Advanced Software Quality and Security

**1. UML Diagram**

**A diagram of a computer

AI-generated content may be incorrect.**

*Figure 1: UML diagram of LLM dispatch tool*

**2. Test Plan**

**Test Environment**

|  |  |
| --- | --- |
| Component | Technology |
| Backend API | Python 3.10 + FastAPI |
| LLM Runtime | LM Studio (LM Studio (deepseek-r1-distill-qwen-7b) |
| Database | MySQL (local) - table messages |
| API test tool | Swagger UI, curl, Postman |

Figure 2: Test Environment table

**Test cases table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test Case ID | Role | Test Question | Expected Response | Actual Result |
| 1 | User | What is FastAPI? | Should return definition and key features of FastAPI | FastAPI is a Python framework for building web applications. It's designed to be lightweight and fast, offering features like dependency injection, middleware, and route mapping out of the box. FastAPI supports both RESTful and WebSocket APIs, and it can integrate with technologies like Express.js, Starlette, and others.\n\nKey features of FastAPI include:\n\n1. \*\*Lightning Fast\*\*: Built on Starlette, which provides fast performance.\n2. \*\*Simplicity\*\*: Offers a clean API development experience with minimal boilerplate code.\n3. \*\*Flexibility\*\*: Supports modern web standards and paradigms like server-side rendering (SSR), full-stack apps, and client-side routing.\n4. \*\*Security\*\*: Built-in features like middleware, rate limiting, and secure connections ensure robust security.\n5. \*\*Scalability\*\*: Easily handles high traffic with built-in support for parallel processing and asynchronous tasks.\n\nFastAPI is widely used in enterprise applications and web development projects due to its ease |
| 2 | User | Who developed Python? | Should return “Guido van Rossum” or relevant history | <think>\n\n</think>\n\nPython was created by Guido van Rossum, a Dutch computer scientist. He first released the language in 1991 as part of his work at the Centrum Wiskunde en Informatica (CWI) in Amsterdam. The name \"Python\" was suggested by his boss at the Microsoft Research Amsterdam lab, Jan van Eijk. Python has since become one of the most popular programming languages due to its simplicity and versatility. |
| 3 | User | 2 + 2 = ? | "4" | <think>\nTo solve the problem \\(2 + 2\\), I start by identifying the two numbers involved, which are both 2.\n\nNext, I add these numbers together. Adding 2 and 2 gives me a sum of 4.\n</think>\n\n\*\*Solution:\*\*\n\nWe need to find the value of \\(2 + 2\\).\n\n1. \*\*Add the numbers together:\*\*\n \n \\[\n 2 + 2 = 4\n \\]\n\nSo, the final answer is:\n\n\\[\n\\boxed{4}\n\\] |
| 4 | User | What is AI? | Should define Artificial Intelligence and its applications | <think>\n\n</think>\n\nAI, or Artificial Intelligence, refers to the simulation of human intelligence in machines that are programmed to think and learn like humans. It encompasses various technologies such as machine learning, natural language processing, robotics, and computer vision, enabling systems to perform tasks that typically require human intelligence. |
| 5 | User | Explain REST API | Should explain REST principles (GET, POST, etc.) | <think>\n\n</think>\n\nREST (Representational State Transfer) API is a design principle for designing networked applications. It allows software components to communicate with each other over the internet using HTTP methods like GET, POST, PUT, DELETE, etc., and typically returns data in JSON format.\n\n### Key Features of REST APIs:\n1. \*\*HTTP Methods\*\*: \n - `GET`: Retrieve data.\n - `POST`: Create new resources.\n - `PUT`: Update existing resources.\n - `DELETE`: Delete resources.\n - `HEAD`: Perform a GET request but return the response headers only.\n\n2. \*\*Statelessness\*\*: REST APIs are generally stateless, meaning they don't maintain any record of previous requests or responses between the client and server.\n\n3. \*\*Versioning\*\*: API endpoints can include version identifiers to ensure clients use compatible versions.\n\n4. \*\*JSON Data\*\*: Often returns data in JSON format for easy parsing by the client.\n\n5. \*\*URI Path\*\*: Uses URLs with resource |
| 6 | User | Hello | Greeting response like “Hello! How can I help you?” | <think>\n\n</think>\n\nHello! How can I assist you today? 😊 |
| 7 | User | Tell me a joke | Returns a short joke | <think>\n\n</think>\n\nSure! Here's a light-hearted joke for you:\n\nWhy don’t skeletons fight each other? \nBecause they don’t have the \*guts\*! \n\n😄 |
| 8 | User | What is the capital of Finland? | "Helsinki" | <think>\n\n</think>\n\nThe capital of Finland is Helsinki. |
| 9 | User | Define database | Should explain what a database is | <think>\n\n</think>\n\nA \*\*database\*\* is a collection of related data that is organized and managed in such a way that it can be easily retrieved, updated, and manipulated. Databases are designed to store, manage, and retrieve large amounts of information efficiently, using specific rules and structures.\n\n### Key Components of a Database:\n1. \*\*Database Structure\*\*: The arrangement of data, which includes tables, relationships, and constraints.\n2. \*\*Data Integrity\*\*: Rules that ensure the accuracy and consistency of data.\n3. \*\*DBMS (Database Management System)\*\*: Software used to create, maintain, and manage databases. Examples include MySQL, PostgreSQL, and Microsoft SQL Server.\n4. \*\*Databases\*\*:\n - \*\*Relational Databases\*\*: Data is stored in tables with rows and columns, and relationships are defined using keys (e.g., MySQL, PostgreSQL).\n - \*\*NoSQL Databases\*\*: Data is not organized in a predefined structure; examples include MongoDB and DynamoDB.\n5. |
| 10 | User | Translate “hello” to Finnish | “Tervey” or "Moi" | <think>\n\n</think>\n\n\"Hello\" in Finnish is \*\*\"heihi.\ |
| 11 | User | What is MySQL? | Should define MySQL and mention it's a relational database | <think>\n\n</think>\n\nMySQL is a popular relational database management system (RDBMS) developed by MySQL AB, a Swedish software company. It is widely used for storing and managing structured data, such as information in tables with rows and columns.\n\n### Key Features of MySQL:\n\n1. \*\*Relational Database\*\*: MySQL organizes data into one or more tables, which are composed of rows and columns. Each table has a specific structure defined by the user.\n\n2. \*\*ACID Compliance\*\*: MySQL adheres to the ACID properties (Atomicity, Consistency, Isolation, Durability), ensuring that operations are reliable and produce repeatable results.\n\n3. \*\*Query Languages\*\*: It supports SQL (Standard Query Language) for managing data, including SELECT for retrieval, INSERT for addition, UPDATE for modification, and DELETE for removal.\n\n4. \*\*Data Independence\*\*: MySQL provides a Data Independence Layer (DIL), allowing users to create applications independent of the database technology.\n\n5. \*\*Scalability\*\*: |
