File I/O
Part 2

Today's Objectives

- Investigating File and Directory metadata using the File class
- Write text data to a file
- Buffering in File I/O
- Importance of releasing external resources

Java Output

Java has the ability to communicate data back to the user. Consider some of these methods:

- Using System.out.println() that sends a message to the console.
- Send a HTML view back to the user (Module 3).
- Write data to a database (Module 2).
- Transmit data to an API (Module 2).
- For today, we will focus on something simpler, writing data back to a text file.

Finding Additional Info About a File Path

The **`File`** class has several methods which can be used to find extra information about the specified path. You have already seen **`exists()`** but here are a few of the available methods of this sort:

- **`getName()`** - returns name of file (just the name, not any path info)
- **`getAbsolutePath()`** - we saw this yesterday… returns absolute path of the File
- **`exists()`** - indicates whether the file or directory pointed to by File exists
- **`isDirectory()`** - indicates whether the path points to a directory
- **`isFile()`** - indicates whether the path points to a directory
- **`length()`** - size of file in bytes

Using the File Class to Create a Directory

One of the things the File class can be used for is creating a new directory.

```
File newDirectory = new File("myDirectory");

if (newDirectory.exists()) {
     System.out.println("Sorry, "
     + newDirectory + " already exists.");
}
else {
     newDirectory.mkdir();
}
```

Using the File Class to Create a Directory

One of the things the File class can be used for is creating a new directory.

Create new **`File`** object with path of directory to create as the param.

```
File newDirectory = new File("myDirectory");

if (newDirectory.exists()) {
     System.out.println("Sorry, "
     + newDirectory + " already exists.");
}
else {
     newDirectory.mkdir();
}
```

Using the File Class to Create a Directory

One of the things the File class can be used for is creating a new directory.

Create new `File` object with path of directory to create as the param.

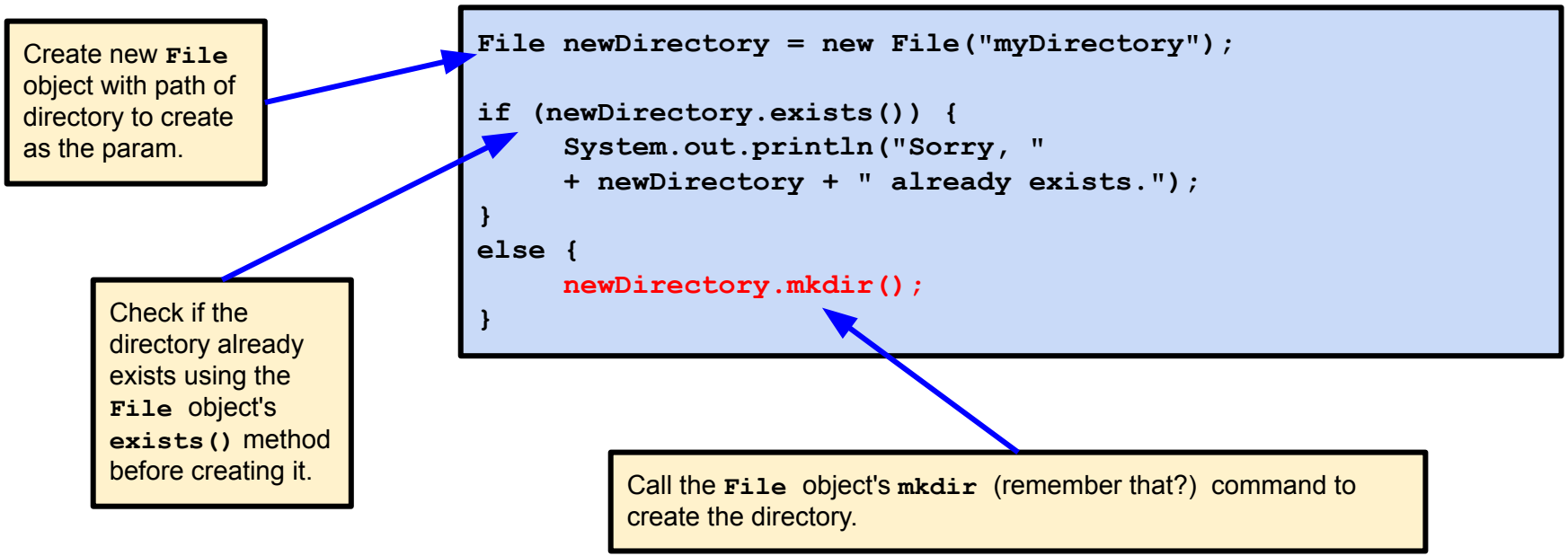
Check if the directory already exists using the `File` object's `exists()` method before creating it.

```
File newDirectory = new File("myDirectory");

if (newDirectory.exists()) {
     System.out.println("Sorry, "
     + newDirectory + " already exists.");
}
else {
     newDirectory.mkdir();
}
```

