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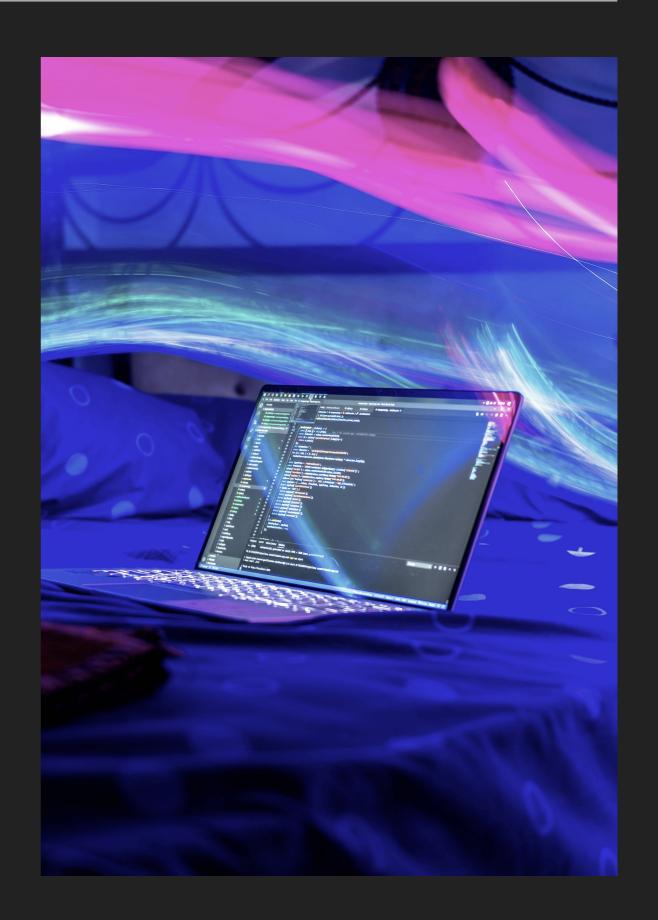
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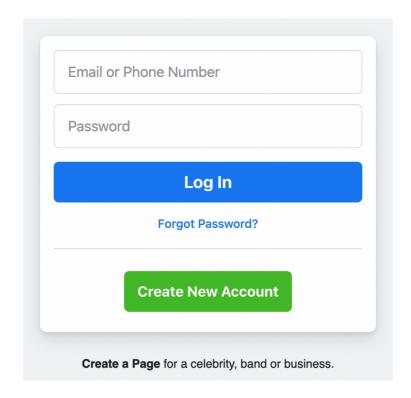
SCANNER CLASS

COMPUTER SCIENCE I

OBJECTIVES

▸ Review

▸ Scanner

SCANNER — GETTING INPUT FROM THE USER

▸ Normally, we would want to get our data from users.

▸ For example, in a login page, we may need to allow a user to **input** their email and password. We can use the Scanner class for this.

SCANNER — GETTING INPUT FROM THE USER

▸ Scanner is a Java *class*

▸ We can create a Scanner *object* to use the *methods* define in the Scanner class.

▸ We will go more into detail with classes, objects and methods as the semester goes on, but for now, just understand how to use the Scanner class.

▸ If you are curious, Java Docs for Scanner: https://docs.oracle.com/javase/8/docs/api/java/util/Scanner.html

SCANNER — HOW TO USE IT

1. In order to use the Scanner class, we need to first **import** it. To do so, at the top of your Java file, write in:

   ▸ **import java.util.Scanner;**

2. Then, to use it, we need to create a Scanner variable and assign it a Scanner object. This way, we can call on our Scanner object by using its name (Just like a variable, you decide on the name. I like to use sc, some people like kb.):

   ▸ **Scanner *sc* = *new* Scanner(System.in);**

   ✦ **NOTE:** Notice how the s in Scanner is capital. Remember! Classes ALWAYS start with a capital letter. Primitive data types are lowercase (int, double, char, etc) – What does that tell you about Strings then?

system.in tells the java compiler that system input will be provided through console(**keyboard**)

Scanner *sc* = *new* Scanner(System.in);

Declaring a Scanner class

Initializing the Scanner class with a new Scanner object (DON'T forget the **new** keyword)

The entire process is call **instantiating** a class (in layman's terms, means **creating an object**)

SCANNER — HOW TO USE THE METHODS

3. To use methods from the Scanner class we say the name of our Scanner variable, **sc,** followed by a **.** and then the **name** of the method we want to use. The following are the what we will be using for now. However, to see a full list, you can find them in the link provided on slide 6:

- **nextInt()**
  reads the next *integer* value typed

- **nextDouble()**
  reads the next *double* value typed

- **next()**
  reads the next *"word"* typed

- **nextLine()**
  reads the next *line* typed

- **next().charAt(0)**
  reads the next *character* typed

SCANNER — HOW TO USE THE METHODS

Scanner sc = *new* Scanner(System.in);

1. To read an integer from your keyboard, **declare** an integer with a variable name like you normally would:

int i

2. Then, **assign** the variable a Scanner method. For integers, we use **nextInt()**. Don't forget to include the name of your Scanner variable (sc in this case) and a period:

int i = sc.nextInt();

EXAMPLE – INTEGER

▸ Reading an **integer** using Scanner – Complete program:

