Dasar Dasar Pemrograman 2

Topik Pekan 1: Konsep-konsep Dasar dalam Bahasa Java

Acuan: Introduction to Java Programming and Data Structure, Bab 3 dan 4

Sumber Slide: Liang

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Objectives

- To declare **boolean** variables and write Boolean expressions using relational operators.
- To implement selection control using one-way **if** statements.
- To implement selection control using two-way **if-else** statements.
- To implement selection control using nested **if** and multi-way **if** statements.
- To avoid common errors and pitfalls in **if** statements.
- To generate random numbers using the **Math.random()** method.
- To combine conditions using logical operators (**&&**, ||, and **!**).
- To implement selection control using **switch** statements.
- To write expressions using the conditional expression.
- To examine the rules governing operator precedence and associativity.
- To solve mathematics problems by using the methods in the Math class (§4.2).
- To represent characters using the char type (§4.3).
- To encode characters using ASCII and Unicode (§4.3.1).
- To represent special characters using the escape sequences (§4.4.2).
- To cast a numeric value to a character and cast a character to an integer (§4.3.3).
- To compare and test characters using the static methods in the Character class (§4.3.4).
- To introduce objects and instance methods (§4.4).
- To represent strings using the String objects (§4.4).
- To return the string length using the length() method (§4.4.1).
- To return a character in the string using the charAt(i) method (§4.4.2).
- To use the + operator to concatenate strings (§4.4.3).
- To read strings from the console (§4.4.4).
- To read a character from the console (§4.4.5).
- To compare strings using the equals method and the compareTo methods (§4.4.6).
- To obtain substrings (§4.4.7).
- To find a character or a substring in a string using the indexOf method (§4.4.8).
- To format output using the System.out.printf method (§4.6).

The `boolean` Type and Operators

Often in a program you need to compare two values, such as whether i is greater than j. Java provides six comparison operators (also known as relational operators) that can be used to compare two values. The result of the comparison is a Boolean value: true or false.

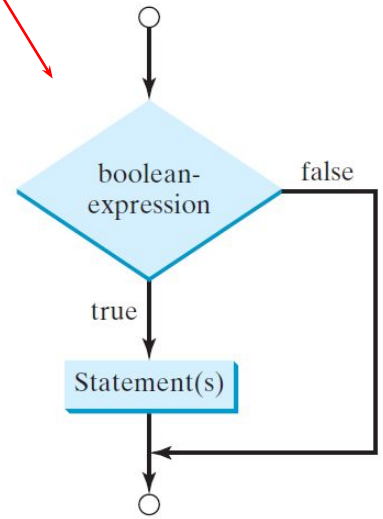
```
boolean b = (1 > 2);
```

Relational Operators

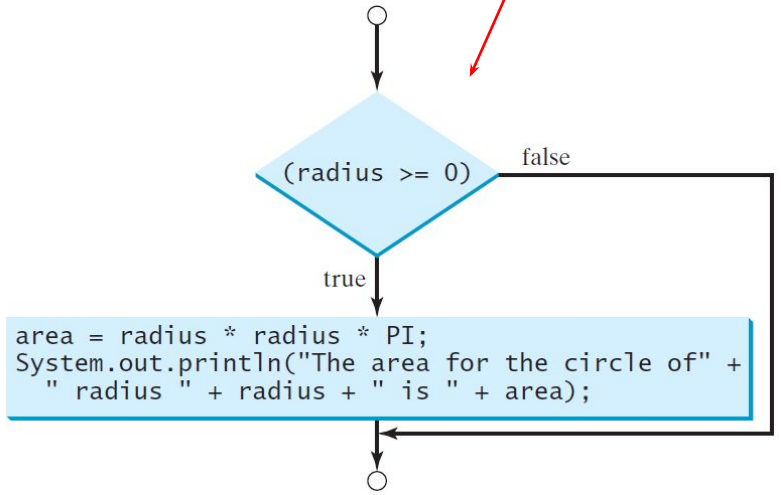
Java Operator	Mathematics Symbol	Name	Example (radius is 5)	Result
<	<	less than	`radius < 0`	`false`
<=	≤	less than or equal to	`radius <= 0`	`false`
>	>	greater than	`radius > 0`	`true`
>=	≥	greater than or equal to	`radius >= 0`	`true`
==	=	equal to	`radius == 0`	`false`
!=	≠	not equal to	`radius != 0`	`true`

One-way `if` Statements

```
if
  (boolean-expressio
  n) {
  statement(s);
}
```




```
if (radius >= 0) {
  area = radius * radius * PI;
  System.out.println("The area"
    + " for the circle of radius "
    + radius + " is " + area);
}
```



Note

```
if i > 0 {
  System.out.println("i is positive");
}
```

(a) Wrong

```
if (i > 0) {
  System.out.println("i is positive");
}
```

(b) Correct

```
if (i > 0) {
  System.out.println("i is positive");
}
```

(a)

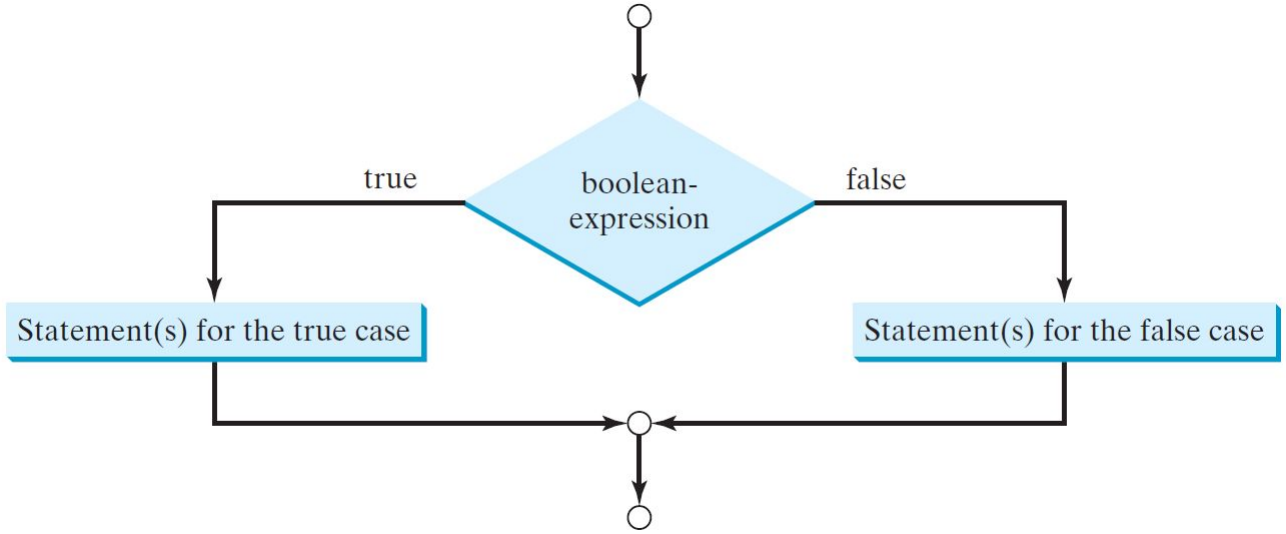
Equivalent

```
if (i > 0)
  System.out.println("i is positive");
```

(b)

The Two-way `if` Statement

```
if (boolean-expression) {
  statement(s)-for-the-true-case;
}
else {
  statement(s)-for-the-false-case;
}
```



if-else Example

```
if (radius >= 0) {
  area = radius * radius * 3.14159;

   System.out.println("The area for the "
    + "circle of radius " + radius +
    " is " + area);
}
else {
  System.out.println("Negative input");
}
```

Multiple Alternative if Statements

```
if (score >= 90.0)
  System.out.print("A");
else
  if (score >= 80.0)
    System.out.print("B");
  else
    if (score >= 70.0)
      System.out.print("C");
    else
      if (score >= 60.0)
        System.out.print("D");
      else
        System.out.print("F");
```

(a)

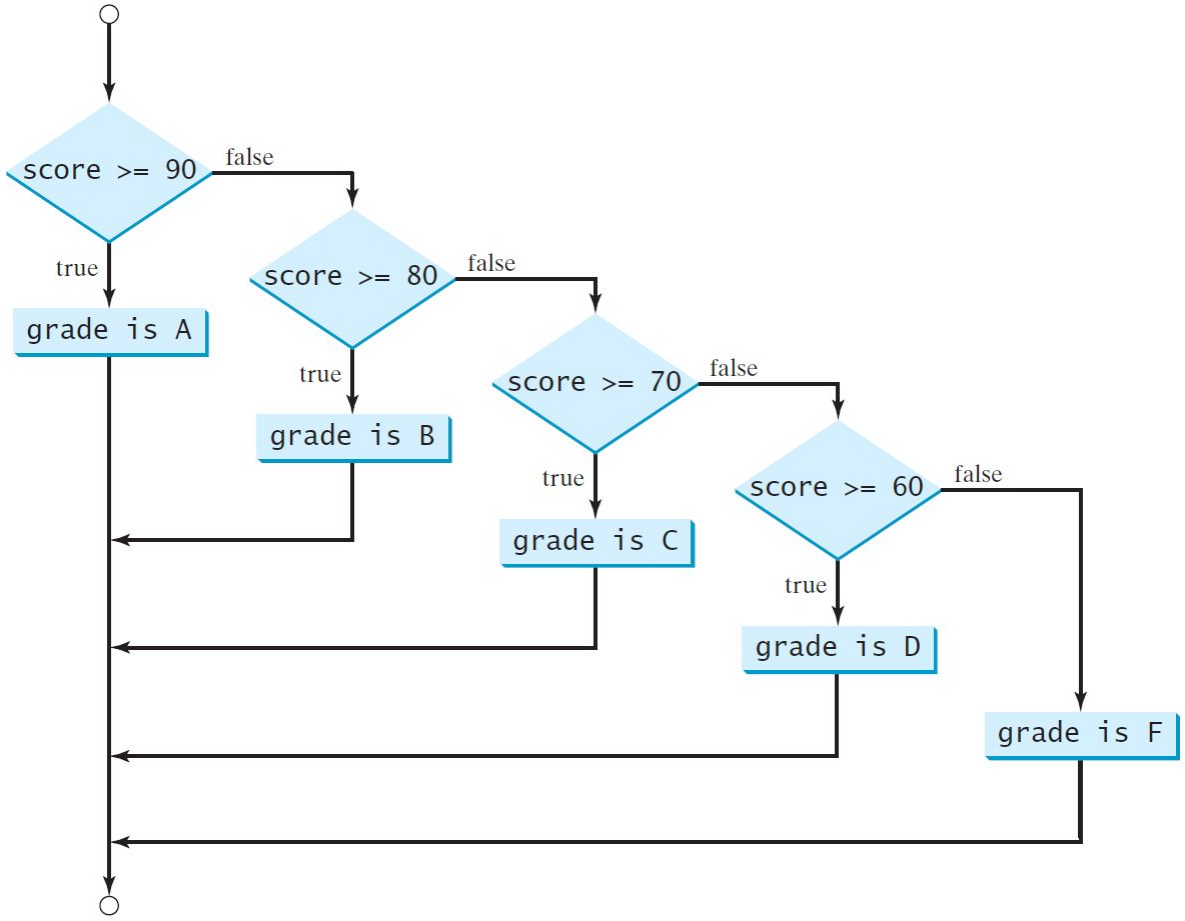
Equivalent

This is better

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

(b)

Multi-Way if-else Statements



Trace if-else statement

Suppose score is 70.0

The condition is false

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

Trace if-else statement

Suppose score is 70.0

The condition is false

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

Trace if-else statement

Suppose score is 70.0

The condition is true

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

Trace if-else statement

Suppose score is 70.0

grade is C

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

Trace if-else statement

Suppose score is 70.0

Exit the if statement

```
if (score >= 90.0)
  System.out.print("A");
else if (score >= 80.0)
  System.out.print("B");
else if (score >= 70.0)
  System.out.print("C");
else if (score >= 60.0)
  System.out.print("D");
else
  System.out.print("F");
```

Note

The else clause matches the most recent if clause in the same block.

```
int i = 1, j = 2, k = 3;

if (i > j)
  if (i > k)
    System.out.println("A");
else
    System.out.println("B");
```

(a)

Equivalent

This is better with correct indentation

```
int i = 1, j = 2, k = 3;

if (i > j)
  if (i > k)
    System.out.println("A");
  else
    System.out.println("B");
```

(b)

Note, cont.

Nothing is printed from the preceding statement.
To force the else clause to match the first if clause, you must add a pair of braces:

```
int i = 1;
int j = 2;
int k = 3;
if (i > j) {
  if (i > k)
    System.out.println("A");
}
else
  System.out.println("B");
```

This statement prints B.

Common Errors

Adding a semicolon at the end of an if clause is a common mistake.

```
if (radius >= 0) ;
{
  area = radius*radius*PI;
  System.out.println("The area for the circle of
radius "
                     + radius + " is " + area);
}
```

Wrong

This mistake is hard to find, because it is not a compilation error or a runtime error, it is a logic error. This error often occurs when you use the next-line block style.

TIP

```
if (number % 2 == 0)
  even = true;
else
  even = false;
```

(a)

Equivalent

```
boolean even
  = number % 2 == 0;
```

(b)

CAUTION

```
if (even == true)
  System.out.println(
    "It is even.");
```

(a)

Equivalent

```
if (even)
  System.out.println(
    "It is even.");
```

(b)

Logical Operators

Operator	Name	Description
!	not	logical negation
&&	and	logical conjunction
||	or	logical disjunction
^	exclusive or	logical exclusion

Truth Table for Operator !

p	!p	Example (assume age = 24, weight = 140)
true	false	!(age > 18) is false, because (age > 18) is true.
false	true	!(weight == 150) is true, because (weight == 150) is false.

Truth Table for Operator &&

p_1	p_2	p_1 && p_2	Example (assume age = 24, weight = 140)
false	false	**false**	(age <= 18) && (weight < 140) is false, because (age > 18) and (weight <= 140) are both false.
false	true	**false**	
true	false	**false**	(age > 18) && (weight > 140) is false, because (weight > 140) is false.
true	true	**true**	(age > 18) && (weight >= 140) is true, because both (age > 18) and (weight >= 140) are true.

Truth Table for Operator ||

p_1	p_2	p_1 || p_2	Example (assume age = 24, weihgt = 140)
false	false	**false**	
false	true	**true**	(age > 34) || (weight <= 140) is true, because (age > 34) is false, but (weight <= 140) is true.
true	false	**true**	(age > 14) || (weight >= 150) is false, because (age > 14) is true.
true	true	**true**	

Truth Table for Operator ^

p_1	p_2	p_1 ^ p_2	Example (assume age = 24, weight = 140)
false	false	false	(age > 34) ^ (weight > 140) is true, because (age > 34) is false and (weight > 140) is false.
false	true	true	(age > 34) ^ (weight >= 140) is true, because (age > 34) is false but (weight >= 140) is true.
true	false	true	(age > 14) ^ (weight > 140) is true, because (age > 14) is true and (weight > 140) is false.
true	true	false	

Examples

Here is a program that checks
whether a number is ***divisible by 2 and 3***,
whether a number is ***divisible by 2 or 3***,
and whether a number is ***divisible by 2 or 3 but not both***:

Examples

```
System.out.println("Is " + number + " divisible by 2 and 3? " +
  ((number % 2 == 0) && (number % 3 == 0)));

System.out.println("Is " + number + " divisible by 2 or 3? " +
  ((number % 2 == 0) || (number % 3 == 0)));

 System.out.println("Is " + number +
   " divisible by 2 or 3, but not both? " +
   ((number % 2 == 0) ^ (number % 3 == 0)));
```

Review Latihan

- Tebak ulang tahun: https://replit.com/@AdeAzurat/DDP2-Pekan02#Ex11GuessBirthday.java

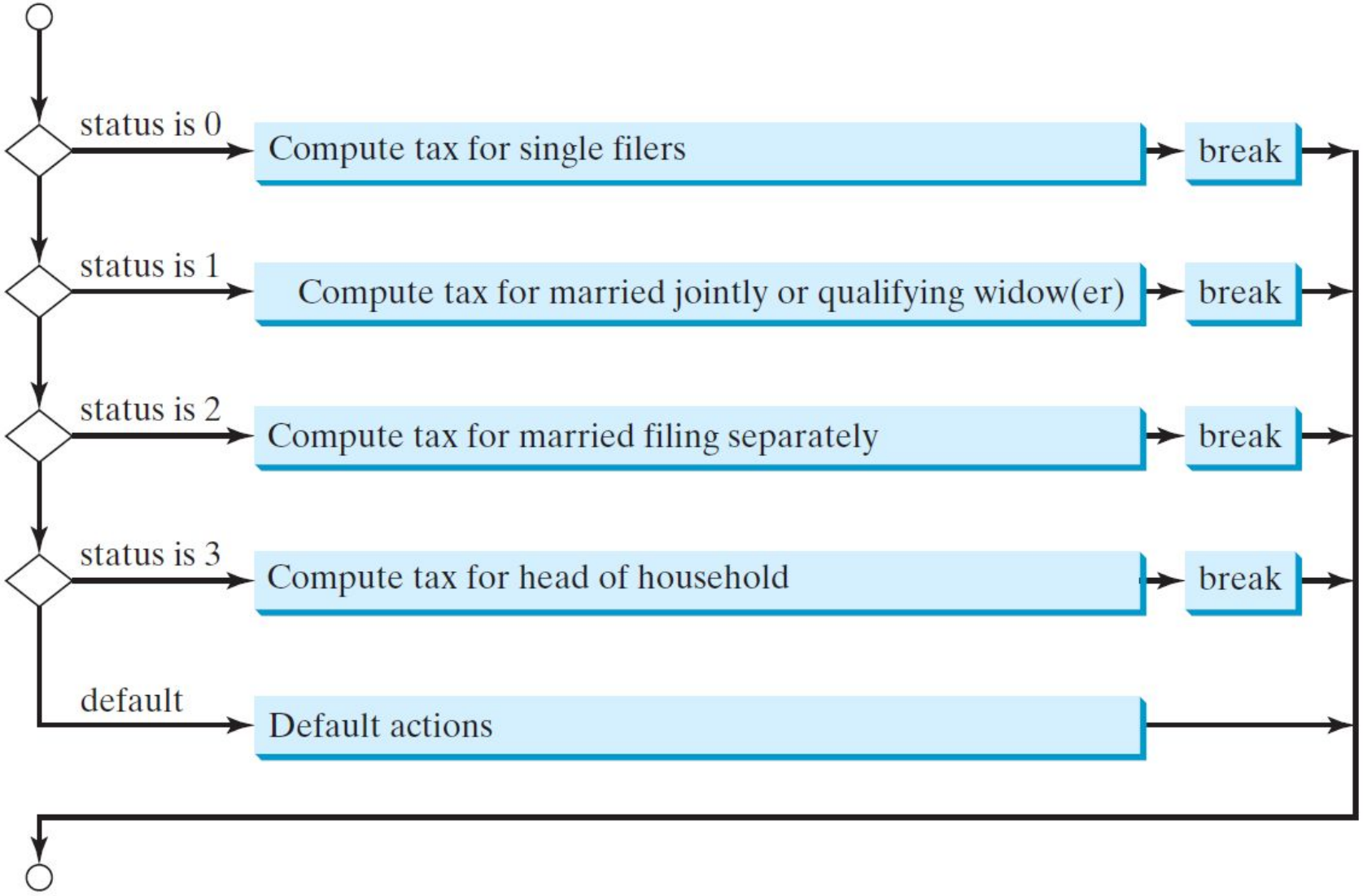
- Buat flowchart ide algoritma untuk permasalahan mencari bilangan terbesar dari tiga buah bilangan yang diberikan.
- Buat program nya dalam bahasa pemrograman Java

- Buat flowchart ide algoritma untuk permasalahan menentukan jenis segitiga bila diberikan tiga buah bilangan bulat yang menyatakan panjang sisi-sisinya. Cukup menyatakan apakah termasuk segitiga siku-siku, sama-kaki, sama-sisi, sembarangan atau bukan segitiga.
- Buat programnya dalam bahasa pemrograman Java.

`switch` Statements

```
switch (status) {
  case 0:  compute taxes for single filers;
           break;
  case 1:  compute taxes for married file jointly;
           break;
  case 2:  compute taxes for married file separately;
           break;
  case 3:  compute taxes for head of household;
           break;
  default: System.out.println("Errors: invalid status");
           System.exit(1);
}
```

`switch` Statement Flow Chart



`switch` Statement Rules

The switch-expression must yield a value of char, byte, short, or int type and must always be enclosed in parentheses.

The value1, ..., and valueN must have the same data type as the value of the switch-expression. The resulting statements in the case statement are executed when the value in the case statement matches the value of the switch-expression. Note that value1, ..., and valueN are constant expressions, meaning that they cannot contain variables in the expression, such as 1 + x.

```
switch (switch-expression) {
  case value1:  statement(s)1;
                break;
  case value2: statement(s)2;
                break;
  …
  case valueN: statement(s)N;
                break;
  default: statement(s)-for-default;
}
```

`switch` Statement Rules

The keyword break is optional, but it should be used at the end of each case in order to terminate the remainder of the switch statement. If the break statement is not present, the next case statement will be executed.

```
switch (switch-expression) {
  case value1:  statement(s)1;
        break;
  case value2: statement(s)2;
        break;
  …
  case valueN: statement(s)N;
        break;
  default: statement(s)-for-default;
}
```

The default case, which is optional, can be used to perform actions when none of the specified cases matches the switch-expression.

When the value in a **case** statement matches the value of the **switch-expression**, the statements *starting from this case* are executed until either a **break** statement or the end of the **switch** statement is reached.

Trace switch statement

Suppose day is 2:

```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Trace switch statement

Match case 2

```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Trace switch statement

Fall through case 3

```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Trace switch statement

Fall through case 4

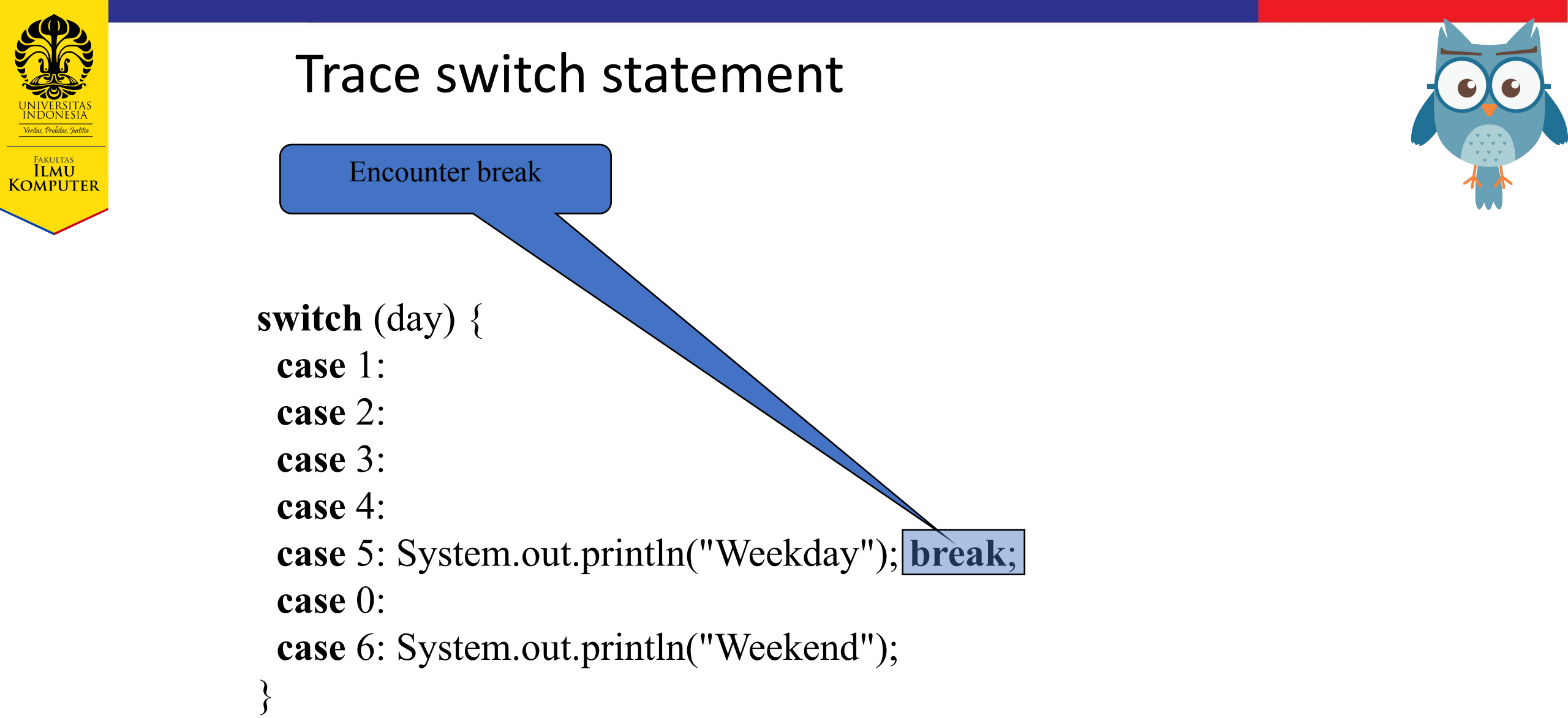
```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Trace switch statement

Fall through case 5

```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Trace switch statement



Trace switch statement

```
switch (day) {
  case 1:
  case 2:
  case 3:
  case 4:
  case 5: System.out.println("Weekday"); break;
  case 0:
  case 6: System.out.println("Weekend");
}
```

Exit the statement

Conditional Expressions

```
if (x > 0)
  y = 1
else
  y = -1;
```

is equivalent to

```
y = (x > 0) ? 1 : -1;
```

(boolean-expression) ? expression1 : expression2

Ternary operator
Binary operator
Unary operator

Conditional Operator

```
if (num % 2 == 0)
  System.out.println(num + “is even”);
else
  System.out.println(num + “is odd”);


System.out.println(
  (num % 2 == 0)? num + “is even” :num + “is odd”);
```

Conditional Operator, cont.

```
boolean-expression ? exp1 : exp2
```

Operator Precedence

- var++, var--
- +, - (Unary plus and minus), ++var,--var
- (type) Casting
- ! (Not)
- *, /, % (Multiplication, division, and remainder)
- +, - (Binary addition and subtraction)
- <, <=, >, >= (Relational operators)
- ==, !=; (Equality)
- ^ (Exclusive OR)
- && (Conditional AND) Short-circuit AND
- || (Conditional OR) Short-circuit OR
- =, +=, -=, *=, /=, %= (Assignment operator)

Operator Precedence and Associativity

The expression in the parentheses is evaluated first. (Parentheses can be nested, in which case the expression in the inner parentheses is executed first.) When evaluating an expression without parentheses, the operators are applied according to the precedence rule and the associativity rule.

If operators with the same precedence are next to each other, their associativity determines the order of evaluation. All binary operators except assignment operators are left-associative.

Operator Associativity

When two operators with the same precedence are evaluated, the *associativity* of the operators determines the order of evaluation. All binary operators except assignment operators are *left-associative*.

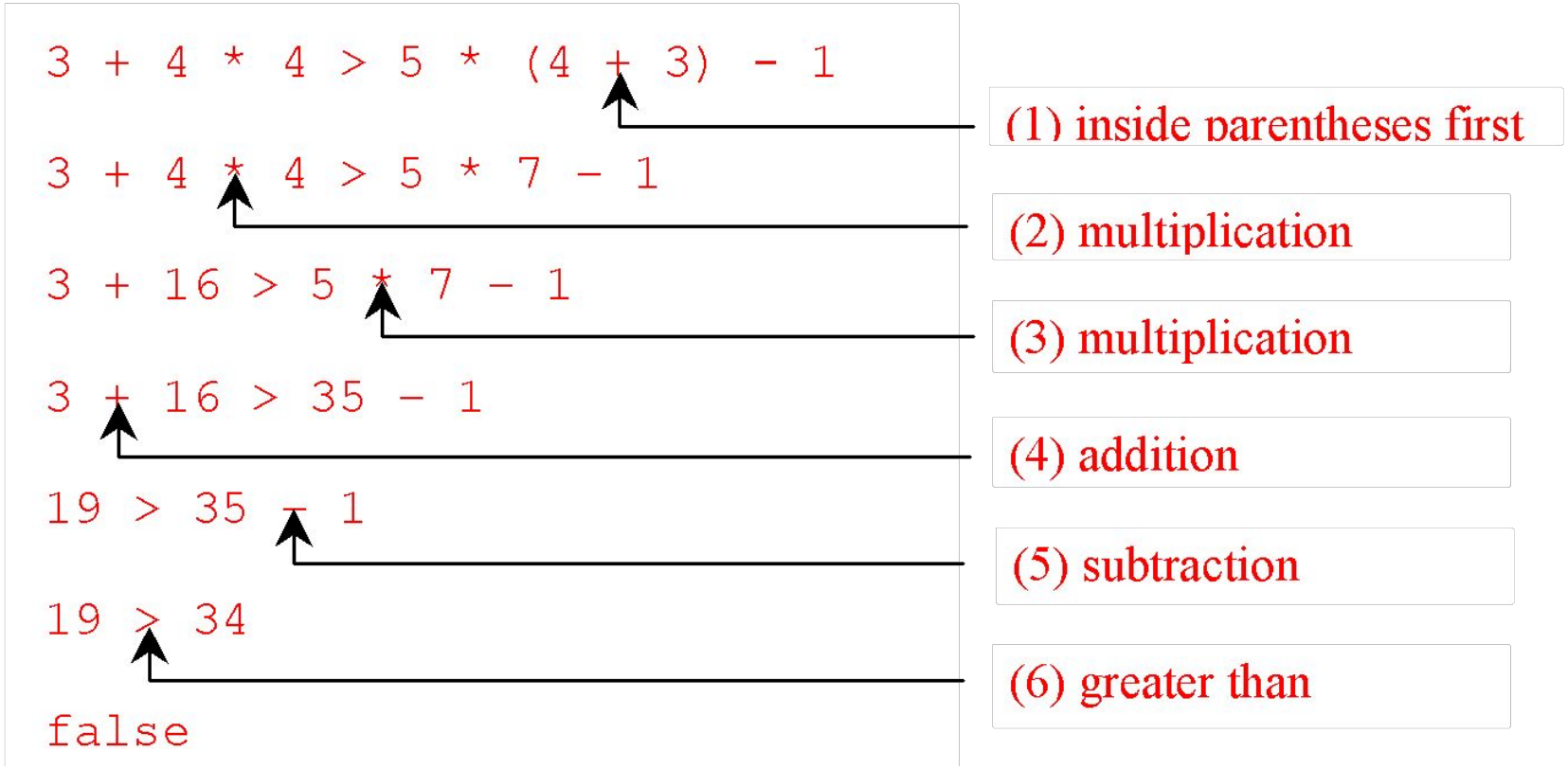
a – b + c – d is equivalent to ((a – b) + c) – d

Assignment operators are *right-associative*. Therefore, the expression

a = b += c = 5 is equivalent to a = (b += (c = 5))

Example

Applying the operator precedence and associativity rule, the expression 3 + 4 * 4 > 5 * (4 + 3) - 1 is evaluated as follows:



Mathematical Functions

Java provides many useful methods in the **Math** class for performing common mathematical functions.

The `Math` Class

- Class constants:
  - `PI`
  - `E`
- Class methods:
  - Trigonometric Methods
  - Exponent Methods
  - Rounding Methods
  - min, max, abs, and random Methods

Trigonometric Methods

- `sin(double a)`
- `cos(double a)`
- `tan(double a)`
- `acos(double a)`
- `asin(double a)`
- `atan(double a)`

```
Examples:

Math.sin(0) returns 0.0
Math.sin(Math.PI / 6)
  returns 0.5
Math.sin(Math.PI / 2)
  returns 1.0
Math.cos(0) returns 1.0
Math.cos(Math.PI / 6)
  returns 0.866
Math.cos(Math.PI / 2)
  returns 0
```

Radians

toRadians(90)

Exponent Methods

- **`exp(double a)`**
  Returns `e` raised to the power of `a`.
- **`log(double a)`**
  Returns the natural logarithm of `a`.
- **`log10(double a)`**
  Returns the 10-based logarithm of `a`.
- **`pow(double a, double b)`**
  Returns `a` raised to the power of `b`.
- **`sqrt(double a)`**
  Returns the square root of `a`.

Examples:

```
Math.exp(1) returns 2.71
Math.log(2.71) returns 1.0
Math.pow(2, 3) returns 8.0
Math.pow(3, 2) returns 9.0
Math.pow(3.5, 2.5) returns
   22.91765
Math.sqrt(4) returns 2.0
Math.sqrt(10.5) returns 3.24
```

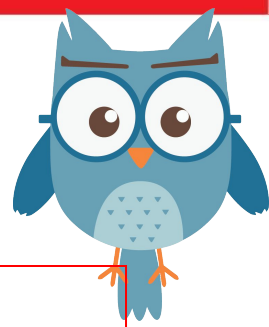
Rounding Methods

- **`double ceil(double x)`**
  x rounded up to its nearest integer. This integer is returned as a double value.
- **`double floor(double x)`**
  x is rounded down to its nearest integer. This integer is returned as a double value.
- **`double rint(double x)`**
  x is rounded to its nearest integer. If x is equally close to two integers, the even one is returned as a double.
- **`int round(float x)`**
  Return (int)Math.floor(x+0.5).
- **`long round(double x)`**
  Return (long)Math.floor(x+0.5).

Rounding Methods Examples

```
Math.ceil(2.1) returns 3.0
Math.ceil(2.0) returns 2.0
Math.ceil(-2.0) returns -2.0
Math.ceil(-2.1) returns -2.0
Math.floor(2.1) returns 2.0
Math.floor(2.0) returns 2.0
Math.floor(-2.0) returns -2.0
Math.floor(-2.1) returns -3.0
Math.rint(2.1) returns 2.0
Math.rint(2.0) returns 2.0
Math.rint(-2.0) returns -2.0
Math.rint(-2.1) returns -2.0
Math.rint(2.5) returns 2.0
Math.rint(-2.5) returns -2.0
Math.round(2.6f) returns 3
Math.round(2.0) returns 2
Math.round(-2.0f) returns -2
Math.round(-2.6) returns -3
```

min, max, and abs



- `max(a, b)` and `min(a, b)`
  Returns the maximum or minimum of two parameters.
- `abs(a)`
  Returns the absolute value of the parameter.
- `random()`
  Returns a random `double` value in the range [0.0, 1.0).

Examples:

```
Math.max(2, 3) returns 3
Math.max(2.5, 3) returns 3.0
Math.min(2.5, 3.6) returns 2.5
Math.abs(-2) returns 2
Math.abs(-2.1) returns 2.1
```

The random Method

Generates a random double value greater than or equal to 0.0 and less than 1.0 (0 <= Math.random() < 1.0).

Examples:

```
(int)(Math.random() * 10)
```
→ Returns a random integer between 0 and 9.

```
50 + (int)(Math.random() * 50)
```
→ Returns a random integer between 50 and 99.

In general,

```
a + Math.random() * b
```
→ Returns a random number between a and a + b, excluding a + b.

Character Data Type

```
char letter = 'A'; (ASCII)
char numChar = '4'; (ASCII)
char letter = '\u0041'; (Unicode)
char numChar = '\u0034';
```

Four hexadecimal digits.

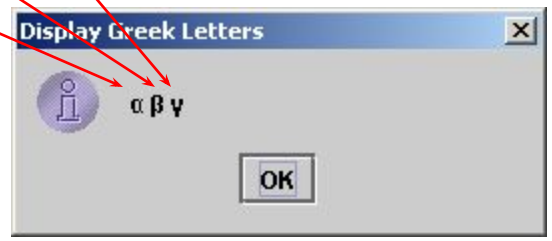
NOTE: The increment and decrement operators can also be used on char variables to get the next or preceding Unicode character. For example, the following statements display character b.

```
char ch = 'a';
System.out.println(++ch);
```

Unicode Format

Java characters use *Unicode*, a 16-bit encoding scheme established by the Unicode Consortium to support the interchange, processing, and display of written texts in the world's diverse languages. Unicode takes two bytes, preceded by \u, expressed in four hexadecimal numbers that run from '\u0000' to '\uFFFF'. So, Unicode can represent `65535 + 1 characters`.

Unicode \u03b1 \u03b2 \u03b3 for three Greek letters



ASCII Code for Commonly Used Characters

Characters	Code Value in Decimal	Unicode Value
'0' to '9'	48 to 57	\u0030 to \u0039
'A' to 'Z'	65 to 90	\u0041 to \u005A
'a' to 'z'	97 to 122	\u0061 to \u007A

Escape Sequences for Special Characters

Escape Sequence	*Name*	*Unicode Code*	*Decimal Value*
`\b`	Backspace	`\u0008`	8
`\t`	Tab	`\u0009`	9
`\n`	Linefeed	`\u000A`	10
`\f`	Formfeed	`\u000C`	12
`\r`	Carriage Return	`\u000D`	13
`\\`	Backslash	`\u005C`	92
`\"`	Double Quote	`\u0022`	34

Casting between char and Numeric Types

```
int i = 'a'; // Same as int i = (int)'a';

char c = 97; // Same as char c = (char)97;
```

Comparing and Testing Characters

```
if (ch >= 'A' && ch <= 'Z')
  System.out.println(ch + " is an uppercase
letter");
else if (ch >= 'a' && ch <= 'z')
  System.out.println(ch + " is a lowercase
letter");
else if (ch >= '0' && ch <= '9')
  System.out.println(ch + " is a numeric
character");
```

Methods in the Character Class

Method	Description
`isDigit(ch)`	Returns true if the specified character is a digit.
`isLetter(ch)`	Returns true if the specified character is a letter.
`isLetterOfDigit(ch)`	Returns true if the specified character is a letter or digit.
`isLowerCase(ch)`	Returns true if the specified character is a lowercase letter.
`isUpperCase(ch)`	Returns true if the specified character is an uppercase letter.
`toLowerCase(ch)`	Returns the lowercase of the specified character.
`toUpperCase(ch)`	Returns the uppercase of the specified character.

The String Type

The char type only represents one character. To represent a string of characters, use the data type called String. For example,

```
String message = "Welcome to Java";
```

- String is actually a predefined class in the Java library just like the System class and Scanner class.
- The String type is not a primitive type.
- It is known as a *reference type*.
- Any Java class can be used as a reference type for a variable. Reference data types will be thoroughly discussed in Chapter 9, “Objects and Classes.”
- For the time being, you just need to know how to declare a String variable, how to assign a string to the variable, how to concatenate strings, and to perform simple operations for strings.

Simple Methods for **String** Objects

Method	Description
`length()`	Returns the number of characters in this string.
`charAt(index)`	Returns the character at the specified index from this string.
`concat(s1)`	Returns a new string that concatenates this string with string s1.
`toUpperCase()`	Returns a new string with all letters in uppercase.
`toLowerCase()`	Returns a new string with all letters in lowercase.
`trim()`	Returns a new string with whitespace characters trimmed on both sides.

Simple Methods for **String** Objects

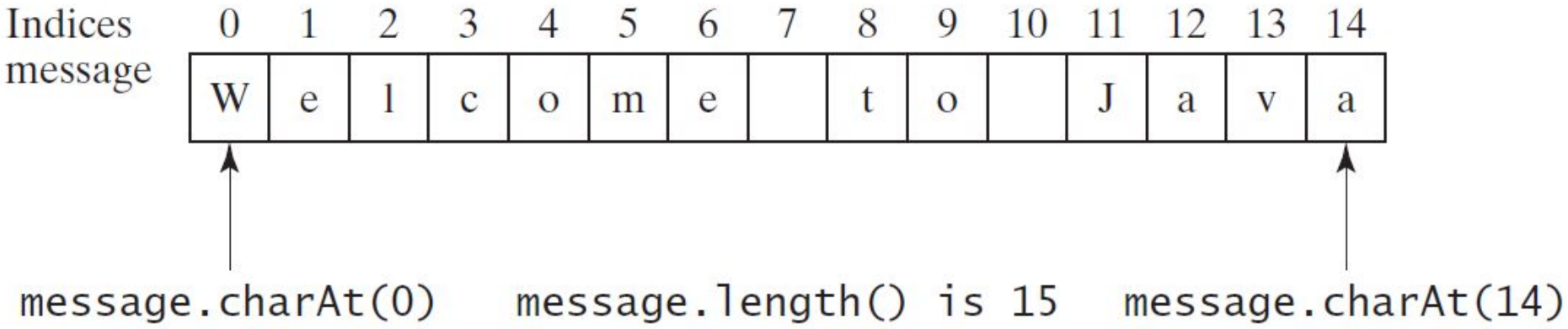
Strings are objects in Java. The methods in the preceding table can only be invoked from a specific string instance. For this reason, these methods are called *instance methods*. A non-instance method is called a *static method*. A static method can be invoked without using an object. All the methods defined in the **Math** class are static methods. They are not tied to a specific object instance. The syntax to invoke an instance method is

```
referenceVariable.methodName(arguments) .
```

Getting String Length

```
String message = "Welcome to Java" ;
System.out.println("The length of " +
message + " is "
  + message.length());
```

Getting Characters from a String




```
String message = "Welcome to Java" ;
System.out.println("The first character in
message is "
  + message.charAt(0));
```

Converting Strings

"Welcome".toLowerCase() returns a new string, welcome.

"Welcome".toUpperCase() returns a new string, WELCOME.

" Welcome ".trim() returns a new string, Welcome. (without space)

String Concatenation

```
String s3 = s1.concat(s2);
```

or

```
String s3 = s1 + s2;
```

// Three strings are concatenated

```
String message = "Welcome " + "to " +
"Java";
```

// String Chapter is concatenated with number 2

```
String s = "Chapter" + 2;
```
// s becomes Chapter2

// String Supplement is concatenated with character B

```
String s1 = "Supplement" + 'B';
```
// s1 becomes SupplementB

Reading a String from the Console

```
Scanner input = new Scanner(System.in);
System.out.print("Enter three words separated
by spaces: " );
String s1 = input.next();
String s2 = input.next();
String s3 = input.next();
System.out.println("s1 is " + s1);
System.out.println("s2 is " + s2);
System.out.println("s3 is " + s3);
```

Reading a Character from the Console

