Developer WorkBench for JEE Lab Book

Document Revision History

Date	Revision No.	Author	Summary of Changes
01-Nov -11	1.0	Rathnajothi Perumalsamy	
5-6-2016	1.1	Zainab Kulkarni	ANT was replaced with MAVEN

Table of Contents

Getting Started

Overview

This lab book is a guided tour for learning Maven tool and PMD tool. It comprises step by step guidance and 'To Do' assignments. Follow the steps provided in the solved examples and work out the 'To Do' assignments given which will expose you to working with Java applications.

Setup Checklist for Maven and PMD

Here is what is expected on your machine in order for the lab to work.

Minimum System Requirements

- Intel Pentium 90 or higher (P166 recommended)
- Microsoft Windows 95, 98, or NT 4.0, 2k, XP.
- Memory: 32MB of RAM (64MB or more recommended)
- Internet Explorer 6.0 or higher
- MS-Access/Connectivity to Oracle database
- Apache Tomcat Version 5.0.
- Apache Maven 3.0

Please ensure that the following is done:

- Eclipse Luna is installed.
- JDK 1.8 is installed. (This path is henceforth referred as <java_install_dir>)
- Wildfly 8.1

Instructions

- For all coding standards refer Appendix A. All lab assignments should refer coding standards.
- Create a directory by your name in drive <drive>. In this directory, create a subdirectory java_assgn. For each lab exercise create a directory as lab <lab number>.

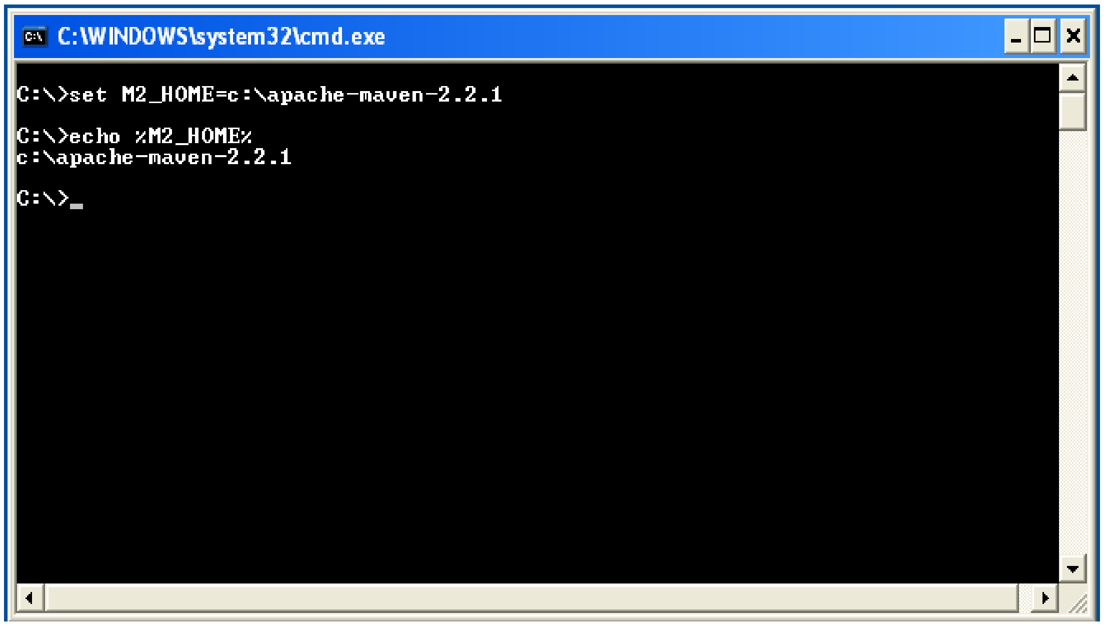
Lab 1. Getting Started With Maven

Goals	• Learn and Understand the process of • Setting environment variables • Configuring Maven settings • Creating a simple Maven Project using commands
Time	60 minutes

1.1: Setting environmental variables

Step1: set M2_Home to Maven Installation Directory using the following command:

- **set** M2_**HOME= C:\apache-maven-version.**



```
C:\>set M2_HOME=c:\apache-maven-2.2.1

C:\>echo %M2_HOME%
c:\apache-maven-2.2.1

C:\>_
```

Figure 1: Environmental Variable

Step 2: Set **JAVA_HOME** to Jdk1.8.0_31 using the following command:

- **set JAVA_HOME= C:**\Program Files\Java\jdk1.8.0_31

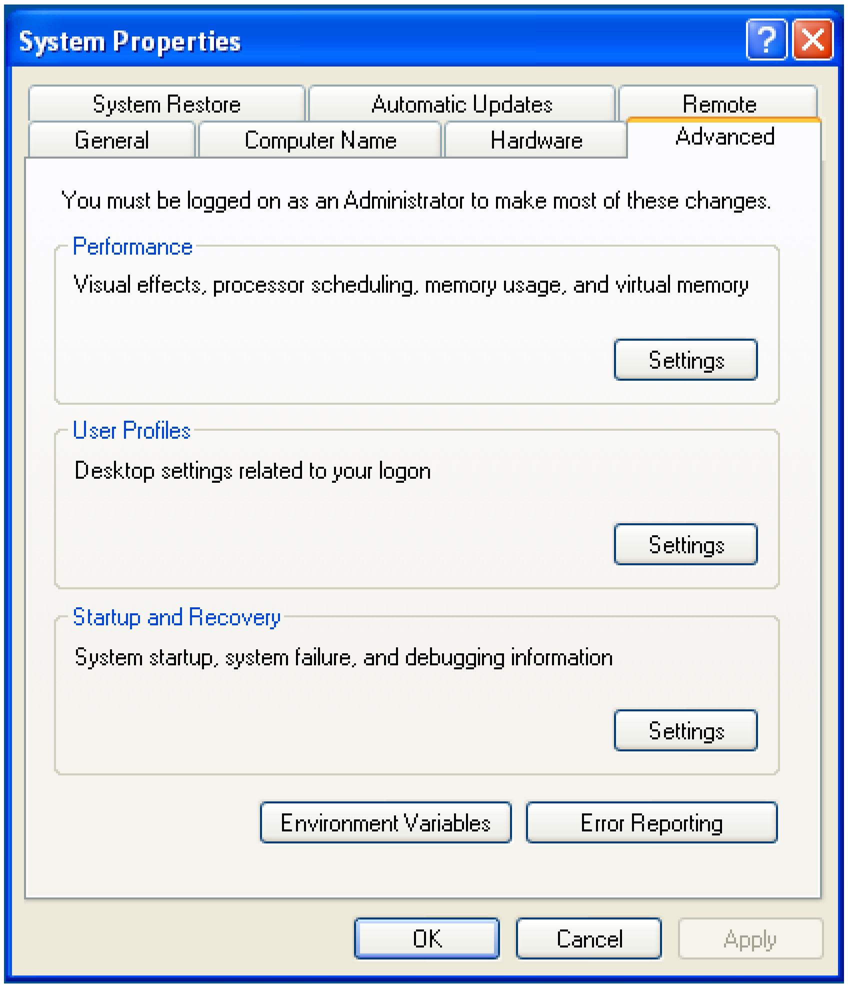
Step 3: Set PATH environment variable:

- **Set PATH=%PATH%;%JAVA_HOME%\bin;%M2_HOME%\bin;**

Alternatively follow the following steps for setting the environment variables

Alternate approach:

Step 1: Right click **My Computers**, and select **Properties→Environment Variables**.



