

Distributed Computing Toolbox Release Notes

Summary by Version	1
About Release Notes	1
Version 3.0 (R2006b) Distributed Computing Toolbox ..	4
Support for Windows Compute Cluster Server (CCS)	4
Windows 64 Support	5
Parallel Job Enhancements	5
Distributed Arrays	5
Interactive Parallel Mode (pmode)	6
Moved MDCE Control Scripts	6
rand Seeding Unique for Each Task or Lab	7
Task ID Property Now Same as labindex	7
Upgrade Distributed Computing Products Together	8
Version 2.0.1 (R2006a) Distributed Computing Toolbox	9
Version 2.0 (R14SP3+) Distributed Computing Toolbox	10
Third-Party Schedulers	10
Parallel Jobs	10
Adding Tasks to Running Jobs	11
Engine Process Enhancements	11
ErrorIdentifier Changed	13
Checkpoint Directory Structure Change	13
Version 1.0.2 (R14SP3) Distributed Computing Toolbox	14
Rapid Simulation (RSim) Target	14
Version 1.0.1 (R14SP2) Distributed Computing Toolbox	15
License Files Upgraded	15
-port Flag Not Supported	15
Version 1.0 (R14SP1+) Distributed Computing Toolbox	16

Compatibility Summary for Distributed Computing
Toolbox **17**

Summary by Version

This table provides quick access to what is new in each version. For clarification, see “About Release Notes” on page 1.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V3.0 (R2006b)	Yes Details	Yes Summary	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation
V2.0.1 (R2006a)	No	No	Bug Reports Includes fixes	No
V2.0 (R14SP3+)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
V1.0.2 (R14SP3)	Yes Details	No	Bug Reports Includes fixes	No
V1.0.1 (R14SP2)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
New product V1.0 (R14SP1+)	No	No	No	No

About Release Notes

Use release notes when upgrading to a newer version to learn about new features and changes, and the potential impact on your existing files and practices. Release notes are also beneficial if you use or support multiple versions.

If you are not upgrading from the most recent previous version, review release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the New Features and Changes, Version Compatibility Considerations, and Bug Reports for V1.1 and V1.2.

New Features and Changes

These include

- New functionality
- Changes to existing functionality
- Changes to system requirements (complete system requirements for the current version are at the MathWorks Web site)
- Any version compatibility considerations associated with each new feature or change

Version Compatibility Considerations

When a new feature or change introduces a known incompatibility with the previous version, its description includes a **Compatibility Considerations** subsection that details the impact. For a list of all new features and changes that have compatibility impact, see the “Compatibility Summary for Distributed Computing Toolbox” on page 17.

Compatibility issues that become known after the product has been released are added to Bug Reports at the MathWorks Web site. Because bug fixes can sometimes result in incompatibilities, also review fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

MathWorks Bug Reports is a user-searchable database of known problems, workarounds, and fixes. The MathWorks updates the Bug Reports database as new problems and resolutions become known, so check it as needed for the latest information.

Access Bug Reports at the MathWorks Web site using your MathWorks Account. If you are not logged in to your MathWorks Account when you link to Bug Reports, you are prompted to log in or create an account. You then can view bug fixes and known problems for R14SP2 and more recent releases.

The Bug Reports database was introduced for R14SP2 and does not include information for prior releases. You can access a list of bug fixes made in prior versions via the links in the summary table.

Related Documentation at Web Site

Printable Release Notes (PDF). You can print release notes from the PDF version, located at the MathWorks Web site. The PDF version does not support links to other documents or to the Web site, such as to Bug Reports. Use the browser-based version of release notes for access to all information.

Product Documentation. At the MathWorks Web site, you can access complete product documentation for the current version and some previous versions, as noted in the summary table.

Version 3.0 (R2006b) Distributed Computing Toolbox

This table summarizes what is new in Version 3.0 (R2006b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes — Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation

New features and changes introduced in this version are

- “Support for Windows Compute Cluster Server (CCS)” on page 4
- “Windows 64 Support” on page 5
- “Parallel Job Enhancements” on page 5
- “Distributed Arrays” on page 5
- “Interactive Parallel Mode (pmode)” on page 6
- “Moved MDCE Control Scripts” on page 6
- “rand Seeding Unique for Each Task or Lab” on page 7
- “Task ID Property Now Same as labindex” on page 7
- “Upgrade Distributed Computing Products Together” on page 8

Support for Windows Compute Cluster Server (CCS)

The Distributed Computing Toolbox and MATLAB Distributed Computing Engine now let you program jobs and run them on a Windows Compute Cluster Server. For information about programming in the toolbox to use CCS as your scheduler, see the `findResource` reference page, and see also “Find a CCS Scheduler”.

Windows 64 Support

The distributed computing products now support Windows 64 (Win64) for both MATLAB client and MATLAB worker machines.

Parallel Job Enhancements

Parallel Jobs Support Any Scheduler

Support for parallel jobs now extends to any type of scheduler. In previous releases, only the MathWorks job manager and mpiexec scheduler object supported parallel jobs. You can now run parallel jobs on clusters scheduled by a job manager, CCS, LSF, mpiexec, or using the generic scheduler interface. For programming information, see “Programming Parallel Jobs”.

