Optional Topic: User Input with Scanner

Adapted from:

1) Building Java Programs: A Back to Basics Approach

by Stuart Reges and Marty Stepp

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, ...

`Scanner` syntax

- The `Scanner` class is found in the `java.util` package.

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

- Constructing a `Scanner` object to read console input:

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

  - Example:

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

`Scanner` methods

Method	Description
`nextInt()`	reads an `int` from the user and returns it
`nextDouble()`	reads a `double` from the user
`next()`	reads a one-word `String` from the user
`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.

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

prompt

- **prompt**: A message telling the user what input to type.

Scanner example

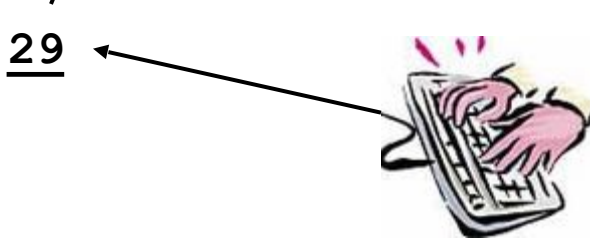
```
import java.util.*;   // so that I can use Scanner
public class UserInputExample {
    public static void main(String[] args) {
        Scanner console = new Scanner(System.in);

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

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

age 29

years 36

- Console (user input underlined):

```
How old are you?
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.

```
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)
        ...
```

Scanner example 2

```
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`.

```
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`.

```
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.
```

References

1) CPJava Website
2) CPJava Google Classroom
3) CPJava repl.it Classroom
4) Runestone CSAwesome BUSHSCHOOL_CPJAVA Course
5) Building Java Programs: A Back to Basics Approach by Stuart Reges and Marty Stepp