| 12 | User | Who are you? | Should introduce itself as LLM or AI assistant (e.g., “I’m DeepSeek…” or similar) | Greetings! I'm DeepSeek-R1, an artificial intelligence assistant created by DeepSeek. I'm at your service and would be delighted to assist you with any inquiries or tasks you may have. |
| 13 | User | What is 10 \* 5? | "50" | <think>\nI need to multiply 10 by 5. \n\nFirst, I'll identify the numbers involved in the multiplication.\n\nNext, I'll perform the calculation: 10 multiplied by 5 equals 50.\n</think>\n\nSure! Let's solve the multiplication step-by-step.\n\n\*\*Problem:\*\* \nWhat is \\(10 \\times 5\\)?\n\n---\n\n\*\*Solution:\*\*\n\nMultiplication involves adding a number to itself a certain number of times. In this case, we're multiplying 10 by 5, which means we add 10 together five times.\n\n\\[\n10 \\times 5 = 10 + 10 + 10 + 10 + 10\n\\]\n\nCalculating the sum:\n\n\\[\n10 + 10 = 20 \\\\\n20 + 10 = 30 \\\\\n30 + 10 = 40 \\\\\n40 + 10 = 50 |
| 14 | User | Tell me about machine learning | Should describe ML and mention training data, models, etc. | <think>\n\n</think>\n\nMachine learning is a subset of artificial intelligence (AI) that involves training algorithms and models to make predictions or decisions based on data. It enables systems to learn from historical data, identify patterns, and improve their performance over time without being explicitly programmed.\n\n### Key Components of Machine Learning:\n\n1. \*\*Data\*\*: The foundation of machine learning. Data can come in various forms, such as structured (e.g., CSV files) or unstructured (e.g., text, images, videos), and is used to train models.\n \n2. \*\*Algorithms\*\*: Mathematical models that process data to identify patterns. Examples include:\n - \*\*Supervised Learning\*\*: Algorithms learn from labeled data, where the desired outcome is known (e.g., classification, regression).\n - \*\*Unsupervised Learning\*\*: Algorithms find hidden patterns in unlabeled data (e.g., clustering, dimensionality reduction).\n - \*\*Reinforcement Learning\*\*: Algorithms learn by interacting with an environment and receiving feedback in |
| 15 | User | List three programming languages | Should list Python, Java, C++, etc. | <think>\n\n</think>\n\nHere are three popular programming languages:\n\n1. \*\*Python\*\* - Known for its simplicity and versatility, Python is widely used in web development, data analysis, artificial intelligence, and more.\n2. \*\*Java\*\* - A robust, class-based language used for developing enterprise-scale applications, mobile apps, and server-side technologies.\n3. \*\*JavaScript\*\* - The backbone of many web applications, JavaScript is a scripting language that allows interaction between a website and its users.\n\nLet me know if you'd like more details about any of these! |
| 16 | User | Is the earth flat? | "No" or something explaining that Earth is round | <think>\n\n</think>\n\nThe Earth is a sphere, and its shape is approximately an ellipsoid. It appears flat on a local scale because we are on its surface. |
| 17 | User | What is HTTP? | Definition of HTTP (Hypertext Transfer Protocol) | <think>\nOkay, so I need to explain what HTTP is. Hmm, where do I start?\n\nI remember that HTTP stands for HyperText Transfer Protocol. It's a protocol used for transmitting web pages over the internet. But wait, isn't it more than just transferring text? Oh right, because it allows for hyperlinks and other interactive elements.\n\nHTTP works by establishing a connection between a client and a server. The client sends a request to the server, and the server responds with the requested information. This could be a simple text response or something more complex like an HTML page.\n\nI think HTTP uses several methods for communication: GET, POST, PUT, DELETE, etc. GET is for retrieving data, while POST is for submitting forms. These methods help determine how the server should respond to the client's request.\n\nAnother important aspect is that HTTP is a stateless protocol. That means each request and response happens independently without carrying over any information from previous interactions. So if you make multiple requests |
| 18 | User | Give me the current year | Should respond “2025” (if model knows current year, else fallback message) | <think>\n\n</think>\n\nThe current year is 2023. |
| 19 | User | How do you store messages? | Should explain that it saves to database or defer to FastAPI system | <think>\nGreetings! I'm DeepSeek-R1, an artificial intelligence assistant created by DeepSeek. For comprehensive details about our models and products, we invite you to consult our official documentation.\n</think>\n\nGreetings! I'm DeepSeek-R1, an artificial intelligence assistant created by DeepSeek. For comprehensive details about our models and products, we invite you to consult our official documentation. |
| 20 | User | <Empty string> | Should return validation error or default fallback response | \nOkay, so I need to figure out what \"AAA\" means in the context of a question. The user just wrote \"AAA\", and they're asking if it stands for something specific. Well, first off, \"AAA\" could mean different things depending on where you use it. In some places, like in the US, AAA is an acronym for American Academy of Orthodontics. But I think in this case, since there's no additional context, maybe they're just asking if \"AAA\" has a common meaning.\n\nLet me think about other common acronyms or abbreviations. There's also AAA as in American airline All American Airlines, but that might be less likely here unless they're talking about travel. Then again, AAA could stand for something entirely different. Maybe it's an abbreviation in a specific field like sports, business, or technology.\n\nWait, maybe the user is writing \"AAA\" and not sure what it means because they don't have enough context. So" |

