4

Data in a Cart

ORACLE

Objectives

After completing this lesson, you should be able to:

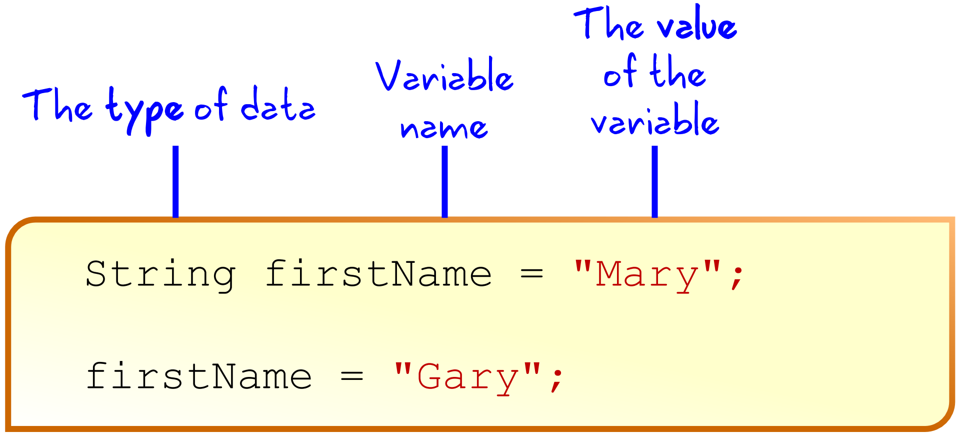
- Describe the purpose of a variable in the Java language
- List and describe four data types
- Declare and initialize `String` variables
- Concatenate `String` variables with the '+' operator
- Make variable assignments
- Declare and initialize `int` and `double` variables
- Modify variable values by using numeric operators
- Override default operator precedence using ( )

Topics

- Introducing variables
- Working with `String` variables
- Working with numbers
- Manipulating numeric data

Variables

- A variable refers to something that can change.
  - Variables can be initiated with a value.
  - The value can be changed.
  - A variable holds a specific type of data.



```
String firstName = "Mary";

firstName = "Gary";
```

Variable Types

- Some of the types of values a variable can hold:
  - `String` (example: "Hello")
  - `int` (examples: -10, 0, 2, 10000)
  - `double` (examples: 2.00, 99.99, -2042.00009)
  - `boolean` (true or false)
- If uninitialized, variables have a default value:
  - `String:` null
  - `int:` 0
  - `double:` 0.0
  - `boolean:` false

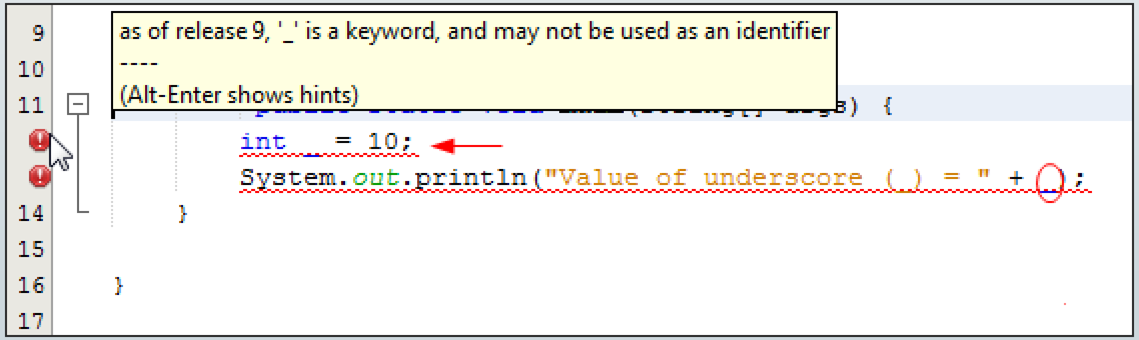
Naming a Variable

Guidelines:

- Begin each variable with a lowercase letter. Subsequent words should be capitalized:
  - `myVariable`
- Names are case-sensitive.
- Names cannot include white space.
- Choose names that are mnemonic and that indicate to the casual observer the intent of the variable.
  - `outOfStock    (a boolean)`
  - `itemDescription   (a String)`

Java SE 9: The Underscore Character Is Not a Legal Name

- If you use the underscore character ("_") as a one-character identifier in source code, then your code won't compile in Java SE 9.
- For example:



```
as of release 9, '_' is a keyword, and may not be used as an identifier
----
(Alt-Enter shows hints)
```

```
                                     s)  {
        int _ = 10;
        System.out.println("Value of underscore (_) = " + _);
    }

}
```

Uses of Variables

- Holding data used within a method:

```
String name = "Sam" ;
double price = 12.35;
boolean outOfStock = true;
```

- Assigning the value of one variable to another:

```
String name = name1;
```

- Representing values within a mathematical expression:

```
total = quantity * price ;
```

- Printing the values to the screen:

```
System.out.println(name);
```

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Examples: Variable Declaration and Initialization

- Basic Example :

$$\underbrace{\texttt{String}}_{\text{type}}\ \underbrace{\texttt{address}}_{\text{identifier}}\ \texttt{=}\ \underbrace{\texttt{"123 Oak St";}}_{\text{value}}$$

```
                                       //one variable declared
                                       // and initialized
```

