

**HIGHER EDUCATIONAL ESTABLISHMENT
OF THE UNION OF COOPERATIVE SOCIETIES OF UKRAINE
«POLTAVA UNIVERSITY OF ECONOMICS AND TRADE»**

FOREIGN STUDENTS DEPARTMENT

**THE DEPARTMENT OF MATHEMATICAL SIMULATION AND
SOCIAL INFORMATICS**

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«» 2021 y

**DIPLOMA THESIS
EXPLANATORY NOTE**

on topic:
ALGORITHMIZATION AND DEVELOPMENT OF SIMULATOR ON THE TOPIC
"CYCLES IN JAVA" OF THE DISCIPLINE "PROGRAMMING"

major 122 «Computer Sciences»

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Poltava – 2021

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LIST OF SYMBOLS, UNITS, ABBREVIATIONS, TERMS

Symbols, units, abbreviations, terms	Explanation of symbols, units, abbreviations, terms
GUI	Graphical User Interface
JDK	The Java Development Kit
JVM	Java Virtual Machine
JRE	Java Runtime Environment

INTRODUCTION

In order for a student to be able to effectively perform their functions in proficient exercises, he ought to secure certain practical aptitudes and theoretical information amid his studies. One of the critical conditions for moving forward the advancement of theory and practice is to form a framework of assignments, their sequence and diversity.

A computer test system could be a preparing gadget that simulates circumstances, activities, makes a circumstance near to the real one. In a smaller sense, it may be a computer-based educational modules for the improvement of students' capacities and abilities in a specific action, as well as the advancement of related capacities.

The aim of the work is to algorithmize the elements of the simulator on the topic Algorithmization and development of simulator elements on the topic “Cycles in Java” of the discipline “Programming”.

The object of development is the process of distance learning in functional programming disciplines.

Subject of the development – software application for the simulator on topic «Cycles in Java» of the distant course «Programming»

Purpose of the paper – development of the algorithm of the training for solving cycles in java problems by the means of using a simulator, the software implementation of program testing.

Methods that have been used to solve the problem is, Algorithm theory methods are used in the bachelor project work. The program was developed using Java language in the environment of Netbeans IDE 8.2.

The language used was java. Java is fast, secure, and reliable, therefore. It is widely used for developing Java applications in laptops, data centers, game consoles, scientific supercomputers, cell phones, etc.

The main task is to develop an algorithm for the simulator, which should be used to develop a training simulator on the topic "Cycles in Java", as part of a distance course "Programming".

1. STATEMENT OF THE PROBLEM

1.1. Problem description

The main task of the simulator is to teach or help the student to work with loops in Java.

The simulator can be implemented as a sequence of questions. The student must answer each question. If a student gives an incorrect answer, he will receive a hint and will answer again.

Objective: Develop a java program that contains questions and answers with hints to users in a graphical user interface.

Problem Data.

Example 1. What is the result of executing the following code?

```
for(int i=10; i>=5;i--)  
{  
    System.out.println(2*i+" ");  
}
```

- A) 20 18 16 14 12 10 (*)
- B) 20 18 16 14 12
- C) 10 9 8 7 6 5
- D) 10 9 8 7 6
- E) 9 8 7 6 5

Hints:

If student choose B)

the hint: "Variable **i** is greater than or equal to 5"

If student choose C)

the hint: "Variable **i** is changed in this range but there are printed **2*i**"

If student choose D)

the hint: " Variable **i** is greater than or equal to 5 and there are printed **2*i**"

If student choose E)

the hint: "Variable **i** starts from 10 and there are printed **2*i**"

2. INFORMATION REVIEW

2.1. Review of works where the task similar to a theme of work is considered

Improvement of the Web, growth of network transmission capacities contribute to the advancement of distance education in Ukraine and the world. Distance education needs the suitable computer program.

To speed up the development of web-sites, there are a large number of CMS (Content Management System) - content management systems. There are CMS designed for certain types of sites: blogs, forums, online stores, etc. There are also CMS for educational sites - learning management systems (Learning Management System, LMS). An example of such a system is Moodle.

Moodle is a free, open learning management system.

Focused primarily on organizing the interaction between teacher and students, though it also suitable for organizing distance learning courses, as well as supporting full-time study.

Moodle also has a Ukrainian localization.

Typical Moodle functionality includes:

- submission of tasks;
- discussion forums;
- download files;
- evaluation;
- messaging;
- calendar of events;
- news and announcements of events (for different levels: site, course, study group);
- testing;
- wiki.

Developers can create add-ons with a new add-on functionality. In the Higher educational institution of Ukoopspilka "Poltava University Economics and Trade" for distance learning also uses the system such as Moodle.

Training simulators are created to expand the capabilities of the system Moodle during practical training of students. At the Department of Mathematics modeling and social informatics created a significant number of simulators.

Typically, a simulator is designed to help a student deal with a specific topic or how to solve some type of examples from a particular discipline.

An example of a similar simulator such as the Moodle is shown below (Fig 2.1) from the Higher educational institution of Ukoopspilka "Poltava University Economics and Trade" for distance learning for foreign students under the subject "Web programming and web design".

The screenshot shows a Moodle quiz page for 'Web programming and web design'. The browser address bar shows 'www2.el.puet.edu.ua/iz/mod/quiz/attempt.php?attempt=13285'. The user is logged in as 'Wahhab Hakim Larti'. The page title is 'Web programming and web design'. The breadcrumb trail is 'Home > basic > Web programming and web design > Final control > Final Test'. On the left, there is a 'GO TO THE TEST' section with a grid of question numbers from 1 to 40. The main content area displays two questions:

Question 1
 There was no answer yet
 Max. score up to 1.00
 Mark the question

ALL HTML Tags Are Must Be Enclosed In?
 Choose one answer:
 a. ? And!
 b. # And #
 c. <and>
 d. {And}

Question 2
 There was no answer yet
 Max. score up to 1.00
 Mark the question

Correct HTML Tag For The Largest Heading Is
 Choose one answer:
 a. <head>
 b. <h1>
 c. <heading>
 d. <h12>

Fig 2.1 Sample simulator.

As a result of the analysis of various simulators, it was concluded that the best choice for the implementation of the simulator will be the Java programming language.

The graphical interface will be similar to the simulator on the topic "Web programming and web design" (Fig. 2.1).

The initial part will contain the list of questions and answers.

The graphical user interface (GUI) of the simulator will be created using Java JFrame feature.

2.2. Positive aspects of the reviewed works

Modern telecommunication, data and computer advances, to begin with of all - electronic test systems are broadly utilized for training. Simulator programs are utilized for preparing of skills on the decision of typical issues. They provide:

- Consecutive display of tasks of a given complexity on the chosen subject.
- Control over the user's activities to solve the proposed assignment.
- Instant response to incorrect actions.
- Correction of user errors.
- Demonstration of the correct solution.
- Display of the final message about the results user (maybe with recommendations or counsel).

With the assistance of test systems it is conceivable to actualize an individual approach within the organization of training. Thus, the advantages of this form of work include the following:

- Generation of educational assignments and cases.
- The plausibility of step-by-step control of the assignment.
- The plausibility of working with the test system in extracurricular time.
- The arrangement of assignments of distinctive levels of complexity.

- No need of control by the educator or instructor (control is given to the data framework), which altogether increments the proficiency of the educator.

