CSE 20
Intro to Computing I

Lecture 3 – Variables (2)

Announcements

- Lab #4 this week
  - Due in a week
  - Make sure to show your work to **YOUR TA** (or me) before submission

- Reading assignment
  - Chapter 2.11 – 2.14 of textbook

Variable Dependency (Ch 2.1)

```
Scanner input = new Scanner(System.in);
int n1, n2;
System.out.print("Please enter the first number:");
n1 = input.nextInt();
System.out.print("Please enter the second number:");
n2 = input.nextInt();

int average;
average = (n1+n2)/2;
System.out.print("The average of the numbers is ");
System.out.println(average);
```

Variable Dependency

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Scanner input = new Scanner(System.in);
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```

Variable Dependency

```
Scanner input = new Scanner(System.in);
System.out.print("Please enter the first number:");
n1 = input.nextInt();
int n1, n2;
System.out.print("Please enter the second number:");
n2 = input.nextInt();

int average;
average = (n1+n2)/2;
System.out.print("The average of the numbers is ");
System.out.println(average);
```

n1 needs to be declared first!

Variable Dependency

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int average;
average = (n1+n2)/2;
System.out.print("The average of the numbers is ");
System.out.println(average);
```

Declaration + Initialization

Declaration

Write/Assign

Read/Access

Variable Reuse

```
Scanner input = new Scanner(System.in);
int n1, n2;
System.out.print("Please enter the first number:");
n1 = input.nextInt();
System.out.print("Please enter the second number:");
n2 = input.nextInt();

int average;
average = (n1+n2)/2;
System.out.print("The average of the numbers is " + average);
int average;
float average;
```

Re-defining a variable is not allowed!

Code – Executable Statements

```
int first = 1;
double second = 0.5;
double result = first - second;
```

Code – Executable Statements

```
int first; // Declaration (type name)
first = 0; // Assignment (initialize)
first = 1; // Assignment (reuse/override)
double second = 0.5; // Declare + Assign
double result = first - second;
```

Type Casting (Up Conversion)

```
double first; // use "higher" Type
first = 0; // 0 is also a valid double (0.0)
first = 1; // 1.0
double second = 0.5;
double result = first - second;
```

Up Conversion -> no information loss

Type Casting (Down Conversion)

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
// using "lower" Type needs explicit cast
```

Forced it to be an **int** (explicitly)

A double

Down Conversion -> possible information loss

Type Conversions

- Implicit – Up conversion
  - *double* d = 4;
  - *char* a = '}';
  - *int* i = 'A';
  - *float* f = 'A';
  - *double* e = 'A';

There is no loss of information

- Explicit – Down conversion
  - a = (*char*)i;
  - a = (*char*)f;
  - a = (*char*)d;
  - i = (*int*)f;
  - i = (*int*)e;
  - f = (*float*)e;

There may be loss of information

Output Variable

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
System.out.println(result);
```

Console Output: 0

Output Message

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
System.out.println("Result is ");
System.out.println(result);
```

Console Output: Result is
0

Output Message – Corrected

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
System.out.print("Result is ");
System.out.println(result);
```

Console Output: Result is 0

Output Message using +

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
System.out.println("Result is " + "result");
```

A string!!!

Console Output: Result is result

Output Variable using +

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
System.out.println("Result is " + result);
```

Console Output: Result is 0

String Variable (1)

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
String outMessage = "Result is ";
System.out.println(outMessage + result);
```

Console Output: Result is 0

String Variable (2)

```
double first;
first = 0;
first = 1;
double second = 0.5;
int result = (int)(first - second);
String outMessage = "Result is " + result;
System.out.println(outMessage);
```

Save output string as outMessage first.
Then print it out.

Console Output: Result is 0

Addition : + (Data Types)

- short + short → int
- short + int → int
- char + char → int
- int + int → int Highest data type in the expression
- int + float → float
- string + boolean → string
- string + (expression) → string
- string + char + char → string + char → string
- char + char + string → int + string → string

Names are Case Sensitive

- MAIN
- Main
- main
- mAin
- maIn
- maiN
- mAIn
- MaiN
- Everything above is a different “word”!

Naming Convention

- Begin with letter or _
- Class (program) names capitalized
  - Averages
  - FirstProgram

  UpperCamelCase
- Variable names
  - Begins with lowercase letter
    - main
    - average
    - result
  - Combining words
    - toUpper
    - toUpperCase
    - theSquare

    lowerCamelCase

Putting it all Together

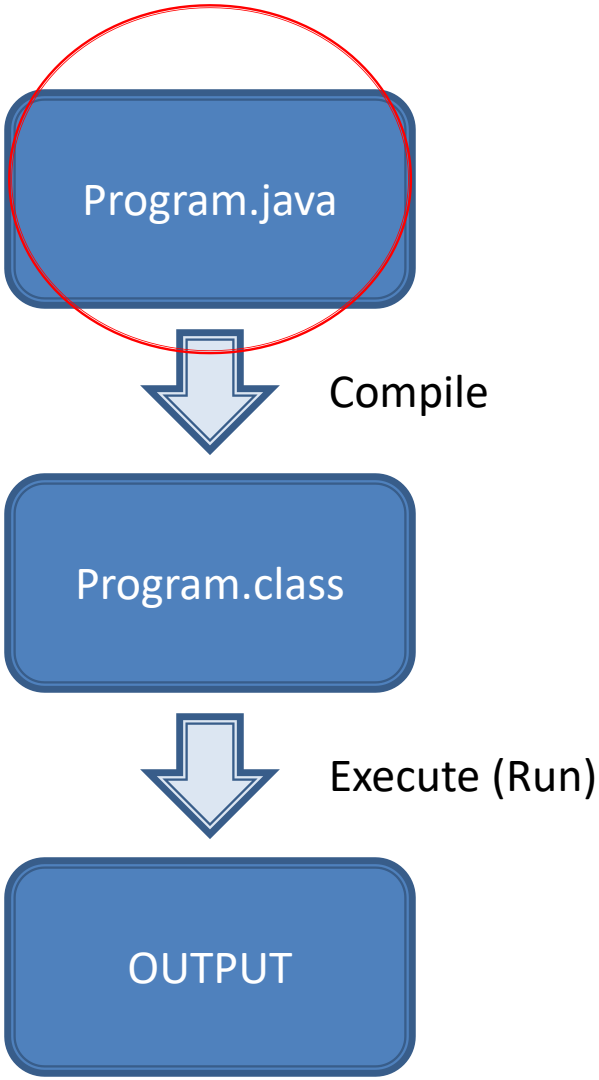
```
Scanner keyboardInput = new Scanner(System.in); //Create Scanner
System.out.print("What is your name? ");
String myName = keyboardInput .next();
System.out.print("Where do you live " + myName + "? ");
String myCity = keyboardInput .next();

System.out.println("\n" + myName + " lives in " + myCity + ".");
```

```
Output:
What is your name? Daniel
Where do you live Daniel? Merced
Daniel lives in Merced.
```

How Java Programing Works?

- Java Execution Model
  - Capitalized program name

Submit this file!



Types of Errors in Programing (Ch 1.6)

- **Compile-time errors:** Errors found when the program is being compiled.
  - Example: Syntax errors
  - Depending on your setup, Eclipse may catch some or all of these as you type.
- **Run-time errors:** The program compiles correctly, but an error results when run.
  - Example: Errors in utilizing memory
- **Logical errors:** The program compiles OR runs, but behaves unexpectedly.
  - Example: you intended the program to print "***Hello world!***" but it prints "***Goodbye cruel world***"