LEC 03

CSE 122

File I/O – Hybrid processing and Printing

BEFORE WE START

Talk to your neighbors:

Any weekend plans?

Music: [122 24sp Lecture Tunes 🌼]

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Questions during Class?

Raise hand or send here

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Lecture Outline

- **Announcements/Reminders**
- Refresh Last Time
- Scanners with Strings
  - Hybrid Approach & Files
- Using Printstream for File Output
- Example

Announcements

- Programming Assignment 0 (P0) out later today!
  - Due next Friday, July 5th
  - Focused on File I/O
- Creative Project 0 (C0) was due last night. How'd it go?
  - Expect feedback back about a week after the assignment was due
  - Joined class late? Submit C0 with C1

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(Last Time) Scanner/File for input

Scanner is defined in the `java.util` package

```
import java.util.*;
```

File is defined in the `java.io` package

```
import java.io`.*;
```

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

File newFile = new File("example.txt");
Scanner fileScan = new Scanner(newFile);
```

Scanner Methods	Description
`nextInt()`	Reads the next token from the user as an `int` and returns it
`nextDouble()`	Reads the next token from the user as a `double` and returns it
`next()`	Reads the next token from the user as a `String` and returns it
`nextLine()`	Reads an *entire line* from the user as a `String` and returns it
`hasNextInt()`	Returns `true` if the next token can be read as an `int`, `false` otherwise
`hasNextDouble()`	Returns `true` if the next token can be read as a `double`, `false` otherwise
`hasNext()`	Returns `true` if there is another token of input to be read in, `false` otherwise
`hasNextLine()`	Returns `true` if there is another line of input to be read in, `false` otherwise

(PCM) Typical Line-Processing Pattern

```
while (scan.hasNextLine()) {
    String nextLine = scan.nextLine();
    // do something with nextLine
}
```

(PCM) Typical Token-Processing Pattern

```
while (scan.hasNext__()) {
    __ nextToken = scan.next__();
    // do something with nextToken
}
```

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(PCM) Scanners with Strings

```
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext__()) {
    __ nextToken = stringScan.next__();
    // do something with nextToken
}
```

(PCM) Scanners with Strings

```
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext()) {
    String nextToken = stringScan.next();
    System.out.println(nextToken);
}
```

(PCM) Scanners with Strings

```java
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext()) {
    String nextToken = stringScan.next();
    System.out.println(nextToken);
}
```

A

(PCM) Scanners with Strings

```
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext()) {
    String nextToken = stringScan.next();
    System.out.println(nextToken);
}
```

quick,

(PCM) Scanners with Strings

```
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext()) {
    String nextToken = stringScan.next();
    System.out.println(nextToken);
}
```

brown

(PCM) Scanners with Strings

```
String str = "A quick,  brown fox";

Scanner stringScan = new Scanner(str);
while (stringScan.hasNext()) {
    String nextToken = stringScan.next();
    System.out.println(nextToken);
}
```

fox

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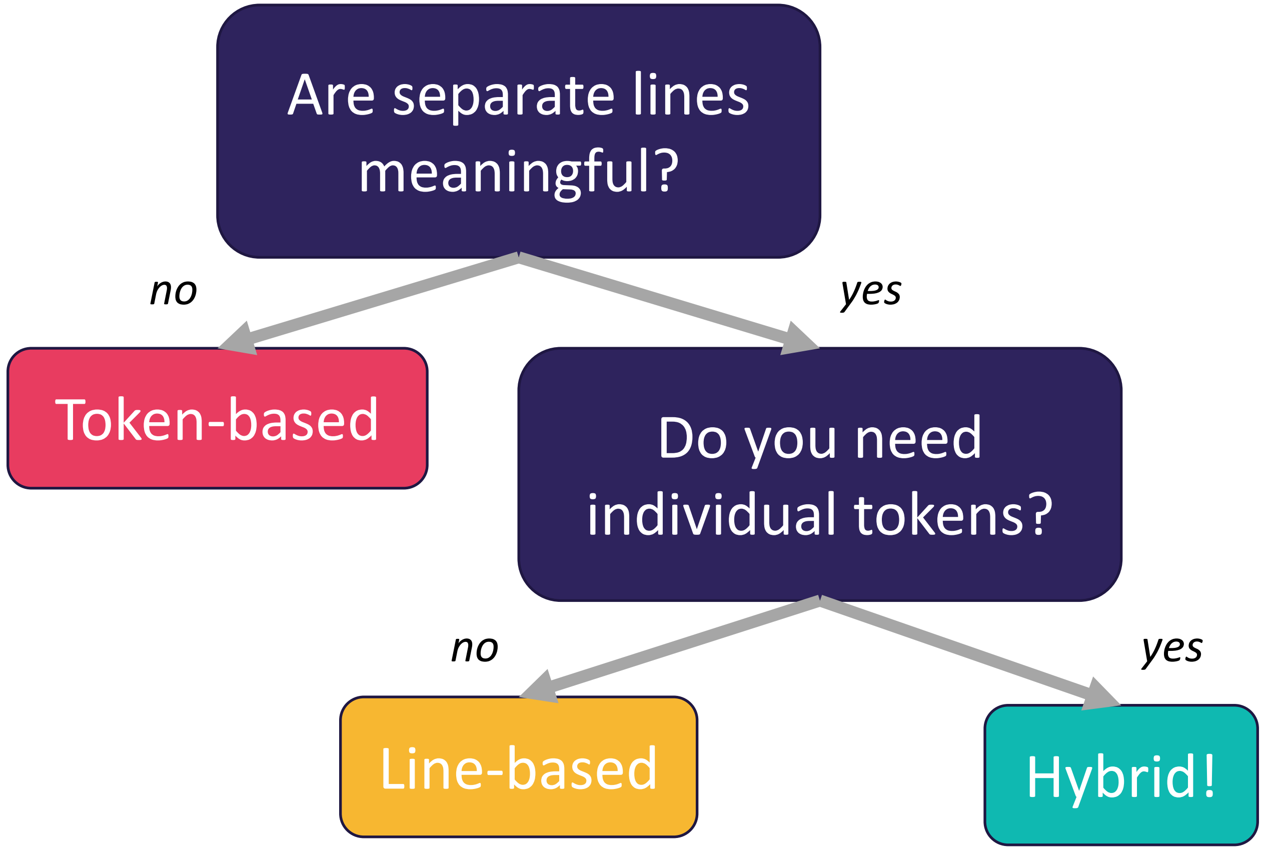
(PCM) Typical Hybrid Pattern

```
File newFile = new File("in.txt");
Scanner fileScan = new Scanner(newFile);
while (fileScan.hasNextLine()) {
    String line = fileScan.nextLine();

    Scanner lineScan = new Scanner(line);
    while (lineScan.hasNext__()) {
        __ nextToken = lineScan.next__();
        // do something with nextToken
    }
}
```

(PCM) Token vs. Line vs. Hybrid?

- We now know 3 different ways to use Files!
  - Although this gives us flexibility – it can sometimes get confusing
- Feel free to use the following diagram to help!


Are separate lines meaningful?
no
yes
Token-based
Do you need individual tokens?
no
yes
Line-based
Hybrid!

(PCM) Scanning Numeric Data

On Wednesday, we primarily used `String`-based `Scanner` methods to read input from a file. Let's work with some numeric data now!

We're going to make more use of

- `hasNextInt()`
- `hasNextDouble()`
- `nextInt()`
- `nextDouble()`
- Assumptions about our file's format!

Practice : Think

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What would be the result of executing the following code?

```
Scanner fileScan = new Scanner(new File("data.txt"));
while (fileScan.hasNextLine()) {
    String line = fileScan.nextLine();
    Scanner lineScan = new Scanner(line);
    double min = lineScan.nextDouble();
    double max = min;
    while (lineScan.hasNextDouble()) {
        double nextNum = lineScan.nextDouble();
        min = Math.min(min, nextNum);
        max = Math.max(max, nextNum);
    }
    System.out.println("Max: " + max + ", Min: " + min);
}
```

data.txt

```
2.3 9.2
   17        0.73
  -1.5000
```

A) Max: 9.2, Min: 2.3
Max: 17.0, Min: 0.73
Max: -1.5, Min: -1.5

B) Max: 9.2, Min: -1.5

C) Max: 9.2, Min: 2.3
Max: 17, Min: 0.73
Max: 0.0, Min: -1.5

D) Error

Practice : Pair

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What would be the result of executing the following code?

```java
Scanner fileScan = new Scanner(new File("data.txt"));
while (fileScan.hasNextLine()) {
    String line = fileScan.nextLine();
    Scanner lineScan = new Scanner(line);
    double min = lineScan.nextDouble();
    double max = min;
    while (lineScan.hasNextDouble()) {
        double nextNum = lineScan.nextDouble();
        min = Math.min(min, nextNum);
        max = Math.max(max, nextNum);
    }
    System.out.println("Max: " + max + ", Min: " + min);
}
```

data.txt

```
2.3 9.2
   17        0.73
  -1.5000
```

A) Max: 9.2, Min: 2.3
Max: 17.0, Min: 0.73
Max: -1.5, Min: -1.5

B) Max: 9.2, Min: -1.5

C) Max: 9.2, Min: 2.3
Max: 17, Min: 0.73
Max: 0.0, Min: -1.5

D) Error

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(PCM) PrintStreams for output

`PrintStream` is defined in the `java.io` package

```
import java.io.*;
```

```
File outputFile = new File("out.txt");
PrintStream output = new PrintStream(outputFile);
```

PrintStream Methods	Description
`print(…)`	Prints the given value to the set output location.
`println(…)`	Prints the given value to the set output location, and then terminates the line.

```
System.out.print("Hello, world! ");
System.out.println("#1 Bee Movie fan!");
```

```
output.print("Hello, world! ");
output.println("#1 Bee Movie fan!");
```

```
Hello, world! #1 Bee Movie fan!
```

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Movie Ratings

In this program, we'll be examining and altering data from a file of IMDB ratings for popular U.S. movies. This will happen through 3 major user-entered commands:

(F)ind movie, **(A)dd** a rating, and **(S)ave**.

small.tsv

```
5
Title	Average	Total
Bee_Movie	6.1	176805
Barbie	6.9	455488
Oppenheimer	8.4	588723
Poor_Things	8.5	20542
Spider-Man:_Across_the_Spider-Verse	8.6	329200
```

Movie Ratings

```
Welcome to the CSE 122 Movie Rating Program!
Loaded 5 movies from small.tsv!

Menu: (F)ind movie, (A)dd rating, (S)ave, (Q)uit
Enter your choice: F
What's the name of the movie? Bee Movie
Movie Bee_Movie found!
    Average Rating: 6.1
    Total Ratings: 176805

Menu: (F)ind movie, (A)dd rating, (S)ave, (Q)uit
Enter your choice: A
What movie would you like to add your rating to? Bee Movie
And what rating would you like to give? 100000

Menu: (F)ind movie, (A)dd rating, (S)ave, (Q)uit
Enter your choice: f
What's the name of the movie? Bee_Movie
Movie Bee_Movie found!
    Average Rating: 6.7
    Total Ratings: 176806

Menu: (F)ind movie, (A)dd rating, (S)ave, (Q)uit
Enter your choice: S
What's the name of the file you'd like to save to? out.txt

Menu: (F)ind movie, (A)dd rating, (S)ave, (Q)uit
Enter your choice: q
Thank you for using this program! Bye!
```

small.tsv

```
5
Title   Average Total
Bee_Movie   6.1 176805
Barbie  6.9 455488
Oppenheimer 8.4  588723
Poor_Things 8.5  20542
Spider-Man:_Across_the_Spider-Verse 8.6  329200
```

```
[Bee_Movie, Barbie, Oppenheimer, Poor_Things, Spider-Man…]
[6.1,       6.9,    8.4,         8.5,         8.6]
[176805,    455488, 588723,      20542,       329200]
```

Movie Ratings: Development Strategy

1. Fill in the main method with a loop that calls a method to read the data in from the .tsv file and allows the user to select between the different options (find, add, save, quit)
2. Implement a method to load the movie rating data from the file and populate the appropriate arrays
3. Implement a method that allows users to find the rating for a movie
4. Implement a method that allows users to add a rating for a movie
5. Implement a method that allows users to save the movie ratings information to a file