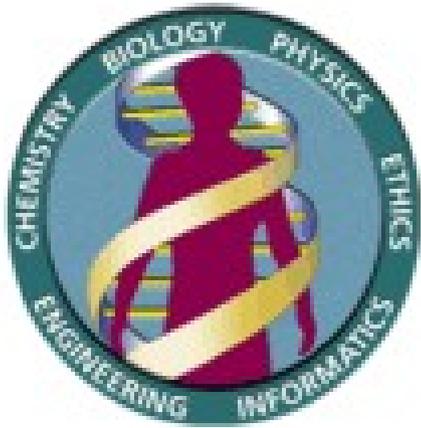


# File Processing

# Midterm Logistics

- Midterm **tonight**, 7PM – 10PM
- Exam location by last name:
  - Last names starts with A-J: **Hewlett 200**
  - Last names starts with K-O: **Braun Auditorium**
  - Last names starts with P-S: **Gates B01**
  - Last names starts with T-Z: **Gates B03**



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Welcome to Big Data



# Getting Data Into Programs

- Put it directly in the program:
  - Define constants holding your values.
- Get it from the user:
  - Mouse events, **readLine**, etc.
- Generate it randomly:
  - Use a **RandomGenerator**.
- Get it from an external source.
  - Store it in a file and read it later.

# Reading Files

- Virtually all programs that you've used at some point read files from disk:
  - Word processing (documents)
  - Eclipse (Java files)
  - Web browser (cookies)
  - IM client (stored login information)
  - Games (saved progress)
  - Music player (songs)

# The Structure of Files

- A file is just a series of **bits** (ones and zeros).
- Those bits can have structure:
  - Plain-text: Bits represent characters.
  - JPEG: Bits encode information about the structure of an image.
  - MP3: Bits encode frequency information about music.
  - etc.

# The Structure of Files

A file is just a series of **bits** (ones and zeros).

Those bits can have structure:

- **Plain-text: Bits represent characters.**

JPEG: Bits encode information about the structure of an image.

MP3: Bits encode frequency information about music.

etc.

Yesterday, upon the stair,  
I met a man who wasn't there  
He wasn't there again today  
I wish, I wish he'd go away...  
- Hugh Mearns, "Antagonish"

Yesterday, upon the stair,  
I met a man who wasn't there  
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Step one:  
Open the file for reading.

Yesterday, upon the stair,  
I met a man who wasn't there  
He wasn't there again today  
I wish, I wish he'd go away...  
- Hugh Mearns, "Antagonish"

```
BufferedReader br =  
    new BufferedReader(new FileReader("poem.txt"));
```

Yesterday, upon the stair,  
I met a man who wasn't there  
He wasn't there again today  
I wish, I wish he'd go away...  
- Hugh Mearns, "Antagonish"

```
BufferedReader br =  
    new BufferedReader(new FileReader("poem.txt"));
```

To use the `BufferedReader` and  
`FileReader` types, you need to

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

Yesterday, upon the stair,

I met a man who wasn't there

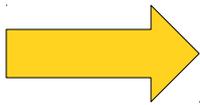
He wasn't there again today

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Yesterday, upon the stair,

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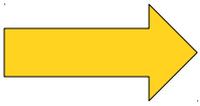
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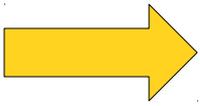
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Step Two:  
Read the file,  
one line at a time.



