Assignment 2

CSE-5306-004-DISTRIBUTED SYSTEMS

Project Assignment 2: gRPC-Backed Virtual Pet Adoption System

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Ali Ashan

Q1:

Node.js (Hello World)

 # Clone the repository to get the example code

$ git clone -b @grpc/grpc-js@1.9.0 --depth 1 --shallow-submodules https://github.com/grpc/grpc-node

 # Navigate to the node example

$ cd grpc-node/examples

 # Install the example's dependencies

$ npm install

 # Navigate to the dynamic codegen "hello, world" Node example:

$ cd helloworld/dynamic_codegen

File Edit Selection View Go ··· grpc-node [Administrator]

EXPLORER

GRPC-NODE
- .github
- doc
- examples
  - cancellation
  - deadline
  - error_handling
  - helloworld
    - dynamic_codegen
      - greeter_client.js
      - greeter_server.js
    - static_codegen
  - interceptors
  - keepalive
  - metadata
  - node_modules
  - protos
  - reflection
  - routeguide
  - xds
- package-lock.json
- package.json
- README.md
- packages
- test
- tools
- .editorconfig
- .gitattributes
- .gitignore
- .gitmodules
- .istanbul.yml
- AUTHORS
- CODE-OF-CONDUCT.md
- CONTRIBUTING.md
- GOVERNANCE.md
- gulpfile.ts
- LICENSE
- MAINTAINERS.md
- merge_kokoro_logs.js
- PACKAGE-COMPARISO...
- package.json
- README.md
- run-tests.bat
- run-tests.sh

DEBUG CONSOLE

Filter (e.g. text, !ex...

OUTLINE

TIMELINE

greeter_client.js

examples > helloworld > dynamic_codegen > greeter_client.js > main > client.sayHello() callback

```js
 *
 *     http://www.apache.org/licenses/LICENSE-2.0
 *
 * Unless required by applicable law or agreed to in writing, software
 * distributed under the License is distributed on an "AS IS" BASIS,
 * WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
 * See the License for the specific language governing permissions and
 * limitations under the License.
 *
 */

var PROTO_PATH = __dirname + '/../../protos/helloworld.proto';

var parseArgs = require('minimist');
var grpc = require('@grpc/grpc-js');
var protoLoader = require('@grpc/proto-loader');
var packageDefinition = protoLoader.loadSync(
    PROTO_PATH,
    {keepCase: true,
     longs: String,
     enums: String,
     defaults: true,
     oneofs: true
    });
var hello_proto = grpc.loadPackageDefinition(packageDefinition).helloworld;

function main() {
  var argv = parseArgs(process.argv.slice(2), {
    string: 'target'
  });
  var target;
  if (argv.target) {
    target = argv.target;
  } else {
    target = 'localhost:50051';
  }
  var client = new hello_proto.Greeter(target,
                                       grpc.credentials.createInsecure());
  var user;
  if (argv._.length > 0) {
    user = argv._[0];
  } else {
    user = 'world';
  }
  client.sayHello({name: user}, function(err, response) {
    console.log('Greeting:', response.message);
  });
}

main();
```

PROBLEMS TERMINAL PORTS OUTPUT node - dynamic_codegen

```
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node> cd .\examples\
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> npm install
npm WARN deprecated google-p12-pem@3.1.4: Package is no longer maintained

added 92 packages, and audited 93 packages in 15s

7 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> cd helloworld/dynamic_codeg^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> ^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $
(whoami)"; node greeter_server.js
10/02/2024 22:44:12 srinivas\bssud
gRPC listening on 50051
```

master ⊗ 0 ⚠ 0 0 Ln 52, Col 58 Spaces: 2 UTF-8 CRLF JavaScript Prettier

25°C Clear Search 10:44 PM 10/2/2024

package.json
README.md
run-tests.bat
run-tests.sh
DEBUG CONSOLE
Filter (e.g. text, !ex...
PROBLEMS TERMINAL PORTS OUTPUT node - dynamic_codegen
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node> cd .\examples\
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> npm install
npm WARN deprecated google-p12-pem@3.1.4: Package is no longer maintained
added 92 packages, and audited 93 packages in 15s
7 packages are looking for funding
run `npm fund` for details

fou Focus folder in explorer (ctrl + click)

PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> cd helloworld/dynamic_codeg^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> ^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $
(whoami)"; node greeter_server.js
10/02/2024 22:44:12 srinivas\bssud
gRPC listening on 50051
OUTLINE
TIMELINE
master ⊗ 0 ⚠ 0 0 Ln 52, Col 58 Spaces: 2 UTF-8 CRLF JavaScript Prettier

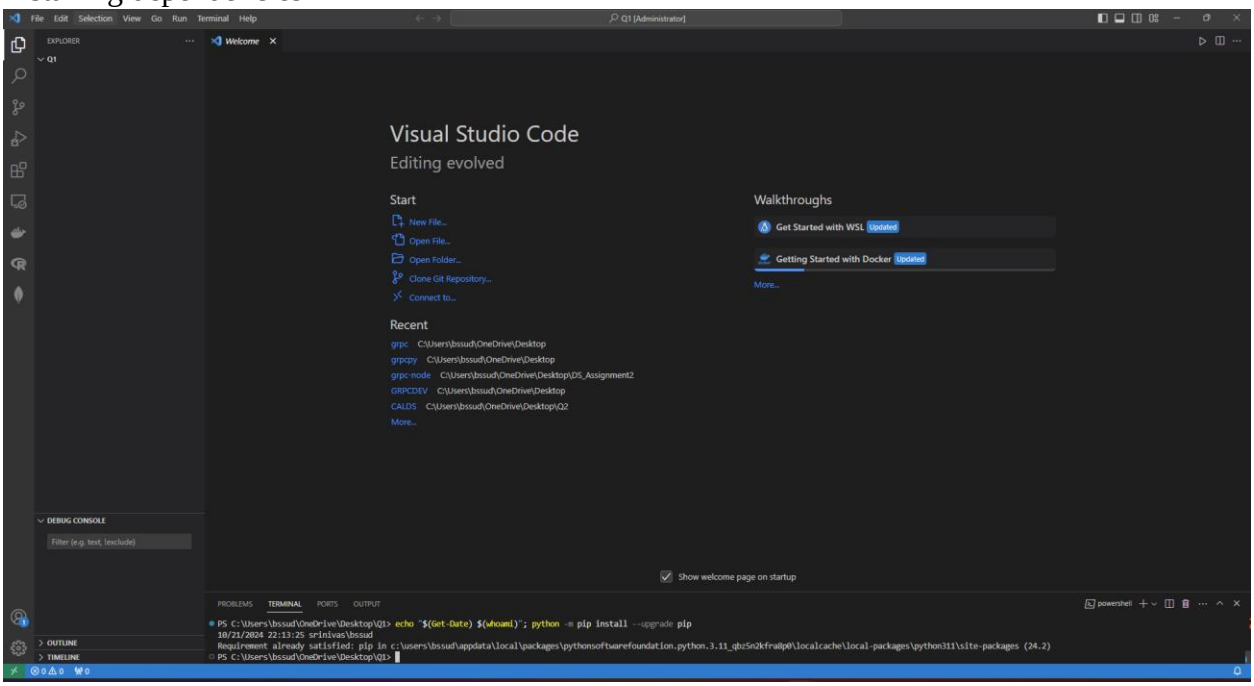
```
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node> cd .\examples\
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> cd .\helloworld\dynamic_codegen\
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $(whoami)"; node greeter_client.js
10/02/2024 22:47:24 srinivas\bssud
Greeting: Hello world
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen>
```

```
7 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples> cd helloworld/dynamic_codeg^C

PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> ^C

PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $(whoami)"; node greeter_server.js
10/02/2024 22:44:12 srinivas\bssud
gRPC listening on 50051
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> ^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $(whoami)"; node greeter_server.js
10/02/2024 23:59:46 srinivas\bssud
(node:31028) DeprecationWarning: Calling start() is no longer necessary. It can be safely omitted.
(Use `node --trace-deprecation ...` to show where the warning was created)
```

