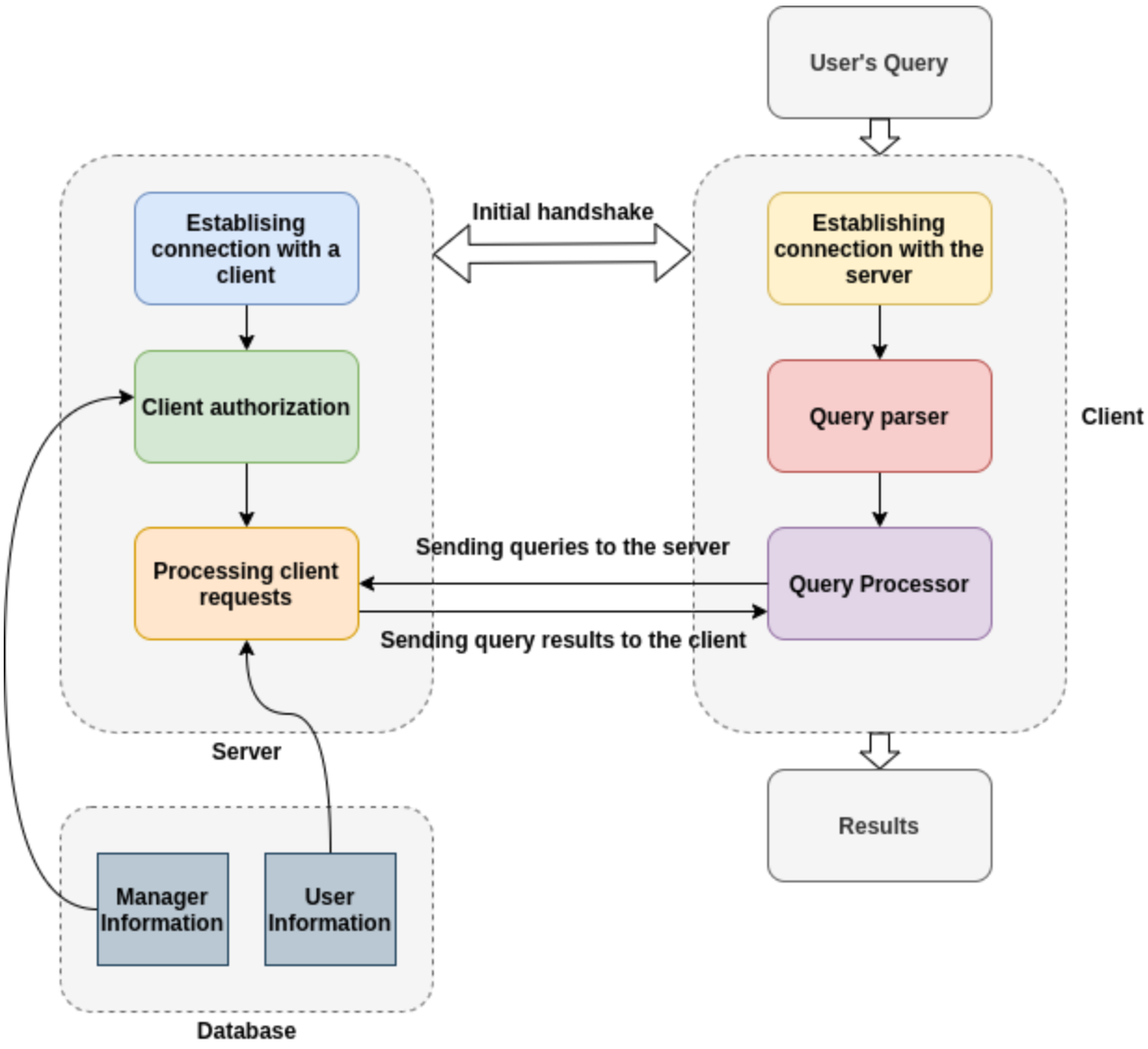
Problem Statement

Implement a TCP-based key-value store. The server implements the key-value store and clients make use of it. The server must accept clients' connections and serve their requests for 'get' and 'put' key value pairs. All key-value pairs should be stored by the server only in memory. Keys and values are strings.

Design description

`Structural design:`



Design Explanation:

