Getting Started with Cloudscape

Cloudscape Version 3.0
December 15, 1999
Getting Started with Cloudscape

Welcome to Cloudscape! Cloudscape is a Java- and SQL-based object-relational database management system (ORDBMS). Cloudscape can be deployed in a number of different ways:

- Embedded in a single-user Java application. Cloudscape can be practically invisible to the user, since it requires no administration and runs in the same Java virtual machine (JVM) as the application.
- Embedded in a multi-user application such as a Web server, an application server, or a shared development environment.
- Embedded in a server framework, either one of your own choice or one available from Cloudscape: RmiJdbc or the full-featured Web and JDBC server, Cloudconnector.
- Deployed in a distributed system in which multiple, occasionally connected, applications have their own copies of the Cloudscape engine. Cloudscape can periodically connect to a central hub version of Cloudscape (called Cloudsync) to submit and receive updates.

This document helps you get started immediately after installation, describes Cloudscape’s set of products and the deployments they support, helps you set the class path correctly, and points you to our examples and sample database. Using the examples and sample database will help you begin developing Cloudscape databases and applications.

The sections of this document are:

- “The Cloudscape Product Line” on page 4
- “Getting Started Road Map” on page 5
- “Cloudscape Documents” on page 16
- “Start Programming with the Examples” on page 17
- “What’s New in Version 3.0?” on page 18
- “What’s New in the Version 3.0 Documentation?” on page 22
- “Contacting Cloudscape Technical Support” on page 23
The Cloudscape Product Line

Cloudscape offers the following products for development and deployment:

- **Cloudscape 3.0**
  Cloudscape is the core product. Cloudscape (without any of the Cloudscape options) allows you to build the following types of applications:
  - Applications with Cloudscape as a built-in, zero-administration data manager for single-user applications. To deploy these applications, you must purchase single-user deployment licenses.
  - Applications with Cloudscape as a built-in data manager for multiple-user application servers. In addition, Cloudscape comes with a lightweight server framework called RmiJdbc, which you can use with applications of this type. A customized version of a freeware product, it provides limited server framework capabilities. Cloudscape includes row-level locking, but the application servers must provide their own network security. To deploy these applications, you must purchase deployment licenses for multiple users.
  - Applications that are target databases in a distributed synchronization system (you must purchase the Cloudsync Option for a complete system, which needs the source database capability).

- **Cloudconnector Option**
  A full-featured server framework add-on that provides JDBC and HTML connectivity for Cloudscape. It allows you to develop and deploy client/server applications that connect to Cloudscape over the network. The framework supports multiple users or a connection pool and can also act as a Web server that allows you to run Cloudscape in a servlet. It provides security of access to JDBC clients; servlet use of Cloudscape is protected by servlet registration requirements.
  To deploy the server and client applications, you must purchase the multiple user deployment licenses.

- **Cloudsync Option**
  Cloudscape with synchronization source capability. Use it to develop and deploy distributed systems for multiple applications in which Cloudscape is embedded for local data management. These applications can occasionally connect to a source Cloudscape hub, which synchronizes data across the system.
  To deploy these applications, you must purchase deployment licenses.
Getting Started Road Map

Here’s a road map of tasks to perform for getting started.

Users on Windows platforms who simply want to start utilities from the Start menu can skip some steps, because it automatically installs a JRE, which is a runtime version of a JVM. Those steps are indicated with an asterisk (*). Users who want to develop applications should not skip any steps.