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

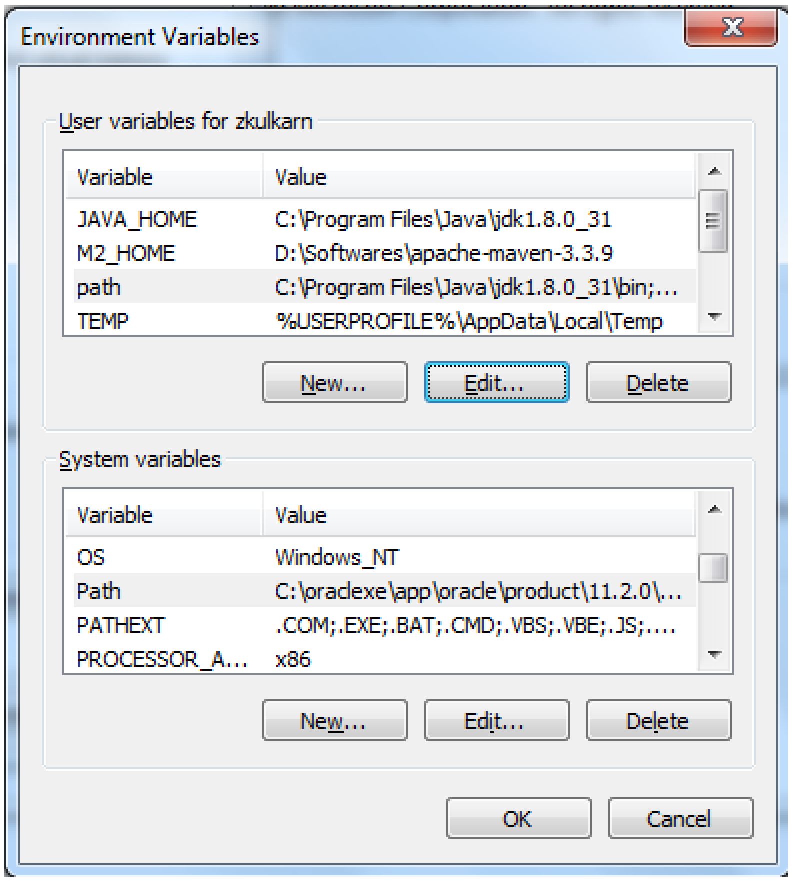
Desktop settings related to your logon

Startup and Recovery

System startup, system failure, and debugging information

Figure 2: System Properties

Step 2: Click **Environment Variables**. The Environment Variables window will be displayed.



Environment Variables

User variables for zkulkarn

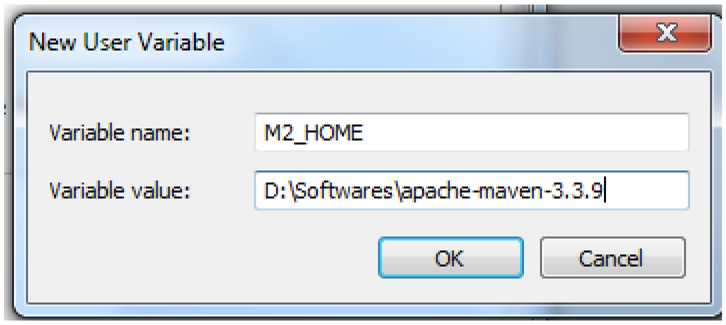
Variable	Value
JAVA_HOME	C:\Program Files\Java\jdk1.8.0_31
M2_HOME	D:\Softwares\apache-maven-3.3.9
path	C:\Program Files\Java\jdk1.8.0_31\bin;...
TEMP	%USERPROFILE%\AppData\Local\Temp

System variables

Variable	Value
OS	Windows_NT
Path	C:\oraclexe\app\oracle\product\11.2.0\...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;....
PROCESSOR_A...	x86

Figure 3: Environment Variables

Step 3: Create a new user variable M2_HOME by clicking on edit and set the path of Apache Maven installation path as shown in the figure.

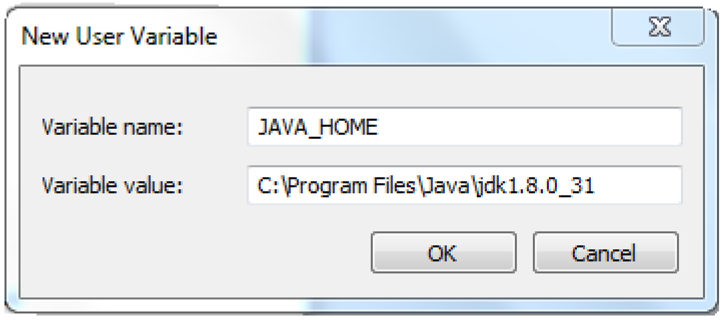


Variable name: M2_HOME

Variable value: D:\Softwares\apache-maven-3.3.9

Figure 4: Edit User Variable

Step 4: Click **JAVA_HOME** System Variable if it already exists, or create a new one and set the path of JDK1.8.0_31 as shown in the figure.

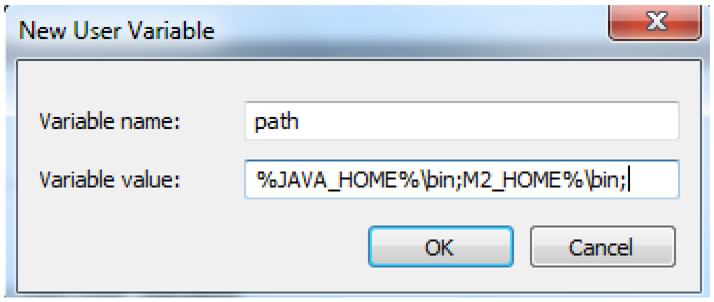


Variable name: JAVA_HOME

Variable value: C:\Program Files\Java\jdk1.8.0_31

Figure 5: Edit User Variable

Step 5: Click **PATH** System Variable and set it as ***%JAVA_HOME%\bin*;%M2_HOME%\bin;**



Variable name: path

Variable value: %JAVA_HOME%\bin;M2_HOME%\bin;

Figure 6: Edit User Variable

1.2 Configuring Maven Settings:

Step 1: Edit settings.xml to configure the proxy settings for downloading artifacts from remote repository.

```
<settings>
….
        <proxies>
                <proxy>
                        <active>true</active>
                        <protocol>http</protocol>
                        <host>proxy.mycompany.com</host>
                        <port>8080</port>
                        <username>your-username</username>
                        <password>your-password</password>
                </proxy>
        </proxies>
```

