# System Requirements Specification Index

For

# Kafka with python

## Temperature Monitoring for an Industrial Facility

Version 1.0

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Problem Statement : Real-Time Temperature Monitoring for an Industrial Facility

Description : Use relevant methods operations toperform specified activities which are given in the instructions.

An industrial facility requires a system to continuously monitor the temperature across various zones (e.g., warehouses, manufacturing units, server rooms) to ensure optimal operating conditions and prevent equipment failures. The facility is equipped with IoT sensors that record temperature data in real time. The data needs to be processed, stored, and analyzed to trigger alerts if temperatures exceed predefined thresholds.

## System Components:

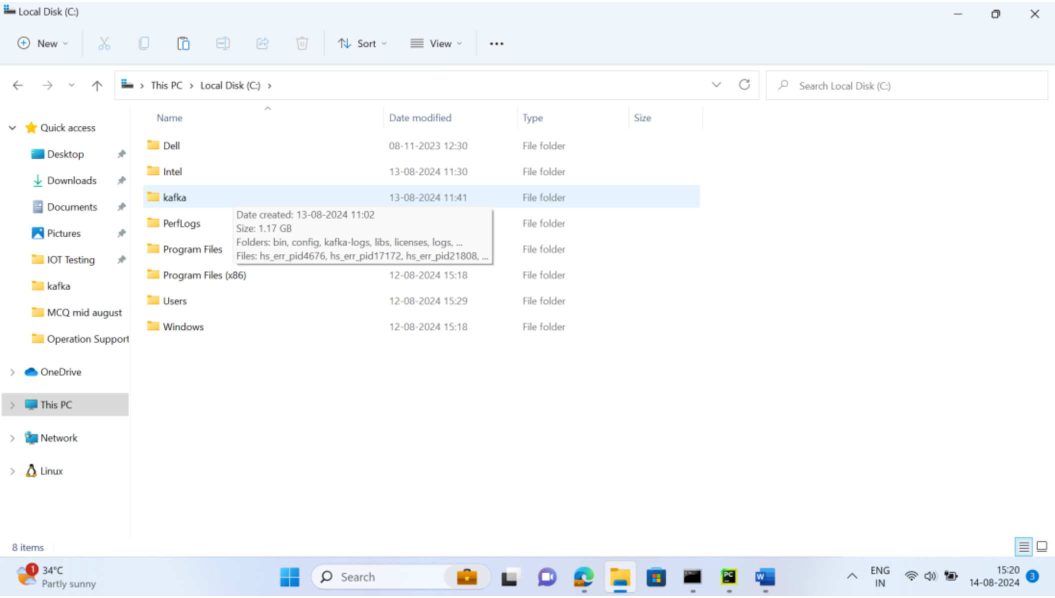
1. **IoT Sensors:**
   - **Purpose:** Measure the temperature at different locations in the facility.
   - **Data:** Each sensor sends temperature readings every second to a central system.
2. **Kafka Producer (`produce_temperature_data`):**
   - **Purpose:** The Kafka Producer reads temperature data from the IoT sensors and sends it to a Kafka topic (`temperature_topic`).
   - **Functionality:** It packages each temperature reading as a message and publishes it to Kafka, enabling real-time data streaming.
3. **Kafka Consumer (`consume_temperature_data`):**
   - **Purpose:** The Kafka Consumer reads the temperature data from the Kafka topic.
   - **Functionality:** It processes the data to check if any temperature readings exceed predefined thresholds. If so, it triggers an alert system to notify maintenance teams.
4. **Data Processing Module (`start_producer`, `start_consumer`):**
   - **Purpose:** To continuously produce and consume temperature data.
   - **Functionality:**
     - The `start_producer` function initiates the producer to start reading from IoT sensors and sending data to the Kafka topic.
     - The `start_consumer` function starts the consumer to process the incoming data, analyze it, and generate alerts if necessary.

## Workflow:

1. **Data Collection:**
   - IoT sensors deployed across the facility continuously measure the temperature and transmit this data to the Kafka Producer.
2. **Data Ingestion:**
   - The Kafka Producer running in the system continuously reads these temperature readings and publishes them to the `temperature_topic` in the Kafka cluster.
   - Each reading is sent as a message, ensuring that no data is lost and that all temperature data is available for processing.

