

# Yuyun Francis Berinyuy

## AIOPs Report -> Lab 7

### Task 1:

The terminal window displays monitoring results for a service named 'shippingservice'. It includes a 'Window Summary' with total anomalies (0), average MAE (0.624), and average MAPE (0.208). It also shows a query for histogram quantiles and a Prometheus response. Below this is a 'Monitoring Results' table with columns for Timestamp, Actual, Predicted, Lower Bound, Upper Bound, Anomaly, MAE, and MAPE. The table contains four rows of data.

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE
2024-12-08 16:49:54.794232	nan	3.924	2.245	5.537	0	nan	nan
2024-12-08 16:50:54.925172	3.000	3.739	2.286	5.574	0	0.739	0.249
2024-12-08 16:51:55.278352	3.017	3.530	1.976	5.161	0	0.514	0.170
2024-12-08 16:52:55.811835	3.033	3.318	1.629	4.895	0	0.285	0.094

The browser window shows the Prometheus interface at `localhost:9090/graph?go.expr=8g0.tab=1&g0.display_mode=lines&g0.show_exemplars=0&g0.range_in�ut=1h`. The search bar contains the prefix 'lab'. A dropdown menu lists various metrics starting with 'lab', such as `lab7_frontend_2_shippingservice_anomaly_count`, `lab7_frontend_2_shippingservice_current_value`, `lab7_frontend_2_shippingservice_mae_score`, `lab7_frontend_2_shippingservice_mape_score`, `lab7_frontend_2_shippingservice_predicted_value`, `lab7_frontend_2_shippingservice_yhat_max`, `lab7_frontend_2_shippingservice_yhat_min`, `label_join`, `label_replace`, `label_replace(_input_vector_, "_dst_", "_replacement_", "_src_", "_regex_")`, `sort_by_label`, `sort_by_label_desc`, `aggregator.unavailable_apiservice`, `kubelet_volume_stats_available_bytes`, `jaeger_badger_key_log_bytes_available`, and `scrape_samples_post_metric_relabeling`.

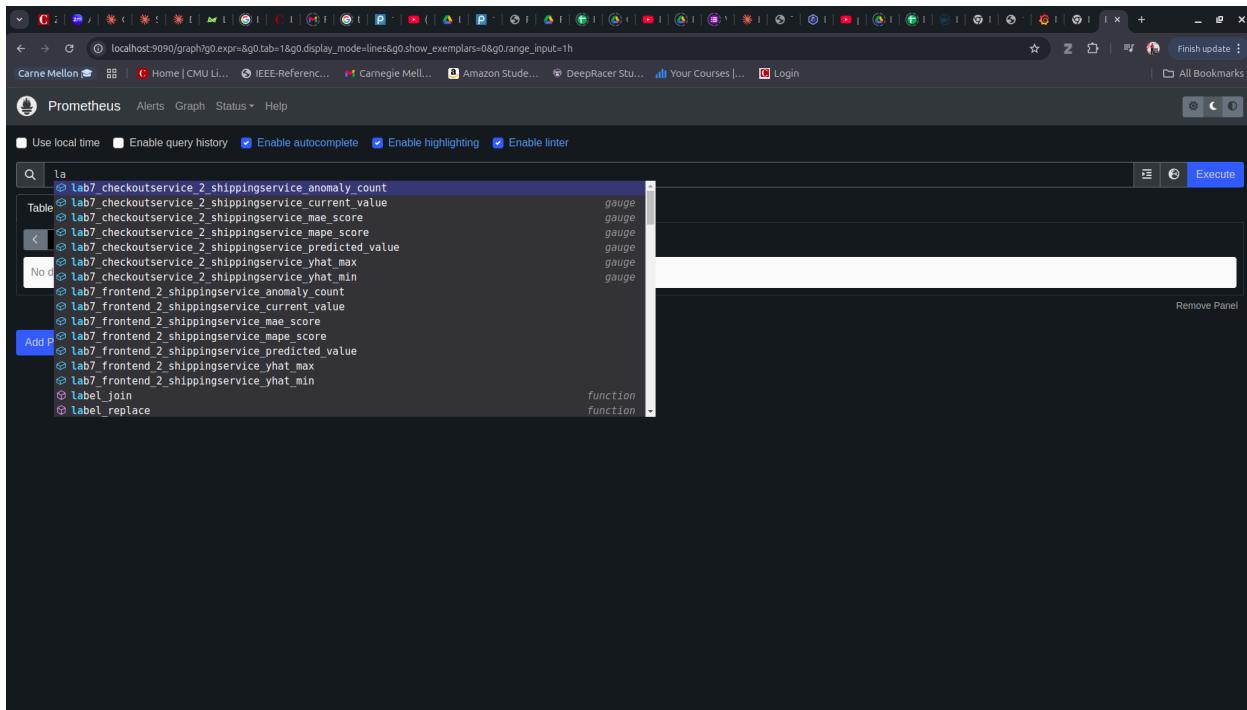
### Task 2:

```

francisbert@berl:~/Desktop/CMU-Africa/Fall2024/slops/Lab$ kubectl get pods -l app=boutique-monitor
NAME                                         READY   STATUS    RESTARTS   AGE
boutique-monitor-checkoutservice-shippingservice-54797b5b88mp5h   2/2     Running   0          10s
boutique-monitor-frontend-shippingservice-6fff759488-qmn24        2/2     Running   0          17s

francisbert@berl:~/Desktop/CMU-Africa/Fall2024/slops/Lab$ kubectl get deployments
NAME                                         READY   UP-TO-DATE   AVAILABLE   AGE
adservice                                     1/1     1           1           5h11m
boutique-monitor-checkoutservice-shippingservice   1/1     1           1           16s
boutique-monitor-frontend-shippingservice        1/1     1           1           23s
cartservice                                    1/1     1           1           5h11m
checkoutservice                                1/1     1           1           5h11m
currencyservice                               1/1     1           1           5h11m
emailservice                                   1/1     1           1           5h11m
Frontend                                      1/1     2           1           5h11m
istio-gateway_istio-ingressgateway-54797b5b88mp5h   1/1     1           1           5h11m
loadgenerator                                 0/0     0           0           5h11m
paymentservice                                1/1     1           1           5h11m
productcatalogservice                         1/1     1           1           5h11m
recommendationservice                        1/1     1           1           5h11m
redis-cart                                    1/1     1           1           5h11m
shippingservice                               1/1     1           1           5h11m

```



### Task 3:

#### Explanation of Implementation:

1. I used the Accumulator algorithm for smooth alerting
2. While Tracking anomaly counts for each service
3. By implementing a simple tracking mechanism that:
  - o Adds 1 to accumulator when anomaly is detected
  - o Subtracts 2 from accumulator when no anomaly is seen
  - o Caps accumulator values between 0 and 10
4. Declares incidents based on accumulator thresholds

- Sev 1: Both services have non-zero accumulators when total temperature exceeds threshold
  - Sev 2: Only one service has non-zero accumulator

5. Publishes Prometheus metrics for:

- Total accumulator temperature
  - Individual service accumulator temperatures
  - Sev 1 and Sev 2 incident status

## 6. Prints console logs for debugging

## Key notes

- The default incident threshold is 5, but this can be configured
  - Metrics are prefixed with `lab7_incident_` for easy identification
  - Logging implemented for easier tracking of incidents
  - Fetches anomaly metrics dynamically from Prometheus