```
Scanner input = new
Scanner(System.in);
System.out.print("Enter a character:
");
String s = input.nextLine();
char ch = s.charAt(0);
System.out.println("The character
entered is " + ch);
```

next()

vs.

nextLine()

Check:
https://replit.com/@AdeAzurat/DDP2-Pekan02#ExOrderTwoCities.java

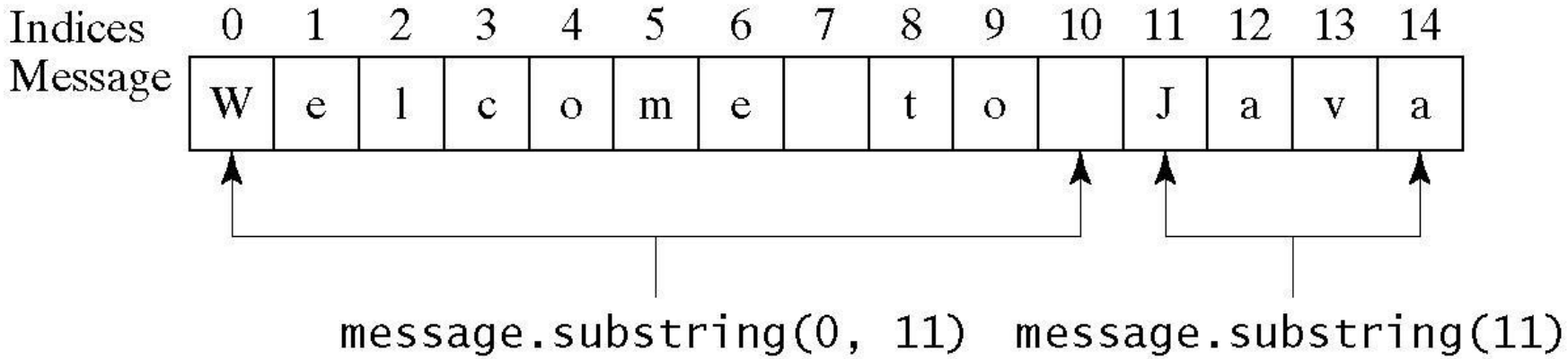
What happen if the **nextLine()** *was changed into* **next()**?

Comparing Strings

Method	Description
`equals(s1)`	Returns true if this string is equal to string `s1`.
`equalsIgnoreCase(s1)`	Returns true if this string is equal to string `s1`; it is case insensitive.
`compareTo(s1)`	Returns an integer greater than `0`, equal to `0`, or less than `0` to indicate whether this string is greater than, equal to, or less than `s1`.
`compareToIgnoreCase(s1)`	Same as `compareTo` except that the comparison is case insensitive.
`startsWith(prefix)`	Returns true if this string starts with the specified prefix.
`endsWith(suffix)`	Returns true if this string ends with the specified suffix.

Obtaining Substrings

Method	Description
`substring(beginIndex)`	Returns this string's substring that begins with the character at the specified `beginIndex` and extends to the end of the string, as shown in Figure 4.2.
`substring(beginIndex, endIndex)`	Returns this string's substring that begins at the specified `beginIndex` and extends to the character at index `endIndex - 1`, as shown in Figure 9.6. Note that the character at `endIndex` is not part of the substring.

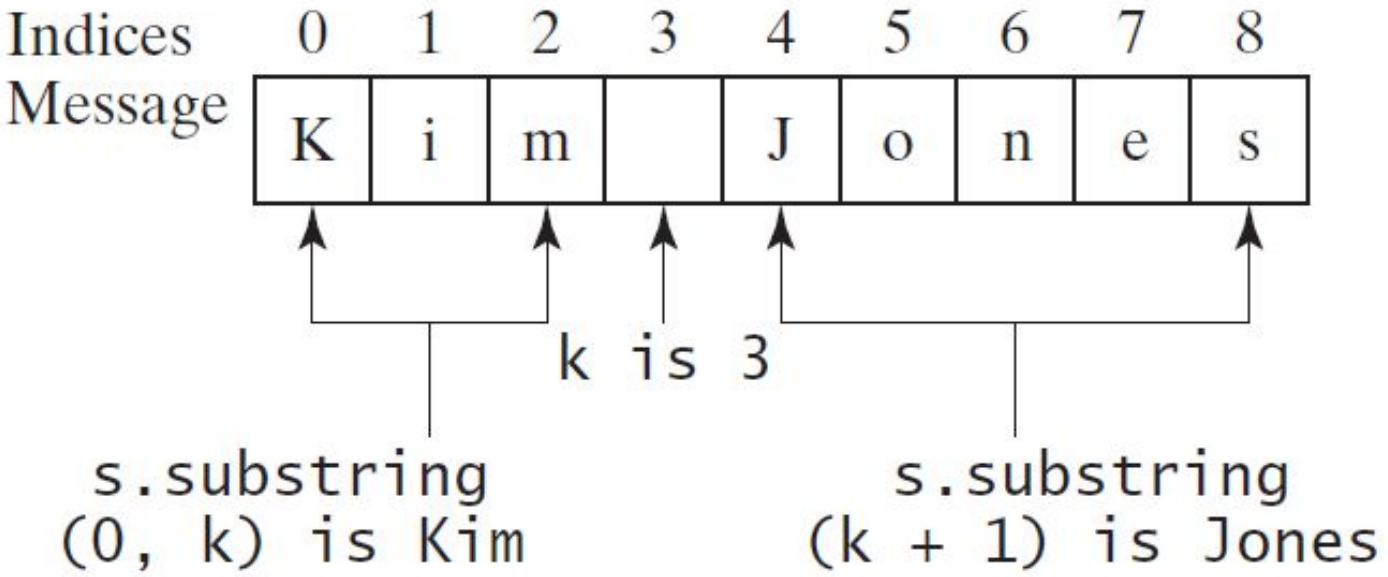


Finding a Character or a Substring in a String

Method	Description
`indexOf(ch)`	Returns the index of the first occurrence of `ch` in the string. Returns `-1` if not matched.
`indexOf(ch, fromIndex)`	Returns the index of the first occurrence of `ch` after `fromIndex` in the string. Returns `-1` if not matched.
`indexOf(s)`	Returns the index of the first occurrence of string `s` in this string. Returns `-1` if not matched.
`indexOf(s, fromIndex)`	Returns the index of the first occurrence of string `s` in this string after `fromIndex`. Returns `-1` if not matched.
`lastIndexOf(ch)`	Returns the index of the last occurrence of `ch` in the string. Returns `-1` if not matched.
`lastIndexOf(ch, fromIndex)`	Returns the index of the last occurrence of `ch` before `fromIndex` in this string. Returns `-1` if not matched.
`lastIndexOf(s)`	Returns the index of the last occurrence of string `s`. Returns `-1` if not matched.
`lastIndexOf(s, fromIndex)`	Returns the index of the last occurrence of string `s` before `fromIndex`. Returns `-1` if not matched.

Finding a Character or a Substring in a String

```
int k = s.indexOf(' ');
String firstName =
s.substring(0, k);
String lastName =
s.substring(k + 1);
```



Conversion between Strings and Numbers

```
int intValue = Integer.parseInt(intString);
double doubleValue =
Double.parseDouble(doubleString);

String s = number + "";
```

Formatting Output

Use the **printf** statement.

```
System.out.printf(format, items);
```

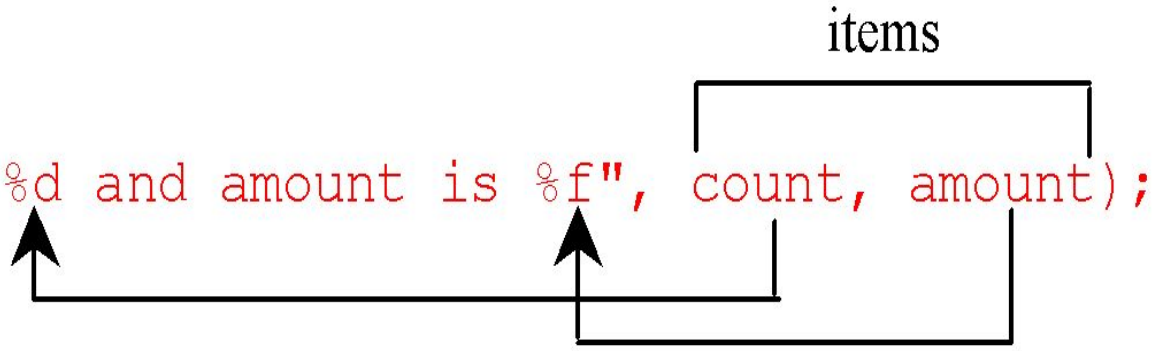
Where format is a string that may consist of substrings and format specifiers. A format specifier specifies how an item should be displayed. An item may be a numeric value, character, boolean value, or a string. Each specifier begins with a percent sign.

Frequently-Used Specifiers

Specifier	Output	Example
%b	a boolean value	true or false
%c	a character	'a'
%d	a decimal integer	200
%f	a floating-point number	45.460000
%e	a number in standard scientific notation	4.556000e+01
%s	a string	"Java is cool"

Frequently-Used Specifiers

```
int count = 5;
double amount = 45.56;
System.out.printf("count is %d and amount is %f", count, amount);
```




```
display              count is 5 and amount is 45.560000
```

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Selamat Berlatih!

Perhatikan lagi List Objective yang perlu dikuasai pekan ini.
Baca buku acuan dan berlatih!
Bila masih belum yakin tanyakan ke dosen atau tutor.

Semangat !