

# CS 602 Java, HW#1(Individual)

## Charitha Kammari(ck369) - Group H

1. Define Java Applet, Java Program, Java Script, and Angular Java Script. Provide examples of each. Name three NYC companies that hire Java, job description, annual salary. (1 point)

**Answer:**

### **Definitions:**

**Java Applet:** A Java Applet is a small software created with the Java programming language that is usually embedded into a webpage. It facilitates interactive features and content on webpages by working inside the boundaries of a web browser. However, because of security concerns and improvements in web technology, Java Applets are becoming less common in modern online programming.

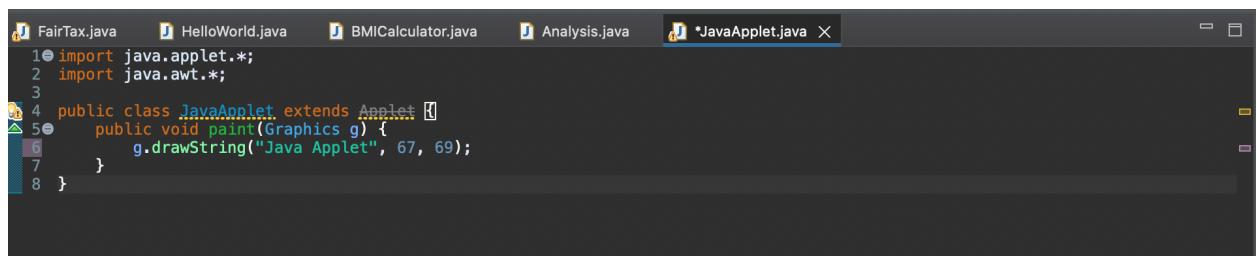
**Java Program:** A Java program is any software application or program written in the Java programming language that is compiled into bytecode for the Java Virtual Machine (JVM) to run on. Both basic command-line apps and complex enterprise-grade software systems can be developed more easily with Java programming.

**JavaScript:** JavaScript is a high-level, dynamic programming language that is frequently used to create interactive websites by means of interpretation. JavaScript, in contrast to Java, is mostly used as a client-side scripting language in web development, adding dynamic behavior and interactivity to websites.

**Angular JavaScript:** This JavaScript-based open-source front-end web framework, also known as AngularJS, is primarily managed by Google in collaboration with a community of contributors. It is employed in the development of dynamic web applications, the addition of new properties to HTML known as directives, and the use of expressions to link data to HTML elements.

### **Examples:**

#### **Java Applet:**



```
FairTax.java  HelloWorld.java  BMICalculator.java  Analysis.java  *JavaApplet.java X
1 import java.applet.*;
2 import java.awt.*;
3
4 public class JavaApplet extends Applet {
5     public void paint(Graphics g) {
6         g.drawString("Java Applet", 67, 69);
7     }
8 }
```

A screenshot of a Java code editor window. The title bar shows several tabs: FairTax.java, HelloWorld.java, BMICalculator.java, Analysis.java, and \*JavaApplet.java (which is the active tab). The code editor displays the following Java code for a Java Applet:

```
1 import java.applet.*;
2 import java.awt.*;
3
4 public class JavaApplet extends Applet {
5     public void paint(Graphics g) {
6         g.drawString("Java Applet", 67, 69);
7     }
8 }
```

The code uses standard Java syntax for importing packages and defining a class that extends the Applet class. It overrides the paint method to draw a string "Java Applet" at coordinates (67, 69).

#### **Java Program:**

```
1 *JavaProgram.java X
2 public class JavaProgram {
3     public static void main(String[] args) {
4         System.out.println("JavaProgram");
5     }
6 }
```

JavaScript:

```
✖ Welcome JS test.js ●
Users > ck > JS test.js > ...
1 const subtraction = (num1, num2) => {
2   return num1 - num2;
3 }
4
5 subtraction[8, 5];
```

Angular JavaScript:

```
✖ Welcome ◇ ng.html X
Users > ck > ◇ ng.html > ⌂ html
1 <!DOCTYPE html>
2 <html>
3 <script src="https://ajax.googleapis.com/ajax/libs/angularjs/1.8.2/angular.min.js"></script>
4 <body>
5
6 <div ng-app="">
7   <p>Name: <input type="text" ng-model="name"></p>
8   <h1>Hello {{name}}</h1>
9 </div>
10
11 </body>
12 </html>
```

### Three NYC companies that hire Java, job description, annual salary:

- Goldman Sachs:

**Job Description:** At Goldman Sachs, our Engineers don't just make things – we make things possible. Change the world by connecting people and capital with ideas. Solve the most challenging and pressing engineering problems for our clients. Join our engineering teams that build massively scalable software and systems, architect low latency infrastructure solutions, proactively guard against cyber threats, and leverage machine learning alongside financial engineering to continuously turn data into action. Create new businesses, transform finance, and explore a world of opportunity at the speed of markets.

Engineering is at the critical center of our business, and our dynamic environment requires innovative strategic thinking and immediate, real solutions. Goldman Sachs Engineers are innovators and problem-solvers, building solutions in risk management, big data, mobile and more. We look for creative collaborators who evolve, adapt to change, and thrive in a fast-paced global environment. Want to push the limit of digital possibilities? Start here.

#### **Salary Range:**

The expected base salary for this New York, New York, United States-based position is \$115000-\$180000. In addition, you may be eligible for a discretionary bonus if you are an active employee as of fiscal year-end.

- Bank Of America:

**Job Description:**

Position Summary Bank of America seeks a Java developer to join the Institutional Retirement Technology organization. Responsible for technical design and development of his/her assignments. Experience in all phases of software development lifecycle including analysis, design, implementation, testing and deployment. Take a long-term strategic approach and creation of highly functional products and reusable components. Implement technical solutions that involve diverse development platforms, software, hardware, backend and front-end technologies. Work closely with the manager, team lead, peers, business owners, analysts and QAs to build features that span various parts of the system and retirement products. Collaborate and support the implementation of software applications. Excellent verbal and written communication. Required Skills Bachelor's degree in Computer Science or related field Plus 4 years of IT experience in application design and development, and experience in various technical aspects of the development. Must have prior experience in software design and development for both front-end and backend components utilizing Core Java, AngularJS, Rest API, and Oracle relational database. Strong understanding of multi-tenant software as a service architecture. Excellent verbal and written communication skills. Desired Skills Python and Kafka would be a plus.

