LEC 02

CSE 122

File I/O – Token and line-based processing

Questions during Class?

Raise hand or send here

sli.do #cse122

BEFORE WE START

Talk to your neighbors:

Are you a cat person or dog person?

Music: 122 25sp Lecture Tunes

Instructors: Brett Wortzman and Adrian Salguero

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
- Review Java
- Scanners for User Input and Files
  - Token-based & Line-based processing
- File I/O Examples

Announcements

- The IPL is open!
  - MGH 334, Schedule is on the course website; staffed by our awesome TAs!
  - Open 12:30 to 9:30PM most days, but check the schedule…
- Creative Project 0 due Thursday, April 10th at 11:59pm
  - Make sure to complete the "Final Submission" slide and **submit**!
  - Submit as many times as you'd like—we will only grade the latest submission made before the deadline
- Just joined CSE 122? That's okay; look at Ed & course website and catch up!
  - Freaking out that C0 is due tomorrow? It's ok! Resubmission cycles allow you to submit it later.
- Go to your designated quiz sections!
- Quiz dates:

Quiz 0: April 22nd **Quiz 1**: May 13th **Quiz 2**: May 27th

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Reminders: Review Java Syntax

- Java Tutorial reviews all the relevant programming features you should familiar with (even if you don't know them in Java).
  - Printing and comments
  - Variables, types, expressions
  - Conditionals (if/else if/ else)
  - Loops (for and while)
  - Strings
  - Methods
  - Arrays & 2D arrays
- Review session recording has been posted to the website

Lecture Outline

- Announcements/Reminders
- Review Java
- **Scanner for User Input and Files**
  - **Token-based & Line-based Processing**
- File I/O Examples

(Review) Scanner for User input

Scanner is defined in the `java.util` package

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

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

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) Token vs. Line-based Scanning

```
The quick,  brown fox
 Jumped       over the
 Lazy dog.
```

Token are units of input (as defined by the Scanner) that are separated by *whitespace* (spaces, tabs, new lines)

(PCM) Token vs. Line-based Scanning

```
The quick,  brown fox
Jumped          over the
Lazy dog.
```

The

(PCM) Token vs. Line-based Scanning

```
The quick, brown fox
Jumped over the
Lazy dog.
```

quick,

(PCM) Token vs. Line-based Scanning

```
The quick, brown fox
Jumped over the
Lazy dog.
```

brown

(PCM) Token vs. Line-based Scanning

```
The quick,  brown fox
Jumped          over the
Lazy dog.
```

fox

(PCM) Token vs. Line-based Scanning

```
The quick,  brown fox
 Jumped       over the
 Lazy dog.
```

(PCM) Token vs. Line-based Scanning

```
The quick,  brown fox
Jumped          over the
Lazy dog.
```

The quick, brown fox

Practice : Think

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How many tokens are in the following line?

```
“Hello world !” my-name is Brett
```

A) Four **B)** Five **C)** Six **D)** Seven

Practice : Pair

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How many tokens are in the following line?

```
“Hello world !” my-name is Brett
```

A) Four **B)** Five **C)** Six **D)** Seven

(PCM) Scanner for File I/O

`Scanner` is defined in the `java.util` package

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

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

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

```
File file = new File("Example.txt");
Scanner fileScan = new Scanner(file);
```

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) Checked Exceptions

If you try to compile a program working with file scanners, you may encounter this error message:

```
error: unreported exception FileNotFoundException; must be
caught or declared to be thrown
```

To resolve this, you need to be `throws FileNotFoundException` at the end of the header of any method containing file Scanner creation code, or any method that calls that method!

- This is like signing a waiver and telling Java – "Hey, I hereby promise to not get mad at you when you bug out and crash my program if I give you a file that doesn't actually exist."

(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
}
```

Practice : Think

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What is the output of this Java program?

```
import java.util.*;
import java.io.*;
public class Demo {
   public static void main(String[] args) throws
                                    FileNotFoundException {
      File f = new File("Example.txt");
      Scanner fileScan = new Scanner(f);
      while (fileScan.hasNextLine()) {
         System.out.print(fileScan.nextLine() + ", ");
      }
   }
}
```

Example.txt:

```
One Two
Three
```

A) One, Two, Three,

B) One,
Two,
Three,

C) One Two,
Three,

D) One Two, Three,

E) Error / Exception

Practice : Pair

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What is the output of this Java program?

```
import java.util.*;
import java.io.*;
public class Demo {
   public static void main(String[] args) throws
                                    FileNotFoundException {
      File f = new File("Example.txt");
      Scanner fileScan = new Scanner(f);
      while (fileScan.hasNextLine()) {
         System.out.print(fileScan.nextLine() + ", ");
      }
   }
}
```

Example.txt:

```
One Two
Three
```

A) One, Two, Three,

B) One,
Two,
Three,

C) One Two,
Three,

D) One Two, Three,

E) Error / Exception

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- **File I/O Examples**

(Friday's PCM) Typical Hybrid Pattern

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