

# LAB ASSIGNMENT-19.2

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COURSE:AI ASSISTED CODING

BATCH:01(AIML)

## QUESTIONS:

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	<p><b>Lab Question 1: Sorting Algorithm Translation</b></p> <p>You are part of a multinational development team. The backend is written in <b>Java</b>, but a new module requires a <b>Python</b> implementation of the same algorithm for integration with a data science pipeline.</p> <ul style="list-style-type: none"><li>• <b>Task 1:</b> Use AI-assisted coding to translate a given <b>Java bubble sort program</b> into Python. Verify that the translated code works correctly.</li><li>• <b>Task 2:</b> Introduce errors in the Python version to check if the input list is empty or contains non-numeric values.</li></ul>
	<p><b>Lab Question 2: File Handling Translation</b></p> <p>A company's legacy codebases stores and processes files in <b>C++</b>, but the analytics team needs an equivalent program in <b>JavaScript (Node.js)</b> for integration with a web dashboard.</p> <ul style="list-style-type: none"><li>• <b>Task 1:</b> Translate a given <b>C++ file read-and-write program</b> into JavaScript using AI assistance. Ensure the script reads a text file and writes processed output to a new file.</li><li>• <b>Task 2:</b> Add error handling in the JavaScript version to gracefully handle missing files or permission errors.</li></ul>
	<p><b>Lab Question 3: API Call Translation</b></p> <p>Your team developed a prototype in <b>Python</b> to fetch weather data from an API, but the production environment only supports <b>Java</b>.</p> <ul style="list-style-type: none"><li>• <b>Task 1:</b> Translate the Python script (that makes an API call and prints the response) into Java using AI-assisted coding. Ensure equivalent functionality.</li><li>• <b>Task 2:</b> Add proper error handling in the Java version for cases such as invalid API key, request timeout, or no internet connection.</li></ul>

## LAB QUESTION 1:

### PROMPT:

*You are part of a multinational development team.*

*The backend system uses Java, but a new module requires a Python implementation for integration with a data science pipeline.*

*Task 1: Use AI-assisted coding to translate the following Java Bubble Sort program into Python and verify that it works correctly.*

*Task 2: Modify the Python version to include error handling that checks if the input list is empty or contains non-numeric values. If so, print an appropriate error message instead of sorting.*

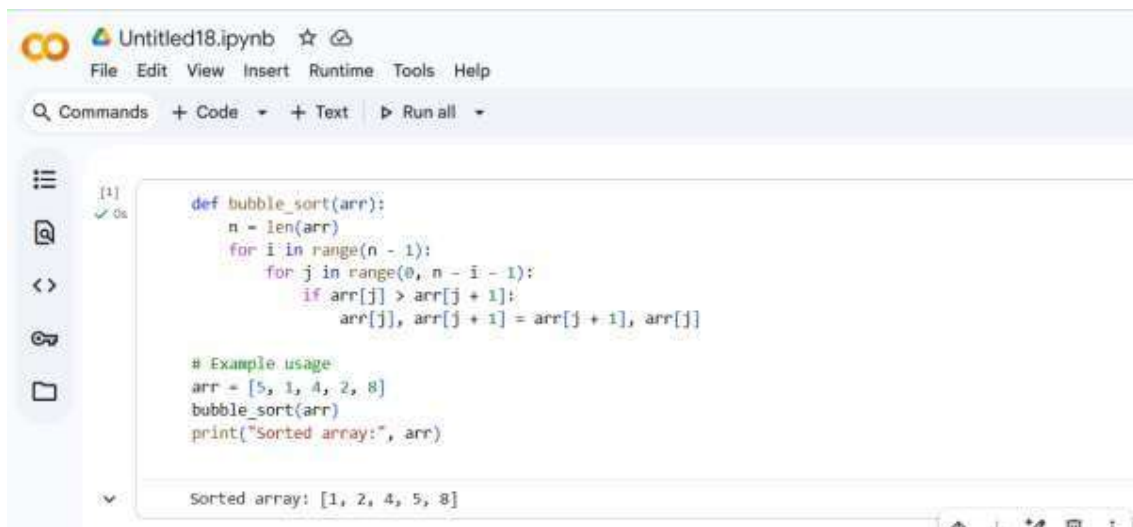
### CODE:

```
public class BubbleSort {  
    public static void main(String[] args) {  
        int[] arr = {5, 1, 4, 2, 8};    bubbleSort(arr);  
        System.out.println("Sorted array:");  
        for (int num : arr) {  
            System.out.print(num + " ");  
        }  
    }  
  
    static void bubbleSort(int[] arr) {  
        int n = arr.length;
```

```

    for (int i = 0; i < n - 1; i++) {
    for (int j = 0; j < n - i - 1; j++) {
    if (arr[j] > arr[j + 1]) {          int
    temp = arr[j];          arr[j] =
    arr[j + 1];          arr[j + 1] =
    temp;
    }
    }
    }
    }
}

