JDB - QUICK GUIDE

JDB - INTRODUCTION

Debugging is a technical procedure to find and remove bugs or defects in a program and get expected results. Debugging includes testing and monitoring. It is very complex when the subunits of a program are tightly coupled. We can debug a program using the debugger tools that follow the prescribed APIs. A debugger allows you to step through every aspect of a code, inspect all the elements, and remove errors, if any.

Debugging Techniques

There are different kinds of techniques to debug a Java program. The old method of debugging is by using print statements at the end of every segment which will print the trace statements on the console. Take a look at the following code.

```
pubic class Add
{
   public static void main(String ar[])
   {
      int a=ar[0];
      system.out.println("A : " +a);
      int b=ar[1];
      system.out.println("B : " +b);
      int c = a + b;
      system.out.println("C = a + b : " +c);
   }
}
```

Here, we have a program that adds two numbers and prints the output. Notice that at each step, we have introduced a print statement that prints the state of the program on the console. This is the traditional approach to debug a program.

In addition, we have advanced concepts that can be used to debug a program such as:

- stepping
- breakpoints, and
- exceptions or watchpoints.

Types of Debugging

We can debug a program using various methods:

- Using Java bytecode *compiledversionofJavacode*
- Using comments inside the programs
- Attaching class to a running program
- Remote debugging
- Debugging on demand
- Optimized code debugging

Java Debuggers

Here are some examples of Java debuggers that are available in the market:

- IDEs such as Eclipse, Netbeans, etc. contain their own debuggers *Visualcafe, Borland, JBuilder*
- Standalone debugger GUIs *suchasJikes, Javaplatformdebugger, andJProbe*
- Command-line debugger *Sun'sJDB*

- Notepad or VI driven *stacktrace*

This tutorial covers how to use the command-line debugger, **jdb**.

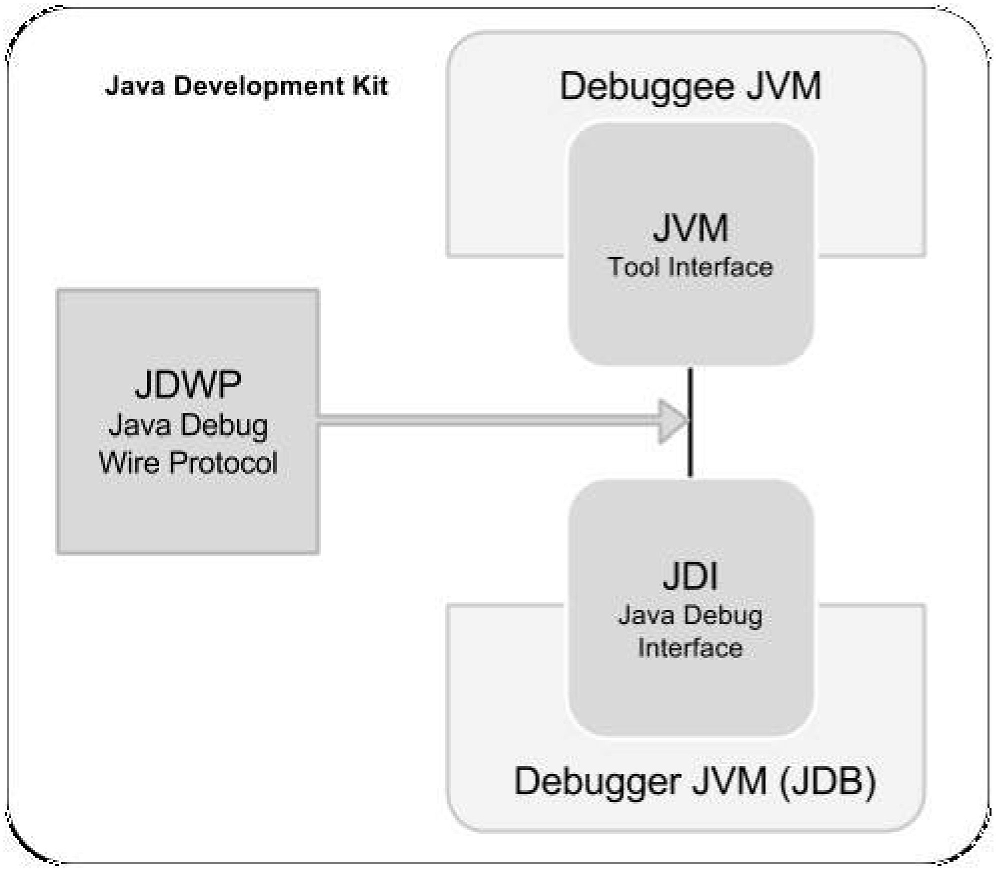
JDB

The Java debugger *JDB* is a tool for Java classes to debug a program in command line. It implements the Java Platform Debugger Architecture. It helps in detecting and fixing bugs in a Java program using Java Debug Interface *JDI*.

JDB in JDK

The following architecture defines the role of JDB in JDK. It contains mainly three units:

- Java Virtual Machine Tool Interface *JVMTI*
- Java Debug Wiring Pool *JDWP*
- Java Debugger Interface *JDI*



JVM TI

It is a native programming interface implemented by VM. It provides ways to inspect and debug the state of the application running on the VM. It allows an implementer *VMImplementer* that can be enclosed easily into the debugging architecture. It also uses a third-party channel called **JDWP** for communication.

JDWP

It defines the format of information and the requests that pass in between the debuggee process and the debugger front end. The primary purpose of having a JDWP is to allow the debuggee and the debugger to communicate when they run under separate VMs or in separate platforms.

JDI

It is a high-level Java interface implemented as front end. It defines the variable information at user code level. It is recommended to use a JDI layer for all debugger development. It uses JDWP for communication with the debuggee JVM.

