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Interoffice Memorandum

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FROM: Carl Gibson
DEPT: LSG Product Mgmt.
EXT: 231-6779
LOC/MAIL STOP: MR1-2/E78

SUBJ: VENUS MARKETING REQUIREMENT DOCUMENT (Nov. '79)

Attached is the November 1979 revision of the VENUS Systems Requirements Document, developed from the May 1979 (M. Ressler) version. Updates to that document have been developed based upon a wide range of contributions directly from marketing people and via the VENUS MTF activities.

The primary objective of this document is to communicate to product and service development people, the system needs perceived by product marketing functions. The document is not intended as a product description, or plan. These will be published during Phase I.

Your input, and criticisms are welcome.

The following items are meant to amplify and clarify the VENUS Marketing Requirements Document and should be considered part of it.

A) Business Metrics (p.48)

The cost components discussed relate to the practices that we use today for system manufacture, delivery and service. The important goal is that a Basic VENUS System not cost DEC more than $54K to build, install, obtain customer acceptance of, and honor warranty on. Alternative methodologies which redistribute costs among components, or add/elliminate cost categories should be considered by product and service developers.

B) Product Assessment (p.49)

The requested VENUS system is expected to address a very broad range of requirements. System development for VENUS should strive to address, in particular the needs of distributed data processing. The target customer for VENUS system will seek real leadership in DDP products. VENUS will be marketed primarily to large customers who own dozens to hundreds of small and mid-range machines. Most VENUS' will directly participate in a network of 3-15 machines and may support, in a relatively detached fashion, many more. A key parameter of the VENUS system (in the marketplace) will be the cost of owning a network of DEC machines. VENUS must, therefore, support a marketing strategy which is based upon offering the customer maximum effectiveness in networks of systems.

IBM is assumed to be present in such networks. The marketing strategy assumes that IBM will continue to excel at performing centralized, routine processing for the network. The leadership that DIGITAL products, and VENUS in particular must provide is simple, reliable, high performance computation and data management in a network of 3-15 or more cooperating systems.

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VENUS PRODUCT REQUIREMENTS

NOV 1979

AUTHOR: Carl Gibson
MR1-2/E78
231-6779

Distribution Control:

Sandy Brown
231-6732

Based on May, 1979 Edition by
Marilyn S. Ressler
TW/A08
247-2421

DIGITAL EQUIPMENT CORPORATION

C O M P A N Y C O N F I D E N T I A L

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ACKNOWLEDGMENT

This VENUS Product Requirements Document is based extensively on a May 1979 Edition written by Marilyn Ressler.

VENUS PRODUCT REQUIREMENTS

PREFACE

This is a Product Requirements document for VENUS, the VAX-11/780 replacement product. Several other documents on the VENUS product will be published. Among these are:

1. Preliminary Product Summary (PPS)/Product Contract
2. Project Plans
3. System Plan
4. System Description and Specification
5. Business Plan

The objectives of this Product Requirements document are:

1. to specify, for development,marketing assessment of what is needed in the VENUS System.
2. to identify the marketplace for VENUS;
3. to describe how the VENUS product, its marketplace, and its product strategy are compatible with the corporate strategy and objectives;
4. to provide product and market requirements information to every DIGITAL group involved in the VENUS development and marketing;
5. to establish a precedent for creation and subsequent use of this document and several other product-related documents that are necessary for short- and long-term review and control of VENUS product development and marketing.

Initially this document reiterates the DIGITAL strategy and objectives for developing and marketing computer products with a 32-bit architecture. Then the market need for a VENUS product is explained. As part of this, the principal market segments are identified along with their respective product requirements. Further breakdown of the market segments is presented relative to DIGITAL's current organization of the Product Lines. The main competitors of each Product Line are also noted.

1.0 OVERVIEW

The corporate strategy is to converge on a 32-bit architecture by FY85 with the center of business in systems having MLP less than $250,000. Focus will be given to development of systems for distributed processing and for high availability.

Between now and the mid-1980's the marketplace will demand computer system products that are cost- and performance-effective, easy to use, secure, highly reliable, and family oriented. The products must support distributed processing with interconnections to systems of many vendors and to packet switched networks. They must be laden with rich software (languages, data management, utilities, applications).

The market for VENUS-based systems meeting these product requirements can be viewed as being divided into three segments:

1. Scientific Computation
2. Interactive Commercial ADP
3. Real-Time Processing

Each of these market segments uses one or more styles of computer service. The 5 styles of computing used by these segments are:

1. scientific computation
2. real-time computation
3. transaction processing
4. Interactive Commercial ADP
5. general purpose timesharing

VENUS PRODUCT REQUIREMENTS

Digital's Product Line Groups are currently organizied to serve these segments as follows:

TECHNICAL GROUP --

TOEM: scientific and real-time computation
LDP : scientific and real-time computation
MSG : real-time computation, Interactive Commercial ADP
ESG : general purpose timesharing, scientific computation
ECS : general purpose timesharing
GSG : Real-Time, Scientific Computation

Interactive Commercial ADP, Transaction Processing.

COMMERCIAL GROUP --

COEM: Interactive Commercial ADP
CSI : Interactive Commercial ADP general purpose timesharing
MDC : general purpose timesharing, real-time computation, Interactive Commercial ADP
T&UG: real-time computation, general purpose timesharing, Interactive Commercial ADP

Computers Product Group--
G/A: Interactive Commercial ADP, Transaction Processing, Timesharing

VENUS PRODUCT REQUIREMENTS

VENUS is a system at the high end of the VAX family pyramid during the FY83-87 timeframe. It will seek to address the market's requirements with product development priorities as follows:

#1 - Customer Satisfaction Superior to comparable IBM system.

#2 - Minimal Life Cycle Cost (to DEC)

#3 - Life Cycle Cost of ownership less than comparable VAX-11/780.

#4 - Basic System at $40K T/C with system performance at 3.5 times VAX-11/780.

#5 - New I/O architecture based on BI, CI, NI, HSC, and MERCURY

#6 - SBI capability for -11/780 migration

#7 - FCS in Q4FY82; volume in Q3FY83

#8 - Minimal system at $25K T/C

#9 - Maximum System

The VENUS system will retain our leadership in the traditional Digital markets --- scientific computation and real-time. For transaction processing and interactive commercial ADP, VENUS is expected to be a strong product with the continued development of software products appropriate to those market segments.

The VENUS system will be compatible with the VAX family architecture. It will use the single VAX family operating system, VAX/VMS. VAX-11/780 migration is supported, and PDP-11 compatibility mode will be maintained.

2.0 DIGITAL'S CORPORATE STRATEGY AND OBJECTIVES

The corporate strategy is to develop and market computer products intended for distributed processing systems and for high availability systems. The center of the corporate business will be single-processor systems with a purchase price below $250,000. While current products are based on 8-, 16-, 32-, and 36-bit architectures, there will be convergence to the principle 32-bit architecture by 1985. The products based on the latter architecture will be developed and marketed in a manner that provides maximum protection of our existing PDP-11, DECsystem-10, and DECSYSTEM-20 customer base.

3.0 THE MARKETPLACE

3.1 Market Requirements

In the FY82-FY85 time frame, the computer system manufacturers in the EDP industry must offer products that meet as a minimum, the following requirements:

- Cost-/performance-effective computing
- Distributed computing capability
- Systems with a high degree of data integrity, internal security and protection
- Effective system interconnection (DEC to DEC, DEC to IBM (via SNA and BISYNCH) and other mainframes, X25 for packet switched networks)
- Optional non-stop computing capability, fault tolerant computing (HYDRA-like configurations)
- Highly reliable systems
- System packaging/operation which minimizes cost of ownership
- Families of compatible systems whether or not the individual systems are physically tied into a network
- Highly approachable, easy-to-use systems whether dedicated to a single application or to several different modes of operation
- Training and documentation suited to a wide variety of end users
- Richness of software (languages, data management, utilities, applications)
- Availability of skilled services from the computer system vendor (maintenance, system design, applications programming help)

VENUS PRODUCT REQUIREMENTS

It will be necessary for vendors of these products to provide complete and accurate cost-of-ownership data to the prospective customers in each market segment. Since the distributed processing style of computing will be emphasized for these products, the amount of mass storage and the number of end user terminals to be purchased will greatly increase from present-day levels.

It will also be necessary to provide prospective customers with comprehensive performance data that they can use to predict performance in their particular use of the computer system product. As an example, for a transaction processing application this could be data on system throughput in terms of the number of transactions processed per hour based on such variables as 1) the number of characters in each transaction, 2) the number and speed of the communications lines, 3) the number of multi-drop terminals on each line, and 4) the number of disk accesses per transaction, and, 5) the number of lines of code required to process the transaction.

