Documentation for the Trains Routes Solution

**DOCUMENTATION PREPARED FOR THE TRAINS ROUTES SOLUTION**

**Delivered on: July 29, 2021**  
  
**Prepared by: Gibran Castillo, candidate**

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OVERVIEW AND GOALS

Hello Jared,

Thank you for taking the time to interview me for the Lead Software Developer position with Zynx Health. I am excited to be exploring a partnership with you.

In reviewing the three problems, I chose to work on the trains routes problem and I have put together this technical document that outlines how I work on the problem and came up with my solution to the trains routes problem. This document will address problem’s requirements and create a better explanation experience for my trains route solution.

Please let me know if you have any questions as you review this technical document.

Sincerely,  
Gibran

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TECHNICAL OVERVIEW

**Discovery**

**RESEARCH & PLANNING**

I started the process by fully understanding all three problems and by asking questions to Jared when I needed clarification. Then I chose the trains routes problem because in my opinion it is the most challenging problem out of the three.

I conducted additional research, including creating directed graph to choose the best coding approach, and decided not to use an adjacency matrix and list because of the drawbacks of using the adjacency matrix (increased of memory as more towns/routes are added and redundancy of information).

**Design**

**TEST-DRIVEN DEVELOPMENT**

I started by reading and understanding the requirements for the trains routes problem, then I worked on the first requirement by translating it to a Unit test. Next, I implemented the code that fulfills the requirement and refine and clean up my code by refactoring.

Once the test-driven development was established with JUnit, I also implemented testing using the Test NG framework to simplify testing.

**Development**

**TECHNICAL IMPLEMENTATION**

I tried to work within the framework of an Agile methodology, whereby I release new builds every two to four hours to be reviewed and refined/approved by me acting as the client as well. Before I began my development I attempted to map the solution to the trains routes problem into a series of results-focused sprints, to ensure efficient execution and timely delivery of a fully-tested and optimized solution.

**Support & Maintenance**

**7-DAY WARRANTY**

The solution includes a 7-day warranty period, during which any bugs you report will be fixed with an as soon as feasible SLA (4 to 8 hours).

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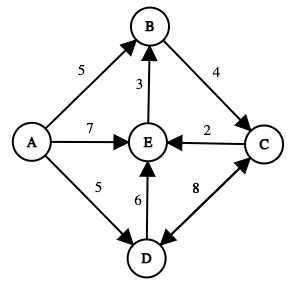
TECHNOLOGY STACK

|  |  |  |
| --- | --- | --- |
| CATEGORY | TECHNOLOGY | BENEFITS |
| Project | Maven 3.8.1 | Maven is a build automation tool used primarily for Java projects. |
| Testing | Junit 4.13.2, TestNG 7.4.0 | JUnit is a unit testing framework for the Java programming language. Test NG is a testing framework designed to simplify testing. |
| Monitoring | Log4j 2.14.1 | Logs provide you with the right level of logging you need depending on the circumstances. |
| Source Control | git 2.27.0, GitHub | To manage project’s source code repositories. Facilitates both development and deployment, allows to track changes in source code during development, manage different versions of the application, helps with version control, takes source  code backup with ability to revert back to previous version, etc. |
| IDE | Eclipse 2021-03 (4.19.0) | Navigation is made easier, auto completion, refactoring, error debugging is easy, and able to install and use the TestNG plugin |
| Programming Language | Java 15 | Java 15 builds on several features of past releases, including records, text blocks, new garbage collection algorithms, and more. |

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ARCHITECTURE

Directed Graph: AB5, BC4, CD8, DC8, DE6, AD5, CE2, EB3, AE7.



TIMEFRAME

|  |  |  |
| --- | --- | --- |
| BUILD | FEATURES | HOURS |
| Start | Start of test-driven development | Hour 0 |
| Discovery | Fully understand all 3 problems & choose a problem to solve | Hour 1-2 |
| Research | Choose best coding approach | Hour 3-4 |
| Design Sprint 1 | Delivery of route distance | Hour 5-6 |
| TDD Sprint 2 | Delivery of # of trips with max stops | Hour 7-8 |
| TDD Sprint 3 | Delivery of # of trips with exact stops | Hour 9-10 |
| TDD Sprint 4 | Delivery of shortest route distance | Hour 11-12 |
| TDD Sprint 5 | Delivery of # of different routes with max distance | Hour 13-14 |
| Documentation | Delivery of technical document | Hour 15-16 |

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CHALLENGE OVERVIEW

|  |  |
| --- | --- |
|  |  |
| Requesting Company | Zynx Health |
| Applying Position | Lead Software Developer |
| Problem or challenge | Trains Routes |

INSTRUCTIONS, ASSUMPTIONS, SUPPORT, AND WARRANTY

**Instructions**

• Use the IDE of your choice with Java 15. I recommend Eclipse or IntelliJ.

• Install the TestNG plugin to your IDE.

• Import maven project into your IDE and make sure you have all of the necessary maven dependencies.

• Run TrainsRoutesDriver to execute the solution and the console will display the expected output

• To change the logging level open the /TrainsRoutesInfo/src/main/resources/log4j2.xml file and in line 13, replace “info” with “debug”.

• To test the Junit suite run TrainsRoutesDirectedGraphTest.

• To test the test ng suite run TrainsRoutesDirectedGraphTestNg and review the file generated by test ng in the /TrainsRoutesInfo/test-output folder

**Assumptions**

• For the test input, the towns are named using the first few letters of the alphabet from A to D. A route between two towns (A to B) with a distance of 5 is represented as AB5.

• Test input directed graph: AB5, BC4, CD8, DC8, DE6, AD5, CE2, EB3, AE7.

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• All deliverables are subject to strict adherence to client feedback and turnaround time to keep project on delivery schedule.

• Client is responsible for terms/conditions, & privacy policy.

**Support & Warranty**

• 7 Days of Warranty is provided after problem completion & submission. Warranty support includes any bugs, issues or errors found within the scope or approved design.

• Solution will be supported on current technology stack upon completion & N-1. 

NEXT STEPS

1. Please carefully review my solution, including the solution scope, timeframe, and instruction pages.

2. If you have any questions at all, please let me know. I am happy to clarify any points and there may be some items that we can sort out together. I am committed to finding the best way to work together.

3. Once you feel confident about everything and would like to move forward, please send me a follow up meeting invite.

WHY GIBRAN?

**Over 17 Years of Experience.**

My love for innovation and technology has not only shaped my career but helped me discover my passion for collaborating and working as a mastermind to create and support great products and services that add real value to society worldwide. I have more than a decade of experience designing, implementing, distributing, and adapting technically sophisticated software and applications. I am now ready to take my skills and love of innovation and technology to the next level.

MY EXPERIENCE

See resume.

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