2.3. Defects in the development of the inspected work

With the simulator, there are the following simulator aspects:

- 1) There is no explanation of the error, only it is fixed that there is an error.
- 2) There is no explanation as to which of the three (or more) answers is correct. This gives a trace to guess.
- 3) There is no overall feedback to the student of his/her total progress or marks after the program ends.
- 4) Error in the last step - there is no arrow on the line on to the right or on to the left, as required by the standard.

2.4. Necessity and relevance of the topic of work

Distance education is one of the most promising forms of education today. Being a form of distance education, distance education is much more effective because it involves much more face-to-face communication between teacher and student, even if they are divided territorially. This has become possible with the help of modern telecommunication technologies and the Internet. This allows to significantly increase the efficiency of education and attract a much larger number of students to study.

Any training requires some organizational and informational support. Components of distance education are:

- Training center, which performs the necessary functions of organizational support.

- Information resources - training courses, reference, methodological and other materials.
- Means of distance learning technology (organizational, technical, software, etc.); consultants who supervise distance courses and are called tutors.

Usually the training center includes teachers with additional staff, and information resources, and a separate organizational and administrative system (a kind of "electronic dean's office"). Also for simplicity it is possible to assume that it contains technical and software means, although, in essence, they relate to all aspects of the distance education system.

For the organization and proper functioning of the distance education system it is necessary to perform the following main functions:

- Support of training courses.
- Delivery of educational material to students.
- Support of reference materials (library).
- Consultations.
- Control of knowledge.
- Organization of students' communication (collective forms of education).

Elements of the distance learning course:

- Information resources,
- Means of communication,
- Testing system,
- Administration system.

The most important component of the distance course are information resources, because they focus on the content part -content (content).

Content includes:

- Educational material (lecture notes, demonstration materials, etc.); frequently asked questions, etc.)

- Library of resources (recommended literature, lists of Web-resources on the topic of the course, etc.)
- Subject and / or thematic dictionary (glossary)
- Curriculum (academic calendar). All these components can be implemented by various means. This is the use of powerful programming languages, and the use of specialized authoring systems, etc.

Distance education can also be used in full-time education. For example, for students who missed classes or cannot attend classes for some reason.

3. THEORETICAL PART

3.1. Problem-solving algorithmization

Cycle - a kind of control structure in high-level languages programming designed to organize multiple execution of the set instructions (commands). Also, the cycle can be called any multiple executable sequence of commands organized in any way (for example, withby means of a conditional transition).

The sequence of instructions intended for multiple execution, is called the body of the cycle. A single execution of a loop body is called an iteration. An expression that determines whether the iteration will be performed again or the loop will end, is called the exit condition or loop termination condition (or condition continuation depending on how its truth is interpreted - how a sign of the need to complete or continue the cycle. Variable in which the current iteration number is stored, called the loop iteration counter or just a cycle counter.

Java supports different types of loops, to mention a few are the following types of loops:

- For.
- While.
- Do..while.
- Loop for each.
- Break.

When you start the training simulator, the student gets a home screen that contains: first the title of our project on the title bar of the application, the question on the topic of the training simulator, a list of possible answers, a “submit” button that provides response to users relating to which their answer is correct or wrong, and the “next” button that provides student the opportunity to go to the next question and answers from the available list of questions that are unknown to him. Below is a descriptive algorithm on how the simulator was developed.

Descriptive Algorithm.

Step 0. Start the program.

Step 1. The program displays the current question from the list of questions and also displays possible list of answers.

Step 2. User has to select one of the answers, among which one is correct. If user selects the right choice, a pop-up message appears as a hint reporting to the user that he/she made the right choice.

Step 3. If user selects a wrong choice, a pop-up message appears as a hint reporting to the user that the choice of selection is incorrect, and then program moves back to step 1.

Step 4. The user then clicks on the next button.

Step 5. If list of questions is empty, move to step 7.

Step 6. Display the next question and possible list of answers.

Step 7. End program.

Below are the list of questions and answers in our training simulator. The correct answer in the training simulator is indicated with (*) in the list of answers.

Q1. What is the result of executing the following code?

```
for (int i = 10; i >= 5; i--) {  
    System.out.print(2 * i + " ");  
}
```

A) 20 18 16 14 12 10 (*)

B) 20 18 16 14 12

C) 1098765

D) 9 8 7 6 5

Q2. What is the result of executing the following code?

```
for (int ii = 10; ii <= 18; ii++) {  
    System.out.print(ii + " ");  
}
```

- A) 1098765
- B) 10 11 12 13 14 15 16 17 18(*)
- C) 20 18 16 14 12
- D) 74 85 63 352 78

Q3. What is the result of executing the following code?

```
String[] forlooparray = {"Apple", "Banana", "Kiwi", "Lemon"};  
for (String m : forlooparray) {  
    System.out.print(m + " ");  
}
```

- A) Kiwi Apple Strawberry Mango
- B) Apple Lemon Banana Kiwi
- C) Apple Banana Kiwi Pineapple
- D) Apple Banana Kiwi Lemon (*)

Q4. What is the result of executing the following code?

```
int j = 10;  
while (j >= 5) {  
    System.out.print(2 * j + " ");  
    j--;  
}
```


- A) 18 47 15 86 4
- B) 10 12 14 16 18 20
- C) 20 18 16 14 12 10 (*)
- D) 2 4 6 8 10 11 78

Q5. What is the result of executing the following code?

```
int jj = 1, sumwhileloop = 0;
    while (jj <= 10) {
        sumwhileloop = sumwhileloop + jj;
        jj++;
    }
```

- A) 55(*)
- B) 45
- C) 35
- D) 25

Q6. What is the result of executing the following code?

```
int kk = 0;
    while (kk < 3) {
        kk++;
    }
    System.out.print(kk + " ");
```

- A) 6
- B) 3(*)
- C) 9
- D) 12

Q7. What is the result of executing the following code?

```
int k = 10;
do {
    System.out.print(2 * k + " ");
    k--;
} while (k >= 5);
```

- A) 20 18 16 14 12 10(*)
- B) 18 16 14 12 10 20
- C) 16 18 14 12 10 20
- D) 20 10 12 14 16 18

Q8. What is the result of executing the following code?

```
int w1 = 0;
do {
    System.out.println(w1);
    w1++;
} while (w1 < 3);
```

- A) 0 1 2 (*)
- B) 1 2 0
- C) 1 2 3
- D) 0 2 1

Q9. What is the result of executing the following code?

```
int dw3 = 21, sumdw3 = 0;
do {
    sumdw3 += dw3;
```

```
    dw3--;  
} while (dw3 > 10);
```

- A) 561
- B) 485
- C) 276
- D) 176(*)

Q10. What is the result of executing the following code?

```
for (int lf1 = 1; lf1 <= 3; lf1++) {  
    System.out.println("Hi java");  
}
```

- A) (Hi Java, Hi Java, Hi Java)(*)
- B) (Hello Java, Hi Java, Hi Jaba)
- C) (Hi Java, Hi Java, Hi Java)
- D) (Hi Java, Hi Java)

Q11. What is the result of executing the following code?

```
int sumlf2 = 0;  
for (int lf2 = 1; lf2 <= 20; lf2++) {  
    sumlf2 = sumlf2 + lf2;  
}
```

- A) 111
- B) 211
- C) 210(*)
- D) 110

Q12. What is the result of executing the following code?

```
String arrayf13[] = {"Ron", "Harry", "Hermoine"};
for (String xlf3 : arrayf13) {
    System.out.println(xlf3);
}
```

