Lesson 1.2

Java Environment Setup

By the end of this lesson you will learn:

- Things we need to code in Java
- How to check whether Java Environment is already exists in your Computer
- How to install JDK
- How to configure path variable
- How to create a Java Project for any Text Editor
- How to compile a Java Program
- How to Run a Java Program

In order to code in Java, you must have setup the java programming environment. It includes the tools to write a java program, to compile a java program and to run a java program. Although there are several IDE (Integrated Development Environment) available in the market such as: NetBeans, Eclipse, IntelliJ, JCreator etc., it is highly unlikely that we will be using these in this course. Using these IDEs are simple, just like you used Visual Studio or CodeBlocks for C++. For this course, we want you to learn everything from the scratch. That's why we will be writing our codes in a text editor and will be giving commands in console to compile and run our programs.

Text Editor

The first thing we need is a Text Editor. A simple text editor comes along with any operating system and we can use that text editor to code. However, coding in plain black and white surface becomes quite dull and boring over time. So, any text editor that can highlight different keywords, constants and statements in a colorful manner, is highly preferable. Lots of text editor are capable of serving our purpose. Among those, Notepad++ and Sublime Text Editor are widely used. You can download any of these two from the following links:

Notepad++ download link	:	https://notepad-plus-plus.org/downloads/
Sublime Text Editor download link	:	https://www.sublimetext.com/3

After downloading any of the text editor you need to install it. Installation process is exactly like any software installation process. Just follow the steps on your screen and you will be fine.

Java Development Kit

Now that we have a text editor to write our code, we need something to compile and run it. We need JDK (Java Development Kit). The latest version of JDK as of May 2020 is JDK 14. However, we are preferring JDK 8 or JDK 11. You can download JDK from the following links:

JDK Download Links:	www.java.com/en/download/manual.jsp
	www.oracle.com/java/technologies/javase-downloads.html

This JDK comprises of Java Compiler that compiles java source code and other development tools along with JRE (Java Runtime Environment). JRE consists of JVM (Java Virtual Machine) and Java Runtime Library Classes. Inside JVM there is JIT (Just-in-Time) compiler. The Java Compiler generates bytecode after compiling the java source codes. This bytecode is platform independent and so, it is same across all platforms. JRE provides the environment to run the bytecode. JVM is platform depended. Different JVMs for different platforms interprets the same bytecode and generate Machine Readable code. JIT compiler executes this machine readable code in real time piece by piece.

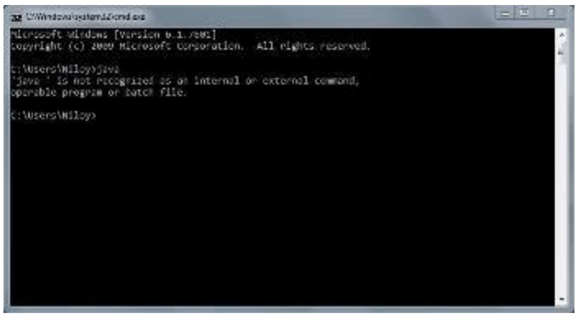
The JRE component can also be downloaded separately. If you install JDK in your computer, JRE gets installed in the process. As a result, you can both compile and run java code in your computer. On the other hand, if you install JRE, you will not be able to compile java codes but you can surely run the bytecode which was generated after the compilation of java source code. It is only possible as the bytecode is same across all the platforms. So, bytecode generated in one platform can run in any platform if the associated platform has a JRE installed in it. As in this course, we need to write source codes and compile them, we should download and install JDK.

Installing JDK and Configuring Environment Variable

Till now, we have downloaded and installed a text editor for writing java codes and we have downloaded JDK. Before installing JDK in our PC, first we should check whether it is already installed or not. The following steps illustrate the process:

Step 1: Go to ***Start***
Step 2: Type ***cmd*** and open ***Command Prompt***.
Step 3: Give a command ***java*** and hit the ***Enter*** key.

After Step 3, there will be any of the following two cases:

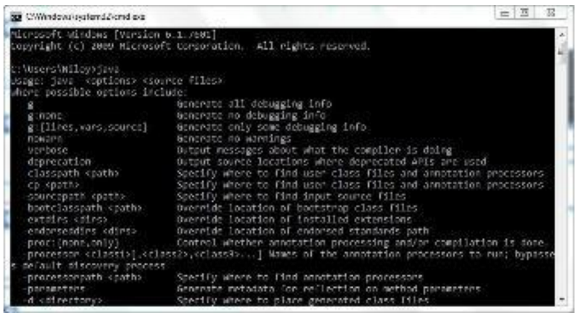


```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>java
'java ' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Niloy>
```

Case 1: Not Installed



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>java
Usage: java  <options> <source files>
where possible options include:
  g                          Generate all debugging info
  g:none                     Generate no debugging info
  g:[lines,vars,source]      Generate only some debugging info
  nowarn                     Generate no warnings
  verbose                    Output messages about what the compiler is doing
  deprecation                Output source locations where deprecated APIs are used
  classpath <path>           Specify where to find user class files and annotation processors
  cp <path>                  Specify where to find user class files and annotation processors
  sourcepath <path>          Specify where to find input source files
  bootclasspath <path>       Override location of bootstrap class files
  extdirs <dirs>             Override location of installed extensions
  endorseddirs <dirs>        Override location of endorsed standards path
  proc:{none,only}           Control whether annotation processing and/or compilation is done.
  processor <class1>[,<class2>,<class3>...] Names of the annotation processors to run; bypasse
s default discovery process
  -processorpath <path>      Specify where to find annotation processors
  -parameters                Generate metadata for reflection on method parameters
  -d <directory>             Specify where to place generated class files
```

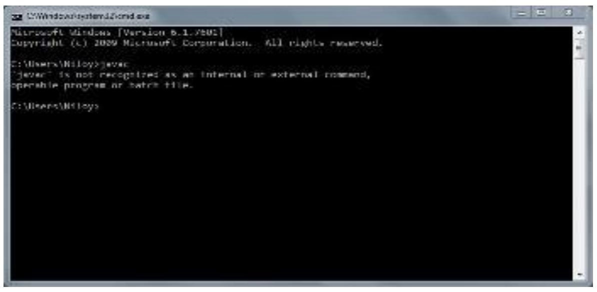
Case 2: Installed

Step 4: If "***Not Installed***", Install ***JDK*** and go to 5. Else go to 5.

Step 5: Open ***Command Prompt*** again.

Step 6: Give a command ***javac*** and hit the ***Enter*** key.

After Step 6, there will be any of the following two cases:

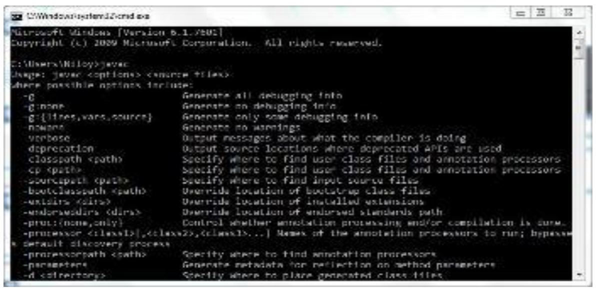


```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>javac
'javac' is not recognized as an internal or external command,
operable program or batch file.

C:\Users\Niloy>
```

Case 1: Path Not Configured



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>javac
Usage: javac <options> <source files>
where possible options include:
  -g                         Generate all debugging info
  -g:none                    Generate no debugging info
  -g:{lines,vars,source}     Generate only some debugging info
  -nowarn                    Generate no warnings
  verbose                    Output messages about what the compiler is doing
  deprecation                Output source locations where deprecated APIs are used
  classpath <path>           Specify where to find user class files and annotation processors
  cp <path>                  Specify where to find user class files and annotation processors
  -sourcepath <path>         Specify where to find input source files
  -bootclasspath <path>      Override location of bootstrap class files
  -extdirs <dirs>            Override location of installed extensions
  -endorseddirs <dirs>       Override location of endorsed standards path
  -proc:{none,only}          Control whether annotation processing and/or compilation is done.
  -processor <class1>[,<class2>,<class3>...] Names of the annotation processors to run; bypasse
s default discovery process
  -processorpath <path>      Specify where to find annotation processors
  -parameters                Generate metadata for reflection on method parameters
  -d <directory>             Specify where to place generated class files
```

Case 2: Path Configured

Step 7: Configure Environment Variable

(a) Go to ***This PC***

(b) Go to ***C Drive***

(c) Go to ***Program Files***

(d) Go to ***Java***

(e) Go to ***jdk1.8.xxxx***

(xxxx is the version number)

(f) Go to ***bin***

(g) Copy the path specified in the picture

Step 8: Now to paste the copied path:

(a) Right Click on ***This PC*** and select ***Properties***

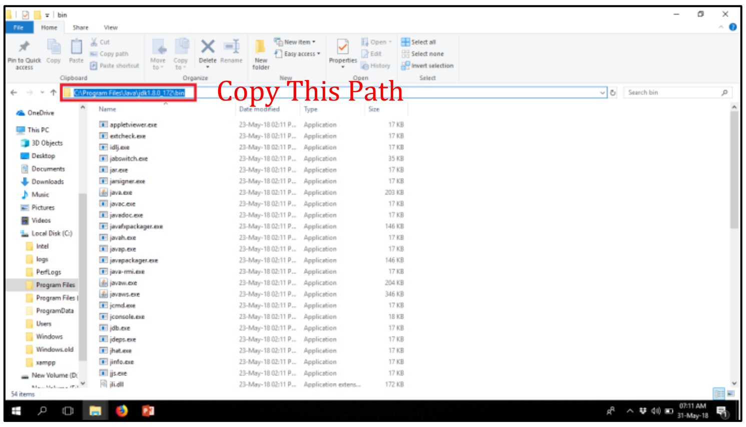
(b) Click on ***Advanced System Settings***

(c) Select ***Environment Variable***

(d) Select ***Path*** from the bottom box and click on ***Edit***

(e) Click on ***New***

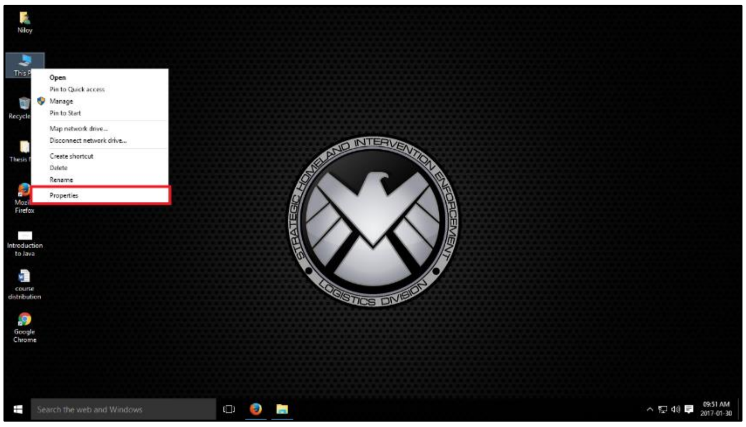
(f) Paste the path and click on ***OK***.



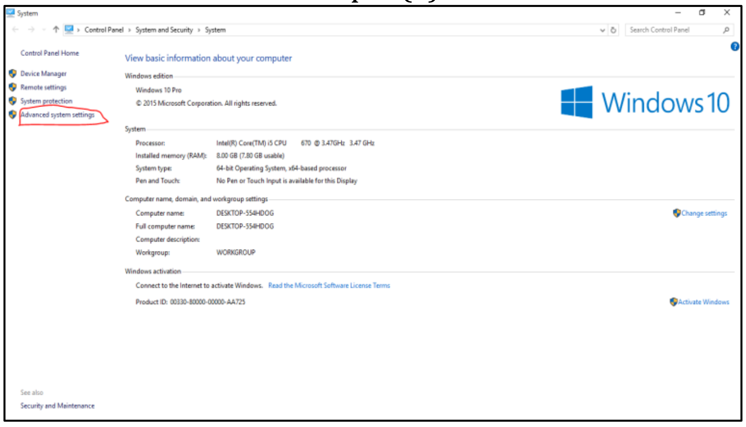
C:\Program Files\Java\jdk1.8.0_172\bin

Name	Date modified	Type	Size
appletviewer.exe	23-May-18 02:11 P...	Application	17 KB
extcheck.exe	23-May-18 02:11 P...	Application	17 KB
idlj.exe	23-May-18 02:11 P...	Application	17 KB
jabswitch.exe	23-May-18 02:11 P...	Application	35 KB
jar.exe	23-May-18 02:11 P...	Application	17 KB
jarsigner.exe	23-May-18 02:11 P...	Application	17 KB
java.exe	23-May-18 02:11 P...	Application	203 KB
javac.exe	23-May-18 02:11 P...	Application	17 KB
javadoc.exe	23-May-18 02:11 P...	Application	17 KB
javafxpackager.exe	23-May-18 02:11 P...	Application	146 KB
javah.exe	23-May-18 02:11 P...	Application	17 KB
javap.exe	23-May-18 02:11 P...	Application	17 KB
javapackager.exe	23-May-18 02:11 P...	Application	146 KB
java-rmi.exe	23-May-18 02:11 P...	Application	17 KB
javaw.exe	23-May-18 02:11 P...	Application	204 KB
javaws.exe	23-May-18 02:11 P...	Application	346 KB
jcmd.exe	23-May-18 02:11 P...	Application	17 KB
jconsole.exe	23-May-18 02:11 P...	Application	18 KB
jdb.exe	23-May-18 02:11 P...	Application	17 KB
jdeps.exe	23-May-18 02:11 P...	Application	17 KB
jhat.exe	23-May-18 02:11 P...	Application	17 KB
jinfo.exe	23-May-18 02:11 P...	Application	17 KB
jjs.exe	23-May-18 02:11 P...	Application	17 KB
jli.dll	23-May-18 02:11 P...	Application extens...	172 KB

Step 7



Step 8 (a)



View basic information about your computer

Windows edition

Windows 10 Pro

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System

Processor:	Intel(R) Core(TM) i5 CPU 670 @ 3.47GHz 3.47 GHz
Installed memory (RAM):	8.00 GB (7.80 GB usable)
System type:	64-bit Operating System, x64-based processor
Pen and Touch:	No Pen or Touch Input is available for this Display

Computer name, domain, and workgroup settings

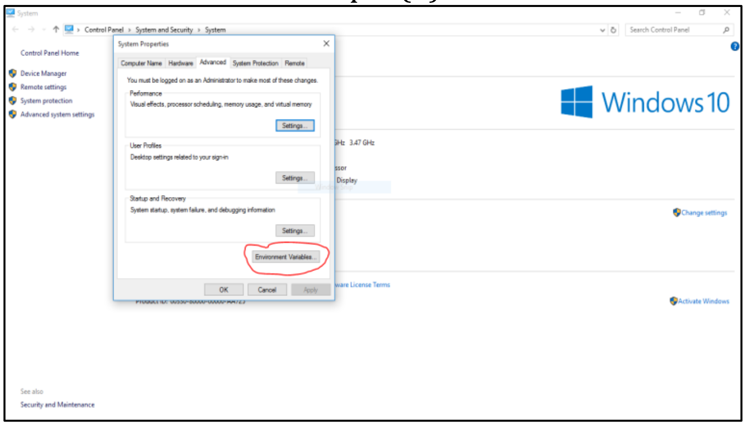
Computer name:	DESKTOP-554HDOG
Full computer name:	DESKTOP-554HDOG
Computer description:	
Workgroup:	WORKGROUP

Windows activation

Connect to the Internet to activate Windows. Read the Microsoft Software License Terms

Product ID: 00330-80000-00000-AA725

Step 8 (b)



You must be logged on as an Administrator to make most of these changes.

Performance

Visual effects, processor scheduling, memory usage, and virtual memory

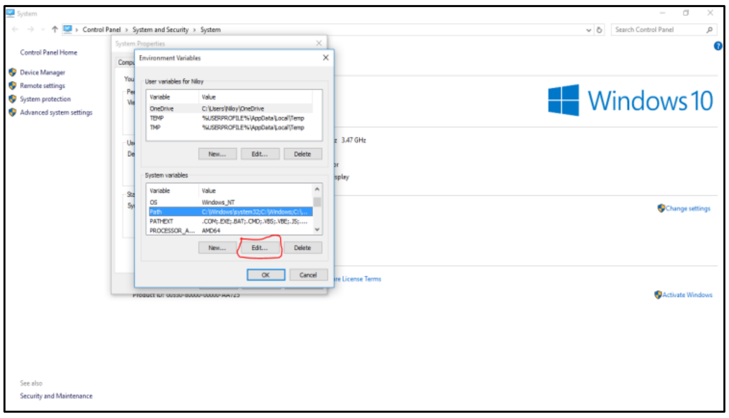
User Profiles

Desktop settings related to your sign-in

Startup and Recovery

System startup, system failure, and debugging information

Step 8 (c)



Environment Variables

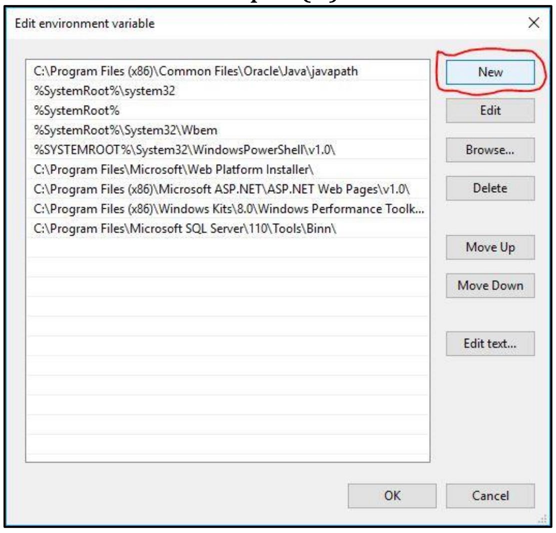
User variables for Niloy

Variable	Value
OneDrive	C:\Users\Niloy\OneDrive
TEMP	%USERPROFILE%\AppData\Local\Temp
TMP	%USERPROFILE%\AppData\Local\Temp

System variables

Variable	Value
OS	Windows_NT
Path	C:\Windows\system32;C:\Windows;C:\...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;....
PROCESSOR_A...	AMD64

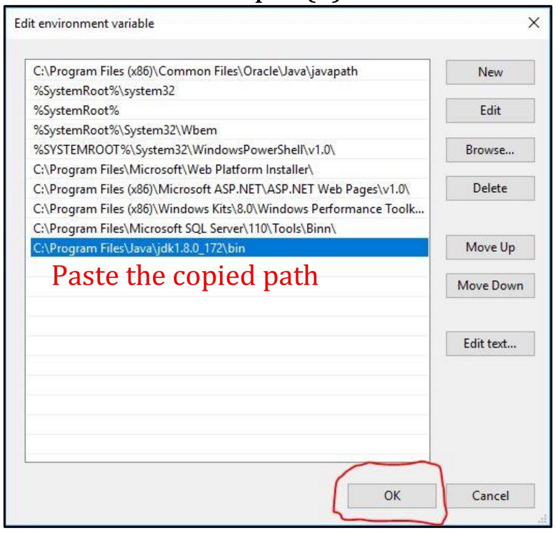
Step 8 (d)



Edit environment variable

```
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
C:\Program Files\Microsoft\Web Platform Installer\
C:\Program Files (x86)\Microsoft ASP.NET\ASP.NET Web Pages\v1.0\
C:\Program Files (x86)\Windows Kits\8.0\Windows Performance Toolk...
C:\Program Files\Microsoft SQL Server\110\Tools\Binn\
```

Step 8 (e)



Edit environment variable

```
C:\Program Files (x86)\Common Files\Oracle\Java\javapath
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
C:\Program Files\Microsoft\Web Platform Installer\
C:\Program Files (x86)\Microsoft ASP.NET\ASP.NET Web Pages\v1.0\
C:\Program Files (x86)\Windows Kits\8.0\Windows Performance Toolk...
C:\Program Files\Microsoft SQL Server\110\Tools\Binn\
C:\Program Files\Java\jdk1.8.0_172\bin
```

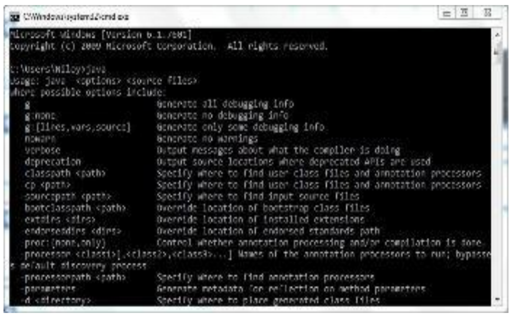
Paste the copied path

Step 8 (f)

Step 11: Open ***Command Prompt*** again and give the ***java*** command again.

Step 12: Give the ***javac*** command again.

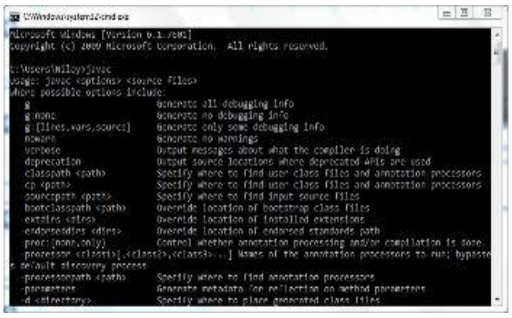
The following two cases should appear respectively:



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>java
Usage: javac <options> <source files>
where possible options include:
  -g                         Generate all debugging info
  -g:none                    Generate no debugging info
  -g:{lines,vars,source}     Generate only some debugging info
  -nowarn                    Generate no warnings
  -verbose                   Output messages about what the compiler is doing
  -deprecation               Output source locations where deprecated APIs are used
  -classpath <path>          Specify where to find user class files and annotation processors
  -cp <path>                 Specify where to find user class files and annotation processors
  -sourcepath <path>         Specify where to find input source files
  -bootclasspath <path>      Override location of bootstrap class files
  -extdirs <dirs>            Override location of installed extensions
  -endorseddirs <dirs>       Override location of endorsed standards path
  -proc:{none,only}          Control whether annotation processing and/or compilation is done.
  -processor <class1>[,<class2>,<class3>...] Names of the annotation processors to run; bypasse
s default discovery process
  -processorpath <path>      Specify where to find annotation processors
  -parameters                Generate metadata for reflection on method parameters
  -d <directory>             Specify where to place generated class files
```

Step 11



```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\Niloy>javac
Usage: javac <options> <source files>
where possible options include:
  -g                         Generate all debugging info
  -g:none                    Generate no debugging info
  -g:{lines,vars,source}     Generate only some debugging info
  -nowarn                    Generate no warnings
  -verbose                   Output messages about what the compiler is doing
  -deprecation               Output source locations where deprecated APIs are used
  -classpath <path>          Specify where to find user class files and annotation processors
  -cp <path>                 Specify where to find user class files and annotation processors
  -sourcepath <path>         Specify where to find input source files
  -bootclasspath <path>      Override location of bootstrap class files
  -extdirs <dirs>            Override location of installed extensions
  -endorseddirs <dirs>       Override location of endorsed standards path
  -proc:{none,only}          Control whether annotation processing and/or compilation is done.
  -processor <class1>[,<class2>,<class3>...] Names of the annotation processors to run; bypasse
s default discovery process
  -processorpath <path>      Specify where to find annotation processors
  -parameters                Generate metadata for reflection on method parameters
  -d <directory>             Specify where to place generated class files
```

Step 12

Creating a Java Project

After we have completed installing JDK and configuring environment path variable, we will now create our 1st Java project. We can follow the following steps:

Step 1: Go to Your ***preferred directory*** (Any drive apart from ***C Drive***) and Create a **folder**. We will create all the projects inside this folder. You may name this folder as per your wish. Let us assume that the name of this folder is ***"Java Projects".***

Step 2: We will be creating separate folders for each of our projects. So, inside the ***Java Projects*** folder, create another folder. The name of this folder should indicate what project we are doing inside it. For Example: we are going to do a "***Hello World"*** application as our 1st project. So, let's name this folder "***HelloWorldApp***".

Step 3: Inside the ***HelloWorldApp*** folder we will create a text file. We will have to rename this file as per the name of the class we will be writing in it. It is because of the coding convention of writing one class inside one file. Let's assume that the name of the class will be ***Hello.*** So, we have to rename the file as ***Hello*** and we also need to change the extension of file from ***.txt*** to ***.java***.

We have now successfully completed creating our 1st project in Java. All that remains is just to write a code in the ***Hello.java*** and start our journey of exploring the magic of Java.

The Hello World Program

The following is the Hello World Program that we will be writing inside the ***Hello.java*** file:

```
public class Hello
{
        public static void main(String [ ]args)
        {
                System.out.println("Hello World");
        }
}
```

Compiling and Running a Java Project

After writing the above code in the ***Hello.java*** file, we need to compile it. But, before compiling we have to save the file. If we do not save the file, unsaved file with partial code or even in some cases an empty file with no code will be compiled.

As we stated earlier that, we will be giving commands in command prompt to compile and run our code, first we need to open command prompt in the directory we have saved our code (in this case, in the HelloWorldApp folder).

After opening the command prompt, we have to use the ***javac*** command to compile the ***Hello.java*** file. We need to write the following and hit the ***Enter*** key:

```
javac   Hello.java
```

If there is any error in the code, it will be shown in the command prompt. If there is no error in the code, the ***Hello.java*** file will be compiled successfully and a ***Hello.class*** file will be generated inside the ***HelloWorldApp*** folder. Now, to run the code we have to use the ***java*** command and specify the name of the class that contains the main method (in this case, the class name is ***Hello***) in the command prompt. So, we need to write the following and hit the ***Enter*** key:

```
java   Hello
```

The code will run and will display the sentence "***Hello World***" as output.

Practice

- ✓ Create a Project named ***Test*** in java that has one class named ***Test*** in it. The Test class contains the main method and the main method prints the sentence "***This is a Test***".