## Incident Detector deployed

Dec 8 17:45

localhost:9090/graph?g0.expr=lab7\_checkoutservice\_2\_shippingbservice\_anomaly\_count&g0.tab=1&g0.display\_mode=lines&g0.show\_exemplars=0&g0.range\_input=1

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Prometheus Alerts Graph Status Help

Use local time  Enable query history  Enable autocomplete  Enable highlighting  Enable linter

Execute

lab7\_checkoutservice\_2\_shippingbservice\_anomaly\_count  
Table lab7\_checkoutservice\_2\_shippingbservice\_current\_value  
lab7\_checkoutservice\_2\_shippingbservice\_mae\_score  
lab7\_checkoutservice\_2\_shippingbservice\_mape\_score  
lab7\_checkoutservice\_2\_shippingbservice\_predicted\_value  
lab7\_checkoutservice\_2\_shippingbservice\_yhat\_max  
lab7\_checkoutservice\_2\_shippingbservice\_yhat\_min  
lab7\_frontend\_2\_shippingbservice\_anomaly\_count  
lab7\_frontend\_2\_shippingbservice\_current\_value  
lab7\_frontend\_2\_shippingbservice\_mae\_score  
lab7\_frontend\_2\_shippingbservice\_mape\_score  
lab7\_frontend\_2\_shippingbservice\_predicted\_value  
lab7\_frontend\_2\_shippingbservice\_yhat\_max  
lab7\_frontend\_2\_shippingbservice\_yhat\_min  
lab7\_incident\_frontend\_checkoutservice\_service1\_temperature  
lab7\_incident\_frontend\_checkoutservice\_service2\_temperature

gauge gauge gauge gauge gauge gauge

Load time: 93ms Resolution: 14s Result series: 1

Remove Panel

localhost:9090/graph?g0.expr=lab7\_checkoutservice\_2\_shippingbservice\_anomaly\_count&g0.tab=1&g0.display\_mode=lines&g0.show\_exemplars=0&g0.range\_input=1

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Prometheus Alerts Graph Status Help

Use local time  Enable query history  Enable autocomplete  Enable highlighting  Enable linter

Execute

lab7\_checkoutservice\_2\_shippingbservice\_yhat\_max  
Table lab7\_frontend\_2\_shippingbservice\_anomaly\_count  
lab7\_frontend\_2\_shippingbservice\_current\_value  
lab7\_frontend\_2\_shippingbservice\_mae\_score  
lab7\_frontend\_2\_shippingbservice\_mape\_score  
lab7\_frontend\_2\_shippingbservice\_predicted\_value  
lab7\_frontend\_2\_shippingbservice\_yhat\_max  
lab7\_frontend\_2\_shippingbservice\_yhat\_min  
lab7\_incident\_frontend\_checkoutservice\_service1\_temperature  
lab7\_incident\_frontend\_checkoutservice\_service2\_temperature

gauge gauge

Load time: 93ms Resolution: 14s Result series: 1

Remove Panel

Dec 8 17:44

localhost:9090/graph?g0.expr=lab7\_incident\_frontend\_checkoutservice\_total\_temperature&g0.tab=1&g0.display\_mode=lines&g0.show\_exemplars=0&g0.range\_input=1

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Prometheus Alerts Graph Status Help

Use local time  Enable query history  Enable autocomplete  Enable highlighting  Enable linter

Execute

lab7\_incident\_frontend\_checkoutservice\_total\_temperature

Table Graph

Evaluation time < >

lab7\_incident\_frontend\_checkoutservice\_total\_temperature{app="boutique-incident-detector", destination="shippingbservice", instance="10.84.0.45:15020", job="kubernetes-pods", namespace="default", node="gke-boutique-default-pool-4798e0d0-dgnk", pod="boutique-incident-detector-frontend-checkoutshippingservice07", pod\_template\_hash="58b74b69cc", security\_istio\_io\_tlsMode="istio", service1="frontend", service2="checkoutservice", service\_istio\_io\_canonical\_name="boutique-incident-detector", service\_istio\_io\_canonical\_revision="latest"} 0

Load time: 109ms Resolution: 14s Result series: 1

Remove Panel

```

Dec 8 23:49
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7

Incident Detector started - waiting for initial data points...
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_checkoutservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_frontend_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729665.669,"0"}]}}
Response 2 Status: 200
Response 2 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729665.682,"0"}]}}
Anomaly 1: 0.0, Anomaly 2: 0.0
    873797000 value(app=boutique-monitor, destination_service=shipping-service, instance=10.112.0.35.15020, job=kubernetes-pods, namespace=default, mode=gte-boutique1-default-pool-4ec3d3c1-minit, pod=boutique-monitor-checkoutservice-shipping-service-3, revision=1)
    873797000 security_info_le_ticker=0, service_info_le_canonical_name=boutique-monitor, service_info_le_canonical_revision=1000, source_service=checkoutservic
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:34:25.685459 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_checkoutservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_frontend_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729725.694,"0"}]}}
Response 2 Status: 200
Response 2 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729725.699,"0"}]}}
Anomaly 1: 0.0, Anomaly 2: 0.0
    873797000 value(app=boutique-monitor, destination_service=shipping-service, instance=10.112.0.35.15020, job=kubernetes-pods, namespace=default, mode=gte-boutique1-default-pool-4ec3d3c1-minit, pod=boutique-monitor-checkoutservice-shipping-service-3, revision=1)
    873797000 security_info_le_ticker=0, service_info_le_canonical_name=boutique-monitor, service_info_le_canonical_revision=1000, source_service=checkoutservic
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:34:25.685459 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:35:25.702768 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend

```

```

Dec 8 23:49
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7

| 2024-12-09 07:36:25.721227 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_checkoutservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_frontend_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729845.730,"0"}]}}
Response 2 Status: 200
Response 2 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729845.736,"0"}]}}
Anomaly 1: 0.0, Anomaly 2: 0.0
    873797000 value(app=boutique-monitor, destination_service=shipping-service, instance=10.112.0.35.15020, job=kubernetes-pods, namespace=default, mode=gte-boutique1-default-pool-4ec3d3c1-minit, pod=boutique-monitor-checkoutservice-shipping-service-3, revision=1)
    873797000 security_info_le_ticker=0, service_info_le_canonical_name=boutique-monitor, service_info_le_canonical_revision=1000, source_service=checkoutservic
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:34:25.685459 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:35:25.702768 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:36:25.721227 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:37:25.741344 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_checkoutservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_frontend_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729905.751,"0"}]}}
Response 2 Status: 200
Response 2 Content: {"status":"success","data":{"resultType":"vector","result":[{"metric":{},"value":1733729905.763,"0"}]}}
Anomaly 1: 0.0, Anomaly 2: 0.0
    873797000 value(app=boutique-monitor, destination_service=shipping-service, instance=10.112.0.35.15020, job=kubernetes-pods, namespace=default, mode=gte-boutique1-default-pool-4ec3d3c1-minit, pod=boutique-monitor-checkoutservice-shipping-service-3, revision=1)
    873797000 security_info_le_ticker=0, service_info_le_canonical_name=boutique-monitor, service_info_le_canonical_revision=1000, source_service=checkoutservic
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+
| 2024-12-09 07:34:25.685459 | 0 | 0 | 0 | 0 | 0 | 0 |
+-----+-----+-----+-----+-----+-----+