A major challenge will be to provide highly cost-/performance-effective computing systems which require neither a sizable staff of support specialists nor a special operational environment. This means that the systems must be easy to build (dock merge), easy to install (customer merge), easy to use, and easy to repair (self-diagnosis, some customer maintenance). Similarly, the desire of customers to utilize the computer system as a resource to do a specific job (rather than to learn how to be system programmers) and to increase worker productivity puts a great emphasis on 1) the availability of programming languages, data management facilties, utilities and applications software, 2) the reduction (and even elimination) of system and sub-system downtime, and 3) the familiness of systems to ensure that no learning is required when upgrading to a more powerful configuration or when adding another family member to a network.

3.2 Application Segments

VENUS-based systems should be capable of meeting the marketplace requirements outlined above. To provide focus for VENUS product development and marketing, several key application segments can be identified according to how the VENUS-based systems are used, what the characteristics are of computer system products utilized in these market segments, and who these users are.

From the perspective of system use, the application segments for the VENUS product are:

1. Scientific Computation
2. Real-time Computation
3. Transaction Processing
4. Interactive Commercial ADP
5. General Purpose Timesharing

VENUS PRODUCT REQUIREMENTS

Characteristics common to the computer systems utilized in all these segments are:

- Easy-to-use, highly approachable, friendly systems for various levels of users
- Easy-to-use program development tools
- Documentation, commands, prompting, error messages in the language and style of the end user
- System HELP facilities
- Internal system security and protection
- Large capacity, high-speed mass storage
- Fast backup/restore between disks and tapes
- Storage hierarchies
- Data management, data integrity
- Support (programming tools, file exchange utilities) for transfer from other current DIGITAL products, migration to future products; **system familiness is critical**
- Ease of connection to other DEC (DECnet), IBM, CDC, other networks (X25)
- Network transparency to applications programs and to terminal users
- One general purpose operating system with sufficient extensibility/adaptability to serve the entire range of market segments
- Systems configurable/tunable to effective use by a specific market segment (and its changing needs)
- Ease of adding applications packages to the system
- Variety of programming lan`guages
- ANSI-standard languages with validated compilers
- Common for all programming -- call standards, data types, record management, exception handling, run-time library, symbolic debugger
- High system reliability -- extensive H/W, S/W RAMP support; solid quality assurance testing

In addition to the above common characteristics, each application segment has very specific needs. By application segment these are:

3.2.1. Scientific Computation

Multi-user systems (2-64)
Good interactive performance (<3 sec, excluding application computation)
High-speed processing (>3 MIPS)
Accuracy (33 decimal digit precision)

Fast, mainframe
FORTRAN,PL/1(370/168)
FORTRAN IV PLUS to match IBM Level H FORTRAN
Global optimizer (optional during program development)
APL with file system
Vector processor with language support (see discussion)
Large programs (up to 40MB)
Sharable programs
Reliable systems to run large programs to completion
Mainframe off-loading (ANSI-standard high performance FORTRAN and PL/1, ANSI-standard mag tape, virtual address space)
Multi-system, high-speed interconnects to other DEC; to IBM(Bisynch), CDC, and UNIVAC
DECnet, X25
Batch (unattended) processing (especially when replacing outmoded IBM systems)
Data management (for large data files)
Software routines for graphics displays and plotters
Applications packages (statistics, project management/control, math library)

3.2.2. Real-time Computation

- High-speed processing (>3 MIPS)
- Rapid context switching (< 50 microsec)
- Low scheduling overhead
- Fast interrupt handling (response to, service of interrupts)
- Fast I/O (16 MByte/sec)
- Accuracy (33 decimal digit precision)
- DECnet (for distributed data acquistion systems)
- Fast math functions
- High availability through redundancy, ease/transparency of switchover
- File exchange utility for other DEC products (especially -11M systems)
- Fast, highly-optimized FORTRAN (optimizer optional during program development)
- PASCAL, PL/1, ADA, CORAL-66 (United Kingdom), PEARL (Germany)
- Fully-supported end-user tools for UCS or equivalent
- Ease of interfacing and supporting

- Up to 4 special devices operating at 2-4 MB/sec.
- Tools for performance measurement, system tuning

- Interconnect to ,IBM, UNIVAC, Honeywell

- DBMS for large (10+GB) files

3.2.3. Transaction Processing

Many (10-500) terminals on-line simultaneously in a network
Terminal cluster controllers with down-line load, up-line dump, data entry/verify, interim storage for off-line data entry
Intelligent communications subsystems (MERCURY)
TP concurrent with program development
Multi-drop terminals
Intelligent terminals with down-line load
Fast COBOL, (ANSI std., validated at high level) PL/1, Commercial BASIC

Data management
Distributed data base management, data base integrity
Hierarchical data storage, archiving
Message control
Forms definition language (compiler, debugger)
Batch
Connect to DECnet, IBM(SNA), X25
Fast, reliable communications
Network transparency to user terminals, applications programs
High availability (HYDRA-like configuration)
Journalling
Shadow recording
Transaction roll forward/roll backward
System-/network-wide data directory and dictionary
Tools for network performance measurement, load balancing, tuning, reconfiguring
Easy switchover of TP terminal to general purpose use (program development, data inquiry)
Multiple operators' consoles

3.2.4. Interactive Commercial ADP

- Multi-user system (production EDP runs concurrent with interactive program development, word processing, on-line applications, RJE to mainframes)
- Tools for computer-assisted program documentation
- File design assists
- Support for a family of terminals (dumb to intelligent)
- Applications packages (broad range of capabilties; ease of installation, use, support)
- Host word processing
- Multi-volume disk files
- Data management
- Distributed data base management
- Data integrity
- Inquiry language, report writer
- Forms definition language(compiler,debugger) with full data entry features including field validation
- Limited transaction processing
- Journaling
- Shadow recording
- Transaction roll forward/roll backward
- Communication with other mainframes (IBM(SNA), CDC, UNIVAC); connect to DECnet, X25
- Industry standard languages
- Fast, mainframe COBOL(ANSI std., validated at hi level), PL/1
- Interactive BASIC
- RPG II, BASIC, MUMPS, APL with file system
- SORT with MERGE option
- Tools for migration from IBM to DEC
- IBM tape handling (including EBCDIC data)
- ANSI-standard tapes (labels, formats)
- Disk allocation controls and reporting
- BATCH (scheduling, resource allocation, reporting)
- Job class scheduling
- System resource accounting

System-/network-wide data directory and dictionary
Application source code generator.
System Library Manager
Removable private files
Office automation (connect to remote word processors, backup storage for large documents, document interchange utility, electronic mail)
Support of typeset terminals (SCRIBE editor)
Hierarchical data storage, archiving
System security and protection (e.g., terminals limited to running a single application)

3.2.5. General Purpose Timesharing

Multi-user system (512 edu terminals active sumultaneously)
Good interactive performance (especially for on-line applications; for edit, compile, link/task build, debug/test process)
Large programs
Sharable programs
Interactive BASIC
Multiple languages (FORTRAN, COBOL, PL/1, BASIC, PASCAL, ADA, RPG II, BLISS, APL, MUMPS, ALGOL)
Fast compilers
Fast syntax checkers for all languages
Flexible BATCH, spooler queues
File exchange utilities
Data management
Inquiry language
Report writer
Resource allocation, quotas, scheduling
System resource accounting
Dynamic working set size selection
Applications packages (especially CAI, school administration, project management/control; broad range of capabilities; ease of installation, use, support)
Tools for host development of small systems (DEC) software
Software for graphics displays and plotters
Connect to other mainframes (IBM(SNA), CDC, UNIVAC)
DECnet, X25
Scientific computation
Office automation

3.3 DIGITAL'S Marketing Groups

If we now consider the current organization of DIGITAL'S Product Line Marketing Groups, it is possible to identify several of the users (customers) within each of these segments and to denote those customers with requirements spanning two or more market segments.

3.3.1. TECHNICAL GROUP

TOEM, Technical OEM.

Their users are providing solutions in :

a. flight training simulation -- real-time computation
b. power monitoring -- real-time computation (high-availability systems)
c. seismic exploration -- scientific computation
d. aerospace systems -- real-time and scientific computation (familiness is required)

Potential new users are those in industrial automation and in telephone and data communications (both real-time computation).

TOEM sees competition from SEL, Interdata, Harris (all in-flight simulation), Modcomp (power monitoring), and PRIME and the mainframe vendors (in seismic and aerospace).

