EXata 5.1
Distributed Reference Guide

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Preface

Who Should Read this Guide

EXata 5.1 Distributed Reference Guide describe the system requirements, installation process, compilation, and running EXata on a distributed architecture.

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EXata Document List

The following table shows the EXata Documentation Set and offers a brief description of each document.

Document	Description
EXata API Reference Guide	This guide is a supplement to *EXata Programmer's Guide* and provides detailed information on the EXata API functions and parameters. This is available in both PDF and HTML formats.
EXata Connection Manager User's Guide	This guide provides information on installing and using EXata Connection Manager.
EXata Distributed Reference Guide	This guide provides instructions for running EXata on a distributed architecture.
EXata Documentation Portfolio	The documentation portfolio combines all EXata documents in a single PDF file.
EXata Installation Guide	This guide provides detailed steps for installing EXata on Windows and Linux platforms.

Document	Description
EXata Model Libraries	This set of documents contains detailed reference information on all EXata models and includes the following protocol libraries. See *EXata Model Library Index* for an alphabetical list of all our models and a reference to which library they can be found in. Advanced Wireless Cellular Cyber Developer Federation Interfaces LTE Multimedia and Enterprise Network Management Sensor Networks UMTS Urban Propagation Wireless
EXata Product Tour	This tour provides an introduction to EXata by means of an example.
EXata Programmer's Guide	This is a guide to the EXata programming interface and functions, allowing users to develop and customize protocol models.
EXata Release Notes	This document lists the changes (added and removed features, bug fixes, etc.) made in the current version of EXata with respect to the previous version.
EXata Statistics Database User's Guide	This is a guide to the statistics database generated by EXata.
EXata User's Guide	This is a detailed guide for using *EXata* and works in combination with the *EXata Model Libraries* set of documents.

Document Conventions

EXata documents use the following conventions:

Convention	Description
Book Title	Title of a document.
`Command Input`	A command name or qualified command phrase, daemon, file, or option name.
`Command Output`	Text displayed by the computer.
Note: or **Notes:**	Information of special interest.
[ ]	In syntax definitions, square brackets indicate items that are optional.
`Code Segment`	Segment of code from EXata source files used for illustration.
`Added Code`	Example of code that the user should add to existing EXata functions and declarations to add a custom model to EXata. A vertical margin in the left column indicates new lines of code that need to be added.
Ellipses (. . .)	Ellipses are used to indicate lines of code from EXata source files that have been omitted from an example for the sake of brevity.

More Information

- For general information about SCALABLE, visit the company website at www.scalable-networks.com.
- For more information on EXata, please contact EXata Sales at info@scalable-networks.com or visit the EXata website at www.exata.com.
- For technical help on EXata or help on EXata documentation, please contact EXata Support at support@scalable-networks.com or visit our Support website at support.scalable-networks.com.

EXata for Distributed Architectures

This document covers the system requirements, compiling, and running EXata on distributed architectures.

Notes: 1. Information contained in this document is supplemental to the information contained in *EXata Installation Guide.* For help with installing and running EXata on distributed architectures, users should also refer to *EXata Installation Guide.*

2. In the rest of the document, we will use the term Distributed EXata when referring to EXata running on distributed architectures.

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1 System Requirements

The requirements to run Distributed EXata are listed in Table 1. (These requirements are in addition to the general requirements for running EXata listed in *EXata Installation Guide.*)

TABLE 1.   Requirements for Distributed EXata

Item	Requirements
Linux Distribution	CentOS 5.9, 64-bit version or Red Hat Enterprise Linux 5.9, 64-bit version **Note:** Other 64-bit Linux distributions with glibc 2.5 with gcc 4.1 may also work.
OFED	OpenFabrics Enterprise Distribution (OFED) 1.5 with Open MPI or MVAPICH

TABLE 1. Requirements for Distributed EXata (Continued)

Item	Requirements
Network	Ethernet (with OpenMPI of OFED 1.5) or Infiniband interconnect (with OpenMPI or MVAPICH of OFED 1.5)
Expat Library	Expat library for the Linux distribution
C Compiler	gcc 4.1
C++ compiler	g++ (Gnu C++ compiler)

2 Installing Distributed EXata

The capability to run on distributed architectures is inherent in standard EXata. Refer to *EXata Installation Guide* for instructions for installing EXata on Linux platforms.