- A) (Harry, Hermoine, Ron)
- B) (Ron, Harry, Hermoine)(*)
- C) (Harry, Ron, Hermoine)
- D) (Hermoine, Ron, Ron)

Q13. What is the result of executing the following code?

```
for (int b1 = 0; b1 < 10; b1++) {
    if (b1 == 4) {
        break;
    }
}
```

- A) 0 1 2 3(*)
- B) 1 2 3 0
- C) 1 2 3 4
- D) 4 3 2 1

Q14. What is the result of executing the following code?

```
int[] numbers = {10, 20, 30, 40, 50};
for (int b2 : numbers) {
    if (b2 == 30) {
        break;
    }
}
```

```
    }
```

- A) 20 10
- B) 11 20
- C) 10 20(*)
- D) 22 10

Q15. What is the result of executing the following code?

```
int varb3;
    for (varb3 = 100; varb3 >= 10; varb3--) {
        System.out.println("var: " + varb3);
        if (varb3 == 99) {
            break;
        }
    }
```

- A) 96
- B) 97
- C) 98
- D) 99(*)

Q16. What is the result of executing the following code?

```
int a = 100;
    while (a > 0) {
        a /= 2;
        if (a > 10) {
            continue;
        }
    }
```

- A) aaaa0 (*)

B) aaa0

C) aa0

D) a0

Q17. What is the result of executing the following code?

```
for (int ct2 = 0; ct2 <= 6; ct2++) {  
    if (ct2 == 4) {  
        continue;  
    }  
}
```

A) 0 1 2 3 5 6(*)

B) 0 1 2 5 7 8

C) 0 1 2 4 5 8

D) 1 2 3 4 5 6

Q18. What is the result of executing the following code?

```
int ct3 = 0;  
while (ct3 < 10) {  
    if (ct3 == 4) {  
        ct3++;  
        continue;  
    }  
}
```

A) 0 4 8 5 6 8 5 9 5

B) 0 1 4 5 8 9 6 7 5

C) 0 1 2 3 4 6 7 8 9

D) 0 1 2 3 5 6 7 8 9(*)

Q19. What is the result of executing the following code?

```
int numif1 = 10;
    if (numif1 == 10) {
        System.out.println("Number can be / with 5.");
    } else {
        System.out.println("it cannot");
    }
}
```

- A) Number can be / with 5 and 10
- B) Number cannot be /with 5
- C) Number can be / with 5(*)
- D) Number can be / with 5 and 14

Q20. What is the result of executing the following code?

```
int aa3 = 6, bb3 = 5;
    if (aa3 > bb3) {
        System.out.println("num1 is larger than num2");
    } else {
        System.out.println("num2 is lesser than num1");
    }
}
```

- A) num1 is smaller than num2
- B) num2 is larger than num1
- C) num2 is larger than num2
- D) num1 is larger than num2(*)

Q21. What is the result of executing the following code?

```
int age;
```

```

age = 18;
if (age < 18) {
    System.out.println("You are not an adult");
} else {
    System.out.println("You are an adult");
}

```

- A) You are not an adult
- B) You are an adult(*)
- C) You might be an adult
- D) You are an adult then.

Q22. What is the result of executing the following code?

```

int rows = 5;
for (int n1 = 1; n1 <= rows; ++n1) {
    for (int nj1 = 1; nj1 <= n1; ++nj1) {
        System.out.print(nj1 + " ");
    }
}

```

- A) 8 4 7
- B) 9 7 4
- C) 3 5 4
- D) 1,1 2,1 2 3,1 2 3 4,1 2 3 4 5 (*)

Q23. What is the result of executing the following code?

```

for (int n1 = 1; n1 <= 3; n1++) {
    for (int nj2 = 1; nj2 <= 3; nj2++) {
        System.out.println(n1 + " " + nj2);
    }
}

```



```
    }
```

- A) 1 1,1 2,1 3,2 1,2 2,2 3,3 1,3 2,3 3(*)
- B) 4 7 8
- C) 6 7 3
- D) 8 7 5

Q24. What is the result of executing the following code?

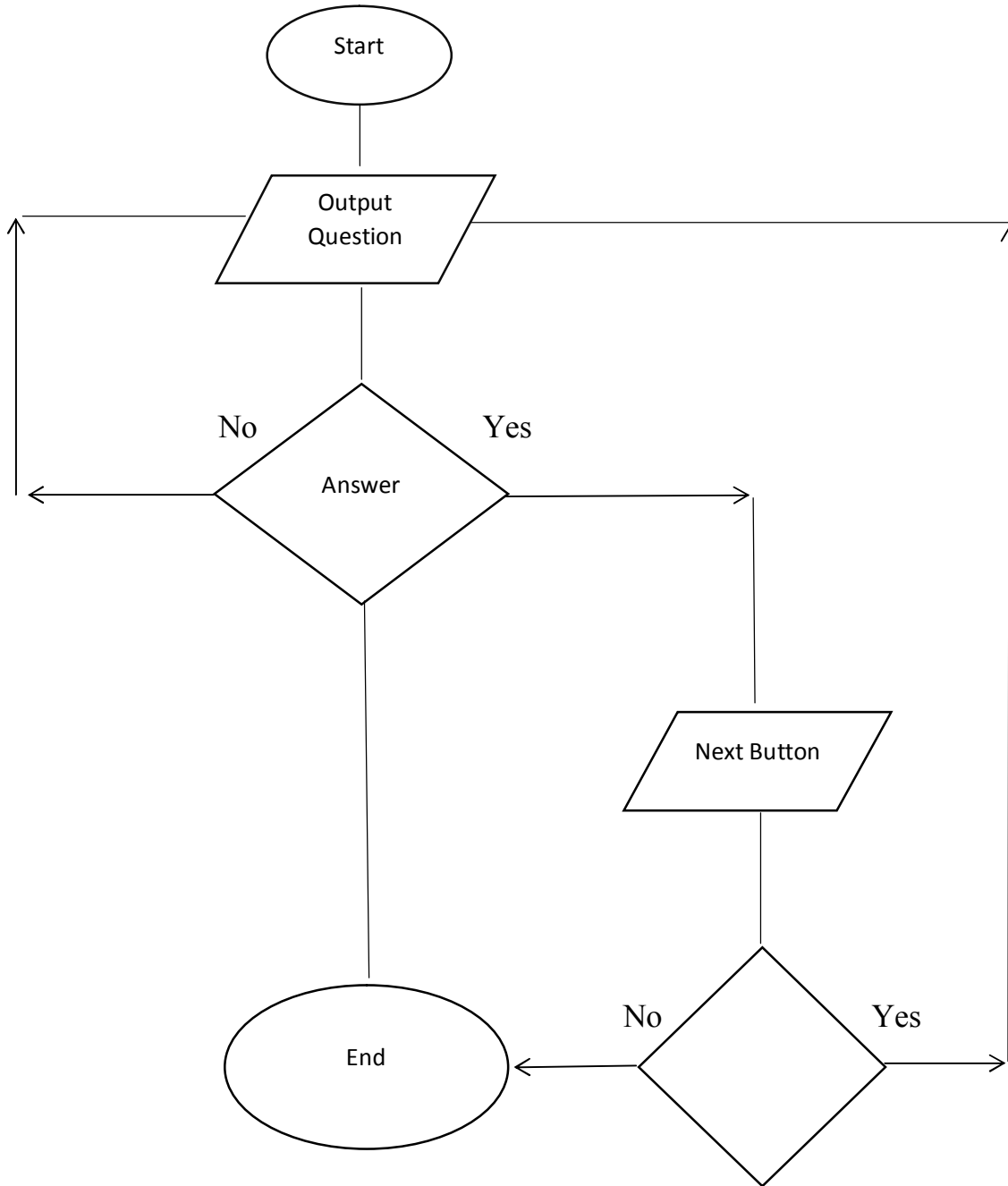
```
int mat[][] = {{1, 2, 3, 4},
               {5, 6, 7, 8},
               {9, 10, 11, 12}};
```

```
for (int nl3 = 0; nl3 < mat.length; nl3++) {
    // Loop through all elements of current row
    for (int nj3 = 0; nj3 < mat[nl3].length; nj3++) {
        System.out.print(mat[nl3][nj3] + " ");
    }
}
```

- A) 3 6 9
- B) 2 5 8
- C) 1 4 7
- D) 1 2 3 4,5 6 7 8,9 10 11 12(*)

3.2. Development of a block diagram to be programmed

Flowchart Algorithm.



