Apache Derby

The Apache DB Project
http://db.apache.org/

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Step 1: Install Software

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Introduction

This tutorial requires the Java Development Kit (JDK) and the Apache Derby software.

First, this section describes which JDK release is required, asks you to install it if you haven't already, then shows you how to configure and verify your installation.

Next, it shows you how to install the Apache Derby software, configure your environment to use the Derby Embedded JDBC driver, and verify your installation with the Derby `sysinfo` tool.

Java Development Kit (JDK)

Derby requires Java 2 Standard Edition (J2SE) 9 or higher. Only the Java Runtime Environment (JRE) is required to run Derby, but this tutorial compiles a Java application, so it requires the Java Development Kit (JDK).

If you already have a JDK installed, verify you are configured to use it, then proceed to the Apache Derby installation section.

Install JDK

If you have not already installed a JDK, download and install it now. No specific vendor implementation is required; the only requirement is that it be certified for J2SE 9 or higher. Java's reference implementation is at http://www.oracle.com/technetwork/java/javase/downloads/index.html. After installing the JDK of your choice, proceed to the next section.

Configure JDK

Set the `JAVA_HOME` environment variable to the root location of the JDK installation directory. The examples below use `C:\jdk1.9` for Windows and `/opt/jdk1.9` for UNIX, but be sure to use the actual location on your system. (e.g. The default installation location used by the JDK installer might be something like C:\Program Files\Java\jdk1.9.0_11-b23)

```
Windows:
C:\> set JAVA_HOME=C:\jdk1.9

UNIX Korn Shell:
$ export JAVA_HOME=/opt/jdk1.9
```

Next set the `PATH` environment variable to include the JDK `bin` directory. The `PATH` variable tells the operating system where to find the `java` interpreter and the `javac` compiler.

```
Windows:
C:\> set PATH=%PATH%;%JAVA_HOME%\bin
```

In Windows, these environment variables can also be set from - right click "My Computer" -> Advanced -> Environment Variables.

```
UNIX Korn Shell:
$ export PATH=$JAVA_HOME/bin:$PATH
```

Verify JDK

Use the `java -version` command, as shown below, to verify the installed release:

```
java -version
java version "9"
Java(TM) SE Runtime Environment (build 9+181)
Java HotSpot(TM) 64-Bit Server VM (build 9+181, mixed mode)
```

The output you see may be different from what is shown above because the `java -version` command outputs vendor-specific information; however, if you don't see what looks like valid version information, then **STOP!** And don't proceed until you resolve that problem.

Apache Derby

Download Derby

Download the binary Apache Derby distribution from the Derby web site at http://db.apache.org/derby/derby_downloads.html. These tutorial instructions use version 10.15.2.0 and assume you downloaded one of the binary distribution files listed in the table below:

Operating System	Download File
Windows	db-derby-10.15.2.0-bin.zip
UNIX, Linux, and Mac	db-derby-10.15.2.0-bin.tar.gz

If a more recent release is available, download that, then substitute that version number for `10.15.2.0` in the following instructions.

Install Derby

Choose the directory into which you want to install the Derby software. You must have write permissions to this directory. The sample instructions below use `C:\Apache` for Windows and `/opt/Apache` for UNIX; be sure to use your actual location. Copy the software distribution to the location you choose, then extract it as shown below.

```
Windows (use your extraction tool e.g. WinZip -- these instructions use mks unzip):
mkdir C:\Apache
copy db-derby-10.15.2.0-bin.zip C:\Apache
cd C:\Apache
unzip db-derby-10.15.2.0-bin.zip

UNIX:
mkdir /opt/Apache
cp db-derby-10.15.2.0-bin.tar.gz /opt/Apache
cd /opt/Apache
tar xzvf db-derby-10.15.2.0-bin.tar.gz
```

In both cases, the software will now be extracted into a subdirectory named `db-derby-10.15.2.0-bin`.

Set DERBY_INSTALL

Set the `DERBY_INSTALL` variable to the location where you installed Derby. Examples are shown below, but be sure to use the actual location on your system:

```
Windows:
C:\> set DERBY_INSTALL=C:\Apache\db-derby-10.15.2.0-bin

UNIX Korn Shell:
$ export DERBY_INSTALL=/opt/Apache/db-derby-10.15.2.0-bin
```

Configure Embedded Derby

To use Derby in its embedded mode set your `CLASSPATH` to include the jar files listed below:

- `derby.jar`: contains the Derby engine and the Derby Embedded JDBC driver
- `derbytools.jar`: optional, provides the `ij` tool that is used by a couple of sections in this tutorial

You can set your `CLASSPATH` explicitly with the command shown below:

```
Windows:
C:\> set CLASSPATH=%DERBY_INSTALL%\lib\derby.jar;%DERBY_INSTALL%\lib\derbytools.jar;%DERBY_INSTALL%\lib\derbyoptionaltools.jar;%DERBY_INSTALL%\lib\derbyshared.jar;.

UNIX:
$ export CLASSPATH=$DERBY_INSTALL/lib/derby.jar:$DERBY_INSTALL/lib/derbytools.jar:$DERBY_INSTALL/lib/derbyoptionaltools.jar:$DERBY_INSTALL/lib/derbyshared.jar:.
```

Notice that multiple entries in the class path are separated by a semicolon (;) on Windows and a colon (:) on UNIX.