### Kafka setup

You can see the kafka setup in the download folder



| Name | Date modified | Type | Size |
|---|---|---|---|
| Dell | 08-11-2023 12:30 | File folder | |
| Intel | 13-08-2024 11:30 | File folder | |
| kafka | 13-08-2024 11:41 | File folder | |
| PerfLogs | | File folder | |
| Program Files | | File folder | |
| Program Files (x86) | 12-08-2024 15:18 | File folder | |
| Users | 12-08-2024 15:29 | File folder | |
| Windows | 12-08-2024 15:18 | File folder | |

Date created: 13-08-2024 11:02
Size: 1.17 GB
Folders: bin, config, kafka-logs, libs, licenses, logs, ...
Files: hs_err_pid4676, hs_err_pid17172, hs_err_pid21808, ...

### 1. Extract Kafka:

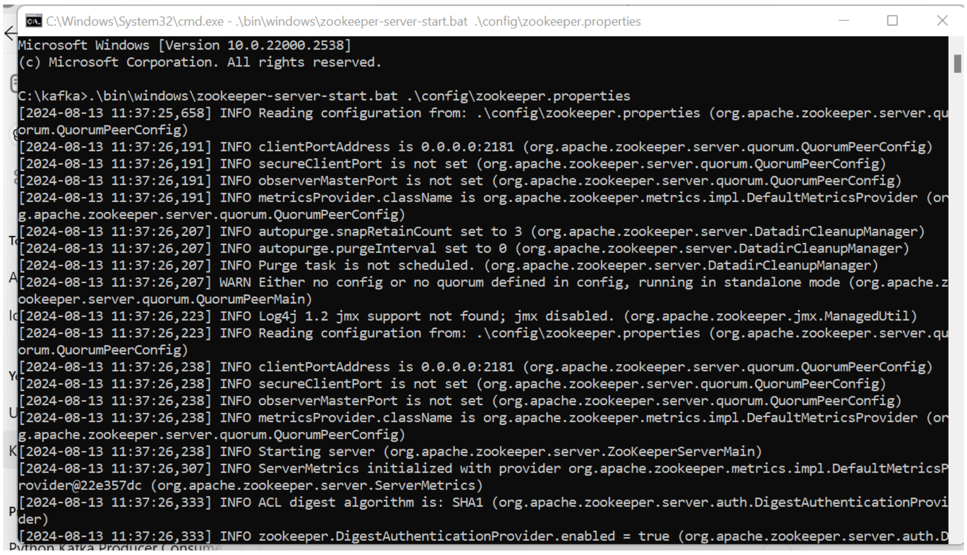
- Extract the downloaded Kafka binaries into a directory of your choice (e.g., C:\kafka).

### 2. Set Up Zookeeper:

- Kafka uses Zookeeper to manage distributed brokers. Zookeeper is included in the Kafka distribution.