```



The screenshot shows a Jupyter Notebook titled "Untitled18.ipynb". The interface includes a menu bar (File, Edit, View, Insert, Runtime, Tools, Help) and a toolbar with icons for commands, code, text, and running all cells. The main area contains a code cell with the following Python code:

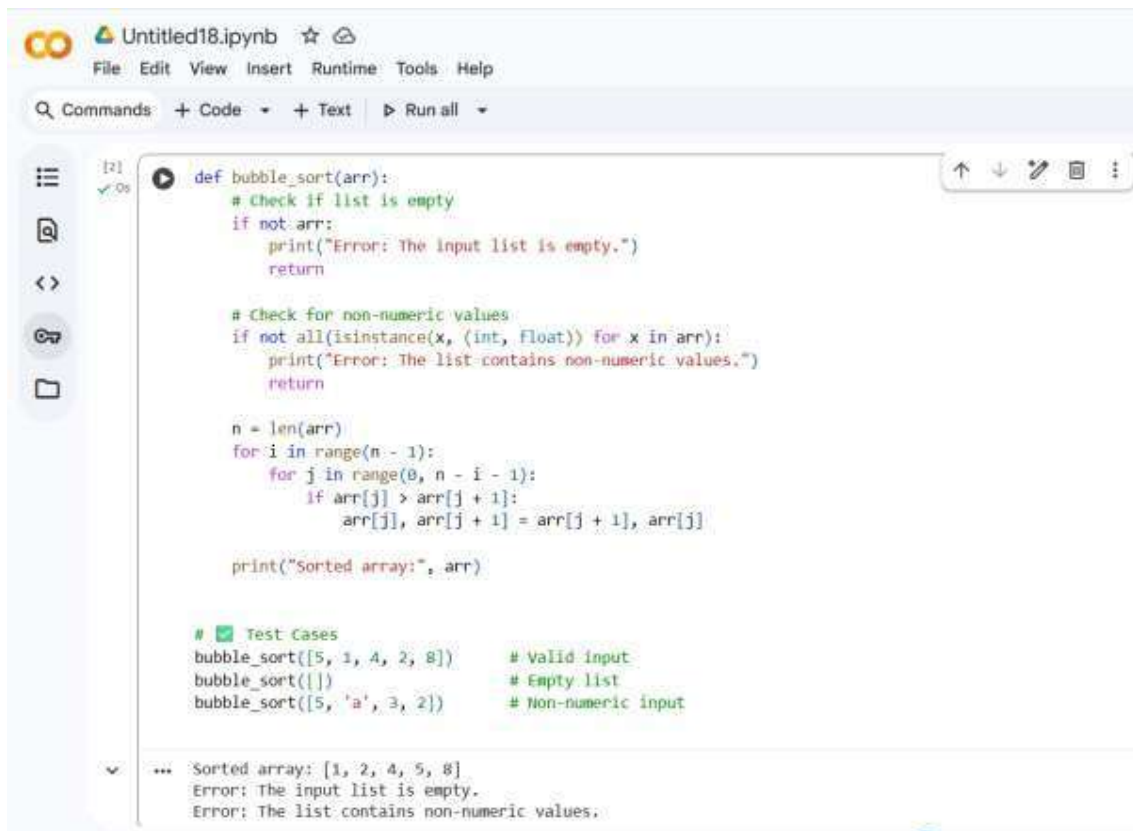
```

def bubble_sort(arr):
    n = len(arr)
    for i in range(n - 1):
        for j in range(0, n - i - 1):
            if arr[j] > arr[j + 1]:
                arr[j], arr[j + 1] = arr[j + 1], arr[j]

# Example usage
arr = [5, 1, 4, 2, 8]
bubble_sort(arr)
print("Sorted array:", arr)

