Reading Files

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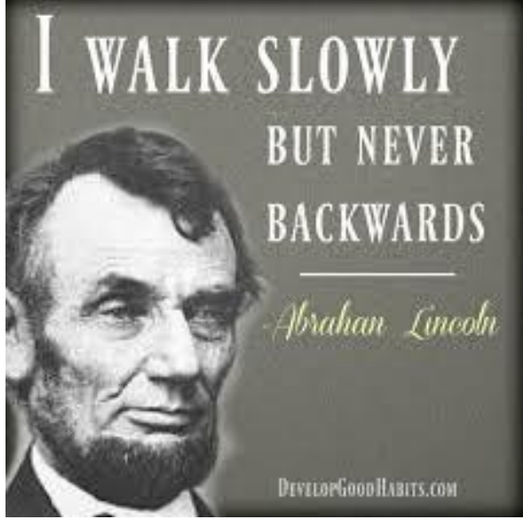
Announcements

NEXT WEEK
Exam 2

Don't procrastinate and catch up if you need!



TODO Reminders:

Readings are due **before** lecture

- Reading 14 (zybooks) – you should have already done that ☺
- Lab 09 – go to your lab to have the participation points
- Reading 15 (zyBooks)
- Lab 10 – go to your lab to have the participation points
- Reading 16 (zybooks)
- RPA 7

Keep practicing your RPAs in a spaced and mixed manner ☺

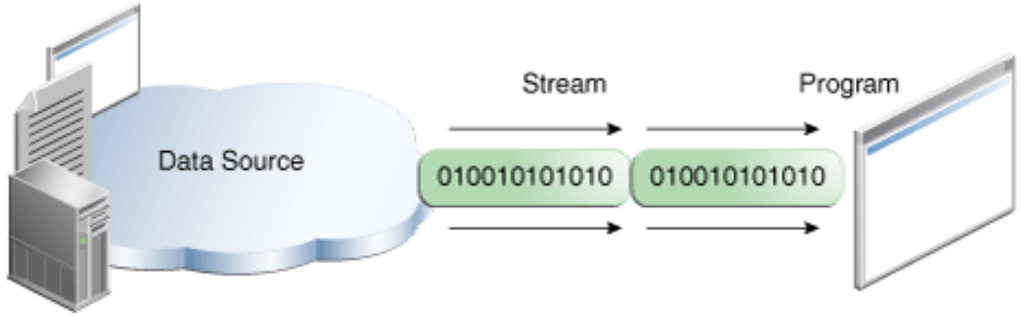
Help Desk

Day	Time : Room
Monday	12 PM - 2 PM : CSB 120
Tuesday	6 PM - 8 PM : Teams
Wednesday	3 PM - 5 PM : CSB 120
Thursday	6 PM - 8 PM : Teams
Friday	3 PM - 5 PM : CSB 120
Saturday	12 PM - 4 PM : Teams
Sunday	12 PM - 4 PM : Teams

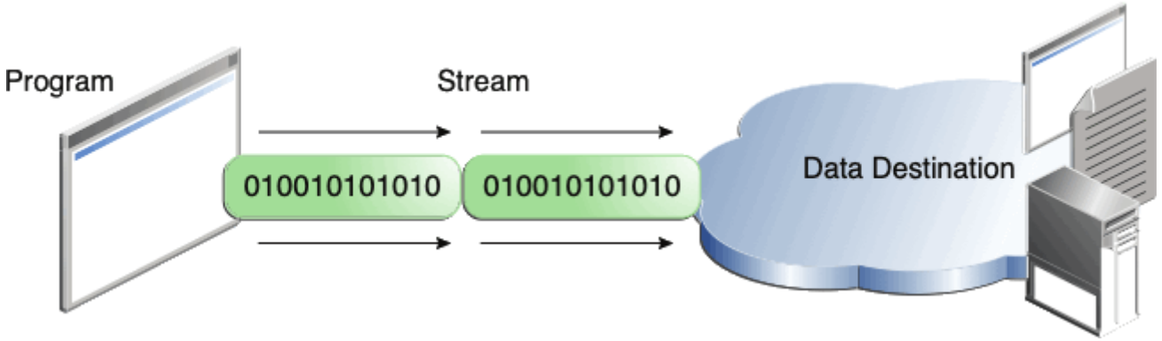
I/O Streams

https://docs.oracle.com/javase/tutorial/essential/io/streams.html

- A stream is a sequence of data.
- A program uses an input stream to read data from a source, one item at a time:



- A program uses an output stream to write data to a destination, one item at time:



OutputStream

- System.out is a predefined OutputStream object reference that is associated with a system's standard output, usually a computer screen.

- The print() and println() methods are overloaded in order to support the various standard data types, such as int, boolean, float, etc., each method converting that data type to a sequence of characters.

InputStream

- System.in is an input byte stream
- When using an InputStream, a programmer must append the clause `throws IOException` when using the method read()
  - A `throws` clause tells the Java virtual machine that the corresponding method may exit unexpectedly due to an exception, which is an event that disrupts a program's execution.