JDB - INSTALLATION

This chapter explains how to install JDB on Windows and Linux based systems. JDB is a part of JDK. Therefore, JDK installation is enough for using JDB in command prompt.

System Requirements

Here are the system requirements for installing JDB:

JDK	Java SE 2 JDK 1.5 or above
Memory	1 GB RAM *recommended*
Disk Space	No minimum requirement
Operating System Version	Windows XP or above, Linux

Follow the simple steps given below to install JDB on your system.

Step 1: Verifying Java Installation

First of all, you need to have Java Software Development Kit *SDK* installed on your system. To verify this, execute any of the two commands depending on the platform you are working on.

If the Java installation has been done properly, then it displays the current version and specifications of Java installation. A sample output is given in the following table.

Platform	Command	Sample Output
Windows	Open command console and type: **\>java –version**	Java version "1.7.0_60" Java *TM* SE Run Time Environment $build1.7.0_60 - b19$ Java Hotspot *TM* 64-bit Server VM $build24.60 - b09, mixedmode$
Linux	Open command terminal and type: **$java –version**	java version "1.7.0_25" Open JDK Runtime Environment $rhel - 2.3.10.4.el6_4 - x86_64$ Open JDK 64-Bit Server VM $build23.7 - b01, mixedmode$

We assume the readers of this tutorial have Java SDK version 1.7.0_60 installed on their system. In case you do not have Java SDK, download its current version from the link http://www.oracle.com/technetwork/java/javase/downloads/index.html and install it.

Step 2: Setting Up Java Environment

Set the environment variable JAVA_HOME to point to the base directory location where Java is installed on your machine. For example,

Platform	Description

Windows	set JAVA_HOME to C:\ProgramFiles\java\jdk1.7.0_60
Linux	export JAVA_HOME=/usr/local/java

Append the full path of Java compiler location to the System Path.

Platform	Description
Windows	Append the String "C:\Program Files\Java\jdk1.7.0_60\bin" at the end of the system variable PATH.
Linux	export PATH=$PATH$:JAVA_HOME/bin/

Execute the command **java -version** from the command prompt as explained above.

Step 3: Verifying JDB Installation

Verify the JDB version as follows:

Platform	Command	Sample Output
Windows	Open command console and type: **\>jdb -version**	This is JDB version 1.6 $JavaSEversion1.7.0_60$
Linux	Open command terminal and type: **$jdb -version**	This is JDB version 1.6 $JavaSEversion1.7.0_60$

JDB - SYNTAX

This chapter explains the syntax of JDB command. The syntax contains four sections listed as follows:

- JDB
- option
- class
- arguments

Syntax

The syntax of JDB is as follows.

```
jdb [ options ] [ class ] [ arguments ]
```

JDB

It calls jdb.exe from the Java Development Kit.

Options

These include the command line options used to debug a Java program in an efficient way. The JDB launcher accepts all the options $suchas-D, -classpath, and-X$ and some additional advanced options such as −*attach*, − *listen*, − *launch*, *etc*. .

Class

It is the class name on which you want to perform debugging operations.

Arguments

These are the input values given to a program at runtime. For example, arg[0], arg[1] to the main method.

In the above four segments, options is the most important one.

JDB - OPTIONS

This chapter describes the important options available in JDB that are submitted as arguments with the jdb command.

Options

The following table contains a list of options accepted by JDB:

Name	Description
-help	Displays the help message and lists the related options.
-sourcepath	Uses the given path for source files if path is not specified, then it takes the default path “.”, i.e., the current directory.
-attach	Attaches the debugger to the running VM by specifying the running VM address.
-listen	Waits for the running VM to connect using standard connector.
-listenany	Waits for the running VM to connect using any address.
-launch	Launches the debugged application immediately up on startup job.
-listconnectors	Lists the connectors available in this VM.
-connect	Connects to the target VM using named connector with listed argument values.
-dbgtrace	Prints information for debugging jdb.
-tclient	Runs the application in Java Hotspot VM *client*.
-tserver	Runs the application in Java Hotspot VM *server*.
-Joption	Passes the option to the Java virtual machine used to run JDB.

Using Options with Commands

The following commands show how to use some of the above options:

-help

The following command gets -help on using JDB.

```
\>jdb -help
```

-attach

The following command attaches the debugger to a specified VM *portnumber*: 1099.

```
\> jdb -attach 1099
```

-listen

The following command makes the JDB process running on the current VM wait using standard connector *VMin*8008.

```
\>jdb -listen 8088
```

-listenany

The following command makes the JDB process running on the current VM wait using any connector *VMincurrentlyrunningport*.

```
\>jdb –listenany
```

-tclient

The following command executes the application in Java Hotspot™ VM*client*.

```
\>jdb –tclient
```

-tserver

The following command executes the application in Java Hotspot™ VM*server*.

```
\>jdb -tserver
```

JDB - SESSION

This chapter describes how to start a JDB session in different ways. JDB launch is the frequently used technique to start a JDB session.

There are two different ways to start a JDB session:

- Starting JDB session by adding class *mainclassname* to it.
- Adding JDB to running JVM to start session.

Start a Session by Adding Class

The following command starts a JDB session:

Syntax

```
\>jdb <classname>
```

Example

Let us assume we have a class named **TestClass**. The following command starts a JDB session from the TestClass.

```
\>jdb TestClass
```

If you follow this command, it starts a new Java VM with any specified parameters. Thereafter it loads the class and stops it before executing the first statement of the class.

Start a Session by Adding JDB to a Running JVM

Given below is the syntax and example to start a JDB session by adding the JDB to a running JVM.

Syntax

The following syntax is for JDB session:

```
-agentlib:jdwp=transport=dt_shmem,address=,server=y,suspend=n
```

Example

Let us assume the main class name is **TestClass** and JVM allows the JDB to connect it later. The following is the command to add JDB to JVM:

```
\>java
-agentlib:jdwp=transport=dt_shmem,address=jdbconn,server=y,suspend=n TestClass
```

Now you can attach the JDB to the JVM with the following command:

```
\> jdb -attach jdbconn
```

Note: Here, the **TestClass** is not added to the JDB command, because JDB is connected to the running VM instead of launching a new one.