1. Install a JVM of 1.1.1 or Higher.*
2. Set the PATH Environment Variable for the JVM.*
4. Set the CLOUDSCAPE_INSTALL Environment Variable.
5. Set the Class Path.
6. Set Path to Use the Tools and Startup Utilities (Windows or UNIX).*
7. Browse the Cloudscape Documents.
8. Bring up Cloudview Against a Sample Database.
10. Read and do the lessons in Learning Cloudscape: The Tutorial.
11. If you are a previous customer, read “What’s New in Version 3.0?” on page 18 and “What’s New in the Version 3.0 Documentation?” on page 22

Install a JVM of 1.1.1 or Higher

Before you use the Cloudscape software, you need to install a JDK or a JVM. (The Windows installer installs a JRE, a runtime version of a JDK, and so you can skip this step if you like.) The following list shows the JDK version required by the various Cloudscape products:

- Cloudscape engine and ij (an SQL scripting tool)
  JDK 1.1.1 or greater
- Cloudscape using disk encryption, JDBC 2.0 and its extensions, or JTA:
  JDK 1.2 or greater
- Cloudview (a graphical user interface)
  JDK 1.2 or greater

It is possible to use Cloudview with a 1.1 JDK (1.1.6 or higher). To do so, you must download an extra library (swingall.jar) from the Cloudscape
Getting Started with Cloudbase

Web site and place it in the class path. You can download this library from http://www.cloudbase.com/support/Downloads/.

For complete information about Cloudbase and platforms, see the release notes.

- RmiJdbc server framework
  JDK 1.1 or greater
- Cloudconnector server framework
  JDK 1.1 or greater

See http://www.javasoft.com/products/jdk/1.1/index.html if you need to install a JDK. Be sure to follow the full installation instructions, which require that you update the PATH and CLASSPATH environment variables.

Set the PATH Environment Variable for the JVM

NOTE: This instruction repeats one of the basic steps in installing a JVM. We are repeating it here to make sure you don’t miss it!

If you haven’t done so already, set your PATH environment variable so that the JVM and Java applications run correctly.

Add the bin subdirectory of the JDK directory to the beginning of the path. For example, if the directory is C:\JDK1.1.7, add C:\JDK1.1.7\bin to the beginning of the path.

The PATH variable enables your operating system to find the appropriate executables from any directory. If you have more than one JDK installed, the JDK you wish to use must appear before any of the others in the PATH variable.

Testing Your Path

Here’s a test you can run to make sure you set the path correctly.

In a command window, try the following command:

```
java
```

If the path is set correctly, you will see a printout telling you how to use the java command.
Read the Release Notes

Read the Cloudscape release notes for late-breaking installation information. The release notes are inside the cloudscape base directory, the directory in which you installed the software.

Set the CLOUDSCAPE_INSTALL Environment Variable

The installation program asked you to choose a base directory; we recommend that you name it cloudscape. This document refers to that directory as the cloudscape base directory.

If your operating system supports it, create an environment variable called CLOUDSCAPE_INSTALL. On some operating systems, the installer may have already have created this variable for you. Set the value of this variable to the path of the cloudscape base directory.

Set the Class Path

The class path tells the JVM and other Java applications where to find class libraries.

There are two ways to set the class path:

- Set the operating system’s CLASSPATH environment variable, either permanently or temporarily (in a particular command window).
- Set the class path with the runtime option (specifying the class path at the time you start your Java application and the JVM).

In most development environments, it works best to set the environment variable temporarily with a script. Run such a script every time you open a new command window.

For instructions on how to set the environment variable permanently (on the system level), see “Setting the CLASSPATH Environment Variable at the System Level” on page 11.

Regardless of which method you choose, you need to know which libraries to include:

- “Cloudscape Libraries” on page 8
Getting Started with Cloudscape

The Cloudscape documentation uses some specialized terms. Here are some definitions that will help you understand Cloudscape:

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>environment</td>
<td>How your application interacts with Cloudscape. Sometimes referred to as a framework. The two environments are embedded environment and client/server environment.</td>
</tr>
<tr>
<td>embedded environment</td>
<td>When an application starts up an instance of Cloudscape within its JVM, the application is said to run in an embedded environment. In this environment, only a single application can access a database at one time, and no network access occurs.</td>
</tr>
<tr>
<td>client/server environment</td>
<td>When multiple applications connect to Cloudscape over the network, they are said to run in a client/server environment. Cloudscape runs embedded in a server framework that allows multiple network connections. (The framework itself starts up an instance of Cloudscape and, strictly speaking, it is running in an embedded environment; the client applications, however, are not.)</td>
</tr>
</tbody>
</table>