> **Note:** If EXata is already installed on your system, you do not need to reinstall EXata to run it on distributed architectures. However, you must recompile EXata to build the binary for distributed execution, as described in Section 5.

3 Installing Third-Party Software

Distributed EXata requires the expat development library, a C/C++ compiler, and OpenFabrics Enterprise Distribution (OFED) to compile. This section describes how to install the required software.

3.1 Expat Development Library

The expat development library is needed to compile EXata on Linux systems.

Install the expat development library from the Linux installation media or download site. Consult your system administrator for help with installing the expat development library.

3.2 C/C++ Compiler

To compile Distributed EXata, gcc 4.1 and C++ compiler (g++) are required.

Install gcc 4.1 from the Linux installation media or download site. Consult your system administrator for help with installing gcc.

Most gcc installations include g++. If g++ is not included, then install the version of g++ compatible with gcc 4.1. Consult your system administrator for help with installing g++.

3.3 OpenFabrics Enterprise Distribution (OFED)

Distributed EXata requires OFED 1.5 to be installed. OFED 1.5 has three MPI flavors: MVAPICH, MVAPICH2, and OpenMPI. EXata supports only MVAPICH and OpenMPI.

Install the version of OFED 1.5 appropriate for your system from http://openfabrics.org.

- For clusters connected by Ethernet, only OFED 1.5 with OpenMPI can be used.
- For clusters connected by InfiniBand, OFED 1.5 with either MVAPICH or OpenMPI can be used.

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4 Configuring OFED

OFED comes with multiple flavors of MPI. To configure OFED for Distributed EXata, you must select an MPI flavor as the default MPI. OFED provides an application called mpi-selector to allow the user to select a default flavor. To use mpi-selector to set an MPI flavor as the default, do the following:

1. Determine which MPI flavors are installed by typing the following command:

```
mpi-selector --list
```

This displays the list of MPI flavors supported by the OFED distribution. For example, the following list is displayed for OFED 1.5:

```
mvapich2_gcc-1.2p1
mvapich_gcc-1.1.0
openmpi_gcc-1.2.8
```

EXata only supports the last two MPI flavors (MVAPICH and OpenMPI).

2. Check which MPI flavor is set as the current default by typing the following command:

```
mpi-selector --query
```

This displays the default MPI flavor. For example, the following output is displayed if MVAPICH is the default MPI flavor with user level privileges:

```
default mvapich_gcc-1.1.0
level: user
```

3. To select an MPI flavor as the default or change the default flavor, do the following:

To select MVAPICH as the default MPI flavor, type the following command:

```
mpi-selector --set mvapich_gcc-1.1.0
```

To select OpenMPI as the default MPI flavor, type the following command:

```
mpi-selector --set openmpi_gcc-1.2.8
```

4. Start a new shell, or log out and log in again. (mpi-selector sets the default for future sessions but does not change the current shell.)

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5 Compiling Distributed EXata

To compile Distributed EXata, perform the following steps:

1. Open a command window.

2. Select an MPI flavor as the default using mpi-selector, as described in Section 4.

3. Go to EXATA_HOME/main directory.

4. EXATA_HOME/main includes makefiles for different combinations of glibc and gcc versions and MPI flavors (see Table 3-1). Make a copy of the appropriate makefile.