Using the File Class to Create a Directory

One of the things the File class can be used for is creating a new directory.

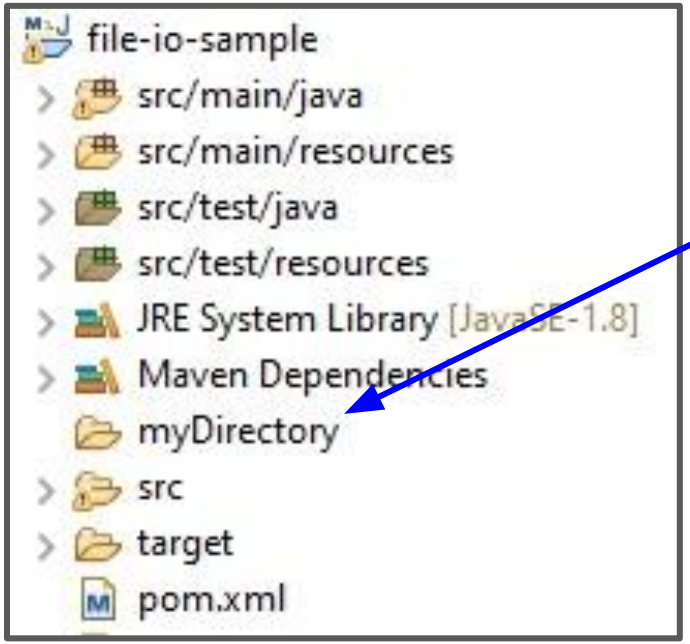



```
File newDirectory = new File("myDirectory");

if (newDirectory.exists()) {
    System.out.println("Sorry, "
    + newDirectory + " already exists.");
}
else {
    newDirectory.mkdir();
}
```

Using the File Class to Create a Directory

Just like with reading from files, writing is done with respect to the project root.



Notice that the directory has been created at the root level of the project.

Using the File Class to Create a File

We can also use the File class to create a file (also relative to the root of the project).

```
try {
     File newFile = new File("myDataFile.txt");
     newFile.createNewFile();
} catch(IOException e) {
     System.out.println("Exception occurred: "
          + e.getMessage());
}
```