3.3. Justification of the choice of software for the implementation of task

Java permits you to form platform-independent applications by compiling them into an intermediate view called a bytecode. Numerous past endeavors to know the arrangement to the issue of stage independence have been made through efficiency. Interpreting frameworks like Basic, Perl, endure from an nearly inconceivably need of performance. This was taken into consideration when making Java In spite of the fact that Java is a translated language, bytecode generation has been carefully optimized so that the resulting bytecode can be effortlessly interpreted into machine code that runs at exceptionally high execution. Executing frameworks of this kind don't lose any benefits of versatile code.

The Java Development Kit (JDK) is one of three core technology packages used in Java programming, along with the JVM (Java Virtual Machine) and the JRE (Java Runtime Environment).

Java is outlined to form applications that run in a disseminated Web environment based on TCP / IP conventions. In truth, getting to assets through a URL is distinctive from getting to a file. In expansion, Java includes a means of transmitting messages inside the inside address space. This permits farther methods to be performed. These interfacing are included within the RMI bundle (inaccessible strategy conjuring). This apparatus brings a tall level of reflection to client / server programming.

Java applications carry a critical sum of run-time type data, which is utilized to permit get to objects whereas the program is running. This permits for a secure and ideal energetic layout. In this way, the security of the applet execution environment is accomplished.

The above straightforwardness of programming in Java is the reason that improvement in Java will be cheaper than comparative ones on more effective programming dialects. The compactness of Java applications moreover contributes to this, as the costs related with adjusting the application on a particular stage are eliminated.

Java applications can discover different applications within the learning handle: intuitively instructional exercises, webpages in combination with Java, test programs and especially commerce recreations. You'll get extra benefits by composing these programs within the

shape of applets that are initialized from the Internet server of the inner Intranet. This way, you'll be able to introduce the program on numerous computers - the client basically dispatches a Web browser and loads the required page.

NetBeans is a Java-based integrated development environment (IDE). The term moreover alludes to the IDE's basic application stage system. The IDE is outlined to constrain coding errors and encourage mistake rectification with devices such as the NetBeans FindBugs to find and settle common Java coding issues and Debugger to oversee complex code with field watches, breakpoints and execution observing. In spite of the fact that the NetBeans IDE is outlined particularly for Java designers, it too bolsters C/C++, PHP, JavaScript, and HTML5 in expansion to Java, JavaScript and JavaFX.

Tools and capabilities of the NetBeans IDE incorporate a feature-rich content editor with refactoring devices and code layouts, tall level and granular sees of applications, a drag and drop GUI plan, and versioning utilizing out-of-the-box integration with apparatuses such as Git. The NetBeans IDE can run on any working framework that supports a compatible JVM including Linux, Windows and OS X.

The fundamental NetBeans platform supports creation of unused applications and assist advancement of existing applications utilizing measured program components. As an application running on the NetBeans Platform, the NetBeans IDE itself is extensible and can be expanded to bolster unused languages.

Here are the most reasons for utilizing the NetBeans IDE

- Quickly prepared to work.
- Free and open source.
- Powerful GUI Builder.
- Support for Java standards and platforms.
- Means of profiling and adjustment.
- Support for dynamic language.

4. PRACTICAL PART

4.1. Program description

The implementation of the simulator began with the analysis of the algorithm description. This process was used to develop the simulator.

When the student simulator starts, the home screen appears. The initial screen contains (Fig. 4.1):

The title of the training simulator ("bachelor project"), buttons "Submit", "Next".

JTextArea displaying "Practical questions".

RadioButtons displaying the list of "answer".



Fig 4.1 — Start Screen

When passing through the control element "Practical questions" before the student there are questions with conducting, and then questions with a choice of the answer. If the student did not enter any data and did not select an answer when clicking the "submit" button, a message appears, as shown in Fig. 4.2.