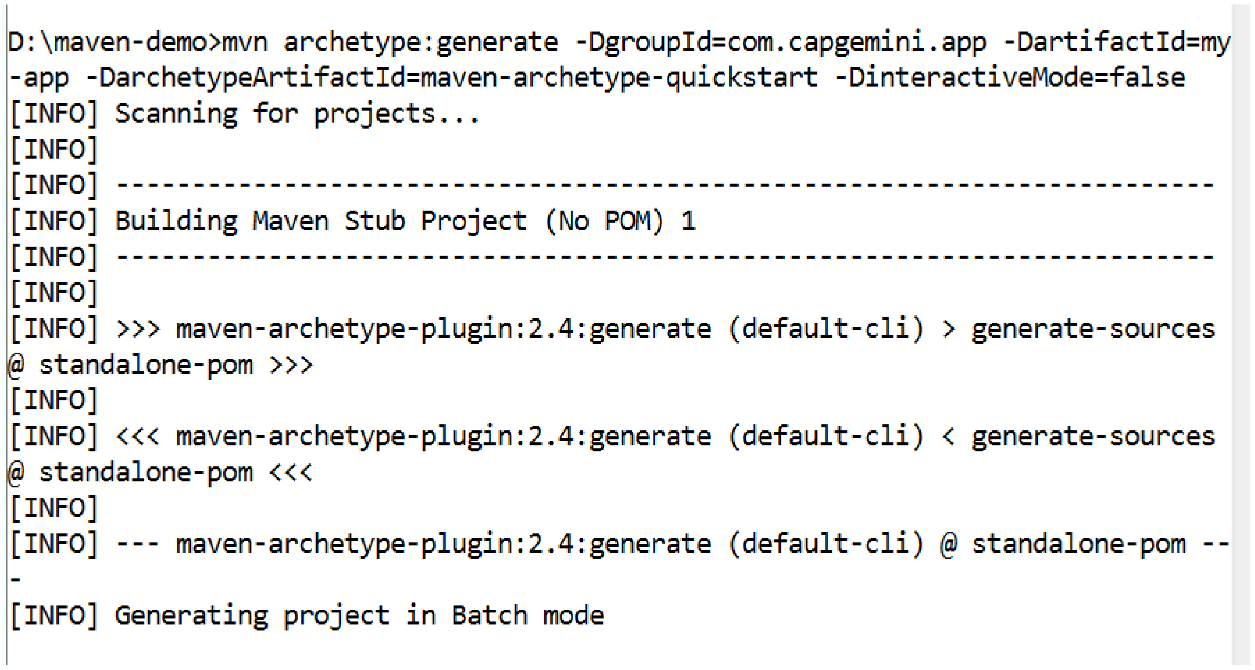
Figure 7: settings.xml

1.3 Creating first standalone Maven application using archetype:

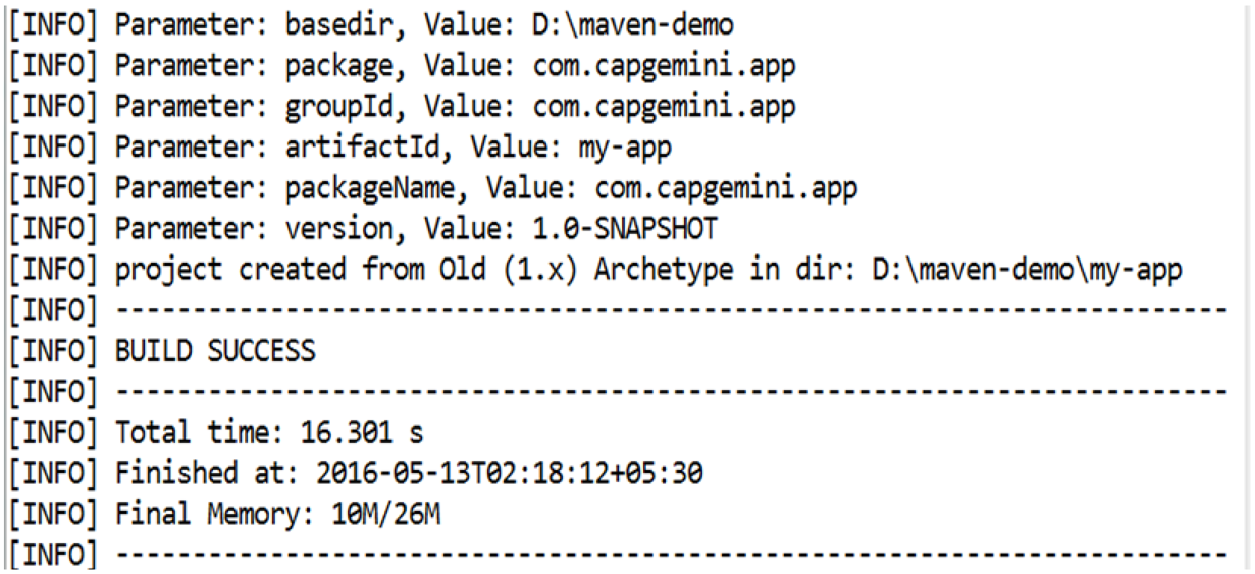
Step 1: Execute the following command to create Maven Project

```
mvnarchetype:generate-DgroupId=com.capgemini.app-DartifactId=my-app -DarchetypeArtifactId=maven-archetype-quickstart-DinteractiveMode=false
```

The execution of the above command should result into the display of archetypes as shown below:



```
D:\maven-demo>mvn archetype:generate -DgroupId=com.capgemini.app -DartifactId=my
-app -DarchetypeArtifactId=maven-archetype-quickstart -DinteractiveMode=false
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building Maven Stub Project (No POM) 1
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] >>> maven-archetype-plugin:2.4:generate (default-cli) > generate-sources
@ standalone-pom >>>
[INFO]
[INFO] <<< maven-archetype-plugin:2.4:generate (default-cli) < generate-sources
@ standalone-pom <<<
[INFO]
[INFO] --- maven-archetype-plugin:2.4:generate (default-cli) @ standalone-pom --
-
[INFO] Generating project in Batch mode
```



```
[INFO] Parameter: basedir, Value: D:\maven-demo
[INFO] Parameter: package, Value: com.capgemini.app
[INFO] Parameter: groupId, Value: com.capgemini.app
[INFO] Parameter: artifactId, Value: my-app
[INFO] Parameter: packageName, Value: com.capgemini.app
[INFO] Parameter: version, Value: 1.0-SNAPSHOT
[INFO] project created from Old (1.x) Archetype in dir: D:\maven-demo\my-app
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 16.301 s
[INFO] Finished at: 2016-05-13T02:18:12+05:30
[INFO] Final Memory: 10M/26M
[INFO] ------------------------------------------------------------------------
```

Figure 8: Creating first standalone Maven application using archetype

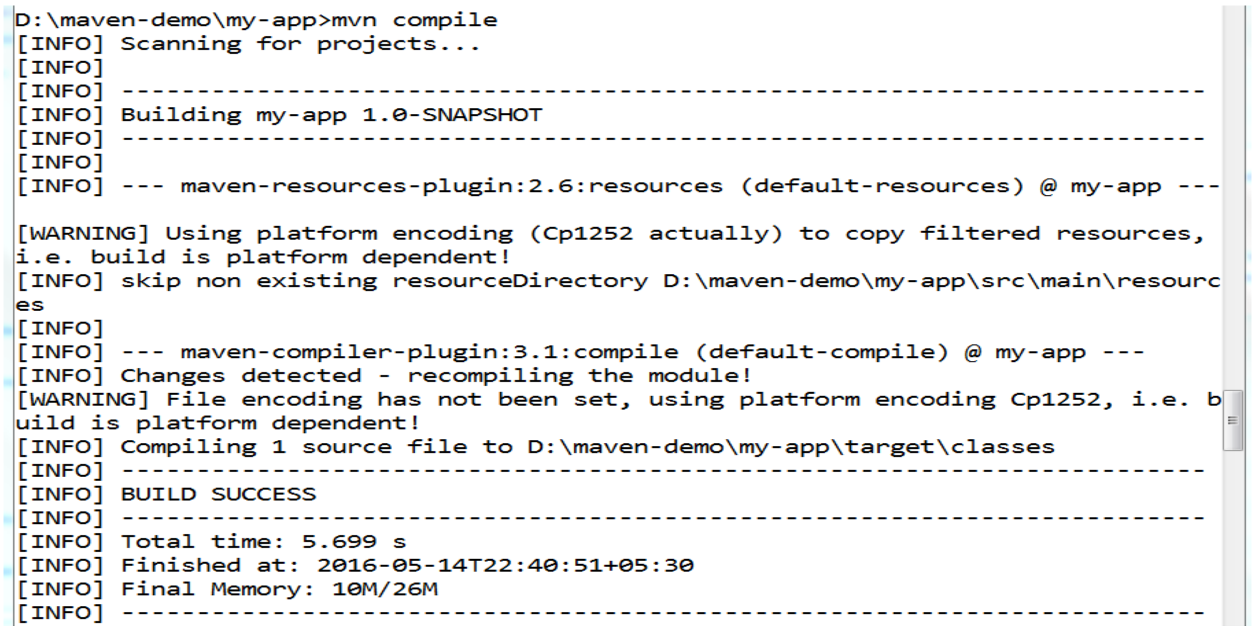
Step 2: After successful execution of the command, Maven will create the project directory my-app having pom.xml with the contents shown below.

Keep the application specific files in ${basedir}/src/main/java and test sources reside in ${basedir}/src/test/java, where ${basedir} represents the directory containing pom.xml.

```
<project>
        <modelVersion>4.0.0</modelVersion>
        <groupId>com.capgemini.app</groupId>
        <artifactId>my-app</artifactId>
        <packaging>jar</packaging>
        <version>1.0</version>
        <name>my-app</name>
        <url>http://maven.apache.org</url>
        <dependencies>
                <dependency>
                        <groupId>junit</groupId>
                        <artifactId>junit</artifactId>
                        <version>4.11</version>
```

Figure 9: Sample pom.xml

Step 3: Execute the "mvn compile" command to compile your application sources as shown below:



```
D:\maven-demo\my-app>mvn compile
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] Building my-app 1.0-SNAPSHOT
[INFO] ------------------------------------------------------------------------
[INFO]
[INFO] --- maven-resources-plugin:2.6:resources (default-resources) @ my-app ---

[WARNING] Using platform encoding (Cp1252 actually) to copy filtered resources,
i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory D:\maven-demo\my-app\src\main\resourc
es
[INFO]
[INFO] --- maven-compiler-plugin:3.1:compile (default-compile) @ my-app ---
[INFO] Changes detected - recompiling the module!
[WARNING] File encoding has not been set, using platform encoding Cp1252, i.e. b
uild is platform dependent!
[INFO] Compiling 1 source file to D:\maven-demo\my-app\target\classes
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 5.699 s
[INFO] Finished at: 2016-05-14T22:40:51+05:30
[INFO] Final Memory: 10M/26M
[INFO] ------------------------------------------------------------------------
```

Figure 10: Compiling Sample Project

Step 4: Unit testing of the project can be performed by executing the following command:

mvn test

After successful execution of the command, the test result will be displayed which comprises the details such as test run,failures, errors...

Step 5: Artifact can be packaged and installed into local repository using commands such as
mvn package and mvn install.

