdf]"	-, a, c, d, or f
like "[[ ]"	[
like "]"	]
like “[[]ab]”	[]ab

6.4.4.2 Using the escape Clause

Use the escape clause to specify an escape character. Any single character in the server's default character set can be used as an escape character. If you try to use more than one character as an escape character, the SAP ASE server generates an exception.

Do not use existing wildcard characters as escape characters because:

- If you specify the underscore (_) or percent sign (%) as an escape character, it loses its special meaning within that like predicate and acts only as an escape character.
- If you specify the left or right bracket ([or]) as an escape character, the Transact-SQL meaning of the bracket is disabled within that like predicate.
- If you specify the hyphen (-) or caret (^) as an escape character, it loses its special meaning and acts only as an escape character.

An escape character retains its special meaning within square brackets, unlike wildcard characters such as the underscore, the percent sign, and the open bracket.

The escape character is valid only within its like predicate and has no effect on other like predicates contained in the same statement. The only characters that are valid following an escape character are the wildcard characters (_, %, [,], or [^]), and the escape character itself. The escape character affects only the character following it, and subsequent characters are not affected by it.

If the pattern contains two literal occurrences of the character that happens to be the escape character, the string must contain four consecutive escape characters. If the escape character does not divide the pattern into pieces of one or two characters, the SAP ASE server returns an error message. Examples of escape clauses used with like are:

Table 21: Using the Escape Clause

like predicate	Meaning
like "5@%" escape "@"	5%
like "*_n" escape "*"	_n
like "%80@%%" escape "@"	String containing 80%

like predicate	Meaning
like "*_sql**%" escape "*"	String containing _sql*
like "%#####_#%%" escape "#"	String containing ##_%

6.4.5 Using Wildcard Characters With datetime Data

When you use `like` with `datetime` values, the SAP ASE server converts the dates to the standard `datetime` format, then to `varchar`. Since the standard storage format does not include seconds or milliseconds, you cannot search for seconds or milliseconds with `like` and a pattern.

It is a good idea to use `like` when you search for `datetime` values, since `datetime` entries may contain a variety of date parts. For example, if you insert the value “9:20” and the current date into a column named `arrival_time`, the clause:

```
where arrival_time = '9:20'
```

would not find the value, because the SAP ASE server converts the entry into “Jan 1 1900 9:20AM.” However, the following clause would find this value:

```
where arrival_time like '%9:20%'
```

7 Reserved Words

Keywords, also known as reserved words, are words that have special meanings.

7.1 Transact-SQL Reserved Words

These words are reserved by the SAP ASE server as keywords (part of SQL command syntax).

You cannot use these words as names of database objects such as databases, tables, rules, or defaults. They can be used as names of local variables and as stored procedure parameter names.

To find the names of existing objects that are reserved words, use `sp_checkreswords` in *Reference Manual: Procedures*.

	Words
A	add, all, allow, alter, and, any, arith_overflow, as, asc, at, authorization, avg
B	begin, between, break, browse, bulk, by
C	cascade, case, char_convert, check, checkpoint, close, clustered, coalesce, commit, compressed, compute, confirm, connect, constraint, continue, controlrow, convert, count, count_big, create, current, cursor
D	database, dbcc, deallocate, declare, decrypt, decrypt_default, default, delete, deny, desc, deterministic, disk, distinct, drop, dual_control, dummy, dump
E	else, encrypt, end, endtran, errlvl, errordata, errorexit, escape, except, exclusive, exec, execute, exists, exit, exp_row_size, external
F	fetch, fillfactor, for, foreign, from
G	goto, grant, group
H	having, holdlock
I	identity, identity_gap, identity_start, if, in, index, inout, insensitive, insert, install, intersect, into, is, isolation
J	jar, join
K	key, kill
L	level, like, lineno, load, lob_compression, lock
M	manage, materialized, max, max_rows_per_page, min, mirror, mirrorexit, modify

	Words
N	national, new, noholdlock, nonclustered, not, null, nullif, numeric_truncation **i Note** Although “new” is not a Transact-SQL reserved word, since it may become a reserved word in the future, you should avoid using it (for example, to name a database object). “New” is a special case because it appears in the `spt_values` table, and because `sp_checkreswords` displays “New” as a reserved word.
O	of, off, offsets, on, once, online, only, open, option, or, order, out, output, over
P	partition, perm, permanent, plan, prepare, primary, print, privileges, proc, procedure, processexit, proxy_table, public
Q	quiesce
R	raiserror, read, readpast, readtext, reconfigure, references, release_locks_on_close, remove, reorg, replace, replication, reservepagegap, return, returns, revoke, role, rollback, rowcount, rows, rule
S	save, schema, scroll, select, semi_sensitive, set, setuser, shared, shutdown, some, statistics, stringsize, stripe, sum, syb_identity, syb_restree, syb_terminate
T	table, temp, temporary, textsize, to, tracefile, tran, transaction, trigger, truncate, tsequal
U	union, unique, unpartition, update, use, user, user_option, using
V	values, varying, view
W	waitfor, when, where, while, with, work, writetext
X	xmlextract, xmlparse, xmltable, xmltest

