Q: What makes a programmer?

Fundamentals of Programming

Data Types & Methods

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Overview

- Summary (Previous Lesson)
- Java Data types
- Default values
- Variables
- Input data from keyboard
- Display results
- Methods
- Operators
Exercise

Create a JAVA Program to display the following output

<table>
<thead>
<tr>
<th>EMPLOYEE DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee NO    : HIT1001</td>
</tr>
<tr>
<td>2. Name           : Mr. A. B. Gamage</td>
</tr>
<tr>
<td>2. Age            : 30</td>
</tr>
<tr>
<td>3. Salary         : 23507.50</td>
</tr>
<tr>
<td>4. Married        : Y</td>
</tr>
<tr>
<td>5. Car (Y/N)      : N</td>
</tr>
</tbody>
</table>

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Java Data types

- The eight primitive data types supported by the Java programming language

<table>
<thead>
<tr>
<th>Keyword</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>byte</td>
<td>Byte-length integer</td>
</tr>
<tr>
<td>short</td>
<td>Short integer</td>
</tr>
<tr>
<td>int</td>
<td>Integer</td>
</tr>
<tr>
<td>long</td>
<td>Long integer</td>
</tr>
<tr>
<td>float</td>
<td>Single-precision floating point</td>
</tr>
<tr>
<td>double</td>
<td>Double-precision floating point</td>
</tr>
<tr>
<td>char</td>
<td>A single character</td>
</tr>
<tr>
<td>boolean</td>
<td>A boolean value (true or false)</td>
</tr>
</tbody>
</table>
# Limits of integer in Java

<table>
<thead>
<tr>
<th>type</th>
<th>Size</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>minimum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximum</td>
</tr>
<tr>
<td>byte</td>
<td>1</td>
<td>-128</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>127</td>
</tr>
<tr>
<td>short</td>
<td>2</td>
<td>-32,768</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>32,767</td>
</tr>
<tr>
<td>int</td>
<td>4</td>
<td>-2,147,483,648</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>2,147,483,647</td>
</tr>
<tr>
<td>long</td>
<td>8</td>
<td>-9,223,372,036,854,775,808</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>9,223,372,036,854,775,807</td>
</tr>
</tbody>
</table>
Default values

- the default values for the above data type

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Default Value (for fields)</th>
</tr>
</thead>
<tbody>
<tr>
<td>byte</td>
<td>0</td>
</tr>
<tr>
<td>short</td>
<td>0</td>
</tr>
<tr>
<td>int</td>
<td>0</td>
</tr>
<tr>
<td>long</td>
<td>0L</td>
</tr>
<tr>
<td>float</td>
<td>0.0f</td>
</tr>
<tr>
<td>double</td>
<td>0.0d</td>
</tr>
<tr>
<td>char</td>
<td>'u0000'</td>
</tr>
<tr>
<td>String (or any object)</td>
<td>null</td>
</tr>
<tr>
<td>boolean</td>
<td>false</td>
</tr>
</tbody>
</table>
Variables

• Declaration
  – DataType <space> VaribaleName

• Example:
  – Int count;
  – Int studentAge = 0;
  – float GPA = 3.56
Input from Keyboard

- Use Scanner
  - `import java.util.Scanner;`
- Create a Scanner object to Scan input from command window
  - `Scanner input = new Scanner(System.in);`
- Read value from keyboard
  - `nextInt()` `integer`
  - `nextLine()` `String`
  - `nextFloat()` `float`
  - `nextDouble()` `double`
- Example
  - `value = input.nextInt();`
Example

• Create a JAVA Program that read data from key bard and display the result as follows

```
EMPLOYEE DETAILS
-----------------------
1. Employee NO        : HIT1001
2. Name               : Mr. A. B. Gamage
2. Age                : 30
3. Salary             : 23507.50
4. Married            : Y
5. Car (Y/N)          : N
-----------------------
```
Examples:

Example 1
• Create a java program to read 2 integer values and print the average.

Example 2
• Create a java program to calculate area of a room.
Example 1: Solution

```java
import java.util.Scanner;

public class FundamentalApp {
    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        int value1, value2;
        float avg;
        System.out.println("Enter value1 :");
        value1 = input.nextInt();
        System.out.println("Enter value1 :");
        value2 = input.nextInt();
        avg = (value1 + value2)/2;
        System.out.println("Average is "+ avg);
    }
}
```
Example 3:

- Create a java program to calculate area of the following figure

![Diagram of a rectangle with a circle inside, labeled with dimensions a, b, and c.]
Methods

• Is a group of statements that is executed when it is called from some point of the program.

• Types
  – **Built-in**: Build-in methods are part of the compiler package, such as
    • System.out.println()
  – **User-defined**: User-defined methods are created by you

• Format

  Return typeMethodName (Argument..)

  {     }

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Method Example 1

```java
public class TestApp {

    static void printMe() {
        System.out.println("I am a method");
    }

    public static void main(String[] args) {
        printMe();
    }
}
```
Method Example 2

```java
public class TestApp {
    static void printMe(String Name, int myage) {
        System.out.println("I am a "+Name+ " " + myage);
    }

    public static void main(String[] args) {
        int age = 23;
        printMe("Budditha", age);
    }
}
```
public class TestApp
{
    static float getAverage(int n1, int n2)
    {
        float avg;
        avg = (n1 + n2)/2.0f;
        return avg;
    }

    public static void main(String[] args) {
        int a, b;
        float avg;
        a=23;
        b=34;
        avg = getAverage(a, b);
        System.out.println("Avg is" + avg);
    }
}
Scope of a variable

1. In a class body as class fields. Variables declared here are referred to as class-level variables.

2. As parameters of a method

3. In a method's body

4. Within a statement block, such as inside a while or for block.
Scope of a variable

```java
public class TestApp {
    int data1;
    public static void main(String[] args) {
        int data2;
        for(int i = 0; i<10; i++) {
            System.out.println("Value "+i);
        }
    }
}
```
Exercise

• Create a Java Program to do the following

  1. Read Celsius temperature and calculate the Fahrenheit temperature

     Celsius to Fahrenheit: \( (°C \times \frac{9}{5}) + 32 = °F \)

**Hint:**

– A Method to read data from keyboard
– A Method to Calculate data
– A Method to Print Data
Methods

```java
static float getValue()
{
    float v;
    Scanner in= new Scanner(System.in);
    System.out.println("Enter Temp: ");
    v= in.nextFloat();
    return v;
}

static float calculate(float cT)
{
    float fT;
    fT= cT * 9.0f/5 + 32;
    return fT;
}
```
Methods

```java
static void printData(float cT, float fT) {
    System.out.println("Celcious Temperature "+ cT);
    System.out.println("Fahrenheit Temperature "+ fT);
}
public static void main(String[] args) {
    float ct, ft;
    ct = getValue();
    ft = calculate(ct);
    printData(ct, ft);
}
```
Complete Program
Top-Down Design

```
getValue -> calculate -> printData
```

- Main
- getValue
- calculate
- printData
Example

• Create a JAVA Program that reads 3 integer values from keyboard and print total and average values.

• Hint:
  – Draw a top down design
  – Implement your solution