```

## Task 4:

```

Dec 9 02:12 francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7$ ./incident-detector.py
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+-----+
| 2024-12-09 10:06:04.941530 | 1 | 1 | 1 | 1 | 1 | 2 |
| 2024-12-09 10:07:04.957894 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024-12-09 10:08:04.976377 | 1 | 1 | 1 | 1 | 1 | 2 |
| 2024-12-09 10:09:04.997654 | 1 | 1 | 1 | 2 | 2 | 4 |
+-----+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_shippingservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_shippingservice_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733739005.012, "1"]}]} }
Response 2 Status: 200
Response 2 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733739005.027, "1"]}]} }
Anomaly 1: 1.0, Anomaly 2: 1.0
SEV 1 INCIDENT DETECTED: frontend and checkoutservice
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+-----+
| 2024-12-09 10:06:04.941530 | 1 | 1 | 1 | 1 | 1 | 2 | |
| 2024-12-09 10:07:04.957894 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2024-12-09 10:08:04.976377 | 1 | 1 | 1 | 1 | 1 | 2 |
| 2024-12-09 10:09:04.997654 | 1 | 1 | 1 | 2 | 2 | 4 |
| 2024-12-09 10:10:05.031304 | 1 | 1 | 3 | 3 | 3 | 6 | Sev 1 |
+-----+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice

```

```

Dec 9 02:12 francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7
francisberi@beri:~/Desktop/CMU-Africa/Fall2024/alops/Lab7$ ./incident-detector.py
Screenshot Just now Screenshot captured You can paste the image from the clipboard.
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+-----+
| 2024-12-09 10:07:04.957894 | 0 | 0 | 0 | 0 | 0 | 0 | |
| 2024-12-09 10:08:04.976377 | 1 | 1 | 1 | 1 | 1 | 2 |
| 2024-12-09 10:09:04.997654 | 1 | 1 | 2 | 2 | 2 | 4 |
| 2024-12-09 10:10:05.031304 | 1 | 1 | 3 | 3 | 3 | 6 | Sev 1 |
| 2024-12-09 10:11:05.066967 | 1 | 1 | 4 | 4 | 4 | 8 | Sev 1 |
+-----+-----+-----+-----+-----+-----+-----+
Attempting to fetch anomaly metrics:
Prometheus URL: http://prometheus.istio-system:9090
Service 1: frontend
Service 2: checkoutservice
Query 1: sum({__name__="lab7_frontend_2_shippingservice_anomaly_count"}) or vector(0)
Query 2: sum({__name__="lab7_checkoutservice_2_shippingservice_anomaly_count"}) or vector(0)
Response 1 Status: 200
Response 1 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733739125.077, "1"]}]} }
Response 2 Status: 200
Response 2 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733739125.082, "1"]}]} }
Anomaly 1: 1.0, Anomaly 2: 1.0
SEV 1 INCIDENT DETECTED: frontend and checkoutservice
Incident Detector Results:
+-----+-----+-----+-----+-----+-----+-----+
| Timestamp | Service1_Anomaly | Service2_Anomaly | Service1_Temperature | Service2_Temperature | Total_Temperature | Incident |
+-----+-----+-----+-----+-----+-----+-----+
| 2024-12-09 10:08:04.976377 | 1 | 1 | 1 | 1 | 1 | 2 | |
| 2024-12-09 10:09:04.997654 | 1 | 1 | 2 | 2 | 2 | 4 |
| 2024-12-09 10:10:05.031304 | 1 | 1 | 3 | 3 | 3 | 6 | Sev 1 |
| 2024-12-09 10:11:05.066967 | 1 | 1 | 4 | 4 | 4 | 8 | Sev 1 |
| 2024-12-09 10:12:05.085176 | 1 | 1 | 5 | 5 | 5 | 10 | Sev 1 |
+-----+-----+-----+-----+-----+-----+-----+

```

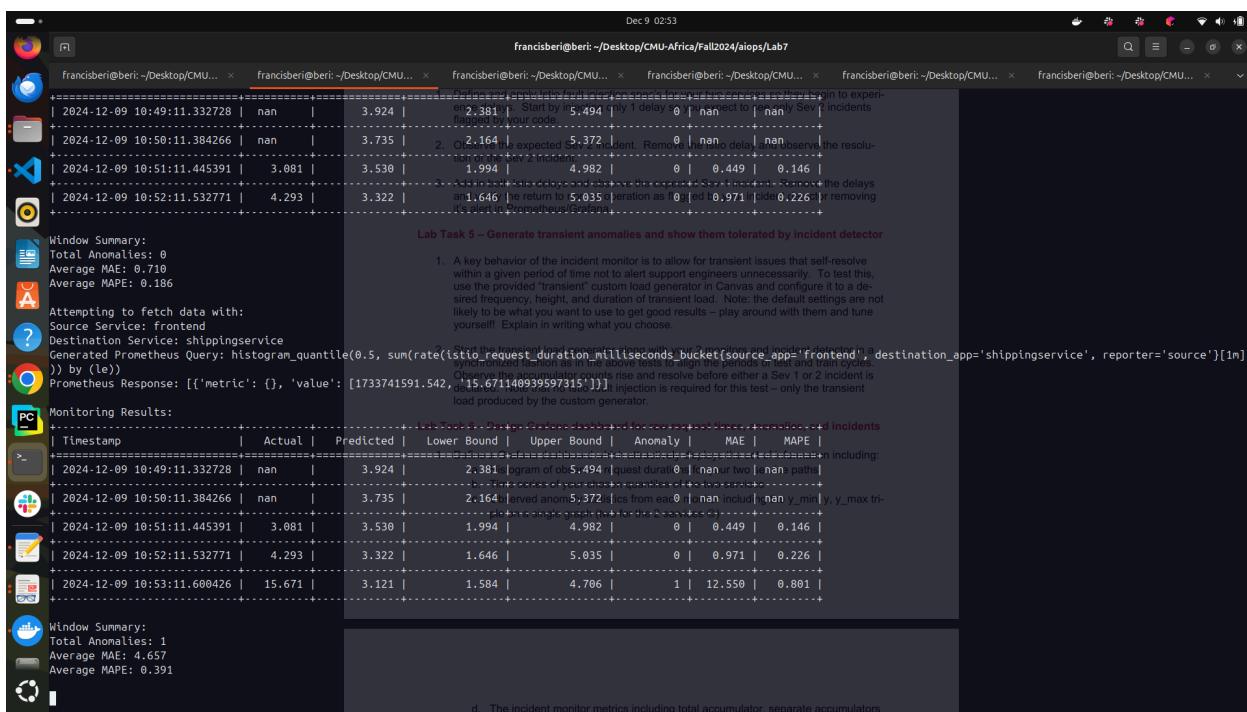
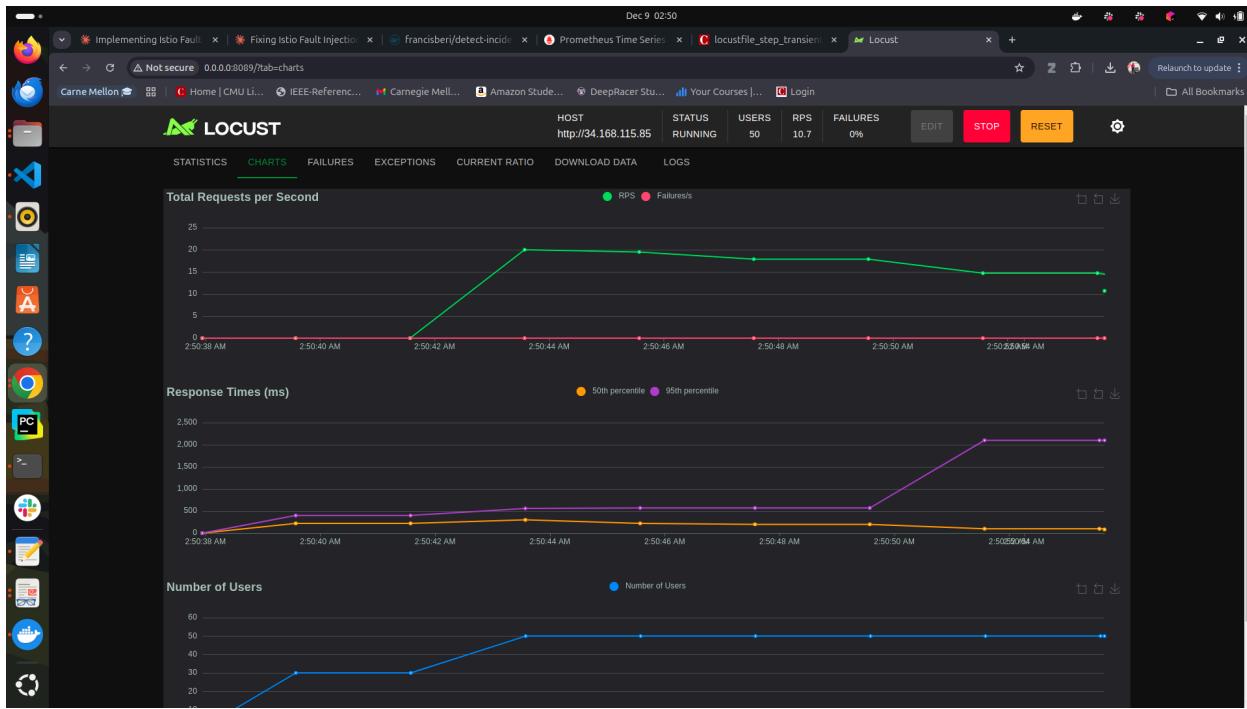
Dec 9 02:21