JDB - BASIC COMMANDS

This chapter takes you through the basic commands of JDB. After launching a session, these commands are used for debugging a program.

The following is the list of commands used for debugging.

Name	Description
help or ?	The most important **JDB** command; it displays a list of recognized commands with a brief description.
run	After starting **JDB** and setting the necessary breakpoints, you can use this command to start execution and debug an application.
cont	Continues execution of the debugged application after a breakpoint, exception, or step.
print	Displays Java objects and primitive values.
dump	For primitive values, this command is identical to print. For objects, it prints the current value of each field defined in the object. Static and instance fields are included.
threads	Lists the threads that are currently running.
thread	Selects a thread to be the current thread.
where	Dumps the stack of the current thread.

Example

Let us assume we have a sample class called **Add** for the following examples:

Add.java

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

Compile this class Add.java using the following command:

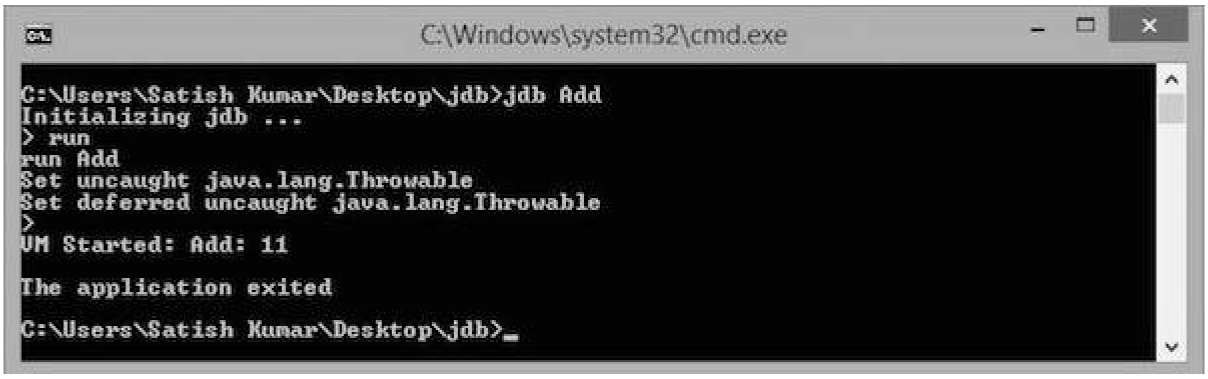
```
\>javac Add.java
```

Run

This command executes the main class file, which is added to JDB for debugging. Execute the following commands to run the Add class.

```
\>jdb Add
initializing jdb …
>run
```

On executing these commands, you get to see the following output:



```
C:\Users\Satish Kumar\Desktop\jdb>jdb Add
Initializing jdb ...
> run
run Add
Set uncaught java.lang.Throwable
Set deferred uncaught java.lang.Throwable
>
VM Started: Add: 11

The application exited

C:\Users\Satish Kumar\Desktop\jdb>_
```

JDB - BREAKPOINTS

This chapter explains the concept of breakpoints and how to set breakpoints in a program. A breakpoint introduces an explicit stop or pause in the execution of a program at a particular line of code while debugging. It is useful to acquire knowledge about variables in the program in its execution.

Syntax

The following command sets up a breakpoint at a particular line number:

```
> stop at <class name>:<Line no>
```

The following command sets up a breakpoint on a particular method or on a particular variable:

```
> stop in <class name>:< Method name | Variable name>
```

Example

The following example shows how to set up a breakpoint in a class.

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

Save the above file as Add.java. Compile this file using the following command:

```
\>javac Add.java
```

Debugging

Let us take an example for debugging. Here, we start the debugging process by setting up a breakpoint on main. Given below are the steps to be followed in the debugging process:

Step 1: Start a JDB Session

The following command starts a JDB session on the Add class for debugging:

```
\> jdb Add
```

Step 2: Set a Breakpoint

The following command sets up a breakpoint on the main method of Add class.

```
> stop in Add.main
```

If the breakpoint is set successfully, you get to see the following output:

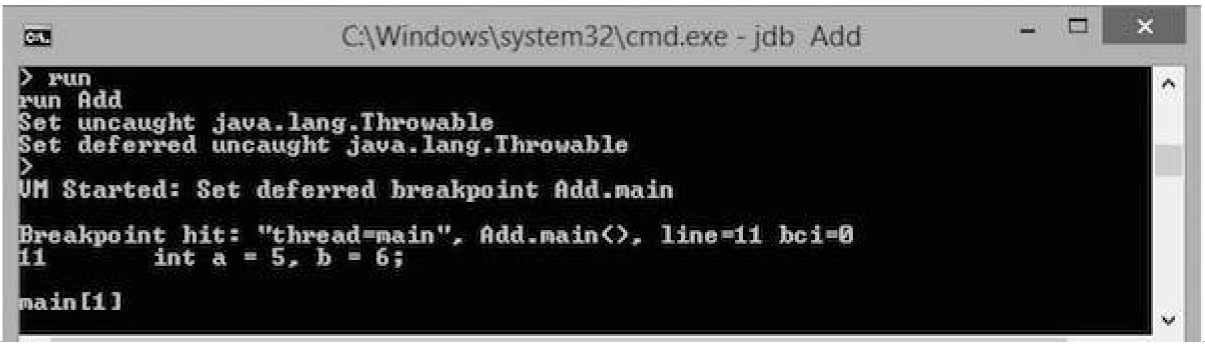
```
Deferring breakpoint Add.main.
It will set after the class is loaded.
>
```

Step 3: Start Debugging

The following command starts execution of the class Add:

```
> run Add
```

If you run this command, you get to see the following output. In this output, you find that the execution stops at the breakpoint position, that is at the main function.



```
> run
run Add
Set uncaught java.lang.Throwable
Set deferred uncaught java.lang.Throwable
>
VM Started: Set deferred breakpoint Add.main

Breakpoint hit: "thread=main", Add.main(), line=11 bci=0
11        int a = 5, b = 6;

main[1]
```

The execution stops at the first line of the main method, that is at "int a=5, b=6;" or Line no: 11 in the code. You can observe this information in the output.

