

java

تدریبات وملخص لكثير 4

Conclusion of Lecture 4: Control Structures (Conditional Statements)

Key Points Covered:

1. Flow of Control

- Defines the order in which instructions are executed.
- Three basic structures: **sequence**, **branching (selection)**, and **looping (repetition)**.

2. Branching Statements in Java

- `if`
- `if-else`
- `if-else if-else`
- `switch`

3. The `if` Statement

- Executes a block of code only if a condition is `true`.
- Syntax:

java

```
if (condition) {  
    // code to execute if true  
}
```

The `if-else` Statement

- Chooses between two alternatives.
- Syntax:

java

```
if (condition) {
```

```
    // code if true
} else {
    // code if false
}
```

• **Nested `if` Statements**

- An `if` inside another `if` or `else`.
- Beware of the **dangling-else problem** – use braces `{}` for clarity.

• **Ternary (Conditional) Operator**

- Shorthand for `if-else`:
`variable = (condition) ? valueIfTrue : valueIfFalse;`
- Useful for simple assignments.

• **Multiple Alternatives with `if-else if-else`**

- Used for checking multiple conditions in sequence.
- Example: grading system.
- `if (condition) {`
- `// code if true`
- `} else if {`
-
- `}`
- `Else{ }`
-

The `switch` Statement

- Efficient for testing a single variable against multiple constant values.
- Syntax:

java

```
switch (variable) {  
    case value1: // code; break;  
    case value2: // code; break;  
    default: // code;  
}
```

- Works with `byte`, `short`, `int`, `char`, `String`, and `enums`.
- **Fall-through behavior** occurs if `break` is omitted.

8. Common Errors

- Semicolon after `if` condition: `if (x > 0);`
- Forgetting braces for multiple statements.
- Misplacing `else` without braces.

9. When to Use `switch` vs. `if-else`

- Use `switch` for equality checks against known constants.
 - Use `if-else` for ranges or complex conditions.
-

? Questions and Problems with Answers

1. Basic `if` Statement

Q1: What is the output of the following code?

```
java
int x = 10;
if (x > 5) {
    System.out.println("X is greater than 5");
}
```

A1:

X is greater than 5

Q2: Identify the error:

```
java
int y = 3;
if (y = 5) {
    System.out.println("Y is 5");
}
```

A2:

Use `==` for comparison, not `=` (assignment).

2. if-else Statements

Q3: Write an if-else statement that prints "Even" if a number is even, otherwise "Odd".

A3:

```
java
if (number % 2 == 0) {
    System.out.println("Even");
} else {
    System.out.println("Odd");
}
```

Q4: What is the output?

```
java
int a = 7, b = 10;
if (a > b) {
    System.out.println("A is larger");
} else {
    System.out.println("B is larger or equal");
}
```

A4:

B is larger or equal

3. Ternary Operator

Q5: Rewrite using ternary operator:

```
java
if (score >= 50) {
    result = "Pass";
} else {
    result = "Fail";
}
```

A5:

java

```
result = (score >= 50) ? "Pass" : "Fail";
```

Q6: What does this print?

java

```
int x = 8;  
System.out.println(x > 10 ? "High" : "Low");
```

A6:

Low

4. Nested if and Dangling-Else

Q7: What is the output?

java

```
int x = 6, y = 4;  
if (x > 5)  
    if (y > 5)  
        System.out.println("Both > 5");  
else  
    System.out.println("X <= 5");
```

A7:

X <= 5 (the else pairs with the inner if).

Q8: Fix the above code so the `else` pairs with the first `if`.

A8:

```
java
if (x > 5) {
    if (y > 5)
        System.out.println("Both > 5");
} else {
    System.out.println("X <= 5");
}
```

5. if-else if-else Chains

Q9: Write a grading program using if-else if-else for scores:

- A: 90+
- B: 80–89
- C: 70–79
- D: 60–69
- F: <60

A9:

```
java
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");
}
```

6. switch Statement

Q10: Convert this if-else to switch:

```
java
int day = 3;
if (day == 1) System.out.println("Mon");
else if (day == 2) System.out.println("Tue");
else if (day == 3) System.out.println("Wed");
else System.out.println("Invalid");
```

A10:

```
java
switch (day) {
    case 1: System.out.println("Mon"); break;
    case 2: System.out.println("Tue"); break;
    case 3: System.out.println("Wed"); break;
    default: System.out.println("Invalid");
}
```

Q11: What is the output?

```
java
int num = 2;
switch (num) {
    case 1: System.out.print("One ");
    case 2: System.out.print("Two ");
    case 3: System.out.print("Three ");
    default: System.out.print("Default");
}
```