Related Information

Potential ANSI SQL Reserved Words [page 498]

7.2 ANSI SQL Reserved Words

The SAP ASE server includes entry-level ANSI SQL features. Full ANSI SQL implementation includes the words listed in the following tables as command syntax.

Upgrading identifiers can be a complex process; therefore, we are providing this list for your convenience. The publication of this information does not commit SAP to providing all of these ANSI SQL features in subsequent releases. In addition, subsequent releases may include keywords not included in this list.

ANSI SQL keywords that are not reserved words in Transact-SQL are:

	Words
A	absolute, action, allocate, are, assertion
B	bit, bit_length, both
C	cascaded, case, cast, catalog, char, char_length, character, character_length, coalesce, collate, collation, column, connection, constraints, corresponding, cross, current_date, current_time, current_timestamp, current_user
D	date, day, dec, decimal, deferrable, deferred, describe, descriptor, diagnostics, disconnect, domain
E	end-exec, exception, extract
F	false, first, float, found, full
G	get, global, go
H	hour
I	immediate, indicator, initially, inner, input, insensitive, int, integer, interval
J	join
L	language, last, leading, left, local, lower
M	match, minute, module, month
N	names, natural, nchar, next, no, nullif, numeric
O	octet_length, outer, output, overlaps
P	pad, partial, position, preserve, prior
R	real, relative, restrict, right
S	scroll, second, section, semi_sensitive, session_user , size , smallint, space, sql, sqlcode, sqlerror, sqlstate, substring, system_user
T	then, time, timestamp, timezone_hour, timezone_minute, trailing, translate, translation, trim, true
U	unknown, upper, usage
V	value, varchar
W	when, whenever, write, year
Z	zone

7.3 Potential ANSI SQL Reserved Words

If you are using the ISO/IEC 9075:1989 standard, avoid using these words because they may become ANSI SQL reserved words in the future.

	Words
A	after, alias, async
B	before, boolean, breadth
C	call, completion, cycle
D	data, depth, dictionary
E	each, elseif, equals
G	general
I	ignore
L	leave, less, limit, loop
M	modify
N	new, none
O	object, oid, old, operation, operators, others
P	parameters, pendant, preorder, private, protected
R	recursive, ref, referencing, resignal, return, returns, routine, row
S	savepoint, search, sensitive, sequence, signal, similar, sqlexception, structure
T	test, there, type
U	under
V	variable, virtual, visible
W	wait, without

8 SQLSTATE Codes and Messages

SQLSTATE codes are required for entry level ANSI SQL compliance, and provide diagnostic information about warnings and exceptions.

Warnings	Conditions that require user notification but are not serious enough to prevent a SQL statement from executing successfully.
Exceptions	Conditions that prevent a SQL statement from having any effect on the database.

Each SQLSTATE code consists of a 2-character class followed by a 3-character subclass. The class specifies general information about error type. The subclass specifies more specific information.

SQLSTATE codes are stored in the `sysmessages` system table, along with the messages that display when these conditions are detected. Not all SAP ASE error conditions are associated with a SQLSTATE code – only those mandated by ANSI SQL. In some cases, multiple SAP ASE error conditions are associated with a single SQLSTATE value.

8.1 SQLSTATE Warnings

The SAP ASE server detects SQLSTATE warning conditions

The warnings are:

Message	Value	Description
`Warning - null value eliminated in set function.`	01003	Occurs when you use an aggregate function (`avg`, `max`, `min`, `sum`, `count`) on an expression with a null value.
`Warning - string data, right truncation`	01004	Occurs when character, unichar, or binary data is truncated to 255 bytes. The data may be: • The result of a `select` statement in which the client does not support the WIDE TABLES property. • Parameters to an RPC on remote SAP ASE servers or Open Servers that do not support the WIDE TABLES property.

Related Information

avg [page 70]
max [page 256]
min [page 259]

sum [page 404]
count [page 119]

8.2 Exceptions

The SAP ASE server detects various types of exceptions.

- Cardinality violations
- Data exceptions
- Integrity constraint violations
- Invalid cursor states
- Syntax errors and access rule violations
- Transaction rollbacks
- `with check option` violations

8.2.1 Cardinality Violations

Cardinality violations occur when a query that should return only a single row returns more than one row to an Embedded SQL™ application.

Message	Value	Description
`Subquery returned more than 1 value. This is illegal when the subquery follows =, !=, <, <=, >, >=. or when the subquery is used as an expression.`	21000	Occurs when: • A scalar subquery or a row subquery returns more than one row. • A `select into parameter_list` query in Embedded SQL returns more than one row.

8.2.2 Data Exceptions

Data exceptions occur when an entry is too long for its datatype, or contains an illegal escape sequence or other format errors.

Message	Value	Description
`Arithmetic overflow occurred.`	22003	Occurs when: • An exact numeric type would lose precision or scale as a result of an arithmetic operation or a `sum` function. • An approximate numeric type would lose precision or scale as a result of truncation, rounding, or a `sum` function.
`Data exception - string data right truncated.`	22001	Occurs when a `char`, `unichar`, `univarchar`, or `varchar` column is too short for the data being inserted or updated and non-blank characters must be truncated.
`Divide by zero occurred.`	22012	Occurs when a numeric expression is being evaluated and the value of the divisor is zero.
`Illegal escape character found. There are fewer bytes than necessary to form a valid character.`	22019	Occurs when you are searching for strings that match a given pattern if the escape sequence does not consist of a single character.
`Invalid pattern string. The character following the escape character must be percent sign, underscore, left square bracket, right square bracket, or the escape character.`	22025	Occurs when you are searching for strings that match a particular pattern when: • The escape character is not immediately followed by a percent sign, an underscore, or the escape character itself, or • The escape character partitions the pattern into substrings whose lengths are other than 1 or 2 characters.

Related Information

sum [page 404]

8.2.3 Integrity Constraint Violations

Integrity constraint violations occur when an `insert`, `update`, or `delete` statement violates a `primary key`, `foreign key`, `check`, or `unique` constraint or a unique index.

Message	Value	Description
`Attempt to insert duplicate key row in object <object_name> with unique index <index_name>.`	23000	Occurs when a duplicate row is inserted into a table that has a unique constraint or index.
`Check constraint violation occurred, dbname = <database_name>, table name = <table_name>, constraint name = <constraint_name>.`	23000	Occurs when an `update` or `delete` would violate a check constraint on a column.
`Dependent foreign key constraint violation in a referential integrity constraint. dbname = <database_name>, table name = <table_name>, constraint name = <constraint_name>.`	23000	Occurs when an `update` or `delete` on a primary key table would violate a foreign key constraint.
`Foreign key constraint violation occurred, dbname = <database_name>, table name = <table_name>, constraint name = <constraint_name>.`	23000	Occurs when an `insert` or `update` on a foreign key table is performed without a matching value in the primary key table.

8.2.4 Invalid Cursor States

Invalid cursor states occur when a `fetch` uses a cursor that is not currently open, or an `update where current of` or `delete where current of` affects a cursor row that has been either modified or deleted, or not been fetched.

Message	Value	Description
`Attempt to use cursor <cursor_name> which is not open. Use the system stored procedure sp_cursorinfo for more information.`	24000	Occurs when an attempt is made to fetch from a cursor that has never been opened or that was closed by a `commit` statement or an implicit or explicit `rollback`. Reopen the cursor and repeat the `fetch`.

Message	Value	Description
`Cursor <cursor_name> was closed implicitly because the current cursor position was deleted due to an update or a delete. The cursor scan position could not be recovered. This happens for cursors which reference more than one table.`	24000	Occurs when the join column of a multitable cursor has been deleted or changed. Issue another `fetch` to reposition the cursor.
`The cursor <cursor_name> had its current scan position deleted because of a DELETE/UPDATE WHERE CURRENT OF or a regular searched DELETE/UPDATE. You must do a new FETCH before doing an UPDATE or DELETE WHERE CURRENT OF.`	24000	Occurs when a user issues an `update/delete where current of` whose current cursor position has been deleted or changed. Issue another `fetch` before retrying the `update/delete where current of`.
`The UPDATE/DELETE WHERE CURRENT OF failed for the cursor <cursor_name> because it is not positioned on a row.`	24000	Occurs when a user issues an `update/delete where current of` on a cursor that: • Has not yet fetched a row • Has fetched one or more rows after reaching the end of the result set

8.2.5 Syntax Errors and Access Rule Violations

Syntax errors are generated by SQL statements that contain unterminated comments, implicit datatype conversions not supported by the SAP ASE server or other incorrect syntax.