```

The output of the code cell is displayed at the bottom: "Sorted array: [1, 2, 4, 5, 8]".



The screenshot shows a Jupyter Notebook titled 'Untitled18.ipynb'. The code defines a `bubble_sort` function that checks for an empty list and non-numeric values before performing a bubble sort. Below the function, three test cases are provided: a valid input list, an empty list, and a list with a non-numeric value. The output shows the sorted array for the first test case and error messages for the other two.

```
def bubble_sort(arr):  
    # Check if list is empty  
    if not arr:  
        print("Error: The input list is empty.")  
        return  
  
    # Check for non-numeric values  
    if not all(isinstance(x, (int, float)) for x in arr):  
        print("Error: The list contains non-numeric values.")  
        return  
  
    n = len(arr)  
    for i in range(n - 1):  
        for j in range(0, n - i - 1):  
            if arr[j] > arr[j + 1]:  
                arr[j], arr[j + 1] = arr[j + 1], arr[j]  
  
    print("Sorted array:", arr)  
  
# Test Cases  
bubble_sort([5, 1, 4, 2, 8]) # Valid input  
bubble_sort([]) # Empty list  
bubble_sort([5, 'a', 3, 2]) # Non-numeric input
```

Output:

```
Sorted array: [1, 2, 4, 5, 8]  
Error: The input list is empty.  
Error: The list contains non-numeric values.
```

## LAB QUESTION 2:

### PROMPT:

*You are part of a development team that is modernizing a company's legacy C++ system.*

*The old system reads a text file, processes its content, and writes the results to a new file.*

*Task 1: Use AI-assisted coding to translate the given C++ file read-and-write program into JavaScript (Node.js).*

*Ensure that the JavaScript version correctly reads data from a text file and writes processed output (for example, uppercase text) into a new file.*

*Task 2*

*Extend the JavaScript (Node.js) file-handling program by adding error handling.*

*The updated script should handle missing input files, invalid permissions, or any I/O errors gracefully, showing userfriendly messages without crashing the program.*

**CODE :**

```
#include <iostream>

#include <fstream>

#include <string> using
namespace std;

int main() {
    ifstream inputFile("input.txt");
    ofstream outputFile("output.txt");
    string line;

    if (inputFile.is_open() && outputFile.is_open()) {
        while (getline(inputFile, line)) {            outputFile
        << line << endl;
        }
        cout << "File has been copied successfully." << endl;
    } else {
        cout << "Error opening file." << endl;
    }

    inputFile.close();
    outputFile.close();
}
```

```
    return 0;
}
```



The screenshot shows a Jupyter Notebook window titled "Untitled18.ipynb". The interface includes a menu bar (File, Edit, View, Insert, Runtime, Tools, Help) and a toolbar with icons for commands, code, text, and running all cells. The active cell is a code cell containing JavaScript code that uses the `fs` module to read a file, process its content (convert to uppercase), and write it to a new file. The code is as follows:

```
%%writefile file_processor.js

const fs = require('fs');


const inputFile = 'input.txt';
const outputFile = 'output.txt';

fs.readFile(inputFile, 'utf8', (err, data) => {
  if (err) {
    console.error('Error reading file ${inputFile}:', err);
    return;
  }

  // Process the content (e.g., convert to uppercase)
  const processedContent = data.toUpperCase();

  fs.writeFile(outputFile, processedContent, 'utf8', (err) => {
    if (err) {
      console.error('Error writing file ${outputFile}:', err);
      return;
    }
    console.log('File has been processed and copied successfully to output.txt.');
```

Below the code cell, a status bar indicates "Writing file\_processor.js".