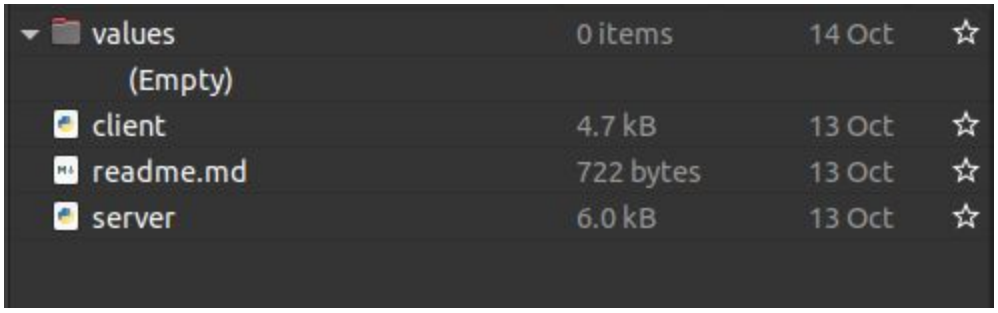
1. Server starts and prompts its address including the port number in the console.
2. Server is designed to serve the clients on a "serve and go" basis. A client only connects to the server when some query needs to be processed. After successfully getting results from the server, the client leaves and the same is prompted in the console of the server.
3. The Server manages the user's information and key-value pairs as a csv file. Every user is assigned a particular csv file.
4. A user can demand the server for upgradation to a manager. The server may accept or deny the request.
5. When the server grants a user request for upgradation, the user is required to set a password for authorization purposes.
6. The server stores the manager's authorization details in a separate csv file. When a manager is connected in future, it is asked for the password. If an incorrect password is entered thrice, the user is demoted to a guest user.
7. The server can handle multiple clients and store multiple client's information simultaneously. It can also support multiple managers who can access everyone's information.

File Information:

1. Client profiles: Every client's key-value pairs are stored in their own csv file in the folder "*values".*
2. Manager profiles: A list of all client usernames who have manager authorization is stored in a file names *"managers.csv".*

Sample I/O

Initial state of the directory



Logs of the server and client during the query processing stage

Server	Client
$ ./server Server listening at IP: localhost , PORT: 8000 -------------------------- Connected by ('127.0.0.1', 38456) --------------------------	$ ./client localhost 8000 put roll 1 put name Priyank put marks 100 Username: Priyank

```
Username: PRIYANK
New User entered

Request Type: put
Key: ROLL, Value: 1
Request Type: put
Key: NAME, Value: Priyank
Request Type: put
Key: MARKS, Value: 100
connection closed!!

----------
Connected by ('127.0.0.1', 38458)
----------

Username: DEVESH
New User entered

Request Type: put
Key: ROLL, Value: 2
Request Type: put
Key: NAME, Value: Devesh
Request Type: put
Key: MARKS, Value: 99
connection closed!!

----------
Connected by ('127.0.0.1', 38464)
----------

Username: IMRAN
New User entered

Request Type: put
Key: ROLL, Value: 3
Request Type: put
Key: NAME, Value: Imran
Request Type: put
Key: MARKS, Value: 99.5
connection closed!!

----------
Connected by ('127.0.0.1', 38466)
----------

Username: IMRAN

Request Type: put
Key: ROLL, Value: 3
Request Type: put
Key: NAME, Value: Imran
Request Type: put
Key: MARKS, Value: 99.5
connection closed!!

----------
Connected by ('127.0.0.1', 38468)
----------

Username: SHASHI
New User entered

Request Type: put
Key: ROLL, Value: 4
Request Type: put
Key: NAME, Value: Shashi
Request Type: put
Key: MARKS, Value: 100
connection closed!!

----------
Connected by ('127.0.0.1', 38470)
----------

Username: PRIYANK

Request Type: get
Key: ROLL
Request Type: get
Key: NAME
Request Type: get
Key: MARKS
```

```
$ ./client localhost 8000 put roll 2 put name
Devesh put marks 99
Username: Devesh

$ ./client localhost 8000 put roll 3 put name
Imran put marks 99.5
Username: Imran

$ ./client localhost 8000 put roll 3 put name
Imran put marks 99.5
Username: Imran

$ ./client localhost 8000 put roll 4 put name
Shashi put marks 100
Username: Shashi

$ ./client localhost 8000 get roll get name get
marks
Username: priyank

1
Priyank
100
$ ./client localhost 8000 manager get roll get
name get marks
Username: Priyank
Request for upgradation to manager denied by
the server!!

1
Priyank
100
$ ./client localhost 8000 manager get roll get
name get marks
Username: Priyank
Create password: Priyank123
Confirm password: Priyank123
You are now a manager
Enter the name of the user whose information
you need: Imran

3
Imran
99.5
$ ./client localhost 8000 manager get roll get
name get marks
Username: Priyank
You are marked as a manager!!

Enter correct password else you will be demoted
```

```
connection closed!!

---------------------------
Connected by ('127.0.0.1', 38472)
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Username: PRIYANK
Request for upgrade denied!

Request Type: get
Key: ROLL
Request Type: get
Key: NAME
Request Type: get
Key: MARKS
connection closed!!

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Connected by ('127.0.0.1', 38474)
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Username: PRIYANK
A new manager added

Request Type: get
Key: ROLL
Request Type: get
Key: NAME
Request Type: get
Key: MARKS
connection closed!!

---------------------------
Connected by ('127.0.0.1', 38476)
---------------------------

A manager accessed the connection
Username: PRIYANK

Request Type: get
Key: ROLL
Request Type: get
Key: NAME
Request Type: get
Key: MARKS
connection closed!!
```

to a guest user!!
Password: Priyank2
Error!!
2 attempts remaining!!
Password: Priyank123

_Welcome Manager!!
Enter the name of the user whose information you need: Shashi

4
Shashi
100

Final state of the directory after the query processing