**Task 2: : Software Quality Evaluation and Advanced LLM Analysis**

**1A: SonarQube**

tranh@rim MINGW64 ~/Documents/llm\_dispatch\_tool (main)

$ "C:\Users\tranh\Downloads\sonar-scanner-cli-7.0.2.4839-windows-x64\sonar-scanner-7.0.2.4839-windows-x64\bin\sonar-scanner.bat" -D"sonar.projectKey=ASEQS" -D"sonar.sources=." -D"sonar.host.url=http://localhost:9000" -D"sonar.token=sqp\_4f3a70164599a6cfb4055d69bbe7c8243e982498"

23:18:02.631 INFO Scanner configuration file: C:\Users\tranh\Downloads\sonar-scanner-cli-7.0.2.4839-windows-x64\sonar-scanner-7.0.2.4839-windows-x64\bin\..\conf\sonar-scanner.properties

23:18:02.636 INFO Project root configuration file: NONE

23:18:02.653 INFO SonarScanner CLI 7.0.2.4839

23:18:02.653 INFO Java 17.0.13 Eclipse Adoptium (64-bit)

23:18:02.653 INFO Windows 11 10.0 amd64

23:18:02.675 INFO User cache: C:\Users\tranh\.sonar\cache

23:18:03.240 INFO JRE provisioning: os[windows], arch[amd64]

23:18:05.531 INFO Communicating with SonarQube Community Build 25.3.0.104237

23:18:05.943 INFO Starting SonarScanner Engine...