francisberi@beri:~/Desktop/CMU-Africa/Fall2024/ilops/Lab7

Timestamp	Service1_Anomaly	Service2_Anomaly	Service1_Temperature	Service2_Temperature	Total_Temperature	Incident
2024-12-09 10:16:05.180369	1	0	9	6	15	Sev 1
2024-12-09 10:17:05.214176	1	0	10	4	14	Sev 1
2024-12-09 10:18:05.241029	0	0	8	2	10	Sev 1
2024-12-09 10:19:05.265308	0	0	6	8	6	Sev 2
2024-12-09 10:20:05.289554	0	0	4	0	4	

## Task 5:

```
(myenv) francisberi@beri:~/Desktop/CMU-Africa/Fall2024/ilops/Lab7/microservices-demo/src/loadgenerators$ locust --host='http://34.168.115.85' -f locustfile_step_transient_new.py
```



Dec 9 02:53

francisberi@beri: ~/Desktop/CMU-Africa/Fall2024/alops/Lab7

Response 2 Status: 200  
Response 2 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733741571.479, "0"]}]}},  
Anomaly 1: 0.0, Anomaly 2: 0.0

1. Define and apply the fault injection spec's for your two services so they begin to experience transient anomalies.

Incident Detector Results:

Timestamp	Service1_Anomaly	Service2_Anomaly	Service1_Temperature	Service2_Temperature	Total_Temperature	Incident
2024-12-09 10:49:51.428505	0	0	0	0	0	0
2024-12-09 10:50:51.444486	0	0	0	0	0	0
2024-12-09 10:51:51.462890	0	0	0	0	0	0
2024-12-09 10:52:51.485117	0	0	0	0	0	0

2. Observe the expected Sev 2 incident. Remove the Istio delay and observe the resolution of the Sev 2 incident.

Attempting to fetch anomaly metrics:

Prometheus URL: http://prometheus.istio-system:9090

Service 1: frontend  
Service 2: checkoutservice

Query 1: sum({\_\_name\_\_='lab7\_frontend\_2\_shippingservice\_anomaly\_count'}) or vector(0) injection is required for this test – only the transient metric is needed.  
Query 2: sum({\_\_name\_\_='lab7\_checkoutservice\_2\_shippingservice\_anomaly\_count'}) or vector(0)

Response 1 Status: 200  
Response 1 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733741631.494, "1"]}]}},  
Response 2 Status: 200  
Response 2 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733741631.504, "1"]}]}},  
Anomaly 1: 1.0, Anomaly 2: 1.0

a. Histogram of observed request durations for your two service paths  
b. Time series of your chosen quantiles of the two services  
c. Observed anomaly statistics from each monitor including the y\_min, y\_max triangle

Incident Detector Results:

Timestamp	Service1_Anomaly	Service2_Anomaly	Service1_Temperature	Service2_Temperature	Total_Temperature	Incident
2024-12-09 10:49:51.428505	0	0	0	0	0	0
2024-12-09 10:50:51.444486	0	0	0	0	0	0
2024-12-09 10:51:51.462890	0	0	0	0	0	0
2024-12-09 10:52:51.485117	0	0	0	0	0	0
2024-12-09 10:53:51.509411	1	1	1	1	2	1

d. The incident monitor metrics including total accumulator, separate accumulators.

Dec 9 02:54

francisberi@beri: ~/Desktop/CMU-Africa/Fall2024/alops/Lab7

Response 2 Status: 200  
Response 2 Content: {"status": "success", "data": {"resultType": "vector", "result": [{"metric": {}, "value": [1733741651.615, "0"]}]}},  
Anomaly 1: 0.0, Anomaly 2: 0.0

1. Define and apply the fault injection spec's for your two services so they begin to experience transient anomalies.

Incident Detector Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE	Incidents
2024-12-09 10:50:11.384266	nan	3.735	2.164	5.372	0	0.449	0.146	0
2024-12-09 10:51:11.445391	3.081	3.530	2.094	4.982	0	0.449	0.146	0
2024-12-09 10:52:11.532771	4.293	3.322	1.646	5.035	0	0.971	0.226	0
2024-12-09 10:53:11.680426	15.671	3.121	1.584	4.706	1	12.558	0.801	1
2024-12-09 10:54:11.665955	13.547	2.939	1.340	4.395	1	10.688	0.783	1

2. Observe the expected Sev 1 incident. Remove the Istio delay and observe the resolution of the Sev 1 incident.

Attempting to fetch data with:

Source Service: frontend  
Destination Service: shippingservice

Generated Prometheus Query: histogram\_quantile(0.5, sum(rate(istio\_request\_duration\_milliseconds\_bucket[source\_app='frontend'; destination\_app='shippingservice', reporter='source'][1m])) by (le))

Prometheus Response: [{"metric": {}, "value": [1733741651.615, "13.546637744034708"]}]

Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE	Incidents
2024-12-09 10:50:11.384266	nan	3.735	2.164	5.372	0	0.449	0.146	0
2024-12-09 10:51:11.445391	3.081	3.530	2.094	4.982	0	0.449	0.146	0
2024-12-09 10:52:11.532771	4.293	3.322	1.646	5.035	0	0.971	0.226	0
2024-12-09 10:53:11.680426	15.671	3.121	1.584	4.706	1	12.558	0.801	1
2024-12-09 10:54:11.665955	13.547	2.939	1.340	4.395	1	10.688	0.783	1

Window Summary:  
Total Anomalies: 1  
Average MAE: 4.657  
Average MAPE: 0.391

Attempting to fetch data with:  
Source Service: frontend  
Destination Service: shippingservice

Generated Prometheus Query: histogram\_quantile(0.5, sum(rate(istio\_request\_duration\_milliseconds\_bucket[source\_app='frontend'; destination\_app='shippingservice', reporter='source'][1m])) by (le))

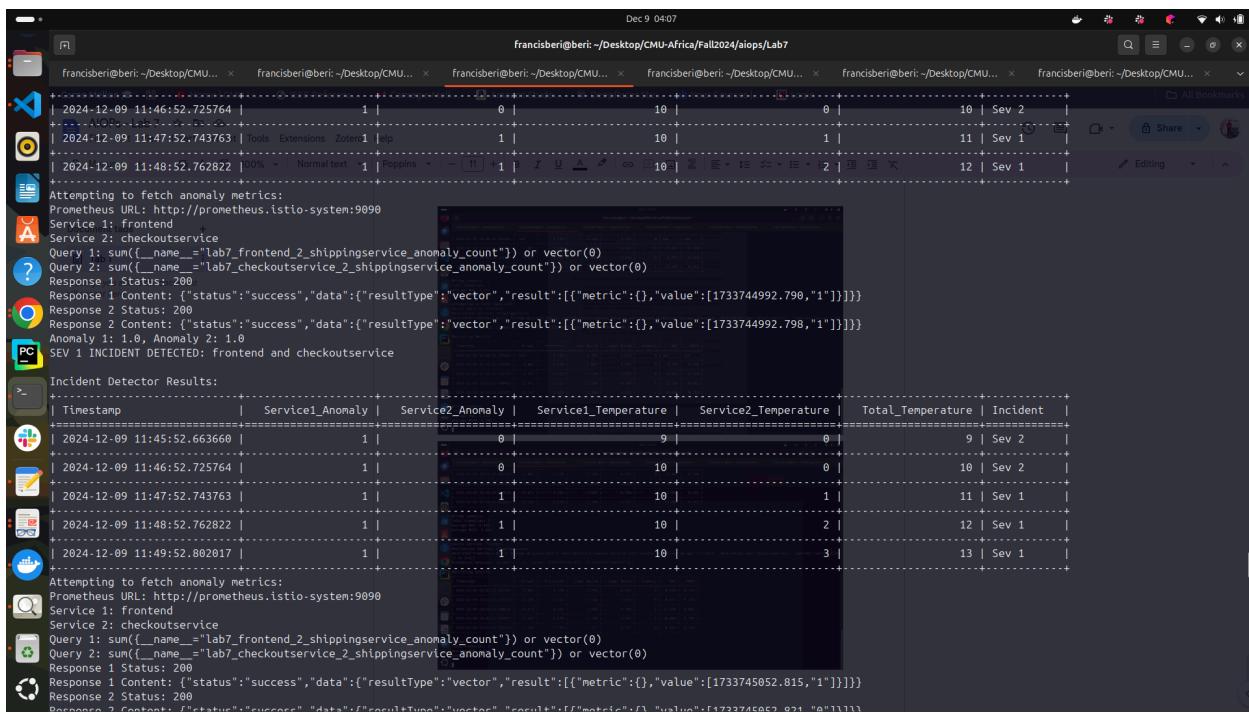
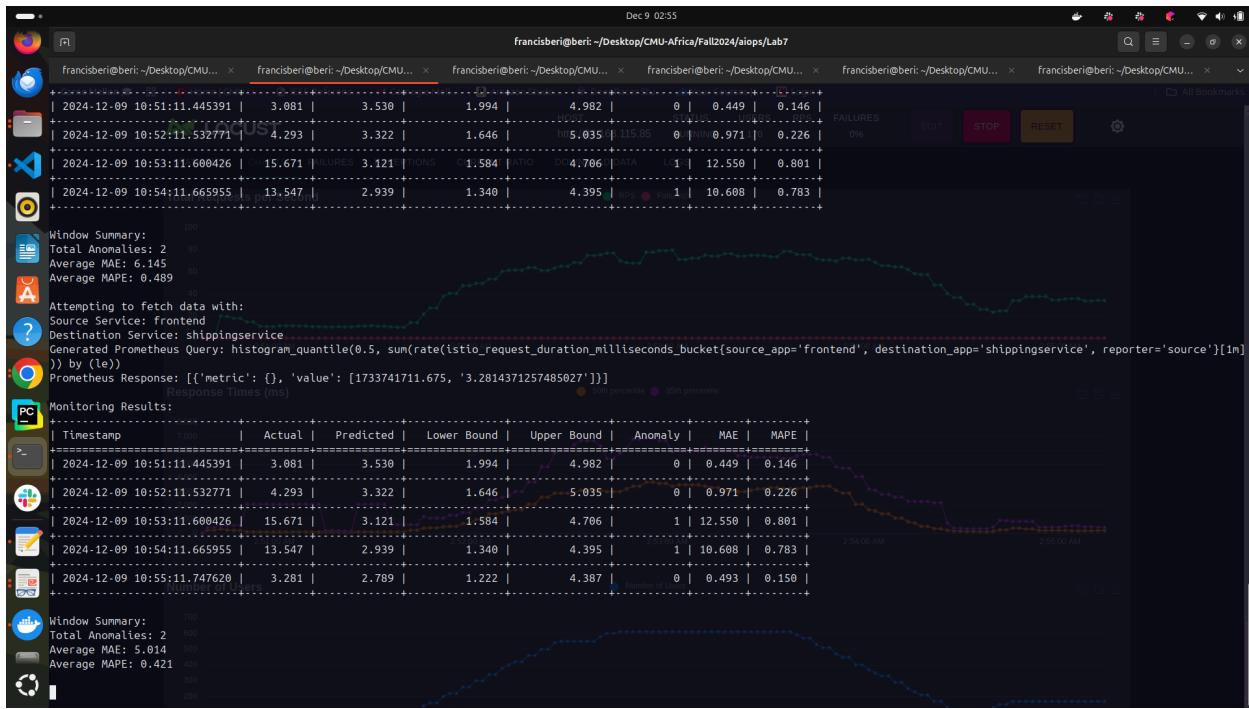
Prometheus Response: [{"metric": {}, "value": [1733741651.615, "13.546637744034708"]}]

Monitoring Results:

Timestamp	Actual	Predicted	Lower Bound	Upper Bound	Anomaly	MAE	MAPE	Incidents
2024-12-09 10:50:11.384266	nan	3.735	2.164	5.372	0	0.449	0.146	0
2024-12-09 10:51:11.445391	3.081	3.530	2.094	4.982	0	0.449	0.146	0
2024-12-09 10:52:11.532771	4.293	3.322	1.646	5.035	0	0.971	0.226	0
2024-12-09 10:53:11.680426	15.671	3.121	1.584	4.706	1	12.558	0.801	1
2024-12-09 10:54:11.665955	13.547	2.939	1.340	4.395	1	10.688	0.783	1

Window Summary:  
Total Anomalies: 2  
Average MAE: 6.145  
Average MAPE: 0.489

d. The incident monitor metrics including total accumulator, separate accumulators.