**In the command prompt type the following command .**

.\bin\windows\zookeeper-server-start.bat .\config\zookeeper.properties



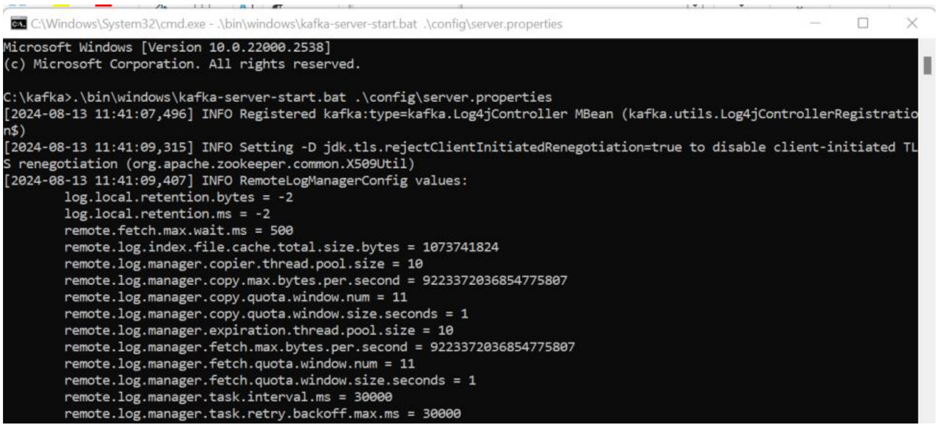
C:\Windows\System32\cmd.exe - .\bin\windows\zookeeper-server-start.bat  .\config\zookeeper.properties

```
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.

C:\kafka>.\bin\windows\zookeeper-server-start.bat .\config\zookeeper.properties
[2024-08-13 11:37:25,658] INFO Reading configuration from: .\config\zookeeper.properties (org.apache.zookeeper.server.qu
orum.QuorumPeerConfig)
[2024-08-13 11:37:26,191] INFO clientPortAddress is 0.0.0.0:2181 (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,191] INFO secureClientPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,191] INFO observerMasterPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,191] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider (or
g.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,207] INFO autopurge.snapRetainCount set to 3 (org.apache.zookeeper.server.DatadirCleanupManager)
[2024-08-13 11:37:26,207] INFO autopurge.purgeInterval set to 0 (org.apache.zookeeper.server.DatadirCleanupManager)
[2024-08-13 11:37:26,207] INFO Purge task is not scheduled. (org.apache.zookeeper.server.DatadirCleanupManager)
[2024-08-13 11:37:26,207] WARN Either no config or no quorum defined in config, running in standalone mode (org.apache.z
ookeeper.server.quorum.QuorumPeerMain)
[2024-08-13 11:37:26,223] INFO Log4j 1.2 jmx support not found; jmx disabled. (org.apache.zookeeper.jmx.ManagedUtil)
[2024-08-13 11:37:26,223] INFO Reading configuration from: .\config\zookeeper.properties (org.apache.zookeeper.server.qu
orum.QuorumPeerConfig)
[2024-08-13 11:37:26,238] INFO clientPortAddress is 0.0.0.0:2181 (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,238] INFO secureClientPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,238] INFO observerMasterPort is not set (org.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,238] INFO metricsProvider.className is org.apache.zookeeper.metrics.impl.DefaultMetricsProvider (or
g.apache.zookeeper.server.quorum.QuorumPeerConfig)
[2024-08-13 11:37:26,238] INFO Starting server (org.apache.zookeeper.server.ZooKeeperServerMain)
[2024-08-13 11:37:26,307] INFO ServerMetrics initialized with provider org.apache.zookeeper.metrics.impl.DefaultMetricsP
rovider@22e357dc (org.apache.zookeeper.server.ServerMetrics)
[2024-08-13 11:37:26,333] INFO ACL digest algorithm is: SHA1 (org.apache.zookeeper.server.auth.DigestAuthenticationProvi
der)
[2024-08-13 11:37:26,333] INFO zookeeper.DigestAuthenticationProvider.enabled = true (org.apache.zookeeper.server.auth.D
```

**In an another  command prompt**

Start Kafka Broker:

.\bin\windows\kafka-server-start.bat .\config\server.properties



C:\Windows\System32\cmd.exe - .\bin\windows\kafka-server-start.bat .\config\server.properties

```
Microsoft Windows [Version 10.0.22000.2538]
(c) Microsoft Corporation. All rights reserved.

C:\kafka>.\bin\windows\kafka-server-start.bat .\config\server.properties
[2024-08-13 11:41:07,496] INFO Registered kafka:type=kafka.Log4jController MBean (kafka.utils.Log4jControllerRegistratio
n$)
[2024-08-13 11:41:09,315] INFO Setting -D jdk.tls.rejectClientInitiatedRenegotiation=true to disable client-initiated TL
S renegotiation (org.apache.zookeeper.common.X509Util)
[2024-08-13 11:41:09,407] INFO RemoteLogManagerConfig values:
        log.local.retention.bytes = -2
        log.local.retention.ms = -2
        remote.fetch.max.wait.ms = 500
        remote.log.index.file.cache.total.size.bytes = 1073741824
        remote.log.manager.copier.thread.pool.size = 10
        remote.log.manager.copy.max.bytes.per.second = 9223372036854775807
        remote.log.manager.copy.quota.window.num = 11
        remote.log.manager.copy.quota.window.size.seconds = 1
        remote.log.manager.expiration.thread.pool.size = 10
        remote.log.manager.fetch.max.bytes.per.second = 9223372036854775807
        remote.log.manager.fetch.quota.window.num = 11
        remote.log.manager.fetch.quota.window.size.seconds = 1
        remote.log.manager.task.interval.ms = 30000
        remote.log.manager.task.retry.backoff.max.ms = 30000
```