- mvn package packages the artifact based on the packaging type specified in the pom.xml.
- mvn install installs the packaged artifact into the local repository.

Step 6: Basic Standard site for project can also be created using command mvn site.

<<TODO>>

Assignment-1: Create a Banking System project in maven which maintains two kinds of accounts for customers, one called savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book but no interest. Current account holders should have a minimum balance else they should pay service charges. Build, test and deploy the project into local repository.

Lab 2. Integrating Maven with Eclipse

Goals	• Learn and Understand the process of • Installing m2eclipse plugin • Configure environment to run Maven Project • Creating a simple Maven Project in eclipse
Time	60 minutes

2.1: Configure environment to run Maven project

Step1: To execute Maven project, eclipse needs to be run using JDK instead of JRE.

Step2: Start the eclipse now, tocreate a Maven Project and run successfully.

2.2: Creating a sample Maven project

Create a simple java project named ‘myproject’.

Solution:

Step 1: Open **eclipse3.3**.

Step 2: Select **File→New→Project →Maven project**.

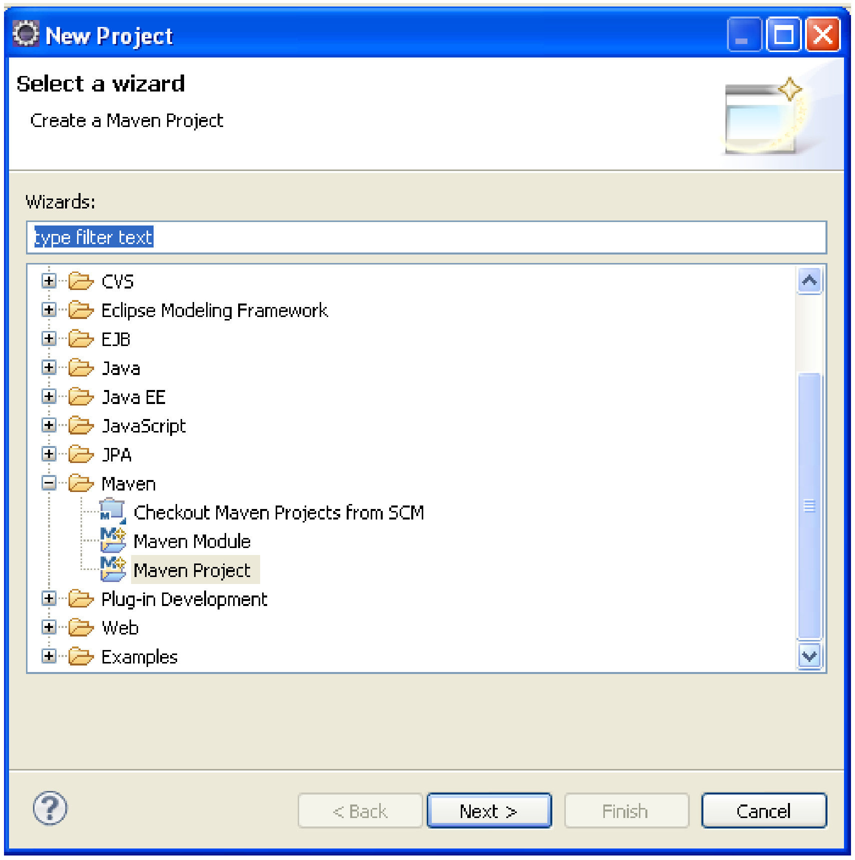
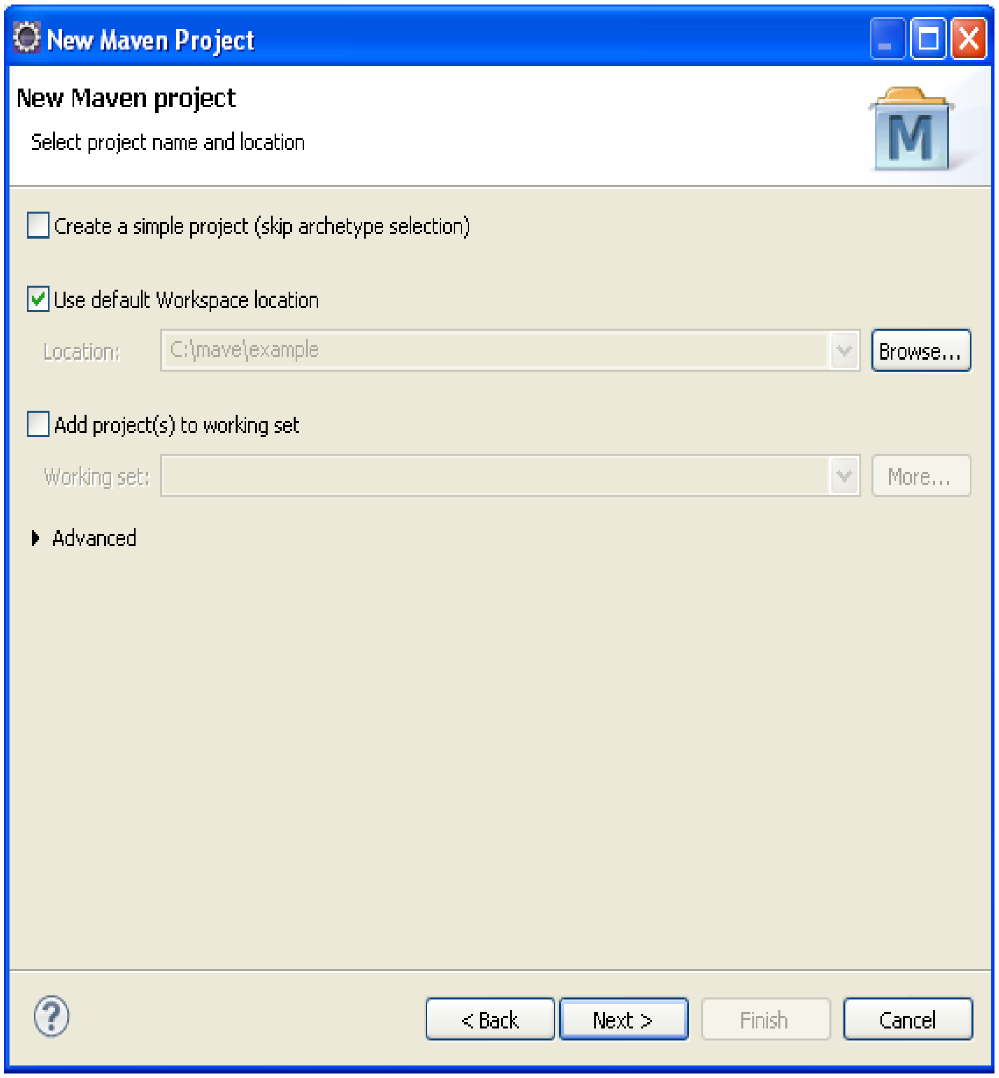


Figure 9: Select Wizard in Eclipse

Step 3: Choose Maven Project and use the default Workspace location or specify the location if necessary.


New Maven Project

New Maven project

Select project name and location

[ ] Create a simple project (skip archetype selection)