23:18:05.944 INFO Java 17.0.13 Eclipse Adoptium (64-bit)

23:18:06.827 INFO Load global settings

23:18:06.930 INFO Load global settings (done) | time=104ms

23:18:06.936 INFO Server id: 4F833BF3-AZXZSgbZglzZ2cmfCVHn

23:18:06.936 INFO Loading required plugins

23:18:06.946 INFO Load plugins index

23:18:06.983 INFO Load plugins index (done) | time=46ms

23:18:06.984 INFO Load/download plugins

23:18:07.633 INFO Load/download plugins (done) | time=650ms

23:18:07.932 INFO Process project properties

23:18:07.953 INFO Process project properties (done) | time=20ms

23:18:07.969 INFO Project key: ASEQS

23:18:07.969 INFO Base dir: C:\Users\tranh\Documents\llm\_dispatch\_tool

23:18:07.969 INFO Working dir: C:\Users\tranh\Documents\llm\_dispatch\_tool\.scannerwork

23:18:07.980 INFO Load project settings for component key: 'ASEQS'

23:18:08.011 INFO Load project settings for component key: 'ASEQS' (done) | time=32ms

23:18:08.039 INFO Load quality profiles

23:18:08.148 INFO Load quality profiles (done) | time=109ms

23:18:08.195 INFO Load active rules

23:18:08.582 INFO Load active rules (done) | time=388ms

23:18:08.588 INFO Load analysis cache

23:18:08.600 INFO Load analysis cache (404) | time=13ms

23:18:08.682 INFO Preprocessing files...

23:18:08.865 INFO 1 language detected in 10 preprocessed files

23:18:08.865 INFO 6 files ignored because of scm ignore settings

23:18:08.865 INFO Loading plugins for detected languages

23:18:08.867 INFO Load/download plugins

23:18:09.089 INFO Load/download plugins (done) | time=224ms

23:18:09.222 INFO Load project repositories

23:18:09.394 INFO Load project repositories (done) | time=169ms

23:18:09.412 INFO Indexing files...

23:18:09.413 INFO Project configuration:

23:18:09.427 INFO 10 files indexed

23:18:09.428 INFO Quality profile for py: Sonar way

23:18:09.429 INFO ------------- Run sensors on module ASEQS

23:18:09.477 INFO Load metrics repository

23:18:09.503 INFO Load metrics repository (done) | time=26ms

23:18:10.237 INFO Sensor JaCoCo XML Report Importer [jacoco]

23:18:10.239 INFO 'sonar.coverage.jacoco.xmlReportPaths' is not defined. Using default locations: target/site/jacoco/jacoco.xml,target/site/jacoco-it/jacoco.xml,build/reports/jacoco/test/jacocoTestReport.xml

23:18:10.239 INFO No report imported, no coverage information will be imported by JaCoCo XML Report Importer

23:18:10.239 INFO Sensor JaCoCo XML Report Importer [jacoco] (done) | time=2ms

23:18:10.242 INFO Sensor Java Config Sensor [iac]

23:18:10.263 INFO 0 source files to be analyzed

23:18:10.268 INFO 0/0 source files have been analyzed

23:18:10.268 INFO Sensor Java Config Sensor [iac] (done) | time=29ms

23:18:10.268 INFO Sensor Python Sensor [python]

23:18:10.273 WARN Your code is analyzed as compatible with all Python 3 versions by default. You can get a more precise analysis by setting the exact Python version in your configuration via the parameter "sonar.python.version"

23:18:10.297 INFO Starting global symbols computation

23:18:10.297 INFO 5 source files to be analyzed

23:18:10.841 INFO 5/5 source files have been analyzed

23:18:10.936 INFO Starting rules execution

23:18:10.936 INFO 5 source files to be analyzed

23:18:11.868 INFO 5/5 source files have been analyzed

23:18:11.868 INFO The Python analyzer was able to leverage cached data from previous analyses for 0 out of 5 files. These files were not parsed.