**Salary Range:**

\$100K -- \$150K

- Sumitomo Mitsui Banking Corporation – SMBC Group:

**Job Description:**

SMBC Group is a top-tier global financial group. Headquartered in Tokyo and with a 400-year history, SMBC Group offers a diverse range of financial services, including banking, leasing, securities, credit cards, and consumer finance. The Group has more than 130 offices and 80,000 employees worldwide in nearly 40 countries. Sumitomo Mitsui Financial Group, Inc. (SMFG) is the holding company of SMBC Group, which is one of the three largest banking groups in Japan. SMFG's shares trade on the Tokyo, Nagoya, and New York (NYSE: SMFG) stock exchanges.

In the Americas, SMBC Group has a presence in the US, Canada, Mexico, Brazil, Chile, Colombia, and Peru. Backed by the capital strength of SMBC Group and the value of its relationships in Asia, the Group offers a range of commercial and investment banking services to its corporate, institutional, and municipal clients. It connects a diverse client base to local markets and the organization's extensive global network. The Group's operating companies in the Americas include Sumitomo Mitsui Banking Corp. (SMBC), SMBC Nikko Securities America, Inc., SMBC Capital Markets, Inc., SMBC Rail Services LLC, Manufacturers Bank, JRI America, Inc., SMBC Leasing and Finance, Inc., Banco Sumitomo Mitsui Brasileiro S.A., and Sumitomo Mitsui Finance and Leasing Co., Ltd.

The anticipated salary range for this role is between \$103,000.00 and \$206,000.00. The specific salary offered to an applicant will be based on their individual qualifications, experiences, and an analysis of the current compensation paid in their geography and the market for similar roles at the time of hire. The role may also be eligible for an annual discretionary incentive award. In addition to cash compensation, SMBC offers a competitive portfolio of benefits to its employees.

**Salary Range:**

\$103,000/yr - \$206,000/yr

2. When you compile Java programs on PC, there are two ways. One is the DOS format, and another one is Eclipse IDE. Download both platforms onto your personal PC. Describe step by step process for downloading. Show screenshots to prove both ways. (2 points)

**Answer:**

The Java Development Kit (JDK) and the Java Runtime Environment (JRE) must be downloaded in order for Java programs to run on a PC.

**1) To run DOS-formatted Java programs:**

Use the javac command to begin compiling the Java program.

After that, use the java command and the main class name to run the compiled application.

The steps in this sequence are to use the javac command to compile the Java source code into bytecode, then the java command to run the produced code.

JDK 21    JDK 17    GraalVM for JDK 21    GraalVM for JDK 17

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**JDK Development Kit 21.0.2 downloads**

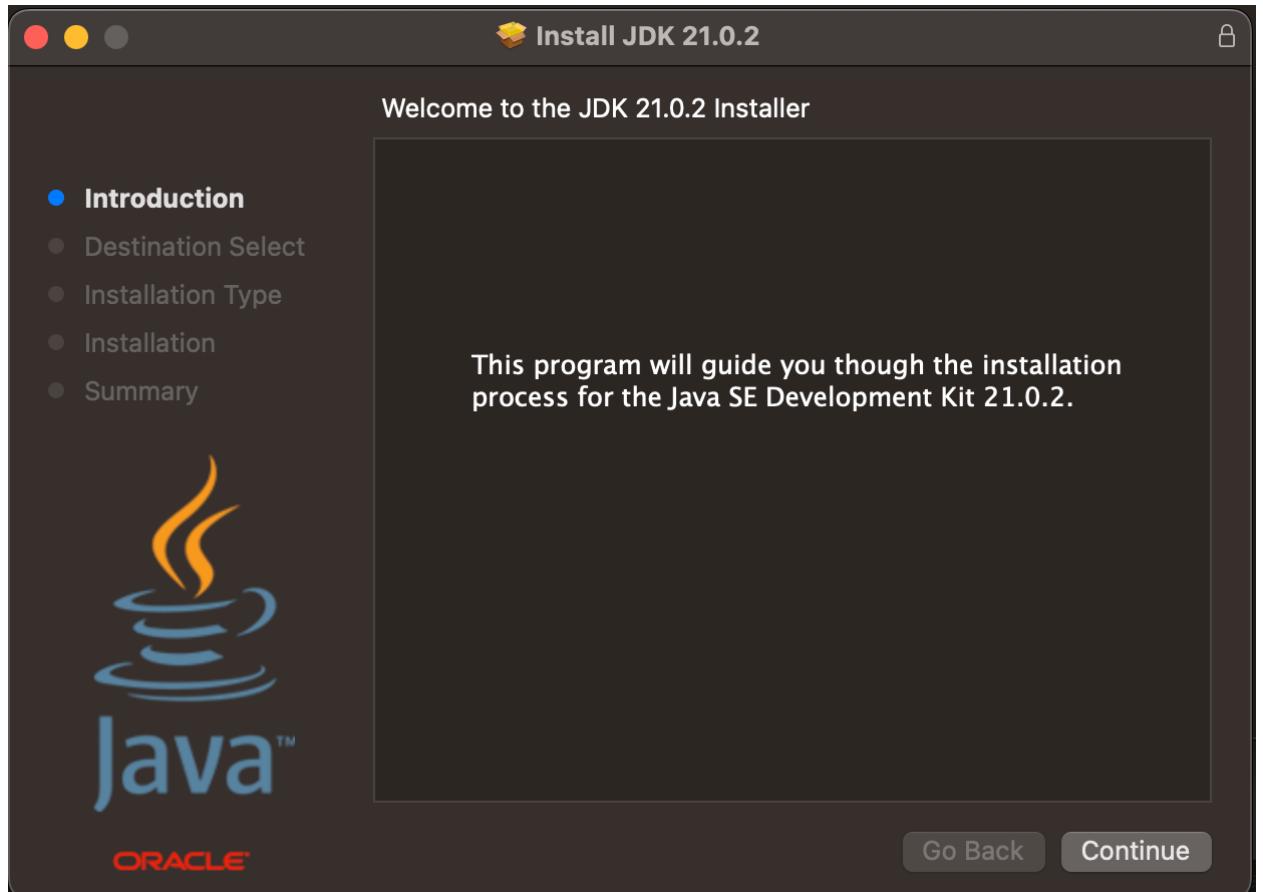
JDK 21 binaries are free to use in production and free to redistribute, at no cost, under the [Oracle No-Fee Terms and Conditions \(NFTC\)](#).