**NOTE:** Most users who are just getting started with Cloudscape work with it in an embedded environment.

### Cloudscape Libraries

Add the appropriate items to class path. Paths shown are relative to the cloudscape base directory ($CLOUDSCAPE_INSTALL or %CLOUDSCAPE_INSTALL%):

- **the primary Cloudscape library (lib/cloudscape.jar or lib/cloudsync.jar)**
  The primary Cloudscape library is the library that provides the database engine itself; it is either cloudscape.jar or cloudsync.jar. You always need this library for embedded environments. For client/server environments, you need this library on the server only.
  See Table 1, “Primary Cloudscape Libraries (put only one in the class path)” for details on when to use a particular library. Be sure to have only one of the libraries in your class path.

- **the license library (lib/license.jar)**
  For users of the thirty-day evaluation copy only. You do not need this library if you have purchased a Cloudscape product. If you have the thirty-day evaluation version of Cloudscape but neglect to add license.jar to your class path, you will get an error.
Getting Started Road Map

- **the client Cloudscape library (lib/client.jar)**
  Only for JDBC client applications in a client/server environment. This library is not needed for non-JDBC clients such as servlet clients.

- **the server framework libraries**
  The server libraries on the servers, the client libraries on the clients. See Table 2, “Libraries for Different Connectivity Options”.

- **the tools library (lib/tools.jar) if you want to use the Cloudscape tools**
  For embedded environments, you need this library in the class path to use the tools. For a client/server environment, you need this library on the client only.

- **the sample database and application libraries (demo/programs/tours)**
  For embedded environments; for a client/server environment, on both the client and the server.

- **the current directory (.)**

**NOTE:** If you want to work in a client/server environment and are just getting started, include all the necessary client and server libraries in your class path to make it easier to get started.

**Table 1** Primary Cloudscape Libraries (put only one in the class path)

<table>
<thead>
<tr>
<th>Product</th>
<th>Use</th>
<th>Library Name</th>
<th>Path from the cloudscape base directory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloudscape</td>
<td>For non-synchronization systems</td>
<td>cloudscape.jar</td>
<td>lib/cloudscape.jar</td>
</tr>
<tr>
<td>Cloudsync</td>
<td>For target or source databases in a synchronized system.</td>
<td>cloudsync.jar</td>
<td>lib/cloudsync.jar</td>
</tr>
</tbody>
</table>

A Note on Setting Class Path

Cloudscape provides scripts to help you get started setting class path in the /bin subdirectories in each of the frameworks directories in %CLOUDSCAPE_INSTALL%/frameworks. These scripts have names that reflect their environment; for example, setEmbeddedCloudscapeCP (in %CLOUDSCAPE_INSTALL%/frameworks/embedded/bin) helps you get started setting class path for an embedded environment. These scripts come in two flavors: one for Windows environment (this file ends with .bat) and one for UNIX environments (this file ends with .ksh). For users working in those environments, copying the commands in this file will help you get started setting the class path. Note that you may need to add the license.jar file because this file does not appear in the scripts.

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NEW: The requirement to use cloudsync.jar for target databases is new in Version 3.0. In prior versions, cloudscape.jar supported target databases. Now cloudscape.jar supports only non-synchronization databases.