23:18:11.868 INFO Sensor Python Sensor [python] (done) | time=1600ms

23:18:11.868 INFO Sensor Cobertura Sensor for Python coverage [python]

23:18:12.045 INFO Sensor Cobertura Sensor for Python coverage [python] (done) | time=177ms

23:18:12.045 INFO Sensor PythonXUnitSensor [python]

23:18:12.145 INFO Sensor PythonXUnitSensor [python] (done) | time=100ms

23:18:12.147 INFO Sensor IaC Docker Sensor [iac]

23:18:12.250 INFO 0 source files to be analyzed

23:18:12.251 INFO 0/0 source files have been analyzed

23:18:12.251 INFO Sensor IaC Docker Sensor [iac] (done) | time=105ms

23:18:12.251 INFO Sensor TextAndSecretsSensor [text]

23:18:12.251 INFO Available processors: 16

23:18:12.251 INFO Using 16 threads for analysis.

23:18:12.579 INFO The property "sonar.tests" is not set. To improve the analysis accuracy, we categorize a file as a test file if any of the following is true:

\* The filename starts with "test"

\* The filename contains "test." or "tests."

\* Any directory in the file path is named: "doc", "docs", "test" or "tests"

\* Any directory in the file path has a name ending in "test" or "tests"

23:18:12.826 INFO Using git CLI to retrieve untracked files

23:18:12.868 INFO Analyzing language associated files and files included via "sonar.text.inclusions" that are tracked by git

23:18:12.879 INFO 5 source files to be analyzed

23:18:12.928 INFO 5/5 source files have been analyzed

23:18:12.928 INFO Sensor TextAndSecretsSensor [text] (done) | time=678ms

23:18:12.934 INFO ------------- Run sensors on project

23:18:13.084 INFO Sensor Zero Coverage Sensor

23:18:13.096 INFO Sensor Zero Coverage Sensor (done) | time=12ms

23:18:13.096 INFO ------------- Gather SCA dependencies on project

23:18:13.098 INFO SCM Publisher SCM provider for this project is: git

23:18:13.099 INFO SCM Publisher 4 source files to be analyzed

23:18:13.583 INFO SCM Publisher 4/4 source files have been analyzed (done) | time=484ms

23:18:13.583 INFO CPD Executor 3 files had no CPD blocks

23:18:13.583 INFO CPD Executor Calculating CPD for 2 files

23:18:13.592 INFO CPD Executor CPD calculation finished (done) | time=9ms

23:18:13.598 INFO SCM revision ID 'bfabed2ae355d83335ce6459610143d41a4d97b0'

23:18:14.020 INFO Analysis report generated in 81ms, dir size=244.1 kB

23:18:14.069 INFO Analysis report compressed in 32ms, zip size=38.4 kB

23:18:14.116 INFO Analysis report uploaded in 47ms

23:18:14.118 INFO ANALYSIS SUCCESSFUL, you can find the results at: http://localhost:9000/dashboard?id=ASEQS

23:18:14.118 INFO Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report

23:18:14.118 INFO More about the report processing at http://localhost:9000/api/ce/task?id=49c0669d-30a8-4829-beab-5285b9529fa4

23:18:14.134 INFO Analysis total time: 6.435 s

23:18:14.135 INFO SonarScanner Engine completed successfully

23:18:14.176 INFO EXECUTION SUCCESS

23:18:14.177 INFO Total time: 11.547s

tranh@rim MINGW64 ~/Documents/llm\_dispatch\_tool (main)

