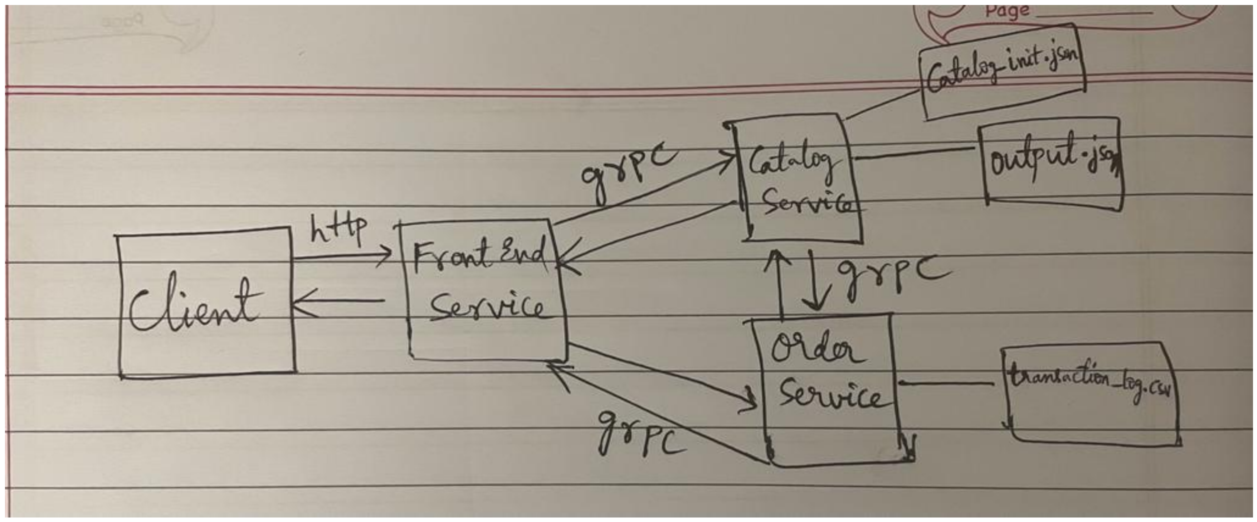
Design Document Lab 2

Architecture:



1. Catalog service uses catalog_init.json to initialize the trade volumes on every new start and output.json contains the final state of the catalog on server exit. If the server is up again, then output.json would be the initial state of the server. Inorder to initialize the server with catalog_init, get a git pull or clear output.json .
2. transaction_log.csv maintains the history of transactions present in the order service. Every time the server is rebuilt, the transaction number is continued from the last transaction_id in transaction_log.csv. Inorder to reinitialize the server with transaction_id=0, get a git pull again or clear transaction_log.csv.
3. Output.json and transaction_log.csv are updated after every successful order request.

Communication between services:
Client to Frontend: HTTP
All internal calls after frontend service use gRPC as the internal communication protocol.

Database:
1. Output.json for catalog service
2. Transaction_log.csv for order_service

Front End Service-

The front-end service uses simple http.server classes to set up and run the server. The frontend server uses the ThreadingHttpServer class. The request handler for front-end service extends to BaseHTTPRequestHandler class. The requirement was to execute GET and POST requests made by the client and this was addressed by overriding the do_GET and do_POST methods of the

BaseHTTPRequestHandler by our own customized code as excepted in the problem statement. When a GET request is made, the do_GET method is called up and inside it, the run_lookup method is getting executed. The run_lookup call is called through a grpc channel of catalog_service and utilizes that to generate the appropriate response. Similarly, when a POST request is being made by the client, the do_POST method gets called up and in it, the run_order is getting executed. The run_order call is called a grpc channel of order_service and uses its methods to generate and send back the response. On the server code, the ThreadingHttpServer is customized by updating the protocol_versions to HTTP1.1 to have persistent connections and implement the thread per session behavior for our service.

API Contracts::

1. GET /stocks/<stock_name>

   Params: provide the name of the stock to fetch
   Body: None
   Sample Request: http://0.0.0.0:8081/stocks/GameStart
   Sample Response:
   ```
   "data": {
         "name": "GameStart",
         "price": 10.0,
         "quantity": 100.0
      }
   ```

2. POST /orders

   Params: None
   Body: None
   Sample POST: http://0.0.0.0:8081/orders,json={
   ```
         'name': "GameStart",
         'quantity': 5,
         'type': "sell"
      }
   ```
   Sample Response:
   ```
   data": {
     "transaction_number": 1
   }
   ```

Note: Standard and basic http errors like 400's are handled.

Catalog Service:

The Catalog Service implements two GRPC interfaces:

1. Lookup
2. Trade

Lookup Method: Frontend calls this method on the catalog service to make a lookup. Only the stock_name argument needs to be passed, and we can expect the return to be success and stock_ details.

Return values:
{-1, {}} if stock_name isn't present
{1, {name:"meta", quantity:"10", status:"0"}} if stock status is active.
{0, {}} if stock status is suspended.

Trade Method: Order Service calls this method on catalog service to execute an order it received from frontend.

Args: stock_name, trade_volume, type
Return: {success}

Success Values:
1 - Successful trade
0 - if trade volume < 0 & if stock is suspended to trade
-1 - if stock_name is invalid
-2 - if trade_volume > stock quantity

Order Service:
Implements one GRPC interface Order

Order Method: Take an order request from Frontend Service

Args:stock_name, trade_volume, type
Return: {success, transaction_id}

Return Values:
{1, 1} - transaction_id is legit only if success is 1
{0, -1} - transaction_id=-1 if order fails.

Tradeoffs:
1. The final trade for an order request is anyhow implemented in the catalog service. So, in this design, order service is adding an extra layer of latency to the execution.

2. For now the system isn’t fault tolerant due to lack of replication in the components. Also, in heavy load scenarios, frontend would contribute to the highest decrease in performance in comparison to other components as http is the communication protocol it interfaces with the client (gRPC is faster compared to http).