LDP, Laboratory Products

Their users, primarily doing scientific and real-time computation, are involved with

a. U.S. and foreign government research
b. university research
c. energy research
d. industrial research
e. simulation (sensor-based and modeling)

VENUS PRODUCT REQUIREMENTS

Competition is mainly from SEL, Harris, and Interdata. CDC will remain strong competition since there are many systems (6400, 6600, 7600s especially in energy) to be off-loaded or even replaced by one or more VENUS systems.

MSG, Medical Systems

Their users are

a. medical OEMs -- real-time computation (high availability systems)
b. medical administration -- general purpose commercial EDP (patient billing, report generation, financial applications)

With medical OEM's the main competition comes from IBM, Data General and Honeywell. Hewlett-Packard is becoming very active in this area. In medical administration the strongest competitors are Hewlett-Packard, IBM, and NCR.

ESG, Engineering Systems

Their users specialize in

a. aerospace design
b. automotive design
c. chemical engineering
d. electronic/electrical design
e. engineering consulting
f. architectural and engineering design

VENUS PRODUCT REQUIREMENTS

A general purpose timesharing system is required with strength in the area of scientific computation.
ESG's priorities for VENUS are:

I. Large programs - relaible systems to run large programs to completion

II. Accuracy

III. High speed processing

IV. Fast mainframe FORTRAN

V. Vector processing

VI. Multisystem highspeed interconnects to other systems (DEC and non-DEC)

VIII. DECnet x25.

XI. Good interaction performance

X. Software routines for graphics displays and plotters

XI. Mainframe offloading

XII. Application packages (statistics, project management/control, math library)

Competition comes mainly from Data General, Hewlett-Packard, PRIME, CDC, and IBM. Sometimes Harris and Interdata are seen.

ESG - VENUS Priorities

1) Time to market

2) Performance

3) Cost

VENUS PRODUCT REQUIREMENTS

Typical ESG system:

Main memory: 4-8 MB
Mass Storage: 2 x 600MB (20GB MAX)
Communications: 32 ASYNCH
Tapes: Faster than 6250, new technology ok, maybe disk.
Efficient backup needed.
Need all 4 power variations
Max of 8 tapes
Synch lines 50KB-100KB
Hyperchannel desired
Hot FP>4 x 11/780 desired
Warm FP=2.5 x 11/780 OK

ECS, Education

Their users, always conscious of system price(measured as cost/termminal), prefer a general purpose timesharing system for large numbers of users with specialties as noted:

a. K-12 students -- BASIC programs (small-scale problem solving, little I/O); good text editors, fast compile, debuggers for program development; not production.
b. university students -- technically sophisticated; more FORTRAN than BASIC; heavy text editing; large, complex FORTRAN and COBOL programs.
c. university departments -- variety of languages; some large FORTRAN programs.
d. school administration -- RJE required to installed main frame; high performance COBOL, some data management; administrative usage is growing; on-line, interactive applications; need application packages.
e. private college administration and students -- good COBOL and data management plus applications packages for administration; students need BASIC, FORTRAN, COBO

The competitors of ECS are IBM,Harris, PRIME, Hewlett-Packard.

VENUS PRODUCT REQUIREMENTS

GSG, Government Systems

These users fall into two major applications arenas:

- o Command and Control, Communications, Intelligence, and Weapons Systems (C^3I-WS): which generally requires real time, network oriented, distributed processing systems that range in size and complexity from small imbedded single function processors thru dedicated, multi-processor host systems having very large data bases and extensive, interactive terminal complexes often serviced by terminal concentrator processors.
- o ADP: Requires medium to large general purpose commercial systems doing a combination of

  - forms data entry/validation
  - database inquiry/update
  - word processor
  - mainframe (IBM) communications

  Dedicated transaction processing systems with the capability to support at least 128 terminals are also requirement.

Both application arenas stress the following product needs:

- approachability
- reliability/maintainability
- security, to include secure OS
- CODASYL DBMS w/query and retrieval
- standard languages to include COBOL, FORTRAN, JOVIAL and ADA
- computer family with single OS

C^3I-WS also requires TEMPEST compatible products (design attention to emanation issues).

Generally, the major competitors of GSG are IBM, Univac, and Honeywell (and H.P. for ADP applications) within the USA, and major local vendors for overseas government business."

3.3.2 COMMERCIAL GROUP

COEM, Commercial OEM

COEM customers acquire systems intended for operation with specialized applications packages, e.g., business office management (wages and payroll, accounts payable, general ledger), customer billing, order entry and inventory control, sales analysis. Many of these systems are sold to small manufacturing and distribution companies and to lawyers, accountants, physicians, and dentists, but OEM's are beginning to penetrate F500 firm with large systems.

Competition for COEM comes primarily from IBM, Wang, and Basic Four in addition to DG and HP oems.

CSI, Commercial Service Industries

Their users work in

a. banks, insurance companies, financial institutions
b. data services companies
c. transportation companies
d. state and local government
e. retail business
f. service business

Many of these users require general purpose commercial EDP systems. A low-cost subset of the general purpose system can be geared to users in the small business community. Transaction processing is becoming extremely important to these users as is real-time computation for communications and sensor-based applications. Data service companies are interested in general purpose timesharing.

Competition is very strong from IBM at the account level. Other competitors are Hewlett-Packard, Data General, Honeywell, Tandem, NCR, PRIME, Computer Automation, and Burroughs.

VENUS PRODUCT REQUIREMENTS

MDC, Manufacturing Distribution and Control

Their users are found in

a. manufacturing companies
b. process industries

Required is a general purpose timesharing system to be used mainly for host development of software for smaller -11 based production systems running RSX-11M or RSX-11S. This general purpose system must have a good FORTRAN with an easy-to-use file system plus COBOL for data processing activities such as inventory control and materials scheduling. Real-time computation is becoming a requirement for more of these users.

Competitors for MDC are IBM, Tandem, SEL, Perkin-Elmer (Interdata), and Harris. Hewlett-Packard is beginning to enter this market area.

TIG, Telephone & Industry Group

Their users are involved with

a. telephone equipment manufacturers -- real-time computation, general purpose timesharing for development of specialized applications (e.g., traffic monitoring, billing data collection, repair order administration)
b. operating telephone companies -- general purpose commercial EDP with emphasis on communications with IBM mainframes.

Competition comes from Interdata, especially at Bell Labs. IBM and Hewlett-Packard are competitors in the operating companies. Tandem is a potential competitor.

TIG has unique 100% availability needs and will also benefit from 100% 11/780 compatibility (UNIX issues)

3.3.3 Computer Products Group

G/A Product Line

GAPL, GRAPHIC ARTS PRODUCT LINE

The graphic arts product line has had the Newspaper industry as its main focus. The needs in this market have been for systems with high reliability, large numbers of high-performance sophisticated text editing terminals, high throughput, good CPU power and data base management to support interactive tasks.

Competition has come from Hendrix, Atex, Harris, SCI and a bevy of OEM's.

The product line is shifting the focus to the pre-press needs of the fortune 1000 business concerns. The criticality of non-stop operation has relaxed slightly, but requirements for large data base and high throughput have expanded. The next generation of GAPL products will depend heavily on interfacing word processing to VAX and support of large numbers of interactive text editing terminals.

3.3.4 CUSTOMER SERVICE;

The CS P/L's deliver services to owners of DEC systems and components. From the perspective of the VENUS system, CS will:

A. Provide installation and warranty service to customers with cost born by the header P/L.

B. Provide Remedial and Preventative maintenance to VENUS owners via contract coverage or time and materials arrangements.

C. Provide technical (hardware and software) consulting to VENUS owners as regards the environment, use, and care of their system.

Thirty to fifty percent of VENUS Revenues will be derived from services rendered to owners.

These revenues will come from two different classes of service.

A. Customer unique (custom) service: where Digital provides skills on a time and materials basis to augment the customer's capapability. Price competition is usually subordinate to capabilities competition in this area.

B. Customer endemnification: where Digital agrees to maintain it's products for a fixed periodic fee. Here, price competition is paramount and affects equipment selection.

Industry trends indicate that the market (in the mid '80's) will tolerate maintenance contract prices at only half the level of today (in terms of fees to maintain a given dollar value of equipment). The CS P/L's will require that the VENUS system be comensurately less costly to service.