Question using the template provide your are requested to create python code

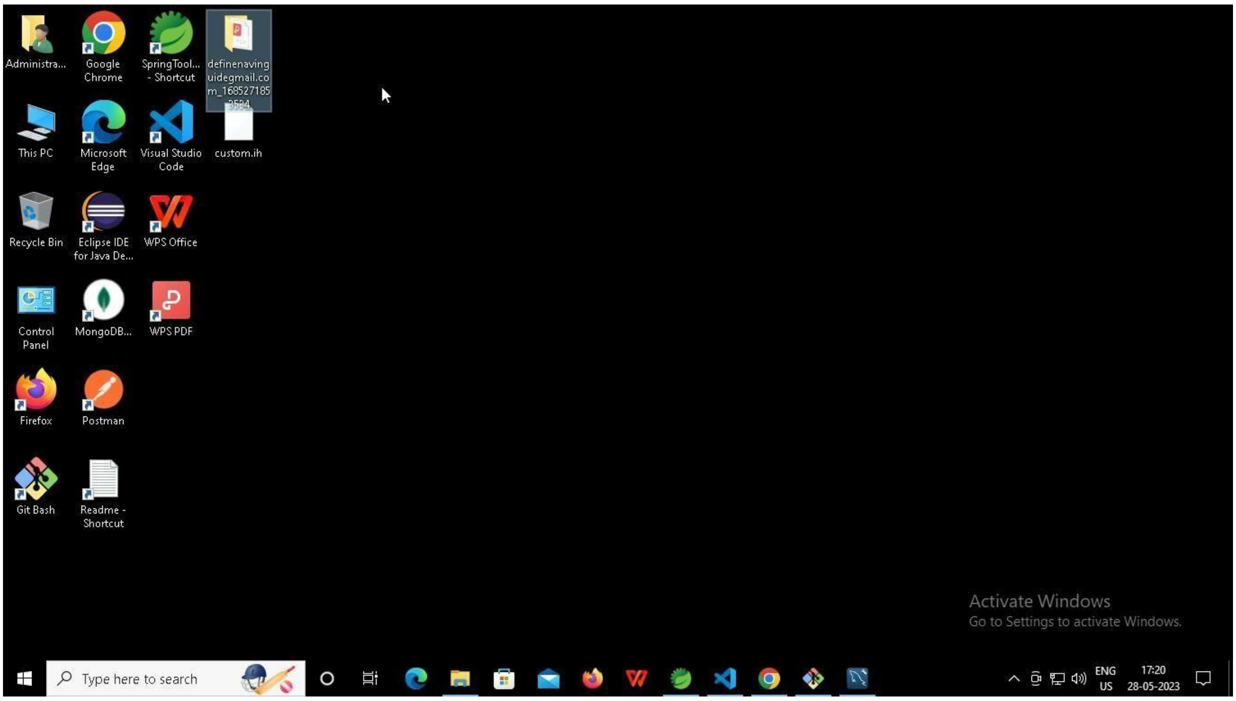
1. Write a function to produce temperature data
2. Write a function to consume temperature data
3. Write a function to fetch the data with the produced to consumer