Table 2 Libraries for Different Connectivity Options

<table>
<thead>
<tr>
<th>Server Framework</th>
<th>Server Library</th>
<th>Client Library</th>
</tr>
</thead>
<tbody>
<tr>
<td>RmiJdbc Server</td>
<td>frameworks/RmiJdbc/classes/RmiJdbc.jar</td>
<td>frameworks/RmiJdbc/classes/RmiJdbc.jar</td>
</tr>
<tr>
<td>(customized framework provided with Cloudscape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloudconnector</td>
<td>frameworks/cloudconnect/classes/</td>
<td>frameworks/cloudconnect/classes/</td>
</tr>
<tr>
<td></td>
<td>frameworks/cloudconnect/lib/weblogicaux.jar</td>
<td>frameworks/cloudconnect/lib/weblogicaux.jar</td>
</tr>
<tr>
<td></td>
<td>frameworks/cloudconnect/license</td>
<td>frameworks/cloudconnect/license</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

About the Versions of Cloudscape Libraries

The Cloudscape libraries must be “in version” with one another. For example, you cannot use cloudscape.jar version 3.0.0 and tools.jar version 3.0.1. If your versions do not match, you may get unexplained and confusing errors in your programs.

You can use Cloudscape’s sysinfo tool to check the versions of Cloudscape products.

    java COM.cloudscape.tools.sysinfo

The following excerpt from near the end of sysinfo’s output indicates a problem, because there are two different version numbers:

    ---------------Cloudscape Info-------------------
    [d:\cloudscape\cloudscape.jar] version 3.0.0 #8648
    [d:\cloudscape\tools.jar] version 3.0.1 #8688
    [License Type] Development. Valid.
    --------------------------------------------------------

Additional Libraries

Some special Cloudscape features require that you install additional libraries and place them in your class path:

- Disk encryption
  You must install the 1.2 version of the standard JCE package. For more information, see the Cloudscape Developer’s Guide.
• LDAP or NIS+ user authentication
  You need additional libraries. For specific library information, see the Cloudscape Developer’s Guide.

• JTA
  You need additional libraries. For specific library information, see the Cloudscape Reference Manual.

• JDBC 2.0 Extensions
  You need additional libraries. For specific library information, see the Cloudscape Reference Manual.

• Cloudview, if you want to use a pre-1.2 JDK (JDK 1.1.6 or higher)
  You will need `swingall.jar` (see “Install a JVM of 1.1.1 or Higher” on page 5). Put this library ahead of any Cloudconnector libraries in your class path.

### Setting the CLASSPATH Environment Variable at the System Level

#### Windows NT

On Windows NT, set the CLASSPATH environment variable with the System Control Panel.

1. Start the System tool from the Control Panel, select the Environment tab, and select the CLASSPATH user variable. If one does not already exist, create a new user variable called CLASSPATH.

2. Add the appropriate text to the beginning of the CLASSPATH user variable definition.
   
   For example:

   ```
   %CLOUDSCAPE_INSTALL%/lib/cloudscape.jar;
   %CLOUDSCAPE_INSTALL%/lib/tools.jar;
   %CLOUDSCAPE_INSTALL%/demo/programs/tours;;
   ```

   assuming that you are not deploying a source synchronization database.

3. Click Set, click Apply, and close the System Control Panel.

#### Windows 95 or Windows 98

On Windows 95 or Windows 98, you add or alter the CLASSPATH setting by adding or altering the text in your `autoexec.bat` file.
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If the variable is already set, add the following text to the beginning of the definition for the variable:

```
%CLOUDSCAPE_INSTALL%\lib\cloudscape.jar;
%CLOUDSCAPE_INSTALL%\lib\tools.jar;
%CLOUDSCAPE_INSTALL%\demo\programs\tours;;
```

assuming that you are not deploying a source or target synchronization database.

If the variable is not already set, add the following text to the file:

```
SET CLASSPATH=%CLOUDSCAPE_INSTALL%\lib\cloudscape.jar;
%CLOUDSCAPE_INSTALL%\lib\tools.jar;
%CLOUDSCAPE_INSTALL%\demo\programs\tours;;
```

When setting environment variables such as CLASSPATH in Windows 95, users sometimes get a message like “Not enough environment space.”

To enlarge the environment space, set the following command in the `CONFIG.SYS` file:

```
SHELL=C:\Windows\COMMAND.COM /P /E:4096
COMMAND.COM is found in the Windows installation direction (usually C:\windows).
```

- `/P` means to leave `COMMAND.COM` running between commands (don’t exit when the user issues the `dir` command).
- `/E:` signifies how much environment space to reserve for each process. 4K is usually enough.