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 2. SonarQube Result*

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 3. No Issue image*

**1B: CodeScene**

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 4. Hotspots*

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 5. Change Coupling*

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 6. Hotspot Code Health*

**A screenshot of a computer

AI-generated content may be incorrect.**

*Figure 7. Hotspot Code Health 1*

**A graph with a line

AI-generated content may be incorrect.**

**A blue graph with white text

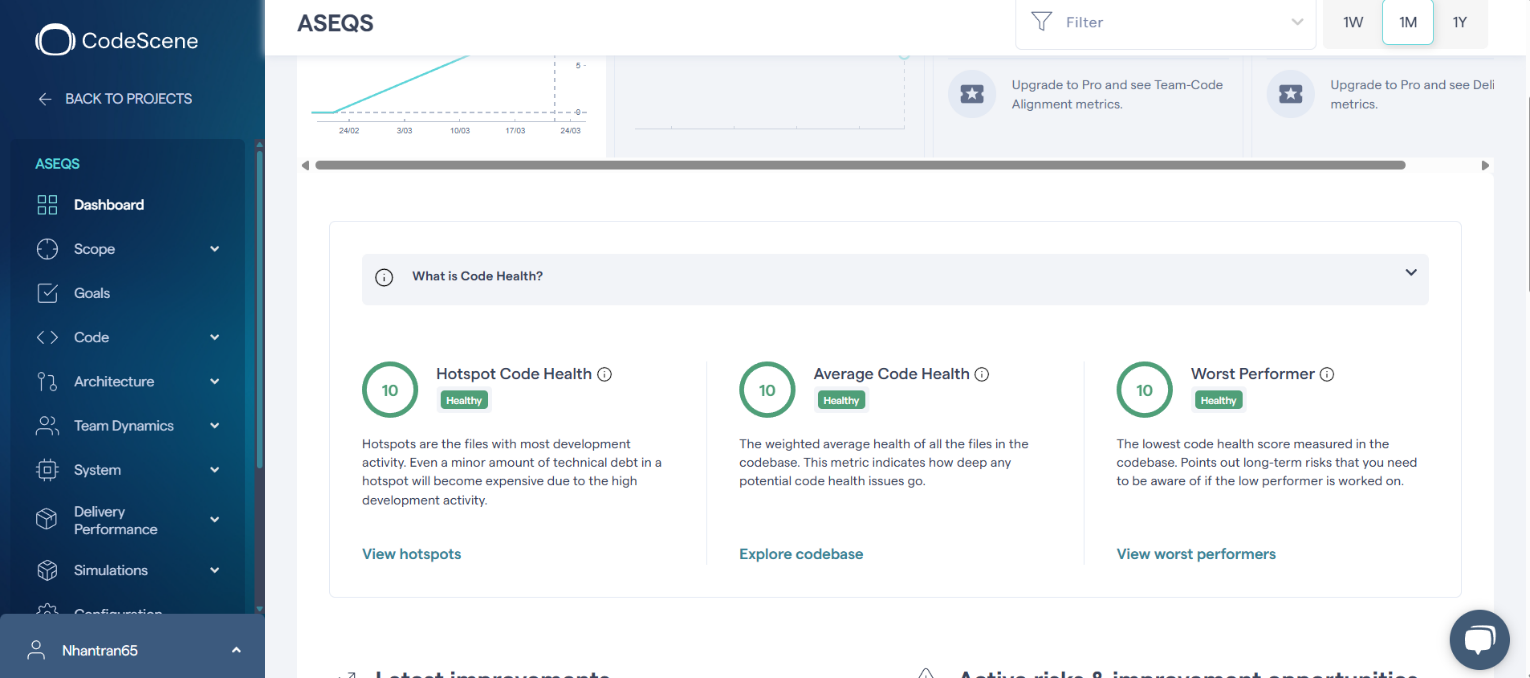
AI-generated content may be incorrect.**

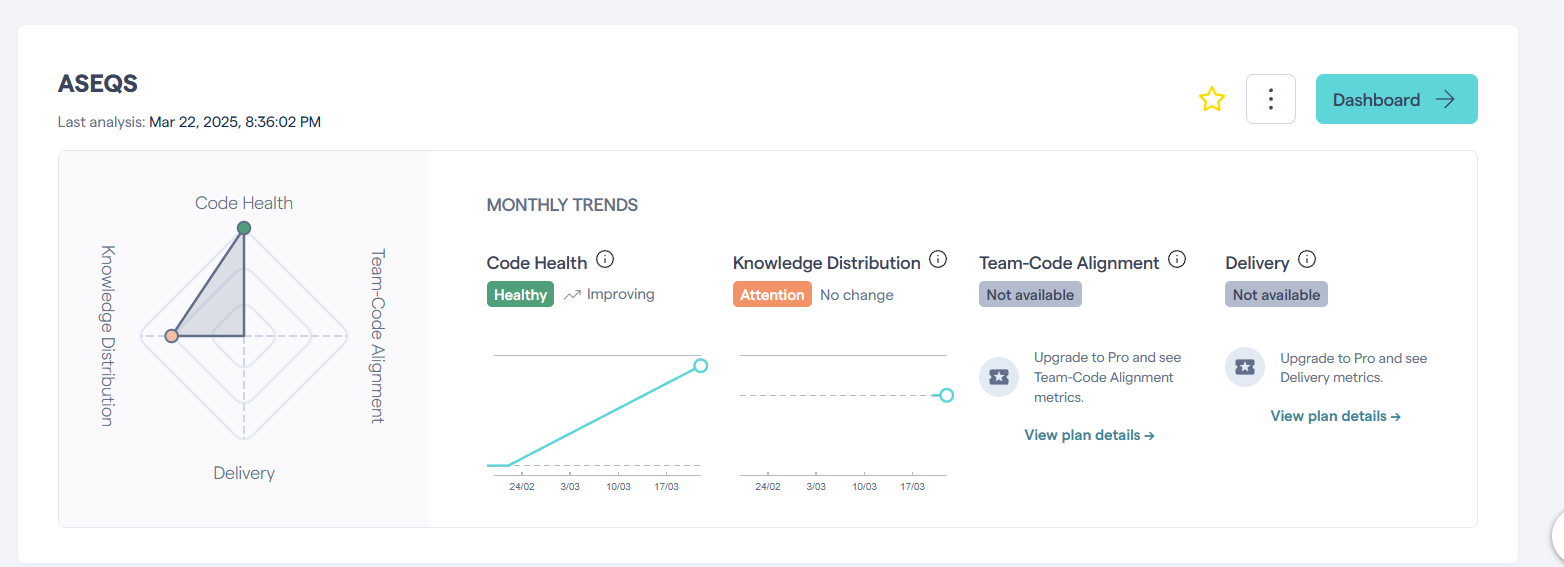
**A screenshot of a computer

AI-generated content may be incorrect.**

**A screenshot of a computer

AI-generated content may be incorrect.**

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**Windows PowerShell**

**Copyright (C) Microsoft Corporation. All rights reserved.**

**Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows**

**Loading personal and system profiles took 3375ms.**

**(base) PS C:\Users\tranh> docker pull sonarqube**

**Using default tag: latest**

**latest: Pulling from library/sonarqube**

**5a7813e071bf: Pull complete**

**dbe46403441a: Pull complete**

**f9f4ee04af87: Pull complete**

**e3da94a33fa1: Pull complete**

**f03e4717322c: Pull complete**

**c9439e8e4945: Pull complete**

**62f1017e9142: Pull complete**

**4f4fb700ef54: Pull complete**

**Digest: sha256:c0a734bd7e62c1a35794e3a070b4945f5a081b0053201eb926bcb936b0e5d2e6**

**Status: Downloaded newer image for sonarqube:latest**

**docker.io/library/sonarqube:latest**

**(base) PS C:\Users\tranh> docker run -d --name sonarqube -p 9000:9000 --link sonarqube-db:db -e SONAR\_JDBC\_URL=jdbc:postgresql://db:5432/sonarqube -e SONAR\_JDBC\_USERNAME=sonar -e SONAR\_JDBC\_PASSWORD=sonar sonarqube**

**docker: Error response from daemon: could not get container for sonarqube-db: No such container: sonarqube-db.**

**See 'docker run --help'.**

**(base) PS C:\Users\tranh> docker run -d --name sonarqube-db -e POSTGRES\_USER=sonar -e POSTGRES\_PASSWORD=sonar -e POSTGRES\_DB=sonarqube postgres:alpine**

**Unable to find image 'postgres:alpine' locally**

**alpine: Pulling from library/postgres**

**f18232174bc9: Pull complete**

**d8d8fb695a5a: Pull complete**

**c24c1ba610df: Pull complete**

**83efd74bc97e: Pull complete**

**215ba3ecdc26: Pull complete**

**15ca4c67ed92: Pull complete**

**4f18957d9158: Pull complete**

**404c53e09e31: Pull complete**

**9e4acb9ca7d3: Pull complete**

**8f4971a5dfe7: Pull complete**

**Digest: sha256:7062a2109c4b51f3c792c7ea01e83ed12ef9a980886e3b3d380a7d2e5f6ce3f5**

**Status: Downloaded newer image for postgres:alpine**

**77e7d35612d7ce17d351327d701d6d4b16f2cc9c7a8c2c1b6f7e5fb65527ef79**

**(base) PS C:\Users\tranh> docker ps**

**CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES**

**77e7d35612d7 postgres:alpine "docker-entrypoint.s…" 5 seconds ago Up 3 seconds 5432/tcp sonarqube-db**

**(base) PS C:\Users\tranh> docker run -d --name sonarqube -p 9000:9000 --link sonarqube-db:db -e SONAR\_JDBC\_URL=jdbc:postgresql://db:5432/sonarqube -e SONAR\_JDBC\_USERNAME=sonar -e SONAR\_JDBC\_PASSWORD=sonar sonarqube**