Step 4: Continue Execution

The following command continues the program execution:

```
cont
```

It gives you the remaining execution part and output as follows:

```
> Add:11
The application exited
\>
```

JDB - STEPPING

This chapter explains how to use the concept of Stepping in debugging a program. Stepping is the debugger feature that lets you execute the code by stepping through line by line. Using this, you can examine each line of the code to ensure they are behaving as intended.

The following commands are used in the stepping process:

- step: steps to the next line of execution
- list: examines where you are in the code
- cont: continues the remaining execution

Example

The following example uses the Add class that we have used in the previous chapter:

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

Save the above file as Add.java. Compile this file using the following command:

```
\>javac Add.java
```

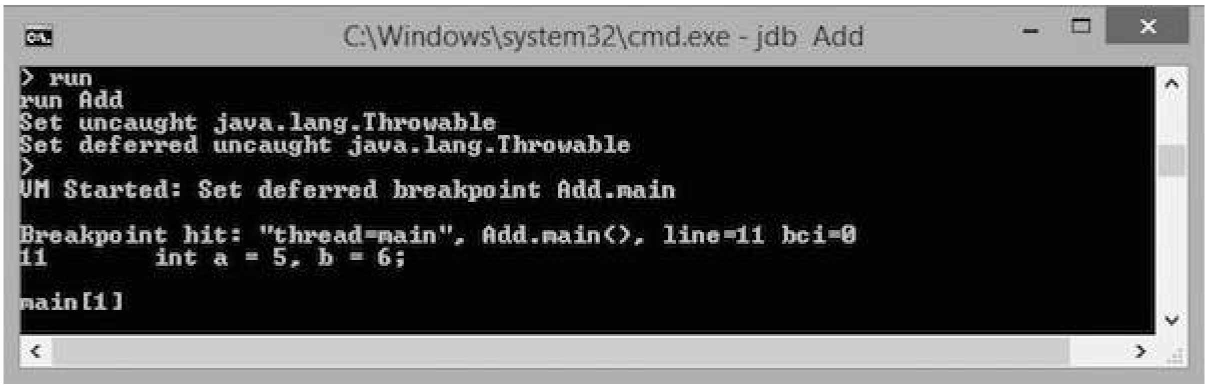
Let us assume that the breakpoint is set on the main method of the Add class. The following steps show how to apply stepping in the Add class.

Step 1: Execute the Job

The following command starts executing the class named Add.

```
> run Add
```

If you execute this command, you get to see the following output. In this output, you can find that the execution stops at the breakpoint position, i.e., at the main method.



```
> run
run Add
Set uncaught java.lang.Throwable
Set deferred uncaught java.lang.Throwable
>
VM Started: Set deferred breakpoint Add.main

Breakpoint hit: "thread=main", Add.main(), line=11 bci=0
11        int a = 5, b = 6;

main[1]
```

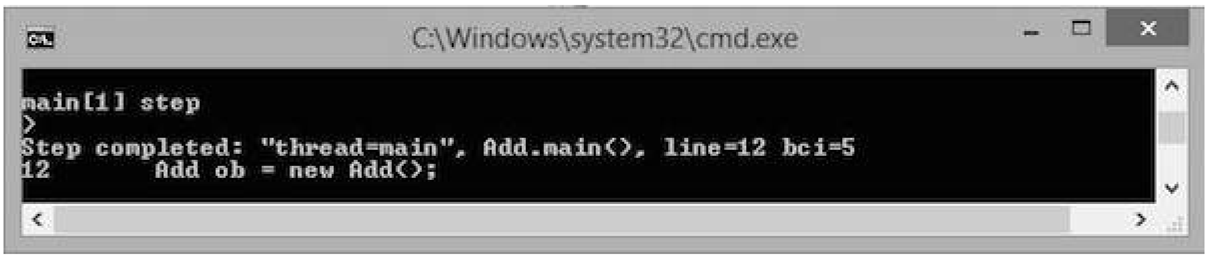
The execution stops at the first line of the main method, that is at "int a=5, b=6;" or Line no: 11 in the code. You can observe this information in the output.

Step 2: Step through the Code

The following command steps the execution to the next line.

```
main[1] step
```

Now the execution steps to Line no: 12. You get to see the following output.



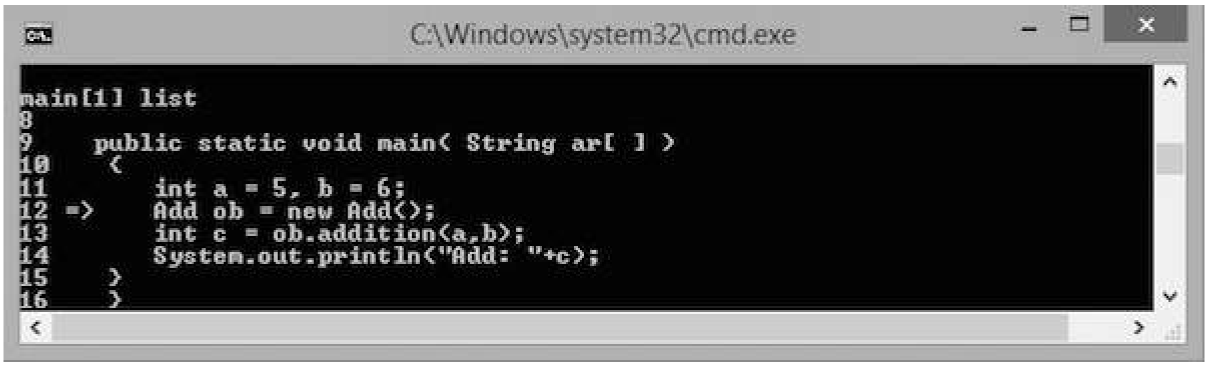
```
main[1] step
>
Step completed: "thread=main", Add.main(), line=12 bci=5
12        Add ob = new Add();
```