Restart the machine.

UNIX Systems

On UNIX systems, alter the value of the CLASSPATH setting or create it if it does not exist in your `.login` or `.profile` file.

- **On Solaris or Linux for ksh/sh:**

  ```
  CLASSPATH=${CLOUDSCAPE_INSTALL}/lib/cloudscape.jar:
  ${CLOUDSCAPE_INSTALL}/lib/tools.jar:
  ${CLOUDSCAPE_INSTALL}/demo/programs/tours:
  .:${CLASSPATH}
  export CLASSPATH
  ```

- **On Solaris or Linux for csh, and on HP and AIX:**

  ```
  setenv CLASSPATH ${CLOUDSCAPE_INSTALL}/lib/cloudscape.jar:
  ${CLOUDSCAPE_INSTALL}/lib/tools.jar:
  ${CLOUDSCAPE_INSTALL}/demo/programs/tours:
  .:${CLASSPATH}
  ```
NOTE: You can find information for other platforms at www.cloudscape.com/support/TechInfo.
### Testing Your Class Path

Cloudscape provides a tool to help you test your class path for your environment. You run the utility like this:

```
java COM.cloudscape.tools.sysinfo -cp arguments
```

Provide arguments as follows:

- **the environment** (required, choose one of the following):
  - embedded
  - RmiClient
  - RmiServer
  - CloudconnectorClient
  - CloudconnectorServer
- **tools** (optional)
  looks for the libraries for using the Cloudscape tools
- **sampleApp** (optional)
  looks for the libraries for using the sample application
- **sync** (optional)
  looks for the libraries for using Cloudscape synchronization (needed only on the server if it is a client/server environment)
- **anyClass.class** (optional)
  looks for any class that you specify

The utility provides a message indicating success or failure and lists the missing libraries if there are any.

For example, to test an embedded environment, using the tools and the sample application:

```
java COM.cloudscape.tools.sysinfo -cp embedded tools sampleApp
```

To test an RmiJdbc client environment using the tools and to test for the class *CloudscapeSimpleApp*:

```
java COM.cloudscape.tools.sysinfo -cp RmiClient tools CloudscapeSimpleApp.class
```
Set Path to Use the Tools and Startup Utilities (Windows or UNIX)

The /bin subdirectories in environment-specific directories in the frameworks directory contain scripts for running some of the Cloudscape tools and utilities.

**NOTE:** These scripts serve as examples to help users on all platforms get started with these tools and utilities. However, they may require modification in order to run properly even on Windows or UNIX platforms.

- `/%CLOUDSCAPE_INSTALL%/frameworks/embedded/bin` contains scripts for working in an embedded environment.
- `/%CLOUDSCAPE_INSTALL%/frameworks/RmiJdbc/bin` contains scripts for working in a client/server environment using the simple framework RmiJdbc.
- `/%CLOUDSCAPE_INSTALL%/frameworks/cloudconnect/bin` contains scripts for working in a client/server environment using Cloudconnector. (Directory is present if you have installed Cloudconnector.)

On a Windows or UNIX platform, add the appropriate /bin directory to your path to use shortened commands to start the Cloudscape tools.

Users on UNIX platforms need to turn on the execute bit for these files. For example:

```bash
chmod +x fileName
```

If You Had Problems Installing, Send Information to Cloudscape

If you encountered any problem using the installation program, make a careful note of any error messages. Then run the utility `COM.cloudscape.tools.sysinfo` to display system and product configuration.

```bash
java COM.cloudscape.tools.sysinfo
```

Send mail including the error message and output of `sysinfo` to `installhelp@cloudscape.com`.

**Cloudscape Version 3.0**
Cloudscape Documents

The Cloudscape installation provides you with a complete documentation set. Read about the documentation in *Using the Cloudscape Documentation*.