    For example, for Red Hat Enterprise Linux 5.9 with OpenMPI, use the following command to make a copy of the makefile:

    ```
    cp Makefile-linux-x86_64-glibc-2.5-openmpi-ofed1.5 Makefile
    ```

    Notes: 1. To check the version of gcc installed on your system, type the following command in a command window: `gcc -v`.

    2. To check the version of glibc installed on your system, type one the following commands in a command window:

        • For Debian-based distributions (such as Ubuntu): `dpkg -s libc6`

        • For the other Linux distributions: `rpm -q glibc`

TABLE 3-1.   Makefiles for Distributed EXata

Linux Distribution	glibc Version	gcc Version	MPI Flavor	Makefile
CentOS 5.9, 64-bit version or Red Hat Enterprise Linux 5.9, 64-bit version	2.5	4.1	OpenMPI	Makefile-linux-x86_64-glibc-2.5-openmpi-ofed1.5
CentOS 5.9, 64-bit version or Red Hat Enterprise Linux 5.9, 64-bit version	2.5	4.1	MVAPICH	Makefile-linux-x86_64-glibc-2.5-mvapich-ofed1.5

5. Compile EXata by using the following command (it takes several minutes for EXata to compile):

    ```
    make
    ```

    This creates the EXata executable in the EXATA_HOME/bin directory. For Distributed EXata, the executable is called exata.mpi.

    To recompile EXata, run `make` again. However, it is sometimes useful to delete all object files before recompiling. Use the following commands to remove all object (.o) files and recompile:

    ```
    make clean
    make
    ```

Note: Use the `make clean` and `make` commands when compiling Distributed EXata for the first time.

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6 Running Distributed EXata

This section describes how to run Distributed EXata from the command line and from EXata GUI.

6.1 Running Distributed EXata from the Command Line

To run Distributed EXata, use the following command:

```
mpirun -np <N> -hostfile <host-file> exata.mpi <input-file>
```

where

`<N>`	Number of processors to run EXata on
`<host-file>`	Name of the host file which lists the computers to be used. The format of this file is described below.
`<input-file>`	Name of the configuration file

Note: The same MPI flavor should be used as the default when compiling Distributed EXata (see Section 5) and when running Distributed EXata.

Format of the Host File

Create a host file that lists the hosts in your cluster or network. Each host name appears on a line by itself and is repeated as many times as the number of processors it has.

Note: The format of the basic host file for all MPI implementations is the same as described here. However, each MPI implementation may have advanced options for the host file. Refer to the OFED 1.5 documentation for a description of the advanced options.

Example

The following is an example host file that lists four hosts with two processors each:

```
host1
host2
host3
host4
host1
host2
host3
host4
```

6.2 Running Distributed EXata from the GUI

To run Distributed EXata from the EXata GUI, perform the following steps:

1. Open the **Run Settings** dialog by pressing the **Run Settings** button (see Figure 1).

FIGURE 1.   Run Settings Button

2. In the **Run Settings** dialog window that opens, set the parameters for distributed execution.

    - For running EXata locally, do the following:
        a. Select the **Local Execution** radio button.
        b. Enter a value in the **Number of Processors** field.
        c. Check **Distributed Run Mode**.
        d. In the **Host File** field, specify the name of the host file that lists the computers to be used. See Section 6.1 for the format of the host file.

