Intro to Java Programming

Conditional Statements and Operations

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Outline

Objectives

What we will cover

- Understand what a conditional statement is
- Learn how to perform comparison
- Understand branching flow

Conditional Statements

Conditional Statements

Code

```
1 System.out.println("Hello, world!");
2 if (true) {
3     System.out.println("This code is unavoidable!");
4 }
```

```
Hello, world!
This code is unavoidable!
```

Results

Code

```
1 int number = 11;
2 if (number > 10) {
3     System.out.println("The number was greater than 10");
4 }
```

```
The number was greater than 10
```

Results

Conditional Statement (Cont'd)

Code

```
1 int number = 11;
2 boolean greaterThan10 = number > 10;
3 if (greaterThan10) {
4     System.out.println("Greater than 10!");
5 }
```

```
Greater than 10!
```

Results

Programming Exercise - Speeding Ticket

Part01_23.SpeedingTicket

Write a program that asks the user for an integer and prints

the string "Speeding ticket!" if the input is greater than 120.

Code

```
1  import java.util.Scanner;
2
3  public class SpeedingTicket {
4
5      public static void main(String[] args) {
6          Scanner scanner = new Scanner(System.in);
7
8          // Write your program here.
9      }
10 }
```

Desired Output

```
Give speed:
15
```

Results

```
Give speed:
135
Speeding ticket!
```

Results

Indentation

Indentation is for humans

Code

```
1 public class ProgramName {
2     public static void main(String[] args) {
3         int number = 72;
4         if (number < 100){
5             System.out.println("Number less than 100");
6         }
7     }
8 }
```

```
Number less than 100
```

Results

A lack of indentation is ugly but sometimes still works!

Code

```
1 public class ProgramName {
2 public static void main(String[] args) {
3 int number = 72;
4 if (number < 100){
5 System.out.println("Number less than 100");
6 }
7 }
8 }
```

```
Number less than 100
```

Results

Comparison Operators

Common Comparators

Operator	Use
>	Greater Than
>=	Greater Than or Equal To
<	Less Than
<=	Less Than or Equal To
==	Equal To
!=	Not equal To

Programming Exercise - Ancient

Part01_26.Ancient

Write a program that prompts the user for a year.

If the user inputs a number that is smaller than 2015, then the program prints the string "Ancient history!".

Code

```
1  import java.util.Scanner;
2
3  public class Ancient {
4
5      public static void main(String[] args) {
6          Scanner scan = new Scanner(System.in);
7
8          // Write your program here
9      }
10 }
```

Desired Output

```
Give a year:
2017
```

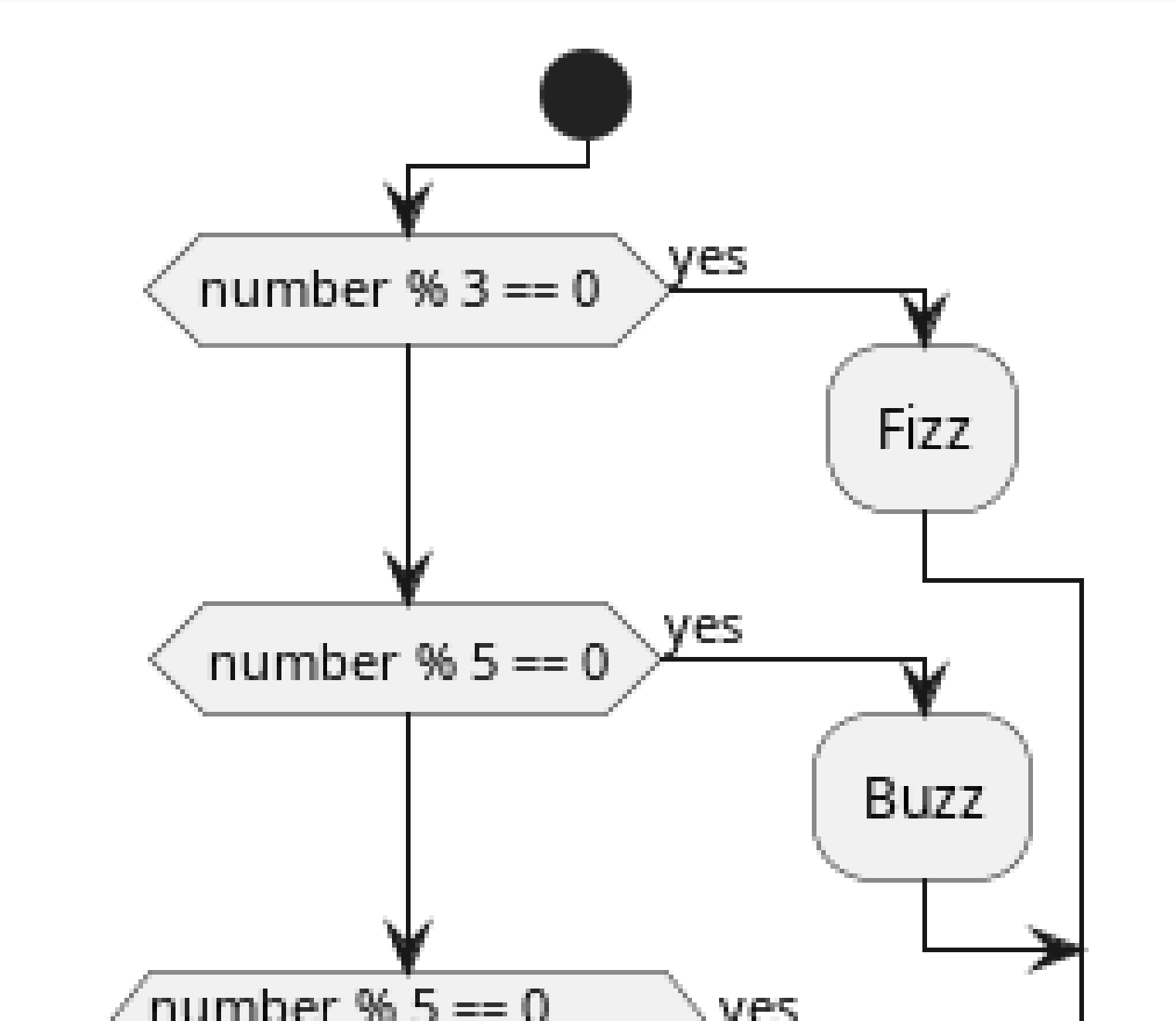
Results

```
Give a year:
2013
Ancient history!
```

Results

Else

Else statements



Programming Exercise - Positivity

Part01_28.Positivity

Write a program that prompts the user for an integer and informs the user whether or not it is positive (greater than zero).

Code

```
1  import java.util.Scanner;
2
3  public class Positivity {
4
5      public static void main(String[] args) {
6          Scanner scan = new Scanner(System.in);
7
8          // Write your program here
9      }
10 }
```

Desired Output

```
Give a number:
5
The number is positive.
```

Results

```
Give a number:
-2
The number is not
      positive.
```

Results

Programming Exercise - Adulthood

Part01_29.Adulthood

Write a program that prompts the user for their age and tells them whether or not they are an adult (18 years old or older).

Code

```
1  import java.util.Scanner;
2
3  public class Adulthood {
4
5      public static void main(String[] args) {
6          Scanner scan = new Scanner(System.in);
7
8          // Write your program here
9      }
10 }
11
```

Desired Output

```
How old are you?
12
You are not an adult
```

Results

```
How old are you?
32
You are an adult
```

Results

More conditionals

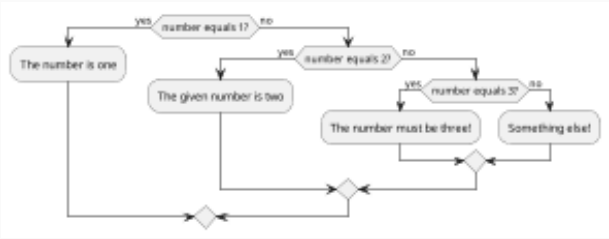
Else If

Code

```
1  int number = 3;
2
3  if (number == 1) {
4      System.out.println("The number is one");
5  } else if (number == 2) {
6      System.out.println("The given number is two");
7  } else if (number == 3) {
8      System.out.println("The number must be three!");
9  } else {
10     System.out.println("Something else!");
11 }
```

```
The number must be three!
```

Results



Programming Exercise - Larger Than or Equal To

Part01_30.LargerThanOrEqualTo

Write a program that prompts the user for two integers and prints the larger of the two. If the numbers are the same, then the program informs us about this as well.

Code

```
1 import java.util.Scanner;
2
3 public class LargerThanOrEqualTo {
4
5     public static void main(String[] args) {
6         Scanner scan = new Scanner(System.in);
7
8     }
9 }
```

Desired Output

```
Give the first number:
5
Give the second number:
3
Greater number is: 5
```

Results

```
Give the first number:
5
Give the second number:
8
Greater number is: 8
```

Results

```
Give the first number:
5
Give the second number:
5
The numbers are equal!
```

Results

Programming Exercise - Grades and Points

Part01_31.GradesAndPoints

The table below describes how the grade for a particular course is determined. Write a program that gives a course grade according to the provided table.

points	grade
< 0	impossible!
0-49	failed
50-59	1
60-69	2
70-79	3
80-89	4
90-100	5
> 100	incredible!

Desired Output

```
Give points [0-100]:
37
Grade: failed
```

Results

```
Give points [0-100]:
76
Grade: 3
```

Results

```
Give points [0-100]:
95
Grade: 5
```

Results

```
Give points [0-100]:
-3
Grade: impossible!
```

Results

Remainder Operations

Modulo

The % Operator

Code

```
1 int remainder = 7 % 2;
2 System.out.println(remainder);
```

```
1
```

Results

Code

```
1 int number = 800;
2
3 if (number % 400 == 0) {
4     System.out.println("The number " + number + " is divisible by four hundred.");
5 } else {
6     System.out.println("The number " + number + " is not divisible by four hundred.");
7 }
```

```
The number 800 is divisible by four hundred.
```

Results

Programming Exercise - Odd or Even

Part01_32.OddOrEven

Write a program that prompts the user for a number and

informs us whether it is even or odd.

Code

```
1 import java.util.Scanner;
2
3 public class OddOrEven {
4
5     public static void main(String[] args) {
6         Scanner scan = new Scanner(System.in);
7
8     }
9 }
```

Desired Output

```
Give a number:
2
Number 2 is even.
```

Results

```
Give a number:
7
Number 7 is odd.
```

Results

Comparing Strings

The .equals() method

.equals()

Code

```
1 boolean compareInts = 10 == 10;              // evalutes to true
2 boolean compareDoubles = 42.42 == 42.42;    // evaluates to true
3 boolean compareStrings = "this" == "this"; //evaluates to false
```

Code

```
1 String sampleString = "this is my string";
2 boolean compareStrings = sampleString.equals("this is my string");      // evaluates to true
3 compareStrings = sampleString.equals("this is not my string");          // evaluates to false
```

Programming Exercise - Password

Part01_33.Password

Write a program that prompts the user for a password. If the password is "Caput Draconis" the program prints "Welcome!". Otherwise, the program prints "Off with you!"

Code

```
1  import java.util.Scanner;
2
3  public class Password {
4
5      public static void main(String[] args) {
6          Scanner scan = new Scanner(System.in);
7
8          // Write your program here
9      }
10 }
```

Desired Output

```
> Password?
< Wattlebird
> Off with you!
```

Results

```
> Password?
< Caput Draconis
> Welcome!
```

Results

Programming Exercise - Same

Part01_34.Same

Write a program that prompts the user for two strings. If the strings are the same, then the program prints "Same". Otherwise, it prints "Different". prints "Off with you!"

Code

```
1  import java.util.Scanner;
2
3  public class Same {
4
5      public static void main(String[] args) {
6          Scanner scan = new Scanner(System.in);
7
8          // Write your program here.
9      }
10 }
```

Desired Output

```
Enter the first string:
hello
Enter the second string:
hello
Same
```

Results

```
Enter the first string:
hello
Enter the second string:
world
Different
```

Results

Logical Operators

Logical Operators

Code

```
1 String gender = "M";
2 int age = 45;
3
4 if (gender.equals("M")){
5     if (age > 40){
6         System.out.println("You are quite old!");
7     }
8 }
```

```
You are quite old!
```

Results

Code

```
1 String gender = "M";
2 int age = 42;
3
4 if (gender.equals("M") && age > 40)  {
5     System.out.println("You are quite old!");
6 }
```

```
You are quite old!
```

Results

Logic	Symbol
and	&&
or	||
not	!

Logical Operators: AND

AND

Code

```
System.out.println(true && true);
```

```
true
```

Results

Code

```
System.out.println(true && false);
```

```
false
```

Results

Code

```
System.out.println(false && false);
```

```
false
```

Results

Logical Operators: OR

OR

Code

```
System.out.println(false || true);
```

```
true
```

Results

Code

```
System.out.println(true || false);
```

```
true
```

Results

Code

```
System.out.println(false || false);
```

```
false
```

Results

Logical Operators: NOT

NOT

Code

```
System.out.println(!true);
```

```
false
```

Results

Code

```
public static boolean isRightAngle(int angle){
    if (angle == 90) {
        return true;
    } else {
        return false;
    }
}

public static void main(String[] args){
    if (!isRightAngle(89)) {
        System.out.println("Not a right angle!");
    }
}
```

```
Not a right angle!
```

Results

Programming Exercise - Checking the Age

Part01_35.CheckingTheAge

Write a program that prompts the user to input their age and checks whether or not it is possible (at least 0 and at most 120).

Only use a single if-command in your program.

Code

```
1 import java.util.Scanner;
2
3 public class CheckingTheAge {
4
5     public static void main(String[] args) {
6         Scanner scan = new Scanner(System.in);
7
8     }
9 }
```

Desired Output

```
> How old are you?
< 10
> OK
```

Results

```
> How old are you?
< 55
> OK
```

Results

```
> How old are you?
< -3
> Impossible!
```

Results

```
> How old are you?
< 150
> Impossible!
```

Results

Execution Order of Conditional Statements

Example: FizzBuzz

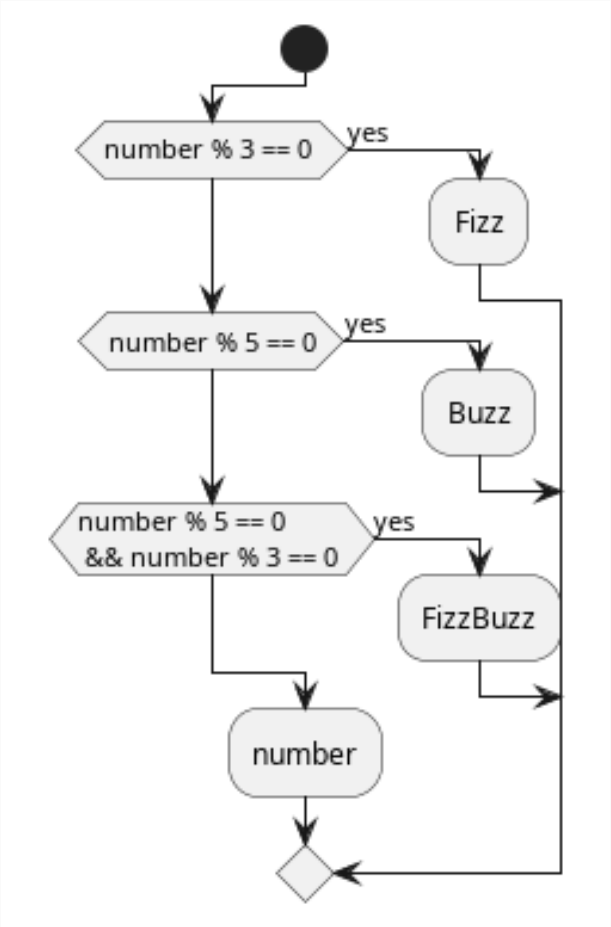
Description
'Write a program that prompts the user for a number between one and one hundred, and prints that number. If the number is divisible by three, then print "Fizz" instead of the number. If the number is divisible by five, then print "Buzz" instead of the number. If the number is divisible by both three and five, then print "FizzBuzz" instead of the number.'

The Steps to solve Fizz Buzz in PseudoCode

Pseudocode

- Write a program that prompts the user for a number and prints that number.
- If the number is divisible by three, then print `Fizz` instead of the number.
- If the number is divisible by five, then print `Buzz` instead of the number.
- If the number is divisible by both three and five, then print `FizzBuzz` instead of the number.

Logic Tree



An example that fails

Code

Code

```
1  Scanner reader = new Scanner(System.in);
2
3  int number = Integer.valueOf(reader.nextLine());
4
5  if (number % 3 == 0) {
6      System.out.println("Fizz");
7  } else if (number % 5 == 0) {
8      System.out.println("Buzz");
9  } else if (number % 3 == 0 && number % 5 == 0) {
10     System.out.println("FizzBuzz");
11 } else {
12     System.out.println(number);
```

Output

```
< 3
> Fizz
```

Results

```
< 4
> 4
```

Results

```
< 5
> Buzz
```

Results

```
< 15
> Fizz
```

Results

An working example

Code

Code

```
1  Scanner reader = new Scanner(System.in);
2
3  int number = Integer.valueOf(reader.nextLine());
4
5  if (number % 3 == 0 && number % 5 == 0) {
6      System.out.println("FizzBuzz");
7  } else if (number % 3 == 0) {
8      System.out.println("Fizz");
9  } else if (number % 5 == 0) {
10     System.out.println("Buzz");
11 } else {
12     System.out.println(number);
13 }
```

Output

```
< 3
> Fizz
```

Results

```
< 4
> 4
```

Results

```
< 5
> Buzz
```

Results

```
< 15
> FizzBuzz
```

Results

Programming Exercise - Leap Year

Part01_36.LeapYear

A year is a leap year if it is divisible by 4. However, if the year is divisible by 100, then it is a leap year only when it is also divisible by 400.

Write a program that reads a year from the user, and checks

whether or not it is a leap year.

Code

```
1 import java.util.Scanner;
2
3 public class LeapYear {
4
5     public static void main(String[] args) {
6         Scanner scan = new Scanner(System.in);
7
8     }
9 }
```

Desired Output

```
Give a year: 2011
The year is not a leap
      year.
```

Results

```
Give a year: 2012
The year is a leap year.
```

Results

```
Give a year: 1800
The year is not a leap
      year.
```

Results

```
Give a year: 2000
The year is a leap year.
```

Results

Programming Exercise - Gift Tax

Part01_37.GiftTax

A gift is a transfer of property to another person against no compensation or payment. If the total value of the gifts you receive from the same donor in the course of 3 years is €5,000 or more, you must pay gift tax.

When a gift is given by a close relative or a family member, the amount of gift tax is determined by the following table (source vero.fi):

Write a program that calculates the gift tax for a gift from a close relative or a family member. This is how the program should work:

Value of gift	Tax at the lower limit	Tax rate(%)
5 000 — 25 000	100	8
25 000 — 55 000	1 700	10
55 000 — 200 000	4 700	12
200 000 — 1 000 000	22 100	15
1 000 000 —	142 100	17

Desired Output

```
Value of the gift?
3500
No tax!
```

Results

```
Value of the gift?
3500
No tax!
```

Results

```
Value of the gift?
5000
Tax: 100.0
```

Results

```
Value of the gift?
27500
Tax: 1950.0
```

Results