Bring up Cloudview Against a Sample Database

/demo/databases contains a pre-built version of the Cloudscape sample database, called *toursDB*.

**NOTE:** Cloudview works best in a JDK 1.2 environment. Use JDK 1.2 if available.

Users in Windows environments start Cloudview against the sample database as follows:

1. From the Start menu, choose Programs->Cloudscape->ToursDB Demo.

Users in UNIX environments start Cloudview against the sample database by following these steps:

1. Open a command window.
2. Change directories to the /demo/databases subdirectory of the cloudscape base directory.
3. Type `cview`.
4. Choose File->Open by Name, and type *toursDB*.
5. Click OK.

Users in other environments can start Cloudview against the sample database by following these steps:

1. Open a command window.
2. Change directories to the /demo/databases subdirectory of the cloudscape base directory.
3. Type:
   ```
   java -ms32M -mx32M COM.cloudscape.tools.cview toursDB
   ```
Start Programming with the Examples

• “Simple Examples” on page 17
• “A More Complex Example: The JBMSTours Tutorial” on page 18

Simple Examples

• “Simple” on page 17
• “Synchronization” on page 17

Simple

demo/programs/simple contains a simple Java application, along with step-by-step instructions for compiling and running it. It illustrates basic tasks such as:

• starting Cloudscape, loading the Cloudscape JDBC driver
• running in an embedded or a client/server environment (RmiJdbc or Cloudconnector)
• establishing a connection
• turning off auto-commit
• creating a table
• inserting and selecting data
• disconnecting
• shutting down Cloudscape

In this directory, the file demo/programs/simple/example.html contains the instructions for compiling and running the application.

Synchronization

Users who install Cloudsync get an application that illustrates the features of this product.

• demo/programs/synchronization illustrates Cloudscape synchronization. This example/link is available only if you have purchased and installed Cloudsync.
A More Complex Example: The JBMSTours Tutorial

demo/programs/tours contains a complete sample application that builds and runs against the sample database, toursDB. The application consists of the Java package JBMSTours.

Learning Cloudscape: The Tutorial takes you step-by-step through building the database and then running queries and applications against it.

You can use the pre-built version of the database as well. From Cloudview, you can browse its data and dictionary objects and enter queries and other SQL-J statements from its SQL window.

In addition, you can do some of the lessons as stand-alone examples. These examples include:

- storing images in the database
- creating a servlet
- creating a JDBC applet
- accessing external data through Cloudscape’s Virtual Table Interface

What’s New in Version 3.0?

For previous customers, this section tells you what is new in the current version. For late-breaking features and information, be sure to read the release notes.

For information about upgrading databases, see the Cloudscape Developer’s Guide.

See the release notes for details about changes that might affect existing applications.

Core Features

J2EE Compliance and JDBC 2.0 Features

- JTA support (see the Cloudscape Reference Manual).
- Support for a subset of JDBC 2.0 features including batch processing (see the Cloudscape Reference Manual).
What's New in Version 3.0?

- Full `CallableStatement` support, including OUTPUT parameters and full IN/OUT parameters (see the Cloudscape Reference Manual).
- Support for a subset of `javax.sql` JDBC 2.0 extensions (including `DataSource` and `ConnectionPool`). (See the Cloudscape Reference Manual)
- JDBC 2.0 `getXXX/setXXX` support on `ResultSet`, `PreparedStatement`, and `CallableStatement` (no support for new types `Clob`, `Blob`, `Ref`, `Struct`).
- Scrolling insensitive cursors (see the Cloudscape Reference Manual and the Cloudscape Developer’s Guide).

SQL

- The ability to recompile all invalid statements (see ALTER STATEMENT in the Cloudscape Reference Manual).
- Triggers (see CREATE TRIGGER in the Cloudscape Reference Manual).
- Column defaults (see CREATE TABLE in the Cloudscape Reference Manual).
- The ability to create a stored prepared statement that is not compiled until you use it (see CREATE STATEMENT in the Cloudscape Reference Manual).