JDK 21 will receive updates under the NFTC, until September 2026, a year after the release of the next LTS. Subsequent JDK 21 updates will be licensed under the [Java SE OTN License \(OTN\)](#) and production use beyond the [limited free grants](#) of the OTN license will [require a fee](#).

[Linux](#)    [macOS](#)    [Windows](#)

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Product/file description	File size	Download
ARM64 Compressed Archive	182.11 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_macos-aarch64_bin.tar.gz">https://download.oracle.com/java/21/latest/jdk-21_macos-aarch64_bin.tar.gz (sha256)</a>
ARM64 DMG Installer	181.42 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_macos-aarch64_bin.dmg">https://download.oracle.com/java/21/latest/jdk-21_macos-aarch64_bin.dmg (sha256)</a>
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x64 DMG Installer	183.67 MB	<a href="https://download.oracle.com/java/21/latest/jdk-21_macos-x64_bin.dmg">https://download.oracle.com/java/21/latest/jdk-21_macos-x64_bin.dmg (sha256)</a>



```

last login: Sun Feb 17 11:45:04 on ttys001
ck@charithas-air: ~ % java
Usage: java [options] <mainclass> [args...]
       (to execute a class)
       or java -jar <jarfile> [args...]
       (to execute a jar file)
       or java [options] -m <module>/<mainclass> [args...]
       java [options] -m <module>/<submodule>/<mainclass> [args...]
       (to execute the main class in a module)
       or java <sourcefile> [args]
       (to execute a single source-file program)

Arguments following the main class, source file, -jar <jarfile>,
-m or --module <module>/<mainclass> are passed as the arguments to
main class.

where options include:

--cp <classpath> search path of directories and zip/jar files>
--classpath <class search path of directories and zip/jar files>
--class-path <class search path of directories and zip/jar files>
      A : separated list of directories, JAR archives,
      and ZIP archives to search for class files.
--p <module-path>...
      A : separated list of elements, each element is a file path
      to a module or a directory containing modules. Each module is either
      a modular JAR or an exploded-module directory.
--upgrade-module-path <module path>...
      A : separated list of elements, each element is a file path
      to a module or a directory containing modules to replace
      upgradeable modules in the runtime image. Each module is either
      a modular JAR or an exploded-module directory.
--add-modules <modules>...
      root modules to resolve in addition to the initial module.
      <module name> can also be ALL-DEFAULT, ALL-SYSTEM,
      ALL-MODULES.
--enable-native-access <module name>,<module name>...
      modules that are permitted to perform restricted native operations.
      <module name> can also be ALL-UNNAMED.
--list-modules...
      list observable modules and exit
-d <module name>...
      describe-module <module name>
      describe all modules and exit.
--dry-run...
      create VM and load main class but do not execute main method.
      The --dry-run option may be useful for validating the
      command-line options such as the module system configuration.
--validate-modules...
      validate all modules and exit
      The --validate-modules option may be useful for finding
      conflicts and other errors with modules on the module path.
-D<name>=<value>...
      set a system property
--verbose:[class|module][;jpi;jni]...
      verbose output for the given subsystem
--version...
      print product version to the error stream and exit
--version...
      print product version to the output stream and exit
--showVersion...
      print product version to the error stream and continue
--showVersion...
      print product version to the output stream and continue
--show-module-resolution...
      show module resolution output during startup
-? -h -help...
      print this help message to the error stream
--help...
      print this help message to the output stream
-x <extra>...
      print extra options to the error stream
--help-extra...
      print help on extra options to the output stream
-ea[:<packagename>...];<classname>...
      enable assertions with specified granularity
-dea[:<packagename>...];<classname>...
      disable assertions with specified granularity
-disableassertions[:<packagename>...];<classname>...
      disable assertions with specified granularity
-esa | -enableassertions

```

## 2) To run using eclipse

Open Eclipse first, then set up a workspace to arrange your apps. Next, make a class file in the program's workspace that you are now working on. The software can now be run by selecting the green play button from the toolbar. You can create and test Java programs more quickly with the Eclipse IDE thanks to this simplified procedure.

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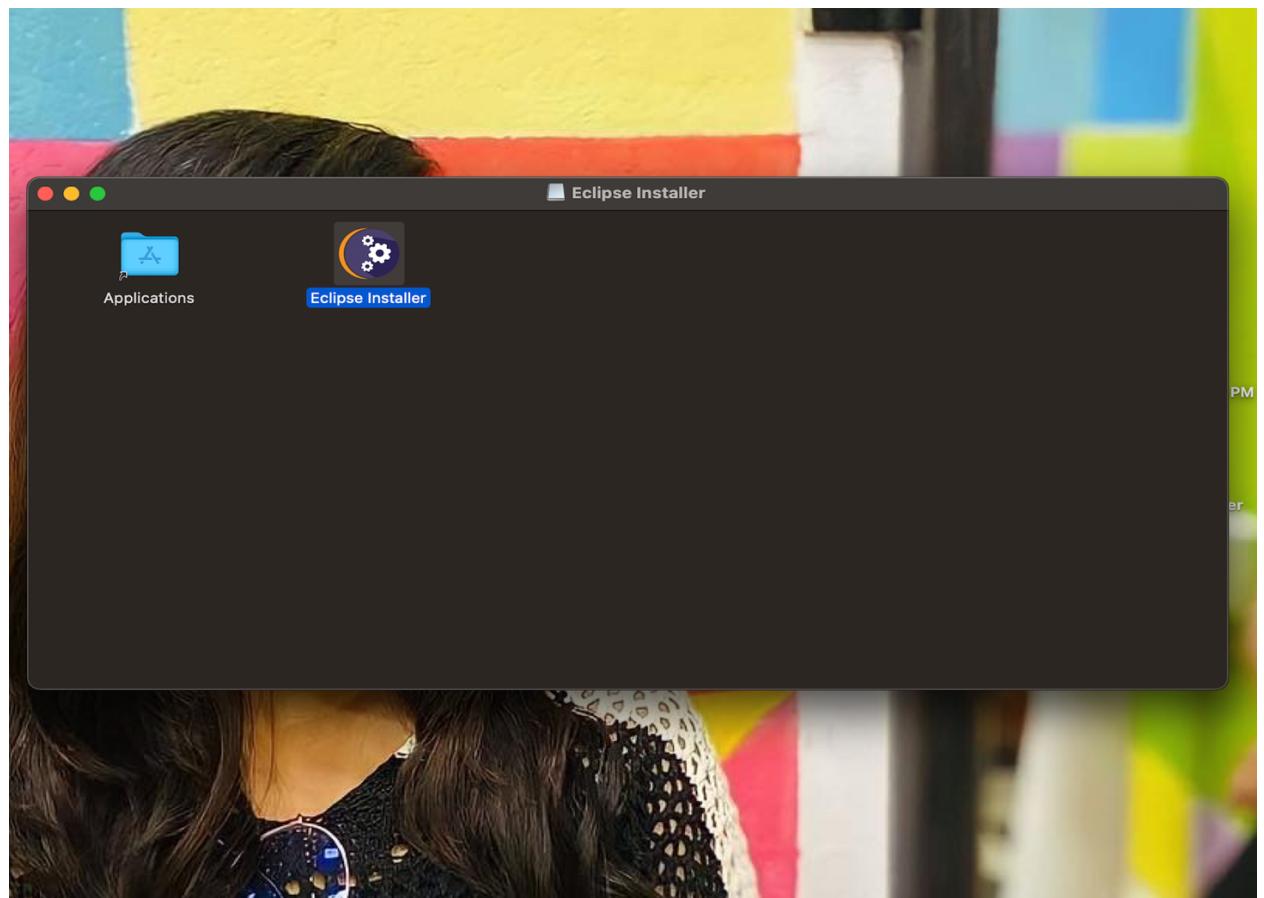
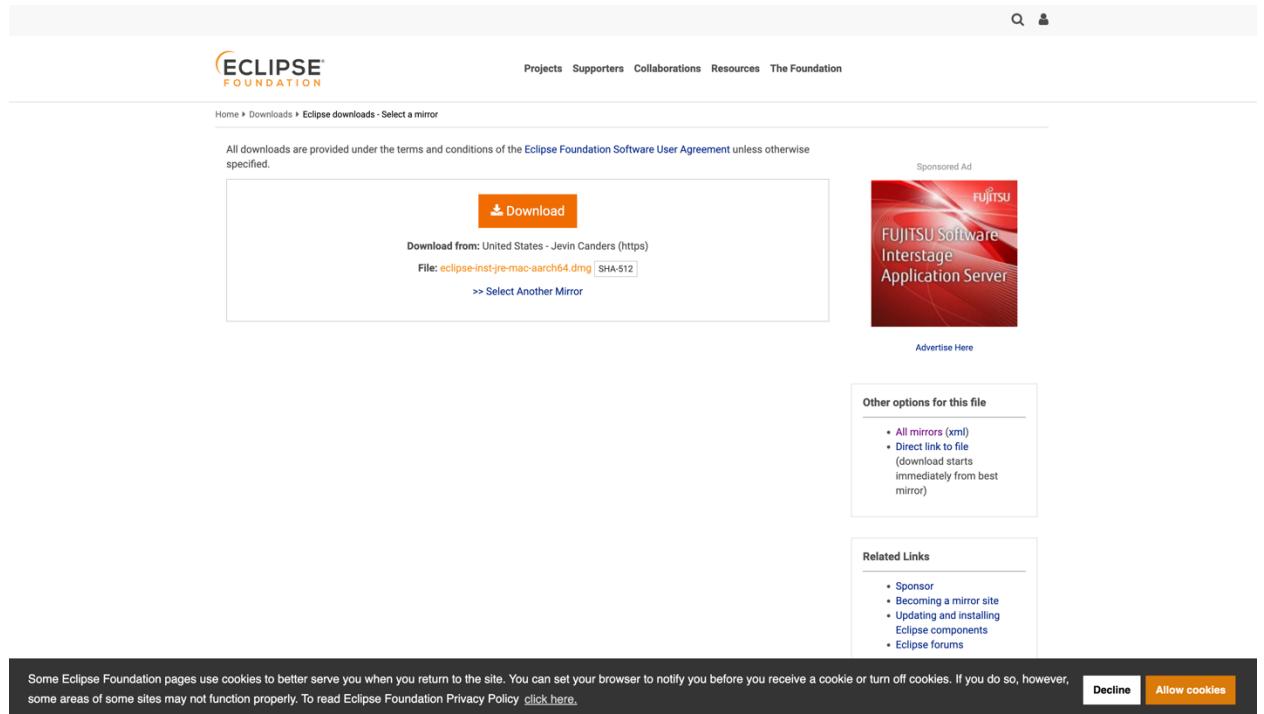
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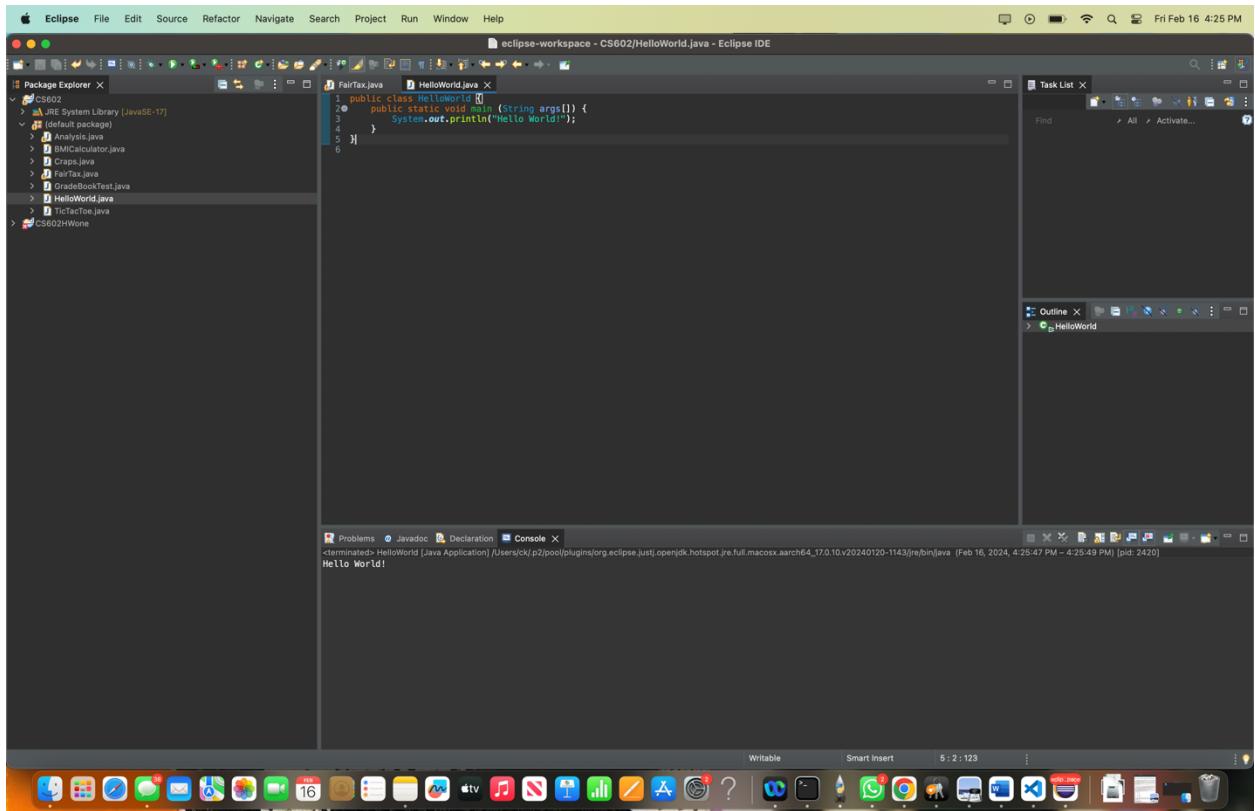
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3. Use Eclipse, create, compile, run, print (program listing and results) and explain:

b. How Analysis.java works, pages 93-94 (1 point)

Answer:

Description:

The purpose of this Java software, "Analysis," is to collect and evaluate the results of a theoretical investigation or assessment. This is a brief synopsis of how it works:

The application uses the java.util package's Scanner class to handle user input.

Main Method: To begin, a Scanner object called "input" is initialized in order to record user answers. The integer variables "passes" and "failures" are then initialized to record the number of students that passed and failed, respectively. It also configures "studentCounter" to track the quantity of students handled.

Looping Logic: The application asks the user to enter pass (1) or fail (2) for each student inside of a while loop. The user's reaction is then recorded and captured, and "passes" or "failures" are incremented correspondingly.

After assessing every student, the software shows the overall numbers of passes and fails. The application sends out a "Bonus to instructor!" message to recognize this accomplishment if the pass count is higher than eight.

In summary, this application provides a summary of pass and fail tallies, simulating the grading procedure for ten students. In the event that pass rates are exceptionally high, it also gives the teacher kudos. Its usefulness might be further improved with additions like accurate handling for ten students and more understandable user instructions.

Code:

The screenshot shows the Eclipse IDE interface with the following details:

- Top Bar:** Eclipse, File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help.
- Title Bar:** eclipse-workspace - CS602/Analysis.java - Eclipse IDE
- Left Side:** Package Explorer showing the project structure under CS602, including files like BMICalculator.java, Craps.java, FairTax.java, GradeBookTest.java, HelloWorld.java, and TicTacToe.java.
- Middle Area:** Editor pane displaying the Java code for Analysis.java. The code reads student grades from standard input and prints a summary to standard output.
- Bottom Area:** Console tab showing the execution output. The program prompts for 10 student results (1=pass, 2=fail), counts them, and prints the total number of passes and fails.
- Mac OS Dock:** Shows various application icons at the bottom of the screen.

```

1 //package CS602Home;
2
3 import java.util.Scanner;
4
5 public class Analysis {
6     public static void main(String[] args) {
7         Scanner input = new Scanner(System.in);
8         int passes = 0;
9         int failures = 0;
10
11         int studentCounter = 0;
12
13         while (studentCounter <= 10) {
14             System.out.println("Enter result (1= pass,2 = fail): ");
15             int result = input.nextInt();
16
17             if (result == 1) {
18                 passes = passes + 1;
19             } else {
20                 failures = failures + 1;
21             }
22
23             studentCounter = studentCounter + 1;
24
25         }
26
27         System.out.printf("Passed: %d\nFailed: %d\n", passes, failures);
28
29         if (passes > 8) {
30             System.out.println("Bonus to instructor!");
31         }
32         input.close();
33     }
}

```

d. How Craps.java works, pages 171-173 (1 point)

Answer:

Description:

Craps, a Java software, simulates the well-known dice game. This is a brief synopsis of how it functions:

To guarantee safe random number generation, the application imports the SecureRandom class from the java.security package.

sets up variables to monitor the game status (gameStatus) and the player's point (myPoint). computes the sum of two dice rolls using the rollDice() function.

based on the total number of dice thrown, uses a switch statement to determine the starting

game status:

The player wins if the total is either 7 or 11.

The player is eliminated if the total is 2, 3, or 12.

If not, the player receives the sum as their point and the game goes on.

becomes stuck while the game is in the CONTINUE state:

Rolls the dice once more.

decides whether the player loses (rolling a 7) or wins (matching the point).

Prints "Player wins" or "Player loses" according to the game's ultimate status.

Using SecureRandom, generate random numbers for two dice rolls.

adds the two dice together.

displays the results of the dice rolls.

gives back the total.

Through the use of dice rolls simulation and the application of the game's rules to decide win or loss, this program essentially gives users the feeling of playing Craps.

The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure with files like Analysis.java, Craps.java, and module-info.java.
- Craps.java:** The main source file containing the Craps class definition. The code implements a Craps game logic using SecureRandom for dice rolls and various rules for winning, losing, or continuing based on the sum of two dice rolls.
- Task List:** An empty list.
- Outline:** Shows the class structure of Craps.
- Problems:** Shows the terminated status of the Craps application.
- Console:** Displays the terminal output of the application execution, showing the rolling of dice and the final outcome.

```
import java.security.SecureRandom;
public class Craps {
    private static final SecureRandom randomNumbers = new SecureRandom();
    private static final int SNAKE_EYES = 2;
    private static final int SEVEN = 7;
    private static final int YO_LEVEN = 11;
    private static final int BOX_CARS = 12;
    private enum Status {CONTINUE, WON, LOST};
    public static void main(String[] args) {
        int myPoint = 0;
        Status gameStatus = Status.CONTINUE;
        int sumOfDice = rollDice();
        switch (sumOfDice) {
            case SEVEN: // win with 7 on first roll
            case YO_LEVEN: // win with 11 on first roll
                gameStatus = Status.WON;
                break;
            case SNAKE_EYES: // win with 2 on first roll
            case BOX_CARS: // win with 3 on first roll
                gameStatus = Status.LOST;
                break;
            default:
                gameStatus = Status.CONTINUE;
                myPoint = sumOfDice;
                System.out.printf("Point is %d\n", myPoint);
        }
        while (gameStatus == Status.CONTINUE) {
            sumOfDice = rollDice();
            if (sumOfDice == myPoint) {
                gameStatus = Status.WON;
            } else {
                if (sumOfDice == SEVEN) {
                    gameStatus = Status.LOST;
                }
            }
        }
        if (gameStatus == Status.WON) {
            System.out.println("Player wins");
        } else {
            System.out.println("Player loses");
        }
    }
    public static int rollDice() {
        return randomNumbers.nextInt(6) + 1 + 6;
    }
}
Player rolled 6 + 6 = 12
Player rolled 6 + 5 = 11
Player rolled 6 + 4 = 10
Player rolled 2 + 1 = 3
Player rolled 6 + 3 = 9
Player rolled 3 + 3 = 6
Player wins
```