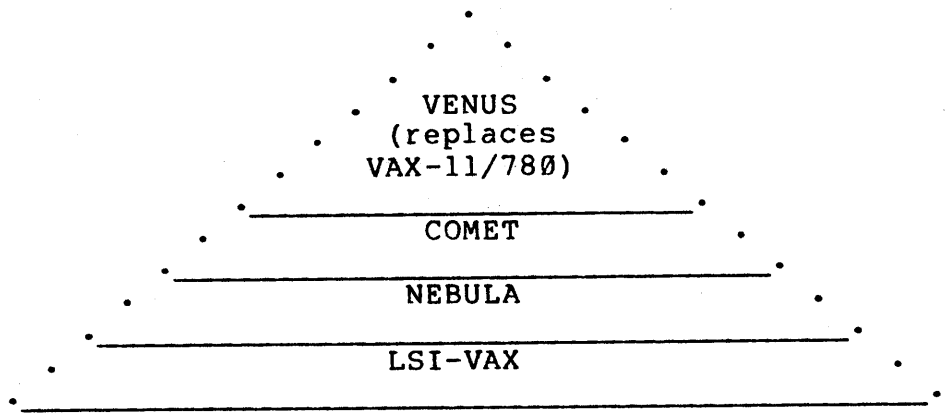
VENUS PRODUCT REQUIREMENTS

4.0 PRODUCT STRATEGY AND OBJECTIVES

VENUS is a high performance computer system which implements the VAX-11 architecture and runs the VAX/VMS operating system with its associated layered software products. The MLP ($) design center of VENUS is the same as that of the VAX-11/780. Increased system performance is achieved by applying state-of-the-art technology (e.g., MACRO CELL Array Technology) to the VAX-11 architecture.

In the FY82-FY87 timeframe VENUS is at the top of a pyramid of VAX family distributed data processing products in terms of

- general purpose computing capability,
- cost and performance
- ease of interconnection to and strict compatibility with all other members of the pyramid.



VENUS will remain as a product offering until at least FY87 although a new, higher performance processor may be required in the FY85/86 timeframe.

As the VAX-11/780 replacement, the VENUS product is consistent with the corporate strategy which calls for a principle 32-bit system architecture dominance by 1985. Furthermore, VENUS will augment the VAX family of 32-bit products in a fashion which is consistent with the corporate goal calling for concentration on systems priced at $250,000 or less.

VENUS PRODUCT REQUIREMENTS

In a single processor configuration or in distributed processing configurations, VENUS provides the functional base for scientific and real-time computations, transaction processing, general purpose commercial EDP, and general purpose timesharing. VENUS should also be utilized in HYDRA multi-processor configurations (high availability, non-stop computing systems).

VENUS systems must comply with the constraint of having VAX/VMS serve as the single operating system for the entire VAX family. A vast array of layered software products (such as COBOL, FORTRAN, DATA BASE MANAGEMENT), system options (such as TRANSACTION PROCESSING, HIGH AVAILABILITY modules), and applications must be offered. These will be VAX/VMS system add-ons in much the same fashion as, for example, disk and tape hardware sub-systems are field add-ons at an existing customer installation.

5.0 PRODUCT REQUIREMENTS

The VENUS system product will satisfy the market requirements outlined above. Priorities to guide the development of this product are given below (in descending order of importance):

#1 - Customer Satisfaction Superior to comparable IBM system.

#2 - Minimal Life Cycle Cost (to DEC)

#3 - Life Cycle Cost of ownership less than comparable VAX-11/780.

#4 - Basic System at $40K T/C with system performance at 3.5 time VAX-11/780.

#5 - New I/O architecture based on BI, CI, NI, HSC, and MERCURY

#6 - SBI capability for -11/780 migration

#7 - FCS in Q4FY82; volume in Q3FY83

#8 - Minimal system at $25K T/C

#9 - Maximum System

The capabilities and functions to be developed for VENUS-based systems according to these priorities are illustrated by the following chart.

VENUS PRODUCT REQUIREMENTS

The chart is organized into 4 sytem classes. These are:

Minimal System

Description: High performance compute engine with minimal peripheral set to support VMS and RAMP tools: "Most MIPS for the $"

Purpose: Marketing MIPS/$ for dedicated computation applications.

Functionality: Minimal memory, mass storage, number of users Full RAMP functionality.

Business Goals: Less than 10% of VENUS should be this system Need O/FA+T and minimal installation/warranty costs because margins are slim.

Basic System

Description: Balanced, expandable system at lower edge of "typical system" space.

Purpose: Provide typical system for OEM's and building block for end users. Should be expandable via SBI and/or new interconnects to form typical end-user systems.

Business goals: Approximately 50% of VENUS systems will be shipped in this class configuration. Many of these will be expanded via add-ons to "typical" configuration. The "basic" system should be based on an I/O architecture which allows expansion via repetition of units where possible. It should not be necessary to "scrap" any part of basic system to expand to typical systems.

Typical System

Description: The most typical class of system used (including 1st year field upgrades)

Purpose: Most cost/effective system when viewed by such metrics as cost/terminal, cost/transaction, cost/application run.

Functionality: General purpose system for end-user environment.

Business goals: Represent 50% of installed systems after 1 year in field. This is the class of system that we should be most efficient at servicing and our software should be most effective on.

Maximum System

Description: Largest system that we expect our customers to grow to

Purpose: Identifies upper limit to be designed for.

Functionality: Varied needs.

VENUS PRODUCT REQUIREMENTS

	MINIMAL SYSTEM *	BASIC SYSTEM *	TYPICAL SYSTEM	MAX. CONFIG.
CPU with CIS warm floating point(includes G and H)	yes	yes	yes	yes
FPA	OPTION	OPTION	yes(1/2 sys)	yes
Main Memory	1MB	2MB	4MB	32MB
Vector Processor	none	none	none	1
Disks	2 x 40-50MB, removable	600MB, fixed or fixed/ removable	1GB fixed or fixed/ removable	20 GB fixed or fixed/ removable
Mag tape	none	1600/6250 bpi, 125ips	2 x 6250 bpi, 200ips	8 highest perfor.avail
Console with terminal load device	yes	yes	yes	yes
Asynch lines ***	8 (1200B)	16(1200B)	32 (2400B)	256 (2400B)
Synch Lines ***	none	none	2 (100KB) or 8 (64 term, 9.600)	4 (100KB) 16 (512 term 9.600)
Line Printer	optional	optional	1	4
Card Reader	option	option	1	2
SBI	none	option (1) or DR780)	1 (Unibus Periph or DR780)	1 (Unibus Periph
ICCS	option			4
Remote diagnostics, console port on-line diagnostics, UETP	yes	yes	yes	yes

VENUS PRODUCT REQUIREMENTS

Cabinetry, power supplies	single cabinet w/exp.space	single cabinet w/exp.space	TBD	TBD
VAX/VMS	yes	yes	yes	yes
Languages	1	any (not included in cost)	any (not incldded in cost)	all
Transfer Cost (average of 800th-900th system shipped)	25K	40K	< 70K	TBD

*Note expansion possibilities under discussion of Priority #4 and #8.
** See discussion of this topic (p 46)
***Synch/Asynch terminals and lines can be traded against each other.

VENUS PRODUCT REQUIREMENTS

PRIORITY #1 Customer Satisfaction Superior to Comparable IBM System.

The ultimate measure of customer satisfaction is repeat business. VENUS will be measured in this respect by Customer Satisfaction Research Institute. The metric for DIGITAL's performance will be the Composite Customer Satisfaction Index determined by CSRI. The known product attributes which affect this measure are:

1. Predictability of performance.
2. Predictability and efficiency of delivery and installation
3. Frequency and duration of unscheduled usage interruptions
4. Human engineering (H/W and S/W)
5. Operating Cost (Facility, maintenance, supplies)

PRIORITY # 2:

Minimal Life Cycle Cost (to DEC). All Digital cost related to the VENUS program and products should be minimized. Firm Metrics in this domain are presently being developed. The development organization is requested to put in place a formal, visible process which addresses this goal.

PRIORITY # 3:

Life Cycle Cost of Ownership less than comparable VAX 11/780.

The VENUS System must be most competitive when viewed by a customer from the perspective of ownership costs over a 5 year productive life. Components of cost to the customer are:

1. Equipment purchase price
2. Site preparation (Class A environment costs $100/square foot in 1979 plus air conditioning).
3. Air conditioning (A/C costs $1000/ton to install in 1979)
4. Energy for equipment and climate control
5. Learning costs (direct computer specialty labor cost approximately $22K/year (with fringes) in 1979 and is projected to reach $60K/year in 1990)

VENUS PRODUCT REQUIREMENTS

Inflation is expected at 10-12% in the 1980's with energy related operating costs increasing at 15-20%/year.