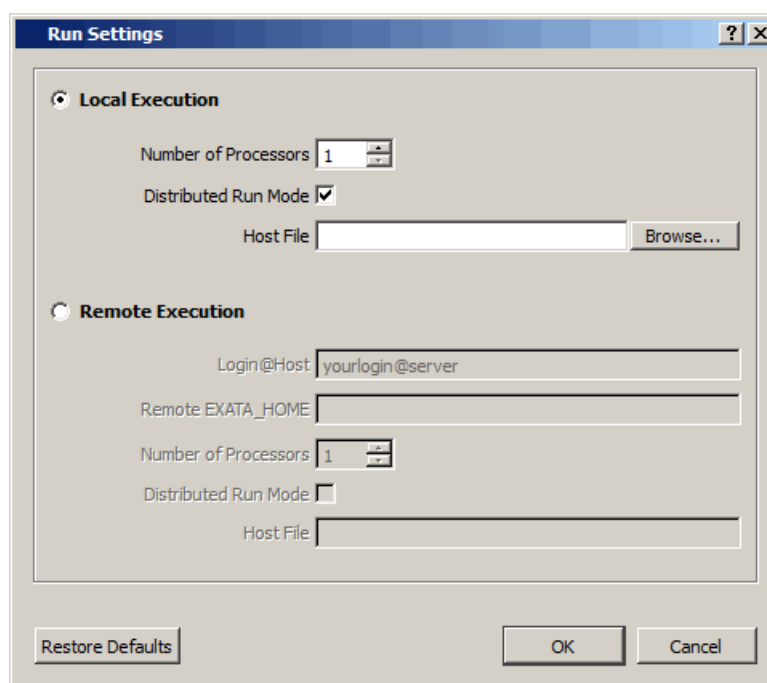**FIGURE 2.   Run Settings Local Execution**

    - For running EXata remotely, do the following:
        a. Select the **Remote Execution** radio button.
        b. In the **Login@Host** field, enter the login name and the host machine.
        c. In the **Remote EXATA_HOME** field, specify the directory where EXata is installed on the host.
        d. Enter a value in the **Number of Processors** field.
        e. Check **Distributed Run Mode**.

f. In the **Host File** field, specify the name of the host file that lists the computers to be used. See Section 6.1 for the format of the host file.
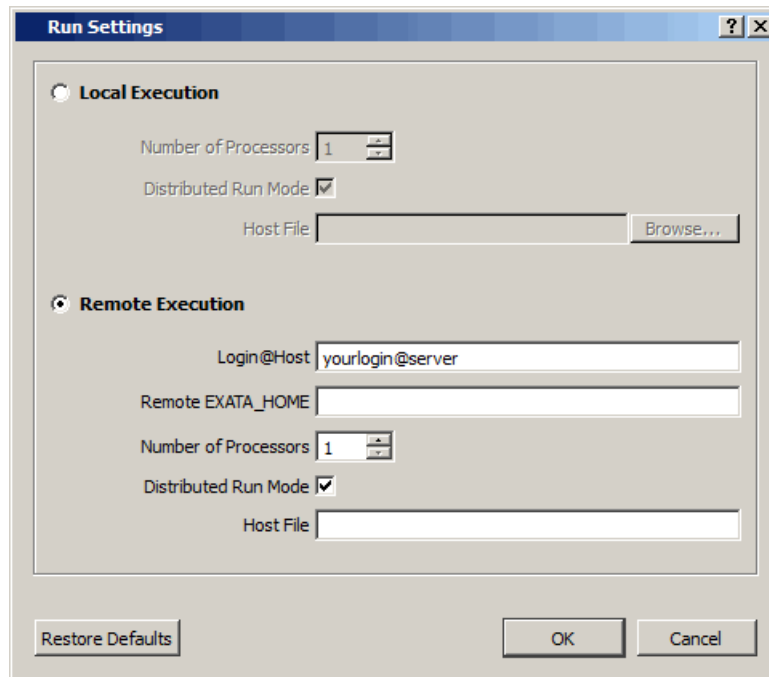

FIGURE 3.   Run Settings for Remote Execution

7. Click **OK** to save the changes.

8. Run EXata by clicking the **Run Simulation** button.

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7 Helpful Links

- Helpful information on installation is available in the **Installation & Startup** section of **Community Forums**, which are accessible from the following URL:

    http://www.scalable-networks.com/boards

    Community Forums require a free registration for access.

- You can also get help with common installation and licensing issues at the FAQ page:

    http://www.scalable-networks.com/snt-support/index.php?_m=knowledgebase&_a=view