Using the File Class to Create a File

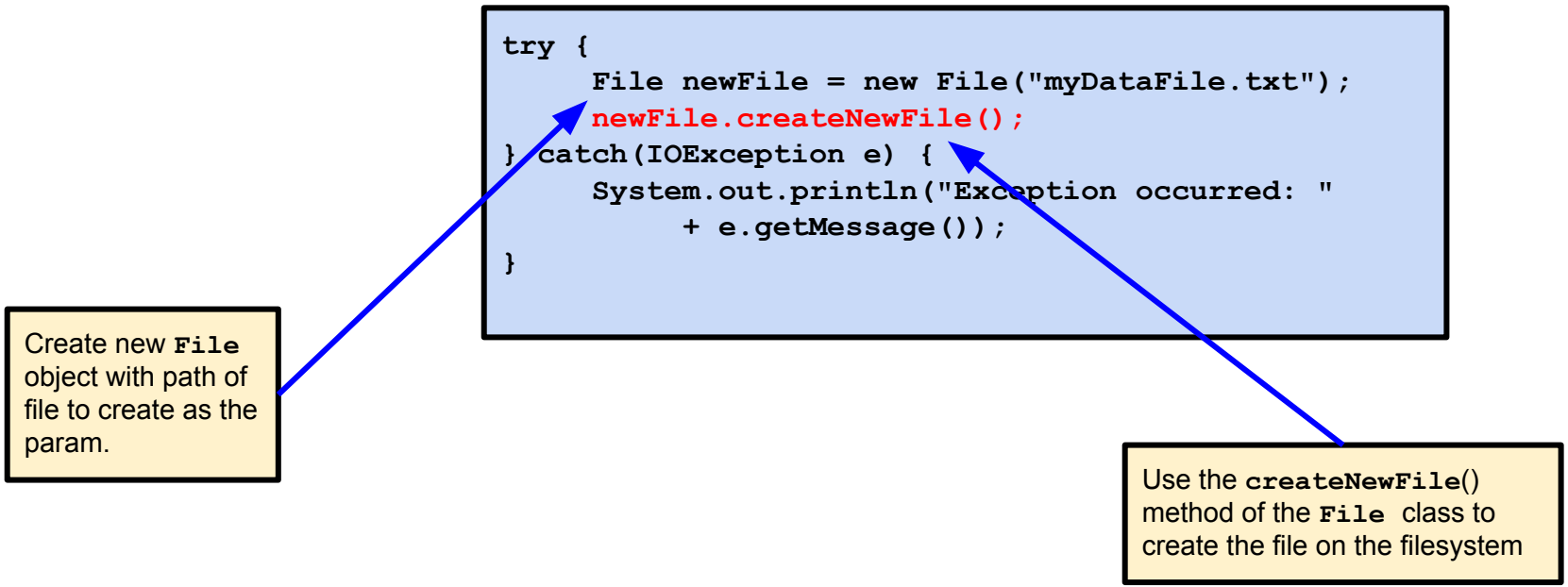
We can also use the File class to create a file (also relative to the root of the project).

```
try {
     File newFile = new File("myDataFile.txt");
     newFile.createNewFile();
} catch(IOException e) {
     System.out.println("Exception occurred: "
          + e.getMessage());
}
```

Create new **`File`** object with path of file to create as the param.