### Execution Steps to Follow:

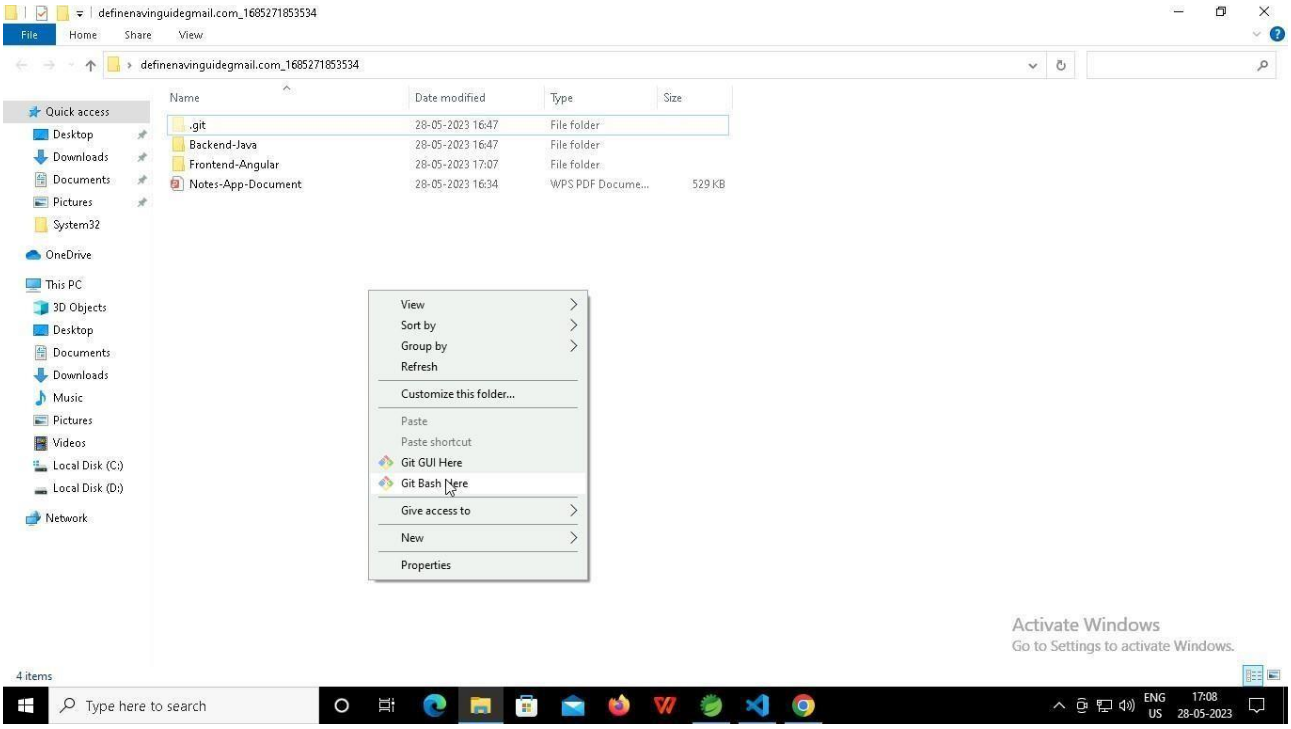
1. Use the same dataset as follows temperatures = [22.5, 23.0, 23.5, 24.0, 24.5]
2. Capture the data from producer to consumer
3. Perform all the methods
4. Upload the code to the Github
5. Submit the code the get the test auto graded

## Steps to upload the code to github

1. **Make sure before final submission you commit all changes to git**. For that open the project folder available on desktop


Administra...
Google Chrome
SpringTool... - Shortcut
definenaving uidegmail.co m_168527185 3534
This PC
Microsoft Edge
Visual Studio Code
custom.ih
Recycle Bin
Eclipse IDE for Java De...
WPS Office
Control Panel
MongoDB...
WPS PDF
Firefox
Postman
Git Bash
Readme - Shortcut
Activate Windows
Go to Settings to activate Windows.
Type here to search
ENG
US
17:20
28-05-2023