New labSendReceive Function

The labSendReceive function is introduced in this release. This function performs the same things as both labSend and labReceive, but greatly reduces the risk of deadlock, because the send and receive happen simultaneously rather than by separate statements. For more information, see the labSendReceive reference page.

Improved Error Detection

This release offers improved error detection for miscommunication between labs running parallel jobs. Most notable among the improvements are error detection of mismatched labSend and labReceive statements.

Distributed Arrays

Distributed arrays are partitioned into segments, with each segment residing in the workspace of a different lab, so that each lab has its own array segment to work with. Reducing the size of the array that each lab has to store and process means a more efficient use of memory and faster processing, especially for large data sets. For more information, see “Working with Distributed Arrays”.

There are many new and enhanced MATLAB functions to work with distributed arrays in parallel jobs. For a listing of these functions and their reference pages, see “Toolbox Functions Used in Parallel Jobs and pmode”.

parfor: Parallel for-Loops

Parallel for-loops let you run a for-loop across your labs simultaneously. For more information, see “Using a Parallel for-Loop (parfor)” or the parfor reference page.

Interactive Parallel Mode (pmode)

The parallel mode (pmode) of MATLAB lets you work interactively with a parallel job running simultaneously on a number of labs. Commands you type at the pmode command line are executed on all labs at the same time. Each lab executes the commands in its own workspace on its own local variables or segments of distributed arrays. For more information, see “Getting Started with Interactive Parallel Mode”.

Moved MDCE Control Scripts

To provide greater consistency across all platforms, the MDCE control scripts for Windows have moved and those for UNIX and Macintosh have new names.

Compatibility Considerations

Windows Utilities Moved. In previous versions of the distributed computing products, the MDCE utilities for Windows computers were located in

```
matlabroot\toolbox\distcomp\bin\win32
```

The utilities are now located in

```
matlabroot\toolbox\distcomp\bin
```

The files that have moved are

```
nodestatus  
mdce  
startjobmanager  
stopjobmanager  
startworker  
stopworker  
mdce_def.bat
```

UNIX and Macintosh Utilities Renamed. In previous versions of the distributed computing products, the MDCE utilities for UNIX and Macintosh computers were called by

```
nodestatus.sh
startjobmanager.sh
stopjobmanager.sh
startworker.sh
stopworker.sh
```

You can now call these with the following commands:

```
nodestatus
startjobmanager
stopjobmanager
startworker
stopworker
```

Note For UNIX and Macintosh, `mdce` and `mdce_def.sh` have not been moved or renamed.

rand Seeding Unique for Each Task or Lab

The random generator seed is now initialized based on the task ID for distributed jobs, or the `labindex` for parallel jobs (including `pmode`). This ensures that the random numbers generated on each worker or lab for a job are unique.

Compatibility Considerations

In previous versions of the distributed computing products, the `rand` function would by default generate the same set of numbers on each worker.

Task ID Property Now Same as labindex

Although you create only one task for a parallel job, the system copies this task for each worker that runs the job. For example, if a parallel job runs on four workers (labs), the `Tasks` property of the job contains four task objects. The first task in the job's `Tasks` property corresponds to the task run by the

lab whose `labindex` is 1, and so on, so that the `ID` property for the task object and `labindex` for the lab that ran that task have the same value. Therefore, the sequence of results returned by the `getAllOutputArguments` function corresponds to the value of `labindex` and to the order of tasks in the job's `Tasks` property.

Compatibility Considerations

In past releases, there was no correlation between `labindex` and the task `ID` property.

Upgrade Distributed Computing Products Together

This version of the Distributed Computing Toolbox is accompanied by a corresponding new version of the MATLAB Distributed Computing Engine.

Compatibility Considerations

As with every new release, you must upgrade both the Distributed Computing Toolbox and the MATLAB Distributed Computing Engine. The toolbox and engine must be the same version to interact with each other.

Version 2.0.1 (R2006a) Distributed Computing Toolbox

This table summarizes what is new in Version 2.0.1 (R2006a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Bug Reports Includes fixes	No

Version 2.0 (R14SP3+) Distributed Computing Toolbox

This table summarizes what is new in Version 2.0 (R14SP3+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes — Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- “Third-Party Schedulers” on page 10
- “Parallel Jobs” on page 10
- “Adding Tasks to Running Jobs” on page 11
- “Engine Process Enhancements” on page 11
- “ErrorIdentifier Changed” on page 13
- “Checkpoint Directory Structure Change” on page 13

Third-Party Schedulers

The Distributed Computing Toolbox now supports the use of third-party schedulers as an alternative to the MathWorks job manager for running jobs and distributing tasks to the cluster.

Parallel Jobs

The Distributed Computing Toolbox and MATLAB Distributed Computing Engine now support parallel jobs. In a parallel job, the tasks running simultaneously on separate machines are able to communicate with each other during their execution.