[✓] Use default Workspace location

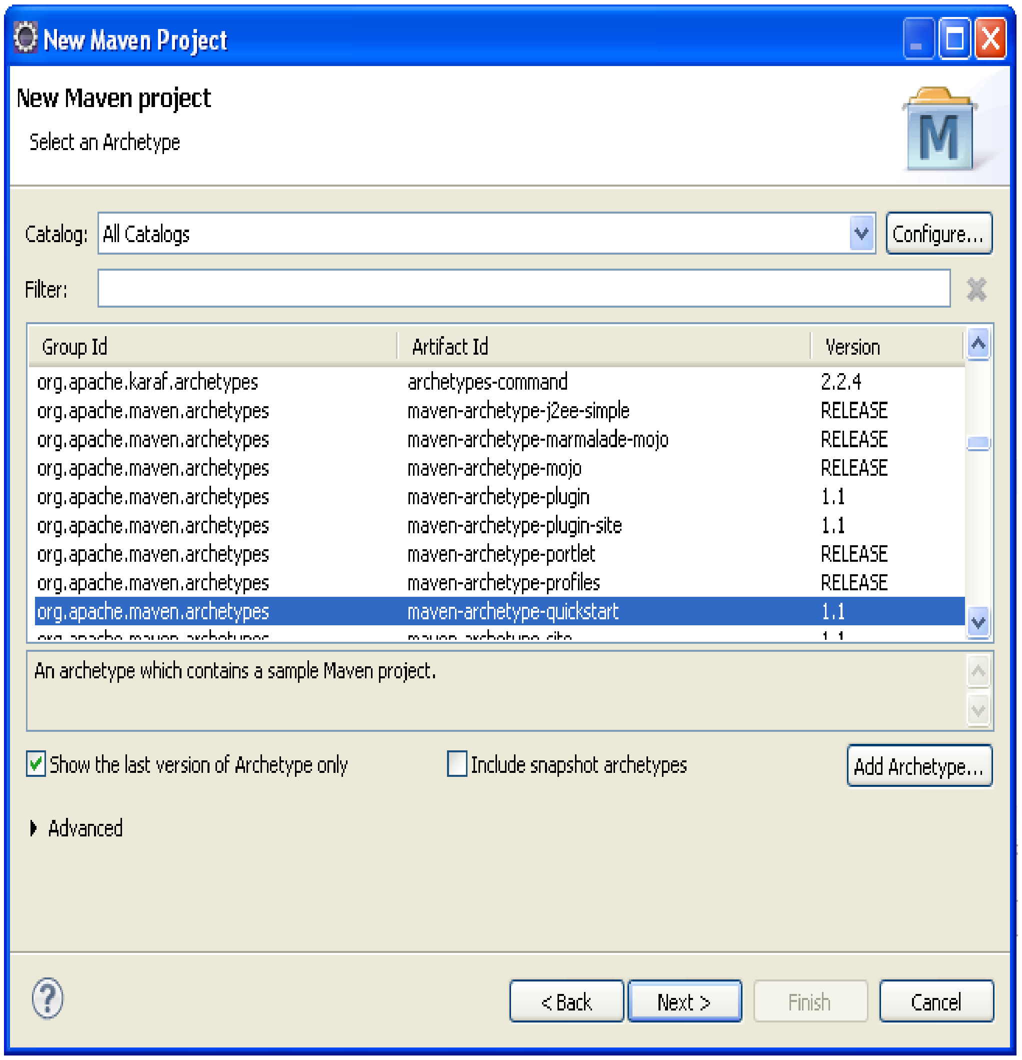
Location: C:\mave\example

[ ] Add project(s) to working set

Working set:

Figure 10: New Maven Project

Step 4: Select the maven-archetype-quickstart archetype from the list.



Catalog: All Catalogs

Filter:

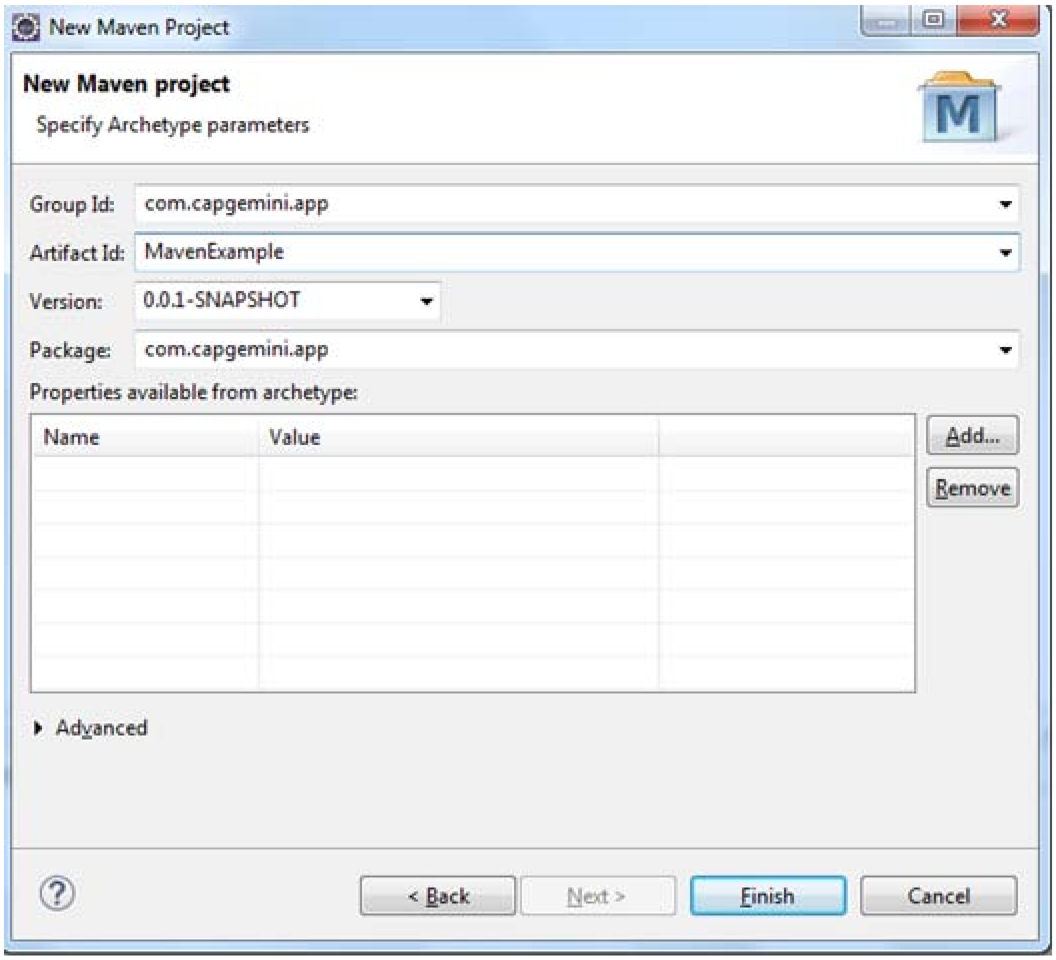
Group Id	Artifact Id	Version
org.apache.karaf.archetypes	archetypes-command	2.2.4
org.apache.maven.archetypes	maven-archetype-j2ee-simple	RELEASE
org.apache.maven.archetypes	maven-archetype-marmalade-mojo	RELEASE
org.apache.maven.archetypes	maven-archetype-mojo	RELEASE
org.apache.maven.archetypes	maven-archetype-plugin	1.1
org.apache.maven.archetypes	maven-archetype-plugin-site	1.1
org.apache.maven.archetypes	maven-archetype-portlet	RELEASE
org.apache.maven.archetypes	maven-archetype-profiles	RELEASE
org.apache.maven.archetypes	maven-archetype-quickstart	1.1
org.apache.maven.archetypes	maven-archetype-site	1.1

An archetype which contains a sample Maven project.

[✓] Show the last version of Archetype only
[ ] Include snapshot archetypes

Figure 11: Selecting an archetype

Step 5: Enter the project coordinate details such as Group Id, Artifact Id and click 'Finish'

