

Design Simple Programs with Input and Output

Hui Chen

Department of Computer & Information Science

Brooklyn College

Objectives

- To design Java programs to perform simple computations (§2.2).
- To obtain input from the console using the **Scanner** class (§2.3).
- To use identifiers to name variables, constants, methods, and classes (§2.4).
- To use variables to store data (§§2.5–2.6).
- To program with assignment statements and assignment expressions (§2.6).

Outline

- Motivation
- From “problem”, to “algorithm”, and to “implementation”
- Design a program with input and output
 - Hardcode input
 - Read from users’ input (from console)
- Dissecting the program
- Exercises/labs

Motivations

- Why do we program?
 - Solve problems

Problem: Compute Area of a Shape

- Computing the area of a shape is a common problem we face in real life
 - How big is the apartment?
 - is it “cheaper” to buy an extra large pizza or to buy large pizza?
 - Is the room big enough so that we can maintain a safe distance?

Problem to Solution: Compute Area of a Circle

- Solution: an algorithm
 - Read in radius (hard code in the program)
 - Compute area
 - Display the area

Solution to Code: Compute Area of a Circle

- Let's implement the solution in Java

```
public class ComputeArea {  
    public static void main(String[] args) {  
        double radius;  
        double area;  
  
        // Assign a radius  
        radius = 20;  
  
        // Compute area  
        area = radius * radius * 3.14159;  
  
        // Display results  
        System.out.println("The area for the circle of radius " +  
            radius + " is " + area);  
    }  
}
```

Trace the program

- Compile
- Run
- Trace the program

Questions?

- Any questions?
- What if we want to compute the area of a different circle?

Reading Input from Console

- Reading Input from the Console
 - Create a Scanner object
 - `Scanner input = new Scanner(System.in);`
- Use the method `nextDouble()` to obtain to a double value. For example,
 - `System.out.print("Enter a double value: ");`
 - `Scanner input = new Scanner(System.in);`
 - `double d = input.nextDouble();`

Locating the Scanner class

- Using the fully qualified class name
- Using import
 - Implicit import
 - `import java.util.* ; // Implicit import`
 - Explicit import
 - `Import java.util.Scanner; // Explicit Import`

Computing the Area of Circle Again!

Questions?

Dissecting the Example Programs

- Identifiers
- Variables
- Assignment statements

Identifiers

- An identifier is a sequence of characters that consist of letters, digits, underscores (`_`), and dollar signs (`$`).
- An identifier must start with a letter, an underscore (`_`), or a dollar sign (`$`). It cannot start with a digit.
- An identifier cannot be a reserved word.
 - See Appendix A of the textbook, “Java Keywords,” for a list of reserved words.
- An identifier cannot be `true`, `false`, or `null` (they are not keywords, but you cannot use them to name identifiers).
- An identifier can be of any length.

Variables

- Represent values that may be changed in the program

Examples of Variables

```
// Compute the first area
```

```
radius = 1.0;
```

```
area = radius * radius * 3.14159;
```

```
System.out.println("The area is " + area + " for radius "+radius);
```

```
// Compute the second area
```

```
radius = 2.0;
```

```
area = radius * radius * 3.14159;
```

```
System.out.println("The area is " + area + " for radius "+radius);
```

Declaring Variables

```
int x;    // Declare x to be an  
         // integer variable;
```

```
double radius; // Declare radius to  
              // be a double variable;
```

```
char a;    // Declare a to be a  
         // character variable;
```

Assignment

```
x = 1;    // Assign 1 to x;
```

```
radius = 1.0; // Assign 1.0 to radius;
```

```
a = 'A';   // Assign 'A' to a;
```

Declaring and Initializing in One Step

```
int x = 1;
```

```
double d = 1.4;
```

Questions?

Lab Exercise

- Compute GPA given GPA value (instead of letter grades) of two courses and credit hours obtained from user's input

- See [\(PDF\) pages 59 of the Undergraduate Bulletin](#)

- $$\text{GPA} = \frac{(GPA\ Value\ 1) \times (Credits\ 1) + (GPA\ Value\ 2) \times (Credits\ 2)}{(Credits\ 1) + (Credits\ 2)}$$