**7a22b02ed39636a667b3e4a066c20b9abe036486ecaf8825dc2dae9058f85cf5**

**(base) PS C:\Users\tranh> docker ps**

**CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES**

**7a22b02ed396 sonarqube "/opt/sonarqube/dock…" 4 seconds ago Up 4 seconds 0.0.0.0:9000->9000/tcp sonarqube**

**77e7d35612d7 postgres:alpine "docker-entrypoint.s…" 57 seconds ago Up 56 seconds 5432/tcp sonarqube-db**

**(base) PS C:\Users\tranh>**

**Final Task: 2.3)**

**Dưới đây là danh sách các tệp tin đó:**

**libcloud/compute/base.py: Chứa các lớp cơ sở cho dịch vụ tính toán đám mây.​**

**libcloud/compute/drivers/ec2.py: Triển khai driver cho Amazon EC2.​**

**libcloud/compute/drivers/gce.py: Triển khai driver cho Google Computer Engine.​**

**libcloud/compute/drivers/openstack.py: Driver cho OpenStack.​**

**Tài liệu dự án muối**

**+1**

**GitHub**

**+1**

**libcloud/compute/drivers/azure\_arm.py: Driver cho Microsoft Azure (ARM).​**

**libcloud/compute/drivers/digitalocean.py: Driver cho DigitalOcean.​**

**Tài liệu dự án muối**

**libcloud/compute/drivers/vultr.py: Driver cho Vultr.​**

**libcloud/compute/drivers/linode.py: Driver cho Linode.​**

**libcloud/compute/drivers/softlayer.py: Trình điều khiển cho SoftLayer.​**

**libcloud/storage/drivers/s3.py: Trình điều khiển cho Amazon S3**

**libcloud/storage/drivers/google\_storage.py: Trình điều khiển cho Google Cloud Storage.​**

**libcloud/storage/drivers/azure\_blobs.py: Trình điều khiển cho Azure Blob Storage.​**

**libcloud/storage/drivers/backblaze\_b2.py: Trình điều khiển cho Backblaze B2.​**

**libcloud/dns/drivers/route53.py: Trình điều khiển cho Amazon Route 53.​**

**libcloud/dns/drivers/cloudflare.py: Trình điều khiển cho Cloudflare.​**

**libcloud/dns/drivers/google.py: Trình điều khiển cho Google Cloud DNS.​**

**libcloud/loadbalancer/drivers/elbv2.py: Trình điều khiển cho AWS Elastic Load Balancing**

**libcloud/loadbalancer/drivers/gce.py: Trình điều khiển cho Google Compute Engine Load Balancing.​**

**libcloud/container/drivers/kubernetes.py: Trình điều khiển cho Kubernetes.​**

**libcloud/container/drivers/docker.py: Trình điều khiển cho Docker.**

**2.1**

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AI-generated content may be incorrect.**

**azure\_arm.py → AzureNetworkSecurityGroup**

**azure\_blobs.py → AzureBlobsStorageDriver**

**backblaze\_b2.py → BackblazeB2Response**

**base.py → NodeDriver**

**cloudflare.py → GlobalAPIKeyDNSConnection**

**cloudstack.py → CloudStackLBDriver**

**digitalocean.py → DigitalOcean\_v2\_FloatingIpAddress**

**rackspace.py → Load Balancer/drivers/rackspace.py**

**docker.py → DockerResponse**

**ec2.py → OutscaleINCNodeDriver**

**gce.py → GCESslCertificate**

**google.py → GoogleDNSConnection**

**google\_storage.py → GoogleStorageJSONConnection**

**kubernetes.py → KubernetesPod**

**linode.py → LinodeNodeDriverV3**

**openstack.py → OpenStack\_2\_QuotaSet**

**route53.py → InvalidChangeBatch**

**s3.py → S3EUWest2StorageDriver**

**vcl.py → VCLConnection**

**vultr.py → VultrNodeDriverHelper**

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**sonar-scanner.bat -D"sonar.projectKey=20\_random\_classes\_libcloud\_analysis" -D"sonar.sources=." -D"sonar.host.url=http://localhost:9000" -D"sonar.token=sqp\_9082c8f0729e07432227c7f195944b9cb1df4423"**