It is therefore, highly desireable that VENUS' environmental requirements are equivalent to typical "office environment"; with minimal improvement.

VENUS development must expand on the RAMP designed and implemented for the VAX-11/780. Service price erosion indicates that the BMC of the resulting product must not exceed 1.5% of its transfer cost (1/2 of 11/780 costs). RAMP plans should include software warranty and installation cost goals. RAMP must be considered according to the customer's perception of a total system, e.g., Are spares available when needed? Can troubleshooting be done without taking the entire system down? Is field software support responsive? Did the system product undergo enough quality assurance testing?

Improved RAMP is necessary for at least two reasons:

1. Customers are demanding highly reliable systems. They are becoming increasingly intolerant of computer system interruptions which wreak havoc throughout their organization. Fault toleraance has high impact on customer satisfaction.

2. With the growth of distributed data processing systems, customers will see growing maintenance costs for the many system processing units that are spread across a wide geographical area. Competition is expected to reduce service pricing to one half it's present lead by the mid eighties. Furthermore, system vendors will be unable to provide a sufficient (and large) number of capable service personnel for such maintenance.

For VENUS, undetected failures must be minimized, and the total unrecovered system crash rate must be reduced. The latter includes all crashes attributed to environmental causes, operational procedures, software, hardware, and unexplained failures.

VENUS PRODUCT REQUIREMENTS

The MTBF must be increased significantly from that of the -11/780. Further, the total unproductive time per year must be reduced drastically. This includes, but is not limited to,

1. hardware preventive maintenance
2. software updates and maintenance
3. disk backup operations
4. emergency system maintenance
5. time spent waiting for parts
6. the ambiguous time during repetitive and undetected failures (especially for service calls which do not isolate the problem cause). Marketing would like no more than 1 crash per month in typical systems and not more than 1 unscheduled system outage for repairs per 3 month period.

It is expected that reducing non-productive time will require significant changes in operational and service philosophies.

As part of the VENUS RAMP, consideration should be given to those features available from the HYDRA learning experience. Examples are redundant power supplies and fans plus devices with redundant access paths.

VENUS PRODUCT REQUIREMENTS

PRIORITY #4: Basic System at $40K T/C with performance at 3.5 times VAX-11/780.

With an MLP of $180K, the system transfer cost is $40K (based on MU=4.5).

The basic functionality of this system is

CPU with CIS and warm floating point (including G and H)
2MB ECC MOS memory
600MB disk mass storage; fixed or fixed/removable media
1600/6250 bpi, 125 ips magnetic tape subsystem
Console, including terminal and load device for software patches, software distribution
16 asynchronous lines (up to 1200B)
I/O bus
Remote diagnostics with console port, on-line diagnostics, UETP
Cabinetry, power supplies
VAX/VMS operating system
Expansion space in this single cabinet for
- 6MB ECC MOS memory (additional)
- 16 asynchronous lines (additional)
- 1 line printer
- 1 card reader
- 6-8 synchronous lines
- FPA

Note that the $40K T/C covers the pre-wiring for these expansion components only and not the components themselves.

The configuration rules for this basic system and for all other VENUS-based systems must be easily stated and must be subject to easy verification by all sales people.

Performance at 3.5 times VAX-11/780

FORTRAN and COBOL --

The best FORTRAN and COBOL performance must be

FORTRAN = 3Ø32 = 37Ø/168

COBOL = 3Ø32 = 37Ø/168

This performance can be achieved via accelerators or any other engineering option.

When these high-performance capabilities are removed from the system, the performance is at the 3Ø31 or 37Ø/158 level.

FORTRAN is measured using the Whetstone and SP1111 benchmark programs. The performance for data types F, D=G, and H should each meet these goals compared to the corresponding IBM data types.

COBOL is measured using the U.S. Steel and Profile benchmark programs. The performance for display, binary, and index subscripts and for trailing overpunched and packed decimal data should each meet these goals compared to the corresponding IBM measures.

Real-time --

Times for context switching, CALL, and response to/service of interrupts must be at least 3 times faster than the speedier of COMET or VAX-11/78Ø.

VENUS PRODUCT REQUIREMENTS

Throughput --

Deliverables:

VENUS as a system must provide 350% of 11/780 throughput to retain our position in the market.

Scientific Computation:

VENUS should execute the Scicomp workload being defined by Kent Blackett and Colin Adams at least 3.5x as fast as 11/780 configurable at comparable FY83 transfer cost.

Interactive Commercial ADP:

VENUS should support 3 times as many application terminals performing TP operations as defined by Gray Book, Dick Rislove, as most cost effective 11/780, at 11/780 costs. Additionally, VENUS must complete the ECS workload (Roger Strickland, Colin Adams), at over 3x the performance of similar cost 11/780.

Real Time:

VENUS must, in combination with other VAX systems, accept and store (main memory) 3x as many 16 bit data samples as 11/780 or COMET, whichever is faster. When supporting smaller VAX's as R/T front ends, VENUS must provide over 3x as many links as 11/780, or 3.5x as many cycles for background SCICOMP as 11/780.

VENUS PRODUCT REQUIREMENTS

Memory bandwidth for VENUS must be sufficient to handle max configurations and specifically up to 16 MB/sec of DR32 type I/O. Further, a VENUS system must be capable of handling the equivalent I/O load of 4 UNIBUSes plus 8 MASSBUSes in addition to the maximum allowable number of intersystem connections. This assumes that the system bus also supports (via MERCURY and HSC as appropriate) line printers, card readers, asynchronous and synchronous communications lines, and mass storage units. For availability reasons, it must be possible to configure a single VENUS system with at least two intersystem busses.

Delays in development --

Should the time to market goal not be met, it is required that all performance specifications given above will increase by 30% per year.

Data to Characterize Performance:

Characterization

The VENUS development program must provide characterization of VENUS system performance which are meaningful to a prospective owner.

Examples are:

A. Scientific Computation:

1. Whetstones
2. % degradation of CPU to support each KB/sec of terminal I/O (SYNCH and ASYNCH)
3. Network CPU degradation per link per KB/sec.
4. Typical Max steady state system throughput servicing high performance (>100KB/sec) displays from preformated mass storage images.

B. Interactive Commercial ADP

1. Time to sort randomly sequenced files of various sizes, formats.
2. CPU degradation to service an SNA link at popular speeds.
3. US Steel indices
4. Number of transactions/hour, given input size, output size, number of lines of COBOL code, number of record accesses, etc.

VENUS PRODUCT REQUIREMENTS

An extensive set of performance measurements tasks must be done to provide data that is relevant to customers in the respective market segments. These performance analyses must be completed with results available by the time of VENUS product announcement. Such performance measurement projects must continue throughout the lifetime of VENUS in response to its changing environment (e.g., in terms of new DIGITAL products and competitors' new offerings).

Performance Management

The VENUS system must provide the user with a reasonably useful means to accomplish performance management. The intelligent owner must be able to methodically, and fruitfully tune the system to within 90% of theoretical maximum throughput for his application code. Skills to accomplish this must be acquirable in 16 hours by typical senior technical person without human intervention by DEC. Automatic VMS tuning should be a user invocable option. Such dynamic tuning should achieve over 75% of maximum theoretical throughput on average.

PRIORITY #5: New I/O architecture based on BI, CI, NI and MERCURY

VENUS should exploit the new I/O architecture based on the ICCS bus, the HSC50 mass storage controller for disk and tape, and the MERCURY intelligent communications subsystem for asynchronous lines and synchronous lines and unit record equipment.

PRIORITY #6: SBI capability for -11/780 migration

To facilitate migration of the current VAX-11/780 customers to VENUS, and to allow VENUS to use a wealth of existing DEC and customer peripherals in it's early life, ports for UNIBUS and MASSBUS devices must be provided via the SBI interface.

VENUS Interconnects

1) The VENUS system must, commensurate with it's cost goals, support and exploit the most technologically advanced I/O and inter-computer interconnect architecture and mechanism available within Digital.

2) VENUS must also support the 11/780 SBI and those related 11/780 peripherals not replaced by more modern devices on more modern interonnects.

