

# File Input/Output

Most data is stored in files, not input by the user every time. In this activity, you'll learn the basics of reading and writing plain text files.

## Content Learning Objectives

*After completing this activity, students should be able to:*

- Parse user input and string objects using a Scanner.
- Read a text file line by line, and extract data from it.
- Create a new text file, and output several lines to it.

## Process Skill Goals

*During the activity, students should make progress toward:*

- Reading Java API documentation to explore a class. (Information Processing)



# Model 1 Review of Scanner

The `java.util.Scanner` class is useful for parsing text from various sources:

```
// Example 1
Scanner in = new Scanner(System.in);
while (in.hasNextLine()) {
    String line = in.nextLine();
    System.out.println(line);
}

// Example 2
String input = "1 fish 2 fish red fish blue fish";
Scanner s = new Scanner(input);
System.out.println(s.nextInt());
System.out.println(s.next());
System.out.println(s.nextInt());
System.out.println(s.next());
```

## Questions (10 min)

**Start time:**

1. For each example above, describe what the Scanner is scanning.
  - a) `new Scanner(System.in)`
  - b) `new Scanner(input)`
2. Based on the documentation for Scanner, explain the following:
  - a) `in.hasNextLine()`
  - b) `in.nextLine()`
  - c) `s.nextInt()`
  - d) `s.next()`

3. Run the example program *from the command line*. Type three lines of input, and then press EOF (Ctrl+D on Linux or macOS, Ctrl+Z on Windows). What is the output of the program?

4. EOF stands for “end of file”. Explain why pressing the EOF keyboard shortcut causes the program to move on to Example 2.

5. Rewrite the code for Example 2 to output each word of the string using a `while` loop. Run your code to make sure it works.

## Model 2 Reading from a File

The Social Security Administration maintains a data set of popular baby names. Download the “National data” from <https://www.ssa.gov/oact/babynames/limits.html>, and unzip *name.zip* to the location of your Java code.

Create a new program named *Model2.java*, and add the following lines to its main method:

```
File file = new File("names/yob2000.txt");
Scanner in = new Scanner(file);
System.out.println(in.nextLine());
System.out.println(in.nextLine());
System.out.println(in.nextLine());
in.close();
```

Note the [java.io.File](#) class represents a file or directory location.

### Questions (25 min)

**Start time:**

6. Explain the compiler error when attempting to construct the Scanner.
7. Explain two ways you can modify the code to handle this error. (*Hint*: Eclipse offers them as “quick fixes”.) Which way is better?
8. Modify the the code so that it compiles. Then run the program. What is the output?
9. Explain the format of the program output. For each line, what do the three parts represent? See the *NationalReadMe.pdf* file (included in the download) to check your answer.

10. Open the *names/job2000.txt* file using a text editor.

- a) How many lines does file have?
- b) Describe how the lines are sorted and why.

11. Modify the program so that it outputs the top 5 female and top 5 male names. Your program should work for any of the *jobYYYY.txt* files. Paste the contents of your `main` method below:

## Model 3 Writing to a File

The `java.io.PrintWriter` class is useful for writing text files:

```
File file = new File("names/top2000.txt");
PrintWriter out = new PrintWriter(file);
// output text to the file...
out.close();
```

### Questions (10 min)

**Start time:**

12. Examine the documentation for `PrintWriter`. What methods can be used to output a string to the file?
  
  
  
  
  
  
  
  
  
  
13. Why is it important to close files when you are finished with them?
  
  
  
  
  
  
  
  
  
  
14. Modify your code from Question #11 to output the results to a file instead of to the screen. Summarize your changes below:
  
  
  
  
  
  
  
  
  
  
15. In general, is it easier to write code that reads a file or writes a file? Explain your reasoning.