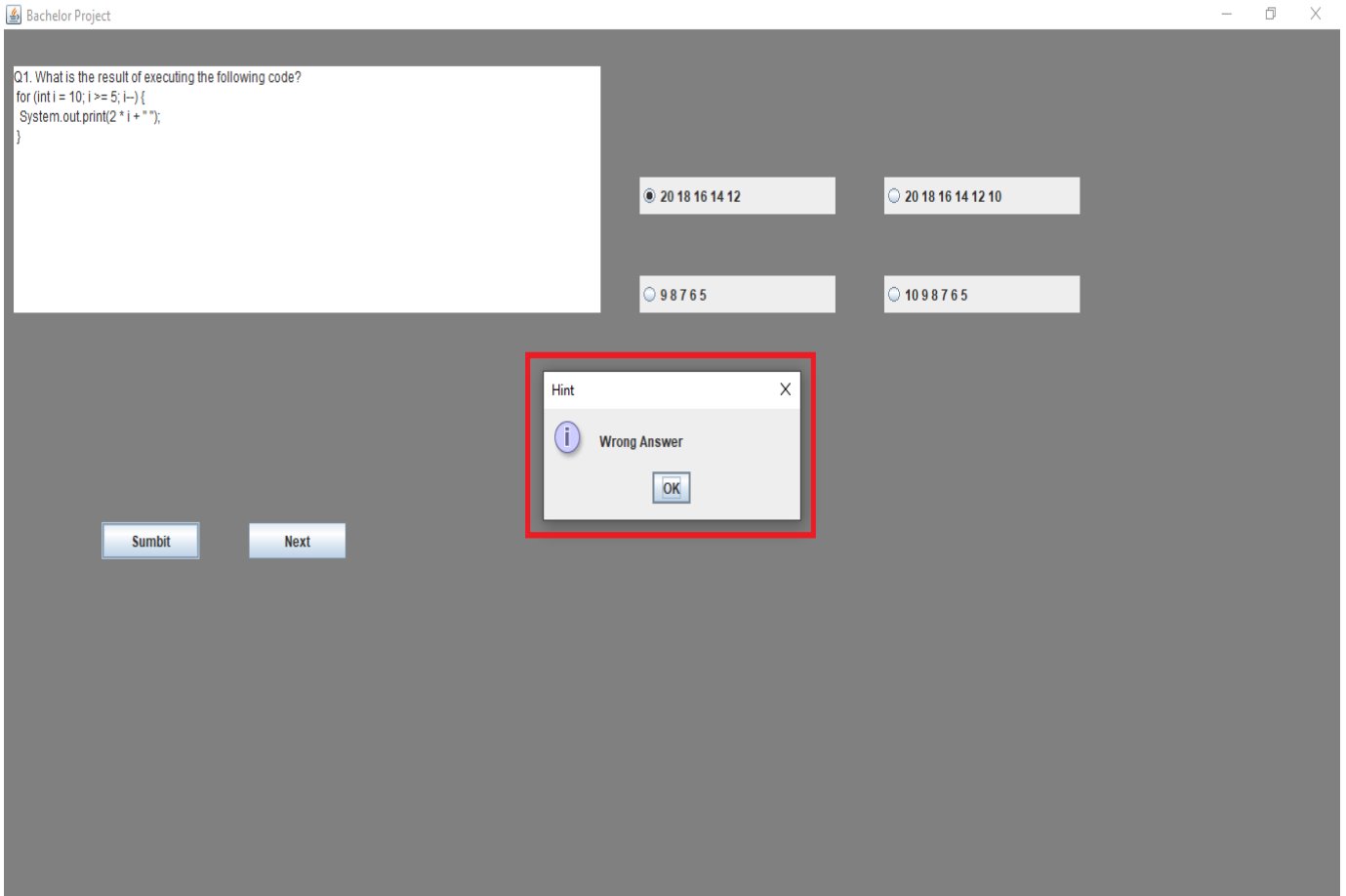


Fig 4.2. — Wrong choice

When passing through the control element "Practical questions" before the student there are questions with conducting, and then questions with a choice of the answer. If the student did select next button, it displays the next question. The program repeats till end of questions.

4.2. RUN MANUAL

Creation of a new Java project as shown in the figure below using the netbeans 8.2 environment. The figure shown below was performed on a Microsoft windows operating system.

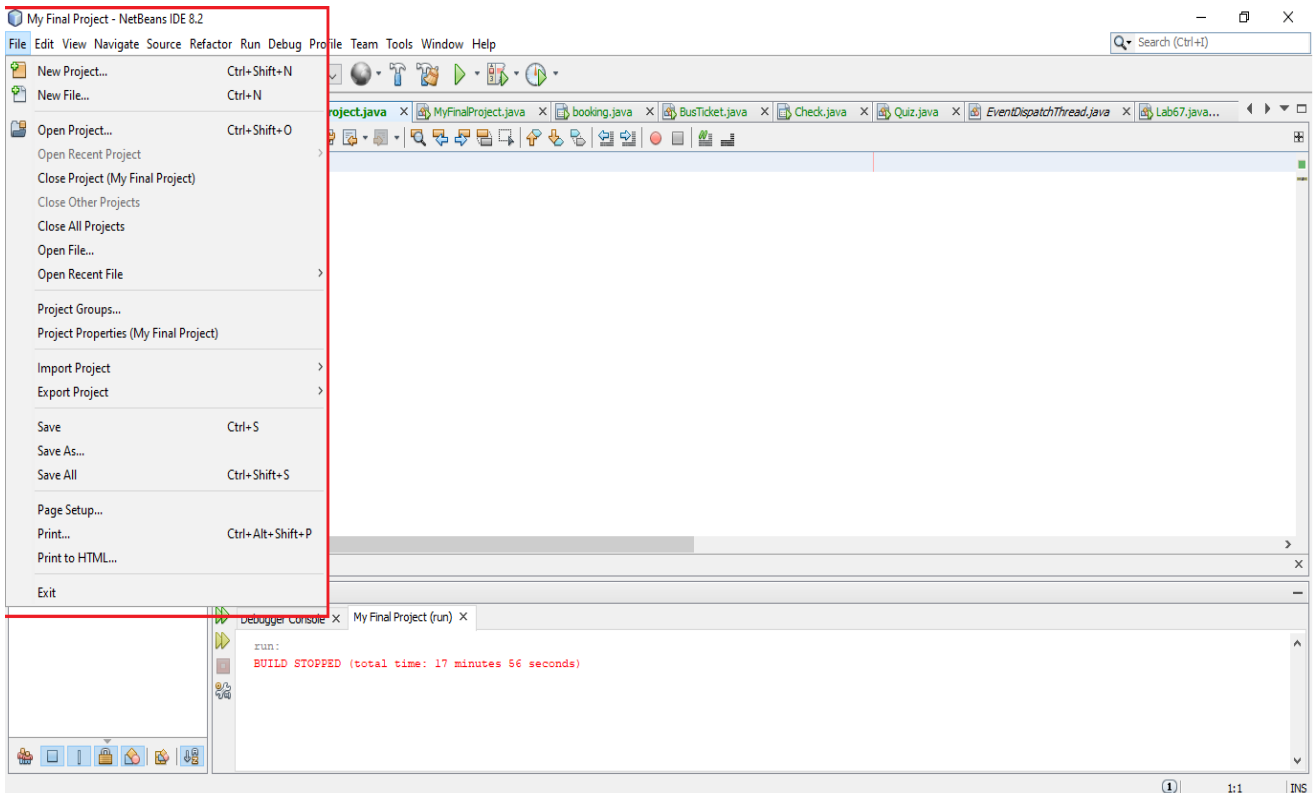


Fig 1. Creating a new project.

Launch the NetBeans IDE.

On Microsoft Windows systems, you can use the NetBeans IDE item in the Start menu.

In the NetBeans IDE, choose File and click on New Project.

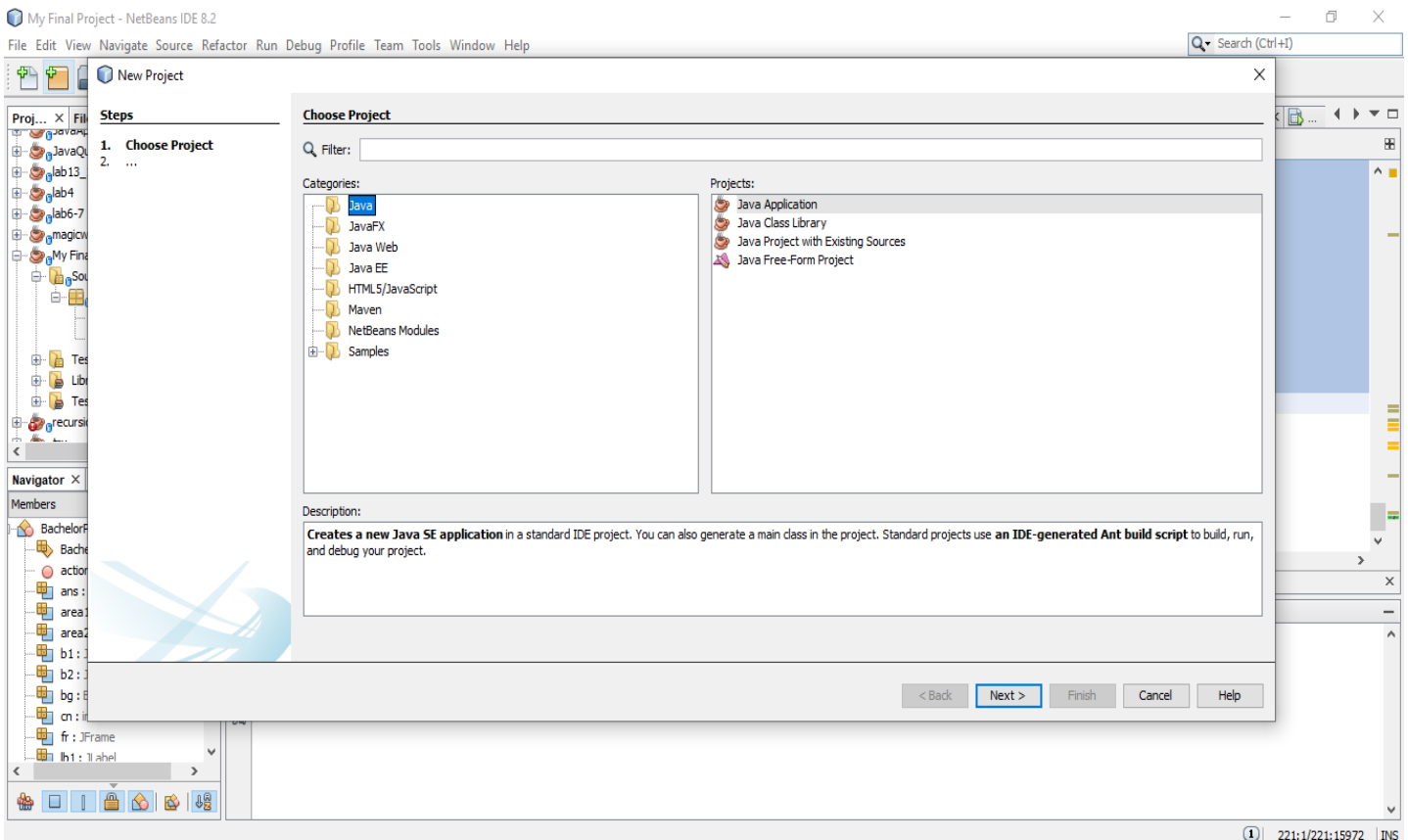


Fig 2. Selecting a new java project.

In the New Project wizard, expand the Java category and select Java Application as shown in the figure above figure.

Fig 3. Name and Location selection

In the Name and Location page of the wizard, there are the following options.

In the Project Name field, type the name of the application.

In the Create Main Class field, type the name of main class name.

This window creates a new Java SE application in a standard IDE project. Standard projects use an IDE-generated Ant build script to build, run, and debug your project.

Fig 3. Name and location

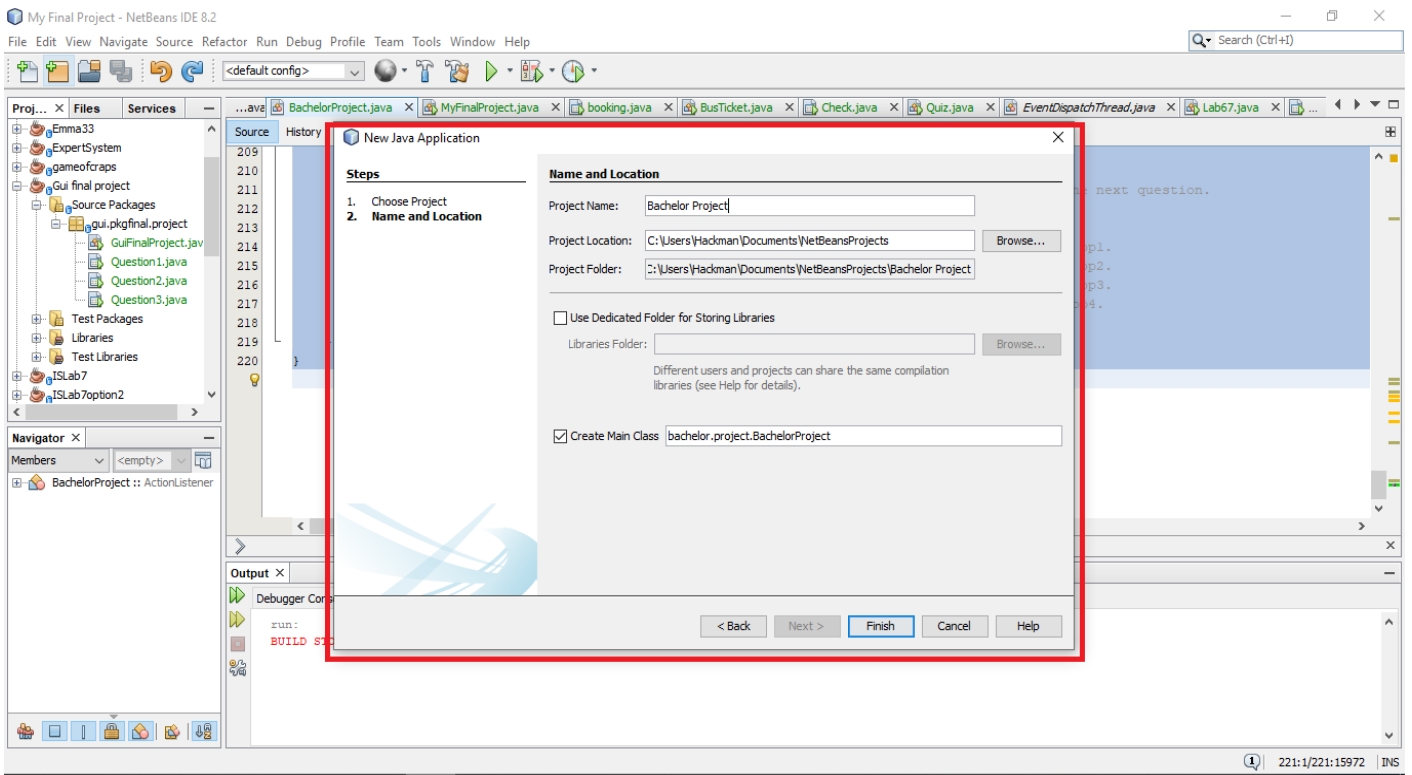


Fig 4. Application Launch

After creating our program, we have this screen for user to use the program. This is the default, nothing is been selected or been clicked. It displays the current question and answers to the user.

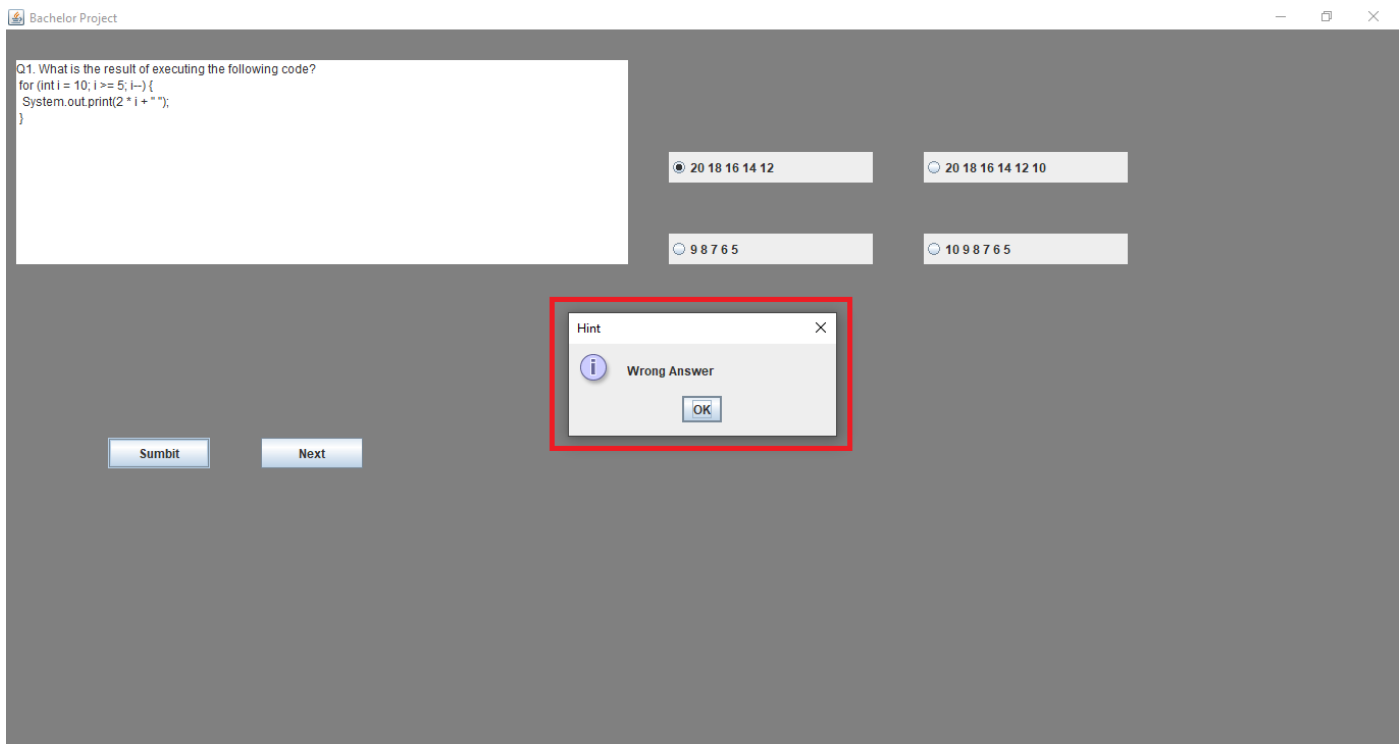


Fig 5. Wrong answer preview.

This window details what happens when a user selects a wrong answer and clicks on the submit button. A pop-up message appears as a hint reporting to the user with a message.

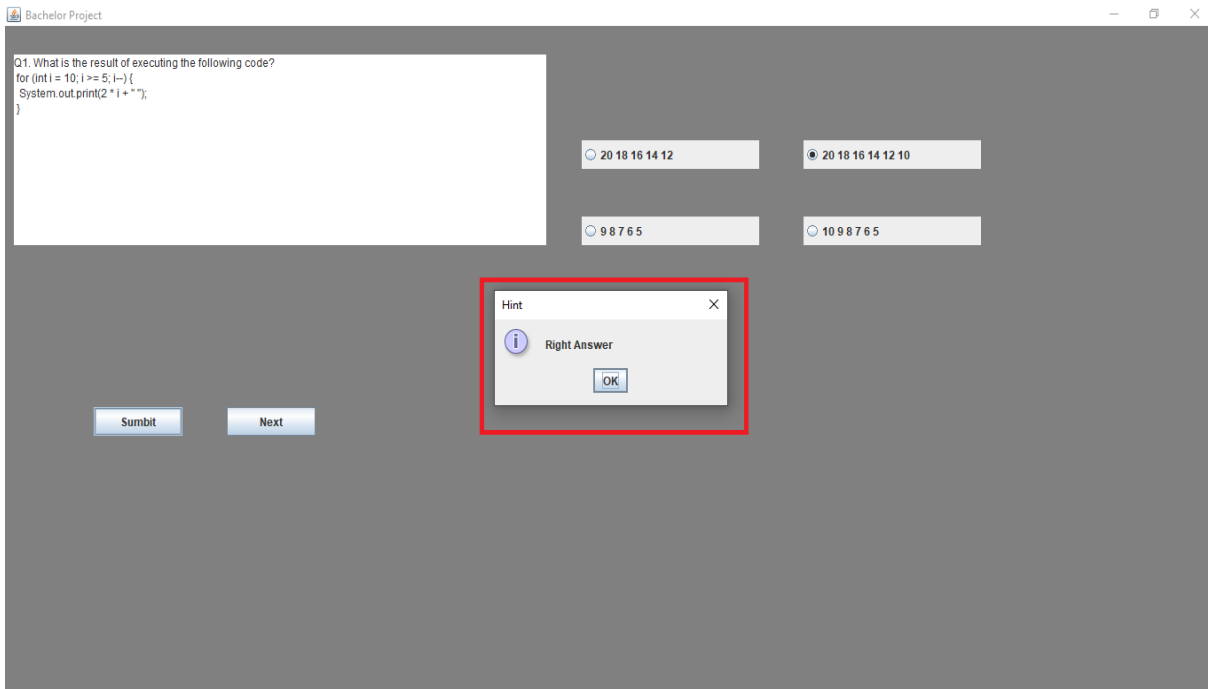


Fig 6. Right answer preview

This window details what happens when a user selects the right answer and clicks on the submit button. A pop-up message appears as a hint reporting to the user with a message that he/she chose the right answer.

The user repeats the steps till the end of questions and answers.

4.3. TESTING

Testing is the method of assessing a framework or its components with the expectation to find whether it fulfills the desired necessities or not. In basic words, testing is executing a framework in arrange to distinguish any gaps, mistakes, or lost necessities in opposite to the real prerequisites.

Purpose of the document:

This report explains the different activities performed as part of the testing of the "Simulator".

Application overview:

'The simulator' is a distance learning application. This simulator teaches students the various 'cycles in java' of the discipline 'programming'. Real-time questions and answers is displayed to the users in a graphical interface. This simulator has buttons for users to click to answer the questions. All these are integrated in the simulator to fulfill the purpose.

Testing method used:

The functional testing method was used to test the simulator. In functional testing, we are able to portray goals as aiming yields of the computer program testing process. The most objective of useful testing is to check how closely the feature is working as per the determinations. For way better understanding, we will isolate useful testing objectives into two parts: validation testing and deformity testing.

Validation testing:

To demonstrate the application making sure it builds successfully.

In the first phase of testing our application, we build it to check it against any bugs or errors before running the application. In the building process, the application was able to build successfully without any errors. The application also built within two seconds. This is shown in the figure below.