3) Some of VENUS systems used in Real-Time and Scientific Computation applications will require a limited number of very high performance specialized I/O ports. Presently, identified requirements are as follows:

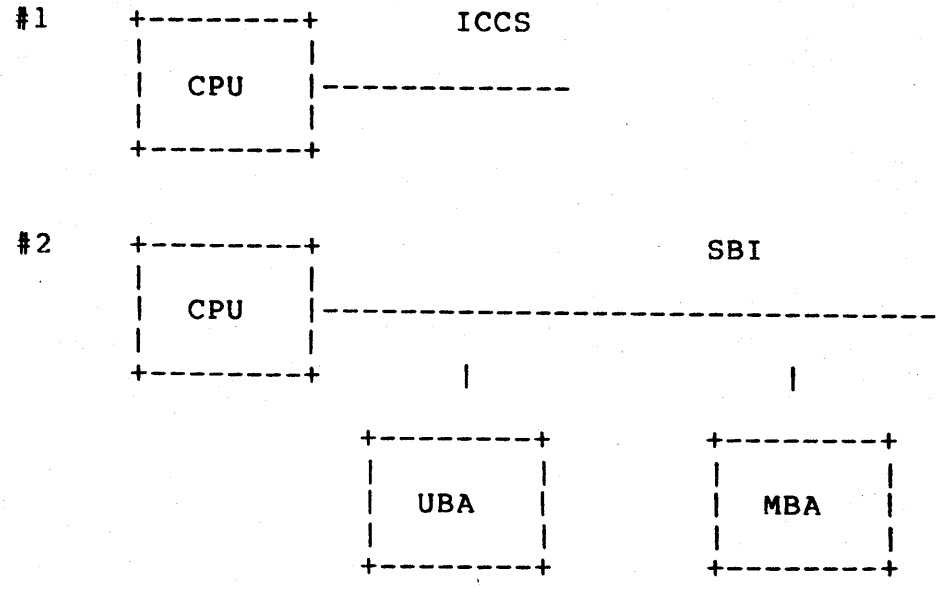
A. Up to 4 synchronous communication lines operating simultaneously at 100KB/sec with minimal CPU degradation for graphics terminal applications, or;

B. Up to 4 public parallel (DR32 style) DMA I/O ports which operate (simultaneously) at up to 4MB/sec.

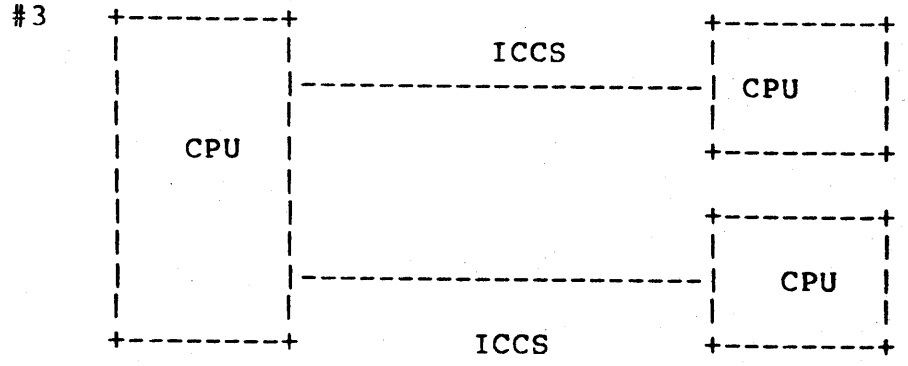
C. Unibus bandwidth and interupt responses at least 11/45 or better. This is needed because DEC and our customers are still designing peripherals for the Unibus. The transition machine to the new interconnect scheme will need to have both for overlap and compatibility.

VENUS PRODUCT REQUIREMENTS

Under the above two priorities (ICCS and SBI capabilities), the various I/O configurations envisioned for VENUS systems and the priorities for their development are:

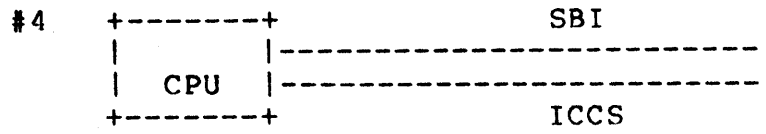


For -11/780 customers wanting an upgrade to a system with a more powerful central processor but with support for existing peripheral devices (via the UBA and/or MBA). This must be available at FCS.



For customers with a distributed processing operation comprised of high-performance connections among intelligent subsystems. These high availability, high reliability systems will be suited for transaction processing, real-time computation, and general purpose timesharing off-loaded from a mainframe. This I/O configuration is part of the VENUS/HYDRA configuration and should be available at FCS.

VENUS PRODUCT REQUIREMENTS



For customers (especially OEM) needing a system with a link to the past (via the SBI) and to newly-developed products (via the ICCS).

PRIORITY #7: FCS in Q4FY82; volume in Q3FY83

The VAX-11/780 product was announced in October, 1977 with FCS in December, 1977 (Q2FY78). Assuming the need for a replacement product every 3-5 years, the desired announcement date for the VENUS product is not later than Q2 of FY82. First customer shipments should follow in Q4FY82. Volume shipments will be reached 2 quarters later.

To summarize the key dates requested for VENUS:

Announcement of basic system	Q2FY82
First customer shipment (FCS)	Q4FY82
Volume availability	Q2FY83
Availability of	
FPA	FCS+3 months
Entry level system	FCS + 6 months
Large system	FCS + 9 months

VENUS PRODUCT REQUIREMENTS

PRIORITY #8: Minimal system at $25K T/C

The entry level system is aimed at cost-sensitive applications. At a $25K T/C this system permits a marketing campaign based on pure system cost. With an MLP of $99K, the system transfer cost is $25K (based on MU = 4.0).

The entry level system is bounded. Expansion is allowed but only at a price which does not disturb the product's design center business.

The basic functionality of this dock merge system are:

CPU with CIS and warm floating point (including G and H)
1MB ECC MOS memory
2 x 40/50 MB ea. disk drives (removable media)
Console, including terminal and load device for software patches, software distribution
8 asynchronous lines
I/O bus
Remote diagnostics with console port
Cabinetry, power supplies
On-line diagnostics, UETP
VAX/VMS operating system with license for one language
Expansion space in this single cabinet for
- 1MB ECC MOS memory (additional)
- 8 asynchronous lines (additional)
- 1 line printer
- 1 card reader
- 6 x 40/50MB ea. disk drives (removable media)
- 2 synchronous lines
- 1 accelerator

Note that the $25K T/C covers the pre-wiring for these expansion components only and not the components themselves.

PRIORITY #9: System options (for large to maximum systems)

To meet the requirements of the marketplace, the VENUS system product will have several options as listed below. These options must be planned in VENUS from the start of product design and development. Availability to the marketplace is noted here as "FCS+n" in months.

Hardware --

(FCS+9)	32MB max. memory (system total)	
(FCS+12)	I/O busses:	max. of 4 ICCS
(FCS+12)		SBI with up to 2 UBAs plus 4 MBAs
(FCS)	disks:	1-2GB, fixed media
(FCS+3)		40-80 MB, removable media optional dual channel access for both
(FCS+9)	tapes:	6250 bpi, 200 ips, auto load, radial bus, dual channel access (optional)
(FCS)		1600/6250 bpi, 125 ips
(FCS)	unit record equipment:	line printer (IBM quality, VFU, DMA)
(FCS)		card reader (DMA)
(FCS)	processor options:	FORTRAN (accelerator)
(FCS)		
(FCS+6)		Vector processor
(FCS)		User accessible control store with S/W tools
(FCS)		MA780 (including COMET shared memory systems) (degraded performance accepted)
(FCS)		DR780
(FCS+ 6 mo)		DRVENUS
(FCS)	terminals:	multi-drop terminals
(FCS)		VT100-style terminals
(FCS)		PDT style terminals
(FCS)		GIGI terminal
(FCS)		Typeset terminals
(FCS)		terminal clusters

Communications --

(FCS)	DECnet
(FCS)	X25
(FCS)	Interconnect to IBM, CDC, UNIVAC
(FCS)	MERCURY communications controller
(FCS)	DMA/buffered asynchronous and synchronous lines

VENUS PRODUCT REQUIREMENTS

VAX/VMS Operating System

Software (native mode) --

(FCS)	SORT/MERGE	(FCS)	Interactive BASIC-PLUS
(FCS)	APL with file system	(FCS)	BASIC-PLUS-2
(FCS)	PL/1	(?)	ADA
(FCS)	PASCAL	(FCS)	CORAL-66
(FCS)	BLISS-32	(?)	PEARL
(FCS)	RPG II	(FCS)	MUMPS
(?)	ALGOL	(?)	LISP

Note for all new languages: compliance with existing ANSI-standard language specifications; validated compilers.

(FCS) Symbolic debuggers for all languages
(FCS) Language support for vector processor
(FCS) DBMS-32
(FCS) DATATRIEVE-32 (inquiry language, report writer)
(FCS) TRAX-32
(FCS) Forms language compiler, debugger, data entry with full field validation
(FCS) Message control with transaction roll forward/backward, journalling, shadow recording
(FCS) Multi-volume disk files
(FCS) ANSI-standard mag tape handling routines
(FCS) IBM mag tape handling
(FCS) Routines for graphics displays and plotters
(FCS) Math library
(FCS) Routines for performance measurement, network tuning, applications program tuning
(FCS) System resource accounting
(FCS) Resource allocation, quotas, scheduling (especially by JOB class); all in BATCH also
(FCS) Support routines for office automation (interface to remote word processors, backup storage for large documents, document interchange utility, electronic mail)
(FCS) Routines for RSTS migration (emulators, conversion utilities)
(FCS) Cross-system development for RSX-11M, -11S, RT-11, RT2.

(FCS) Host Word Processing

General --

(FCS) Node in a HYDRA configuration
(FCS) 512 simultaneous educational users (BASIC-PLUS on a single-processor system)
(FCS) System-/network-wide data dictionary, data directory
(FCS) H/W, S/W support of all devices on -11/780, COMET, NEBULA, HYDRA, FONZ, SCS, PDT.
(FCS) Multiple operator consoles

VENUS PRODUCT REQUIREMENTS

Large system

The functionality of this system is:

CPU with CIS and warm floating point (including G and H)
32MB ECC MOS memory
20GB disk mass storage; fixed or fixed/removable media; dual channel access
8 x highest functionality/performance tape drive available
Console, including terminal and load device for software patches, software distribution
256 asynchronous lines (MERCURY)
4 x ICCS I/O bus with two (2) ICCS ports connected to VENUS, COMET, or NEBULA processors
512 synchronous dropds to terminals, IBM or CDC (MERCURY)
4 line printers (MERCURY)
2 card readers (MERCURY)
Vector processor
Remote diagnostics with console port
Cabinetry, power supplies
On-line diagnostics, UETP
VAX/VMS operating system with FORTRAN, COBOL, PL/1, BASIC, DBMS, PASCAL, etc. and Database management.

VENUS PRODUCT REQUIREMENTS

General Requirements

1. 36 bit interconnect

   VENUS must connect to 2080 and KL via corporate standard inter-computer link.

2. Vector Processing

   A Vector Processing option for VERNUS is desireable if:

   1. The option would also be applicable to COMET at least, and possibly NEBULA.

   2. The option could be built in low volumes at less than $5K transfer cost

   3. Support of such an option would have less than a 2% cost impact on other 95% of systems.

   4. The VP option would be cost/performance competitive with AP-120-- (FPS)

3. VMS Compatibility

   1. User visible compatibility is a must.

   2. Strict hardware subset compatibility (a la 11/45 - 11/70) to 11/780 would permit Telephone Co. (approximately 20+% of VENUS demand) to begin buying VENUS 1 year earlier than possible if Unix must be upgraded.

   3. Power Variation

      Venus will be sold in all freee world markets. All power combinations should be accomodated.

   4. FPA

      The VENUS FPA costs should be equivalent to 11/780. FPA performance of greater than 3.5x 11/780 is desired. We can trade warm FP performance for better hot FP performance. "H" format does not require acceleration.

VENUS PRODUCT REQUIREMENTS

5. Unibus/Massbus Options

A large number of Unibus and Massbus peripherals will be supported by VMS on 11/780, COMET and NEBULA by VENUS FCS

A large number of these devices will have to be tested and supported on VENUS (SBI) to address the needs of 11/780 upgrade customers. The following will be required:

A. Any device which will provide a data/program interchange media between VENUS other VAX's RSX-11M systems, and TOPS-10/20 systems

B. Any device which will be in use on more than 10% of 11/780's at VENUS FCS.

C. Any device which a P/L tests and qualifies per standard established by the VENUS team

6. VENUS development plans must describe areas where design has allowed for "mid-life-kickers".

7. General Mass Storage Port

A large advance in high end mass storage technology is expected in the VENUS timeframe. Examples of this are rumored 18 track, high quality, high performance tapes, and rotating bulk storage at $20-$25 per MB.

VENUS design must include a mechanism whereby DIGITAL can adopt buyout devices using new technologies in such a way as to remain only 1 year behind IBM at only 10% higher cost.

8. Business Metrics

VENUS products and service developers should be cognizant of the basic financial metrics which are applicable to the system.

MLP (Maynard List Price) will be set just before announcement and will reflect a number of variable (competitive situation, related products inventory position, mfg. capacity, short and long term economics and fiscal environment,etc.)

T/C (Transfer Cost) the cost of VENUS components out of volume mfg.

VENUS PRODUCT REQUIREMENTS

S/I (Service Income) related to service prices established as MLP, above

S/E (Service Expense) the cost of delivering System services, including distribution of software

I/W (Hardware Installation and Warranty) The cost born by P/L's of installing and providing first 90 days of preventative and remedial support for system.

I&W, S/W (Software Installation and Warranty) Same as above, for Software, but usually includes (up to 50%) customer familiarization, with hardware and software.

FA&T (Final Assembly and Test) Hot staging and integrated test of complete systems before shipment to owner.

All of the above are operating cost components which relate to each system shipped.

Because VENUS represents a large financial investment for to the corporation, operating cost performance for VENUS must be highly productive to justify the investment. VENUS business planning suggests that the following set of cost goals justifies the financial investment. (All based upon "Basic System")

Item	Corp Avg (% T/C)	VENUS(%T/C)	VENUS $/sys
T/C		100	$40K
S/E (per MO)	1.8%	<1%	$374/mo
I/W (H/W)	24.3%	15%	$6,000
I/W (S/W)	6.75%	5%	$2,000
FA&T	21.6%	14%	$5,600

All of the above require analysis in light of life cycle cost, but some tactics seem evident:

1. T/C: Basic system needs volume T/C goal attention - action; mfg. eng.

2. S/E: VENUS should be reliable, easily diagnosed, quickly arrived at, quickly repaired by low skilled person or customer - action; Eng., CS, P/M (geographic issue)

3. I/W: VENUS should arrive running, automatically train the customer, and not break during first 90 days, - action; Eng., Program Management (self teaching), MFG (no DOA's)

4. FA&T: Should be eliminated if possible;

    1. for less than $35M before FCS
    2. no impact on other costs, volumes, or customer satisfaction.

Action; Program Management, Eng., Mfg., PM (mix mgnt)

6.0 PRODUCT ASSESSMENT

6.1 Market Fitness and Competitive Goodness

The desired fit of the VENUS system in each application space is summarized below:

APPLICATION SPACE	ASSESSMENT
Scientific Computation	Excellent
Real-time Computation	Excellent
Transaction Processing	Very Good
Interactive Commercial ADP	Very Good
General Purpose Timesharing	Good

Against the competitive products either currently offered in the market or else known to be under development for release during VENUS' product life, VENUS should be a very strong performer for DIGITAL, especially in the traditional market segments (scientific, real-time). The challenge will be to achieve the same level of excellence for transaction processing and for interactive commercial ADP. By and large, success here depends upon our ability

1. to develop a considerable number of software products in time for the VENUS announcement and shipment;

2. to gain TP and commercial experience and to build a reputation as a viable vendor of high-end commercial-oriented products;

3. to understand how to win a sizable share of these two markets which are now dominated by extremely strong, well-entrenched competition.

Particular attention must be given here to the competitive challenge of IBM in all our market segments. With the coming H-series to complement their current 4300-series, the 8100, and the System/38, IBM will appear to have a comprehensive product offering aimed specifically at the distributed processing marketplace. The best resources of DIGITAL will be required to beat back this challenge with a rich array of products that can win wide customer acceptance.

Predicted Competitive Situation

Most of our traditional competitors will have updated their lines by the mid eighties and comparisons with today's machines don't serve us well. It is assumed that the price/performance structure of the industry offerings for VENUS class machines will be dominated by IBM. Whether or not we compete head-on with IBM for a specific application, IBM will represent a point of reference for nearly all computer purchases in this class.

Today's reference machines, based upon throughput are the 370/168 and 3032. Predictions indicate that this space will be covered by Olympia and Sierra series machines in the mid 80's. Predicted cost/performance metrics for these systems are:

$175K - 200K per MIP
$20-25/MB of on-line mass storage
System service costs at 1/2 of todays levels
Increased revenue (and value) from software
$50/mo per terminal user in terms of all vendor fees.

6.2 Family Product Positioning

As stated earlier, VENUS is at the top of a pyramid of VAX family distributed processing products. A brief description of each product is given below.