The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure with files like Analysis.java, Craps.java, and module-info.java.
- Craps.java:** The main source file containing the Craps class definition. It includes constants for various game outcomes and a main method that rolls two dice, checks the sum, and prints the result based on the outcome.
- Task List:** A panel on the right showing a single task entry: "Connect Mylyn" with a note to "Connect to your task and ALM tools or create a local task".
- Outline:** Shows the class structure with methods mainString() and rollDice().
- Problems:** No problems listed.
- Javadoc:** No documentation available.
- Declaration:** No declarations listed.
- Console:** Displays the output of the application running in the terminal, showing the player rolling various sums (5, 6, 12, 3, 9) and winning or losing based on the outcome.

The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure with files like Analysis.java, Craps.java, and module-info.java.
- Craps.java:** The main source file containing the Craps class definition. It includes imports for SecureRandom and Status, and defines a Status enum with values CONTINUE, WON, and LOST. It also includes constants for various game outcomes and a main method that rolls two dice, checks the sum, and prints the result based on the outcome.
- Task List:** A panel on the right showing a single task entry: "Connect Mylyn" with a note to "Connect to your task and ALM tools or create a local task".
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The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure under CS602.
- Craps.java:** The main source file containing the Craps class definition.
- Analysis.java:** A generated analysis file.
- Task List:** An empty list.
- Outline:** Shows the class structure and methods.
- Problems:** An empty list.
- Javadoc:** An empty list.
- Declaration:** An empty list.
- Console:** Displays the terminal output of the application's execution.

The console output is as follows:

```
Player rolled 5 + 6 = 11
Player wins
```

The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure under CS602.
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- Outline:** Shows the class structure and methods.
- Problems:** An empty list.
- Javadoc:** An empty list.
- Declaration:** An empty list.
- Console:** Displays the terminal output of the application's execution.

The console output is as follows:

```
Point is 7
Player rolled 1 + 2 = 3
Player rolled 1 + 5 = 6
Player rolled 2 + 2 = 4
Player rolled 1 + 4 = 5
Player rolled 3 + 3 = 6
Player rolled 1 + 3 = 4
Player rolled 5 + 1 = 6
Player rolled 3 + 4 = 7
Player rolled 2 + 5 = 7
Player loses
```

```
private static final int TREY = 3;
private static final int SEVEN = 7;
private static final int YO_LEVEN = 11;
private static final int BOX_CARS = 12;

public static void main(String[] args) {
    int myPoint = 0;
    Status gameStatus;
    int sumOfDice = rollDice();
    switch (sumOfDice) {
        case SEVEN: // win with 7 on first roll
        case YO_LEVEN: // win with 11 on first roll
            gameStatus = Status.WON;
            break;
        case SNAKE_EYES: // win with 2 on first roll
        case TREY: // win with 3 on first roll
        case BOX_CARS:
            gameStatus = Status.LOST;
            break;
        default:
            gameStatus = Status.CONTINUE;
            myPoint = sumOfDice;
            System.out.printf("Point is %d\n", myPoint);
            break;
    }
    while (gameStatus == Status.CONTINUE) {
        sumOfDice = rollDice();
        if (sumOfDice == myPoint) {
            gameStatus = Status.WON;
        } else {
            if (sumOfDice == SEVEN) {
                gameStatus = Status.LOST;
            }
        }
        if (gameStatus == Status.WON) {
            System.out.println("Player wins");
        } else {
            System.out.println("Player loses");
        }
    }
}

public static int rollDice() {
    int die1 = 1 + randomNumbers.nextInt(6);
    int die2 = 1 + randomNumbers.nextInt(6);
    int sum = die1 + die2;
    System.out.printf("Player rolled %d + %d = %d\n", die1, die2, sum);
    return sum;
}
```

Point is 0  
Player rolled 1 + 2 = 3  
Player rolled 1 + 5 = 6  
Player rolled 2 + 2 = 4  
Player rolled 3 + 1 = 4  
Player rolled 2 + 3 = 5  
Player rolled 1 + 3 = 4  
Player rolled 5 + 1 = 6  
Player rolled 3 + 5 = 8  
Player rolled 2 + 5 = 7  
Player loses

```
import java.security.SecureRandom;

public class Craps {

    private static final SecureRandom randomNumbers = new SecureRandom();

    private enum Status {CONTINUE, WON, LOST};

    private static final int SNAKE_EYES = 2;
    private static final int TREY = 3;
    private static final int SEVEN = 7;
    private static final int YO_LEVEN = 11;
    private static final int BOX_CARS = 12;

    public static void main(String[] args) {
        int myPoint = 0;
        Status gameStatus;
        int sumOfDice = rollDice();
        switch (sumOfDice) {
            case SEVEN: // win with 7 on first roll
            case YO_LEVEN: // win with 11 on first roll
                gameStatus = Status.WON;
                break;
            case SNAKE_EYES: // win with 2 on first roll
            case TREY: // win with 3 on first roll
            case BOX_CARS:
                gameStatus = Status.LOST;
                break;
            default:
                gameStatus = Status.CONTINUE;
                myPoint = sumOfDice;
                System.out.printf("Point is %d\n", myPoint);
                break;
        }
        while (gameStatus == Status.CONTINUE) {
            sumOfDice = rollDice();
            if (sumOfDice == myPoint) {
                gameStatus = Status.WON;
            } else {
                if (sumOfDice == SEVEN) {
                    gameStatus = Status.LOST;
                }
            }
            if (gameStatus == Status.WON) {
                System.out.println("Player wins");
            } else {
                System.out.println("Player loses");
            }
        }
    }

    public static int rollDice() {
    }
```

Player rolled 3 + 1 = 4  
Player rolled 5 + 5 = 10  
Player rolled 4 + 1 = 5  
Player rolled 5 + 2 = 7  
Player loses

```

private static final int TREY = 3;
private static final int SEVEN = 7;
private static final int YO_LEVEN = 11;
private static final int BOX_CARS = 12;

public static void main(String[] args) {
    int myPoint = 0;
    Status gameStatus = Status.WON;
    int sumOfDice = rollDice();
    switch (sumOfDice) {
        case TREY: // win with 7 on first roll
        case YO_LEVEN: // win with 11 on first roll
            gameStatus = Status.WON;
            break;
        case SNAKE_EYES: // win with 2 on first roll
        case TREY: // win with 3 on first roll
        case BOX_CARS:
            gameStatus = Status.LOST;
            break;
        default:
            gameStatus = Status.CONTINUE;
            myPoint = sumOfDice;
            System.out.printf("Point is %d\n", myPoint);
            break;
    }
    while (gameStatus == Status.CONTINUE) {
        sumOfDice = rollDice();
        if (sumOfDice == myPoint) {
            gameStatus = Status.WON;
        } else {
            if (sumOfDice == SEVEN) {
                gameStatus = Status.LOST;
            }
        }
        if (gameStatus == Status.WON) {
            System.out.println("Player wins");
        } else {
            System.out.println("Player loses");
        }
    }
}

public static int rollDice() {
    int die1 = 1 + randomNumbers.nextInt(6);
    int die2 = 1 + randomNumbers.nextInt(6);
    int sum = die1 + die2;
    System.out.printf("Player rolled %d + %d = %d\n", die1, die2, sum);
    return sum;
}

```

Output from the terminal window:

```

Player rolled 3 + 1 = 4
Point is 4
Player rolled 5 + 5 = 10
Player rolled 4 + 1 = 5
Player rolled 5 + 2 = 7
Player loses

```

f. How GradeBookTest.java works, pages 274-279 (1 point)

Answer:

Description:

GradeBookTest, a Java application, is a tool for processing and evaluating grades. Here is a rundown of its main elements and features:

The course name and the students' grades are represented by the instance variables `courseName` and `grades`, respectively, in the class.

The supplied course name and grades array are used by the constructor to initialize these variables.

There are established public procedures for modifying and examining the grade data.

Method: `getCourseName()`  
gives back the course name.

Procedure: `processGrades()`  
produces each student's average and grades.  
determines and shows the grades in the gradebook that are lowest and highest.  
creates a bar chart that shows the grade distribution.

`getMaximum()` and `getMinimum()` Methods:

These methods calculate the gradebook's lowest and highest grades, respectively.  
The `getAverage()` Method

determines the average grade for a specific group of grades.  
`resultsUsing BarChart()`:

Using asterisks (\*), creates a graphic depiction of the grade distribution.

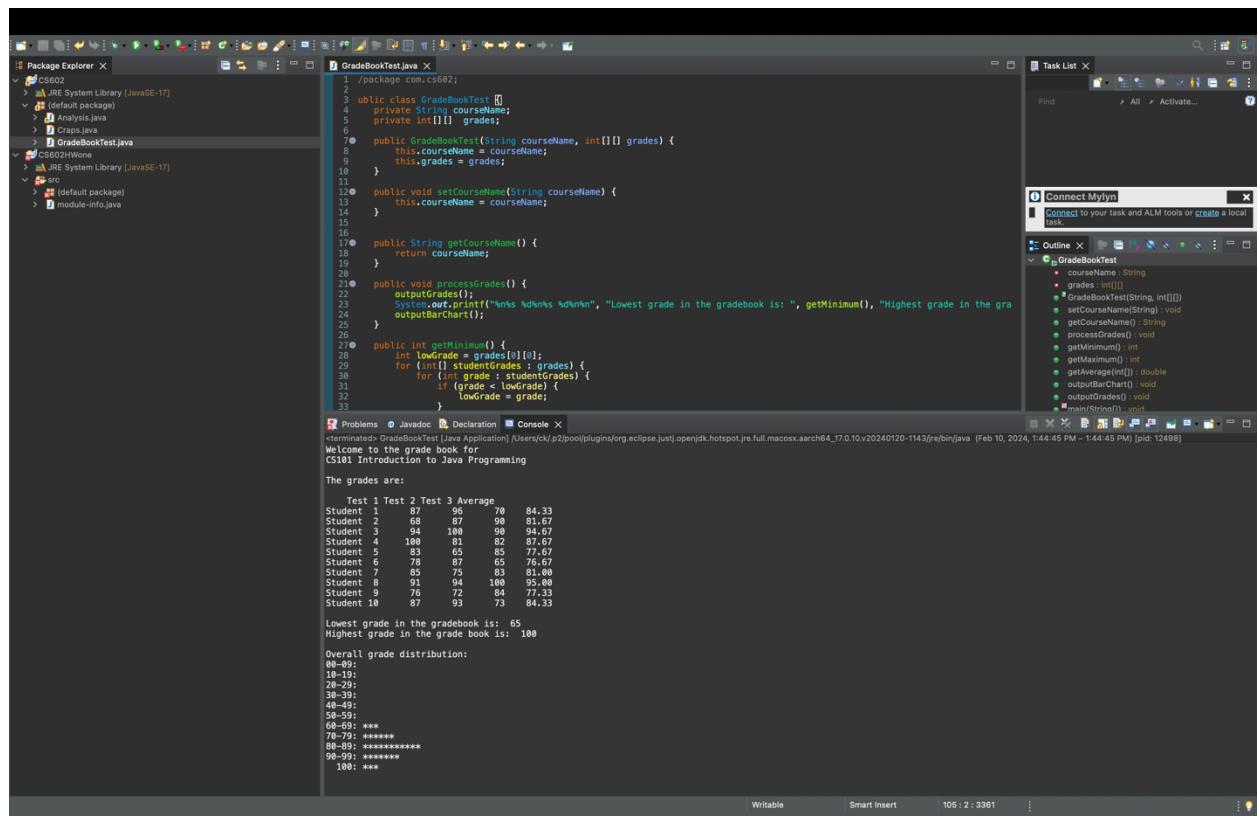
method for `outputGrades()`:

prints all of the student grades, including the average for every student.

assigns a specified course name and grades array to a newly created `GradeBookTest` instance.  
presents a greeting along with the course name.

uses the `processGrades()` function to examine and show the grades.

