Topic 11
Scanner objects, conditional execution

" There are only two kinds of languages:
the ones people complain about
and the ones nobody uses."

— Bjarne Stroustroup, creator of C++

Slides from Mike Scott.
Used with permission.
https://www.cs.utexas.edu/~scottm/cs312/

Based on slides by Marty Stepp and Stuart Reges
from http://www.buildingjavaprograms.com/

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`
  - Can also read from files (Ch. 6), web sites, databases, ...

`Scanner` syntax

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

```
import java.util.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
`nextLine()`	reads a one-*line* `String` from the user
`next()`	reads a one-word `String` from the user Avoid when Scanner connected to System.in

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

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

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

Scanner example

```
import java.util.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? 29
36 years until retirement!
```

`Scanner` example 2

- The `Scanner` can read multiple values from one line.

```
import java.util.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);
    }
}
```

- Output (user input underlined):

```
Please type two numbers: 8 6
The product is 48
```

Clicker 1 - 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"
```

A. 2 B. 6 C. 7

D. 8 E. 9

input tokens

- When a token is the wrong type, the program crashes. (runtime error)

```
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)
        ...
```

Exercise

- Prompt the user to enter two people's heights in inches.
  - Each person should be classified as one of the following:
    - short (under 5'3")
    - medium (5'3" to 5'11")
    - tall (6' or over)
  - The program should end by printing which person is taller.

```
Height in feet and inches: 5 7
You are medium.

Height in feet and inches: 6 1
You are tall.

Person #2 is taller than person #1.
```