Step 3: List the Code

The following command lists the code:

```
main[1] list
```

You get the following output. List command is used to let you know the line in the code up to which the program control has reached. Notice the arrow mark => in the following screenshot that shows the current position of the program control.



```
main[1] list
8
9     public static void main( String ar[ ] )
10     {
11        int a = 5, b = 6;
12 =>     Add ob = new Add();
13        int c = ob.addition(a,b);
14        System.out.println("Add: "+c);
15     }
16     }
```

Step 4: Continue Execution

The following command continues to execute the code:

```
main[1] cont
```

This command continues executing the remaining lines of the code. The output is as shown below:

```
> Add:11
The application exited
\>
```

Generally, there are three types of stepping:

- Step Into
- Step Over
- Step Out

Step Into

Using this command, you can step to the next line of the code. If the next line of the code is a function call, then it enters the function by driving the control at the top line of the function.

In the following code, the arrow mark defines the controller in the code.

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      -> Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

If you use the **step into** command, the controller moves to the next line, i.e., "int c = ob.addition *a*, *b*;". At this line, there is a function call **addition*int, int*** hence the controller moves to the topmost line of the addition function with the arrow mark as shown below:

```
public class Add
{
   public int addition( int x, int y)
   -> {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      int c = ob.addition(a,b);
   System.out.println("Add: "+c);
   }
}
```

Step Over

Step Over also executes the next line. But if the next line is a function call, it executes that function in the background and returns the result.

Let us take an example. In the following code, the arrow mark defines the control in the code.

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      -> Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

If you use the **step over** command, the control moves to the next line, i.e., "int c = ob.addition*a, b* ;". In this line, there is a function call **addition*int, int*** hence the function execution is done in the background and the result is returned to the current line with the arrow mark as shown below:

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      -> int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

Step Out

Step Out executes the next line. If the next line is a function call, it skips that and the function execution continues with the remaining lines of the code.

Let us take an example. In the following code, the arrow mark defines the controller in the code.

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      -> Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

If you use the **step out** command, the controller moves to the next line, i.e., "int c = ob.addition*a, b* ;". In this line, there is a function call **addition*int, int*** hence the function execution is skipped and the remaining execution continues with the arrow mark as shown below:

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
```

```
    {
       int a = 5, b = 6;
       Add ob = new Add();
       -> int c = ob.addition(a,b);
       System.out.println("Add: "+c);
    }
}
```

JDB - EXCEPTION

This chapter explains how to handle the exception class using JDB. Generally, whenever a program raises an exception without a catch statement, then the VM prints the exception line, the cause of the exception, and exits. If the exception has been raised with a catch statement, then the exception is handled by the catch statement. Here, the VM prints the output with the cause of exception.

When the class that raises the exception is running under JDB, it also throws the **uncaught** exception. That exception can be handled using the **catch** command.

Example

Let us take an example of the class JdbException:

```
public class JdbException
{
   public static void main(String ar[]) throws Exception
   {
      int a=8, b=0;
      System.out.println("Welcome");
      System.out.println("Ex: "+(a/b));
   }
}
```

Save the above file with the name JdbException.java. Compile this file using the following command:

```
\>javac JdbException.java
```

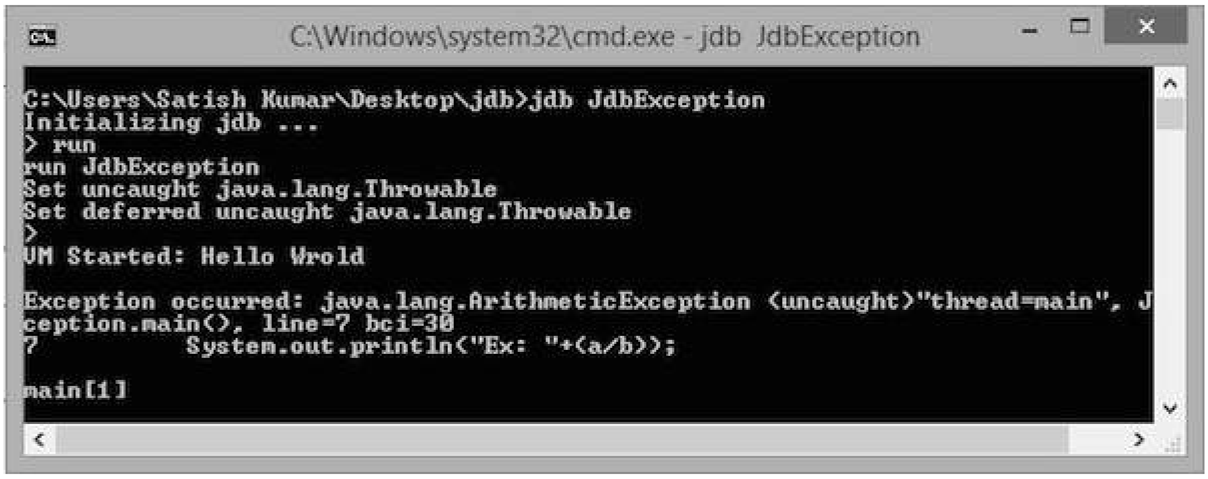
Follow the steps given below to handle the exception.

Step 1: Run the Class

The following command executes the class named **JdbException** as follows:

```
\>jdb JdbException
>run
```

This **JdbException** class contains an exception, hence you get to see the following output:



```
C:\Users\Satish Kumar\Desktop\jdb>jdb JdbException
Initializing jdb ...
> run
run JdbException
Set uncaught java.lang.Throwable
Set deferred uncaught java.lang.Throwable
>
VM Started: Hello Wrold

Exception occurred: java.lang.ArithmeticException (uncaught)"thread=main", J
ception.main(), line=7 bci=30
7          System.out.println("Ex: "+(a/b));

main[1]
```

Step 2: Catch the Exception

The following command catches the exception:

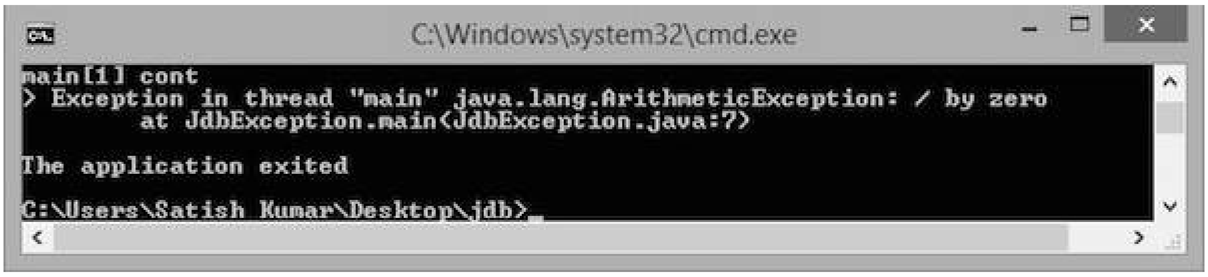
```
mian[1] catch java.lang.ArithmeticException
```

It will give you the following output:

```
Set all java.lang.ArithmeticException
```

Step 3: Continue Execution

The following command continues the execution. Now the catch handles the arithmetic exception as follows:



```
main[1] cont
> Exception in thread "main" java.lang.ArithmeticException: / by zero
        at JdbException.main(JdbException.java:7)

The application exited

C:\Users\Satish Kumar\Desktop\jdb>_
```

JDB - IN ECLIPSE

This chapter explains how to use JDB in Eclipse. Before proceeding further, you need to install Eclipse Indigo. Follow the steps given below to install Eclipse Indigo on your system.

Step 1: Download and Install Eclipse

You can download Eclipse from the following link: http://www.eclipse.org/downloads/packages/eclipse-ide-java-ee-developers/indigosr2

Step 2: Create a New Project and a New Class

- Create a new Java project by following the options **File-> New -> Java project**.
- Name it as **“sampledebug”**.
- Create a new class by right clicking on the **samplebebug** project.
- Select **options ->new -> class**
- Name it as **“Add.java”**

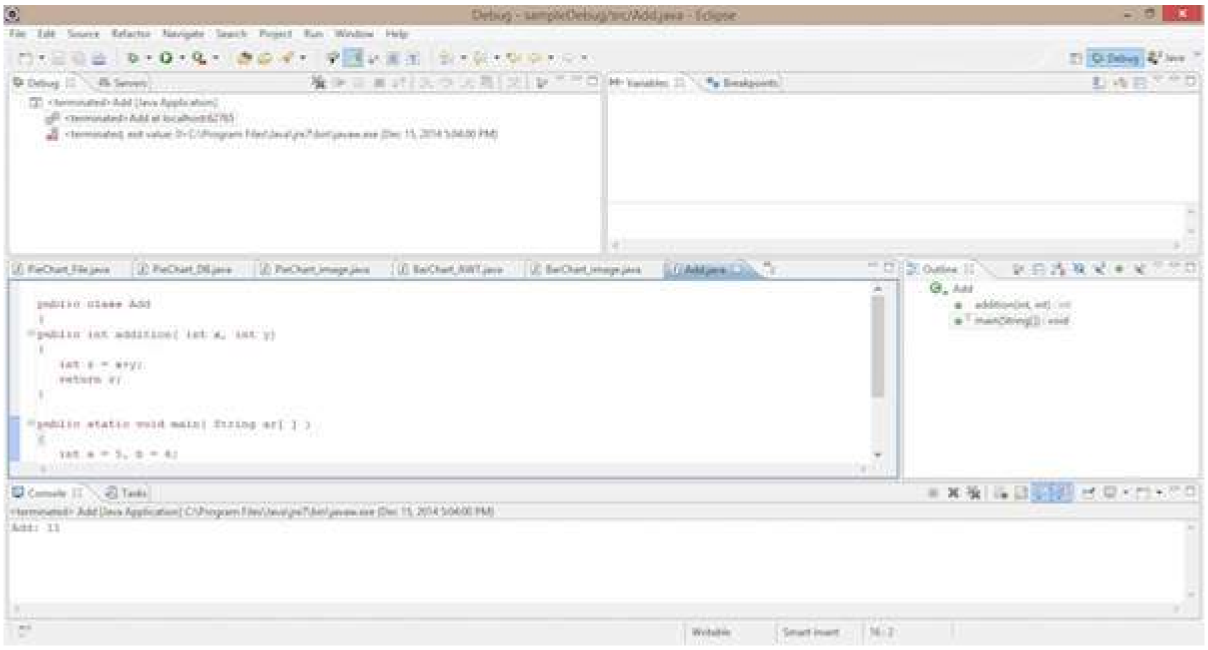
Add.java

```
public class Add
{
   public int addition( int x, int y)
   {
      int z = x+y;
      return z;
   }
   public static void main( String ar[ ] )
   {
      int a = 5, b = 6;
      Add ob = new Add();
      int c = ob.addition(a,b);
      System.out.println("Add: "+c);
   }
}
```

Step 3: Open the Debug Perspective

Follow the instructions given below to open the debug perspective.

On the Eclipse IDE, go to **Window -> Open perspective -> Debug**. Now you get the debug perspective for the program Add.java. You get to see the following window.



