Exception Handling

Lab 8

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Exceptions Practice

- Throwing custom-made exceptions
  - Unchecked exceptions
    - Is not necessary to catch these exceptions.
    - Throw when a client cannot reasonably recover from this exception.
  - Checked exceptions
    - It is necessary to catch these exceptions.
    - Throw when a client can recover from the exception.
- Catch more specific exceptions first.
  - All the specific exceptions will be caught by the general catch block.

Practice

- Make the DiaryApp (Lab7) more robust!
- Today's skeleton code is the solution code of the last week. (modified a little)
- We are going to practice how to improve our code design with Exception.

Practice 1

- Why `NullPointerException`?
  - As of now, running the main function of DIaryUI throws a `NullPointerException`.
  - Find where the source of this problem is in the main function (don't go into deeper call stacks).
  - Then make the program end gracefully after printing relevant information ("Diary directory data/ is not found.").

```
Exception in thread "main" java.lang.NullPointerException  Create breakpoint
    at java.base/java.util.Arrays.sort(Arrays.java:1441)
    at StorageManager.nameSortedDirectoryFiles(StorageManager.java:72)
    at StorageManager.directoryChildrenLines(StorageManager.java:49)
    at Diary.loadEntries(Diary.java:105)
    at Diary.<init>(Diary.java:16)
    at DiaryUI.initializeDiaryUI(DiaryUI.java:8)
    at DiaryUI.main(DiaryUI.java:55)
```

Practice 1

DiaryUI.java

```
55        try {
56            initializeDiaryUI();
57            do {
58                System.out.println("\nType a command");
59                print("create: Create a diary entry");
60                print("list: List diary entries");
61                print("read <id>: Read a diary entry with <id>");
62                print("delete <id>: Delete a diary entry with <id>");
63                print("search <keyword>: List diary entries whose contents contain <keyword>");
64                System.out.print("Command: ");
65                command = scanner.nextLine();
66            } while (runCommand(command));
67        } catch (NullPointerException e) {
68            System.out.println("Diary directory data/ is not found.");
69        }
```

Without "data" directory.

```
Diary directory data/ is not found.

Process finished with exit code 0
```

With "data" directory.
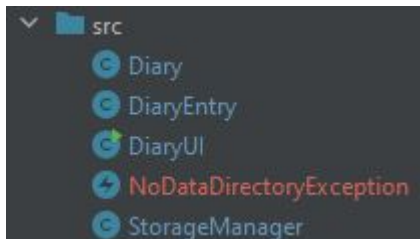
```
Type a command
    create: Create a diary entry
    list: List diary entries
    read <id>: Read a diary entry with <id>
    delete <id>: Delete a diary entry with <id>
    search <keyword>: List diary entries whose contents conta
Command:
```

Practice 2

- Rollback to the original skeleton code, and remove the "data" directory.

- Let's create our own exception class `NoDataDirectoryException` which is raised when there is no "data/" directory.

- Find where the `NullPointerException` is raised in `StorageManager`, throw `NoDataDirectoryException` from the spot, and handle it in the main function of `DiaryUI`.

Practice 2

NoDataDirectoryException.java

```java
public class NoDataDirectoryException extends Exception {
}
```

src
- Diary
- DiaryEntry
- DiaryUI
- NoDataDirectoryException
- StorageManager

StorageManager.java

```java
private static File[] nameSortedDirectoryFiles(String directoryName) throws NoDataDirectoryException
    // TODO: Practice 2
    File[] directoryFiles = directoryFiles(directoryName);
    try {
        Arrays.sort(directoryFiles, Comparator.comparing(File::getName));
    } catch (NullPointerException e) {
        throw new NoDataDirectoryException();
    }
```

```java
public static List<List<String>> directoryChildrenLines(String directoryName) throws NoDataDirectoryException {
```

```java
private void loadEntries() throws NoDataDirectoryException {
```

```java
public Diary() throws NoDataDirectoryException
```

```java
static void initializeDiaryUI() throws NoDataDirectoryException {
```

Practice 2

DiaryUI.java

```java
55    try {
56        initializeDiaryUI();
57        do {
58            System.out.println("\nType a command");
59            print("create: Create a diary entry");
60            print("list: List diary entries");
61            print("read <id>: Read a diary entry with <id>");
62            print("delete <id>: Delete a diary entry with <id>");
63            print("search <keyword>: List diary entries whose contents contain <keyword>");
64            System.out.print("Command: ");
65            command = scanner.nextLine();
66        } while (runCommand(command));
67    } catch (NoDataDirectoryException e) {
68        System.out.println("Diary directory data/ is not found.");
69    }
```

Practice 3

- Modify a method `writeLines` of `StorageManager` to throw `NoDataDirectoryException`.

Practice 3

StorageManager.java

```java
public static void writeLines(String fileName, List<String> strings) throws NoDataDirectoryException {
    try {
        FileWriter fileWriter = new FileWriter(fileName);
        for (String string : strings) {
            fileWriter.write( str string + "\n");
        }
        fileWriter.close();
    } catch (IOException e) {
        // TODO: Practice 3
        throw new NoDataDirectoryException();
    }
}
```

Diary.java

```java
private void saveEntry(DiaryEntry entry) throws NoDataDirectoryException {
```

```java
public void createEntry() throws NoDataDirectoryException {
```

Practice 4

● Inform the users of a successful termination of the diary application.

  ○ Whether the application terminates with an Exception or "exit" command, print the message "Diary application terminated successfully." and close all resources.

Exception is raised ⇒

```
Diary directory data/ is not found.
Diary application exited successfully.
```

Exit command ⇒

```
Type a command
    create: Create a diary entry
    list: List diary entries
    read <id>: Read a diary entry with <id>
    delete <id>: Delete a diary entry with <id>
    search <keyword>: List diary entries whose contents contain <keyword>
    exit: exit the diary app
Command: exit
Diary application exited successfully.
```

Practice 4

DiaryUI.java

```java
56        try {
57            initializeDiaryUI();
58            do {
59                System.out.println("\nType a command");
60                print("create: Create a diary entry");
61                print("list: List diary entries");
62                print("read <id>: Read a diary entry with <id>");
63                print("delete <id>: Delete a diary entry with <id>");
64                print("search <keyword>: List diary entries whose contents contain <keyword>");
65                System.out.print("Command: ");
66                command = scanner.nextLine();
67            } while (runCommand(command));
68        } catch (NoDataDirectoryException e) {
69            System.out.println("Diary directory data/ is not found.");
70        } finally {
71            System.out.println("Diary application terminated successfully.");
72        }
```

Submission

- Compress your final "src" directory into a zip file.
  - After unzipping, the "src" directory must appear.
- Rename your zip file as 20XX-XXXXX_{name}.zip - for example, 2020-12345_KimMinji.zip
- Upload it to eTL - Lab 8 assignment.