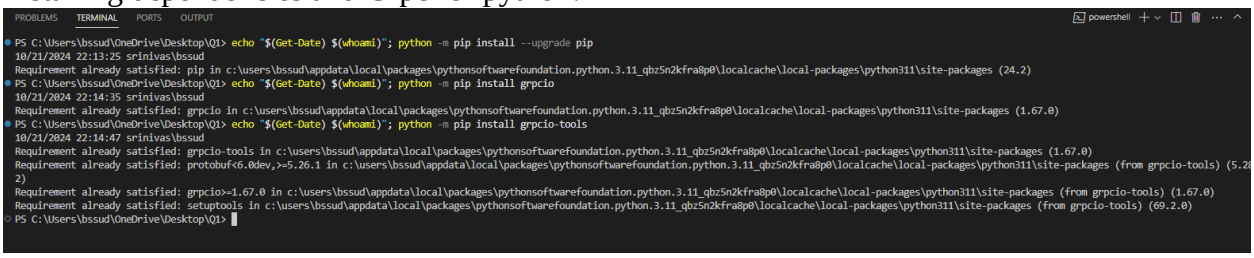
```
    }
  }
  Greeting: Hello world
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> ^C
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen> echo "$(Get-Date) $(whoami)"; node greeter_client.js
10/02/2024 23:59:53 srinivas\bssud
Greeting: Hello world
Greeting: Hello again, you
PS C:\Users\bssud\OneDrive\Desktop\DS_Assignment2\grpc-node\examples\helloworld\dynamic_codegen>
```

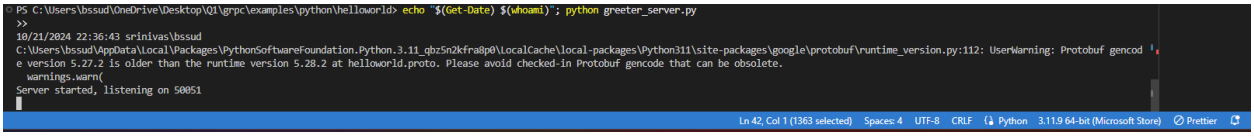
Part 2 (Q1) : Using Python:

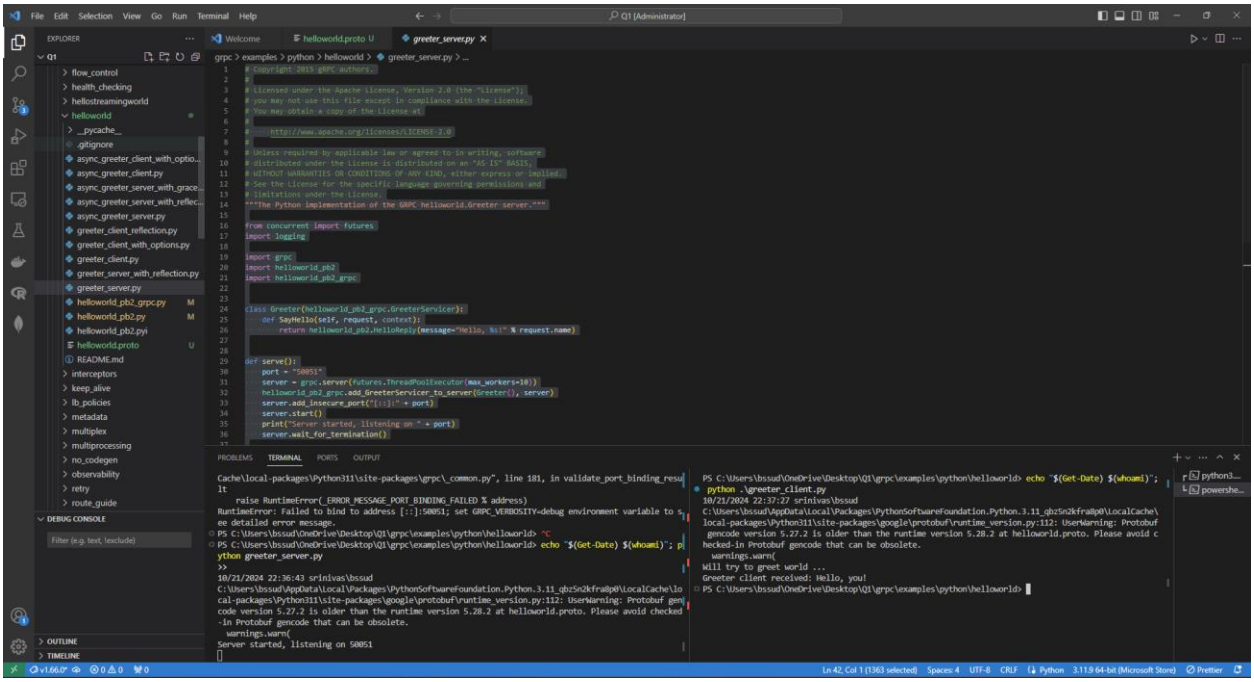
Installing dependencies



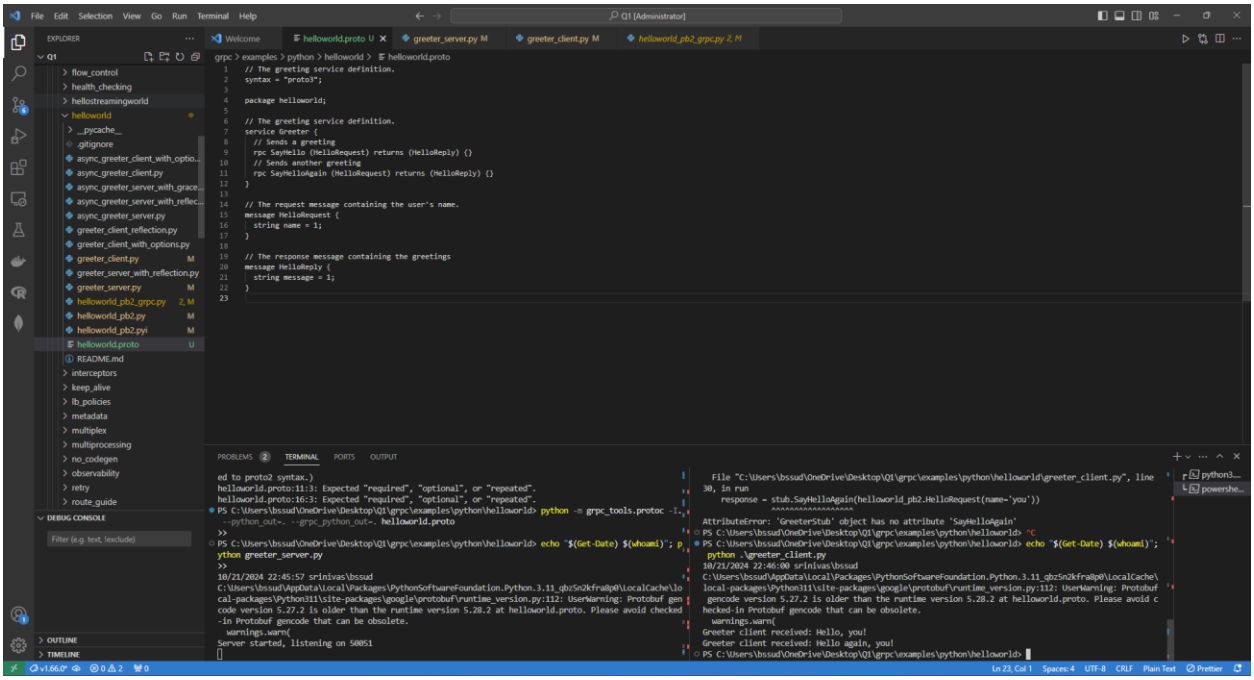
Installing dependencies and Grpc for python:





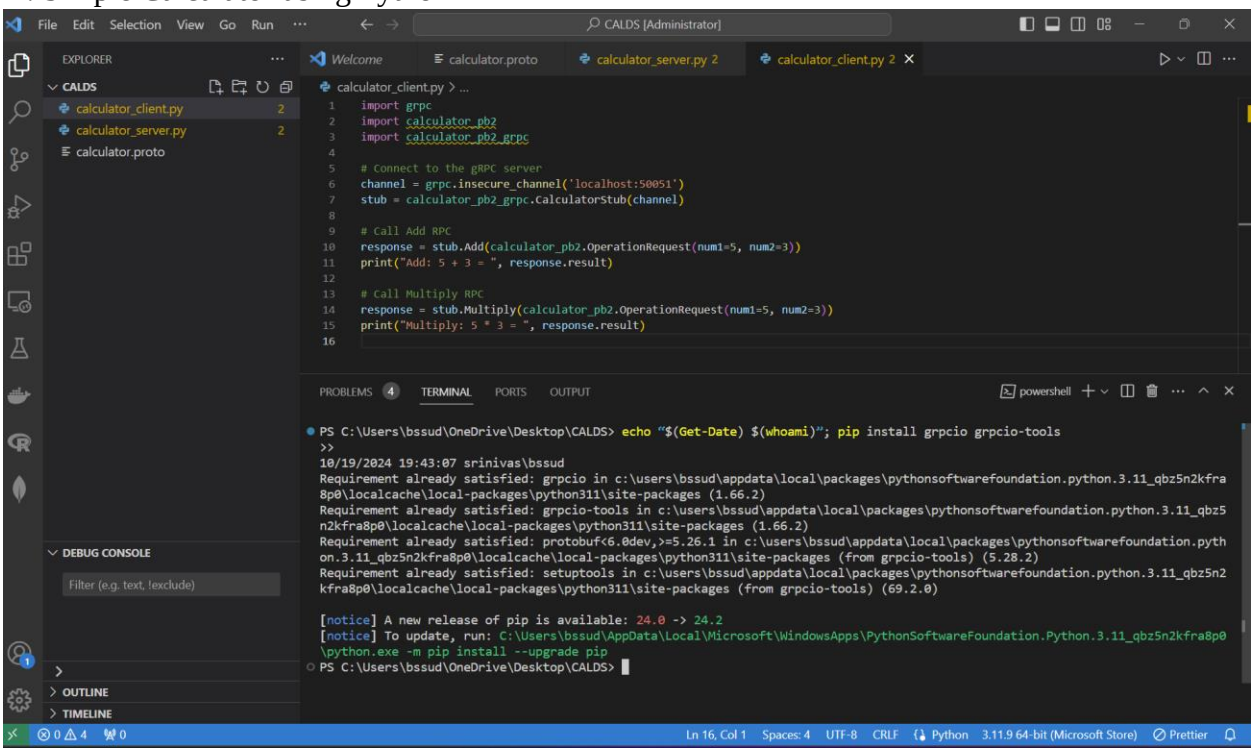


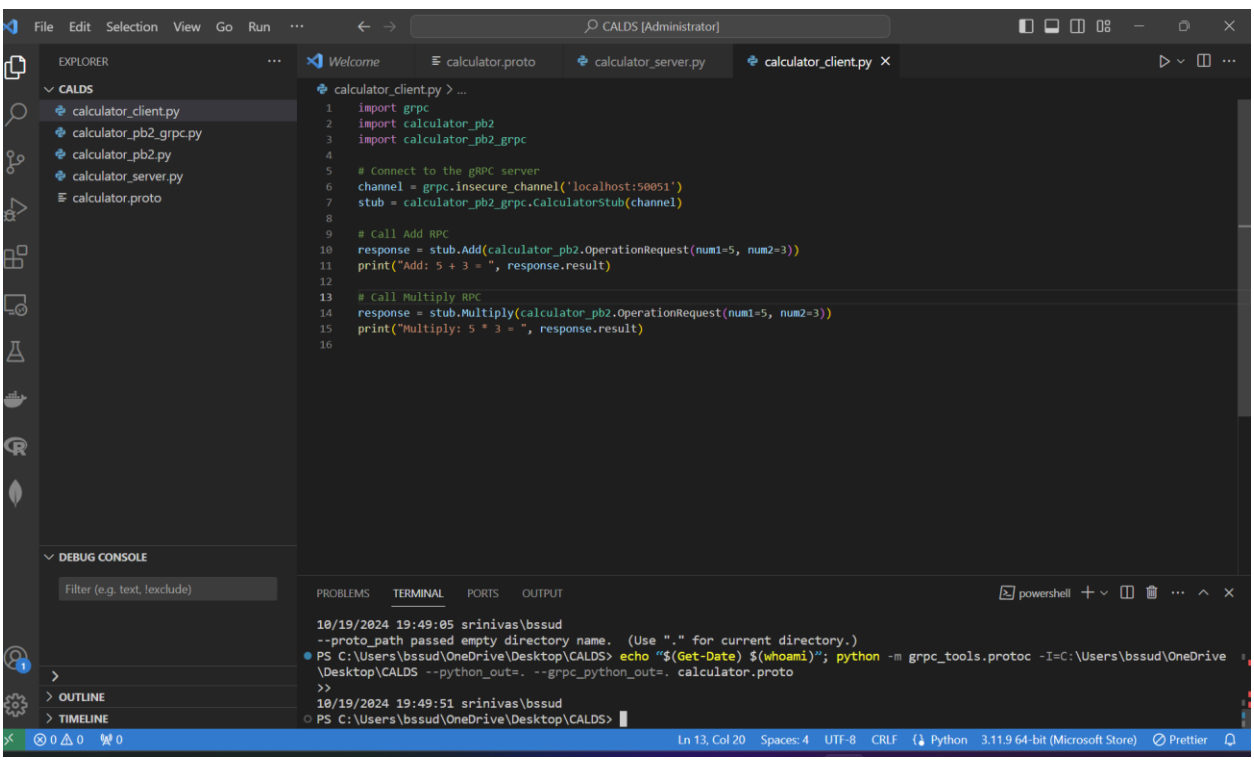
Post Updating the changes and Printing Hello World Again.

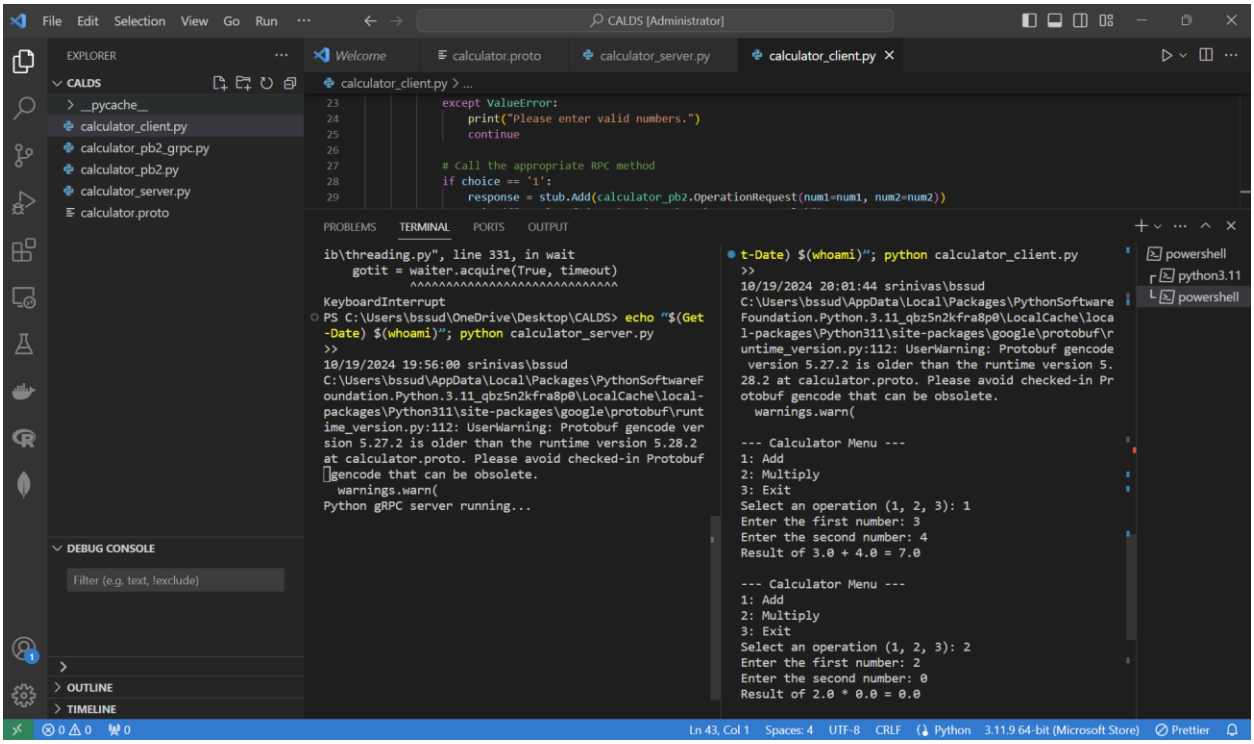


Q2:

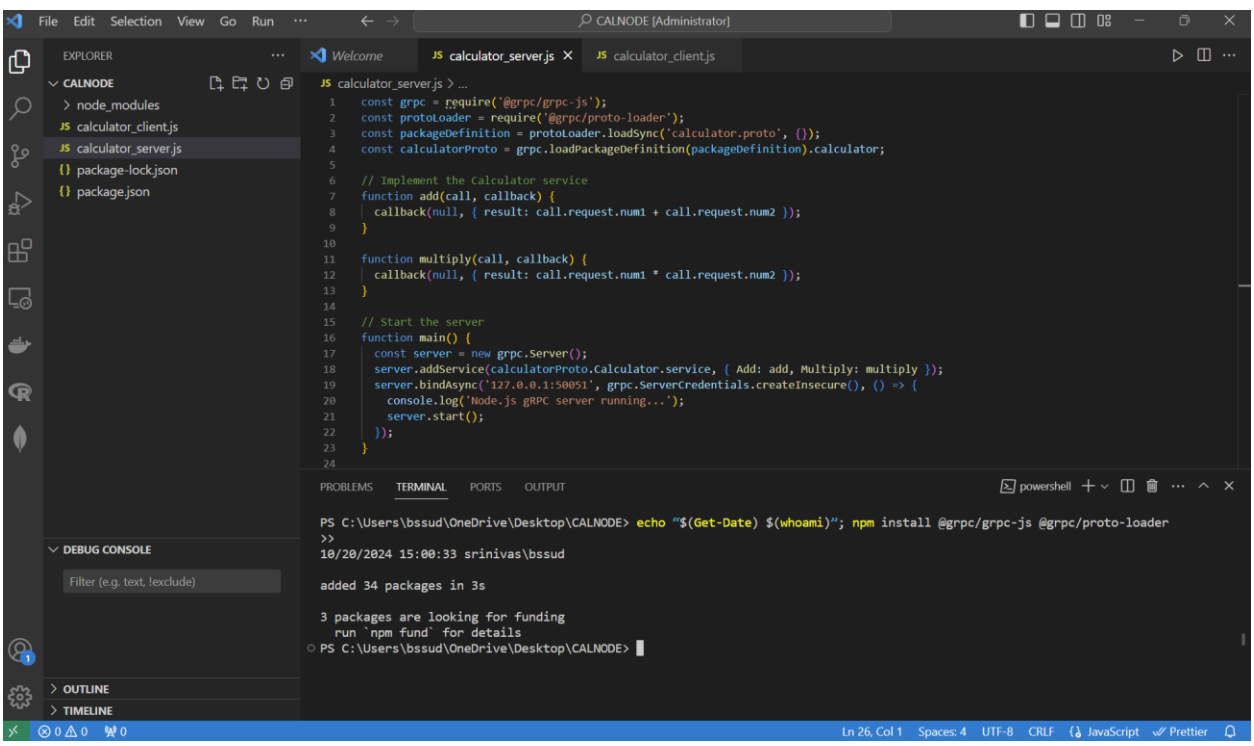
A. Simple Calculator using Python







B. Node (Simple Calculator)



File Edit Selection View Go Run ··· CALNODE [Administrator]

EXPLORER

CALNODE
- node_modules
- calculator_client.js
- calculator_server.js
- package-lock.json
- package.json

Welcome | calculator_server.js | calculator_client.js

calculator_server.js > ...

```
const grpc = require('@grpc/grpc-js');
const protoLoader = require('@grpc/proto-loader');
const packageDefinition = protoLoader.loadSync('calculator.proto', {});
const calculatorProto = grpc.loadPackageDefinition(packageDefinition).calculator;

// Implement the Calculator service
function add(call, callback) {
  callback(null, { result: call.request.num1 + call.request.num2 });
}

function multiply(call, callback) {
  callback(null, { result: call.request.num1 * call.request.num2 });
}

// Start the server
function main() {
  const server = new grpc.Server();
  server.addService(calculatorProto.Calculator.service, { Add: add, Multiply: multiply });
  server.bindAsync('127.0.0.1:50051', grpc.ServerCredentials.createInsecure(), () => {
    console.log('Node.js gRPC server running...');
    server.start();
  });
}
```

PROBLEMS TERMINAL PORTS OUTPUT

```
3 packages are looking for funding
  run `npm fund` for details
PS C:\Users\bssud\OneDrive\Desktop\CALNODE> echo "$(Get-Date) $(whoami)"; npm i
10/20/2024 15:01:02 srinivas\bssud

up to date, audited 35 packages in 812ms

3 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
PS C:\Users\bssud\OneDrive\Desktop\CALNODE>
```

DEBUG CONSOLE

Filter (e.g. text, !exclude)

OUTLINE

TIMELINE

Ln 26, Col 1 Spaces: 4 UTF-8 CRLF JavaScript Prettier

File Edit Selection View Go Run ··· CALNODE [Administrator]

Welcome | calculator_server.js | calculator.proto | calculator_client.js

calculator_client.js > ...

```
                        if (!error) {
                            console.log(`Result of ${num1} * ${num2} = ${response.result}`);
                        } else {
                            console.error("Error: ", error.message);
                        }
                        askOperation();  // Continue prompting after result
                    });
                }
            });
        });
    } else if (choice === '3') {
        console.log("Exiting...");
        rl.close();  // Exit the program
    } else {
```

PROBLEMS TERMINAL PORTS OUTPUT

```
PS C:\Users\bssud\OneDrive\Desktop\CALNODE> echo "$(Get-Date) $(whoami)
"; node calculator_server.js
>>
10/20/2024 15:02:39 srinivas\bssud
Node.js gRPC server running...
(node:55716) DeprecationWarning: Calling start() is no longer necessary
. It can be safely omitted.
(Use `node --trace-deprecation ...` to show where the warning was creat
ed)
```