```
<terminated> Add [Java Application]
<terminated> Add at localhost:62765
<terminated, exit value: 0>C:\Program Files\Java\jre7\bin\javaw.exe (Dec 15, 2014 5:04:00 PM)
```

```
public class Add
{
public int addition( int x, int y)
{
   int z = x+y;
   return z;
}

public static void main( String ar[ ] )
{
   int a = 5, b = 6;
```

```
<terminated> Add [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (Dec 15, 2014 5:04:00 PM)
Add: 11
```

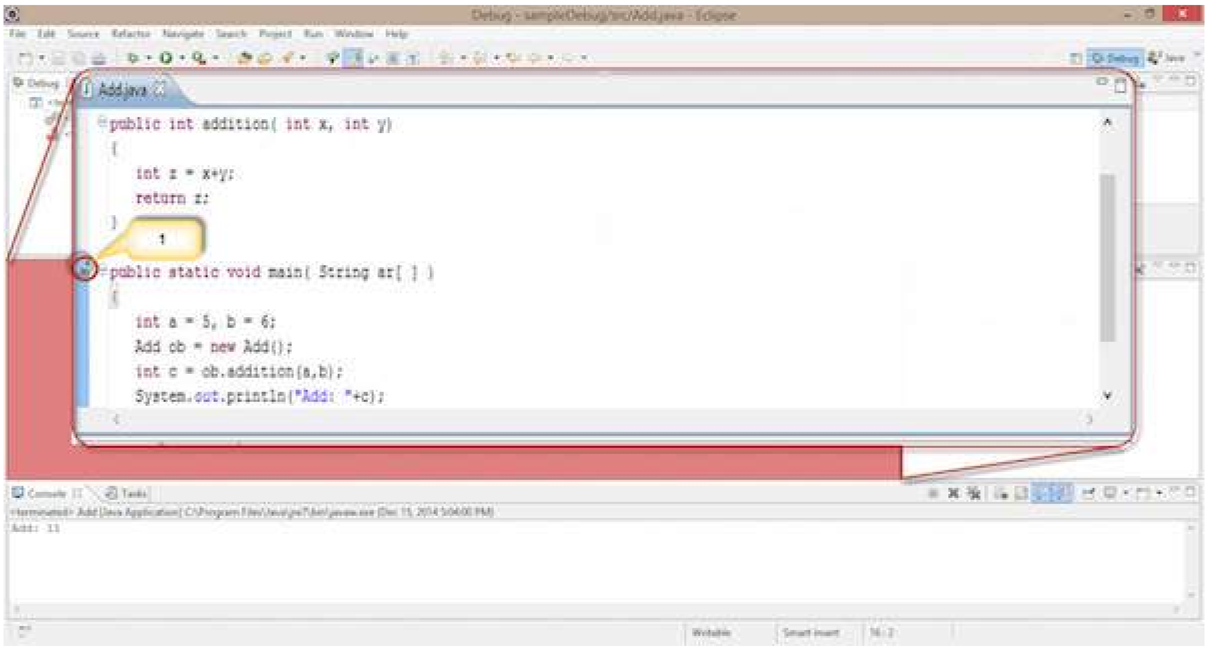
Sections in Debug Perspective

The sections in the Debug perspective are as follows:

Coding Section

Java code is displayed in this section. It is the code you want to debug, that is, **Add.java**. Here we can add a breakpoint on a line by double clicking in front of the line. You find the blue bubble with an arrow symbol to point out the breakpoint of that line. See the following screenshot; you can find the selected area with a red circle pointed as “1”.

1. Double click here. You can set the breakpoint for this line.



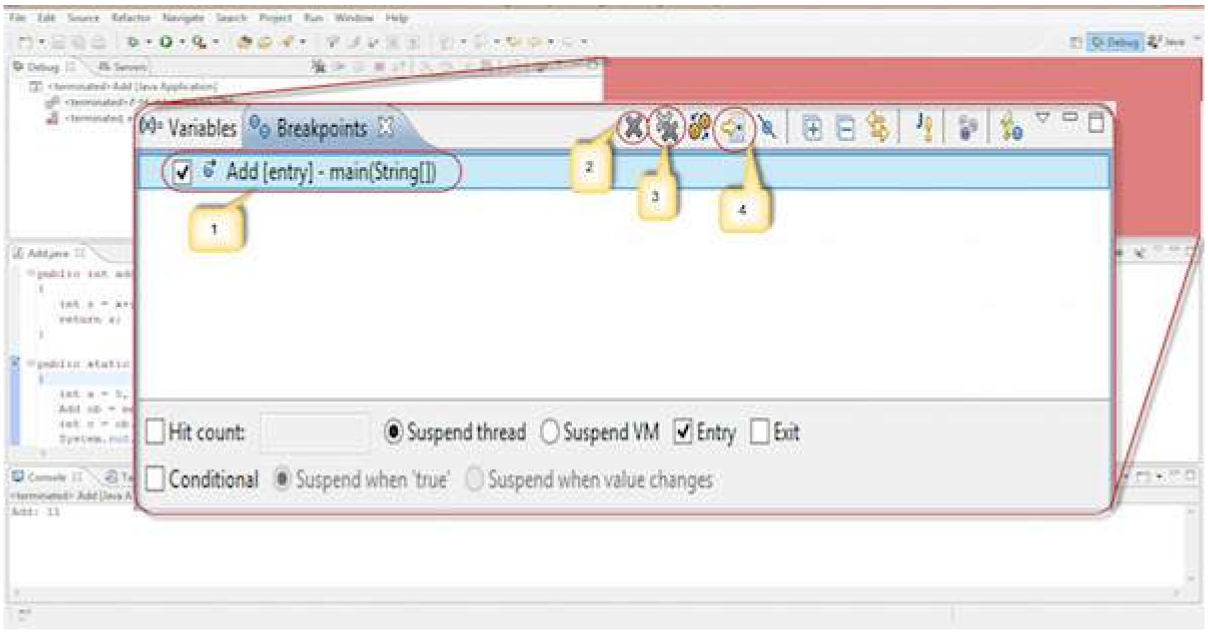
```
public int addition( int x, int y)
{
   int z = x+y;
   return z;
}

public static void main( String ar[ ] )
{
   int a = 5, b = 6;
   Add ob = new Add();
   int c = ob.addition(a,b);
   System.out.println("Add: "+c);
```