a. Right click in folder and open Git Bash

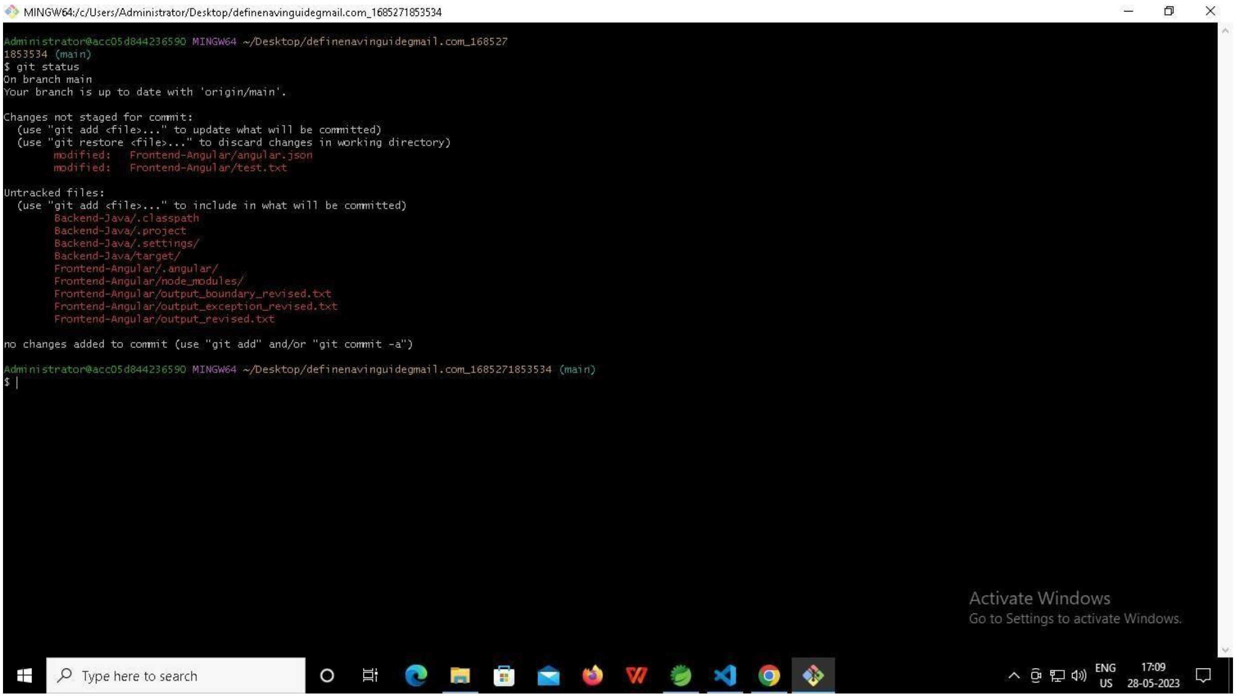


definenavinguidegmail.com_1685271853534

| Name | Date modified | Type | Size |
|---|---|---|---|
| .git | 28-05-2023 16:47 | File folder | |
| Backend-Java | 28-05-2023 16:47 | File folder | |
| Frontend-Angular | 28-05-2023 17:07 | File folder | |
| Notes-App-Document | 28-05-2023 16:34 | WPS PDF Docume... | 529 KB |

