HEARX SA | GROUND FLOOR, BUILDING 2, ASHLEA GARDENS OFFICE PARK, 180 GARSFONTEIN ROAD, ASHLEA GARDENS, 0081, PRETORIA, SOUTH AFRICA

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hearX	WORK INSTRUCTION Backend Developer B2B	RES-WI-01 2025

Regarding: **Backend Developer at hearX**

You've gotten this far. Well done!

Thanks for taking the time to research hearX and what we do and for allowing us the opportunity to interview you. The next stage of the interview process is a case study and presentation. We would love to see how you process information and convey that in visual and written form. Please note that there are 2 parts.

There are no right or wrong answers and you may need to make some assumptions. Please keep who we are top of mind throughout this process.

TIME: There is no limit on time you can take to complete this, however we recommend not spending more than 4 hours in total.

DEADLINE: We would like to receive your submission by Monday at 10:00 . We understand that life sometimes gets in the way and things happen. Please let us know if you'd like us to extend the deadline (within reason :D).

FORMAT: You may select any format (written, slides, multimedia etc.) that best suits your needs. Make sure it's easy to understand and helps describe your thinking in the best manner possible.

COMMUNICATION AND SUBMISSION: Any questions and all submission should be directed to the following people:

- recruit@hearxgroup.com
- johan.bosch@hearxgroup.com
- austin@hearxgroup.com

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Project Description/Purpose

The purpose of this project is to create a gRPC-based Todo List application consisting of a server and a client. The server should expose services for managing a Todo List, including functionalities such as adding tasks, fetching tasks, marking tasks as complete, etc. The data should be stored in a MySQL database. The project should include a Docker Compose file that defines both the gRPC server and the MySQL server.

Version Control

The project must be version-controlled using Git.

Cobra for CLI

Use Cobra to create a command-line interface (CLI) for the project. The CLI should have the following main commands:

- *server: Run the gRPC server with configurable options (e.g., server address, database connection details).*
- *client: Run the gRPC client with subcommands for interacting with the Todo List.*
- *add: Add a new task to the Todo List with parameters for task details.*
- *get: Retrieve the list of tasks.*
- *complete: Mark a task as complete with parameters for the task ID.*

Dependency Injection

Utilize Uber-Fx for dependency injection within the project. Ensure that dependencies are managed efficiently.

gRPC Implementation

Implement gRPC services for managing a Todo List with the following specifications:

- *Service Name: TodoService*
- *RPC Methods:*
  - *AddTask: Add a new task to the Todo List.*
  - *GetTasks: Retrieve the list of tasks.*
  - *CompleteTask: Mark a task as complete.*

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Docker Integration

Include a Dockerfile in the project to build a Docker image for the gRPC server. Provide a Docker Compose file that defines services for both the gRPC server and a MySQL server. The Docker Compose file should include appropriate configuration for initializing the database with schema and required data.

Code Quality

Write clean and well-documented code. Follow the GoLang best practices and idioms.

Additional Considerations

Implement error handling and logging for better code reliability.
Include unit tests to ensure the correctness of your code.
Make use of environment variables or configuration files for configurable settings (e.g., gRPC server address, database connection details, etc.).
Provide a README file with a clear description of the project, its purpose, and instructions on how to build, run, and test it, including Docker-related instructions.

Bonus Points:

REST Reverse gRPC-Gateway

Implement a RESTful API using the gRPC-Gateway to allow communication with the Todo List application over HTTP.

Expose the same TodoService functionalities (AddTask, GetTasks, CompleteTask) via the REST API.

Token Authentication for gRPC Service

Add token-based authentication to the gRPC service to enhance security. Implement a mechanism for generating and validating tokens for client authentication. Ensure that gRPC clients must present a valid token to access the TodoService functionalities.

Additional Considerations

Provide documentation in the README on how to interact with the Todo List application using both gRPC and RESTful APIs, including token authentication instructions for gRPC.

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See this as an opportunity to showcase some of your best work. You are encouraged to also highlight any issues you came across during the process and explain how you handled it.

Lastly, remember to have fun!