```
<terminated> Add [Java Application] C:\Program Files\Java\jre7\bin\javaw.exe (Dec 15, 2014 5:04:00 PM)
Add: 11
```

Breakpoint Section

This section defines the list of breakpoints that are set to the program code. Here we can add, delete, find, and manage the breakpoints. The following screenshot shows the breakpoint section.



[✓] Add [entry] - main(String[])

[ ] Hit count: [✓ Suspend thread] Suspend VM [✓ Entry] [ ] Exit

[ ] Conditional [✓ Suspend when 'true'] Suspend when value changes

Observe the following options in the given screenshot:

1. Using the check box in the left, we can select or deselect a breakpoint. Here, we use one breakpoint, i.e., Add class-main method.

2. The single cross icon “X” is used to delete the selected breakpoint.

3. The double cross icon “XX” is used to delete all the breakpoints in your code.

4. The arrow pointer is used to point to the code where the selected breakpoint is applied.

The remaining functionalities in the breakpoint section are as follows:

- **Hitcount** : It shows how many times the control hits this breakpoint. It is used for recursive logic.

- **Suspend thread** : We can suspend the current thread by selecting it.

- **Suspend VM** : We can suspend the VM by selecting it.

Debug Section

This section is used for the process of debugging. It contains options that are used in debugging.

Start debugging : Follow the instructions given below to start debugging.

Right click on the **code ->** click **Debug as ->** click **1 Java application**.

The process of debugging starts as shown in the following screenshot. It contains some selected options, highlighted using numeric digits.

1. We apply a breakpoint on the Add class main method. When we start debugging, the **controller** gets stuck at the first line of the main method.

2. It is used to **Resume** the debugging process and skip the current breakpoint. It works similar to the **cont** command in the JDB command line.

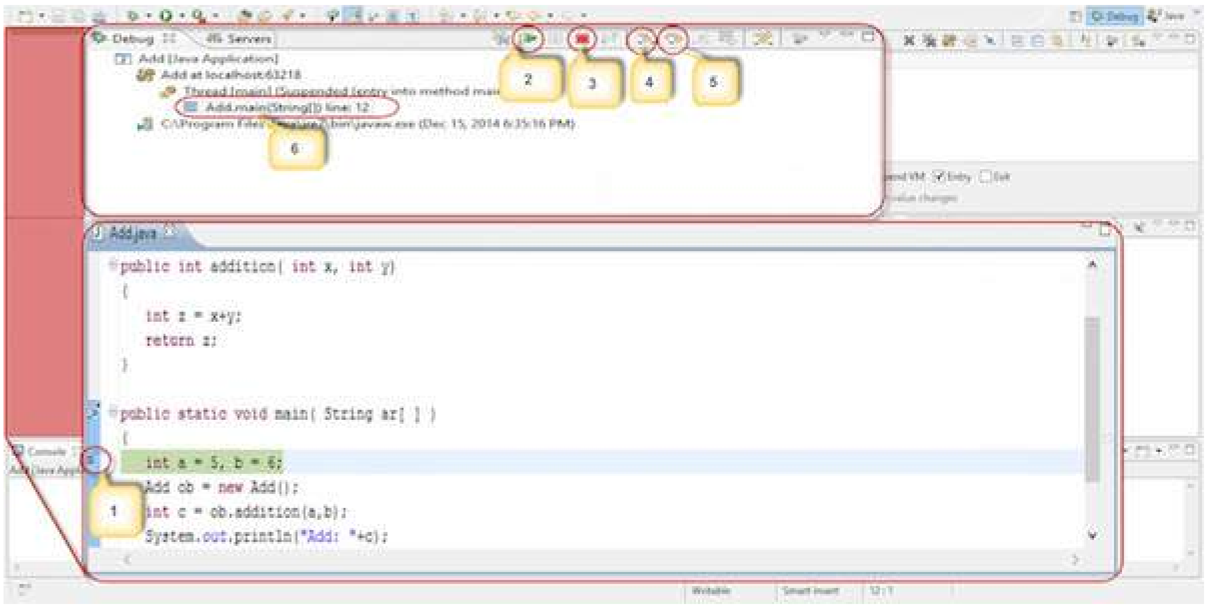
3. It is used to stop the debugging process.

4. It works similar to the **step in** process in the JDB command line. It is used for moving the control to the next line, i.e., point “1” moves to the next line.

5. It works similar to the **step over** process in the JDB command line.

6. It is used to see on which line the breakpoint is applied.

Debug - sampleDebug/src/Add.java - Eclipse
File Edit Source Refactor Navigate Search Project Run Window Help



```
Add [Java Application]
  Add at localhost:63218
    Thread [main] (Suspended (entry into method mai
      Add.main(String[]) line: 12
  C:\Program Files\...\bin\javaw.exe (Dec 15, 2014 6:35:16 PM)
```

```
public int addition( int x, int y)
{
   int z = x+y;
   return z;
}

public static void main( String ar[ ] )
{
   int a = 5, b = 6;
   Add ob = new Add();
   int c = ob.addition(a,b);
   System.out.println("Add: "+c);
```

Follow the given steps and sections to debug your code in eclipse IDE. By default, every IDE contains this debugging process.

Processing math: 100%