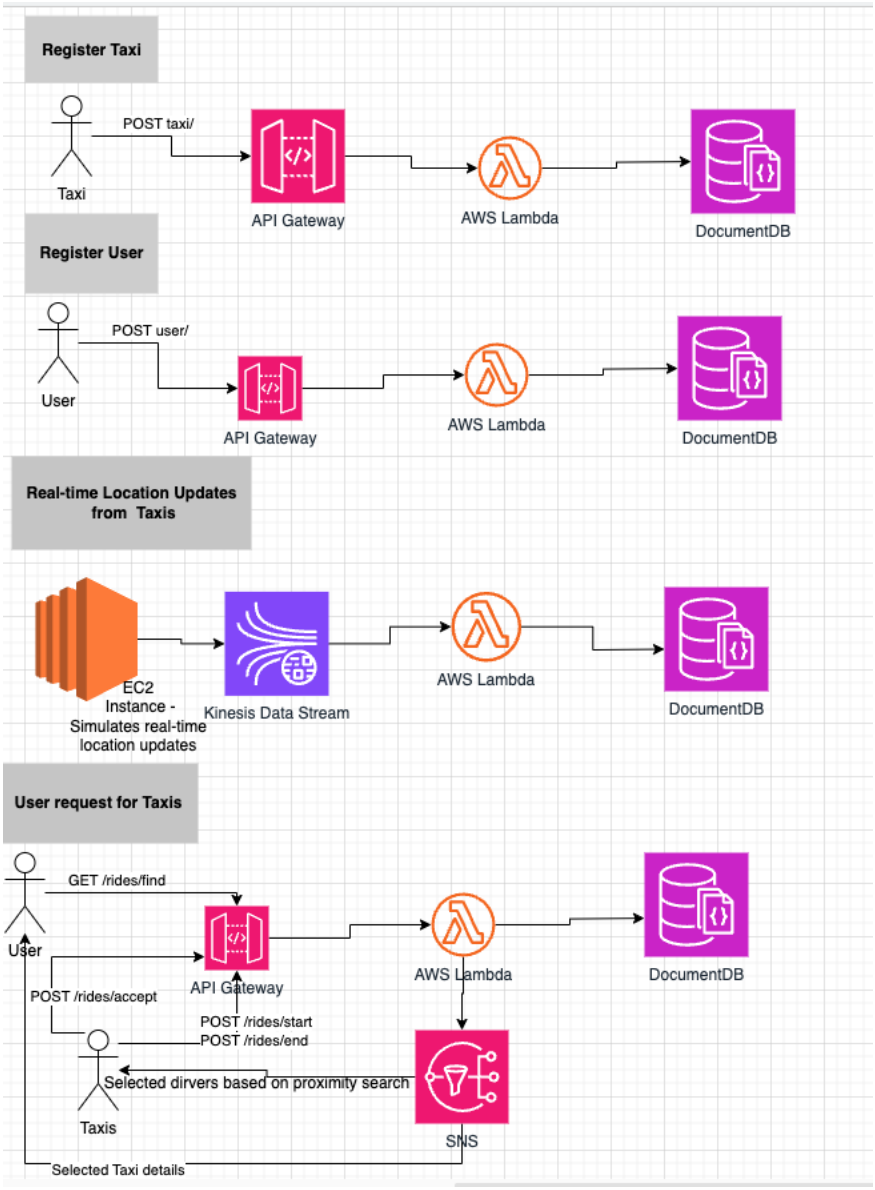
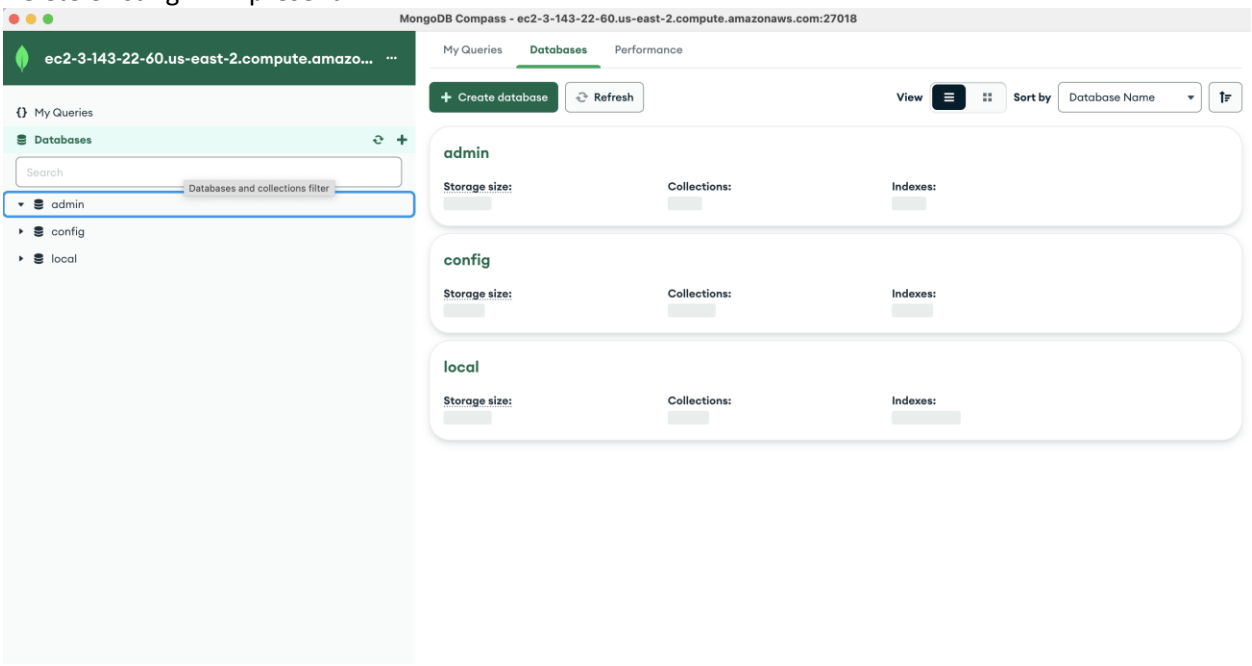
High level Architecture Design Diagram for the Location based Taxi Aggregator and Selector (Cloud)



Demo Presentation:

1. Delete existing DB if present



2. Connect to Ec2 instance using below command from terminal
ssh -i "ec2cp2.pem" ubuntu@ec2-3-143-22-60.us-east-2.compute.amazonaws.com

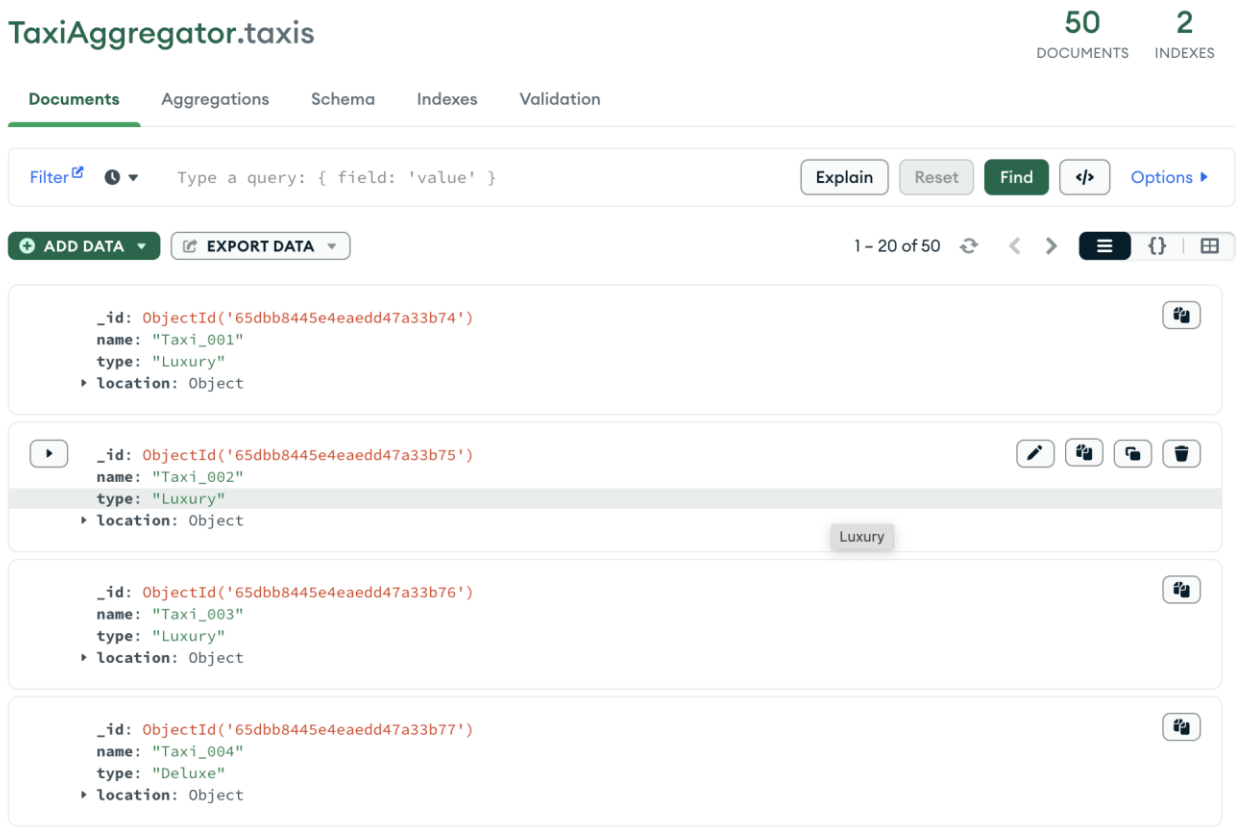
```
➜  Downloads ssh -i "ec2cp2.pem" ubuntu@ec2-3-143-22-60.us-east-2.compute.amazonaws.com
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1017-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Sun Feb 25 21:54:56 UTC 2024

  System load:  0.0               Processes:                111
  Usage of /:   55.1% of 7.57GB   Users logged in:          0
  Memory usage: 47%               IPv4 address for docker0: 172.17.0.1
  Swap usage:   0%                IPv4 address for eth0:    172.31.9.133

 * Ubuntu Pro delivers the most comprehensive open source security and
   compliance features.

   https://ubuntu.com/aws/pro

Expanded Security Maintenance for Applications is not enabled.

37 updates can be applied immediately.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


*** System restart required ***
Last login: Sun Feb 25 20:41:34 2024 from 206.180.248.85
```

3. Run InitializeTaxiAggregatorDB.py to create DB, Collections and 2dsphere index and then insert default service area location.

```
ubuntu@ip-172-31-9-133:~$ python3 InitializeTaxiAggregatorDB.py
Created geospatial index for 'taxis' collection.
Created geospatial index for 'customers' collection.
Inserted default service area document into 'service_areas' collection.
```

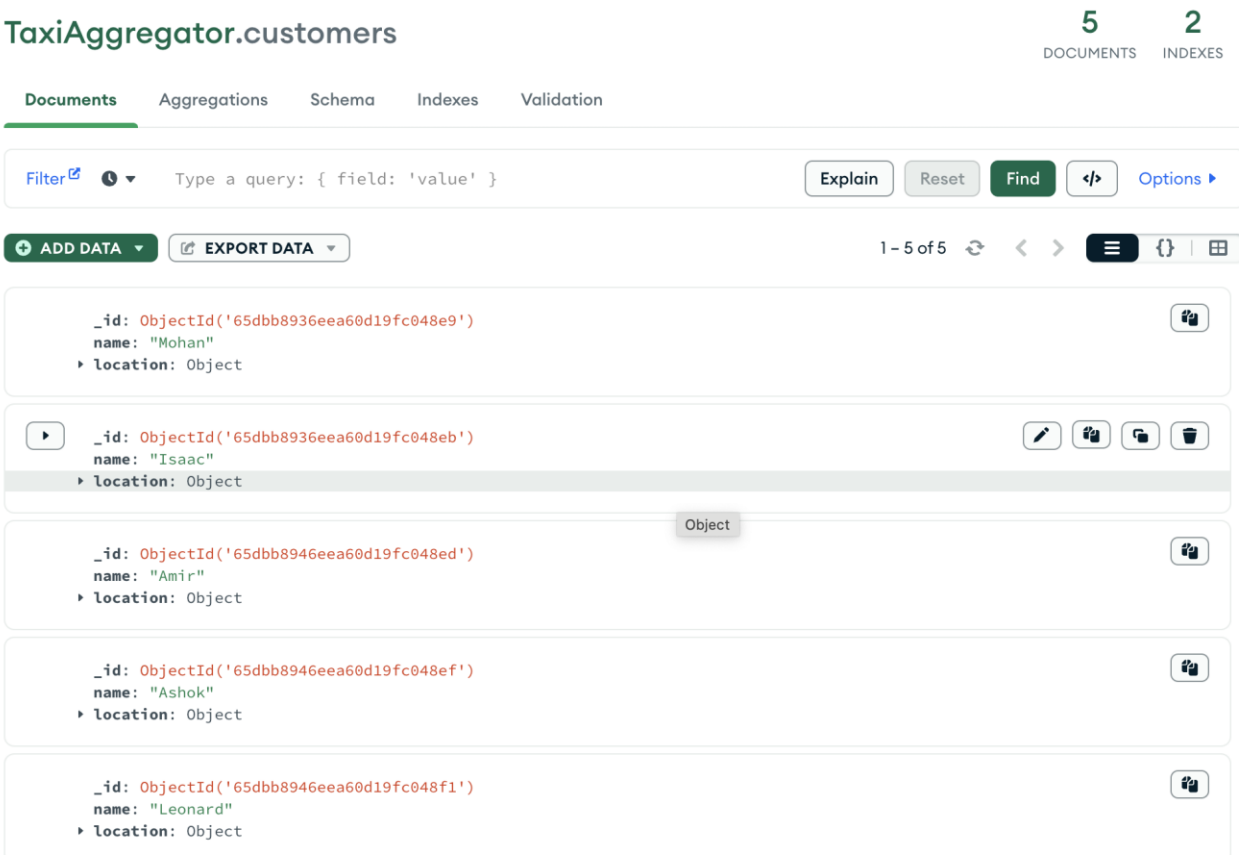
4. Run RegisterTaxis.py to create 50 sample taxi data.

```
ubuntu@ip-172-31-9-133:~$ python3 RegisterTaxis.py
{"statusCode": 200, "headers": {"Content-Type": "application/json"}, "body": "{\"message\": \"Successfully registered taxis within the service area\", \"registered_ids\": [\"65dbb8445e4eaedd47a33b74\", \"65dbb8445e4eaedd47a33b75\", \"65dbb8445e4eaedd47a33b76\", \"65dbb8445e4eaedd47a33b77\", \"65dbb8445e4eaedd47a33b78\", \"65dbb8445e4eaedd47a33b79\", \"65dbb8445e4eaedd47a33b7a\", \"65dbb8445e4eaedd47a33b7b\", \"65dbb8445e4eaedd47a33b7c\", \"65dbb8445e4eaedd47a33b7d\", \"65dbb8445e4eaedd47a33b7e\", \"65dbb8445e4eaedd47a33b7f\", \"65dbb8445e4eaedd47a33b80\", \"65dbb8445e4eaedd47a33b81\", \"65dbb8445e4eaedd47a33b82\", \"65dbb8445e4eaedd47a33b83\", \"65dbb8445e4eaedd47a33b84\", \"65dbb8445e4eaedd47a33b85\", \"65dbb8445e4eaedd47a33b86\", \"65dbb8445e4eaedd47a33b87\", \"65dbb8445e4eaedd47a33b88\", \"65dbb8445e4eaedd47a33b89\", \"65dbb8445e4eaedd47a33b8a\", \"65dbb8445e4eaedd47a33b8b\", \"65dbb8445e4eaedd47a33b8c\", \"65dbb8445e4eaedd47a33b8d\", \"65dbb8445e4eaedd47a33b8e\", \"65dbb8445e4eaedd47a33b8f\", \"65dbb8445e4eaedd47a33b90\", \"65dbb8445e4eaedd47a33b91\", \"65dbb8445e4eaedd47a33b92\", \"65dbb8445e4eaedd47a33b93\", \"65dbb8445e4eaedd47a33b94\", \"65dbb8445e4eaedd47a33b95\", \"65dbb8445e4eaedd47a33b96\", \"65dbb8445e4eaedd47a33b97\", \"65dbb8445e4eaedd47a33b98\", \"65dbb8445e4eaedd47a33b99\", \"65dbb8445e4eaedd47a33b9a\", \"65dbb8445e4eaedd47a33b9b\", \"65dbb8445e4eaedd47a33b9c\", \"65dbb8445e4eaedd47a33b9d\", \"65dbb8445e4eaedd47a33b9e\", \"65dbb8445e4eaedd47a33b9f\", \"65dbb8445e4eaedd47a33ba0\", \"65dbb8445e4eaedd47a33ba1\", \"65dbb8445e4eaedd47a33ba2\", \"65dbb8445e4eaedd47a33ba3\", \"65dbb8445e4eaedd47a33ba4\", \"65dbb8445e4eaedd47a33ba5\"]}"}
Status Code: 200
```



5. Run RegisterCustomers.py to create 5 sample Customer data.

```
[ubuntu@ip-172-31-9-133:~$ python3 RegisterCustomers.py
User Mohan registered successfully.
User Isaac registered successfully.
User Amir registered successfully.
User Ashok registered successfully.
User Leonard registered successfully.
```



6. Run TaxiLocationUpdateSimulator.py to send location data for different taxis at regular interval.

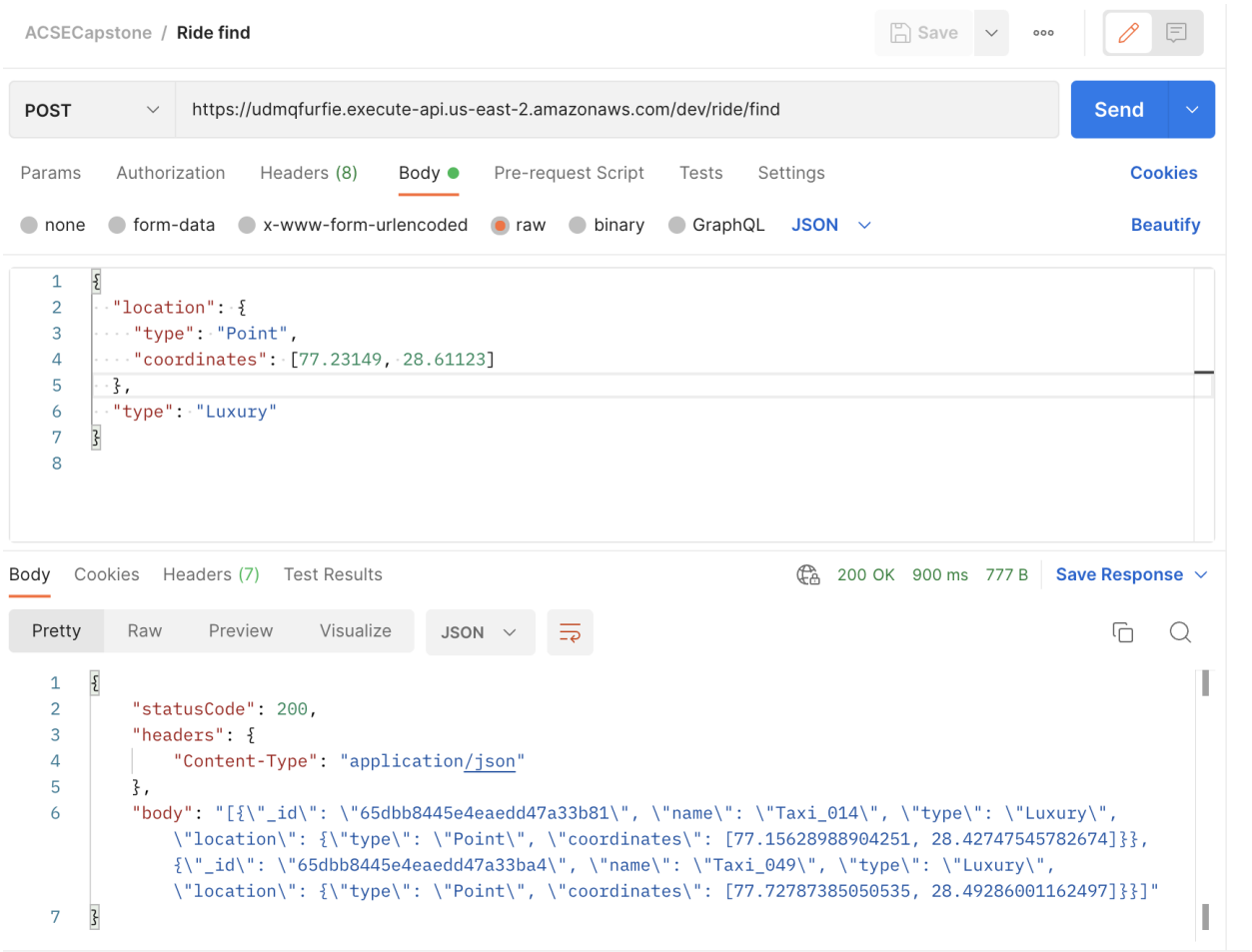
```
ubuntu@ip-172-31-9-133:~$ python TaxiLocationUpdateSimulator.py
Command 'python' not found, did you mean:
  command 'python3' from deb python3
  command 'python' from deb python-is-python3
ubuntu@ip-172-31-9-133:~$ python3 TaxiLocationUpdateSimulator.py
Updating taxi Taxi_001 location to [77.97820711125355, 27.745265818907193]
Updating taxi Taxi_002 location to [77.58673984836355, 29.036456113994994]
Updating taxi Taxi_003 location to [76.49056633366784, 29.150197600643l3]
Updating taxi Taxi_004 location to [77.34860418033428, 28.279482566945294]
Updating taxi Taxi_005 location to [76.2932339110117, 29.16262654214663]
Updating taxi Taxi_006 location to [78.03887525287256, 27.937017632738357]
Updating taxi Taxi_007 location to [76.5067643406846, 29.53966292281688]
Updating taxi Taxi_008 location to [76.60963986736485, 29.25120960128249]
Updating taxi Taxi_009 location to [76.27378677182081, 28.74841795335613]
Updating taxi Taxi_010 location to [77.6729285298968, 29.228750127313614]
Updating taxi Taxi_011 location to [77.18630057427484, 28.273989594099426]
Updating taxi Taxi_012 location to [76.7582422355116, 29.11730512483512]
Updating taxi Taxi_013 location to [77.65150779004566, 28.94162324128028]
Updating taxi Taxi_014 location to [77.1430552450643, 28.41919519291199]
Updating taxi Taxi_015 location to [77.13949438787712, 27.71132429275118]
Updating taxi Taxi_016 location to [77.8221742203139, 28.547789017663344]
Updating taxi Taxi_017 location to [77.80635258785628, 28.340690896219602]
Updating taxi Taxi_018 location to [76.92775677226199, 28.37555756848389]
Updating taxi Taxi_019 location to [76.76726326004464, 29.661682736044046]
Updating taxi Taxi_020 location to [77.43013006008695, 27.68382980774894]
Updating taxi Taxi_021 location to [77.4599212428373, 29.20846476430362]
Updating taxi Taxi_022 location to [77.20481079357265, 28.291306090568813]
Updating taxi Taxi_023 location to [77.6593070298245, 27.804897034634187]
Updating taxi Taxi_024 location to [76.88866000107448, 28.55892573260616]
Updating taxi Taxi_025 location to [78.31958717440725, 29.30523524524064]
Updating taxi Taxi_026 location to [78.27846161509976, 28.206082320706695]
Updating taxi Taxi_027 location to [76.79206993507886, 29.00431274173009]
Updating taxi Taxi_028 location to [77.83791845540817, 27.89976416757519]
Updating taxi Taxi_029 location to [77.79681239743678, 29.042001349464964]
Updating taxi Taxi_030 location to [78.19261212172515, 28.677594172172498]
Updating taxi Taxi_031 location to [77.61830013739012, 27.681872096632883]
Updating taxi Taxi_032 location to [77.87954030670697, 28.9824522545026]
Updating taxi Taxi_033 location to [77.12537631213397, 29.02144432726105]
Updating taxi Taxi_034 location to [76.413064713702, 29.055894099526903]
Updating taxi Taxi_035 location to [77.75771004258876, 29.520653784004924]
Updating taxi Taxi_036 location to [77.67801713380423, 29.340496146232038]
Updating taxi Taxi_037 location to [77.3272154627392, 28.305751974157452]
Updating taxi Taxi_038 location to [77.19925350705347, 29.389673442167016]
Updating taxi Taxi_039 location to [77.36966218193953, 27.971463255903895]
Updating taxi Taxi_040 location to [77.01391052136786, 29.577280989223492]
Updating taxi Taxi_041 location to [76.6294208635961, 28.302307282563486]
Updating taxi Taxi_042 location to [76.9017701160669, 27.981077202250884]
Updating taxi Taxi_043 location to [77.85403226949143, 29.172042044802016]
Updating taxi Taxi_044 location to [78.19219678946521, 28.097096766523855]
Updating taxi Taxi_045 location to [77.05806143965104, 27.763078404572727]
Updating taxi Taxi_046 location to [77.88284875519064, 28.926064171078806]
Updating taxi Taxi_047 location to [76.91559323537476, 29.480095222630915]
Updating taxi Taxi_048 location to [77.5033752148808, 27.722281668988742]
Updating taxi Taxi_049 location to [77.72628514594892, 28.499725586722526]
Updating taxi Taxi_050 location to [77.64095957470933, 29.19474357593197]
Updated taxi locations at 2024-02-25 22:02:42
```

```
Updating taxi Taxi_001 location to [77.97372778543281, 27.744944606490023]
Updating taxi Taxi_002 location to [77.58873820204091, 29.027871233851766]
Updating taxi Taxi_003 location to [76.4822766988495, 29.1507958822895]
Updating taxi Taxi_004 location to [77.34936944537577, 28.28435069250968]
Updating taxi Taxi_005 location to [76.2842864154463, 29.16381089109697]
Updating taxi Taxi_006 location to [78.03497099859592, 27.927321379525875]
Updating taxi Taxi_007 location to [76.50756974327204, 29.544378081597095]
Updating taxi Taxi_008 location to [76.61657786335856, 29.242242339582567]
Updating taxi Taxi_009 location to [76.27551126808359, 28.756792477992423]
Updating taxi Taxi_010 location to [77.67781705916757, 29.236220888871323]
Updating taxi Taxi_011 location to [77.1902621843461, 28.26722560925496]
Updating taxi Taxi_012 location to [76.75502940546608, 29.121903904295824]
Updating taxi Taxi_013 location to [77.64778281519139, 28.93836482299896]
Updating taxi Taxi_014 location to [77.15202760097463, 28.42315584840432]
Updating taxi Taxi_015 location to [77.14764195247777, 27.708180586957656]
Updating taxi Taxi_016 location to [77.81688028029885, 28.542693495777513]
Updating taxi Taxi_017 location to [77.80089490360108, 28.3319155573971198]
Updating taxi Taxi_018 location to [76.93062073364865, 28.373620489083788]
Updating taxi Taxi_019 location to [76.7607562575273, 29.65526848658319]
Updating taxi Taxi_020 location to [77.43805191385675, 27.680155525787566]
Updating taxi Taxi_021 location to [77.45264969472467, 29.21347102673014]
Updating taxi Taxi_022 location to [77.21390393747745, 28.299277310886065]
Updating taxi Taxi_023 location to [77.65291042273277, 27.809195697139035]
Updating taxi Taxi_024 location to [76.89372683906592, 28.568597094368766]
Updating taxi Taxi_025 location to [78.32729337010969, 29.30772157588192]
Updating taxi Taxi_026 location to [78.28197600993002, 28.20267698568134]
Updating taxi Taxi_027 location to [76.79604072861137, 29.012469713225045]
Updating taxi Taxi_028 location to [77.8339293623563, 27.896952317232763]
Updating taxi Taxi_029 location to [77.78958939293365, 29.044473255449613]
Updating taxi Taxi_030 location to [78.19080901654158, 28.6844723339578]
Updating taxi Taxi_031 location to [77.61435287966823, 27.67707125963407]
Updating taxi Taxi_032 location to [77.88411577177119, 28.972782752266838]
Updating taxi Taxi_033 location to [77.12907736389359, 29.01828997664848]
Updating taxi Taxi_034 location to [76.40542225977988, 29.06147032987683]
Updating taxi Taxi_035 location to [77.75271056662496, 29.515600883974084]
Updating taxi Taxi_036 location to [77.67419300349455, 29.35020626598568]
Updating taxi Taxi_037 location to [77.31909470338209, 28.303690398486463]
Updating taxi Taxi_038 location to [77.19283686587157, 29.394882462303222]
Updating taxi Taxi_039 location to [77.37648970004281, 27.9721571776232]
Updating taxi Taxi_040 location to [77.01810602562762, 29.584837093654812]
Updating taxi Taxi_041 location to [76.62971404448729, 28.299047375315784]
Updating taxi Taxi_042 location to [76.8997084286199, 27.972430072440787]
Updating taxi Taxi_043 location to [77.8627018070846, 29.169022205480612]
Updating taxi Taxi_044 location to [78.2013120951041, 28.10539012592195]
Updating taxi Taxi_045 location to [77.05986373755377, 27.77092408938565]
Updating taxi Taxi_046 location to [77.87843559581597, 28.934623985351543]
Updating taxi Taxi_047 location to [76.92248887541562, 29.47936213617439]
Updating taxi Taxi_048 location to [77.50791015470277, 27.727112547820564]
Updating taxi Taxi_049 location to [77.7296887372189, 28.498669842212074]
Updating taxi Taxi_050 location to [77.64672177833478, 29.188779435778795]
Updated taxi locations at 2024-02-25 22:03:43
```

7. Post below request in postman to find rides based on customer location proximity search. API - https://udmqfurfie.execute-api.us-east-2.amazonaws.com/dev/ride/find

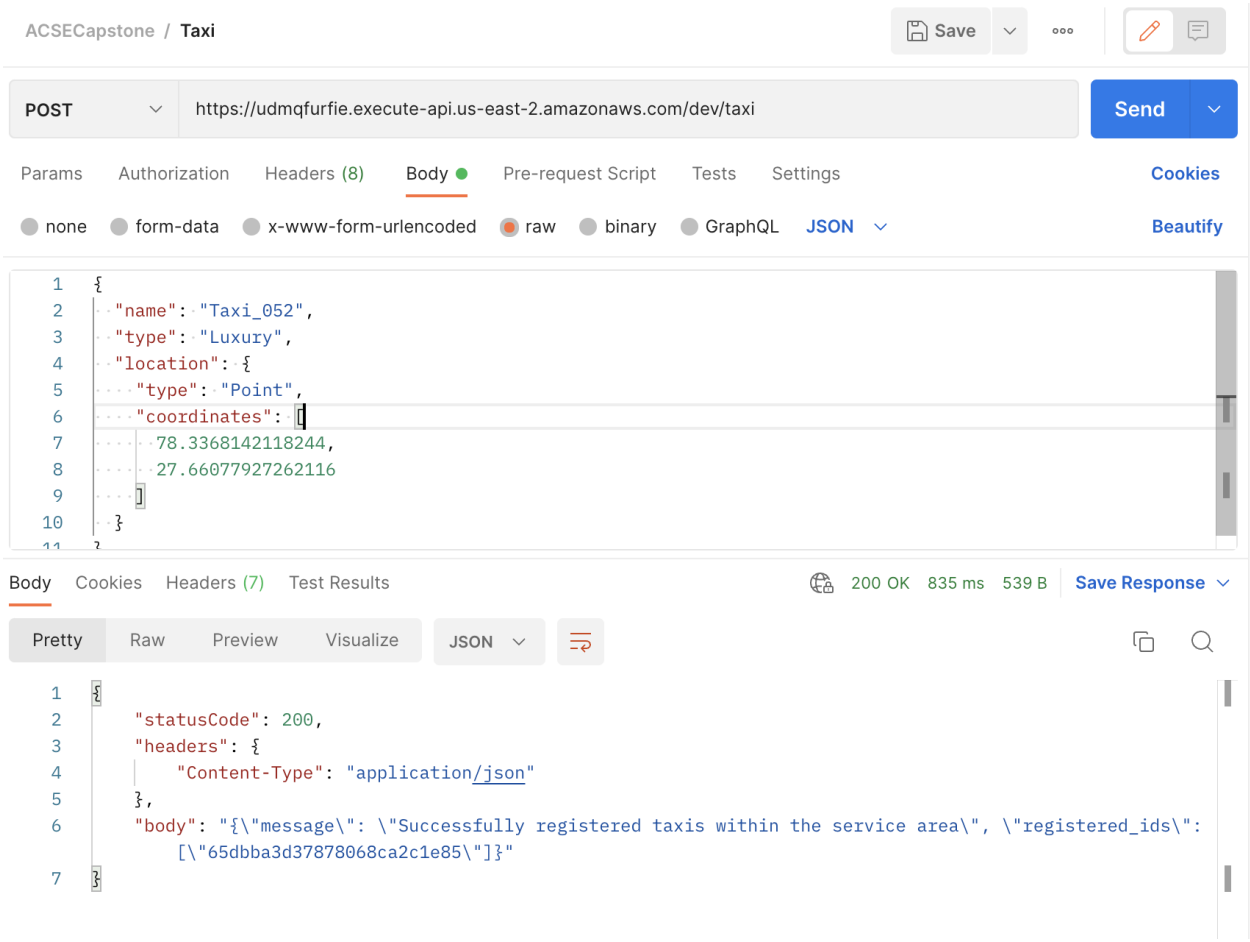
```
{
  "location": {
```

```
  "type": "Point",
  "coordinates": [77.23149, 28.61123]
 },
 "type": "Luxury"
}
```

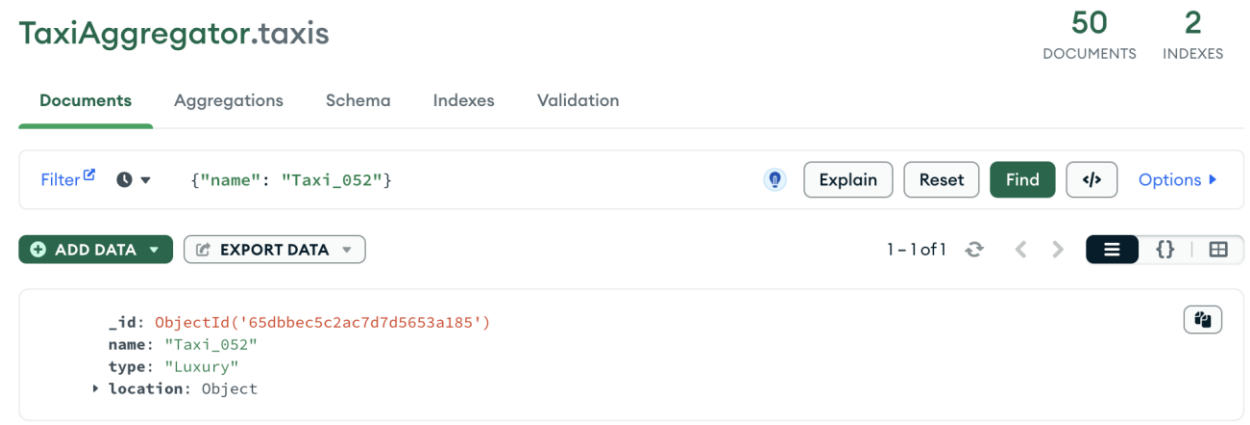


8. Post below json request to create a taxi data using API - https://udmqfurfie.execute-api.us-east-2.amazonaws.com/dev/taxi

```
{
  "name": "Taxi_052",
  "type": "Luxury",
  "location": {
    "type": "Point",
    "coordinates": [
      78.3368142118244,
      27.66077927262116
    ]
  }
}
```

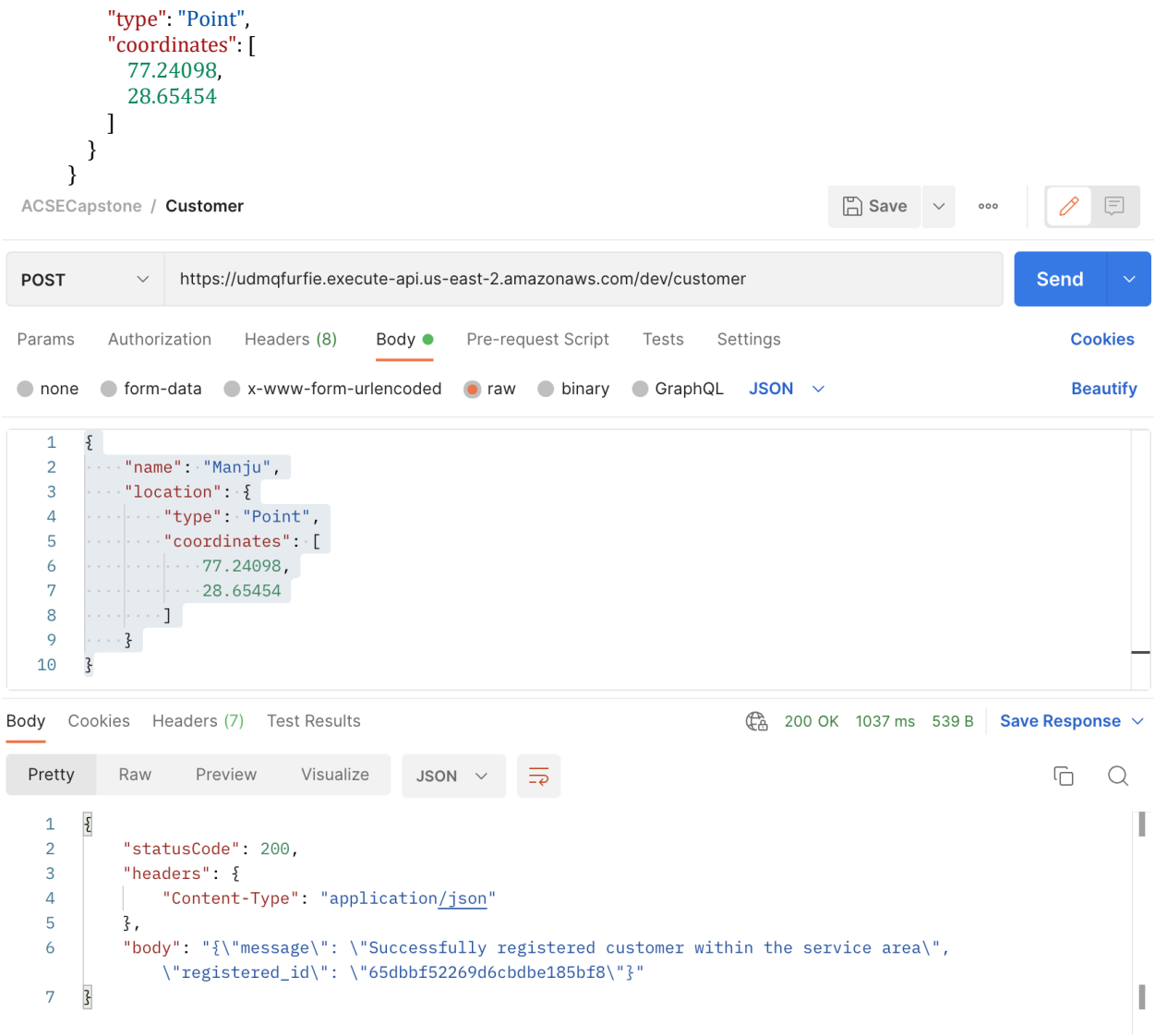


{"name": "Taxi_052"} find result:

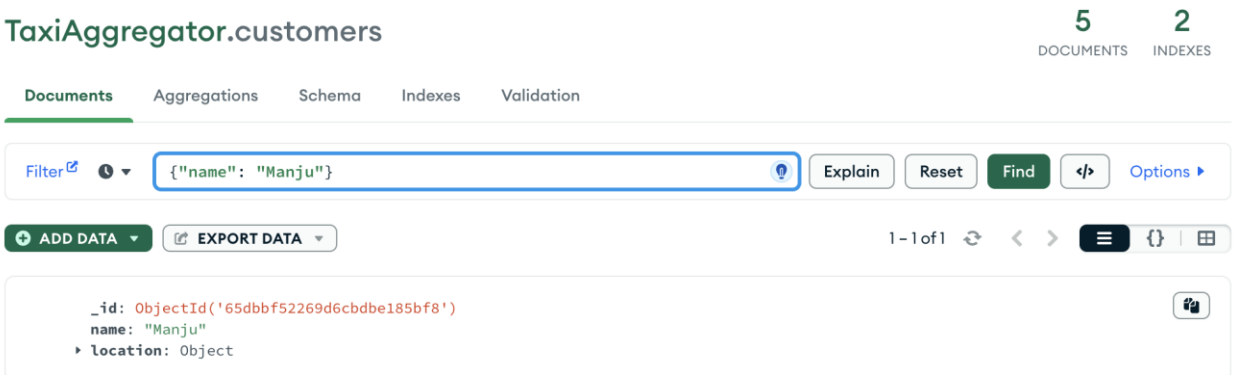


9. Post below json request to create a customer data using API - https://udmqfurfie.execute-api.us-east-2.amazonaws.com/dev/customer

```
{
  "name": "Manju",
  "location": {
```

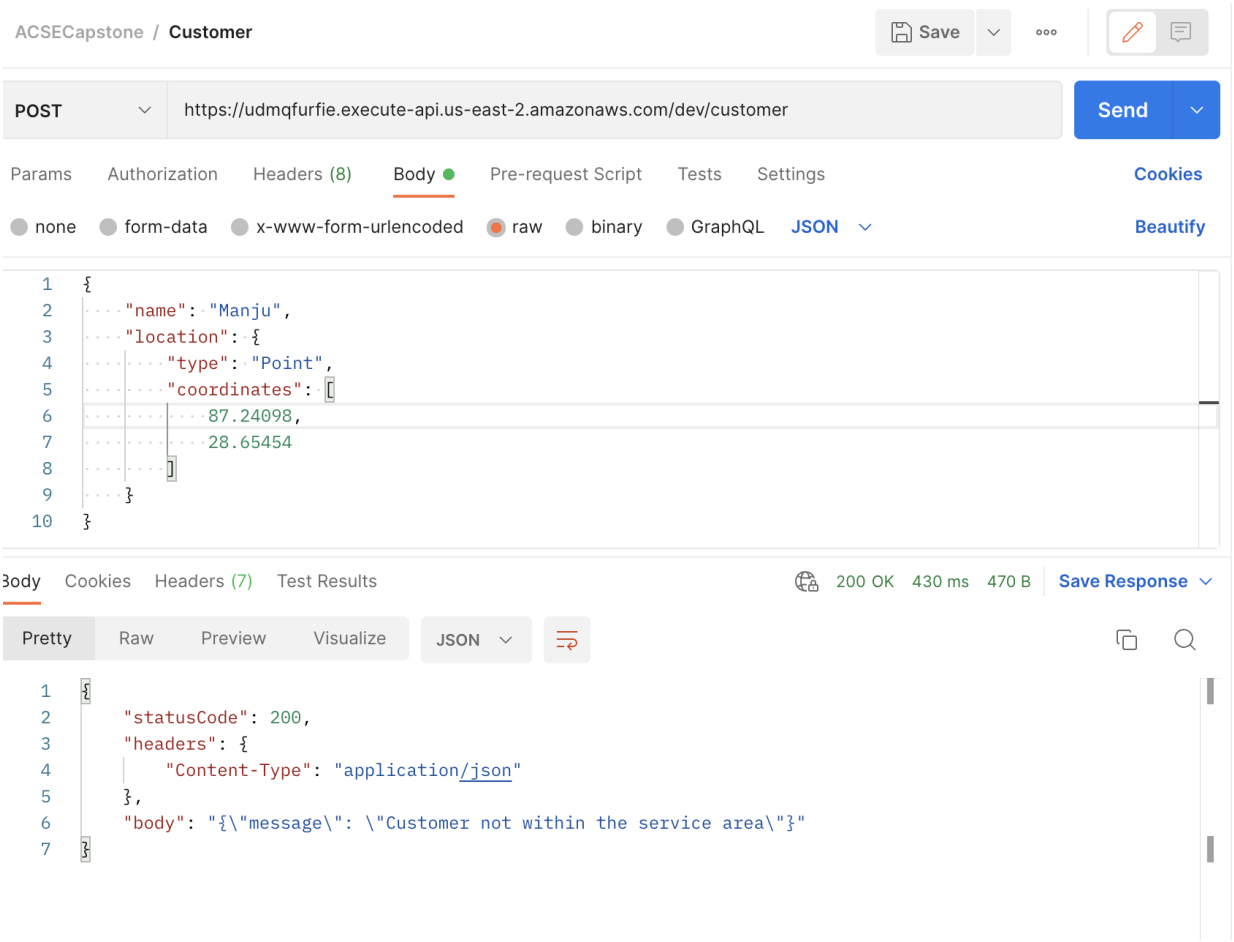


{"name": "Manju"} find result:



9. Service area validation for customer. Post below request to API (https://udmqfurfie.execute-api.us-east-2.amazonaws.com/dev/customer) to test this.

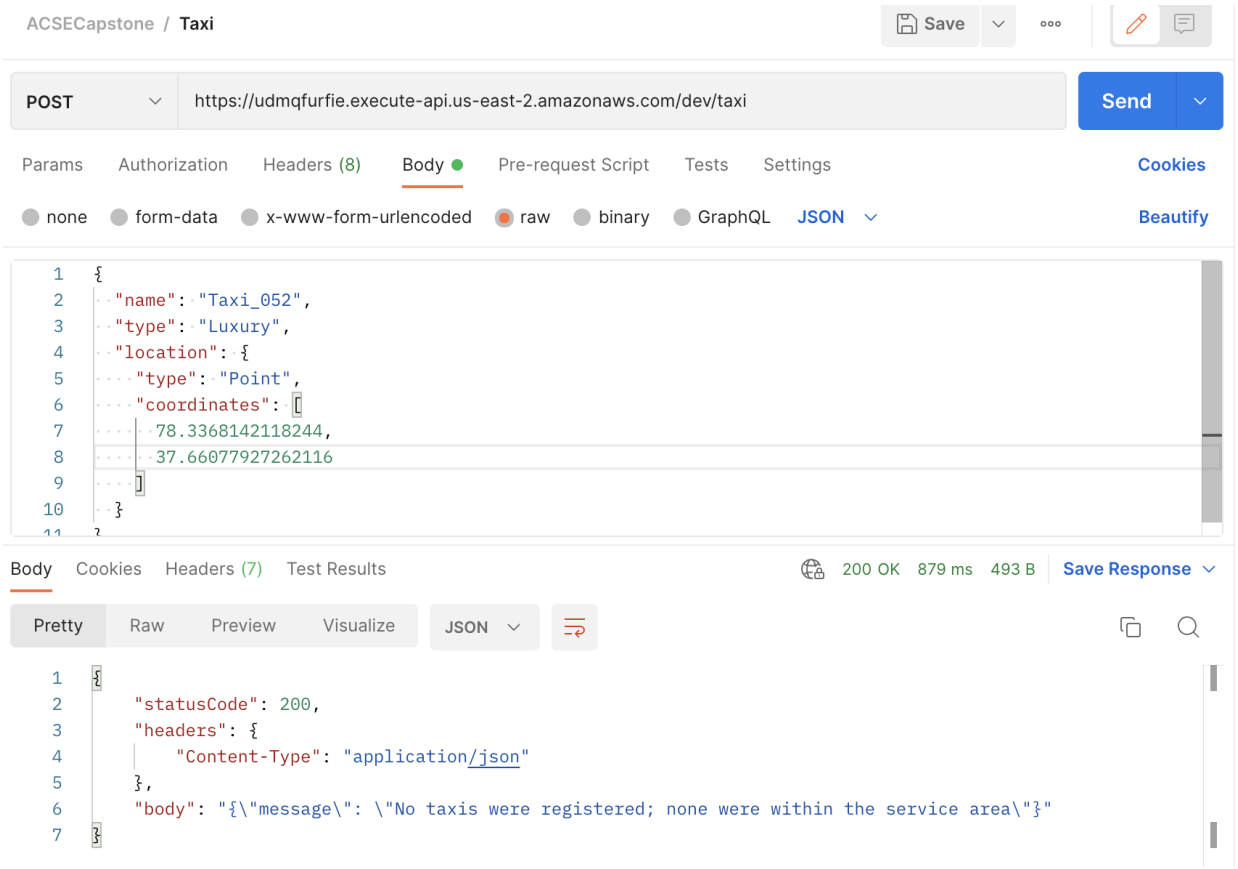
```
{
    "name": "Manju",
    "location": {
        "type": "Point",
        "coordinates": [
            87.24098,
            28.65454
        ]
    }
}
```



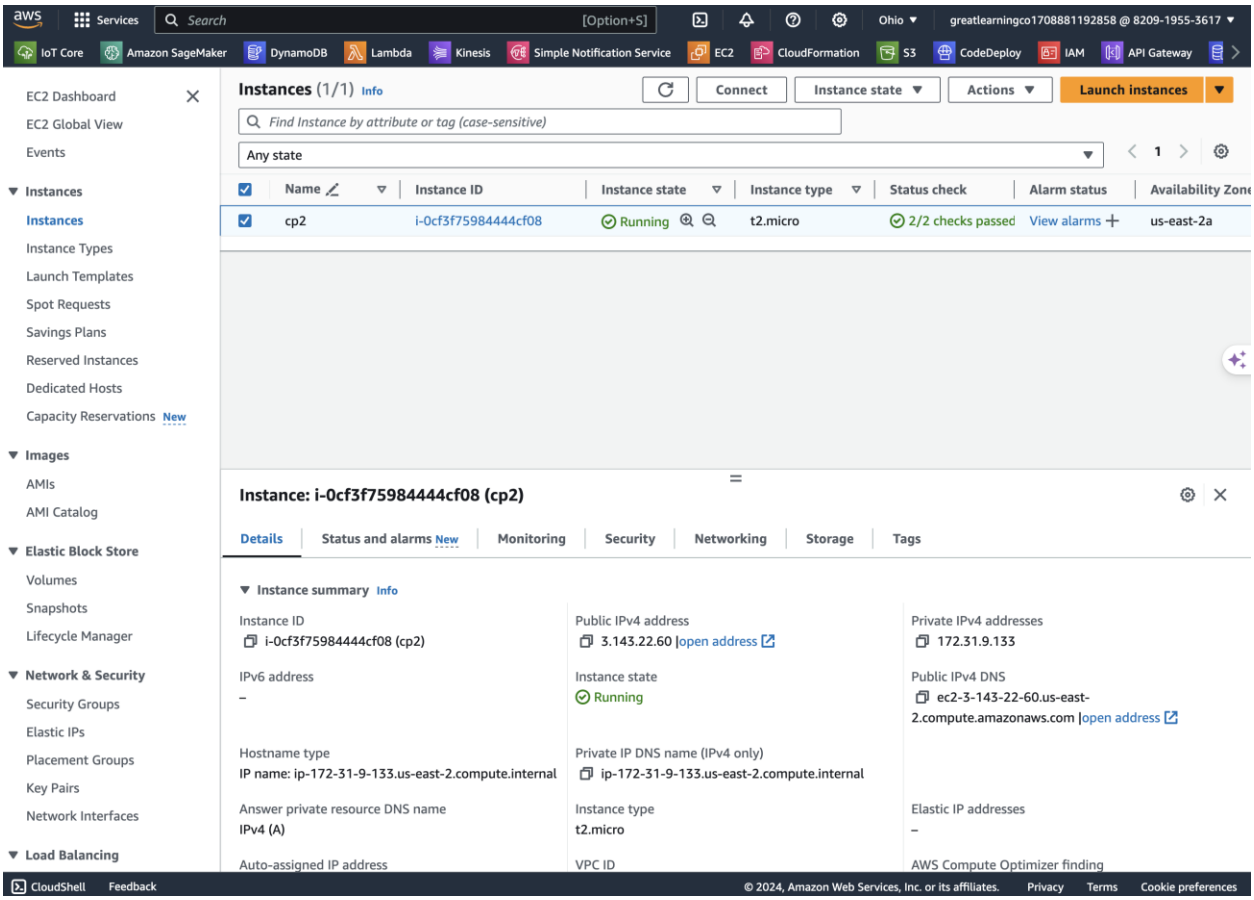
10. Service area validation for taxi. Post below request to API - https://udmqfurfie.execute-api.us-east-2.amazonaws.com/dev/taxi to test this.

```
{
  "name": "Taxi_052",
  "type": "Luxury",
  "location": {
    "type": "Point",
    "coordinates": [
      78.3368142118244,
```

```
        37.66077927262116
      ]
    }
}
```



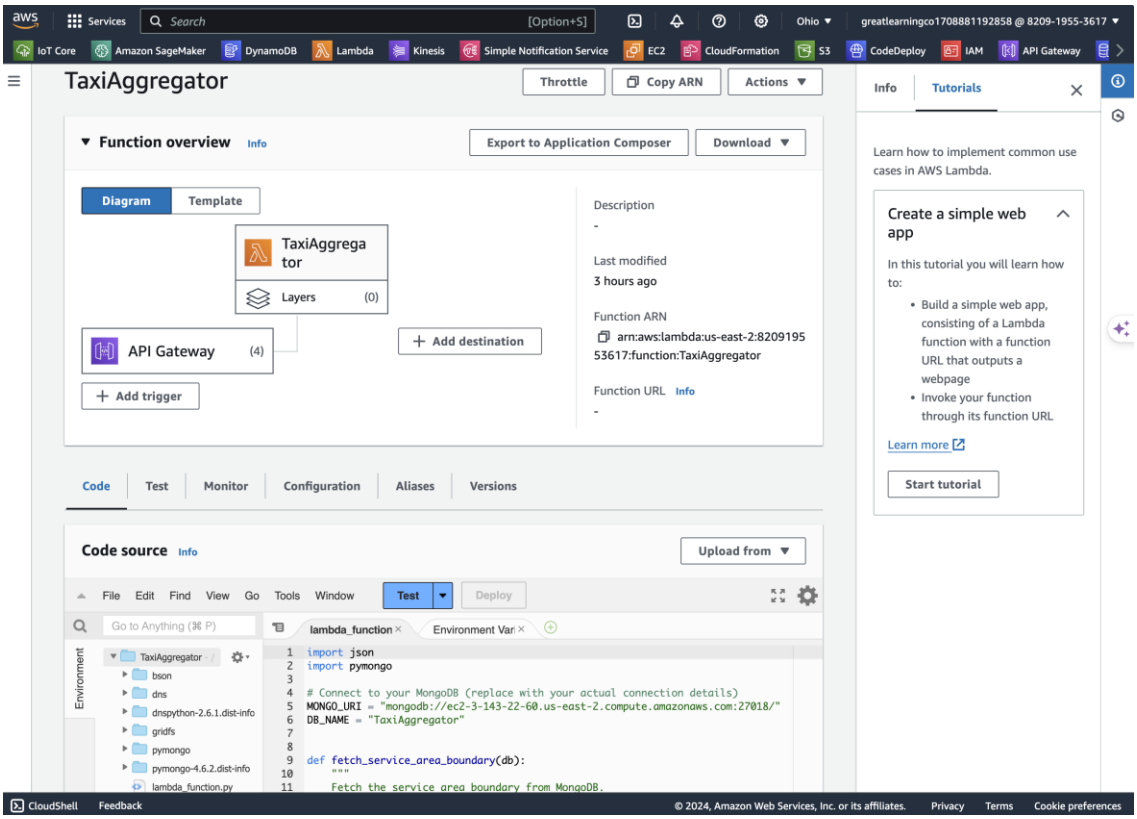
EC2 instance:



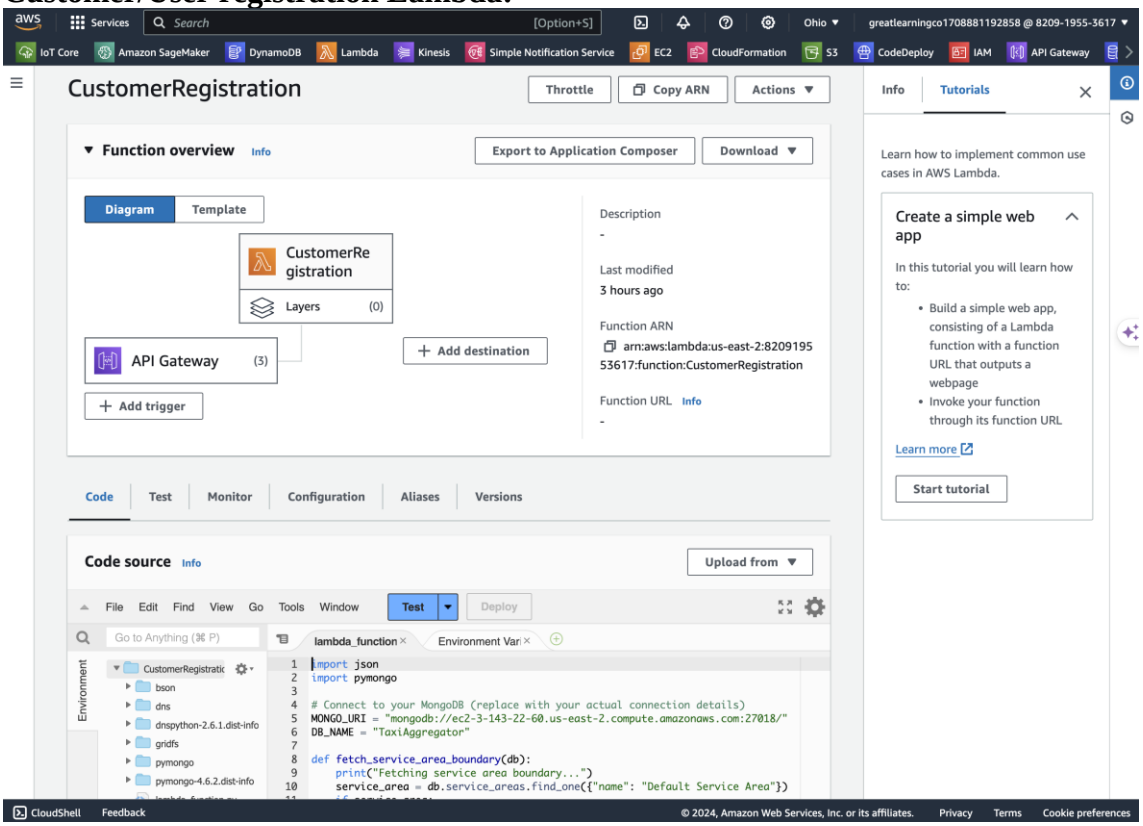
API Gateway:

Lambda Functions:

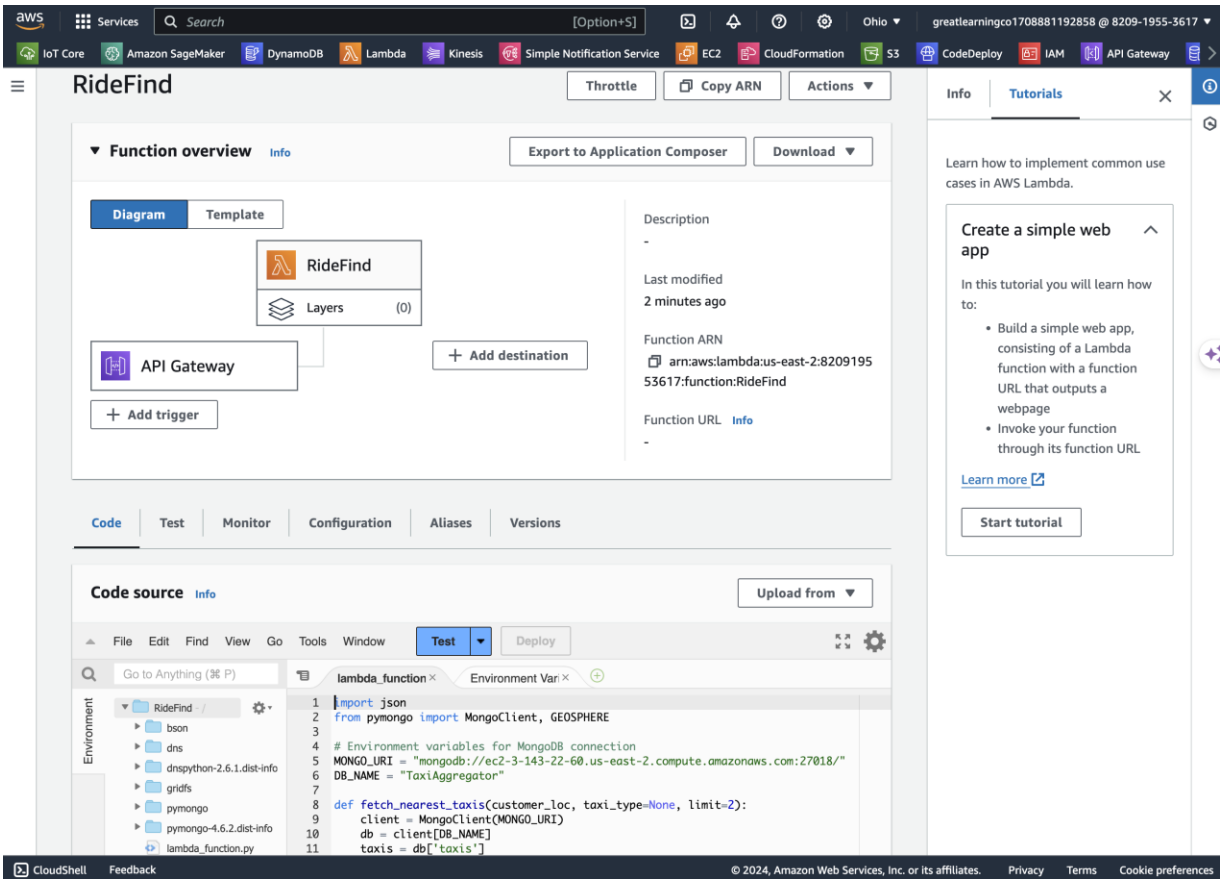
Taxi Registration Lambda:



Customer/User registration Lambda:



Ride Find Lambda:



Docker instance running in EC2:

```
ubuntu@ip-172-31-9-133:~$ sudo docker ps
CONTAINER ID   IMAGE          COMMAND                  CREATED      STATUS      PORTS                                           NAMES
f5ed6430b154   mongo:latest   "docker-entrypoint.s…"   7 days ago   Up 7 days   0.0.0.0:27018->27017/tcp, :::27018->27017/tcp   mongodb
```