### 3. Explanation of how you configured the transients and why

## Key Modifications and Enhancements

## 1. Transient Load Configuration

- Flexible `transient_configs` list allows easy modification
- Configurable start/end times and user surge
- Detailed logging of transient events

## 2. Environment Variable Support

- Easily adjust test parameters via environment variables
- Default values provided for comprehensive testing

## 3. Load Shaping Strategy

- Gradual user load increase and decrease
- Synchronization of transient spikes with load steps
- Automatic cycle reset

### Transient Load Strategy

#### Configuration Rationale:

- **Total Duration:** 1800 seconds (30 minutes)
- **Maximum Users:** 300
- **Cycle Time:** 1200 seconds (20 minutes)

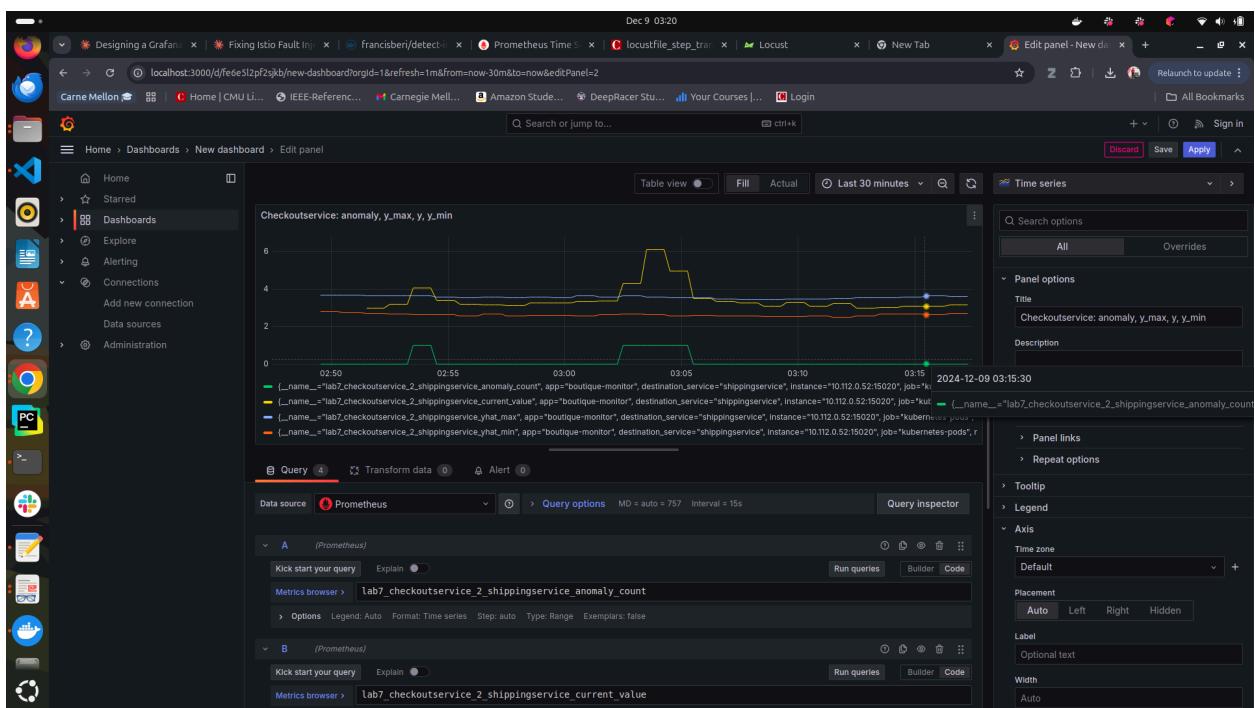
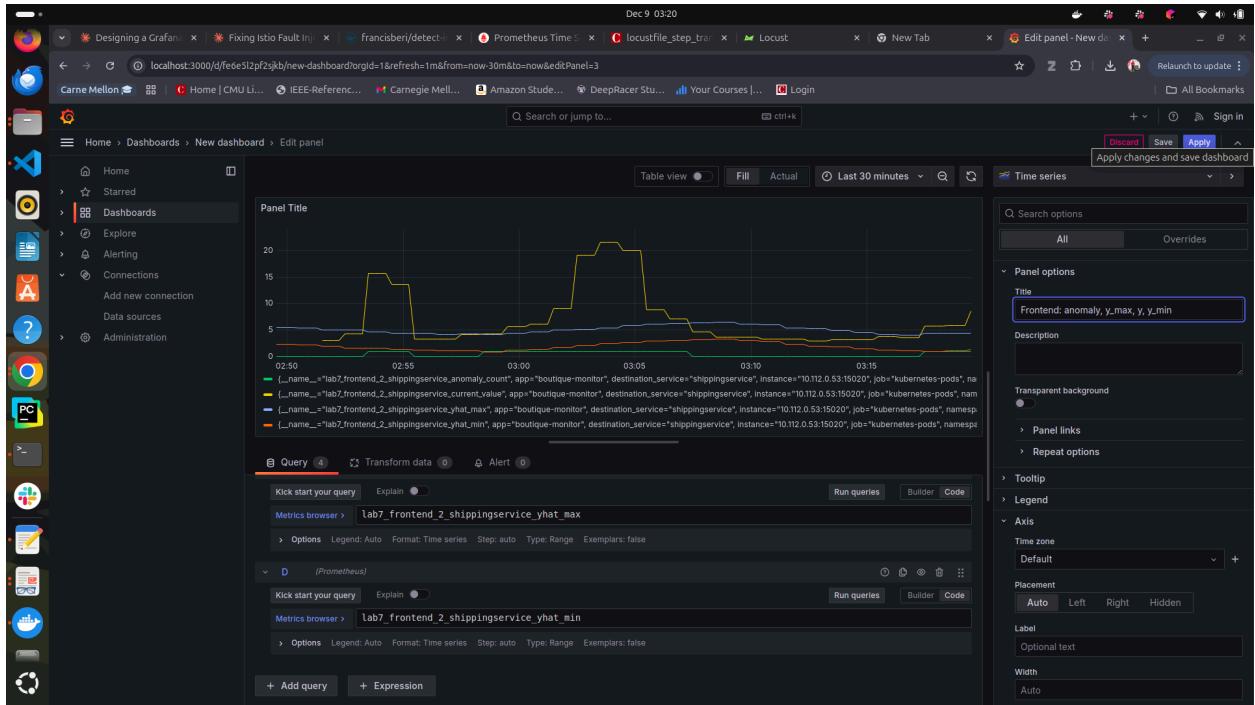
#### Transient Characteristics