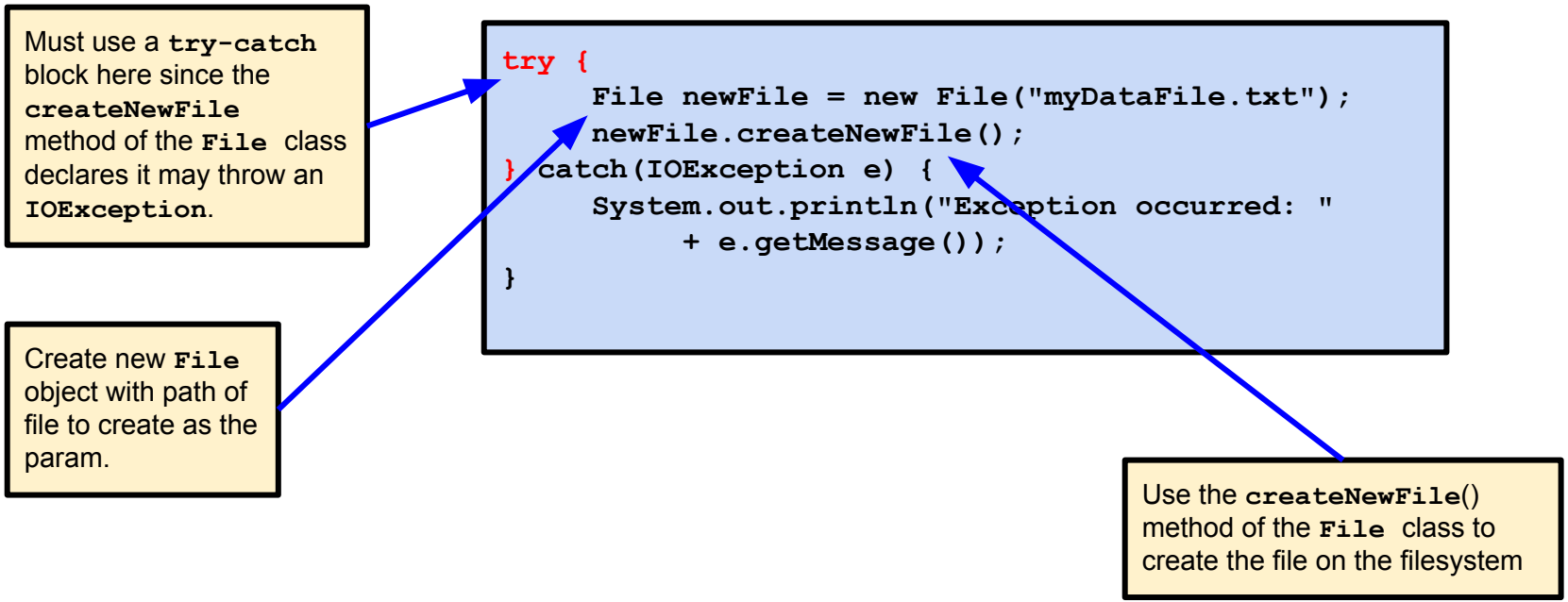
Using the File Class to Create a File

We can also use the File class to create a file (also relative to the root of the project).



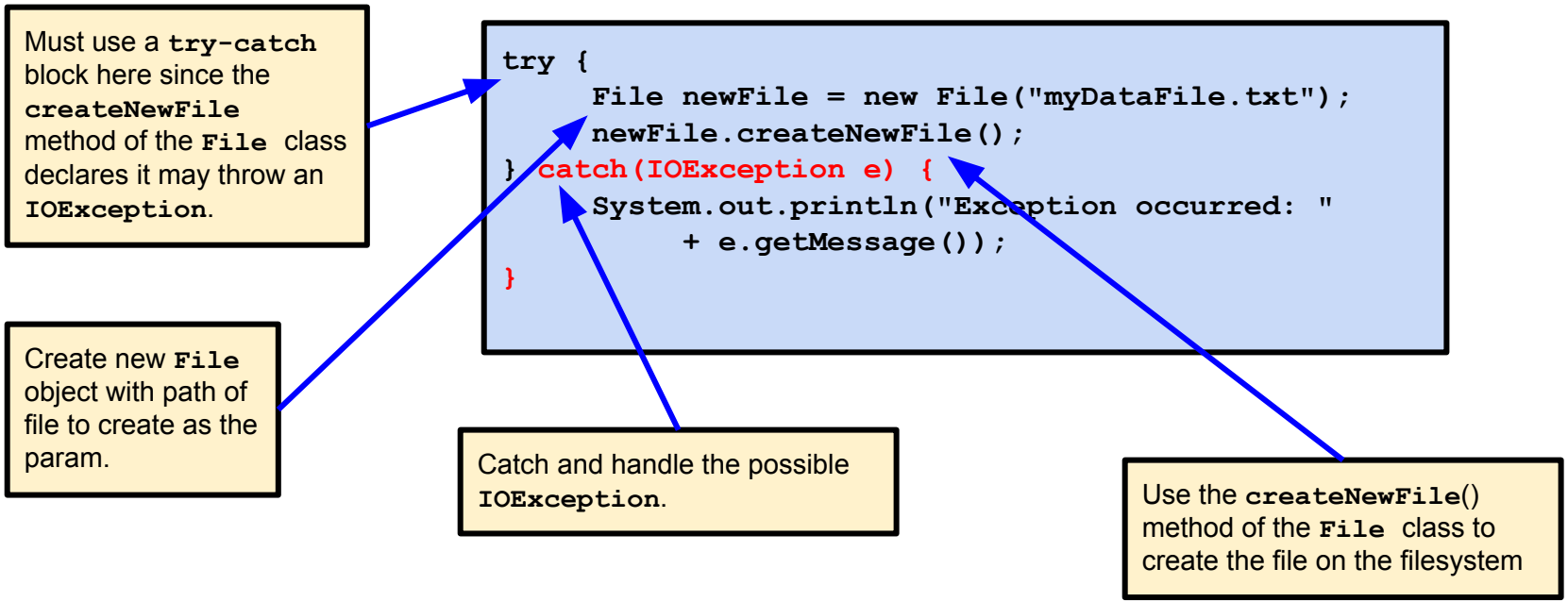
Using the File Class to Create a File

We can also use the File class to create a file (also relative to the root of the project).



