LEC 03

CSE 122

File I/O – Hybrid processing and Printing

Questions during Class?

Raise hand or send here

sli.do #cse122

BEFORE WE START

Talk to your neighbors:

What's the last TV show you watched? What are you planning to watch next?

Music: 122 25sp Lecture Tunes

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TAs:

Andrew	Diya	Logan	Steven
Anya	Elizabeth	Mahima	Yang
Brittan	Ivory	Medha	
Carson	Jack	Minh	
Christopher	Jacob	Nicole	
Colin	Ken	Samuel	
Dalton	kyle	Shivani	
Daniel	Leo	Sreshta	

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 Thursday, April 17th!
  - Focused on File I/O
- Creative Project 0 (C0) was due last night. How'd it go?
  - Expect grades back about a week after the assignment was due
  - Joined class late? **Use Resubmission Cycle 0 to submit it!**

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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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- **Scanners with Strings**
  - Hybrid Approach & Files
- Using Printstream for File Output
- Example

(PCM) Scanners with Strings (not files!)

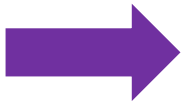
```
String str = "A quick,  brown fox";

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

(PCM) Scanners with Strings (not files!)

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

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

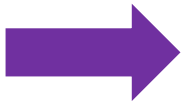
(PCM) Scanners with Strings (not files!)

```
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 (not files!)

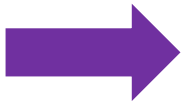
```
String str = "A quick,  brown fox";

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



A

(PCM) Scanners with Strings (not files!)

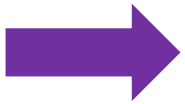
```
String str = "A quick,  brown fox";

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



quick,

(PCM) Scanners with Strings (not files!)

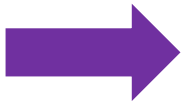
```
String str = "A quick,  brown fox";

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



brown

(PCM) Scanners with Strings (not files!)

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

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



fox

Lecture Outline

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  - **Hybrid Approach & Files**
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- Example

(PCM) Typical Hybrid Pattern

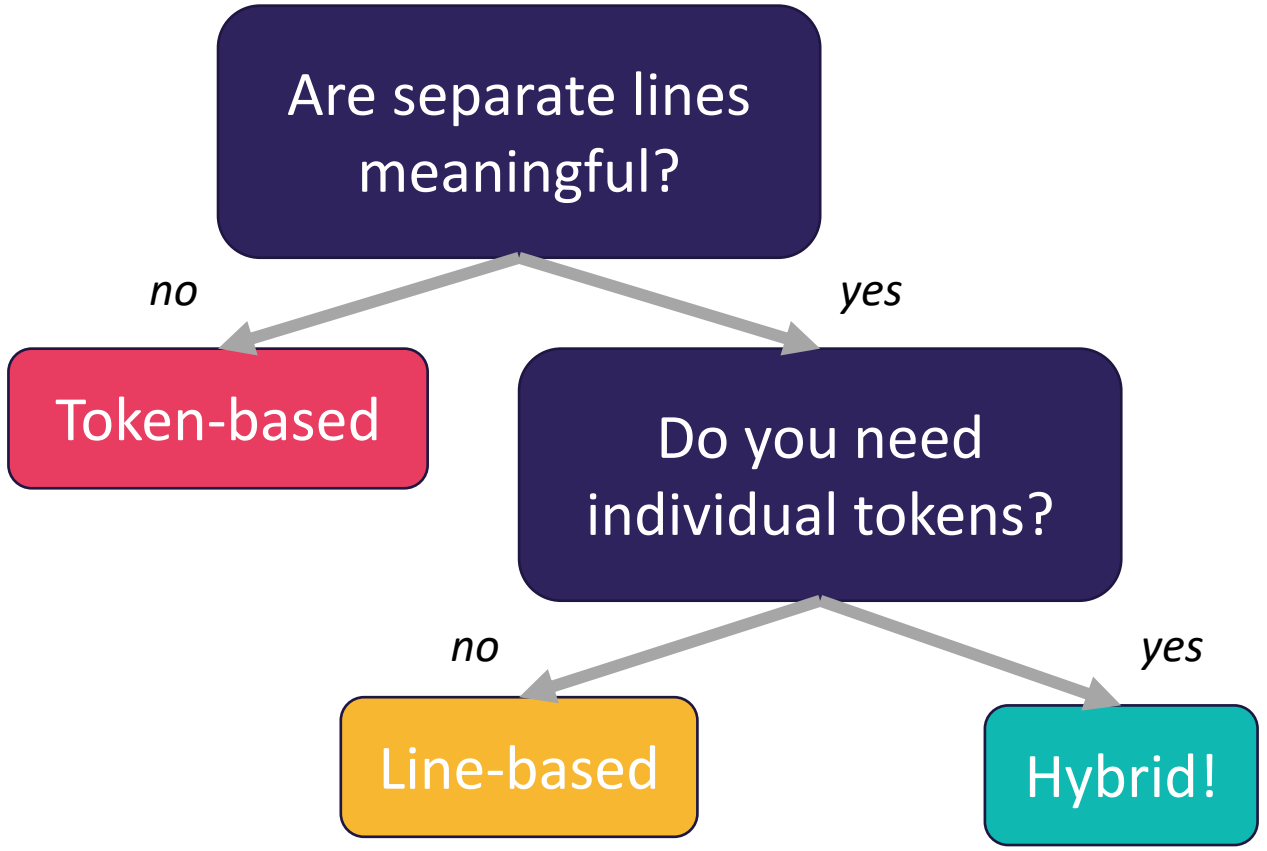
```
File newFile = new File("in.txt");
Scanner fileScan = new Scanner(newFile);
while (fileScan.hasNextLine()) {
    String line = fileScan.nextLine();

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

Line-by-line and **then** token-by-token to do something

(PCM) Token vs. Line vs. Hybrid?

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



(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!

No element next or not the correct type?
Expect a `NoSuchElementException` or an `InputMismatchException`

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?

```
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) We did this for you!
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