b. In Git bash terminal, run following commands

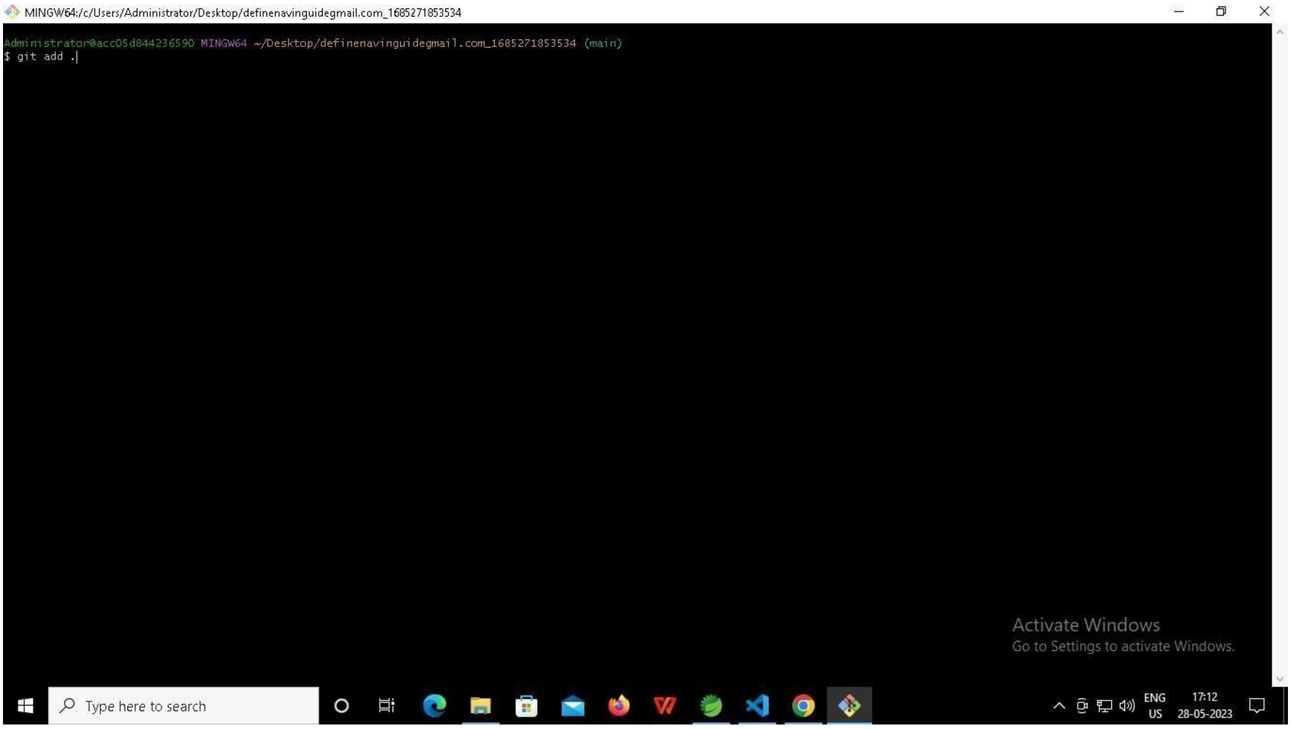
c. git status



MINGW64:/c/Users/Administrator/Desktop/definenavinguidegmail.com_1685271853534

```
Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_168527
1853534 (main)
$ git status
On branch main
Your branch is up to date with 'origin/main'.

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
        modified:   Frontend-Angular/angular.json
        modified:   Frontend-Angular/test.txt

Untracked files:
  (use "git add <file>..." to include in what will be committed)
        Backend-Java/.classpath
        Backend-Java/.project
        Backend-Java/.settings/
        Backend-Java/target/
        Frontend-Angular/.angular/
        Frontend-Angular/node_modules/
        Frontend-Angular/output_boundary_revised.txt
        Frontend-Angular/output_exception_revised.txt
        Frontend-Angular/output_revised.txt

no changes added to commit (use "git add" and/or "git commit -a")

Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_1685271853534 (main)
$ |
```

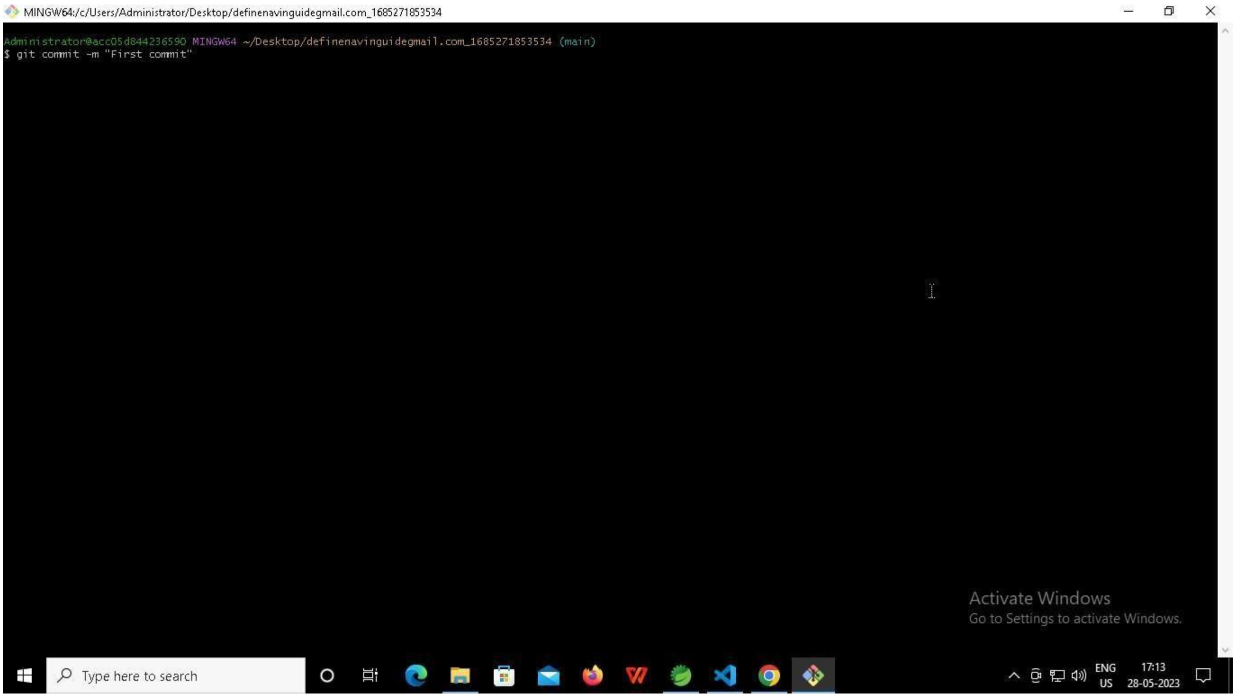
d. git add .