Using the File Class to Create a File

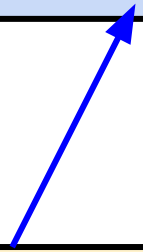
We can also use the File class to create a file (also relative to the root of the project).



Using the File Class to Create a File in a Directory

The **`File`** class has an overloaded constructor which takes an extra parameter specifying the path in which the file or directory should be created should be created.

```
File newFile = new File("myDirectory", "myDataFile.txt");
```



Extra param which tells **`File`** to put the path in the second parameter into the directory at this path. Can be used to add a file to the directory or create a subdirectory.

Writing to a File

Just like with reading data from a file, writing to a file involves bringing in an object of another class. In this case, we will need an instance of the **`PrintWriter`** class.

When more than one class is required to solve a problem, we typically refer to these classes as **collaborators**.In this case, the **`File`**, and **`Printwriter`** classes are collaborators.

Writing to a File

```
File newFile = new File("myDataFile.txt");
String message = "Appreciate\nElevate\nParticipate";

try {
     PrintWriter writer = new
          PrintWriter(newFile);
     writer.print(message);
     writer.flush();
     writer.close();
} catch(FileNotFoundException e) {
     System.out.println("File does not exist.");
}
```

Writing to a File

Text to write to file.

```
File newFile = new File("myDataFile.txt");
String message = "Appreciate\nElevate\nParticipate";

try {
     PrintWriter writer = new
          PrintWriter(newFile);
     writer.print(message);
     writer.flush();
     writer.close();
} catch(FileNotFoundException e) {
     System.out.println("File does not exist.");
}
```

Writing to a File

Text to write to file.

Create a **`PrintWriter`** with the **`File`** object.

```
File newFile = new File("myDataFile.txt");
String message = "Appreciate\nElevate\nParticipate";

try {
     PrintWriter writer = new
          PrintWriter(newFile);
     writer.print(message);
     writer.flush();
     writer.close();
} catch(FileNotFoundException e) {
     System.out.println("File does not exist.");
}
```

Writing to a File

Text to write to file.

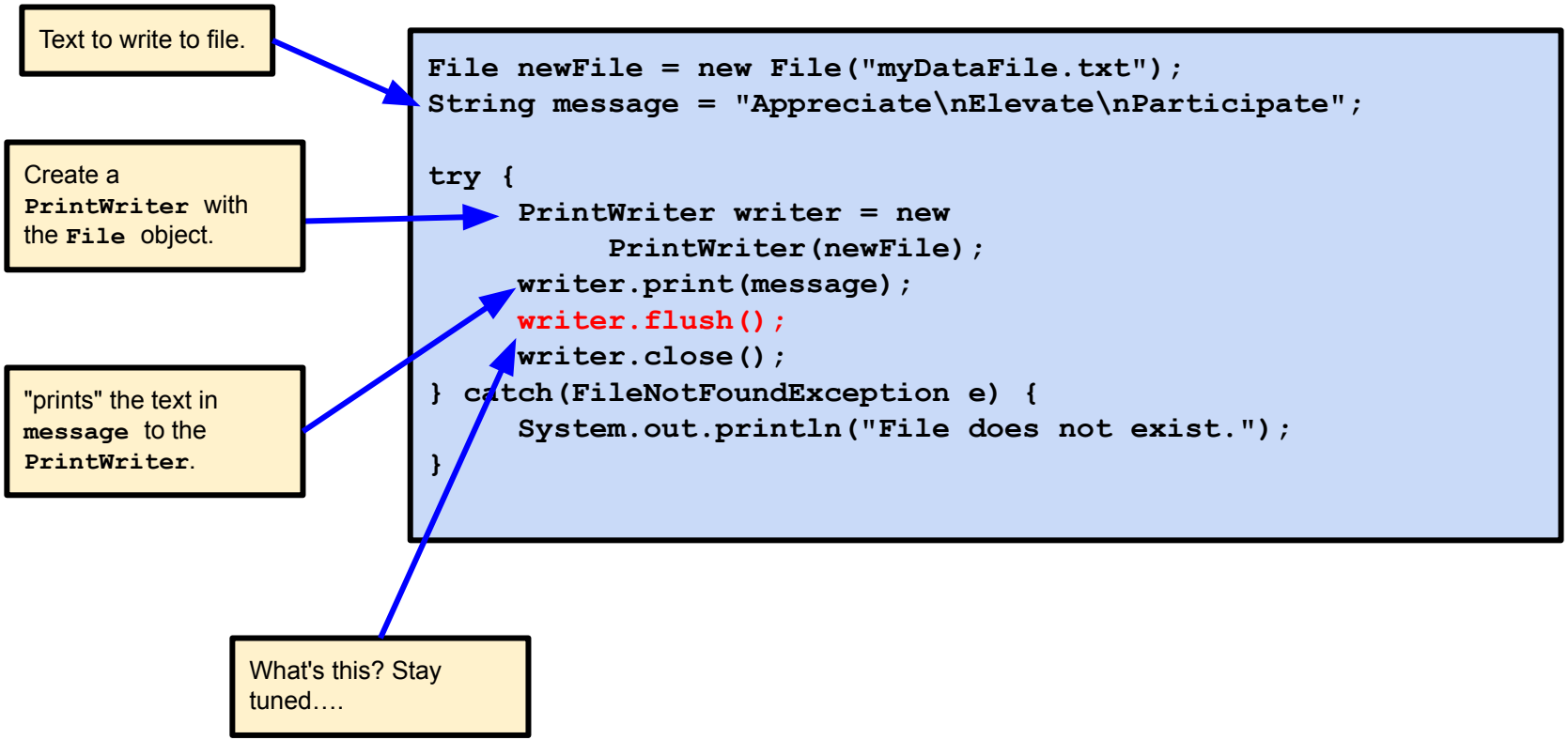
Create a **`PrintWriter`** with the **`File`** object.