VENUS

- High end of the VAX family.
- VAX-11/780 replacement.
- Top of distributed computers hierarchy.
- General purpose capabilities for Scientific and Real-time Computation, Commercial Data Processing, Time Sharing,
  Basic system optimized for $180K sale price.
- Configurable in high availability topologies (HYDRA).
- Attack product for new customers and PDP-11 customers in the $150K-$300K average systems range.
- Migrate top end of 11/74-MP business to VENUS.

VENUS PRODUCT REQUIREMENTS

Competition for VENUS is

IBM 303X, 370, 4341+
CDC Cyber
Burroughs
NCR
Honeywell
SEL

COMET/HYDRA

- Mid-range VAX family product at center of corporate business ($50K-$80K) for single processor applications.
- Main product for distributed data processing host machine at the department/group level.
- Tailored by application of VMS software options to Scientific Computation, Commercial Data Processing, Real-time Computation, Time-sharing, or Transaction Processing environment.
- Attack product for new customers and PDP-11 customers in the $50K-$150K range.
- Attack product for non-stop systems.
- Migrate low end of 11/780 business, some of 11/74-MP business, and top end of 11/44.

Competition for COMET/HYDRA is:

IBM Low end 370, 4331
HP 3000
DG M600
S250
DG 32-bit
PRIME
Tandem
Interdata
SEL

NEBULA

- Low end VAX family product.
- Optimized for $25K systems range.
- Tailored to specific application by packaging VMS options.
- Attack product for new customers and PDP-11 customers in the $20K-$50K range.
- Migrate bulk of 11/34, 11/44 business.

VENUS PRODUCT REQUIREMENTS

Competition for NEBULA is:

IBM Series 1, 8100
HP 3000, HP 1000
DG S250 + New Series
PRIME
Microdata

LSI/VAX

Very low end VAX family product.
Optimized for personal, lab, and office use.
$8-$10K system.
Bottom of the distributed data processing pyramid.
Tailored to a specific function by packaging of VMS (sysgen out functions).
Migration for 11/04, LSI-11 business; co-exist with PDP-11 bounded systems.

Competition for LSI/VAX is:

DG Micro Nova
HP desk top
Microdata
Intel
Wang

6.3 Compatibility with DIGITAL Systems

The key compatibility issues relative to VENUS product development are:

1. VAX family architecture is maintained.

2. **The strategy of one operating system, VAX/VMS, is maintained.**

3. VENUS supports SBI ports to allow connection (with no changes) to the MA780 and DR780.

4. UNIBUS and MASSBUS ports are provided to facilitate migration of the current -11/780 customer base.

5. The new ICCS I/O bus structure is implemented in a uniform fashion across all VAX family members and selected 36 bit family members.

6. The PDP-11 compatibility mode is maintained as in the -11/780.

7. It is possible to use the library of VAX diagnostics unchanged for all existing devices.

8. RSX-11M compatibility is maintained in emulator mode.

9. There is a continued convergence on a single on-disk structure (ODS II), file access method (RMS), and command language (DCL).

10. Tools will be developed to support VENUS-based RT-11 development of software for PDT clusters and the FONZ and also SCS-11 host development.

11. Tools will be developed to allow easy movement of data and high level language programs between VENUS and DECsystem 10/20.

6.4 Product Development Assumptions

The VENUS product development assumes that VAX/VMS is the one operating system maintained for the entire family. Further, the VAX family architecture is maintained, and all implementations are consistent throughout the family.

In this product development, emphasis is placed on languages, data management, communications, ease of use, and system availability. VENUS is suitable as a node in a HYDRA configuration. DECnet is an integral and critical part of the VENUS product. X25 and interconnects to IBM, CDC, UNIVAC are integrated into continued VAX/VMS development.

Tailoring of hardware products to the VENUS marketplace is achieved by adding layered software products and/or boot-time selecting VAX/VMS as appropriate.

6.5 Product Development Risks

A major risk involves timely development of several software products required especially by the commercial-oriented market segments. The significant challenge of this product development is being met today. Major software development projects are currently underway. Others are in the planning stages and require corporate funding and commitment of resources.

The design center and entry level systems depend on the availability of mass storage subsystems (disk and tape) that are significantly more cost-/performance-effective than our current product offerings.

VENUS PRODUCT REQUIREMENTS

VENUS is the first DIGITAL product scheduled to use the MACRO CELL Array technology. Originally VENUS development plans had included the opportunity to learn from the DOLPHIN experience with the MCAs. Their extensive diagnostic capability will contribute heavily to achievement of VENUS' higher RAMP goals.

To achieve the higher RAMP goals, significant changes may have to be made in the philosophies governing hardware/software design and implementation and system support in the field.

APPENDIX A: VENUS Systems

Representative configurations of VENUS systems are:

1. 1MB memory
   ICCS bus
   2 x RL$\emptyset$4 via UDA
   8 asynchronous lines
   VMS + **one language**
   $99K MLP (entry level system)

2. 2MB memory
   SBI
   RM/RA8$\emptyset$ via MBA
   TU77
   8 lines
   VMS

3. 4MB memory
   ICCS bus
   RP$\emptyset$8 via HSC
   TU78
   8 lines
   VMS (no languages)
   18\emptyset$K MLP (basic system)

4. 16MB Memory
   2 x ICCS bus
   4 x RP$\emptyset$8 via HSC
   4 x TU78
   128 lines (MERCURY)
   VMS

5. 2 x System #2
   1 MA78$\emptyset$ with 1MB memory (esp. for OEM)

6. 2 x System #4 with 256 lines total (this is VENUS/HYDRA)

VENUS PRODUCT REQUIREMENTS

APPENDIX B: Comparison Prices and Costs for VAX-11/780

Given here are the configuration, price, cost and BMC of VAX-11/780 packaged systems.

DESCRIPTION	FY80 MLP (M.U.)	FY80 Est. Transfer Cost	FY80 BMC (% XFER)
VAX-11/780 System, 512KB memory, 2 x RK07 (28 MB ea.), 8 asynch. comm. lines, and virtual memory operating system software.	$134,600 (x5.1)	$ 26,600	$748 (2.8%)
VAX-11/780 System, 512KB memory, RM03 disk pack (67MB), TE16 magnetic tape (1600/800 bpi, 45 ips), 8 asynch. comm. lines, and virtual memory operating system software	167,000 (x4.6)	36,100	783 (2.2%)
VAX-11/780 System, 512KB memory, RM03 disk pack (67MB), TU77 magnetic tape (1600/800 bpi, 125 ips), 8 asynch. comm. lines, and virtual memory operating system software.	177,000 (x4.3)	40,700	843 (2.1%)
VAX-11/780 System, 1MB memory, RP06 disk pack (176 MB), TE16 magnetic tape (1600/800 bpi, 45 ips), 8 asynch. comm. lines, and virtual memory operating system software.	207,000 (x4.8)	42,800	937 (2.2%)
VAX-11/780 System, 1MB memory, RP06 disk pack (176MB), TU77 magnetic tape (1600/800 bpi, 125 ips), 8 asynch. comm. lines, and virtual memory operating system software.	217,000 (x4.7)	46,500	997 (2.1%)
"UNIBUS" VAX-11/780 System, 256KB memory, 2 x RK07 (28 MB ea.), 8 asynch. comm. lines, and virtual memory operating system software. (system subject to corporate approval)	99,800 (x3.9)	25,300	698 (2.7%)

APPENDIX D: Related Documentation

Existing documents that are useful for anyone working in VENUS product development and marketing are listed below:

1. VENUS Project Proposal (27 Dec. 1978)
   Contact Steve Jenkins, TW/C04, DTN #247-2395.

2. VENUS Product Description (20 Jan. 1979)
   Contact Steve Jenkins

3. VENUS Impact Statement (13 Feb. 1979)
   Contact Don Ames, TW/A02, DTN #247-2517.

4. VENUS Software Plans (10 Apr. 1979)
   Contact Peter Conklin, TW/A08, DTN #247-2119.

5. VAX/VMS R2.0 Requirements Document (Sept. 1978)
   Contact Kathryn Norris, TW/A08, DTN #247-2580.

6. System plan for VAX/VMS (10 Jan. 1979)
   Contact Joe Carchidi, TW/D08, DTN #247-2251.

7. VAX/VMS RELEASE TWO Project Plan (9 Feb. 1979)
   Contact Trevor Porter, TW/D08, DTN #247-2262

8. Commercial Market Product Requirements (March 1979)
   Contact Roger Cady, MK1-1/E25, DTN #264-5045.

9. NEBULA Product Requirements (Feb. 1979)
   Contact Lou Philippon, TW/A08, DTN #247-2860.