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'''  
Writing file\_processor.js

Next, let's run the Node.js script we just created.

[6]

✓ 0s

▶ node file\_processor.js  
... File has been processed and copied successfully to output.txt.


Finally, let's verify the content of the `output.txt` file to ensure the translation and processing worked correctly.

[7]

✓ 0s

```
with open('output.txt', 'r') as f:  
    output_content = f.read()  
  
print("Content of 'output.txt':\n---\n" + output_content + "\n---")
```

Content of 'output.txt':  
---  
HELLO FROM C++ LEGACY SYSTEM!  
THIS IS A TEST LINE.  
NODE.JS WILL PROCESS THIS.  
---

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[9]

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```
!mv input.txt input_original.txt  
print("Renamed 'input.txt' to 'input_original.txt' to simulate a missing file.")
```

Renamed 'input.txt' to 'input\_original.txt' to simulate a missing file.

Now, let's run the Node.js script. It should now output an error message because `input.txt` is missing.

[10]

✓ 0s

▶ node file\_processor.js  
Error during reading of input.txt: File not found. Please ensure the input file exists.

As you can see, the script gracefully handled the missing file. Now, let's restore the original `input.txt` and run the script one more time to confirm it still works as expected when the file is present.

[11]

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```
!mv input_original.txt input.txt  
print("Restored 'input.txt'.")
```

Restored 'input.txt'.

Running the script again with the `input.txt` file restored.

[12]

✓ 0s

▶ node file\_processor.js  
File has been processed and copied successfully to output.txt.

Great! Let's create a example I create a file that our Node.js script will read from

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First, let's create a sample `input.txt` file that our Node.js script will read from.

```
[4] with open('input.txt', 'w') as f:
    f.write('Hello from C++ legacy system!\n')
    f.write('This is a test line.\n')
    f.write('Node.js will process this.')

print("Created 'input.txt' successfully.")
```

Created 'input.txt' successfully.

Now, here is the JavaScript (Node.js) translation of your C++ program. It uses Node.js's built-in `fs` module to handle file operations. I've also added a step to convert the content to uppercase before writing it to `output.txt`.

```
[8] %writefile file_processor.js

const fs = require('fs');

const inputFile = 'input.txt';
const outputFile = 'output.txt';

// Function to handle errors gracefully with more specific messages
function handleError(err, operation, filePath) {
    let errorMessage = `Error during ${operation} of ${filePath}: `;
    if (err.code === 'ENOENT') {
        errorMessage += 'File not found. Please ensure the input file exists.';
    }
}
```

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```
[8] // Function to handle errors gracefully with more specific messages
function handleError(err, operation, filePath) {
    let errorMessage = `Error during ${operation} of ${filePath}: `;
    if (err.code === 'ENOENT') {
        errorMessage += 'File not found. Please ensure the input file exists.';
    } else if (err.code === 'EACCES') {
        errorMessage += 'Permission denied. Please check file permissions.';
    } else {
        errorMessage += `An unexpected I/O error occurred: ${err.message}`;
    }
    console.error(errorMessage);
}

fs.readFile(inputFile, 'utf8', (err, data) => {
    if (err) {
        handleError(err, 'reading', inputFile);
        return;
    }

    // Process the content (e.g., convert to uppercase)
    const processedContent = data.toUpperCase();

    fs.writeFile(outputFile, processedContent, 'utf8', (err) => {
        if (err) {
            handleError(err, 'writing', outputFile);
            return;
        }
        console.log('File has been processed and copied successfully to output.txt.');
```



### *LAB QUESTION 3:*

#### *PROMPT:*

##### *API Call Translation*

*You are part of a software development team migrating a data pipeline from Python to Java.*

*The Python prototype makes an API call to fetch weather data and prints the response.*

*Task 1: Use AI-assisted coding to translate the following Python API call program into Java while ensuring equivalent functionality (fetch data and print the JSON response).*

##### *Task 2*

*Extend the translated Java API program to include robust error handling.*

*The Java version should gracefully handle the following scenarios:*

- Invalid API key (HTTP 401)*
- Request timeout*
- No internet connection or network issues*

*Print clear error messages for each case without the program crashing.*

#### *CODE:*

```
import requests
```

```
def get_weather():
```

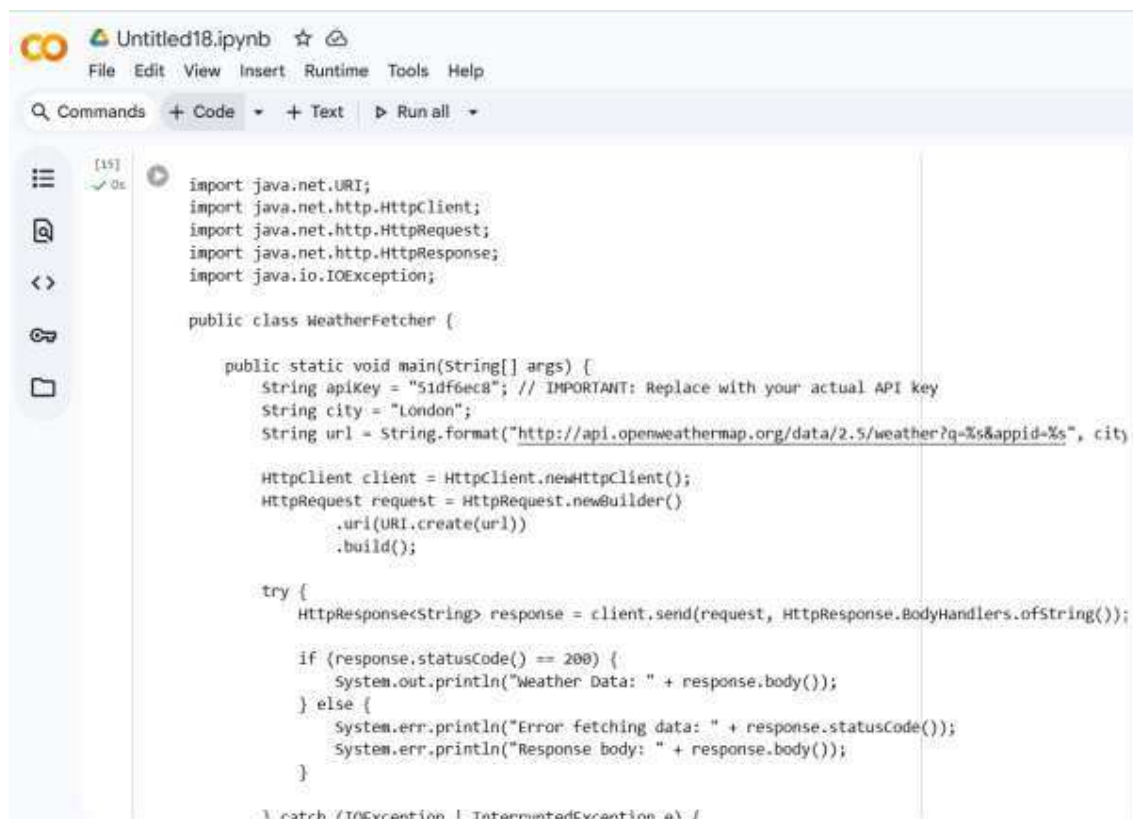
```

    api_key = "your_api_key_here"
    city = "London"    url =
f"http://api.openweathermap.org/data/2.5/weather?q={city}&appid={api_key}
"

    response = requests.get(url)
    if response.status_code == 200:
        print("Weather Data:", response.json())
    else:
        print("Error fetching data:", response.status_code)

get_weather()

```



The screenshot shows a Jupyter Notebook titled "Untitled18.ipynb" with a menu bar (File, Edit, View, Insert, Runtime, Tools, Help) and a toolbar (Commands, + Code, + Text, Run all). The code cell contains the following Java code:

```

import java.net.URI;
import java.net.http.HttpClient;
import java.net.http.HttpRequest;
import java.net.http.HttpResponse;
import java.io.IOException;

public class WeatherFetcher {

    public static void main(String[] args) {
        String apiKey = "51df6ec8"; // IMPORTANT: Replace with your actual API key
        String city = "London";
        String url = String.format("http://api.openweathermap.org/data/2.5/weather?q=%s&appid=%s", city, apiKey);

        HttpClient client = HttpClient.newHttpClient();
        HttpRequest request = HttpRequest.newBuilder()
            .uri(URI.create(url))
            .build();

        try {
            HttpResponse<String> response = client.send(request, HttpResponse.BodyHandlers.ofString());

            if (response.statusCode() == 200) {
                System.out.println("Weather Data: " + response.body());
            } else {
                System.err.println("Error: fetching data: " + response.statusCode());
                System.err.println("Response body: " + response.body());
            }
        } catch (IOException | InterruptedException e) {
            e.printStackTrace();
        }
    }
}

```

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```

[15] ✓ Ok
HttpClient client = HttpClient.newHttpClient();
HttpRequest request = HttpRequest.newBuilder()
    .uri(URI.create(url))
    .build();

try {
    HttpResponse<String> response = client.send(request, HttpResponse.BodyHandlers.ofString());

    if (response.statusCode() == 200) {
        System.out.println("Weather Data: " + response.body());
    } else {
        System.err.println("Error fetching data: " + response.statusCode());
        System.err.println("Response body: " + response.body());
    }
} catch (IOException | InterruptedException e) {
    System.err.println("An error occurred during the API call: " + e.getMessage());
    e.printStackTrace();
}
}

Overwriting WeatherFetcher.java

```

Now, let's compile and run the Java code.

Since Colab primarily supports Python, we'll compile and run the Java code using shell commands. Please ensure

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work. For demonstration purposes, I'll write this Java code to a file named `WeatherFetcher.java`.

```

[19] ✓ Ok
%%writefile WeatherFetcher.java

import java.io.IOException;
import java.net.URI;
import java.net.http.HttpClient;
import java.net.http.HttpRequest;
import java.net.http.HttpResponse;
import java.time.Duration; // Import Duration for timeouts

public class WeatherFetcher {

    public static void main(String[] args) {
        // IMPORTANT: Replace with your actual API key, or use an invalid one for testing 401 error
        String apiKey = "51df6ec8";
        String city = "London";
        String url = String.format("http://api.openweathermap.org/data/2.5/weather?q=%s&appid=%s", city,
            apiKey);

        HttpClient client = HttpClient.newBuilder()
            .connectTimeout(Duration.ofSeconds(10)) // Set connection timeout
            .build();

        HttpRequest request = HttpRequest.newBuilder()
            .uri(URI.create(url))
            .timeout(Duration.ofSeconds(15)) // Set request timeout
            .build();

        try {

```



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[15]

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```
try {
    HttpResponse<String> response = client.send(request, HttpResponse.Bod
    ↑ ↓ ↶ ↷ ✎ 🗑 ⋮;

    if (response.statusCode() == 200) {
        System.out.println("Weather Data: " + response.body());
    } else if (response.statusCode() == 401) {
        System.err.println("Error: Invalid API Key. Please check your OpenWeatherMap API key.");
        System.err.println("Response body: " + response.body());
    } else if (response.statusCode() == 404) {
        System.err.println("Error: City not found or invalid request. Status Code: " + response
        System.err.println("Response body: " + response.body());
    } else {
        System.err.println("Error fetching data. Status Code: " + response.statusCode());
        System.err.println("Response body: " + response.body());
    }
} catch (IOException e) {
    if (e instanceof java.net.UnknownHostException) {
        System.err.println("Network Error: Unknown host. Check your internet connection or URL.");
    } else if (e instanceof java.net.SocketTimeoutException) {
        System.err.println("Network Error: Request timed out. The server took too long to resp
    } else {
        System.err.println("Network or I/O Error: An error occurred during the API call: " + e.
    }
    e.printStackTrace();
} catch (InterruptedException e) {
    System.err.println("Error: The API call was interrupted: " + e.getMessage());
    Thread.currentThread().interrupt(); // Restore the interrupted status
    e.printStackTrace();
}
```