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**COGNIZANT WEEK 2**

## Exercise 1: Basic File Reading and Writing

### Objectives:

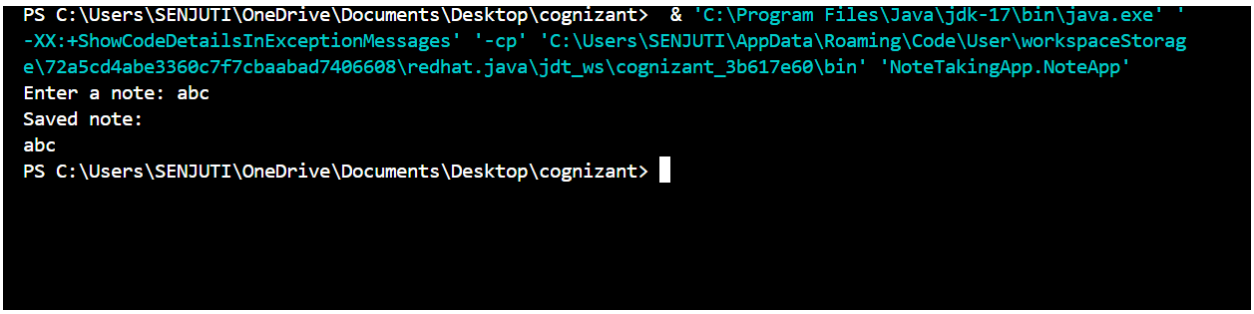
- Learn how to read from and write to files using Java.
- Understand basic file operations.

### Business Scenario:

You are developing a simple note-taking application where users can save their notes to a file and read them back when needed.

### Tasks:

1. **Setup:**
    - Create a new Java project named **NoteTakingApp**.
2. **Writing to a File:**
    - Create a class named **FileWriterDemo**.
    - Write a method **saveNoteToFile(String fileName, String note)** that:
        - Takes a file name and a note as parameters.
        - Uses **FileWriter** and **BufferedWriter** to write the note to the specified file.
3. **Reading from a File:**
    - Create a class named **FileReaderDemo**.
    - Write a method **readNoteFromFile(String fileName)** that:
        - Takes a file name as a parameter.
        - Uses **FileReader** and **BufferedReader** to read the content of the file and print it to the console.
4. **User Interaction:**
    - Create a class named **NoteApp**.
    - Write a main method that:
        - Prompts the user to enter a note.
        - Saves the note to a file using **FileWriterDemo**.
        - Reads the note back from the file using **FileReaderDemo** and displays it.




## Exercise 2: Advanced File Handling with Error Handling

### Objectives:

- Handle errors and exceptions during file operations.
- Implement robust file handling in Java.

### Business Scenario:

You are developing a log management system for an application. The system should be able to write log messages to a file and read log messages from the file, with proper error handling for file operations.

### Tasks:

1. **Setup:**
    - Create a new Java project named **LogManagementSystem**.
2. **Writing Logs to a File:**
    - Create a class named **LogWriter**.
    - Write a method **writeLog(String fileName, String logMessage)** that:
        - Takes a file name and a log message as parameters.
        - Uses **FileWriter** and **BufferedWriter** to append the log message to the specified file.
        - Implements error handling using try-catch blocks to handle **IOException**.
3. **Reading Logs from a File:**
    - Create a class named **LogReader**.
    - Write a method **readLogs(String fileName)** that:

- Takes a file name as a parameter.
- Uses **FileReader** and **BufferedReader** to read the content of the file line by line.
- Implements error handling using **try-catch** blocks to handle **FileNotFoundException** and **IOException**.

4. **User Interaction:**

- Create a class named **LogApp**.
- Write a main method that:
  - Writes multiple log messages to a file using **LogWriter**.
  - Reads the log messages from the file using **LogReader** and displays them.
  - Demonstrates the error handling by attempting to read from a non-existent file.

```
PS C:\Users\SENJUTI\OneDrive\Documents\Desktop\cognizant>  c:; cd 'c:\Users\SENJUTI\OneDrive\Documents\Desktop\
cognizant'; & 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\U
sers\SENJUTI\AppData\Roaming\Code\User\workspaceStorage\72a5cd4abe3360c7f7cbaabad7406608\redhat.java\jdt_ws\cog
nizant_3b617e60\bin' 'LogManagementSystem.LogApp'
Log entries:
Log entry 1
Log entry 2
Log entry 3
Log entry 1
Log entry 2
Log entry 3
Attempting to read a non-existent file:
The log file was not found.
java.io.FileNotFoundException: non_existent_file.txt (The system cannot find the file specified)
        at java.base/java.io.FileInputStream.open0(Native Method)
        at java.base/java.io.FileInputStream.open(FileInputStream.java:216)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:157)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:111)
        at java.base/java.io.FileReader.<init>(FileReader.java:60)
        at LogManagementSystem.LogReader.readLogs(LogReader.java:9)
        at LogManagementSystem.LogApp.main(LogApp.java:20)
PS C:\Users\SENJUTI\OneDrive\Documents\Desktop\cognizant>
```

## Exercise 3: File Handling with Serialization

### Objectives:

- Learn how to serialize and deserialize objects to and from files.
- Understand the use of **ObjectInputStream** and **ObjectOutputStream**.

### Business Scenario:

You are developing a contact management system where contact details can be saved to a file and read back using serialization.

### Tasks:

1. **Setup:**

- Create a new Java project named **ContactManagementSystem**.

2. **Defining the Contact Class:**
    - Create a class named **Contact** that implements **Serializable**.
    - Define attributes for contact details like **name**, **phone**, and **email**.
    - Provide a constructor and appropriate getter and setter methods.
3. **Serializing Contacts:**
    - Create a class named ContactWriter.
    - Write a method **saveContact(String fileName, Contact contact)** that:
        - Takes a file name and a **Contact** object as parameters.
        - Uses **ObjectOutputStream** to write the **Contact** object to the specified file.
        - Implements error handling using **try-catch** blocks to handle **IOException**.
4. **Deserializing Contacts:**
    - Create a class named **ContactReader**.
    - Write a method **readContact(String fileName)** that:
        - Takes a file name as a parameter.
        - Uses **ObjectInputStream** to read the **Contact** object from the file.
        - Implements error handling using **try-catch** blocks to handle **FileNotFoundException**, **IOException**, and **ClassNotFoundException**.
5. **User Interaction:**
    - Create a class named **ContactApp**.
    - Write a main method that:
        - Creates a **Contact** object and saves it to a file using **ContactWriter**.
        - Reads the Contact object back from the file using **ContactReader** and displays the contact details.
        - Demonstrates the error handling by attempting to read from a non-existent file and handling class casting issues.

```
ShowCodeDetailsInExceptionMessages' '-cp' 'C:\Users\SENJUTI\AppData\Roaming\Code\User\workspaceStorage\72a5cd4a
be3360c7f7cbaabad7406608\redhat.java\jdt_ws\cognizant_3b617e60\bin' 'ContactManagementSystem.ContactApp'
Saved contact details:
Name: John Doe
Phone: 123-456-7890
Email: john.doe@example.com
Attempting to read a non-existent file:
The contact file was not found.
java.io.FileNotFoundException: non_existent_contact.ser (The system cannot find the file specified)
        at java.base/java.io.FileInputStream.open0(Native Method)
        at java.base/java.io.FileInputStream.open(FileInputStream.java:216)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:157)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:111)
        at ContactManagementSystem.ContactReader.readContact(ContactReader.java:10)
        at ContactManagementSystem.ContactApp.main(ContactApp.java:23)
PS C:\Users\SENJUTI\OneDrive\Documents\Desktop\cognizant> S
```

## Exercise 4: Processing Large Files

### Objectives:

- Handle large files efficiently using Java.
- Use buffered streams for reading and writing large files.

### Business Scenario:

You are developing a system to process large data files containing sales records. The system should be able to read large files efficiently, process the data, and write the results to a new file.

### Tasks:

1. **Setup:**
    - Create a new Java project named **LargeFileProcessor**.
2. **Reading Large Files:**
    - Create a class named **LargeFileReader**.
    - Write a method **readLargeFile(String inputFileName)** that:
        - Takes an input file name as a parameter.
        - Uses **BufferedReader** to read the file line by line.
        - Processes each line (e.g., parse and print sales records).
        - Implements error handling using **try-catch** blocks to handle **IOException**.
3. **Writing Processed Data:**
    - Create a class named **LargeFileWriter**.
    - Write a method **writeProcessedData(String outputFileName, List<String> processedData)** that:
        - Takes an output file name and a list of processed data as parameters.
        - Uses **BufferedWriter** to write the processed data to the specified file.
        - Implements error handling using try-catch blocks to handle **IOException**.
4. **User Interaction:**
    - Create a class named **FileProcessorApp**.
    - Write a main method that:
        - Reads a large sales data file using LargeFileReader.
        - Processes the data (e.g., filtering records, calculating totals).
        - Writes the processed data to a new file using LargeFileWriter.
        - Demonstrates the error handling by attempting to read and write to non-existent files or restricted directories.

```
cognizant'; & 'C:\Program Files\Java\jdk-17\bin\java.exe' '-XX:+ShowCodeDetailsInExceptionMessages' '-cp' 'C:\U
sers\SENJUTI\AppData\Roaming\Code\User\workspaceStorage\72a5cd4abe3360c7f7cbaabad7406608\redhat.java\jdt_ws\cog
nizant_3b617e60\bin' 'LargeFileProcessor.FileProcessorApp'
Attempting to read a non-existent file:
The file non_existent_input.txt was not found.
java.io.FileNotFoundException: non_existent_input.txt (The system cannot find the file specified)
        at java.base/java.io.FileInputStream.open0(Native Method)
        at java.base/java.io.FileInputStream.open(FileInputStream.java:216)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:157)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:111)
        at java.base/java.io.FileReader.<init>(FileReader.java:60)
        at LargeFileProcessor.LargeFileReader.readLargeFile(LargeFileReader.java:10)
        at LargeFileProcessor.FileProcessorApp.main(FileProcessorApp.java:13)
Attempting to write to a restricted directory:
An error occurred while writing the processed data.
java.io.FileNotFoundException: \restricted_directory\processed_output.txt (The system cannot find the path spec
ified)
        at java.base/java.io.FileOutputStream.open0(Native Method)
        at java.base/java.io.FileOutputStream.open(FileOutputStream.java:293)
        at java.base/java.io.FileOutputStream.<init>(FileOutputStream.java:235)
        at java.base/java.io.FileOutputStream.<init>(FileOutputStream.java:123)
        at java.base/java.io.FileWriter.<init>(FileWriter.java:66)
        at LargeFileProcessor.LargeFileWriter.writeProcessedData(LargeFileWriter.java:10)
        at LargeFileProcessor.FileProcessorApp.main(FileProcessorApp.java:23)
Reading a large file:
The file large_input.txt was not found.
java.io.FileNotFoundException: large_input.txt (The system cannot find the file specified)
        at java.base/java.io.FileInputStream.open0(Native Method)
        at java.base/java.io.FileInputStream.open(FileInputStream.java:216)
```

```
        at LargeFileProcessor.FileProcessorApp.main(FileProcessorApp.java:23)
Reading a large file:
The file large_input.txt was not found.
java.io.FileNotFoundException: large_input.txt (The system cannot find the file specified)
        at java.base/java.io.FileInputStream.open0(Native Method)
        at java.base/java.io.FileInputStream.open(FileInputStream.java:216)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:157)
        at java.base/java.io.FileInputStream.<init>(FileInputStream.java:111)
        at java.base/java.io.FileReader.<init>(FileReader.java:60)
        at LargeFileProcessor.LargeFileReader.readLargeFile(LargeFileReader.java:10)
        at LargeFileProcessor.FileProcessorApp.main(FileProcessorApp.java:27)
Writing processed data:
PS C:\Users\SENJUTI\OneDrive\Documents\Desktop\cognizant>
```

## Exercise 5: File Handling with NIO Package

### Objectives:

- Learn how to use Java NIO package for file operations.
- Understand the differences between java.io and java.nio.

## Business Scenario:

You are tasked with creating a backup system for important files. The system should copy files from a source directory to a backup directory using Java NIO for efficient file operations.

### Tasks:

1. **Setup:**

- Create a new Java project named **BackupSystem**.

2. **Copying Files:**
    - Create a class named **FileCopy**.
    - Write a method **copyFile(Path source, Path target)** that:
        - Takes source and target paths as parameters.
        - Uses **Files.copy** from the **NIO** package to copy the file from source to target.
        - Implements error handling using **try-catch** blocks to handle **IOException**.
3. **Copying Directories:**
    - Create a class named **DirectoryCopy**.
    - Write a method **copyDirectory(Path sourceDir, Path targetDir)** that:
        - Takes source and target directory paths as parameters.
        - Recursively copies all files and subdirectories from the source to the target directory using **Files.walk** and **Files.copy**.
        - Implements error handling using **try-catch** blocks to handle IOException.
4. **User Interaction:**
    - Create a class named **BackupApp**.
    - Write a main method that:
        - Prompts the user for the source and target directories.
        - Uses **DirectoryCopy** to backup all files and directories from the source to the target directory.
        - Demonstrates the error handling by attempting to copy to a read-only directory or a directory with insufficient space.

```
Enter the source directory: projects
Enter the target directory: senjuti
An error occurred while walking the file tree.
java.nio.file.NoSuchFileException: projects
        at java.base/sun.nio.fs.WindowsException.translateToIOException(WindowsException.java:85)
        at java.base/sun.nio.fs.WindowsException.rethrowAsIOException(WindowsException.java:103)
        at java.base/sun.nio.fs.WindowsException.rethrowAsIOException(WindowsException.java:108)
        at java.base/sun.nio.fs.WindowsFileAttributeViews$Basic.readAttributes(WindowsFileAttributeViews.jav
3)
        at java.base/sun.nio.fs.WindowsFileAttributeViews$Basic.readAttributes(WindowsFileAttributeViews.jav
8)
        at java.base/sun.nio.fs.WindowsFileSystemProvider.readAttributes(WindowsFileSystemProvider.java:199)
        at java.base/java.nio.file.Files.readAttributes(Files.java:1851)
        at java.base/java.nio.file.FileTreeWalker.getAttributes(FileTreeWalker.java:220)
        at java.base/java.nio.file.FileTreeWalker.visit(FileTreeWalker.java:277)
        at java.base/java.nio.file.FileTreeWalker.walk(FileTreeWalker.java:323)
        at java.base/java.nio.file.FileTreeIterator.<init>(FileTreeIterator.java:71)
        at java.base/java.nio.file.Files.walk(Files.java:3918)
        at java.base/java.nio.file.Files.walk(Files.java:3973)
        at BackupSystem.DirectoryCopy.copyDirectory(DirectoryCopy.java:9)
        at BackupSystem.BackupApp.main(BackupApp.java:18)
Backup completed.
Attempting to copy to a read-only directory:
```