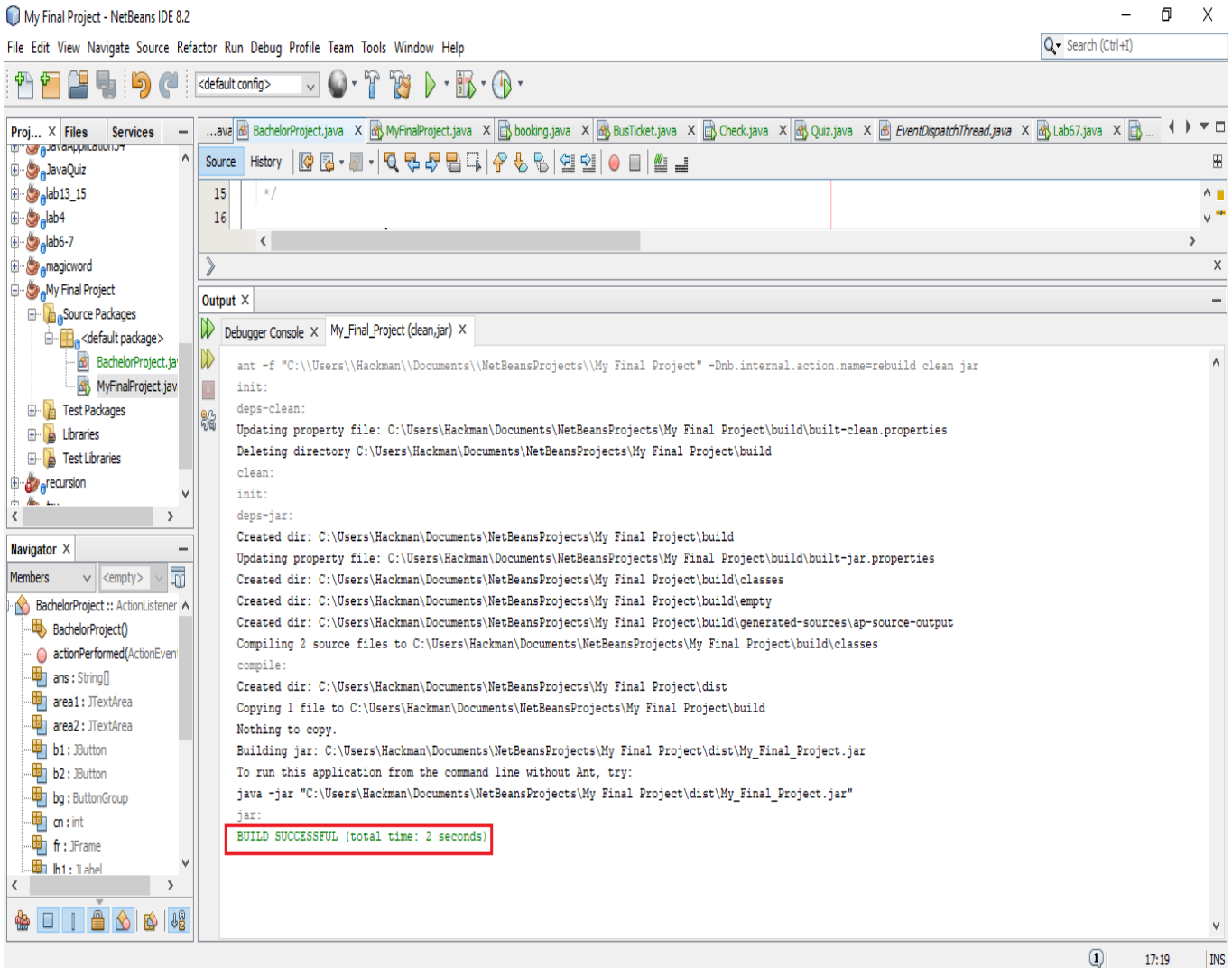


Fig 1. Building application.

Defect testing:

To discover the defects within the usefulness in terms of the client interface, blunder messages and content handling.

In this phase of testing the application, it been check for exception handling when the program is been used. The program was able to handle or meet the client interface and content handling. This is shown in the figure below.



Fig 1. No selection made



Fig 2. User clicks on submit button.

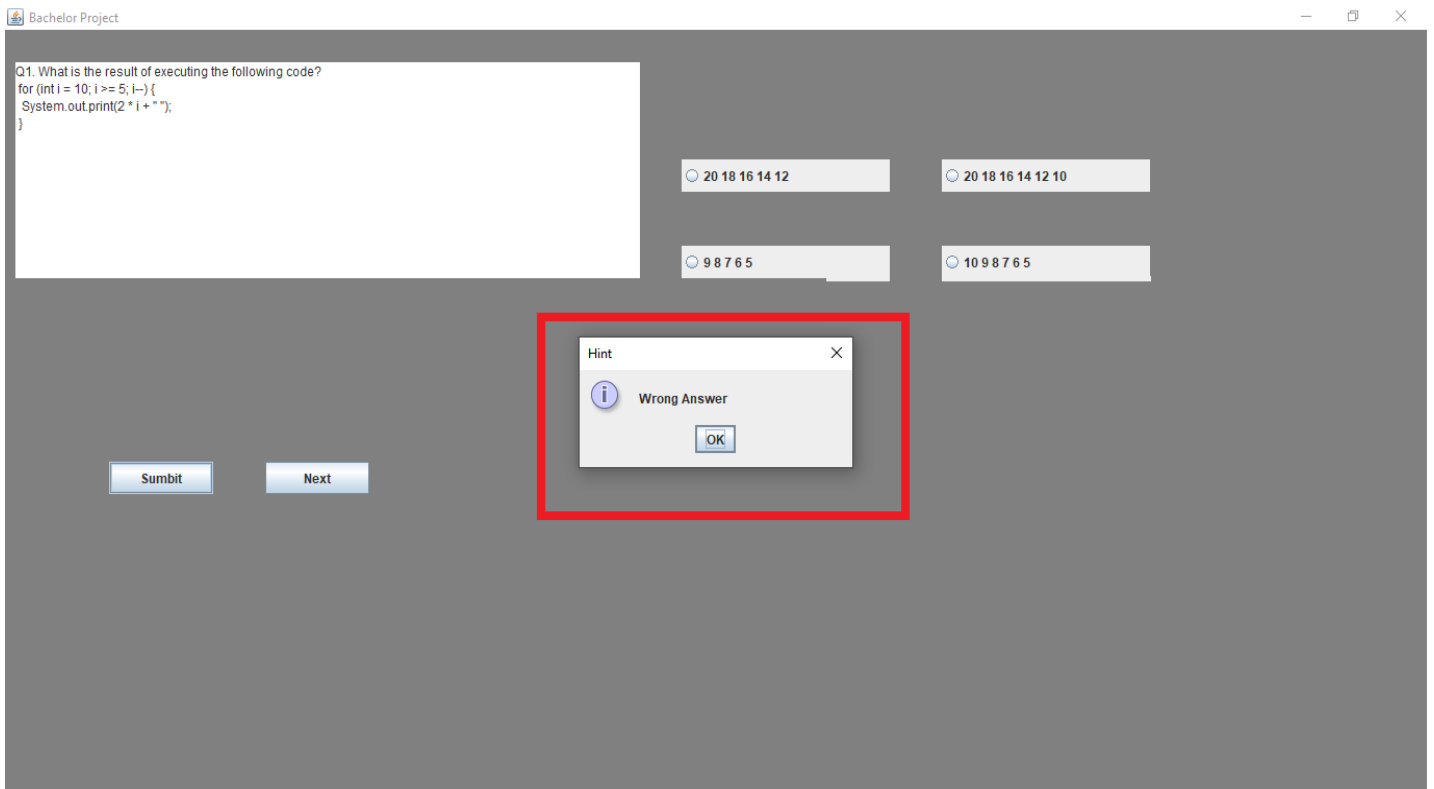


Fig 3. Error handling.

In figure 3, the application was able to handle the exception when a user did not make a selection but clicks on the submit button.

CONCLUSIONS

Thus, a computer simulator is a software tool for the development of skills and abilities in a particular activity, as well as the development of abilities related to this activity. This concept is part of the more general concepts of software and teaching aids and electronic teaching aids, which differ in both functionality and scope.

The result of the work is a simulator on the topic "Algorithmization and development of simulator elements on the topic "Cycles in Java" of the discipline "Programming".

The main results of the work:

- Simulators of similar subjects in programming are considered, describes all aspects of the examined simulators and the relevance of the topic of work;
- Theoretical information about the cycles of Java is considered;
- The specifics of applying the method of resolutions in numerous statements and numerous predicates are considered;
- Developed a simulator algorithm that will consolidate knowledge on the topic "Cycles in Java".

The first step was to consider the simulator on the topic "Cycles in Java" of the distance course.

The algorithm describes step by step all the steps in solving examples, in numerous predicates. After that the block diagram of the developed algorithm is created.

I successfully use an algorithm and chose a suitable method to create a simulator which generates questions and answers with hints in a graphical interface for students to acquire knowledge and enhance their learning capabilities through the simulator.

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