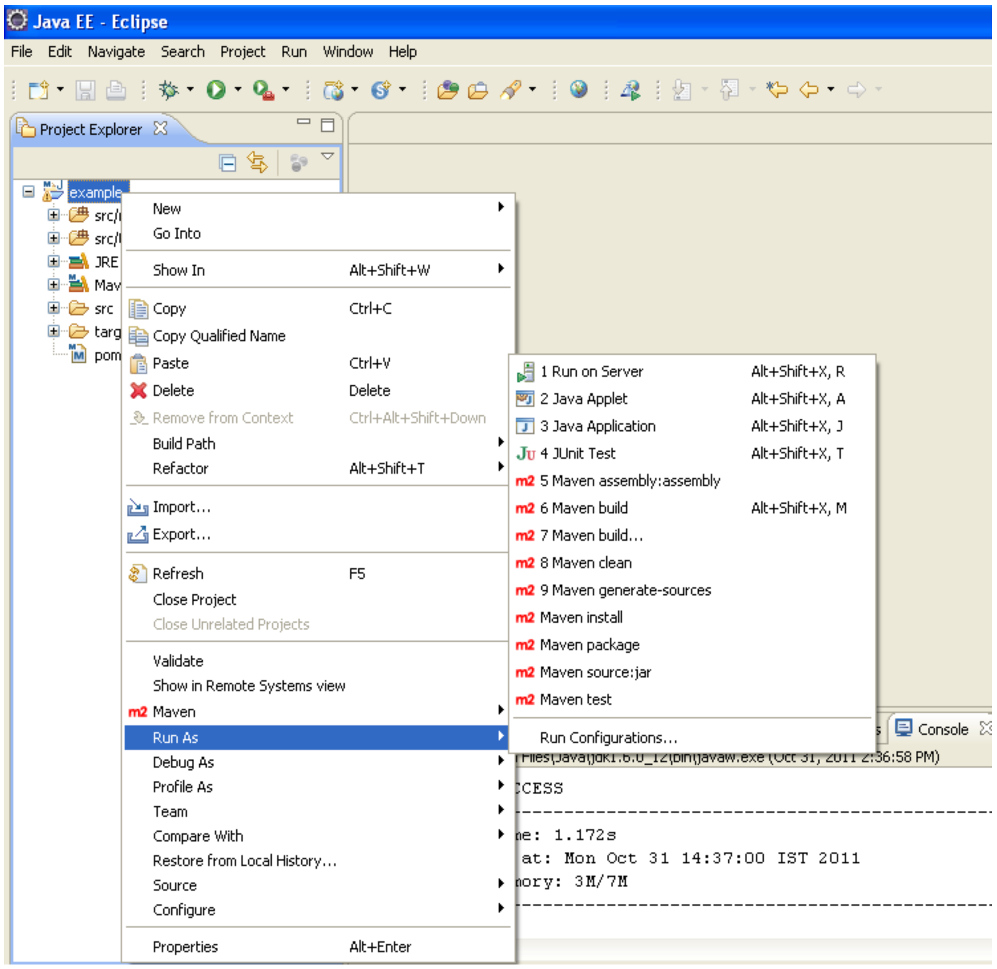


Group Id: com.capgemini.app
Artifact Id: MavenExample
Version: 0.0.1-SNAPSHOT
Package: com.capgemini.app
Properties available from archetype:

Name	Value

Figure 12: Specifying Archetype Parameters

Step 6: To build the project, right click on project named “examples” and choose Maven Build under Run As option.



```
Files\Java\jdk1.6.0_12\bin\javaw.exe (Oct 31, 2011 2:36:58 PM)
CESS
------------------------------------------------
ne: 1.172s
 at: Mon Oct 31 14:37:00 IST 2011
mory: 3M/7M
------------------------------------------------
```

Figure 13: Building an Application

<<TODO>>

Assignment 1: Create aweb application which displays product details such as Product Name, Product description, and its price. Users can place orders specifying the quantity of each product. Once the order is placed by customer, the invoice for the current products transaction showing the product name, quantity ordered, price and total amount should be displayed. Build and execute the common life cycle phases for the web application in eclipse.

Assignment 2: Use the Assignment 1 in Lab 1, import the Banking system project into eclipse and build the project in eclipse environment.

Lab 3. PMD Tool

Goals	At the end of this lab session, you will be able to: o Install PMD. o Use PMD with Eclipse.
Time	90 minutes

2.1: Installing PMD

Solution:

Step 1: Download the latest binary distribution - i.e., pmd-bin-x.xx.zip from Http://pmd.sourceforge.net/index.html or obtain it from the faculty.

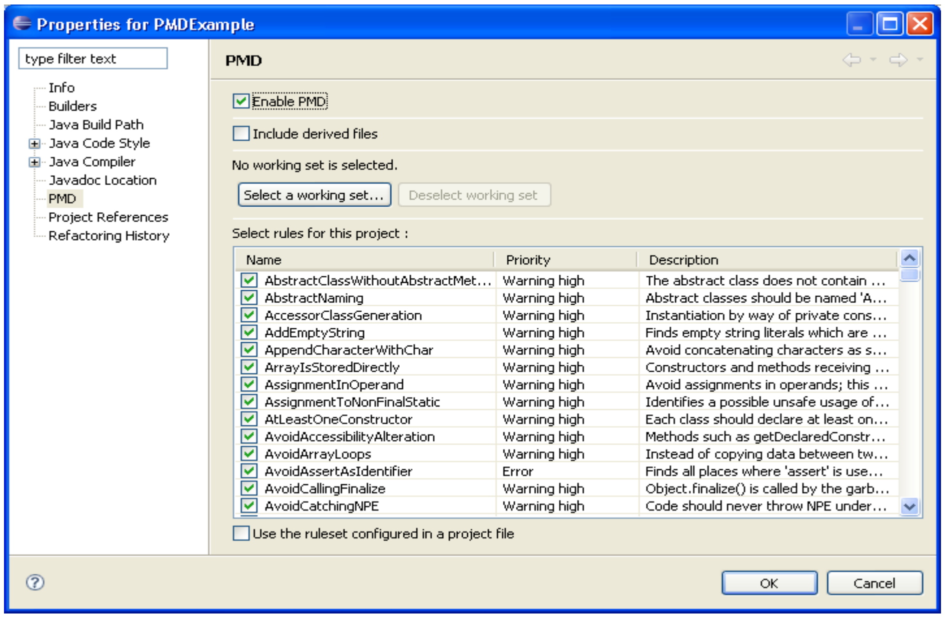
Step 2: Extract the contents of the downloaded zip file.

2.2 Using PMD with Eclipse

Solution:

Step 1: import the Project named **PMDExample**.

Step 2: select the project and click properties. Select PMD and check Enable PMD



[✓] Enable PMD

[ ] Include derived files

No working set is selected.

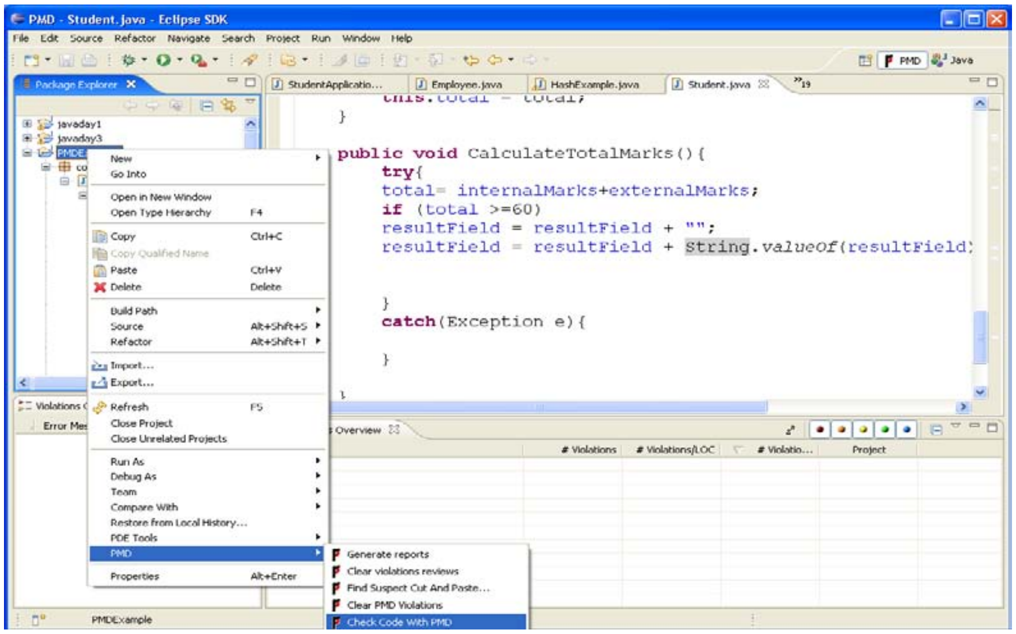
Select rules for this project :

Name	Priority	Description
✓ AbstractClassWithoutAbstractMet...	Warning high	The abstract class does not contain ...
✓ AbstractNaming	Warning high	Abstract classes should be named 'A...
✓ AccessorClassGeneration	Warning high	Instantiation by way of private cons...
✓ AddEmptyString	Warning high	Finds empty string literals which are ...
✓ AppendCharacterWithChar	Warning high	Avoid concatenating characters as s...
✓ ArrayIsStoredDirectly	Warning high	Constructors and methods receiving ...
✓ AssignmentInOperand	Warning high	Avoid assignments in operands; this ...
✓ AssignmentToNonFinalStatic	Warning high	Identifies a possible unsafe usage of...
✓ AtLeastOneConstructor	Warning high	Each class should declare at least on...
✓ AvoidAccessibilityAlteration	Warning high	Methods such as getDeclaredConstr...
✓ AvoidArrayLoops	Warning high	Instead of copying data between tw...
✓ AvoidAssertAsIdentifier	Error	Finds all places where 'assert' is use...
✓ AvoidCallingFinalize	Warning high	Object.finalize() is called by the garb...
✓ AvoidCatchingNPE	Warning high	Code should never throw NPE under...