A11:

Two Three Default (fall-through due to no break)

7. switch with Strings

Q12: Write a `switch` that prints the season based on a `String` `month`:

- Dec, Jan, Feb → Winter
- Mar, Apr, May → Spring
- Jun, Jul, Aug → Summer
- Sep, Oct, Nov → Fall

A12:

java

```
switch (month) {
    case "Dec": case "Jan": case "Feb":
        System.out.println("Winter"); break;
    case "Mar": case "Apr": case "May":
        System.out.println("Spring"); break;
    case "Jun": case "Jul": case "Aug":
        System.out.println("Summer"); break;
    case "Sep": case "Oct": case "Nov":
        System.out.println("Fall"); break;
    default: System.out.println("Invalid");
}
```

8. Logical Errors

Q13: What's wrong?

java

```
int age = 20;
if (age >= 18); {
    System.out.println("Adult");
}
```

A13:

Semicolon after `if` condition ends the statement prematurely.

9. Trace the Output

Q14: What is printed?

```
java
int x = 2, y = 3;
if (x > 2) {
    if (y > 2) {
        int z = x + y;
        System.out.println("z = " + z);
    }
} else {
    System.out.println("x = " + x);
}
```

A14:

x = 2

Q15: What if $x = 3$ and $y = 2$?

A15:

Nothing (outer `if` true, but inner `if` false).

Q16: What if $x = 3$ and $y = 3$?

A16:

z = 6

10. Conditional Expressions

Q17: Rewrite using if-else:

java

```
tax = (income > 10000) ? income * 0.2 : income * 0.17 + 1000;
```

A17:

java

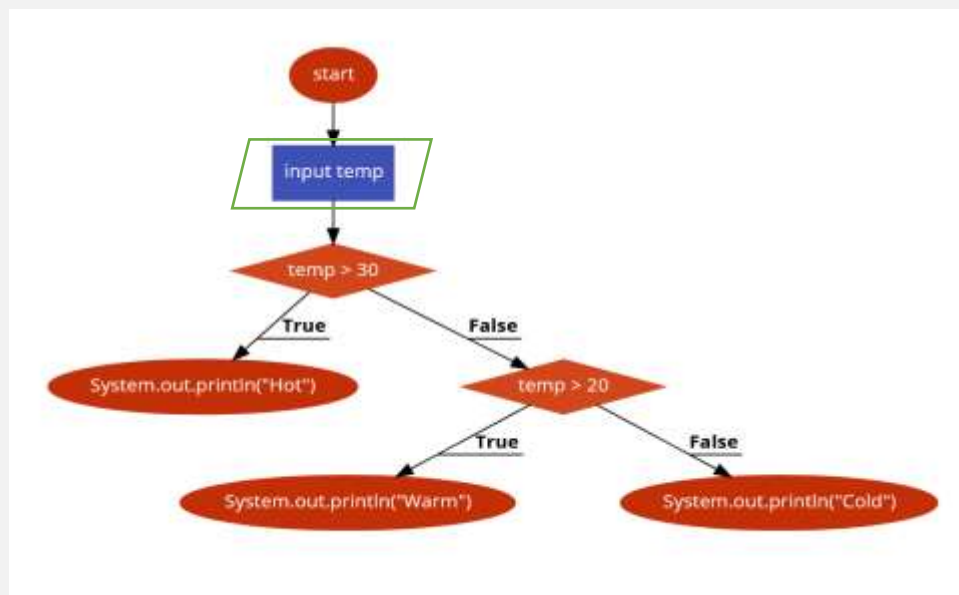
```
if (income > 10000) {  
    tax = income * 0.2;  
} else {  
    tax = income * 0.17 + 1000;  
}
```

11. Flowcharting

Q18: Draw a flowchart for:

java

```
if (temp > 30) {  
    System.out.println("Hot");  
} else if (temp > 20) {  
    System.out.println("Warm");  
} else {  
    System.out.println("Cold");}
```



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	Code	Output
1	<pre>What is the output for the following code? int x=33; if (7 > 3) if (5 < 3) ++ x; else -- x; System.out.println(x); }</pre>	<p>a. 11</p> <p>b. 33</p> <p>c. 32</p> <p>d. None of the above.</p>

What will be the output of the following code?

```
int temperature = 35;
if (temperature > 30) {
  if (temperature < 40) {
    System.out.println("Warm");
  }
}
```

- Cold
- Warm
- No output
- Hot

-20

What is the output?

```
int marks = 55;
if (marks >= 60) {
  System.out.println("Pass");
} else {
  System.out.println("Fail");
}
```

- Not Pass
- Fail
- Nothing
- Pass

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