Identifiers, Keywords, and Types

Mārtiņš Leitass

lattelecom

Comments

The three permissible styles of comment in a Java technology program are:

```
// comment on one line

/* comment on one
 * or more lines
 */

/** documentation comment
 *   can also span one or more lines
 */
```

Semicolons, Blocks, and White Space

- A *statement* is one or more lines of code terminated by a semicolon (;):

```
totals = a + b + c
           + d + e + f;
```

- A *block* is a collection of statements bound by opening and closing braces:

```
{
   x = y + 1;
   y = x + 1;
}
```

Semicolons, Blocks, and White Space

- A *class* definition uses a special block:

```
public class MyDate {
    private int day;
    private int month;
    private int year;
}
```

- You can nest block statements.

```
while ( i < large ) {
    a = a + i;
    // nested block
    if ( a == max ) {
        b = b + a;
        a = 0;
    }
    i = i + 1;
}
```

Semicolons, Blocks, and White Space

- Any amount of *white space* is permitted in a Java program.

  For example:

```
{int  x;x=23*54;}
```

  is equivalent to:

```
{
   int  x;

   x  =  23  *  54;
}
```

Identifiers

Identifiers have the following characteristics:

- Are names given to a variable, class, or method
- Can start with a Unicode letter, underscore (_), or dollar sign ($)
- Are case-sensitive and have no maximum length
- Examples:

```
identifier
userName
user_name
_sys_var1
$change
```

Java Programming Language Keywords

abstract	continue	for	new	switch
assert***	default	goto*	package	synchronized
boolean	do	if	private	this
break	double	implements	protected	throw
byte	else	import	public	throws
case	enum****	instanceof	return	transient
catch	extends	int	short	try
char	final	interface	static	void
class	finally	long	strictfp**	volatile
const*	float	native	super	while

true, false, and null are literals, not keywords

* not used; ** added in 1.2; *** added in 1.4; **** added in 5.0

Primitive Types

The Java programming language defines eight primitive types:

- Logical – boolean
- Textual – char
- Integral – byte, short, int, and long
- Floating – double and float

Logical – boolean

The boolean primitive has the following characteristics:

- The boolean data type has two literals, true and false.
- For example, the statement:

  ```
  boolean truth = true;
  ```

  declares the variable truth as boolean type and assigns it a value of true.

Textual – char

The textual char primitive has the following characteristics:

- Represents a 16-bit Unicode character
- Must have its literal enclosed in single quotes (’ ’)
- Uses the following notations:

'a'	The letter a
'\t'	The tab character
'\u????'	A specific Unicode character, ????, is replaced with exactly four hexadecimal digits . For example, ’\u03A6’ is the Greek letter phi [√].

Textual – String

The textual String type has the following characteristics:

- Is not a primitive data type; it is a class
- Has its literal enclosed in double quotes (" ")

```
"The quick brown fox jumps over the lazy dog."
```

- Can be used as follows:

```
String greeting = "Good Morning !! \n";
String errorMessage = "Record Not Found !";
```

Integral – byte, short, int, and long

The integral primitives have the following characteristics:

- Integral primates use three forms: Decimal, octal, or hexadecimal

2	The decimal form for the integer 2.
077	The leading 0 indicates an octal value.
0xBAAC	The leading 0x indicates a hexadecimal value.

- Literals have a default type of int.
- Literals with the suffix L or lare of type long.

Integral – byte, short, int, and long

- Integral data types have the following ranges:

Integer Length	Name or Type	Range
	byte	-2_7 to 2_7-1
	short	-2_{15} to $2_{15}-1$
	int	-2_{31} to $2_{31}-1$
	long	-2_{63} to $2_{63}-1$

Floating Point – float and double

The floating point primitives have the following characteristics:

- Floating-point literal includes either a decimal point or one of the following:
  - E or e (add exponential value)
  - F or f (float)
  - D or d (double)

3.14	A simple floating-point value (a double)
6.02E23	A large floating-point value
2.718F	A simple float size value
123.4E+306D	A large double value with redundant D