[ ] Use the ruleset configured in a project file

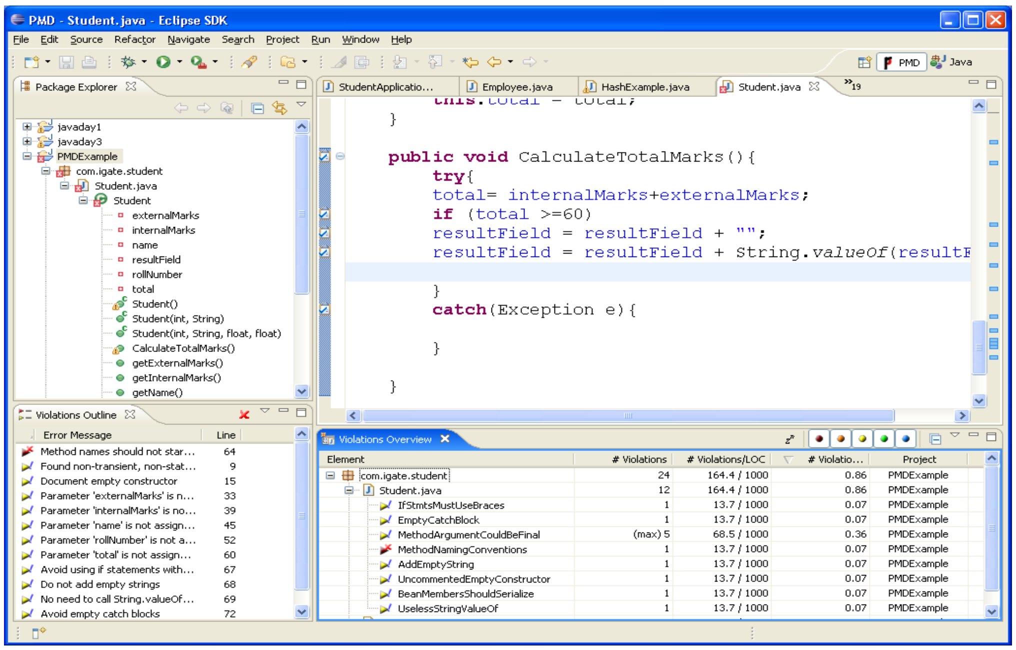
Figure 114: Enable PMD

Step 3: To run PMD with Eclipse right click on the project, select PMD, check code with PMD.



```
        this.total = total;
    }

    public void CalculateTotalMarks(){
        try{
        total= internalMarks+externalMarks;
        if (total >=60)
        resultField = resultField + "";
        resultField = resultField + String.valueOf(resultField)


        }
        catch(Exception e){

        }

    }
```

Figure 115: check code with PMD



```
javaday1
javaday3
PMDExample
  com.igate.student
    Student.java
      Student
        externalMarks
        internalMarks
        name
        resultField
        rollNumber
        total
        Student()
        Student(int, String)
        Student(int, String, float, float)
        CalculateTotalMarks()
        getExternalMarks()
        getInternalMarks()
        getName()
```

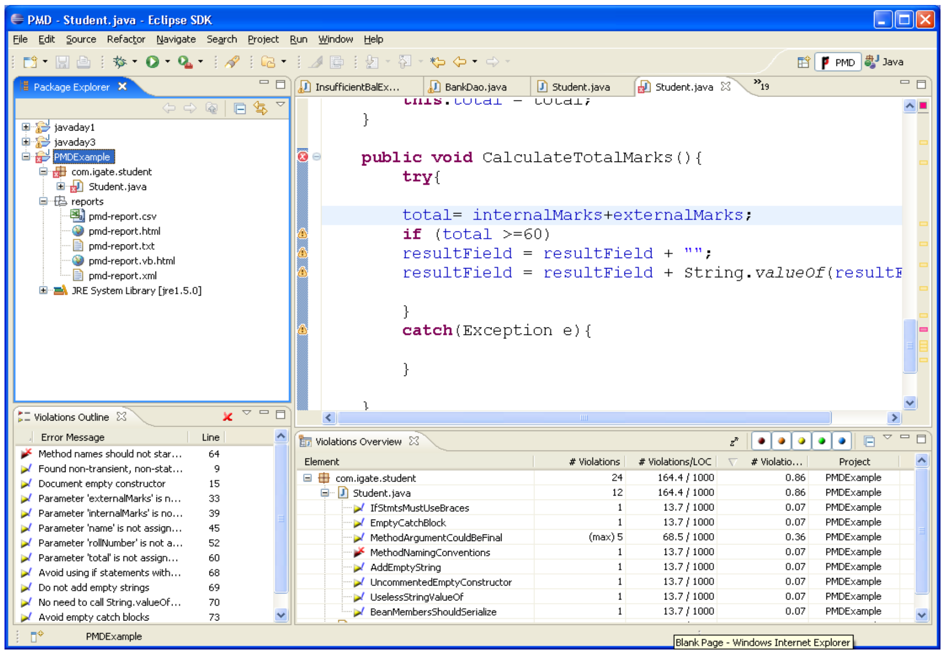
```
    this.total = total;
    }

    public void CalculateTotalMarks(){
        try{
        total= internalMarks+externalMarks;
        if (total >=60)
        resultField = resultField + "";
        resultField = resultField + String.valueOf(resultF

        }
        catch(Exception e){

        }
    }
```

Error Message	Line
Method names should not star...	64
Found non-transient, non-stat...	9
Document empty constructor	15
Parameter 'externalMarks' is n...	33
Parameter 'internalMarks' is no...	39
Parameter 'name' is not assign...	45
Parameter 'rollNumber' is not a...	52
Parameter 'total' is not assign...	60
Avoid using if statements with...	67
Do not add empty strings	68
No need to call String.valueOf...	69
Avoid empty catch blocks	72

Element	# Violations	# Violations/LOC	# Violatio...	Project
com.igate.student	24	164.4 / 1000	0.86	PMDExample
Student.java	12	164.4 / 1000	0.86	PMDExample
IfStmtsMustUseBraces	1	13.7 / 1000	0.07	PMDExample
EmptyCatchBlock	1	13.7 / 1000	0.07	PMDExample
MethodArgumentCouldBeFinal	(max) 5	68.5 / 1000	0.36	PMDExample
MethodNamingConventions	1	13.7 / 1000	0.07	PMDExample
AddEmptyString	1	13.7 / 1000	0.07	PMDExample
UncommentedEmptyConstructor	1	13.7 / 1000	0.07	PMDExample
BeanMembersShouldSerialize	1	13.7 / 1000	0.07	PMDExample
UselessStringValueOf	1	13.7 / 1000	0.07	PMDExample

Figure 116: Eclipse showing with Violations

Step 4: Right click project select PMD – Generate Report



PMD - Student.java - Eclipse SDK
File Edit Source Refactor Navigate Search Project Run Window Help
PMD
Java
Package Explorer
InsufficientBalEx...
BankDao.java
Student.java
Student.java
Violations Outline
Violations Overview
PMDExample
Blank Page - Windows Internet Explorer

```
javaday1
javaday3
PMDExample
  com.igate.student
    Student.java
  reports
    pmd-report.csv
    pmd-report.html
    pmd-report.txt
    pmd-report.vb.html
    pmd-report.xml
  JRE System Library [jre1.5.0]
```

```
    this.total = total;
    }

    public void CalculateTotalMarks(){
        try{

        total= internalMarks+externalMarks;
        if (total >=60)
        resultField = resultField + "";
        resultField = resultField + String.valueOf(resultF

        }
        catch(Exception e){

        }

    }
```

Error Message	Line
Method names should not star...	64
Found non-transient, non-stat...	9
Document empty constructor	15
Parameter 'externalMarks' is n...	33
Parameter 'internalMarks' is no...	39
Parameter 'name' is not assign...	45
Parameter 'rollNumber' is not a...	52
Parameter 'total' is not assign...	60
Avoid using if statements with...	68
Do not add empty strings	69
No need to call String.valueOf...	70
Avoid empty catch blocks	73

Element	# Violations	# Violations/LOC	# Violatio...	Project
com.igate.student	24	164.4 / 1000	0.86	PMDExample
Student.java	12	164.4 / 1000	0.86	PMDExample
IfStmtsMustUseBraces	1	13.7 / 1000	0.07	PMDExample
EmptyCatchBlock	1	13.7 / 1000	0.07	PMDExample
MethodArgumentCouldBeFinal	(max) 5	68.5 / 1000	0.36	PMDExample
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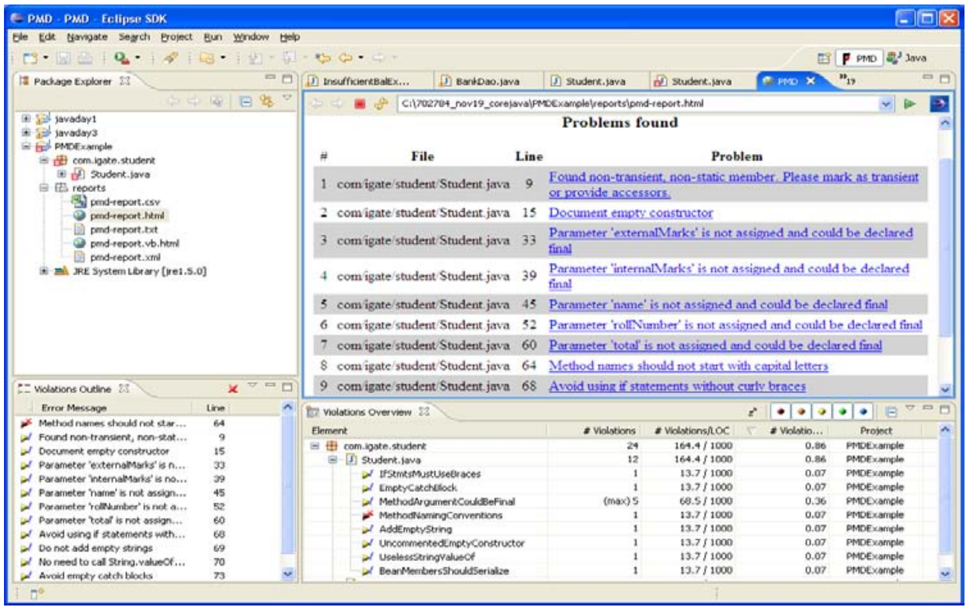
AddEmptyString	1	13.7 / 1000	0.07	PMDExample
UncommentedEmptyConstructor	1	13.7 / 1000	0.07	PMDExample
UselessStringValueOf	1	13.7 / 1000	0.07	PMDExample
BeanMembersShouldSerialize	1	13.7 / 1000	0.07	PMDExample

Figure 117: Generate Report

Step 5: Double click pmd-report.html



Problems found

#	File	Line	Problem
1	com/igate/student/Student.java	9	Found non-transient, non-static member. Please mark as transient or provide accessors.
2	com/igate/student/Student.java	15	Document empty constructor
3	com/igate/student/Student.java	33	Parameter 'externalMarks' is not assigned and could be declared final
4	com/igate/student/Student.java	39	Parameter 'internalMarks' is not assigned and could be declared final
5	com/igate/student/Student.java	45	Parameter 'name' is not assigned and could be declared final
6	com/igate/student/Student.java	52	Parameter 'rollNumber' is not assigned and could be declared final
7	com/igate/student/Student.java	60	Parameter 'total' is not assigned and could be declared final
8	com/igate/student/Student.java	64	Method names should not start with capital letters
9	com/igate/student/Student.java	68	Avoid using if statements without curly braces

Violations Outline

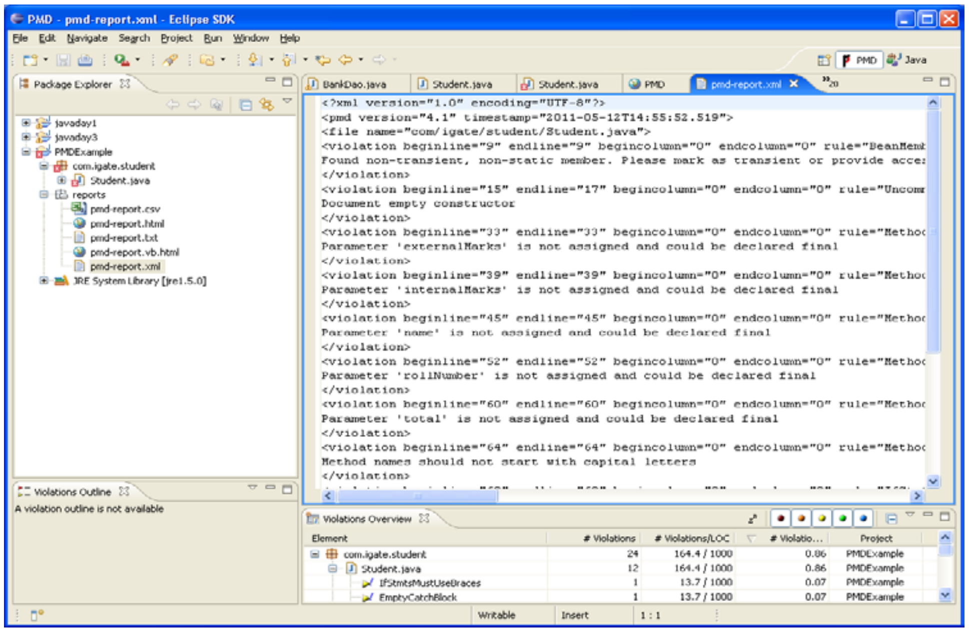
Error Message	Line
Method names should not star...	64
Found non-transient, non-stat...	9
Document empty constructor	15
Parameter 'externalMarks' is n...	33
Parameter 'internalMarks' is no...	39
Parameter 'name' is not assign...	45
Parameter 'rollNumber' is not a...	52
Parameter 'total' is not assign...	60
Avoid using if statements with...	68
Do not add empty strings	69
No need to call String.valueOf...	70
Avoid empty catch blocks	73

Violations Overview

Element	# Violations	# Violations/LOC	# Violatio...	Project
com.igate.student	24	164.4 / 1000	0.86	PMDExample
Student.java	12	164.4 / 1000	0.86	PMDExample
IfStmtsMustUseBraces	1	13.7 / 1000	0.07	PMDExample
EmptyCatchBlock	1	13.7 / 1000	0.07	PMDExample
MethodArgumentCouldBeFinal	(max) 5	68.5 / 1000	0.36	PMDExample
MethodNamingConventions	1	13.7 / 1000	0.07	PMDExample
AddEmptyString	1	13.7 / 1000	0.07	PMDExample
UncommentedEmptyConstructor	1	13.7 / 1000	0.07	PMDExample
UselessStringValueOf	1	13.7 / 1000	0.07	PMDExample
BeanMembersShouldSerialize	1	13.7 / 1000	0.07	PMDExample

Figure 18: HTML Reporting Format

Step 6: Double click pmd-report.html



```
<?xml version="1.0" encoding="UTF-8"?>
<pmd version="4.1" timestamp="2011-05-12T14:55:52.519">
<file name="com/igate/student/Student.java">
<violation beginline="9" endline="9" begincolumn="0" endcolumn="0" rule="BeanMemb
Found non-transient, non-static member. Please mark as transient or provide acce:
</violation>
<violation beginline="15" endline="17" begincolumn="0" endcolumn="0" rule="Uncomm
Document empty constructor
</violation>
<violation beginline="33" endline="33" begincolumn="0" endcolumn="0" rule="Methoc
Parameter 'externalMarks' is not assigned and could be declared final
</violation>
<violation beginline="39" endline="39" begincolumn="0" endcolumn="0" rule="Methoc
Parameter 'internalMarks' is not assigned and could be declared final
</violation>
<violation beginline="45" endline="45" begincolumn="0" endcolumn="0" rule="Methoc
Parameter 'name' is not assigned and could be declared final
</violation>
<violation beginline="52" endline="52" begincolumn="0" endcolumn="0" rule="Methoc
Parameter 'rollNumber' is not assigned and could be declared final
</violation>
<violation beginline="60" endline="60" begincolumn="0" endcolumn="0" rule="Methoc
Parameter 'total' is not assigned and could be declared final
</violation>
<violation beginline="64" endline="64" begincolumn="0" endcolumn="0" rule="Methoc
Method names should not start with capital letters
</violation>
```

Violations Outline

A violation outline is not available

Violations Overview

Element	# Violations	# Violations/LOC	# Violatio...	Project
com.igate.student	24	164.4 / 1000	0.86	PMDExample
Student.java	12	164.4 / 1000	0.86	PMDExample
IfStmtsMustUseBraces	1	13.7 / 1000	0.07	PMDExample
EmptyCatchBlock	1	13.7 / 1000	0.07	PMDExample

Figure 19: XML Reporting Format

<< TO DO>>

Assignment-1:
Review the java code created in the core java Lab Assignment - 4 using PMD tool. Generate the HTML and XML reports.

Appendices

Appendix A: Table of Figures