

Java 6 Update

Introduction



Introducing Java 6 (aka Java 1.6)

- Java 6 adds no features to the language
 - Which is fortunate given all the changes made in Java 5 and the changes anticipated in Java 7 (e.g. closures)
- However many changes are made to libraries:
 - External libraries have been moved into the JSE
 - Existing libraries have been improved and extended
 - Several new libraries have been added
- The Sun JRE 6 update 4 also restructures the JRE
 - Instead of having to download the entire runtime in one go non-essential libraries can be fetched as required



Java 6 Library Changes

- Many libraries have been reworked
 - Including Reflection, Collections, Swing and AWT
- The following become part of the JSE:
 - The Web Services libraries (JAX-WS and JSR 181)
 - Advanced XML Libraries (JAXB, XML-Signature and StAX)
 - The 'Java DB' database (aka Derby and Cloudscape)
 - The JavaBean Activation Framework (aka JAF)
- Three new libraries are added:
 - Scripting for the Java Platform (JSR 223)
 - The Java Compiler API (JSR 199)
 - The Annotation Processing API (JSR 269)



Changes to Existing JSE Libraries

- The String class now has an 'isEmpty' method
 - This is easier than 's.length()==0' or 's.equals("")'
- A new 'Console' class simplifies console I/O
 - The unique instance is obtained via a call to 'System.console'
 - Unlike 'System.out' it can handle non-ASCII characters
- The reflection library has been refined in Java 5 and 6
 - Generics and var-args have been used to improve the API
- The 'File' class has been enhanced:
 - 'getTotalSpace' and 'getFreeSpace' let you query file sizes
 - Programs can now be discovered via 'canExecute'
 - 'setReadable', 'setWritable' and 'setExecutable' are added



Changes to Existing JSE Libraries

- New features have been added to Swing and AWT:
 - Splash screens can be automatically displayed
 - Via a command line option or an entry in the JAR manifest
 - E.g. '-splash:image.gif' or 'SplashScreen-Image: image.gif'
 - The system tray portion of the desktop can be accessed
 - 'JTable' has built in support for sorting and filtering
 - 'SwingWorker' simplifies running background tasks
 - Text components fully support printing
- The JDBC libraries have been updated to version 4.0
 - Driver classes are automatically detected and loaded
 - XML support is added and BLOB/CLOB handling is improved



Changes to Existing JSE Libraries

- Java 6 further extends the Collections library
 - This has already been substantially extended in Java 5 with thread-friendly data structures and the 'Queue' interface
- Five new collection types are added
 - Each with an interface and sample implementation

Interface	Description
Deque	A queue that supports insertion and removal at both ends
BlockingDeque	A deque that supports producer/consumer threads. When the deque is full the producer blocks, whereas when it is empty the consumer blocks
NavigableSet	A sorted set that can find the closest match to a given value
NavigableMap	A sorted map that can find the closest match to a given value
ConcurrentNavigableMap	A navigable map with atomic put, remove and replace operations



The Java Compiler API

- Many Java tools need access to a compiler
 - E.g. the JSP compiler within a JEE Container
- Each compiler has its own vendor-specific API
 - The Sun compiler can be called via 'com.sun.tools.javac.Main'
 - This is normally found in 'tools.jar' which comes with the JDK
 - Changes to this de facto API caused problems for tools
- Java 6 introduces a standard API for compilers
 - The classes and interfaces are placed in 'javax.tools'

```
com.sun.tools.javac.Main javac = new com.sun.tools.javac.Main();  
String [] options = {"-d", "../bin"};  
javac.compile(options);
```



The Java Compiler API

- The core type in the compiler API is 'JavaCompilerTool'
 - You obtain an instance via the 'ToolProvider' factory class
 - The easiest way to compile code is via its 'run' method
 - Passing null parameters means standard streams are used
 - The return value is '0' for success or a tool dependant error code
- For fuller control use a 'CompilationTask'
 - This is obtained via 'JavaCompilerTool.getTask'
 - It allows listeners to be added to monitor error messages

```
JavaCompilerTool compiler = ToolProvider.getSystemJavaCompilerTool();
int retval = compiler.run(null,null,null,"MyClass.java");
if(retval == 0) {
    System.out.println("Compilation successful!");
}
```




Libraries Moving Into the JDK/JRE

- Several libraries are now shipped with the JSE
 - Their inclusion has sparked some controversy
- Support for Web Services is now considered essential
 - All the libraries for building Web Service clients are bundled
 - This caused problems before JSE Update 4 as the JDK shipped with JAX-WS V2.0 whereas many WS tools used V2.1
- The JDK now includes a database called 'Java DB'
 - This was developed by IBM as 'Cloudscape' and then released as an open source project under the name 'Derby'
 - It can be run as a separate program or in-process



Libraries Moving Into the JDK/JRE

- The JavaBeans Activation Framework is now included
 - This is a library that has been around since 1999
 - It defines how to create and load command maps
 - A command map associates MIME types with the actions that can be performed on them, which in turn have command objects
 - E.g. 'image/jpeg' might have 'view' and 'magnify' commands
- The 'StAX' XML API is also built in
 - It offers a pull based alternative to SAX that makes it easier to incrementally process the contents of a document
 - It also simplifies writing documents