SONARQUBE CPP PROJECT ANALYSIS

Step 1: Install Prequisites

1. sudo apt install openjdk-17-jdk –y
2. sudo apt install cppcheck
3. sudo apt install curl

Step 2: Install SonarQube community edition

‘’’

cd ~/Downloads

unzip sonarqube-9.9.8.100196.zip

sudo mv sonarqube-9.9.8.100196 /opt/sonarqube

sudo chown -R $USER:$USER /opt/sonarqube

cd /opt/sonarqube/bin/linux-x86-64

./sonar.sh start

‘’’

Step 3: Go to SonarQube server

1. http://127.0.0.1:9000
2. Login:
   Username- admin
   Password- admin
   (Change to new password when prompted)
3. Click on manually create project.,
   A. Give project name [eg., cpp-analysis] and fill other stuffs and click create.
   B. Click on the newly created project, and locate *locally analyse* section.
   Click on that, and give token name [eg., cpp-analysis] set the expiration date to never, and then click on generate token.
   C. Copy and keep the generated token somewhere safely, [this token will later be used in sonar-project.properties and makefile].

Step 4: create a sample cpp project

1. mkdir -p ~/cpp-analysis cd ~/cpp-analysis
2. **main.cpp**
   Content:
   #include <iostream>
   #include <vector>

```
class Person {
public:
  Person(const std::string& name, int age) : name(name), age(age) {}

  void printInfo() const {
    std::cout << "Name: " << name << ", Age: " << age << std::endl;
  }

private:
  std::string name;
  int age;
};

class Group {
public:
  void addPerson(const std::string& name, int age) {
    Person* p = new Person(name, age); // Memory leak if not deleted
    members.push_back(p);
  }

  void printGroupInfo() const {
    for (int i = 0; i <= members.size(); i++) { // Off-by-one error
      members[i]->printInfo();
    }
  }

  ~Group() {
    for (Person* p : members) {
      delete p; // Properly deleting allocated memory
    }
  }

private:
  std::vector<Person*> members; // Using raw pointers, can cause memory issues
};

int main() {
  Group group;
  group.addPerson("Alice", 30);
  group.addPerson("Bob", 25);

  // Logic error: group.printGroupInfo() not called
```

```
    return 0;
}
```

3. **sonar-project.properties**

   Content:

```
# Basic project information
sonar.projectKey=cpp-analysis
sonar.projectName=cpp-analysis
sonar.projectVersion=1.0
sonar.language=cpp
# Source file configuration
sonar.sources=.
# SonarQube server URL
sonar.host.url=http://127.0.0.1:9000
sonar.login=sqp_f488b71485b9e975180f1819d95d5bc84e2eb43d
# External issues report path (will be generated later)
sonar.externalIssuesReportPaths=issues-report.json
```

4. Run Cppcheck to Generate an XML Report:

```
‘’’
        cppcheck --enable=all --xml main.cpp 2> cppcheck-report.xml
‘’’
```

   Verify the XML Report:

```
‘’’
cat cppcheck-report.xml
‘’’
```

5. **convert_cppcheck_to_json.py**

   Content:

```
import xml.etree.ElementTree as ET
import json
import sys
if len(sys.argv) != 3:
print("Usage: python3 convert_cppcheck_to_json.py <input_xml> <output_json>")
sys.exit(1)
input_file = sys.argv[1]
output_file = sys.argv[2]

errors = []

try:
  tree = ET.parse(input_file)
  root = tree.getroot()
```

```
    for error in root.findall('./errors/error'):
        file = error.find('location').get('file') if error.find('location') is
not None else None
        message = error.get('msg')
        severity = error.get('severity').upper()

        errors.append({
            "file": file,
            "message": message,
            "severity": severity
        })

    with open(output_file, 'w') as json_file:
        json.dump(errors, json_file, indent=4)

    print(f"JSON report saved to {output_file}")
except Exception as e:
    print(f"Error: {e}")
```

6. Convert the Cppcheck XML Report to JSON:
   ‘’’
   python3 convert_cppcheck_to_json.py cppcheck-report.xml issues-report.json
   ‘’’
   Verify the JSON Report:
   ‘’’
   cat issues-report.json
   ‘’’

