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

Slido input & discuss with neighbors:

What's the last show or movie you watched?

Music: 122 26Wi Lecture Tunes ⛄

Instructor: Adrian Salguero

TAs:
Ava
Blake R
Blake P
Cady
Caleb
Cole
Colin
Connor
Dalton
Dani
David
Diya
Hanna
Ivy
Mahima
Medha
Neal
Neha
Nicolae
Nicole
Rio
Rohan
Saachi
Shreya
Shreyank
Sthiti
Sushma
Suyash
TJ
Wesley
Yang

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, January 22nd!
  - 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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(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

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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
    }
}
```

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

(PCM) Typical Hybrid Pattern

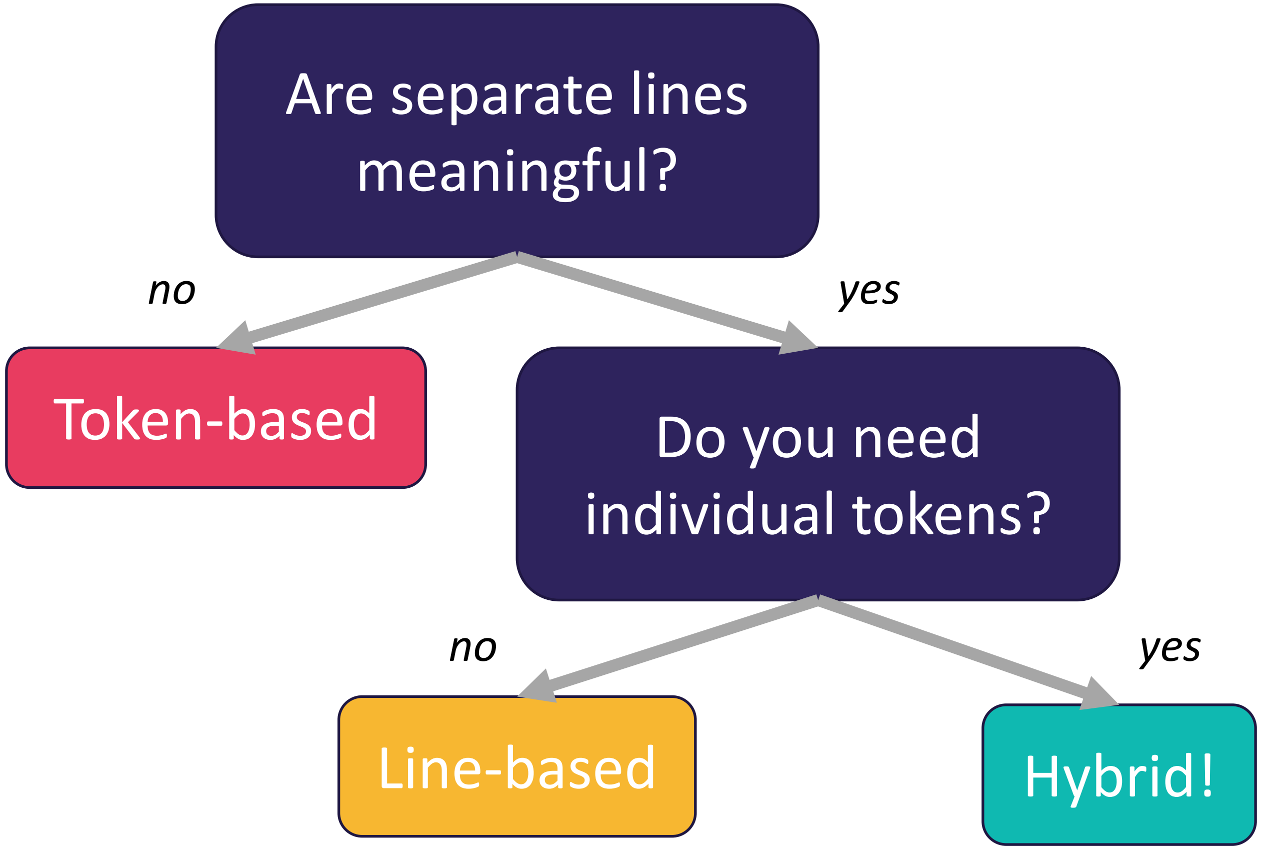
```
File newFile = new File("in.txt");
Scanner fileScan = new Scanner(newFile);
while (fileScan.hasNextLine()) {
    String line = fileScan.nextLine();

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

Let’s look at the example from last time…

(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!


Are separate lines meaningful?

no

Token-based

yes

Do you need individual tokens?

no

Line-based

yes

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!

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?

```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
Pride_&_Prejudice   7.8 323647
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? Pride & Prejudice
Movie Pride_&_Prejudice found!
    Average Rating: 7.8
    Total Ratings: 323647

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? Pride & Prejudice
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? Pride & Prejudice
Movie Pride_&_Prejudice found!
    Average Rating: 8.1
    Total Ratings: 323648

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
Pride_&_Prejudice  7.8 323647
Barbie  6.9 455488
Oppenheimer 8.4  588723
Poor_Things 8.5  20542
Spider-Man:_Across_the_Spider-Verse 8.6  329200
```

```
[Pride_&_..., Barbie, Oppenheimer, Poor_Things, Spider-Man…]
[7.8,         6.9,    8.4,         8.5,         8.6]
[323647,      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) I was nice and 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