BIRZEIT UNIVERSITY

Selections

Liang, Introduction to Java programming, 11ᵗʰ Edition, © 2017 Pearson Education, Inc.
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By: Mamoun Nawahdah (Ph.D.)
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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**.
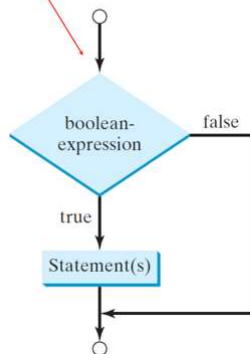
```
boolean b = (1 > 2);
```

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Comparison Operators

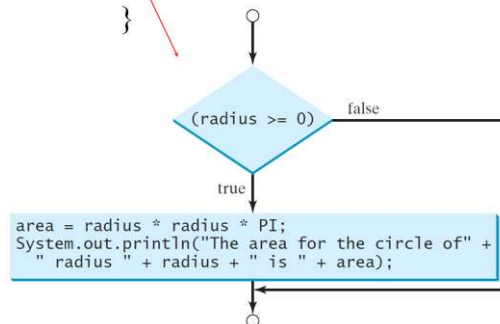| Java Operator	Mathematics Symbol	Name	Example (radius is 5)	Result
<	<	less than	radius < 0	false
<=	≤	less than or equal to	radius <= 0	false
>	>	greater than	radius > 0	true
>=	≥	greater than or equal to	radius >= 0	true
==	=	equal to	radius == 0	false
!=	≠	not equal to	radius != 0	true

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One-way **if** Statements

```
if (boolean-expression) {
   statement(s);
}
```

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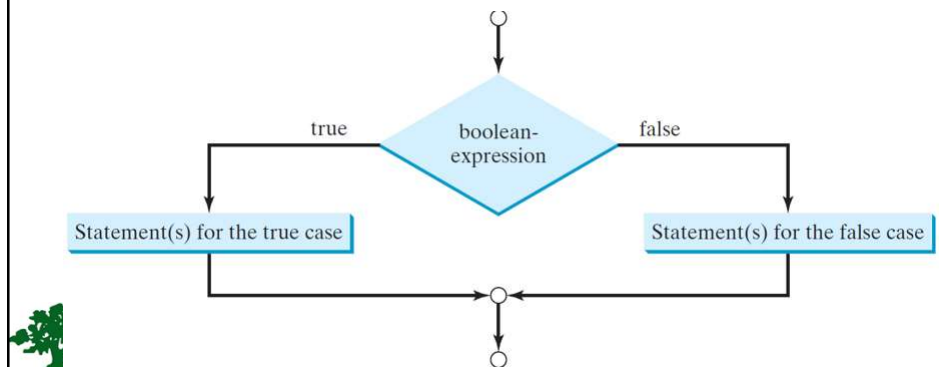
The Two-way if Statement

```
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("Error: 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");
```
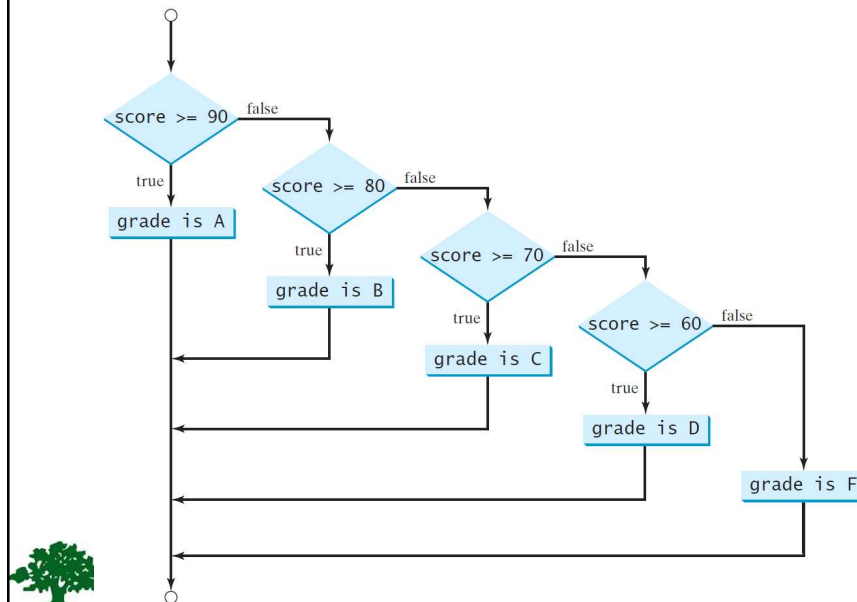
(b)

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Multi-Way **if-else** Statements

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)

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

Equivalent

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

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Common Errors

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

if (radius >= 0) **;** ← Wrong

{

    area = radius*radius*PI;

    System.out.println("The area for the circle is " + area);

}

❖ 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.

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Logical Operators

Operator	Name
!	not
&&	and
||	or
^	exclusive or

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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);
}
```
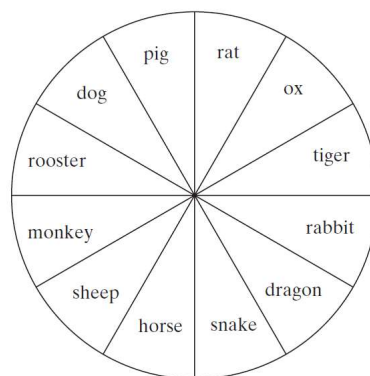
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Trace switch statement

```
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");
}
```

Problem: Chinese Zodiac

Write a program that prompts the user to enter a year and displays the animal for the year.


```
year % 12 = {
  0: monkey
  1: rooster
  2: dog
  3: pig
  4: rat
  5: ox
  6: tiger
  7: rabbit
  8: dragon
  9: snake
  10: horse
  11: sheep
}
```

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Conditional Operator

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

❖ is equivalent to:

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

(boolean-expression) **?** expression1 **:** expression2

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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");**

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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.

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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"

```
int count = 5;                                          items
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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