With regard to a particular course, this program offers features for processing grades,  
calculating statistics, and visualizing grade distributions. It helps teachers efficiently manage  
assignment grading and provides insights into student performance.



The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure for CS602, including packages like IRE System Library [JavaSE-17] and Analysis, and files like GradeBookTest.java.
- GradeBookTest.java:** The code for the GradeBookTest class. It includes methods for setting the course name, getting the course name, printing student grades, calculating minimum and maximum grades, calculating average grades, and generating bar charts for grade distributions.
- Task List:** A panel on the right showing a single task entry: "Connect Mylyn" with a note to "Connect to your task and ALM tools or create a local task".
- Outline:** Shows the class structure with methods like `main(String[])`, `courseName`, `grades`, `setCourseName(String)`, etc.
- Problems:** A panel at the bottom left showing no errors or warnings.
- Console:** A panel at the bottom right showing the execution output of the program. The output includes:
  - A greeting: "Welcome to the grade book for CS601 Introduction to Java Programming"
  - A header: "The grades are:"
  - A table of student grades:

	Test 1	Test 2	Test 3	Average
Student 1	87	96	70	84.33
Student 2	60	87	98	81.67
Student 3	94	80	99	87.67
Student 4	100	81	82	87.67
Student 5	83	65	85	77.67
Student 6	78	87	65	76.67
Student 7	83	75	83	81.00
Student 8	91	94	100	95.00
Student 9	76	72	84	77.33
Student 10	87	93	73	84.33
  - The lowest grade: "Lowest grade in the gradebook is: 65"
  - The highest grade: "Highest grade in the grade book is: 100"
  - An overall grade distribution chart:
    - 0-09: \*\*\*
    - 10-19: \*\*\*
    - 20-29: \*\*\*
    - 30-39: \*\*\*
    - 40-49: \*\*\*
    - 50-59: \*\*\*
    - 60-69: \*\*\*
    - 70-79: \*\*\*\*\*
    - 80-89: \*\*\*\*\*
    - 90-99: \*\*\*
    - 100: \*\*\*

The screenshot shows the Eclipse IDE interface with the following details:

- Package Explorer:** Shows the project structure for CS602, including JRE System Library [JavaSE-17], Analysis.java, Craps.java, GradeBookTest.java, and module-info.java.
- GradeBookTest.java:** The code implements a GradeBook class with methods to calculate minimum, maximum, average, and frequency distribution, and to process grades and output bar charts.
- Console Output:** Displays the execution results:
  - The grades are:

Student	Test 1	Test 2	Test 3	Average
Student 1	87	96	70	84.33
Student 2	69	89	91	80.67
Student 3	94	100	90	94.67
Student 4	100	81	82	87.67
Student 5	83	63	85	77.67
Student 6	78	97	65	82.00
Student 7	85	75	83	81.00
Student 8	91	94	100	95.00
Student 9	76	72	84	77.33
Student 10	87	93	73	84.33

  - Lowest grade in the gradebook is: 65
  - Highest grade in the grade book is: 100
  - Overall grade distribution:
    - 0-99: \*\*\*
    - 10-19: \*\*\*\*\*
    - 20-29: \*\*\*\*\*
    - 30-39: \*\*\*\*\*
    - 40-49: \*\*\*\*\*
    - 50-59: \*\*\*\*\*
    - 60-69: \*\*\*
    - 70-79: \*\*\*\*\*
    - 80-89: \*\*\*\*\*
    - 90-99: \*\*\*\*\*
    - 100: \*\*\*

This screenshot is identical to the first one, showing the same code, execution output, and Eclipse interface. It displays the same student grades, overall distribution, and bar chart representation.

The screenshot shows the Eclipse IDE interface with the Java Application perspective selected. The central area displays the output of a Java program named GradeBookTest. The code in GradeBookTest.java processes a grade array and prints student grades, averages, and a bar chart distribution.

```
74     System.out.print("The grades are: \n");
75     System.out.println();
76   }
77 }
78 public void printGrades() {
79   System.out.printf("The grades are: %n");
80   System.out.print("The average is: ");
81   for (int test = 0; test < grades[0].length; test++) {
82     System.out.printf("%d ", test + 1);
83   }
84   System.out.println("Average");
85   for (int student = 0; student < grades.length; student++) {
86     System.out.printf("Student %d: ", student + 1);
87     for (int test : grades[student]) {
88       System.out.print("%d ", test);
89     }
90     double average = getAverage(grades[student]);
91     System.out.printf("%n%.2f", average);
92   }
93 }
94 }
95 public static void main(String[] args) {
96   // gradebook.setCourseName("Computer Science 101");
97   // gradebook.processGrades();
98   int[][] gradesArray = {{87, 96, 70}, {68, 87, 98}, {94, 100, 90}, {100, 81, 82}, {83, 65, 85}, {78, 87, 85}, {85, 75, 83}, {91, 94, 100}, {100, 98, 95}, {89, 77, 65}, {82, 95, 83}, {75, 85, 97}, {88, 85, 83}, {81, 90, 88}, {86, 85, 94}, {94, 100, 95}, {78, 85, 83}, {82, 75, 84}, {77, 85, 83}, {87, 85, 73}, {89, 85, 83}};
99   Gradebook mygradebook = new GradebookTest("CS101 Introduction to Java Programming", gradesArray);
100   mygradebook.printGrades();
101   mygradebook.processGrades();
102 }
```

The output window shows:

```
Welcome to the grade book for  
CS101 Introduction to Java Programming
```

The grades are:

Student	1	2	3	Average
Student 1	87	96	70	84.33
Student 2	68	87	98	84.67
Student 3	94	100	90	94.67
Student 4	100	81	82	87.67
Student 5	83	65	85	77.67
Student 6	78	97	65	82.00
Student 7	85	95	83	81.00
Student 8	91	94	100	95.00
Student 9	75	77	84	77.00
Student 10	87	53	73	64.33

Lowest grade in the gradebook is: 65  
Highest grade in the grade book is: 100

Overall grade distribution:

Grade Range	Count
0-99:	10
10-19:	0
20-29:	0
30-39:	0
40-49:	0
50-59:	0
60-69:	3**
70-79:	*****
80-89:	*****
90-99:	*****
100:	***