The Derby software provides another way to set `CLASSPATH`, using shell scripts (UNIX) and batch files (Windows). This tutorial shows how to set `CLASSPATH` explicitly and also how to use the Derby scripts to set it.

Change directory now into the `DERBY_INSTALL/bin` directory. The `setEmbeddedCP.bat` (Windows) and `setEmbeddedCP` (UNIX) scripts use the `DERBY_INSTALL` variable to set the `CLASSPATH` for Derby embedded usage. You can edit the script itself to set `DERBY_INSTALL`, or you can let the script get `DERBY_INSTALL` from your environment. Since you already set `DERBY_INSTALL` in the "Set DERBY_INSTALL" section above, you don't need to edit the script, so go ahead and execute it as shown below:

```
Windows:
C:\> cd %DERBY_INSTALL%\bin
C:\Apache\db-derby-10.15.2.0-bin\bin> setEmbeddedCP.bat

UNIX:
$ cd $DERBY_INSTALL/bin
$ . setEmbeddedCP
```

Verify Derby

Run the `sysinfo` command, as shown below, to output Derby system information:

```
java org.apache.derby.tools.sysinfo
```

Successful output will look something like this:

```
------------------ Java Information ------------------
Java Version:    9
Java Vendor:     Oracle Corporation
Java home:       /Library/Java/JavaVirtualMachines/jdk-9.jdk/Contents/Home
Java classpath:  /Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbyshared.jar:/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derby.jar:/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbynet.jar:/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbytools.jar:/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbyoptionaltools.jar:/Users/rhi
OS name:         Mac OS X
OS architecture: x86_64
OS version:      10.11.6
Java user name:  rhi61140
Java user home:  /Users/rhi61140
Java user dir:   /Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin
java.specification.name: Java Platform API Specification
java.specification.version: 9
java.runtime.version: 9+181
--------- Derby Information --------
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derby.jar] 10.15.2.0 - (1853019)
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbytools.jar] 10.15.2.0 - (1853019)
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbynet.jar] 10.15.2.0 - (1853019)
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbyclient.jar] 10.15.2.0 - (1853019)
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbyshared.jar] 10.15.2.0 - (1853019)
[/Users/rhillegas/sw/zzz/db-derby-10.15.2.0-bin/lib/derbyoptionaltools.jar] 10.15.2.0 - (1853019)
------------------------------------------------------
------------------ Locale Information ------------------
Current Locale :  [English/United States [en_US]]
Found support for locale: [cs]
        version: 10.15.2.0 - (1853019)
Found support for locale: [de_DE]
        version: 10.15.2.0 - (1853019)
Found support for locale: [es]
        version: 10.15.2.0 - (1853019)
Found support for locale: [fr]
        version: 10.15.2.0 - (1853019)
Found support for locale: [hu]
        version: 10.15.2.0 - (1853019)
Found support for locale: [it]
        version: 10.15.2.0 - (1853019)
Found support for locale: [ja_JP]
        version: 10.15.2.0 - (1853019)
Found support for locale: [ko_KR]
        version: 10.15.2.0 - (1853019)
Found support for locale: [pl]
        version: 10.15.2.0 - (1853019)
Found support for locale: [pt_BR]
        version: 10.15.2.0 - (1853019)
Found support for locale: [ru]
        version: 10.15.2.0 - (1853019)
Found support for locale: [zh_CN]
        version: 10.15.2.0 - (1853019)
Found support for locale: [zh_TW]
        version: 10.15.2.0 - (1853019)
----------------------------------------------------
```

The output on your system will probably be somewhat different from the output shown above, but it should reflect the correct location of jar files on your machine and there shouldn't be any errors. If you see an error like the one below, it means your class path is not correctly set:

```
$ java org.apache.derby.tools.sysinfo
Exception in thread "main" java.lang.NoClassDefFoundError:
        org/apache/derby/tools/sysinfo
```

Echo your `CLASSPATH`, as shown below, then double check each entry in your class path to verify that the jar file is where you expect it:

```
Windows:
C:\> echo %CLASSPATH%
C:\Apache\DB-DER-1.1-B\lib\derby.jar;C:\Apache\DB-DER-1.1-B\lib\derbytools.jar;C:\Apache\DB-DER-1.1-B\lib\derbyoptionaltools.jar;C:\Apache\DB-DER-1.1-B\lib\derbyshared.jar;

UNIX:
$ echo $CLASSPATH
/opt/Apache/db-derby-10.15.2.0-bin/lib/derby.jar:/opt/Apache/db-derby-10.15.2.0-bin/lib/derbytools.jar:/opt/Apache/db-derby-10.15.2.0-bin/lib/derbyoptionaltools.jar:/opt/Apache/db-derby-10.15.2.0-bin/lib/derbyshared.jar:
```

If `sysinfo` outputs valid information, you're ready to move to "Step 2: Basics".

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