MINGW64:/c/Users/Administrator/Desktop/definenavinguidegmail.com_1685271853534

```
Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_1685271853534 (main)
$ git add .
```

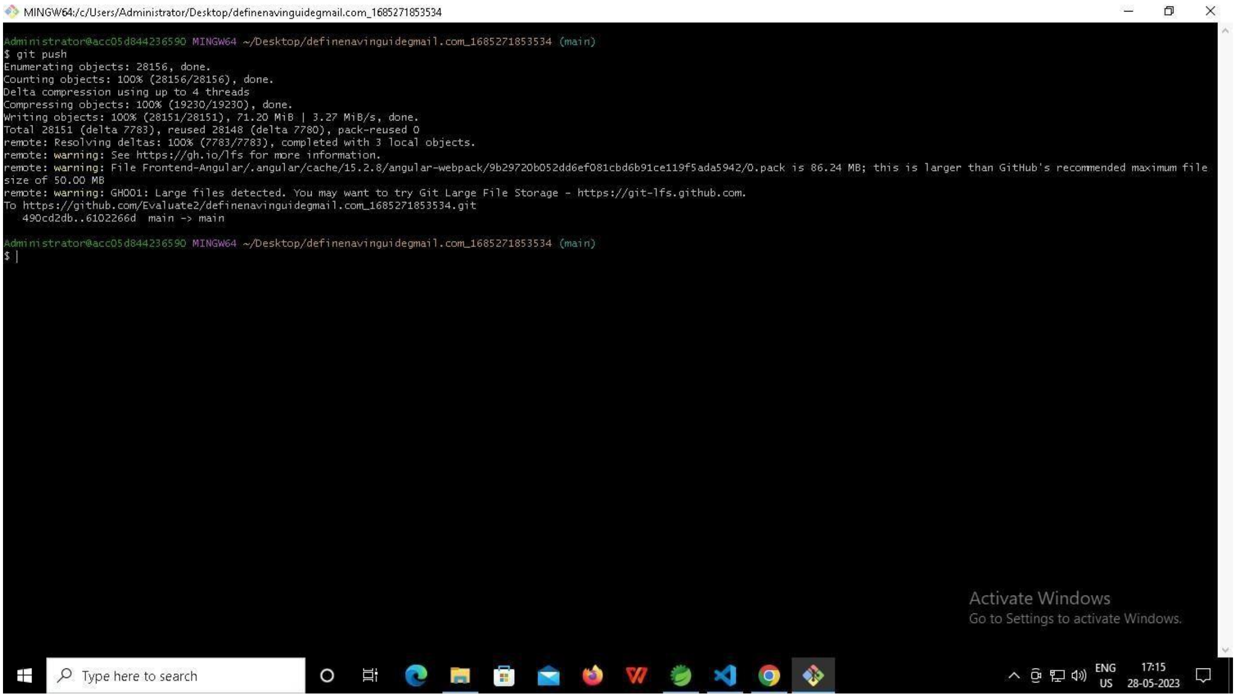
e. git commit -m “First commit”
(You can provide any message every time you commit)



MINGW64:/c/Users/Administrator/Desktop/definenavinguidegmail.com_1685271853534

```
Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_1685271853534 (main)
$ git commit -m "First commit"
```

f. git push



MINGW64:/c/Users/Administrator/Desktop/definenavinguidegmail.com_1685271853534

```
Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_1685271853534 (main)
$ git push
Enumerating objects: 28156, done.
Counting objects: 100% (28156/28156), done.
Delta compression using up to 4 threads
Compressing objects: 100% (19230/19230), done.
Writing objects: 100% (28151/28151), 71.20 MiB | 3.27 MiB/s, done.
Total 28151 (delta 7783), reused 28148 (delta 7780), pack-reused 0
remote: Resolving deltas: 100% (7783/7783), completed with 3 local objects.
remote: warning: See https://gh.io/lfs for more information.
remote: warning: File Frontend-Angular/.angular/cache/15.2.8/angular-webpack/9b29720b052dd6ef081cbd6b91ce119f5ada5942/0.pack is 86.24 MB; this is larger than GitHub's recommended maximum file
size of 50.00 MB
remote: warning: GH001: Large files detected. You may want to try Git Large File Storage - https://git-lfs.github.com.
To https://github.com/Evaluate2/definenavinguidegmail.com_1685271853534.git
   490cd2db..6102266d  main -> main

Administrator@acc05d844236590 MINGW64 ~/Desktop/definenavinguidegmail.com_1685271853534 (main)
$ |
```

-----x-----