Step 5: Install SonarScanner CLI

1. Go to this website SonarScanner and donwload the version suitable to your system.
2. cd ~/Downloads
3. unzip sonar-scanner-cli-6.2.1.4610-linux-x64.zip
4. sudo mv sonar-scanner-6.2.1.4610-linux-x64 /opt/sonar-scanner
5. cd ~
6. export PATH=$PATH:/opt/sonar-scanner/bin
7. echo 'export PATH=$PATH:/opt/sonar-scanner/bin' >> ~/.bashrc
   source ~/.bashrc
8. sonar-scanner –version

Step 6: Analyzing the cpp-analyse project folder

1. cd ~/cpp-analyse

2. sonar-scanner
3. After the successful execution of the above command, go to the sonarqube server and view the updated analysis report changes for the project, this indicates that the sever is working properly.
4. **Makefile**

   Content:

   ```
   CXX = g++
   CXXFLAGS = -Wall -Wextra -std=c++17
   SOURCES = $(wildcard *.cpp)
   TARGET = example
   ISSUES_REPORT = issues-report.json
   SONAR_HOST_URL = http://127.0.0.1:9000
   SONAR_PROJECT_KEY = cpp-analysis
   SONAR_LOGIN = sqp_f488b71485b9e975180f1819d95d5bc84e2eb43d

   .PHONY: all sonar fetch-issues clean

   all: build sonar fetch-issues

   build:
   $(CXX) $(CXXFLAGS) $(SOURCES) -o $(TARGET)

   sonar:
   @echo "Running SonarScanner..."
   @sonar-scanner -Dsonar.projectKey=$(SONAR_PROJECT_KEY) -Dsonar.sources=. -
   Dsonar.host.url=$(SONAR_HOST_URL) -Dsonar.login=$(SONAR_LOGIN)

   fetch-issues:
   @echo "Fetching issues from SonarQube server..."
   @curl -u $(SONAR_LOGIN):
   "http://127.0.0.1:9000/api/issues/search?componentKeys=$(SONAR_PROJECT_KEY)&ps=500" |
   jq '.issues[] | {file: .file, message: .message, severity: .severity}'

   clean:
   rm -f $(TARGET) $(ISSUES_REPORT)
   ```

5. Now execute this command:

   ‘’’