Adding Tasks to Running Jobs

If you use the MathWorks job manager to run your jobs, you can now add tasks to running jobs. Typically, you would do this inside your task function. After evaluating some data derived during execution of a task, the task can create more tasks based on that data. Because that task is not complete, its job is still running. The task can access its parent job object with the `getCurrentJob` function.

Engine Process Enhancements

Unicast Communications Between Processes

MDCE processes can now use unicast for all their communications. See the `MDCE_DEF` file for information about setting up this configuration, or see the help for the start scripts; for example,

```
startjobmanager -help
startworker -help
```

Remote Startup of MDCE Processes

Once the `mdce` service or daemon is running on all your cluster nodes, you can remotely stop and start worker and job manager sessions on those nodes. Use the `-remotehost` flag on the scripts that start and stop job managers and workers. For more information, use the `-help` flag with the process start and stop scripts, for example,

```
startjobmanager -help
stopjobmanager -help
startworker -help
stopworker -help
```

Using Mapped Drives

You can now start and stop the `mdce` service, job managers, and workers from a mapped drive location. Note that because the worker is installed as a service running under `LocalSystem` by default, it does not have access to mapped network drives.

Monitoring Processes

You can use the `nodestatus` command to display the status of the `mdce` service and the job manager and worker processes that it maintains. You can use `nodestatus` to monitor the local host or any remote host. For example,

```
nodestatus -remotehost node_XYZ
Job manager lookup process:
    Status                                Running

Job manager:
    Name                                   OurJobManager
    Running on host                        node_XYZ
    Number of workers                      2

Worker:
    Name                                   node_XYZ_worker
    Running on host                        node_XYZ
    Status                                  Idle
    Job manager                            OurJobManager
    Connection with job manager            Connected

Worker:
    Name                                   worker2
    Running on host                        node_XYZ
    Status                                  Idle
    Job manager                            OurJobManager
    Connection with job manager            Connected

Summary:
The mdce service on node_XYZ manages the following processes:
    Job manager lookup processes          1
    Job managers                          1
    Workers                                2
```

For a complete list of options, use the `-help` flag with `nodestatus`, for example,

```
nodestatus -help
```


ErrorIdentifier Changed

The ErrorIdentifier string from a canceled task has changed.

Compatibility Considerations

A canceled task now returns the ErrorIdentifier

```
distcomp:task:Cancelled
```

In former releases, it returned

```
dce:task:cancelled
```

Checkpoint Directory Structure Change

This release includes a change to the checkpoint directory structure.

Compatibility Considerations

Because of a change in the structure of the checkpoint directories, the processes (e.g., the job manager) of the MATLAB Distributed Computing Engine Version 2 cannot read the checkpoint directories created by the processes of earlier versions.

Version 1.0.2 (R14SP3) Distributed Computing Toolbox

This table summarizes what is new in Version 1.0.2 (R14SP3):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- “Rapid Simulation (RSim) Target” on page 14

Rapid Simulation (RSim) Target

The Rapid Simulation (RSim) target has been enhanced such that RSim executables do not check out a Simulink license when run by a worker executing a task created by the Distributed Computing Toolbox.

Version 1.0.1 (R14SP2) Distributed Computing Toolbox

This table summarizes what is new in Version 1.0.1 (R14SP2):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	Yes — Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports Includes fixes	No

New features and changes introduced in this version are

- “License Files Upgraded” on page 15
- “-port Flag Not Supported” on page 15

License Files Upgraded

New license files for this release support certain feature name changes.

Compatibility Considerations

Because of feature name changes, old license files do not work with this version of the Distributed Computing Toolbox and the MATLAB Distributed Computing Engine. When upgrading the products from Version 1.0 to Version 1.0.1, you must use updated license files.

-port Flag Not Supported

Control of the ports used by the startjobmanager and startworker scripts has moved into the mdce_def file.

Compatibility Considerations

The -port flag for the startjobmanager and startworker scripts is not supported after Version 1.0 of the MATLAB Distributed Computing Engine.

Version 1.0 (R14SP1+) Distributed Computing Toolbox

This table summarizes what is new in Version 1.0 (R14SP1+):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
New product	No	No	No

Compatibility Summary for Distributed Computing Toolbox

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided with the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version V3.0 (R2006b)	See the Compatibility Considerations subheading for each of these new features or changes: <ul style="list-style-type: none"> • “Moved MDCE Control Scripts” on page 6 • “rand Seeding Unique for Each Task or Lab” on page 7 • “Upgrade Distributed Computing Products Together” on page 8
V2.0.1 (R2006a)	None
V2.0 (R14SP3+)	See the Compatibility Considerations subheading for each of these new features or changes: <ul style="list-style-type: none"> • “ErrorIdentifier Changed” on page 13 • “Checkpoint Directory Structure Change” on page 13
V1.0.2 (R14SP3)	None
V1.0.1 (R14SP2)	See the Compatibility Considerations subheading for each of these new features or changes: <ul style="list-style-type: none"> • “License Files Upgraded” on page 15 • “-port Flag Not Supported” on page 15
V1.0 (R14SP1+)	No