- Instead of reading a byte stream, dealing with IOException, and after it converting the data to a String or other data types, we have been using the Wrapper class named Scanner ☺
  - Scanner scnr = new Scanner(System.in);
  - automatically scanning a sequence of bytes and converting those bytes to the desired data type depending on the type of method we use to read the data (nextLine(), nextInt(), etc.)

Scanner – reading from a String

- When we want to read something from the terminal we use:

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

  - The parameter System.in indicates that we are reading from the terminal.

- Sometimes we may want to read something from a String, so instead of using System.in as a parameter we have a String as a parameter

```
String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
Scanner scanner = new Scanner(line);
```

Scanner – reading from a String

```
public class ScannerString {
   public static void main(String args[]){
      String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
      Scanner scanner = new Scanner(line);
      int tokenCounter = 0;
      while(scanner.hasNext()) {
         tokenCounter++;
         System.out.println(scanner.next());
      }
      System.out.println(tokenCounter);
   }
}
```

.hasNext() – returns true if the scanner has another token in its input

.next() – finds and returns the next complete token from this scanner.

Each token is separated by a delimiter, default delimiter is whitespace.

Scanner – What is printed?

```
public class ScannerString {
   public static void main(String args[]){
      String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
      Scanner scanner = new Scanner(line);
      int tokenCounter = 0;
      while(scanner.hasNext()) {
         tokenCounter++;
         System.out.println(scanner.next());
      }
      System.out.println(tokenCounter);
   }
}
```

```
Let
me
be
that
I
am
and
seek
not
to
alter
me.
-Thank
you!
14
```

Scanner – reading from a String

```
import java.util.Scanner;

public class ScannerString {
   public static void main(String args[]){
      String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
      Scanner scanner = new Scanner(line);
      int lineCounter = 0;
      while(scanner.hasNext()) {
         lineCounter++;
         System.out.println(scanner.nextLine());
      }
      System.out.println(lineCounter);
   }
}
```

.hasNext() – returns true if the scanner has another token in its input

.nextLine() – advances this scanner past the current line and returns the input that was skipped

Scanner – What is printed?

```
import java.util.Scanner;

public class ScannerString {
   public static void main(String args[]){
      String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
      Scanner scanner = new Scanner(line);
      int lineCounter = 0;
      while(scanner.hasNext()) {
         lineCounter++;
         System.out.println(scanner.nextLine());
      }
      System.out.println(lineCounter);
   }
}
```

```
Let me be that I am and seek not to alter me.
-Thank you!
2
```

Scanner – reading from a String

```
import java.util.Scanner;

public class ScannerString {
   public static void main(String args[]){
      String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
      Scanner scanner = new Scanner(line);
      scanner.useDelimiter("-");
      int otherCounter = 0;
      while(scanner.hasNext()) {
         otherCounter++;
         System.out.println(scanner.next());
      }
   }
}
```

.useDemiter(String) - Sets this scanner's delimiting pattern to a pattern constructed from the specified String

What is printed now?

```
Let me be that I am and seek not to alter me.


Thank you!
```

Scanner – what is printed?

```
import java.util.Scanner;

public class StringLocation {
   public static void main(String args[]){
      String location = "Fort Collins,40°35'6.9288\"N,105°5'3.9084\"W";
      Scanner locScan = new Scanner(location);
      locScan.useDelimiter(",");
      String city = locScan.next();
      String lat = locScan.next();
      String lon = locScan.next();
      System.out.println(city);
      System.out.println(lat);
      System.out.println(lon);
   }
}
```

```
Fort Collins
40°35'6.9288"N
105°5'3.9084"W
```

Scanner – different uses

Input Streams
- System.in
- Strings
- File
- FileInputStream

- When we want to read something from the terminal we use:

  Scanner scnr = new Scanner(System.in);

  – The parameter System.in indicates that we are reading from the terminal.

- When we want to read something from a String we use:

  ```
  String line = "Let me be that I am and seek not to alter me.\n-Thank you!";
  Scanner scanner = new Scanner(line);
  ```

- What happens if instead of reading from the terminal or a String, we want to read from a file?
  – We need to use the File class!
  – And pass an object of File as a parameter instead of System.in or a String when we construct a Scanner object

Scanner – reading from a File

Basic Structure

```
import java.io.File;
import java.io.IOException;
import java.util.Scanner;
public class FileReadingBasicStructure {
   public static void readFile(String fileName){
      try {
         Scanner fileIn = new Scanner(new File(fileName));
         // now the file is in a scanner, and looping matters!
         while(fileIn.hasNext()) { // could also use hasNextLine()
            System.out.println(fileIn.nextLine());
         }
      }catch(IOException ex) {
         // there was an error finding the file or reading the file!
         // so how do you hand that? For now, we just say that and end the
         //program
         System.err.print("Error reading file!");
         ex.printStackTrace();
      }

   }
   public static void main(String args[]){
      readFile("file.txt");
   }
}
```