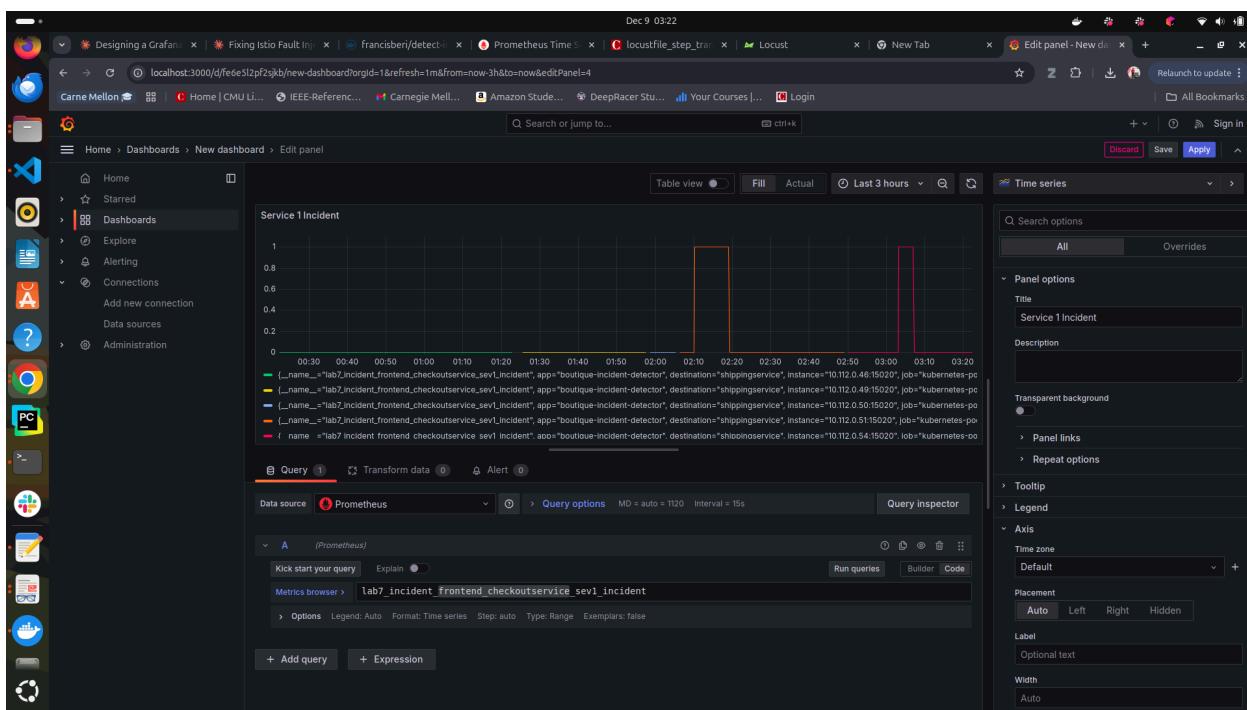
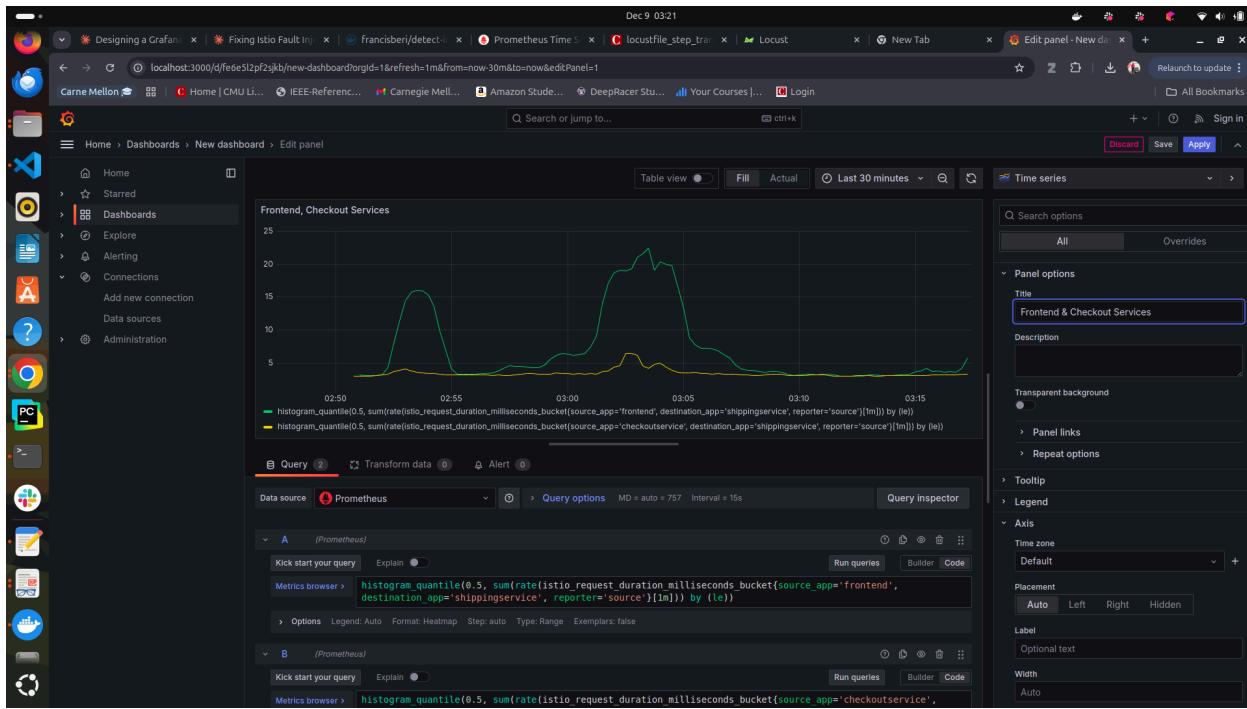
- First Transient – Start: 60 seconds – End: 180 seconds – User Surge: 500 users
- Second Transient – Start: 600 seconds – End: 720 seconds – User Surge: 1000 users

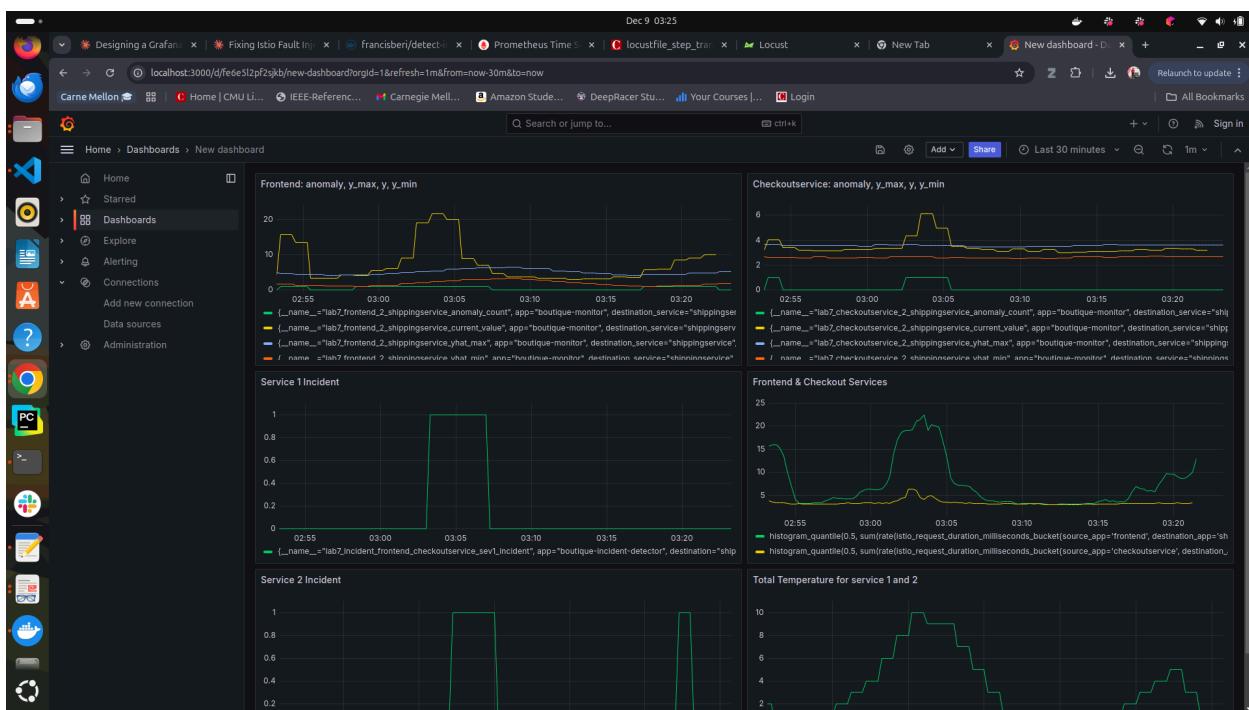
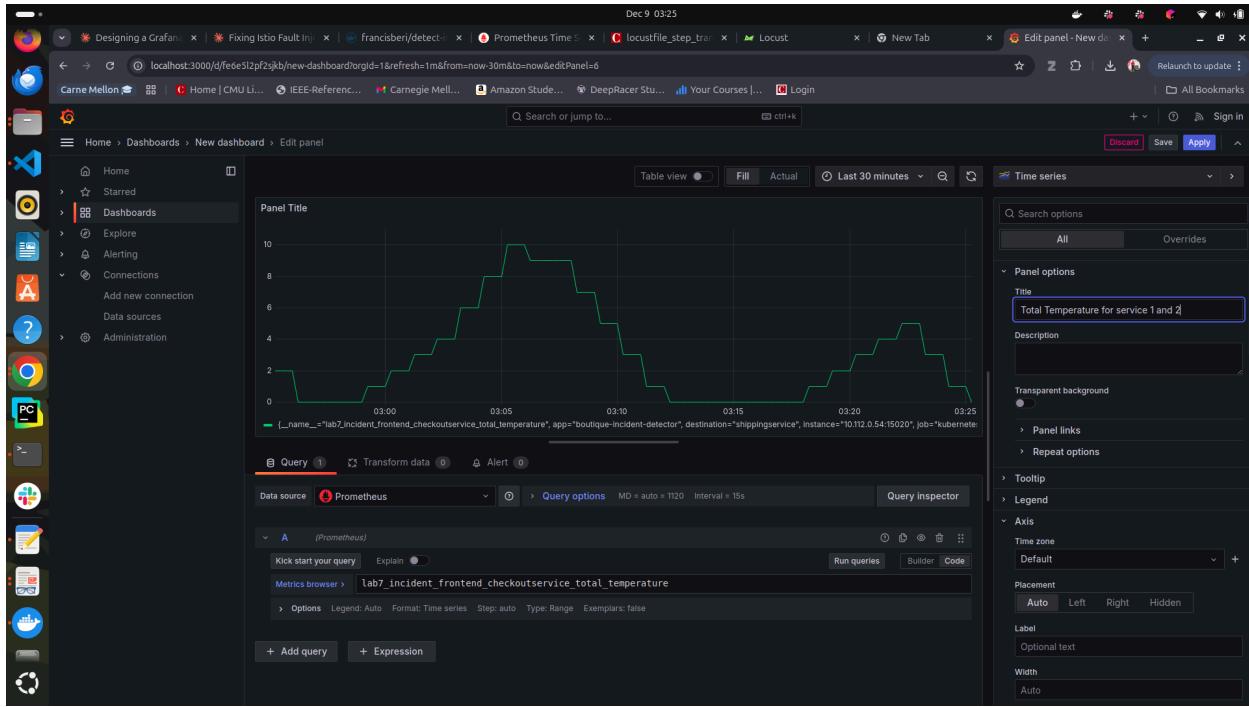
#### Testing Objectives

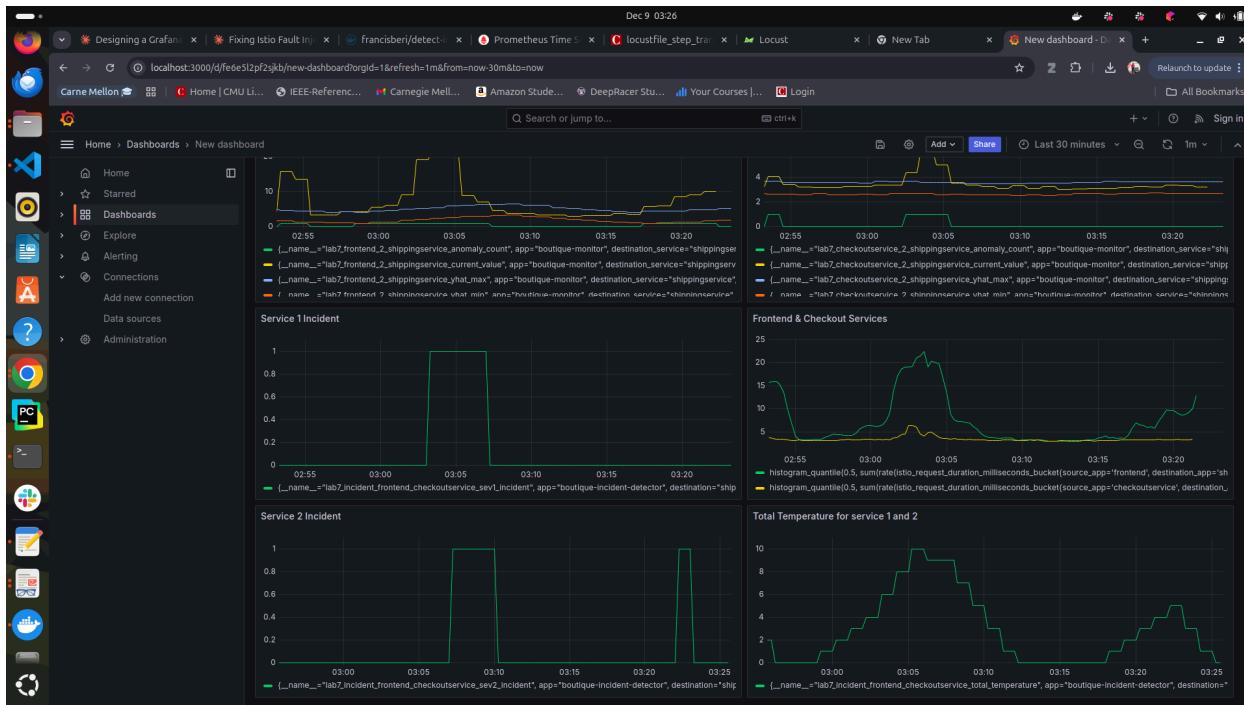
- Validate incident detector's resilience
- Observe anomaly detection during load variations
- Ensure no unnecessary incident declarations

#### Task 6:









[OBJ]