"prints" the text in **`message`** to the **`PrintWriter`**.

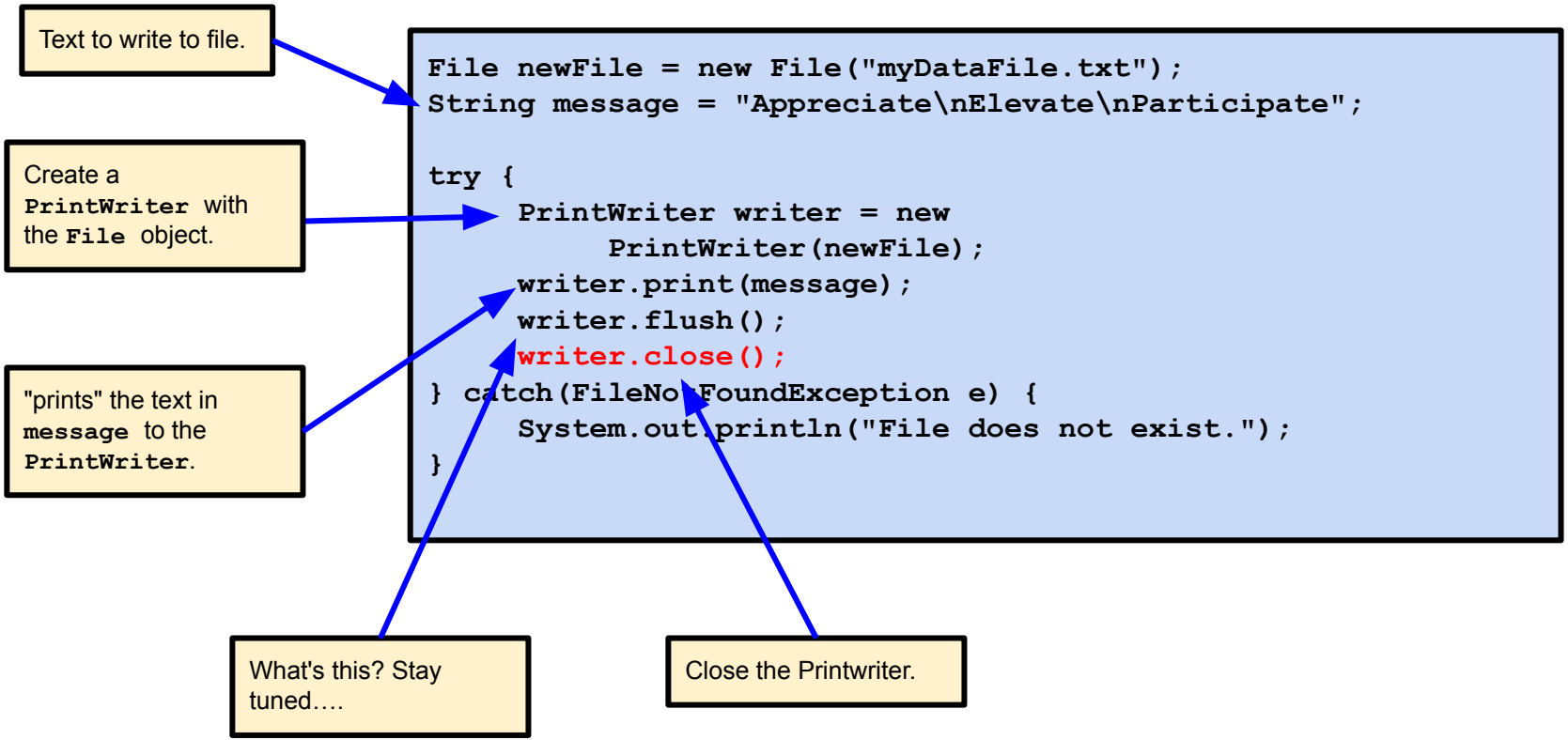
```
File newFile = new File("myDataFile.txt");
String message = "Appreciate\nElevate\nParticipate";

try {
     PrintWriter writer = new
          PrintWriter(newFile);
     writer.print(message);
     writer.flush();
     writer.close();
} catch(FileNotFoundException e) {
     System.out.println("File does not exist.");
}
```