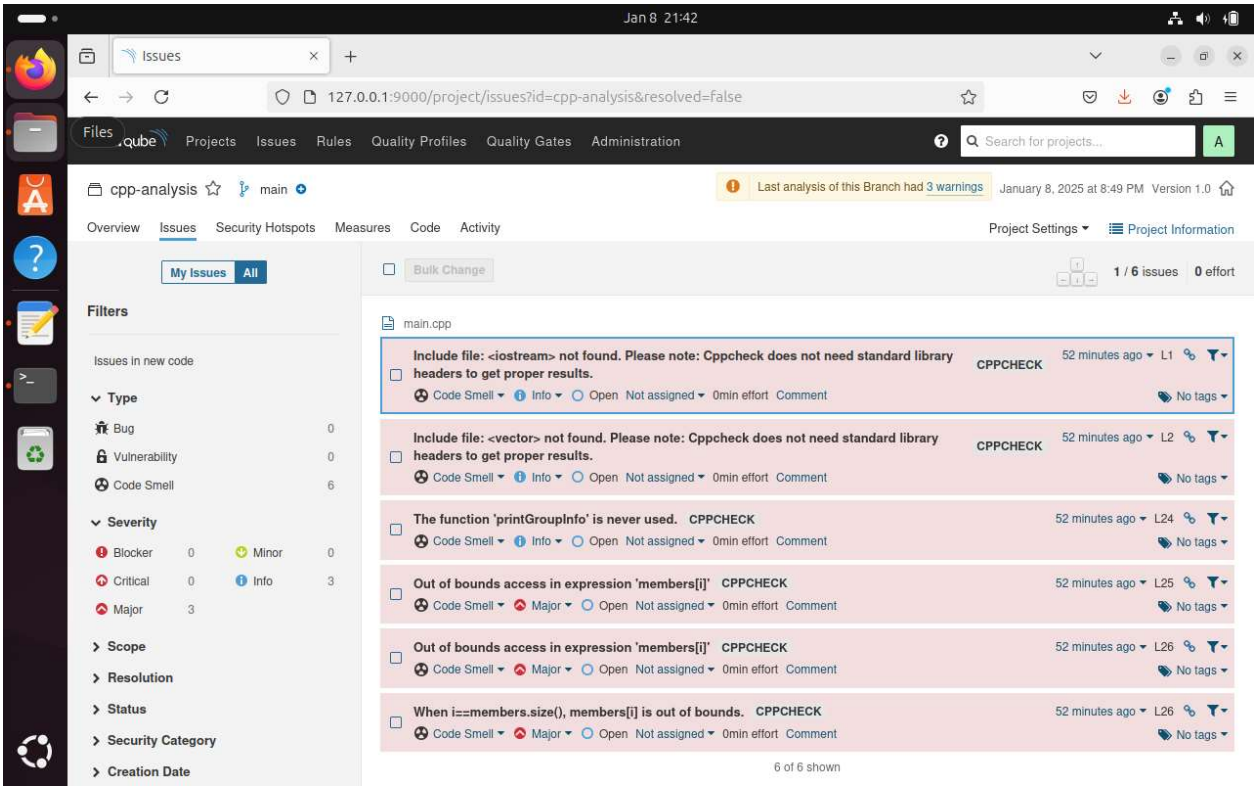
   make all

   ‘’’

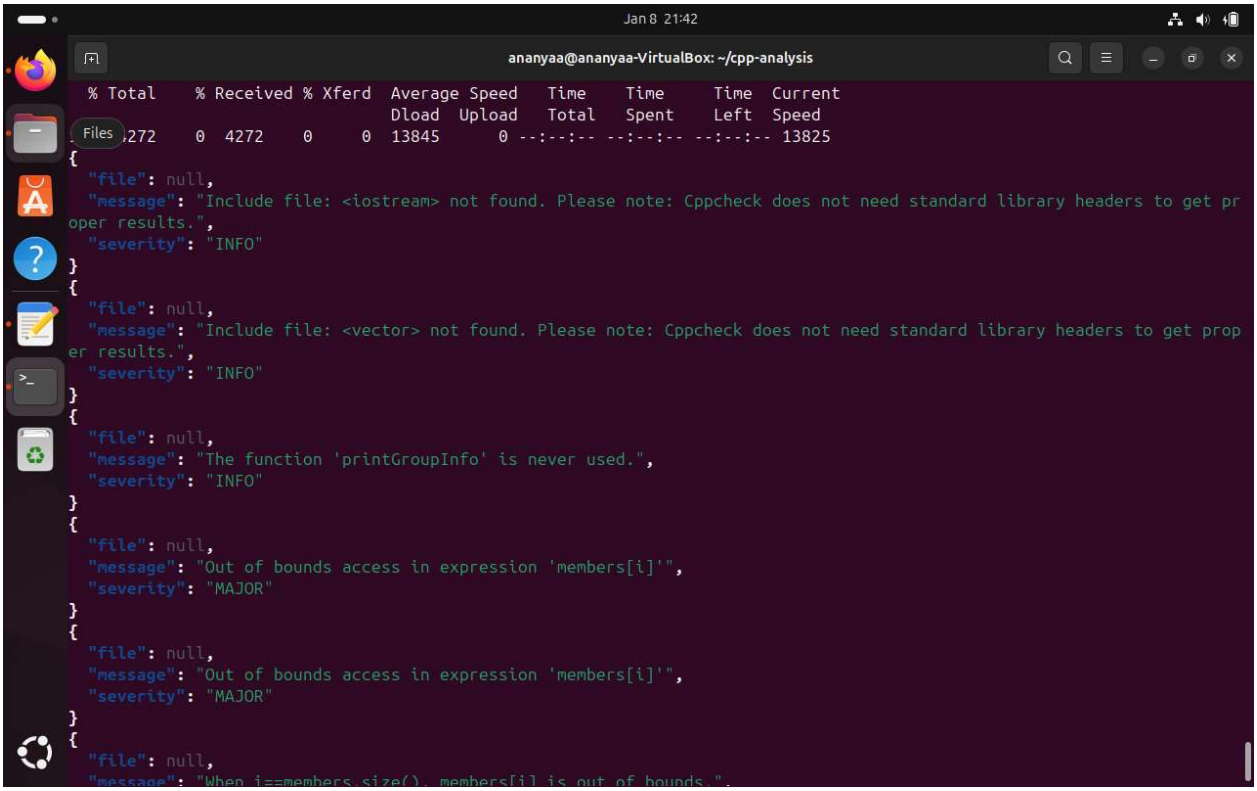
   [you will see the issues of the cpp file in the terminal and in the server too!]