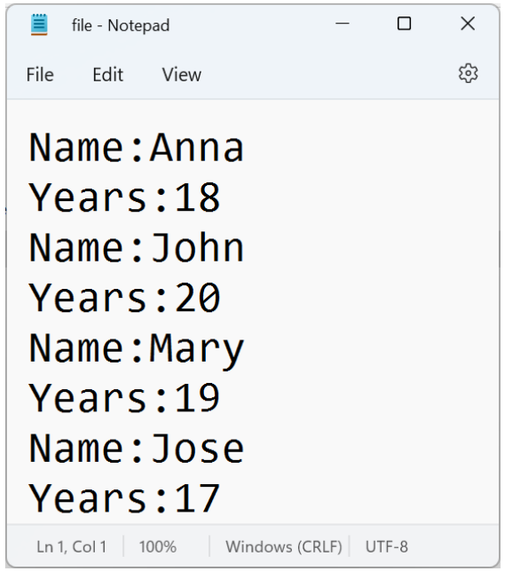
Creates a Scanner from a file

While still has elements

Reads the line

Test for the exception

What is printed?

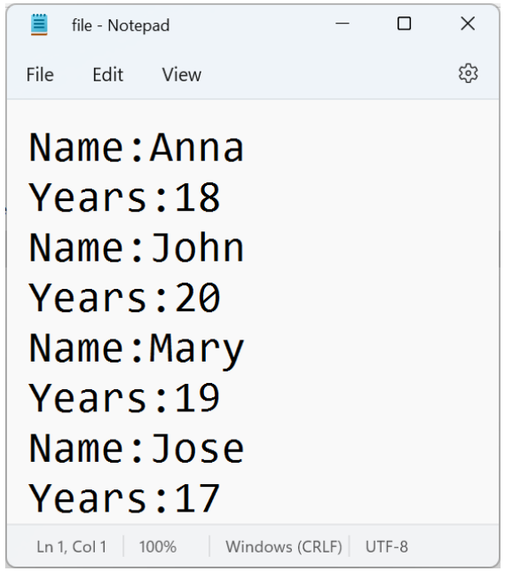



```java
import java.io.File;
import java.io.IOException;
import java.util.Scanner;
public class FileReadingBasicStructure {
    public static void readFile(String fileName){
        try {
            Scanner fileIn = new Scanner(new File(fileName));
            // now the file is in a scanner, and looping matters!
            while(fileIn.hasNext()) { // could also use hasNextLine()
                System.out.println(fileIn.nextLine());
            }
        }catch(IOException ex) {
            // there was an error finding the file or reading the file!
            // so how do you hand that? For now, we just say that and end the
            //program
            System.err.print("Error reading file!");
            ex.printStackTrace();
        }

    }
    public static void main(String args[]){
        readFile("file.txt");
    }
}
```

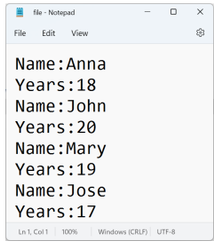
```
Name:Anna
Years:18
Name:John
Years:20
Name:Mary
Years:19
Name:Jose
Years:17
```

Reading from a File and Creating Objects to add into an ArrayList




```java
public class Person {
    private String name;
    private int yearsOld;
    public Person(String name){
        setName(name);
        setYearsOld(0);
    }
    public Person(String name, int years){
        setName(name);
        setYearsOld(years);
    }
    public void setName(String name){
        this.name = name;
    }
    public void setYearsOld(int years){
        yearsOld = years;
    }
    public String getName(){
        return name;
    }
    public int getYearsOld(){
        return yearsOld;
    }
    public String toString(){
        return "Name: " + name + " Years Old: " + yearsOld;
    }
}
```

Reading from a File and Creating Objects to add into an ArrayList




```
public static ArrayList<Person> readFilePerson(String fileName){
   ArrayList<Person> list = new ArrayList<>();
   try {
      Scanner fileIn = new Scanner(new File(fileName));
      String name = "";
      int years = 0;
      int index = 0;
      int lineNumber = 0;
      while(fileIn.hasNext()) {
         String line = fileIn.nextLine();
         if(line.contains("Name")){
            index = line.indexOf(":");
            name = line.substring(index+1, line.length());
            lineNumber++;
         }
         else if (line.contains("Years")){
            index = line.indexOf(":");
            years = Integer.parseInt(line.substring(index+1, line.length()));
            lineNumber++;
         }
         if(lineNumber == 2){
            Person p = new Person(name, years);
            list.add(p);
            lineNumber = 0;
         }
      }
   }catch(IOException ex) {
      System.err.print("Error reading file!");
      ex.printStackTrace();
   }
   return list;
}

public static void main(String args[]){
   ArrayList<Person> lst = readFilePerson("file.txt");
   System.out.println(lst);
}
```