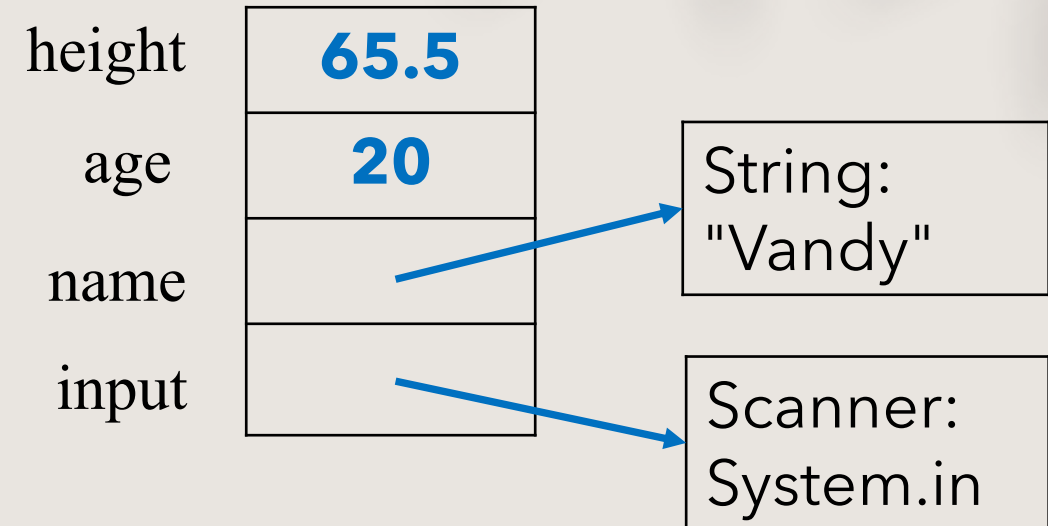# Passing Parameters

zyBook Chap 3.2, 3.3

Data – <type> <name>

- For **primitive** data types, **values** are stored.

- For **objects**, **references** to objects are stored.

Example:

```
double height = 65.5;
int age = 20;
String name = "Vandy";
Scanner input = new Scanner(System.in);
```

height | **65.5**
age | **20**
name |
input |

String: "Vandy"

Scanner: System.in

Passing Parameters

- When a **primitive** data type is passed as a parameter
  - the **value** is copied
  - "pass by value"

- When an **object** is passed as a parameter
  - the **reference** is copied
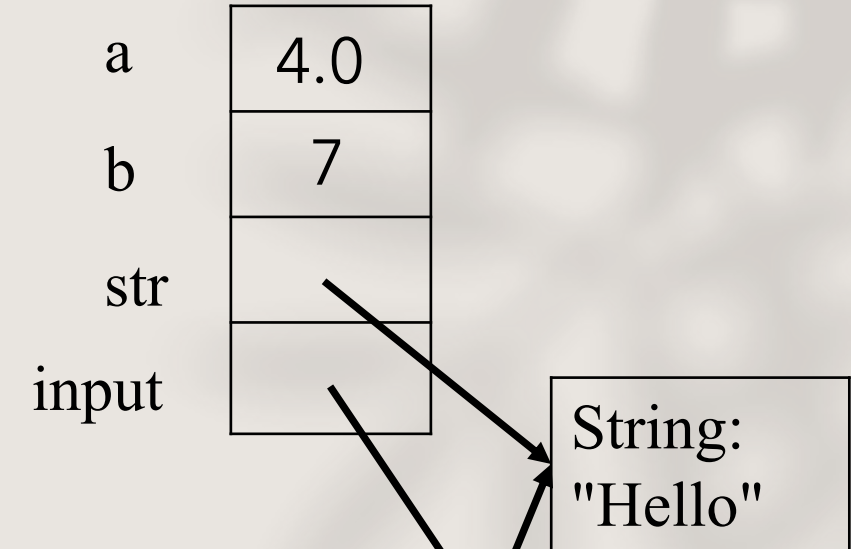 - "pass by reference"

main

a	4.0
b	7
str	
input	

```java
import java.util. Scanner;

public class Mystery {

    public static void main (String[] args) {
        double a = 4.0;
        int b = 7;
        String str = "Hello";
        Scanner input = new Scanner(System.in);
        mystery(a, b, str, input);
    }


    public static void mystery (double w, int x, String y, Scanner z) {
        //......
    }
}
```
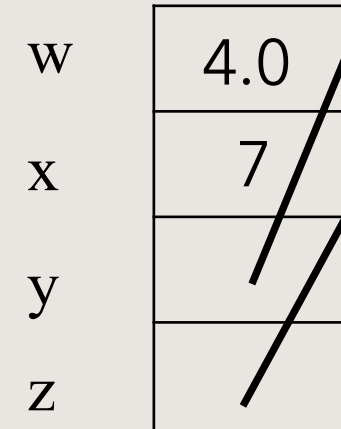
String:
"Hello"

mystery

w	4.0
x	7
y	
z	

Scanner:
System.in

Scope

- The scope of a variable or a constant is the portion of the code that it is visible.

- A variable or constant is visible **from** the time it is **declared until** the **closing curly brace** (}).

  - A variable or constant declared in a method is only visible for that execution of the method.

  - The scope of **parameters** is the method.

Scope

```java
import java.util. Scanner;

public class Mystery {

    public static void main (String[] args) {
        double a = 4.0;    // The scope of a starts here
        int b = 7;         // The scope of b starts here
        String str = "Hello";     // The scope of str starts here
        Scanner input = new Scanner(System.in);  // The scope of input starts here
        mystery(a, b, str, input);
    } // The scope of a, b, str, and input ends here

    public static void mystery (double w, int x, String y, Scanner z) {
        //... Scope of w, x, y, z ...
    }
}
```

Q: What's the exact output of the following code?

```java
public class ParameterMystery {
    public static void main(String[] args) {
        int a = 4;
        int b = 7;
        int c = -2;

        mystery(a, b, c);     // mystery(4, 7, -2);
        mystery(c, 3, a);
        mystery(a + b, b + c, c + a);
    }
                                        c = 4, a = 7, b = -2

    public static void mystery(int c, int a, int b) {
        b -= 2;          // b -= 2
        c = a + 5;       // c = 7 + 5
        a -= b;          // a -= -4
        System.out.println(b + " + " + c + " = " + a);
    }                         // -4 + 12 = 11
}
```

Q: What's the exact output of the following code?

```java
public class ParameterMystery {
    public static void main(String[] args) {
        int a = 4;
        int b = 7;
        int c = -2;

        mystery(a, b, c);    // mystery(4, 7, -2);
        mystery(c, 3, a);    // mystery(-2, 3, 4);
        mystery(a + b, b + c, c + a);   // mystery(11, 5, 2);
    }

    public static void mystery(int c, int a, int b) {
        b -= 2;
        c = a + 5;
        a -= b;
        System.out.println(b + " + " + c + " = " + a);
    }
}
```

```
$ javac ParameterMystery.java
$ java ParameterMystery
-4 + 12 = 11
2 + 8 = 1
0 + 10 = 5
```

TopHat

```java
public class PassingParam {

    public static void main(String [] args) {
        int x = 3;
        int y = 2;
        doTheThing(y, x);    // doTheThing(2, 3);
    }


    public static void doTheThing(int x, int y) {
        // Hence, x is 2, y is 3
        x = y - 1;  // x = 3 - 1;
        y = x + 1;  // y = 2 + 1;
        System.out.println(x + " " + y);
    }
}
```

```
$ javac PassingParam.java
$ java PassingParam
2 3
```

Scanner as a Parameter

Scanner as Parameter

- You should only have **one Scanner** for console input.

- If you need to use the console Scanner in multiple methods, it should be passed as a parameter.
  - The parameter is passed by reference.

Code Example

```java
import java.util.Scanner;

public class CourseInfo {
    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        System.out.print("Enter course: ");
        String course = input.next();

        System.out.print("Enter credit hours: ");
        int creditInt = input.nextInt();

        System.out.println("[" + course + "] "
                        + creditInt + " credit hours");

    }
}
```

```java
import java.util.Scanner;

public class CourseInfoMethod {
    public static void main(String[] args) {

        Scanner input = new Scanner(System.in);

        String course = getCourse(input);

        int creditInt = getHours(input);

        System.out.println("[" + course + "] "
                            + creditInt + " credit hours");
    }

    /**
     * Reads in and returns the course name entered by the user
     * @param console input scanner
     * @return course name
     */
    public static String getCourse(Scanner console) {
        System.out.print("Enter Course: ");
        return console.next();
    }

    /**
     * Reads in and returns the number of credit hours entered by the user
     * @param scnr input scanner
     * @return credit hours
     */
    public static int getHours(Scanner scnr) {
        System.out.print("Enter credit hours: ");
        return scnr.nextInt();
    }
}
```

NOTE:
When passed as a parameter, though it's the SAME Scanner, it could be named differently in each method.

Coding Practice

preLec9
PDF document

Eggs
JAVA File

A farm sells organic brown eggs to local customers. They charge $3.25 for a dozen eggs, or 45 cents for individual eggs that are not part of a dozen. Write a class called **Eggs** that

1. prompts the user for the number of eggs in the order, and then

2. Displays the amount owed with a full explanation in the following format (NOTE: keep 2 decimal places for total):

```
$ javac Eggs.java
$ java Eggs
How many eggs would you like to buy? 27
You ordered 27 eggs. That is 2 dozen at $3.25 per dozen
and 3 loose eggs at 45 cents each for a total of $7.85.
```

```java
import java.util.Scanner;

public class Eggs {

    public static final double DOZEN_PRICE = 3.25;
    public static final double LOOSE_PRICE = 0.45;

    public static void main(String[] args) {
        Scanner input = new Scanner(System.in);
        int numEggs = getNumEggs(input);
        calcPrice(numEggs);
    }

    public static int getNumEggs(Scanner input) {
        System.out.print("How many eggs would you like to buy? ");
        return input.nextInt();
    }

    public static void calcPrice(int numEggs) {
        int numDozenEggs = numEggs / 12;
        int numLooseEggs = numEggs % 12;
        double totalPrice = numDozenEggs * DOZEN_PRICE + numLooseEggs * LOOSE_PRICE;

        System.out.printf("You ordered %d eggs. That is %d dozen at $%.2f per dozen\n",
                          numEggs, numDozenEggs, DOZEN_PRICE);
        System.out.printf("and %d loose eggs at %.0f cents each for a total of $%.2f.\n",
                          numLooseEggs, LOOSE_PRICE * 100, totalPrice);
    }
}
```

Sample Solution