Floating Point – float and double

- Literals have a default type of double.
- Floating-point data types have the following sizes:

Float Length	Name or Type
32 bits	float
64 bits	double

Variables, Declarations, and Assignments

```
1   public class Assign {
2      public static void main (String args []) {
3         // declare integer variables
4         int x, y;
5         // declare and assign floating point
6         float z = 3.414f;
7         // declare and assign double
8         double w = 3.1415;
9         // declare and assign boolean
10        boolean truth = true;
11        // declare character variable
12        char c;
13        // declare String variable
14        String str;
15        // declare and assign String variable
16        String str1 = "bye";
17        // assign value to char variable
18        c = 'A';
19        // assign value to String variable
20        str = "Hi out there!";
21        // assign values to int variables
22        x = 6;
23        y = 1000;
24     }
25  }
```

Java Reference Types

- In Java technology, beyond primitive types all others are reference types.
- A *reference variable* contains a *handle* to an object.
- For example:

```
1    public class MyDate {
2       private int day = 1;
3       private int month = 1;
4       private int year = 2000;
5       public MyDate(int day, int month, int year) { ... }
6       public String toString() { ... }
7    }
```

```
1    public class TestMyDate {
2       public static void main(String[] args) {
3          MyDate today = new MyDate(22, 7, 1964);
4       }
5    }
```

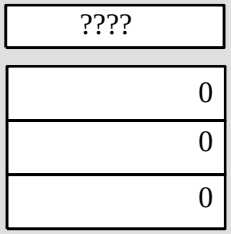
Memory Allocation and Layout

- A declaration allocates storage only for a reference:

```
MyDate my_birth = new MyDate(22, 7, 1964);
```

- Use the new operator to allocate space for MyDate:

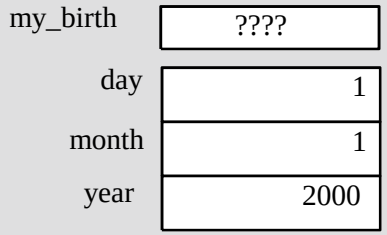
```
MyDate my_birth = new MyDate(22, 7, 1964);
```



Explicit Attribute Initialization

- Initialize the attributes as follows:

```
MyDate my_birth = new MyDate(22, 7, 1964);
```

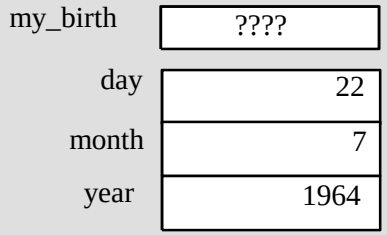


- The default values are taken from the attribute declaration in the class.

Executing the Constructor

- Execute the matching constructor as follows:

```
MyDate my_birth = new MyDate(22, 7, 1964);
```



- In the case of an overloaded constructor, the first constructor can call another.

Constructing and Initializing Objects

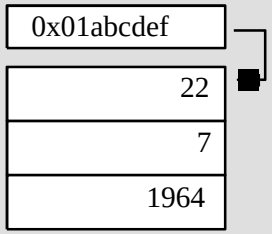
- Calling new *Xyz*() performs the following actions:
  a. Memory is allocated for the object.
  b. Explicit attribute initialization is performed.
  c. A constructor is executed.
  d. The object reference is returned by the new operator.
- The reference to the object is assigned to a variable.
- An example is:

```
MyDate my_birth = new MyDate(22, 7, 1964);
```

Assigning a Variable

- Assign the newly created object to the reference variable as follows:

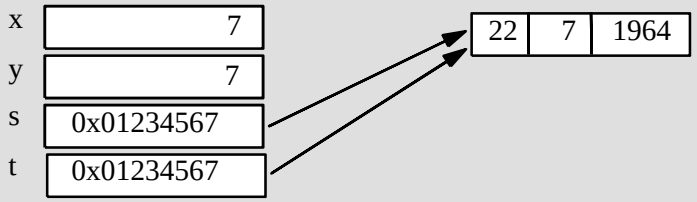
```
MyDate my_birth = new MyDate(22, 7, 1964);
```