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter an integer:
        System.out.println("Please enter an integer:");

        //reading in an integer from the keyboard
        int i = sc.nextInt();

        System.out.println("User wrote in " + i);

    }
}
```

Output (I wrote in the 84):

```
Please enter an integer:
84
User wrote in 84
```

EXAMPLE – DOUBLE

▸ Reading a **double** using Scanner – Complete program:

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter a double:
        System.out.println("Please enter a double:");

        //reading in a word from the keyboard
        double x = sc.nextDouble();

        System.out.println("User wrote in " + x);

    }
}
```

Output (I wrote in the 9.24):

```
Please enter an double:
9.24
User wrote in 9.24
```

EXAMPLE – ONE WORD

▸ Reading a single **word** using Scanner – Complete program:

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter a word:
        System.out.println("Please enter a word:");

        //reading in a word from the keyboard
        String word = sc.next();

        System.out.println("User wrote in " + word);

    }
}
```

Output (I wrote in the Hello Goodbye hi there):

```
Please enter a word:
Hello Goodbye hi there
User wrote in Hello
```

*Notice how only the **Hello** was assigned to the variable. Next slide shows how to read in an entire line.

EXAMPLE – LINE OF TEXT

▸ Reading a **line of text** using Scanner – Complete program:

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter a word:
        System.out.println("Please enter a line of text or word:");

        //reading in a word from the keyboard
        String text = sc.nextLine();

        System.out.println("User wrote in " + text);

    }
}
```

Output (I wrote in the Hello Goodbye hi there):

```
Please enter a line of text or word:
Hello Goodbye hi there
User wrote in Hello Goodbye hi there
```

EXAMPLE – CHARACTER

▶ Reading a **character** using Scanner – Complete program
(**NOTE:** there is no nextChar for Scanner. We'll learn more about charAt(0) when we learn about arrays):

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter a character:
        System.out.println("Please enter a character:");

        //reading in a word from the keyboard
        char c = sc.next().charAt(0);

        System.out.println("User wrote in " + c);

    }
}
```

Output (I wrote in Hello):

```
Please enter a character:
Hello
User wrote in H
```

*Notice how only the **H** was assigned to the variable.

EXAMPLE – USING THE SAME SCANNER IN THE SAME PROGRAM

▸ You can use the same Scanner object as much as needed!

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //prompt the user to enter whatever values needed:
        System.out.println("Please enter an integer, double, and word:");

        //reading in various values from the keyboard:
        int i = sc.nextInt();
        double x = sc.nextDouble();
        String word = sc.next();

        System.out.println("User wrote in: " + i + ", " + x + " and " + word);

        //use sc again!
        System.out.println("\nEnter another integer:");
        int num = sc.nextInt();
        System.out.println("User wrote in " + num);

    }
}
```

Output:

```
Please enter an integer, double, and word:
8 5.24 hello
User wrote in: 8, 5.24 and hello

Enter another integer:
2
User wrote in 2
```

EXAMPLE PROGRAM 1

▸ Write a program that reads in 5 integers and displays the sum and average.

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▸ Write a program that reads in 5 integers and displays the sum and average.

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //1. Instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //2. Prompt the user to enter 5 integers:
        System.out.println("Please enter 5 integers:");

        //3. Reading in the integers:
        int i1 = sc.nextInt();
        int i2 = sc.nextInt();
        int i3 = sc.nextInt();
        int i4 = sc.nextInt();
        int i5 = sc.nextInt();

        //4. get the sum and average
        int sum = i1 + i2 + i3 + i4 + i5;
        double average = sum / 5.0;

        //5. display the sum and average
        System.out.println("Sum = " + sum);
        System.out.println("Average = " + average);

    }
}
```

Output:

```
Please enter 5 integers:
2 5 19 3 5
Sum = 34
Average = 6.8
```

EXERCISE 1

2.9   (*Physics: acceleration*) Average acceleration is defined as the change of velocity divided by the time taken to make the change, as shown in the following formula:

$$a = \frac{v_1 - v_0}{t}$$

Write a program that prompts the user to enter the starting velocity v_0 in meters/second, the ending velocity v_1 in meters/second, and the time span t in seconds, and displays the average acceleration. Here is a sample run:

```
Enter v0, v1, and t: 5.5 50.9 4.5  ↵Enter
The average acceleration is 10.0889
```

EXERCISE 1 – SOLUTION

```java
//import the Scanner class:
import java.util.Scanner;

public class Main {

    public static void main(String[] args) {

        //1. Instantiate a Scanner class
        Scanner sc = new Scanner(System.in);

        //2. Prompt the user to enter v0, v1 and t:
        System.out.println("Enter v0, v1, and t:");

        //3. Read the values in using Scanner:
        double v0 = sc.nextDouble();
        double v1 = sc.nextDouble();
        double t = sc.nextDouble();

        //4. Solve the equation
        double a = (v1 – v0) / t;

        //5. Display the average acceleration: (either print is fine)
        //   System.out.println("The average acceleration is " + a);
        System.out.printf("%s%.4f", "The average acceleration is ", a);

    }
}
```

Output:

```
Enter v0, v1, and t:
5.5 50.9 4.5
The average acceleration is 10.0889
```