Java Extensions to SQL

- Class aliases (see CREATE CLASS ALIAS in the Cloudscape Reference Manual).
- Built-in class aliases for built-in classes, including:
  - `FileImport`
  - `FileExport`
  - `PropertyInfo`
- Orderable and indexable Java objects (UNION, ORDER BY, GROUP BY, DISTINCT, MAX, MIN, comparison operators, indexes and constraints) (see the Cloudscape Reference Manual).
- Validity checking for method alias creation (see the Cloudscape Reference Manual).
- User-defined aggregates (see CREATE AGGREGATE in the Cloudscape Reference Manual).
• Improved handling of null references in method calls (see the Cloudscape Reference Manual).

Miscellaneous

• Allow any join order for joins with ExternalVirtualTables.
• Upgrade path for RunTimeStatistics objects.
• Utility to make it easier to create and maintain user authorization lists (see the Cloudscape Developer’s Guide).
• getEstimatedRowCount method for RunTimeStatistics.

New Administrative Tools

• Lock diagnostics (see the Cloudscape Server and Administration Guide)
• Consistency checker (see the Cloudscape Server and Administration Guide)
• Backup utility (see the Cloudscape Server and Administration Guide)

Performance Improvements

• MAX() optimization (see Tuning Cloudscape).
• Costing information for VTIs (see Tuning Cloudscape).
• Fast load of bulk data on published tables and Fast load when replacing existing data (see the Cloudscape Tools and Utilities Guide)
• The ability to override row-level locking for a table when you create it (see CREATE TABLE in the Cloudscape Reference Manual)
• Automatic recompilation of stale statements (see Tuning Cloudscape).
• Multiple columns allowed as hash keys in hash joins, improved hash joins, VTIs allowed in hash joins.
• Actual deadlock detection and lock wait timeout (see the Cloudscape Developer’s Guide).
• Ability to put log on separate device (see the Cloudscape Server and Administration Guide).
• Concurrent insert improvements (reduced lock contention).
Connectivity Features

RmiJdbc

- Easier-to-use driver and protocol (see the Cloudscape Server and Administration Guide).
- Support for JDBC 2.0.

Cloudscape Tools Features

Cloudview

Support for many new features.

ij

For more information, see the Cloudscape Tools and Utilities Guide.

- New commands to support scrolling-insensitive result sets.
- The ability to provide a user name and password with the Connect request.
- The ability to create read-only connections.

Cloudconnector Features

For more details, see the Cloudscape Server and Administration Guide.

- Support for JDK 1.2.

Synchronization Features

For more details about any of these features, see the Cloudscape Synchronization Guide.

- Support for automatic upgrade of synchronization databases from 2.0 to 3.0.
- Ability to convert non-synchronization databases to source databases.
- Synchronization integrity features preserve system integrity when:
- Databases are recovered.
- Sources or targets are improperly copied.
- Support for bulk insert on published tables.
- The ability to force targets use only work units for synchronization for security and to prevent ad hoc SQL synchronization.
- Ability to set target database properties directly.
- New publication dictionary items:
  - class aliases
  - triggers
  - aggregates
- Application debugging of failed transactions (new VTIs for extracting information about failed transactions).
- Improved performance.

**What’s New in the Version 3.0 Documentation?**

- “New Books” on page 22
- “Changes to Existing Books” on page 22
- “Changes to Sample Database and Application” on page 23

**New Books**

There’s a tiny new book called *Using the Cloudscape Documentation*.

**Changes to Existing Books**

*Cloudscape Server and Guide* has been renamed *Cloudscape Server and Administration Guide* because it now covers material of interest to system administrators but separate from any particular server framework. For example, it covers topics such as deadlock debugging and on-line backups.
Changes to Sample Database and Application

The JBMSTours sample application and database have some minor changes. These changes are outlined in demo/programs/tours/example.html.

Contacting Cloudscape Technical Support

Please visit our Web page at www.cloudscape.com and click “Support.”