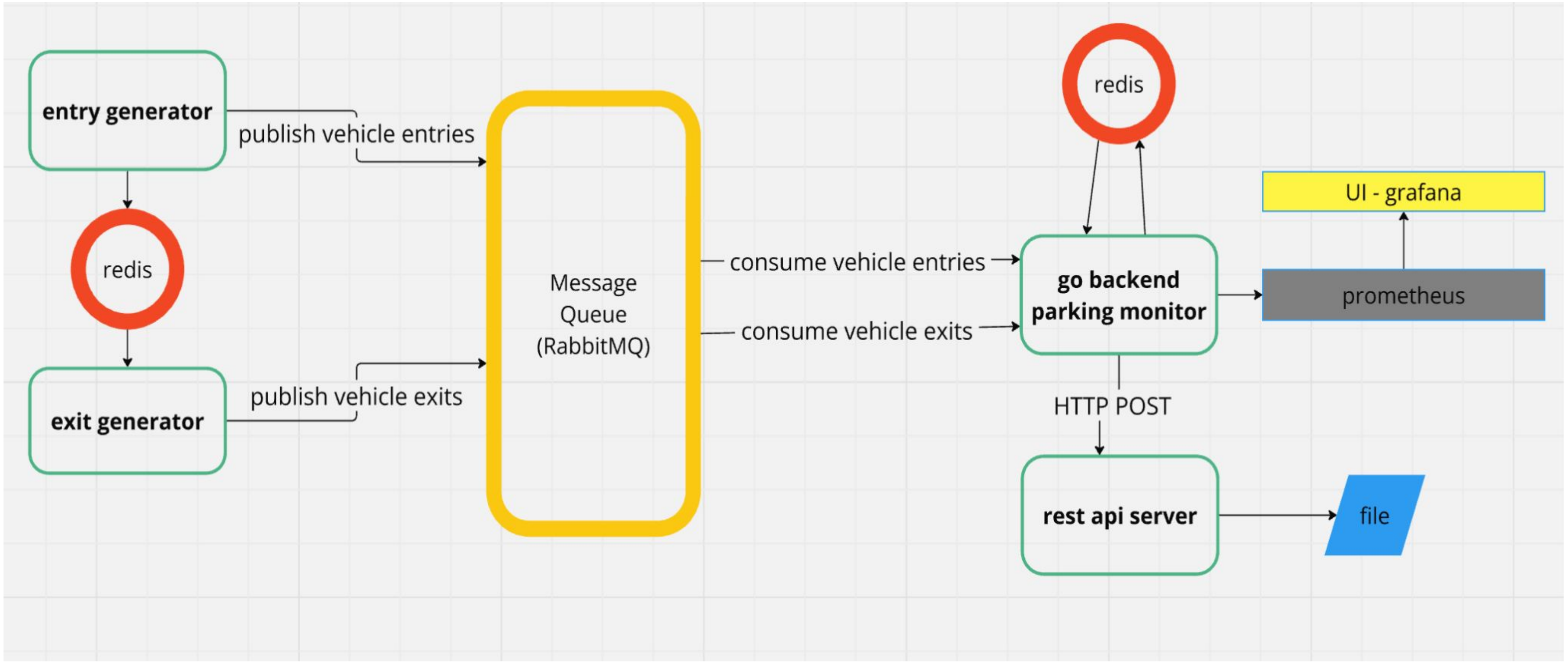
System Diagram



Generator Logic

Generator logic:

Entry generator -> push random generated vehicle plate to DB, messagequeue

```
Exit generator ->  generate random number in [1,100]
                   If (random number > 80)
                       Push exit event for a plate available in DB to messagequeue
                   Else
                       Push exit event for random generated vehicle plate
```

Backend Logic

Follows a pipeline design pattern with dependency injection to facilitate testing as well as decoupling from dependant libraries (rabbitmq, redisdb, restapi client)

Consumer from rabbitmq creates a go channel which gets populated with messages as they arrive.

Consumer func: for each queue, in a goroutine, loops through the messages and calls the handler function for the message.

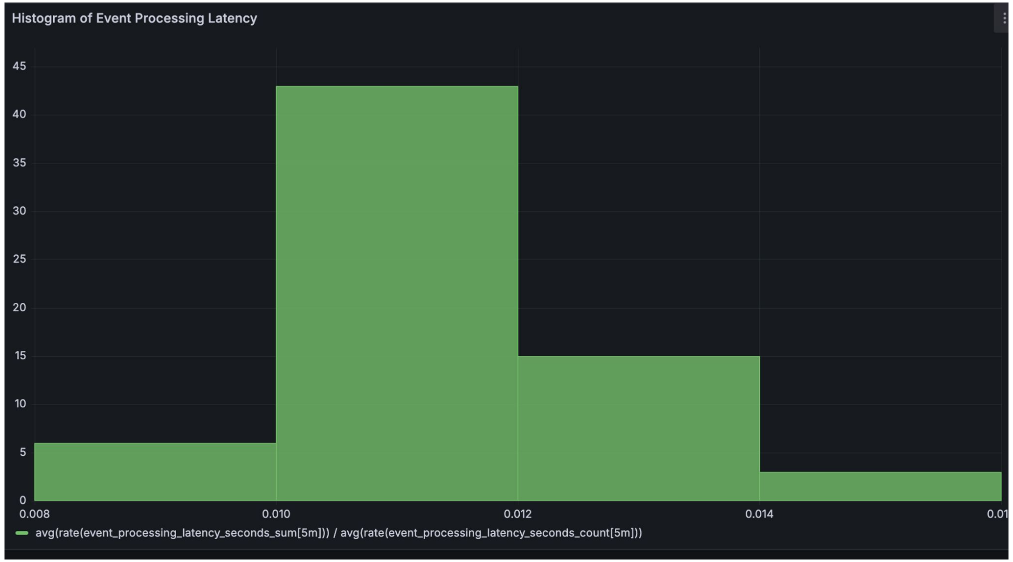
Handler func is declared in an interface

So EntryEventProcessor and ExitEventProcessor are created to implement the Handler interface and because of goroutines are handled concurrently too.

```
Consume message( messagehandler)
    Loop:msgs
        messagehandler.ProcessMessage(msg)
messagehandler.ProcessMessage(msg)
    msg.parse
    dataStore. Store/Retrieve
    (Calculate summary)
    (Restapi.post summary)
```

Metrics

MessageHandler.ProcessMessage is instrumented to get event processing latency metrics



Average event processing time over a 5m interval is calculated and plotted as histogram.

Majority have the latency of 0.01 to 0.02 seconds

Improvements

1. Instrument other services to see overall latency metrics, identify bottlenecks and scope for improvement.(Only go backend is sending metrics to prometheus currently)
2. The exit events that do not have an entry event are now logged as errors in consumed message processing. Improve this logging so it is clearer that the error is indeed expected.
3. Add more unit tests
4. Use RabbitMQ quorum queues for better throughput
5. Add secret handling features for passwords and other sensitive data