- Other Examples:

```
String customer;                  //One variable declared

String name, city                //Two variables declared

String country ="USA", state="CO" //Two variables declared
                                  //and initialized

city=" USA";          //One variable initialized after
                      //being declared earlier
```

`String` Concatenation

- `String` variables can be combined using the '+' operator.
  - `stringVariable1 + stringVariable2`
  - `stringVariable1 + "String literal"`
  - `stringVariable1 + "String literal" + stringVariable2`

- Example:

```
String greet1 = "Hello";
String greet2 = "World";
String message = greet1 + " " + greet2 + "!";
String message = greet1 + " " + greet2 + " " + 2014 +"!";
```

String Concatenation

You can concatenate String variables outside or inside a method call:

```
String greet1 = "Hello";
String greet2 = "World";
String message = greet1 + " " +greet2  + "!";

System.out.println(message);
System.out.println(greet1 + " " + greet2 + "!");
```

Output:

```
Hello World!
Hello World!
```

Exercise 4-1: Using `String` Variables

1. In NetBeans, open the project **`Exercise_04-1`**.
2. Declare and initialize two String variables: `custName` and `itemDesc`.
3. Declare a String variable called `message`. Do not initialize it.
4. Assign the `message` variable with a concatenation of the `custName` and `itemDesc`. Include a String literal that results in a complete sentence.
   - Example: "Mary Smith wants to purchase a Shirt"
5. Print `message` to the System output.

Quiz

Which of the following variable declarations and/or initializations are correct?

a. `int count = 5; quantity = 2;`

b. `string name, label;`

c. `boolean complete = "false";`

d. `boolean complete = true;`

Topics

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`int` and `double` Values

- `int` variables hold whole number values between:
  - `-2,147,483,648`
  - `2,147,483,647`
  - Examples: 2, 1343387, 1_343_387

- `double` variables hold larger values containing decimal portions.
  - Use when greater accuracy is needed.
  - Examples: 987640059602230.7645 , -1111, 2.1E12

Initializing and Assigning Numeric Values

- `int` variables:
  - `int quantity = 10;` ✓
  - `int quantity = 5.5;` 🚫 Compilation fails!

- `double` variables:
  - `double price = 25.99;` ✓
  - `double price = 75;` ✓ Run time will interpret as 75.0.

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Standard Mathematical Operators

Purpose	Operator	Example	Comments
Addition	`+`	`sum = num1 + num2;`	If num1 is 10 and num2 is 2, sum is 12.
Subtraction	`–`	`diff = num1 – num2;`	If num1 is 10 and num2 is 2, diff is 8.
Multiplication	`*`	`prod = num1 * num2;`	If num1 is 10 and num2 is 2, prod is 20.
Division	`/`	`quot = num1 / num2;`	If num1 is 31 and num2 is 6, quot is 5. The remainder portion is discarded. Division by 0 throws an exception.

Increment and Decrement Operators (++ and --)

The long way:

```
age = age + 1;
```

or

```
count = count - 1;
```

The short way:

```
age++;
```

or

```
count--;
```

Operator Precedence

Here’s an example of the need for rules of precedence.

Is the answer to the following problem 34 or 9?

```
int c = 25 - 5 * 4 / 2 - 10 + 4;
```

Operator Precedence

Rules of precedence:

1. Operators within a pair of parentheses
2. Increment and decrement operators (++ or --)
3. Multiplication and division operators, evaluated from left to right
4. Addition and subtraction operators, evaluated from left to right

Using Parentheses

Examples:

```
int c = (((25 - 5) * 4) / (2 - 10)) + 4;
int c = ((20 * 4) / (2 - 10)) + 4;
int c = (80 / (2 - 10)) + 4;
int c = (80 / -8) + 4;
int c = -10 + 4;
int c = -6;
```

Exercise 4-2: Using and Manipulating Numbers

1. Continue editing **`Exercise_04-1`** or open **`Exercise_04-2`**.
2. Declare and initialize numeric fields: `price` (double) `tax` (double), and `quantity` (int). Also declare a double called `total`, but do not initialize it.
3. Change the `message` variable to include `quantity`
   - Example: "Mary Smith wants to purchase 1 Shirt.“
4. Calculate total by multiplying price * quantity * tax.
5. Print a message showing the total cost (example: "Total cost with tax is: 25.78.").

Quiz

Which of the following statements are correct Java code?

a. `int count = 11.4;`

b. `double amount = 11.05;`

c. `int cost = 133_452_667;`

d. `double total = 1.05 * amount;`

Quiz

Given:

```
String name = "Bob";
String msg;
int num = 3;
```

Which of the following statements correctly assigns the value “Bob wrote 3 Java programs.” to the msg variable?

```
a. msg = name + " wrote " + num " Java programs.";
b. msg = name + " wrote " + 3 + " Java programs.";
c. msg = "Bob wrote "+ (2+1) + " Java programs.";
d. msg = name + " wrote " + 2+1 + " Java programs.";
```

Summary

In this lesson, you should have learned how to:

- Describe the purpose of a variable in the Java language
- List and describe four data types
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- Concatenate `String` variables with the '+' operator
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