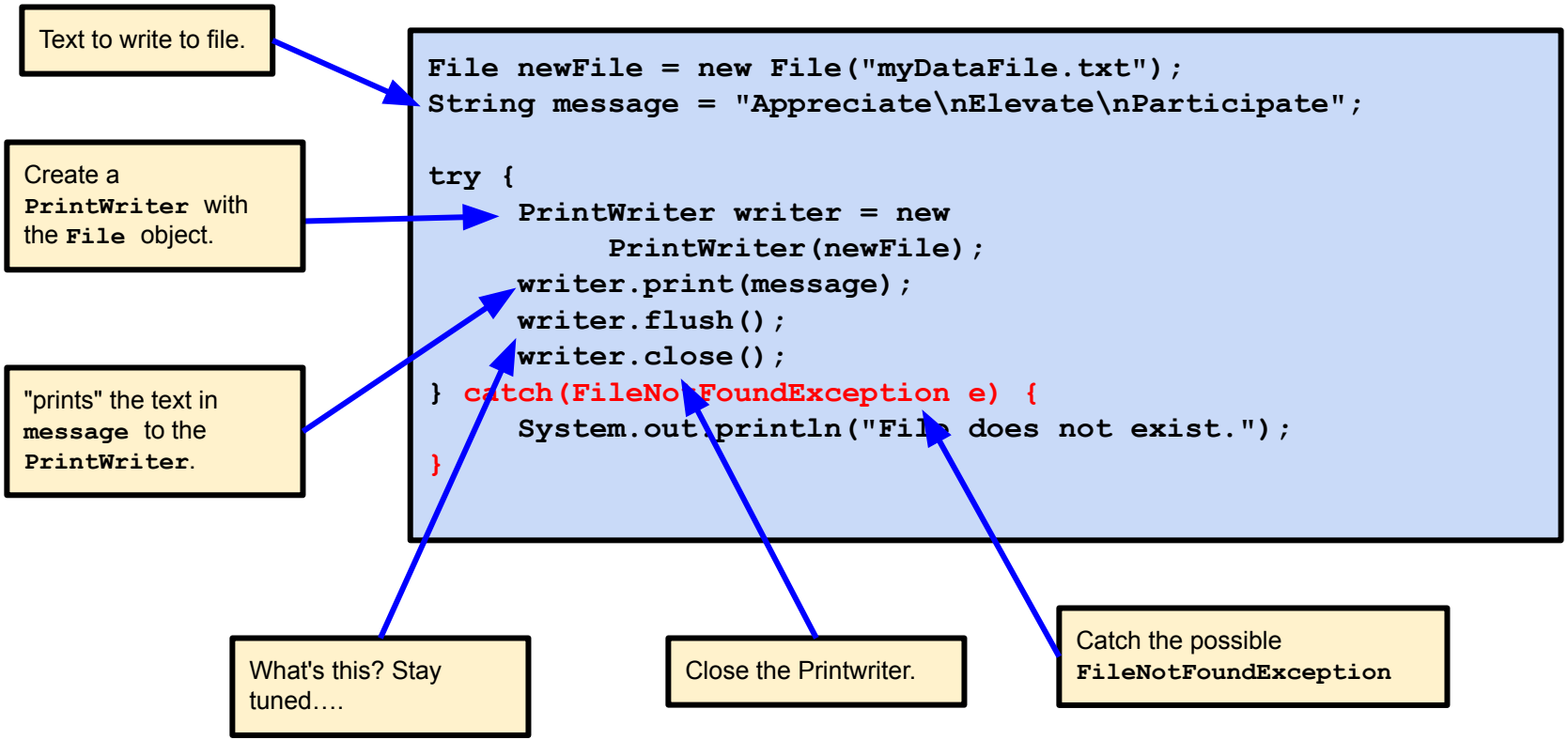
Writing to a File



Writing to a File



Writing to a File



Introducing... Buffers

A **buffer** is like a bucket to which text is initially written. It is only after we invoke the `.flush()` method that the bucket's contents are transferred to the file. `Printwriter` creates a buffered stream that gets flushed when the buffer is full or `.flush()` is manually called and the `Printwriter` is closed.

```
try (PrintWriter writer = new PrintWriter(newFile.getAbsoluteFile())) {
     writer.print(message);
} catch(FileNotFoundException e) {
     System.out.println("File does not exist.");
}
```

Remember how we mentioned the try-with-resources block was created to avoid writing lots of repetitive, cluttered code? The try block in the previous example can be rewritten like this - the try-with-resources takes care of flushing the buffer and closing the `Printwriter` resource when the try block exits!!!!

Appending to a File

The previous example regenerates the file's contents from scratch every time it is run. Sometimes, a file might need to be appended to, preserving the existing data content. The PrintWriter supports two constructors:

- **`PrintWriter(file)`**, where file is a **`File`** object.

- **`PrinterWriter(outputStream, mode)`**
  - **`outputStream`** will be an instance of the **`OutputStream`** class.
  - Mode is a **`boolean`** indicating if you want to instantiate the object in append mode (**`true`** = yes).

File Append Example

We set a **`boolean`** indicating whether to append based on whether the file being written to already exists.

```
File newFile = new File("myDataFile.txt");
String message = "\nAppreciate\nElevate\nParticipate";

boolean append = newFile.exists() ? true : false;
try (PrintWriter writer =
     new PrintWriter(new FileOutputStream(newFile, append))) {
     writer.append(message);
} catch(IOException e) {
     System.out.println("Exception: " + e.getMessage());
}
```

File Append Example

We set a **`boolean`** indicating whether to append based on whether the file being written to already exists.

```
File newFile = new File("myDataFile.txt");
String message = "\nAppreciate\nElevate\nParticipate";

boolean append = newFile.exists() ? true : false;
try (PrintWriter writer =
     new PrintWriter(new FileOutputStream(newFile, append))) {
     writer.append(message);
} catch(IOException e) {
     System.out.println("Exception: " + e.getMessage());
}
```

We create the **`PrintWriter`** using a **`FileOutputStream`**, which is created using the the **`File`** object and the **`boolean`** we created as the param which indicates whether or not to append.

File Append Example

We set a **boolean** indicating whether to append based on whether the file being written to already exists.

```
File newFile = new File("myDataFile.txt");
String message = "\nAppreciate\nElevate\nParticipate";

boolean append = newFile.exists() ? true : false;
try (PrintWriter writer =
     new PrintWriter(new FileOutputStream(newFile, append))) {
     writer.append(message);
} catch(IOException e) {
     System.out.println("Exception: " + e.getMessage());
}
```

We use the **append** method of **PrintWriter** which will append if the stream it is created with is set to append.

We create the **PrintWriter** using a **FileOutputStream**, which is created using the the **File** object and the **boolean** we created as the param which indicates whether or not to append.