

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:


Slido Poll: Apple pie or
pumpkin pie?

Music: [122 26Wi Lecture Tunes](#) 

Instructor: Adrian Salguero

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

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, January 15th at 11:59pm PT
 - 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: January 27th

Quiz 1: February 17th

Quiz 2: March 3rd

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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

Recordings of both sessions are now available on the course website in the course calendar!

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 <code>int</code> and returns it |
| nextDouble() | Reads the next token from the user as a <code>double</code> and returns it |
| next() | Reads the next token from the user as a <code>String</code> and returns it |
| nextLine() | Reads an <i>entire line</i> from the user as a <code>String</code> and returns it |
| hasNextInt() | Returns <code>true</code> if the next token can be read as an <code>int</code> , <code>false</code> otherwise |
| hasNextDouble() | Returns <code>true</code> if the next token can be read as a <code>double</code> , <code>false</code> otherwise |
| hasNext() | Returns <code>true</code> if there is another token of input to be read in, <code>false</code> otherwise |
| hasNextLine() | Returns <code>true</code> if there is another line of input to be read in, <code>false</code> 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.

etc.

(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 Adrian

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 Adrian

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 |
|------------------------------|---|
| <code>nextInt()</code> | Reads the next token from the user as an <code>int</code> and returns it |
| <code>nextDouble()</code> | Reads the next token from the user as a <code>double</code> and returns it |
| <code>next()</code> | Reads the next token from the user as a <code>String</code> and returns it |
| <code>nextLine()</code> | Reads an <i>entire line</i> from the user as a <code>String</code> and returns it |
| <code>hasNextInt()</code> | Returns <code>true</code> if the next token can be read as an <code>int</code> , <code>false</code> otherwise |
| <code>hasNextDouble()</code> | Returns <code>true</code> if the next token can be read as a <code>double</code> , <code>false</code> otherwise |
| <code>hasNext()</code> | Returns <code>true</code> if there is another token of input to be read in, <code>false</code> otherwise |
| <code>hasNextLine()</code> | Returns <code>true</code> if there is another line of input to be read in, <code>false</code> 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!

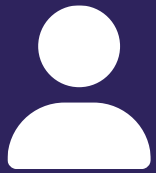
This is like signing a waiver and telling Java – "Hey, I hereby promise to not get mad at you when you bug and crash my program if I give you a file that doesn't actually exist."

(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  
    }  
}
```