Novek Firmware Engineer Interview Exercise

NMEA Sentence Decoder

Problem Statement:

You are provided with a `jogging_path.txt` file that contains data from a GPS device used for exercise tracking. You are required to design and implement a C++ program to decode NMEA sentences from the given `.txt` file. The NMEA sentences contain GPS data that follows a standard format. Your task is to efficiently read, parse, and extract meaningful information from these sentences.

Requirements:

1. **Functionality**:
   - Read NMEA sentences from a `.txt` file.
   - Parse the sentences to extract relevant data (e.g., latitude, longitude, time, etc.).
   - Handle common NMEA sentence types such as GPGGA, GPGLL, GPRMC, etc.
2. **System Design Architecture**:
   - Design a modular and portable system that can be easily extended to support additional NMEA sentence types.
   - Ensure the system is efficient in terms of both time and space complexity.
   - Provide a clear and maintainable code structure.
3. **Portability**:
   - Write code that can be compiled and run on different platforms (Windows, Linux, embedded systems).
   - Avoid platform-specific dependencies.
4. **Software Testing**:
   - Implement unit tests to verify the correctness of the parsing logic.
   - Include tests for edge cases and invalid input handling.
5. **Git Workflow**:
   - Create a public github repository to handle this task.
   - Use feature branches to handle the various features accompanied with relevant merges to your main branch.

NOTE: You are expected to provide README.md documentation on how to build your solution (both test and executable).

Sample NMEA Sentences:

$GPGGA,123456.78,3723.2475,N,12202.3416,W,1,08,0.9,545.4,M,46.9,M,,*47
$GPGLL,4916.45,N,12311.12,W,225444,A,*1D
$GPRMC,235947,A,3723.2475,N,12202.3416,W,022.4,084.4,230394,003.1,W*6A

Example Output:

For the provided NMEA sentences, the output should be the extracted information:

Latitude: 37°23.2475'N, Longitude: 122°02.3416'W, Time: 12:34:56.78Latitude: 49°16.45'N,
Longitude: 123°11.12'W, Time: 22:54:44
Latitude: 37°23.2475'N, Longitude: 122°02.3416'W, Speed: 22.4 knots, Course: 84.4°, Date: 23/03/94

Submission

You are expected to submit your solution in a duration not later than 48 hrs from the time of reception. Create a public GitHub repository where the exercise should be handled.

The solution should be submitted in the form of a public Github repository link.