Access rule violations are generated when users try to access an object that does not exist or one for which they do not have the correct permissions.

Message	Value	Description
`<command> permission denied on object <object_name>, database <database_name>, owner <owner_name>.`	42000	Occurs when a user tries to access an object for which he or she does not have the proper permissions.
`Implicit conversion from datatype '<datatype>' to '<datatype>' is not allowed. Use the CONVERT function to run this query.`	42000	Occurs when the user attempts to convert one datatype to another but the SAP ASE server cannot do the conversion implicitly.

Message	Value	Description
`Incorrect syntax near <object_name>.`	42000	Occurs when incorrect SQL syntax is found near the object specified.
`Insert error: column name or number of supplied values does not match table definition.`	42000	Occurs during inserts when an invalid column name is used or when an incorrect number of values is inserted.
`Missing end comment mark '*/'.`	42000	Occurs when a comment that begins with the /* opening delimiter does not also have the */ closing delimiter.
`<object_name> not found. Specify owner.objectname or use sp_help to check whether the object exists (sp_help may produce lots of output).`	42000	Occurs when a user tries to reference an object that he or she does not own. When referencing an object owned by another user, be sure to qualify the object name with the name of its owner.
`The size (<size>) given to the <object_name> exceeds the maximum. The largest size allowed is <size>.`	42000	Occurs when: • The total size of all the columns in a table definition exceeds the maximum allowed row size. • The size of a single column or parameter exceeds the maximum allowed for its datatype.

8.2.6 Transaction Rollbacks

Transaction rollbacks occur when the `transaction isolation level` is set to 3, but the SAP ASE server cannot guarantee that concurrent transactions can be serialized. This type of exception generally results from system problems such as disk crashes and offline disks.

Message	Value	Description
`Your server command (process id #<process_id> ) was deadlocked with another process and has been chosen as deadlock victim. Re-run your command.`	40001	Occurs when the SAP ASE server detects that it cannot guarantee that two or more concurrent transactions can be serialized.

8.2.7 with check option Violation

This class of exception occurs when data being inserted or updated through a view would not be visible through the view.

Message	Value	Description
`The attempted insert or update failed because the target view was either created WITH CHECK OPTION or spans another view created WITH CHECK OPTION. At least one resultant row from the command would not qualify under the CHECK OPTION constraint.`	44000	Occurs when a view, or any view on which it depends, was created with a `with check option` clause.

Important Disclaimers and Legal Information

Hyperlinks

Some links are classified by an icon and/or a mouseover text. These links provide additional information.
About the icons:

- Links with the icon : You are entering a Web site that is not hosted by SAP. By using such links, you agree (unless expressly stated otherwise in your agreements with SAP) to this:
  - The content of the linked-to site is not SAP documentation. You may not infer any product claims against SAP based on this information.
  - SAP does not agree or disagree with the content on the linked-to site, nor does SAP warrant the availability and correctness. SAP shall not be liable for any damages caused by the use of such content unless damages have been caused by SAP's gross negligence or willful misconduct.
- Links with the icon : You are leaving the documentation for that particular SAP product or service and are entering a SAP-hosted Web site. By using such links, you agree that (unless expressly stated otherwise in your agreements with SAP) you may not infer any product claims against SAP based on this information.

Beta and Other Experimental Features

Experimental features are not part of the officially delivered scope that SAP guarantees for future releases. This means that experimental features may be changed by SAP at any time for any reason without notice. Experimental features are not for productive use. You may not demonstrate, test, examine, evaluate or otherwise use the experimental features in a live operating environment or with data that has not been sufficiently backed up.
The purpose of experimental features is to get feedback early on, allowing customers and partners to influence the future product accordingly. By providing your feedback (e.g. in the SAP Community), you accept that intellectual property rights of the contributions or derivative works shall remain the exclusive property of SAP.

Example Code

Any software coding and/or code snippets are examples. They are not for productive use. The example code is only intended to better explain and visualize the syntax and phrasing rules. SAP does not warrant the correctness and completeness of the example code. SAP shall not be liable for errors or damages caused by the use of example code unless damages have been caused by SAP's gross negligence or willful misconduct.

Gender-Related Language

We try not to use gender-specific word forms and formulations. As appropriate for context and readability, SAP may use masculine word forms to refer to all genders.

Videos Hosted on External Platforms

Some videos may point to third-party video hosting platforms. SAP cannot guarantee the future availability of videos stored on these platforms. Furthermore, any advertisements or other content hosted on these platforms (for example, suggested videos or by navigating to other videos hosted on the same site), are not within the control or responsibility of SAP.

www.sap.com/contactsap

THE BEST RUN