Yesterday, upon the stair,

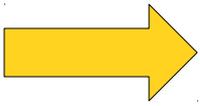
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String line1 = br.readLine();
```



Yesterday, upon the stair,

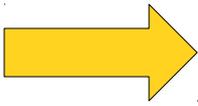
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Yesterday, upon the stair,

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He wasn't there again today

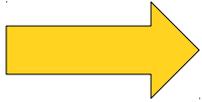
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BufferedReader br =
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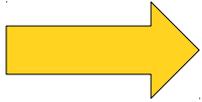
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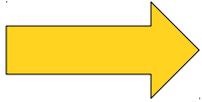
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Yesterday, upon the stair,

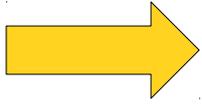
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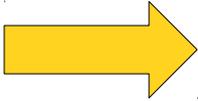
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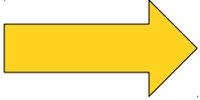
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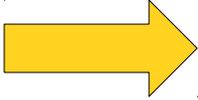
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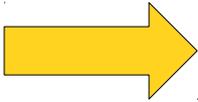
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String line5 = br.readLine();
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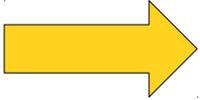
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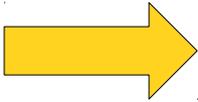
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```
String line5 = br.readLine(); // - Hugh Mearns, "Antagonish"
```

```
String line6 = br.readLine();
```

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```
String line5 = br.readLine(); // - Hugh Mearns, "Antagonish"
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```
String line6 = br.readLine(); // *Returns null*
```

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String line5 = br.readLine(); // - Hugh Mearns, "Antagonish"
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String line6 = br.readLine(); // *Returns null*
```

Step Three:  
Close the file.

Yesterday, upon the stair,

I met a man who wasn't there

He wasn't there again today

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- Hugh Mearns, "Antagonish"

```
BufferedReader br =  
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String line6 = br.readLine(); // *Returns null*  
  
br.close();
```

Let's Try It Out!

There's a Catch...

# Sometimes Things Break

- Programs sometimes encounter unexpected errors.
- Sometimes these are bugs:
  - Dividing by zero.
  - Sending a message to a **null** object.
- Sometimes these are due to external factors:
  - Network errors.
  - Missing files.

# Exceptional Cases

- If Java encounters a case where it can't proceed as normal, it will cause an **exception**.
- Java requires that your program handle certain types of exceptions.
- Think of exceptions as rerouting control in an emergency:
  - If all goes well, program continues as usual.
  - If something goes wrong, handle the emergency.

Let's Try It Out!

Let's **try** It Out!

# `try`-ing Your Best

- To use a method or class that might cause an exception, you need to tell Java to `try` its best, knowing that it might fail.

# try-ing Your Best

- To use a method or class that might cause an exception, you need to tell Java to **try** its best, knowing that it might fail.

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```

# try-ing Your Best

- To use a method or class that might cause an exception, you need to tell Java to **try** its best, knowing that it might fail.

```
try {  
    BufferedReader br =  
        new BufferedReader(new FileReader("poem.txt"));  
  
    String line1 = br.readLine(); // Yesterday, upon the stair,  
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    String line6 = br.readLine(); // *Returns null*  
  
    br.close();  
}
```

There's a Catch...

There's a **catch...**

# try and catch me

- If an exception occurs, you may need to tell Java to **catch** that exception.

# try and catch me

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try {
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    br.close();
}
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# try and catch me

- If an exception occurs, you may need to tell Java to **catch** that exception.

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    br.close();
} catch (IOException e) {
    println("An error occurred: " + e);
}
```

# try and catch me

- If an exception occurs, you may need to tell Java to **catch** that exception.

If something fails up here...

```
try {
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```

... we immediately jump down here.

Finally... let's make this program work!

# Reading a File

- The idiomatic “read all the lines of a file” code is shown here:

```
try {
    BufferedReader br = /* ... open the file ... */
    while (true) {
        String line = br.readLine();
        if (line == null) break;

        /* ... process line ... */
    }
    br.close();
} catch (IOException e) {
    /* ... handle error ... */
}
```

# Writing to Files

- Writing to files is conceptually similar to reading files.
  - Open the file for writing (using **PrintWriter** instead of **BufferedReader**).
  - Write the contents you'd like to the file.
  - Close the file.



**//////// DANGER \\\ \ \ \**

Writing to an existing file will permanently overwrite the contents of that file. Don't write to a file unless you're okay setting it on fire!

Putting Everything Together

empty fridge ?

honest ly

nothing ?

I tremble