OUTPUTS:

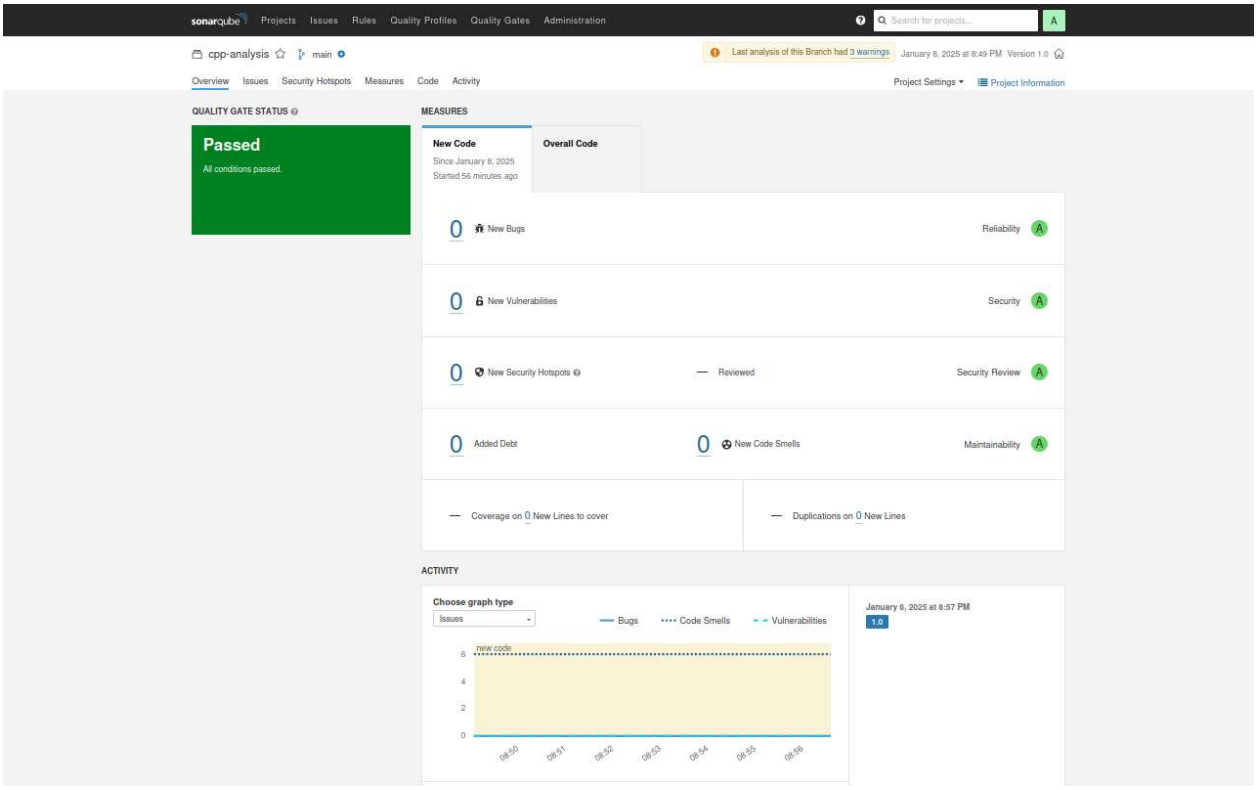
1. SonarQube server analysis issue page:



2. Issues displayed in terminal:



3. SonarQube server overview:



4. Cpp-analysis project folder: