Optional Topic: User Input with Scanner

Adapted from:
1) Building Java Programs: A Back to Basics Approach by Stuart Reges and Marty Stepp

https://longbaonguyen.github.io
Input and System.in

• **interactive program**: Reads input from the console.
  – While the program runs, it asks the user to type input.
  – The input typed by the user is stored in variables in the code.
  – Can be tricky; users are unpredictable and misbehave.
  – But interactive programs have more interesting behavior.

• **Scanner**: An object that can read input from many sources.
  – Communicates with `System.in` (the opposite of `System.out`)
  – Can also read from files, web sites, databases, ...
• The **Scanner** class is found in the `java.util` package.

  ```java
  import java.util.*;  // so you can use Scanner
  ```

• **Constructing a Scanner object to read console input:**

  ```java
  Scanner name = new Scanner(System.in);
  ```

  – Example:

  ```java
  Scanner console = new Scanner(System.in);
  ```
### Scanner methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>nextInt()</code></td>
<td>reads an <code>int</code> from the user and returns it</td>
</tr>
<tr>
<td><code>nextDouble()</code></td>
<td>reads a <code>double</code> from the user</td>
</tr>
<tr>
<td><code>next()</code></td>
<td>reads a one-word <code>String</code> from the user</td>
</tr>
</tbody>
</table>
| `nextLine()`   | reads a one-
|                | `line` `String` from the user                                |

- Each method waits until the user presses Enter.
- The value typed by the user is returned.

```java
System.out.print("How old are you? "); // prompt
int age = console.nextInt();
System.out.println("You typed " + age);
```

**prompt**: A message telling the user what input to type.
import java.util.*;  // so that I can use Scanner

public class UserInputExample {
    public static void main(String[] args) {
        Scanner console = new Scanner(System.in);

        System.out.print("How old are you? ");  // age
        int age = console.nextInt();  // years

        int years = 65 - age;
        System.out.println(years + " years to retirement!");
    }
}

• Console (user input underlined):

How old are you? 29
36 years until retirement!
Input tokens

• **token**: A unit of user input, as read by the `Scanner`.
  – Tokens are separated by *whitespace* (spaces, tabs, new lines).
  – How many tokens appear on the following line of input?
    23  John Smith  42.0  "Hello world"  $2.50  "  19"

• When a token is not the type you ask for, it crashes.

```java
System.out.print("What is your age? ");
int age = console.nextInt();
```

Output:

What is your age? **Timmy**
java.util.InputMismatchException
  at java.util.Scanner.next(Unknown Source)
  at java.util.Scanner.nextInt(Unknown Source)
  ...
```
import java.util.*; // so that I can use Scanner

public class ScannerMultiply {
    public static void main(String[] args) {
        Scanner console = new Scanner(System.in);
        System.out.print("Please type two numbers: ");
        int num1 = console.nextInt();
        int num2 = console.nextInt();
        int product = num1 * num2;
        System.out.println("The product is " + product);
    }
}

• Valid Outputs (user input underlined):

Please type two numbers: 8 6
The product is 48

// 2 tokens separated by space

Please type two numbers: 8 6
The product is 48

// 2 tokens separated by new line
Strings as user input

- Scanner's `next` method reads a word of input as a String.

```java
Scanner console = new Scanner(System.in);
System.out.print("What is your name? ");
String name = console.next();
System.out.println("Your name is " + name);
```

Output:
What is your name? **Chelsey**
Your name is Chelsey.

- The `nextLine` method reads a line of input as a String.

```java
System.out.print("What is your address? ");
String address = console.nextLine();
System.out.println("Your address is " + address);
```

Output:
What is your address? **123 Fake st.**
Your address is 123 Fake st.