Control Statements

1 Introduction

Through this training, to grasp selection and looping statements, and understand how to program with them.

1.1 Evaluation

- Code Correctness: 60%
- Experimental Report: 40%

1.2 Knowledge Points

- if.. else
- switch
- while
- do.. while
- for
- continue and break

2 Demonstration

2.1 Selections

Convert scores to grades:

Grade	Score
A	90~100
B	80~89
C	70~79
D	60~69
F	0~59

(1) Create a class:

```
import java.util.Scanner;
public class TestClass {
    public static void main(String[] args) {
    }
}
```

(2) Input a score using the `Scanner` class:

```
import java.util.Scanner;
public class TestClass {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in); // create a Scanner object for
console input
        System.out.print("Enter a score:"); // hint
        int score = input.nextInt();  // input a number using the nextInt() method
        // conversion
        input.close();
    }
}
```

(3) Convert the score to the grade:

```
import java.util.Scanner;
public class TestClass {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        System.out.print("Enter a score:");
        int score = input.nextInt();
        if(score >= 90) {
            System.out.println("A");
        }else if(score >= 80){
            System.out.println("B");
        }else if(score >= 70){
            System.out.println("C");
        }else if(score >= 60){
            System.out.println("D");
        }else{
            System.out.println("F");
        }
        input.close();
    }
}
```

2.2 Loops

Print string `Hello World!` 10 times.

(1) Use the `while` loop to complete the task:

```
public class TestClass {
    public static void main(String[] args) {
        int count = 0;
        while(count++ < 10) {
            System.out.println("Hello World!");
        }
    }
```

```
}
```

(2) Use the `do..while` loop to complete the task:

```
public class TestClass {
    public static void main(String[] args) {
        int count = 0;
        do {
            System.out.println("Hello World!");
        } while(++count < 10); // Do not forget the semicolon
    }
}
```

(3) Use the `while` loop and `break` to complete the task:

```
public class HelloWorld {
    public static void main(String[] args) {
        int count = 0;
        while(true) {
            if(++count > 10)
                break;
            System.out.println("Hello World!");
        }
    }
}
```

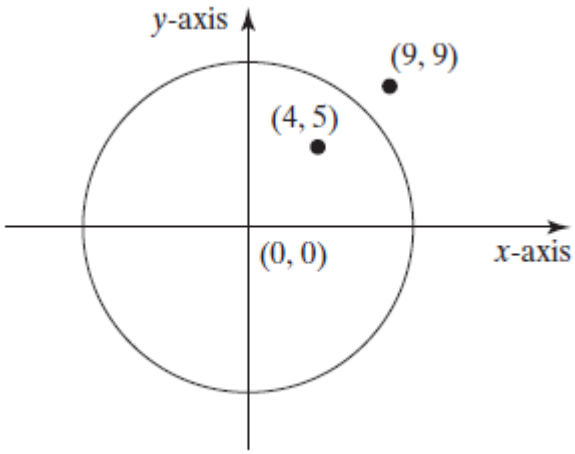
(4) Use the `for` loop to complete the task:

```
public class HelloWorld {
    public static void main(String[] args) {
        for(int i = 0; i < 10; i++) {
            System.out.println("Hello World!");
        }
    }
}
```

3 Experiment Content

3.1 Geometry

Write a program that prompts the user to enter a point (x, y) and checks whether the point is within the circle `centered at (0, 0) with radius 10`. For example, (4, 5) is inside the circle and (9, 9) is outside the circle,



as shown in the following figure.

(1) Create a class named `PointInCircle`:

```
import java.util.Scanner;
public class PointInCircle{
    public static void main(String[] args){
        Scanner input = new Scanner(System.in);
        final double DISTANCE = 10.0;
        // input a point and judge
        input.close();
    }
}
```

(2) Input a point:

```
System.out.print("Enter a point with two coordinates:");
// input x
// input y
```

(3) Calculate the distance from the point to the center of the circle:

```
double dist = ...;
```

(4) Determine the relative position of the point and the circle:

```
if(...)
    System.out.printf("Point(%4.1f, %4.1f) is outside the circle.\n", x, y);
else if(...)
    System.out.printf("Point(%4.1f, %4.1f) is on the circle.\n", x, y);
else
    System.out.printf("Point(%4.1f, %4.1f) is in the circle.\n", x, y);
```

(5) Compile and run the program:

```
$ javac PointInCircle.java
$ java PointInCircle
Enter a point with two coordinates:5 5
Point (5.0, 5.0) is in the circle.
$ java PointInCircle
Enter a point with two coordinates:0 10
Point (0.0, 10.0) is on the circle.
$ java PointInCircle
Enter a point with two coordinates:9 9
Point (9.0, 9.0) is outside the circle.
```

3.2 Game:scissor, rock, paper

Write a program that plays the popular scissor-rockpaper game. (A scissor can cut a paper, a rock can knock a scissor, and a paper can wrap a rock.) The program randomly generates a number `0`, `1`, or `2` representing scissor, rock, and paper. The program prompts the user to enter a number `0`, `1`, or `2` and displays a message indicating whether the user or the computer wins, loses, or draws. Revise the program to let the user continuously play until either the user or the computer wins `two times`.

(1) Create a class named `ScissorRockPaper` and give a program framework:

```
import java.util.Scanner;
public class ScissorRockPaper{
    public  static void main(String[] args){
        Scanner input = new Scanner(System.in);
        System.out.println("************Game start!************");
        int compWinN = 0;
        int peoWinN = 0;
        String[] types = {"scissor", "rock", "paper"};
        while(...){
            // Computer selecting
            int comp = (int)(Math.random() * 3);
            // People selecting
            // If input value is illegal.
            // Judge who wins the game.
            // Print the intermediate result
        }
        if(peoWinN == 2)
            System.out.print("You won!");
        else
            System.out.print("Computer won!");
    }
}
```

(2) Complete the program based on the given framework.

(3) Compile and run the program:

```
$ javac ScissorRockPaper.java
$ java ScissorRockPaper
************Game start!************
scissor (0), rock (1), paper (2):1
The computer is rock. You are rock.(computer:0,you:0)
scissor (0), rock (1), paper (2):2
The computer is paper. You are paper.(computer:0,you:0)
scissor (0), rock (1), paper (2):2
The computer is rock. You are paper.(computer:0,you:1)
scissor (0), rock (1), paper (2):2
The computer is rock. You are paper.(computer:0,you:2)
You won!
```

4 Experiment Report Requirements

4.1 Think and answer the question

(1) What happens if `break` is missing in the `switch` statement?

(2) What is the difference between the `while` and `do..while` statements?

(3) How to use `while(true)` and `break` together?

(4) Other experience.

4.2 Experiment report content

(1) Answer the above questions.

(2) All codes.

4.3 Submission method

(1) Upload the report by ftp:(Address:ftp://172.18.5.102; UserName:wangxiaomeng; Password: wangxiaomeng)

(2) File name format: StudentID+Name. For example, `20191234小明.docx`

4.4 Other Instructions

You can obtain experiment course resources through the web platform (URL: https://www.lanqiao.cn; InvitationCode: `ZF0XA4Y1`)