Assigning References

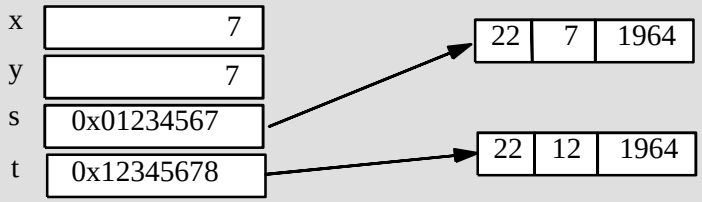
- Two variables refer to a single object:

```
1    int x = 7;
2    int y = x;
3    MyDate s = new MyDate(22, 7, 1964);
4    MyDate t = s;
```



- Reassignment makes two variables point to two objects:

```
5    t = new MyDate(22, 12, 1964);
```



Pass-by-Value

- In a single virtual machine, the Java programming language only passes arguments by value.
- When an object instance is passed as an argument to a method, the value of the argument is a *reference* to the object.
- The *contents* of the object can be changed in the called method, but the original object reference is never changed.

Pass-by-Value

```
1     public class PassTest {
2
3        // Methods to change the current values
4        public static void changeInt(int value) {
5           value = 55;
6        }
7        public static void changeObjectRef(MyDate ref) {
8           ref = new MyDate(1, 1, 2000);
9        }
10       public static void changeObjectAttr(MyDate ref){
11          ref.setDay(4);
12       }
```

Pass-by-Value

```
13
14      public static void main(String args[]) {
15          MyDate date;
16          int val;
17
18          // Assign the int
19          val = 11;
20          // Try to change it
21          changeInt(val);
22          // What is the current value?
23          System.out.println("Int value is: " + val);
```

The result of this output is:

```
Int value is: 11
```

Pass-by-Value

```
24
25          // Assign the date
26          date = new MyDate(22, 7, 1964);
27          // Try to change it
28          changeObjectRef(date);
29          // What is the current value?
30          System.out.println("MyDate: " + date);
```

The result of this output is:

```
MyDate: 22-7-1964
```

Pass-by-Value

```
31
32          // Now change the day attribute
33          // through the object reference
34          changeObjectAttr(date);
35          // What is the current value?
36          System.out.println("MyDate: " + date);
37      }
38  }
```

The result of this output is:

```
MyDate:  4-7-1964
```

The this Reference

Here are a few uses of the this keyword:

- To resolve ambiguity between instance variables and parameters
- To pass the current object as a parameter to another method or constructor

The this Reference

```
1     public class MyDate {
2        private int day = 1;
3        private int month = 1;
4        private int year = 2000;
5
6        public MyDate(int day, int month, int year) {
7           this.day   = day;
8           this.month = month;
9           this.year  = year;
10       }
11       public MyDate(MyDate date) {
12          this.day   = date.day;
13          this.month = date.month;
14          this.year  = date.year;
15       }
```

The this Reference

```
16
17      public MyDate addDays(int moreDays) {
18         MyDate newDate = new MyDate(this);
19         newDate.day = newDate.day + moreDays;
20         // Not Yet Implemented: wrap around code...
21         return newDate;
22      }
23      public String toString() {
24         return "" + day + "-" + month + "-" + year;
25      }
26
```

The this Reference

```
1    public class TestMyDate {
2       public static void main(String[] args) {
3          MyDate my_birth = new MyDate(22, 7, 1964);
4          MyDate the_next_week = my_birth.addDays(7);
5
6          System.out.println(the_next_week);
7       }
8    }
```

Java Programming Language Coding Conventions

- Packages:

  com.example.domain;
- Classes, interfaces, and enum types:

  SavingsAccount
- Methods:

  getAccount()
- Variables:

  currentCustomer
- Constants:

  HEAD_COUNT

Java Programming Language Coding Conventions

- Control structures:

```
if ( condition ) {
    statement1;
} else {
    statement2;
}
```

- Spacing:
  - Use one statement per line.
  - Use two or four spaces for indentation.
- Comments:
  - Use // to comment inline code.
  - Use /** documentation */ for class members.