Scanners

zyBook 1.5

Scanner

What does a `Scanner` do?

- Reads input from various sources (console, files, etc.) and turns the input into data that can be used by your program.

What is the benefit of a `Scanner`?

- Interactive programs!

Interactive Programs

- User output: **`System.out`**
  - `print` and `println` methods print text to the console/terminal

- User input: **`System.in`**
  - Cannot be used directly
  - Use the `Scanner` class to understand the user's input

Importing class – Java Class Libraries

- To use Scanner, need to **import** the class from the **Java Class Library**
  - Java Class Library: a set of Java classes available for you to use
    - Classes are organized into groups, which are called **packages**

- **Import declaration** – goes at the top of your program file
  - `import <package name>.*;`
  - `import <package name>.<class name>;`

Importing class – Scanner

- Requires import
  - `import java.util.*;` OR
  - `import java.util.Scanner;`

- Construction of `Scanner` for console
  - `Scanner <name> = new Scanner(System.in);`
    - Common names: input, console, scnr, …

Tokens

A **single** element of input (e.g., **one word**, **one number**)

- The `Scanner` object reads in user input as tokens
- **Tokens** are separated by **whitespace**, e.g.,
  - Space
  - Tab
  - Newline character '\n'

Scanner Methods

Methods that can be run on Scanner objects.

Method	Description
`nextInt()`	Reads and returns user input as an **int**
`nextDouble()`	Reads and returns user input as a **double**
`next()`	Reads and returns user input as a **String**
`nextLine()`	Reads and returns and **entire line** of user input as a **String**

- Methods wait for the user to type the input and press <Enter>
- Value typed by the user is returned to your program
- You want to prompt the user for input

```java
import java.util.Scanner;

/**
 * Class gets input from users on the number of credit hours they are currently taking.
 *
 * @author Gina Bai
 */
public class CreditHour {

    public static void main(String[] args) {
        // Construct the scanner, which is called input, for the input from console
        Scanner input = new Scanner(System.in);

        // Prompt user for credit hours
        System.out.println("How many credit hours are you currently taking?");

        // Read in the number of credit hours as an integer, and stored it to int creditHour
        int creditHour = input.nextInt();

        // Print message
        System.out.println("You are currently taking " + creditHour + " credit hours.");
    }
}
```

Always do
Step 1: prompt for input
Step 2: read in the input

Error Handling

- `InputMismatchException`
  - If the next token **does not match** the pattern for **the expected type**, or is out of range for the expected type

- `NoSuchElementException`
  - If the input is exhausted