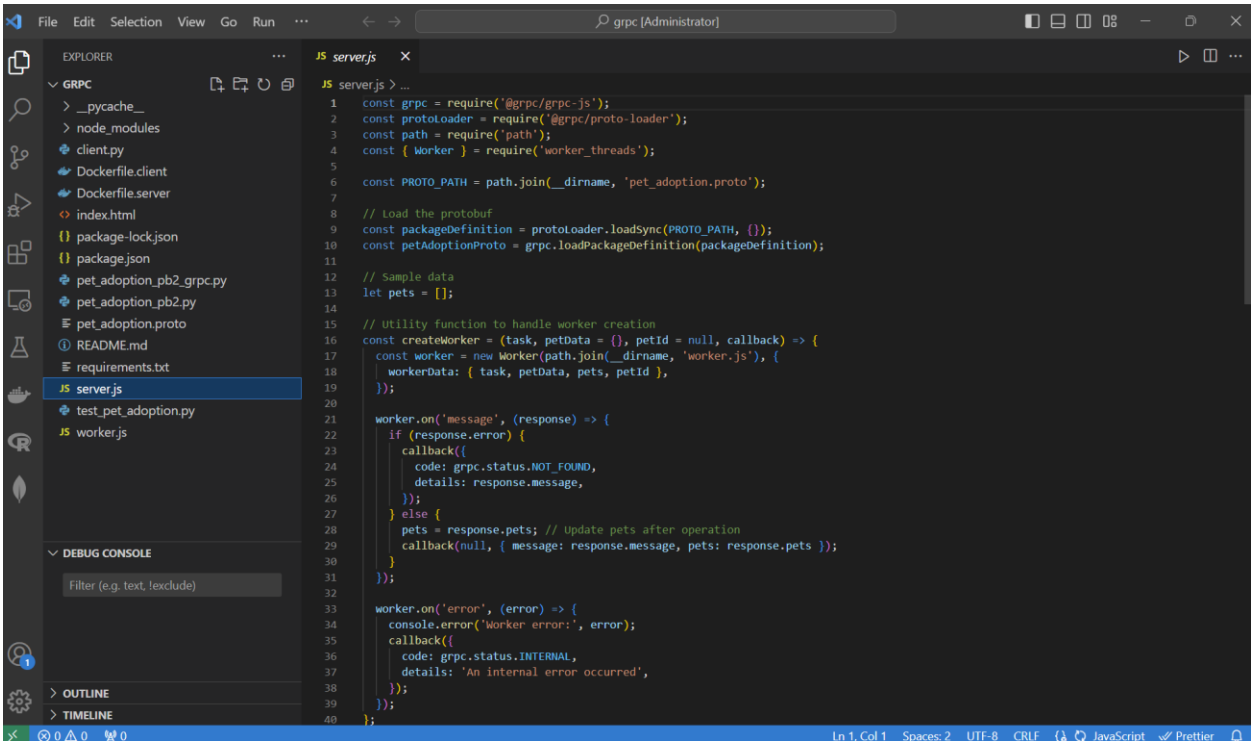
```
PS C:\Users\bssud\OneDrive\Desktop\CALNODE> ^C
PS C:\Users\bssud\OneDrive\Desktop\CALNODE> ^C
PS C:\Users\bssud\OneDrive\Desktop\CALNODE> echo "$(Get-Date) $(whoami
)"; node calculator_client.js
>>
10/20/2024 15:04:29 srinivas\bssud

--- Calculator Menu ---
1: Add
2: Multiply
3: Exit
Select an operation (1, 2, 3): 1
Enter the first number: 3
Enter the second number: 3
Result of 3 + 3 = 6

--- Calculator Menu ---
1: Add
2: Multiply
3: Exit
Select an operation (1, 2, 3):
```

powershell
node
node

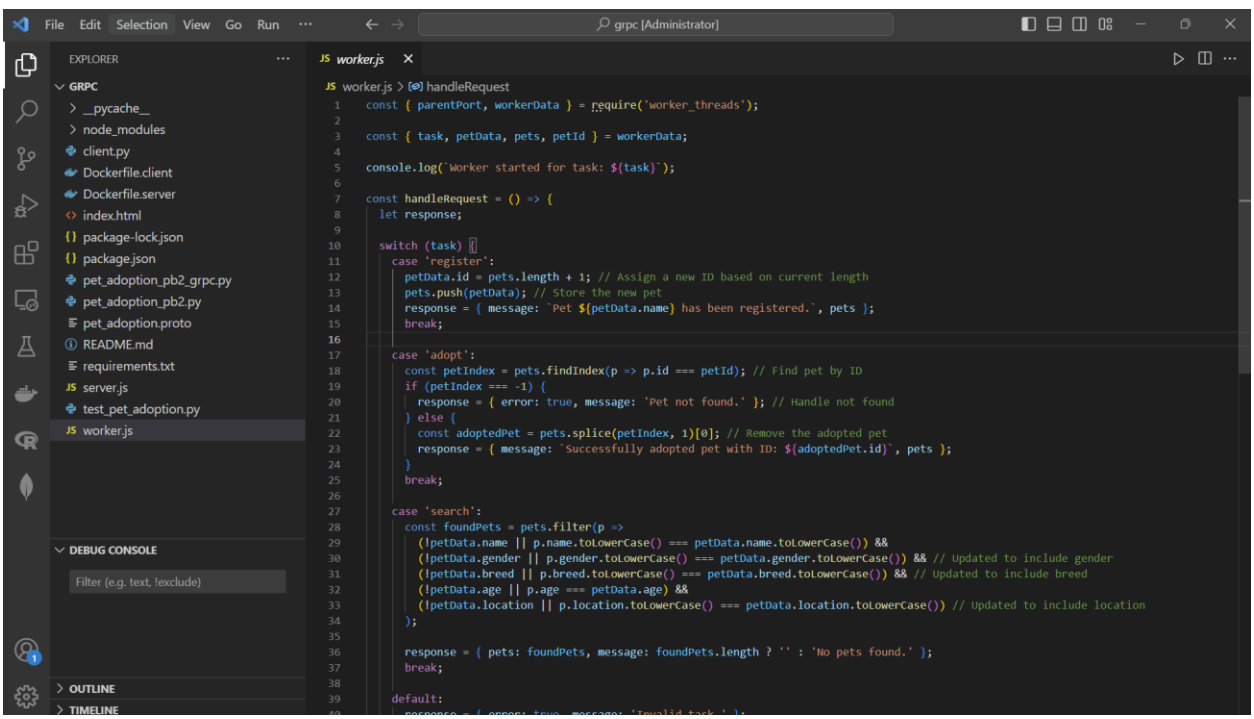
Ln 73, Col 1 Spaces: 4 UTF-8 CRLF JavaScript Prettier

Q3:

Server code:



Worker.js



Client Script:

client.py

```python
import grpc
import pet_adoption_pb2
import pet_adoption_pb2_grpc

def register_pet(stub):
    name = input("Enter the pet's name: ")
    gender = input("Enter the pet's gender (e.g., Male, Female): ")  # New input
    breed = input("Enter the pet's breed: ")  # New input
    age = int(input("Enter the pet's age: "))
    location = input("Enter the pet's location: ")  # New input
    pet = pet_adoption_pb2.Pet(name=name, gender=gender, breed=breed, age=age, location=location)  # Updated
    response = stub.RegisterPet(pet)
    print(f"Pet {name} has been registered.")

def fetch_pets(stub):
    print("Fetching list of pets:")
    response = stub.GetPets(pet_adoption_pb2.Empty())

    if not response.pets:  # Check if the list is empty
        print("No pets available.")
    else:
        for pet in response.pets:
            print(f"Pet ID: {pet.id}, Name: {pet.name}, Gender: {pet.gender}, Age: {pet.age}, Breed: {pet.breed}, Location: {pet.locatio

def adopt_pet(stub):
    pet_id = int(input("Enter the ID of the pet you want to adopt: "))
    try:
        adopt_response = stub.AdoptPet(pet_adoption_pb2.PetIdRequest(petId=pet_id))
        print(adopt_response.message)
    except grpc.RpcError as e:
        print(f"Error: {e.details()}")  # Print the error message returned by the server

def search_pet(stub):
    search_name = input("Enter a name to search for pets: ")
    search_response = stub.SearchPets(pet_adoption_pb2.PetSearchRequest(name=search_name))

    if not search_response.pets:
        print("No pets found matching the search criteria.")
    else:
        print("Search Results:")
```

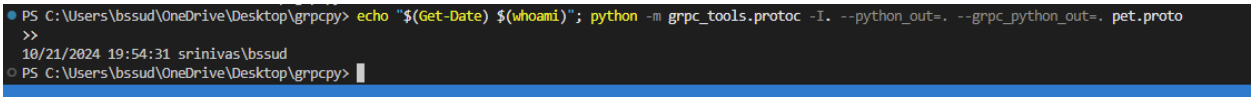
Test Cases Script:

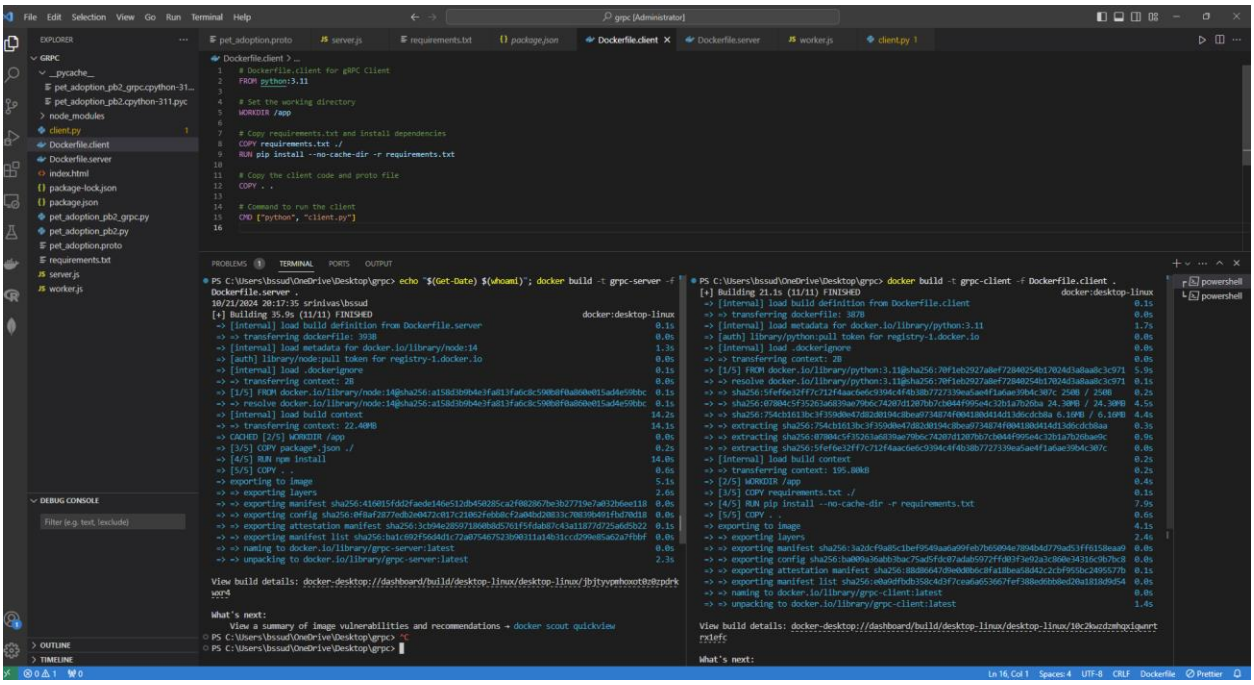
test_pet_adoption.py

```python
import grpc
import unittest
import pet_adoption_pb2
import pet_adoption_pb2_grpc

class TestPetAdoptionSystem(unittest.TestCase):
    @classmethod
    def setUpClass(cls):
        cls.channel = grpc.insecure_channel('localhost:50051')
        cls.stub = pet_adoption_pb2_grpc.PetAdoptionStub(cls.channel)

    def test_register_pet(self):
        pet = pet_adoption_pb2.Pet(name='Buddy', gender='Male', age=3, breed='Golden Retriever', location='Dallas')
        response = self.stub.RegisterPet(pet)
        self.assertEqual(response.message, 'Pet Buddy has been registered.')  # Adjust based on actual message from server

    def test_fetch_pets(self):
        new_pet = pet_adoption_pb2.Pet(name="Buddy", gender='Male', age=3, breed='Golden Retriever', location='Dallas')
        self.stub.RegisterPet(new_pet)

        response = self.stub.GetPets(pet_adoption_pb2.Empty())
        self.assertTrue(len(response.pets) > 0, "Expected pets to be available.")

    def test_adopt_pet(self):
        pet = pet_adoption_pb2.Pet(name='Buddy', gender='Male', age=3, breed='Golden Retriever', location='Dallas')
        self.stub.RegisterPet(pet)  # Register the pet to ensure it exists

        pet_id = 1  # Assuming the first registered pet has ID 1
        adopt_response = self.stub.AdoptPet(pet_adoption_pb2.PetIdRequest(petId=pet_id))
        self.assertEqual(adopt_response.message, f"Successfully adopted pet with ID: {pet_id}")  # Adjusted message

    def test_search_pet(self):
        search_name = 'Buddy'
        search_response = self.stub.SearchPets(pet_adoption_pb2.PetSearchRequest(name=search_name))
        self.assertTrue(len(search_response.pets) > 0, "Expected at least one pet to match the search criteria.")

    def test_adopt_non_existent_pet(self):
```

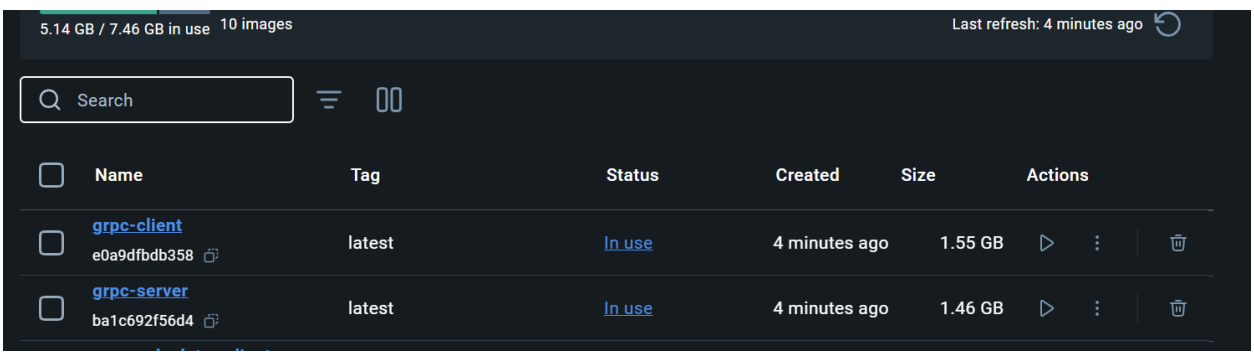
Packages needed:

```
PS C:\Users\bssud\OneDrive\Desktop\grpcpy> echo "$(Get-Date) $(whoami)"; pip install grpcio grpcio-tools
>>
10/21/2024 19:52:04 srinivas\bssud
Requirement already satisfied: grpcio in c:\users\bssud\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-packages\python311\site-packages (1.67.0)
Requirement already satisfied: grpcio-tools in c:\users\bssud\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-packages\python311\site-packages (1.67.0)
Requirement already satisfied: protobuf<6.0dev,>=5.26.1 in c:\users\bssud\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-packages\python311\site-packages (from grpcio-tools) (5.28.
2)
Requirement already satisfied: setuptools in c:\users\bssud\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-packages\python311\site-packages (from grpcio-tools) (69.2.0)
PS C:\Users\bssud\OneDrive\Desktop\grpcpy>
```





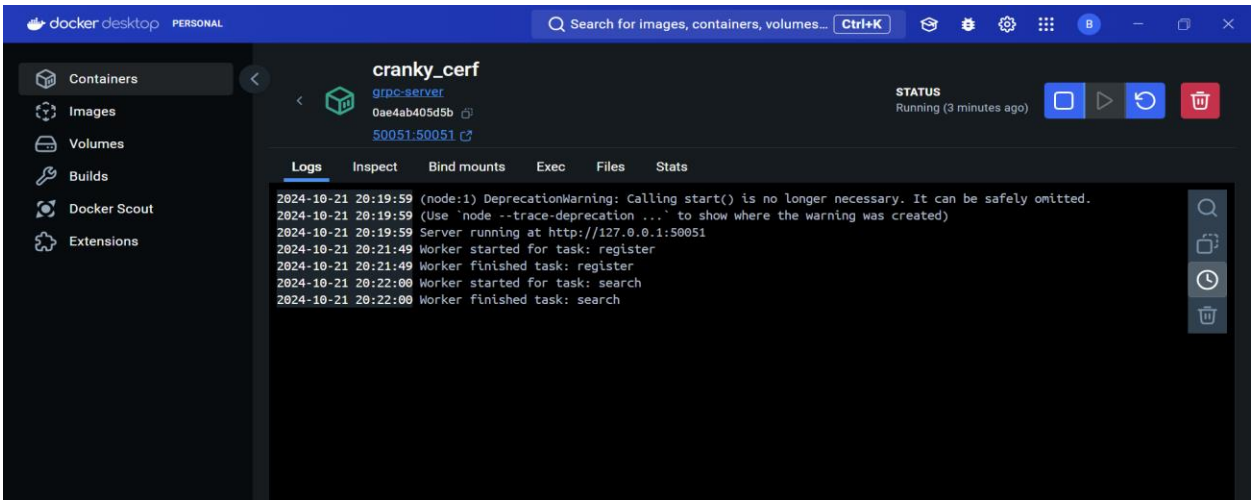
Docker Image:

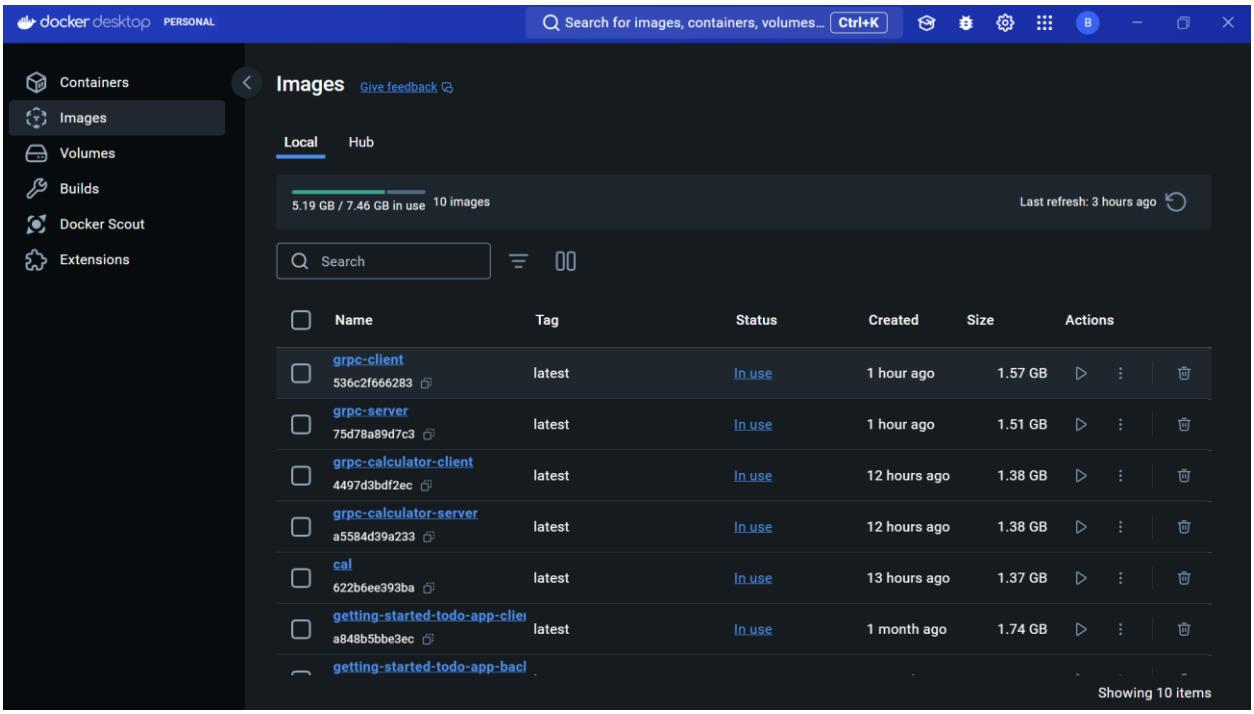


To manually run in the IDE we can pull image and run this cmds:

docker run -p 50051:50051 grpc-server

docker run -it --network="host" grpc-client





Running Test Cases: