

COS80029-Technology Application Project

Group User Manual

Team 4

Student Name	Student ID
Auninda Alam	103823585
Marjan Tahreen	104088466
Raju Dahal	104055570
Simon Dahal	103158504

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1 Introduction

The purpose of this report is to outline our approach and strategy to working with this project and implementing a role-based resource cost breakdown. This report provides a comprehensive overview of our proposed methodology, including key considerations, implementation steps, and anticipated benefits. This report also presents a user with rationale behind the design of individual features and demonstrates how each individually designed component can be utilized.

2 System Requirements

To use the IAM Role-Based Resource Cost Breakdown feature effectively, ensure that your system meets the following requirements:

- Terraform 1.0+
- Python 3.9
- AWScli
- Cloud Custodian
- Prometheus/Grafana/Pushgateway

- checkov 2.0.574 or later
- shellcheck 0.7.1 or later

3 Installation Instruction

Step 1: Configure AWS Cost and Usage Report

1. Create a Cost and Usage Report:

- Log in to your AWS Management Console.
- Navigate to the Billing and Cost Management Dashboard.
- Set up a new Cost and Usage Report to be delivered to an S3 bucket. Ensure that the report includes all necessary data elements required by the XC3 system for analysis.

2. Regular Report Generation:

- Configure the report to be updated at a regular interval that suits your monitoring needs (e.g., daily or monthly).
- Ensure that the report format is compatible with the system requirements (e.g., CSV).

Step 2: Configure S3 Bucket in Terraform

1. Specify S3 Bucket Name:

- Locate the terraform.auto.tfvars file within the infrastructure folder of your project.
- Assign the name of the S3 bucket (where the Cost and Usage Report is stored) to the report_bucket_name variable.

Step 3: Deploy the Configuration

1. Initialise Terraform:

- Run terraform init to initialise the Terraform configuration with your settings.

2. Apply Terraform Changes:

- Execute terraform apply to apply the configuration and deploy the necessary resources and settings to AWS.

Final Step: Verify Installation

1. Check Deployment:

- Ensure that data is being received and processed as expected, and that Prometheus and Grafana are displaying the metrics.

2. Test the System:

- Perform a few test queries in Grafana to see if the cost metrics are correctly visualized according to the IAM roles.

4 Architecture Diagram

The architecture diagram for our implemented feature is given below.

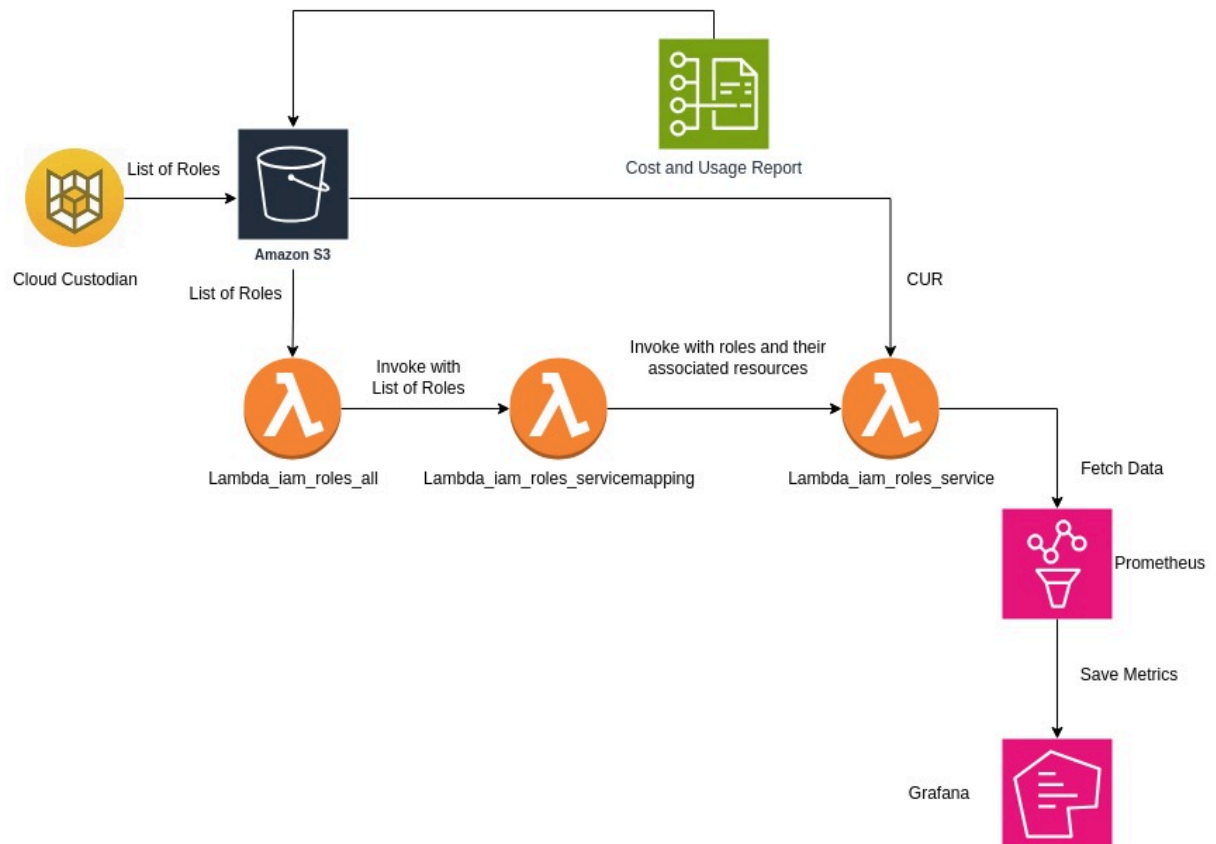


Figure 1: Architecture Diagram

5 Using IAM Role Based Resource Cost Breakdown Feature

Follow these streamlined steps to deploy and use the new feature:

Step 1: Deploy XC3 Architecture

- Run the Initialization Script: Execute `./init.sh` from your project directory to deploy the XC3 architecture.

Step 2: Configure AWS Systems Manager

- Create SSM Parameter: In the AWS Console, add a new parameter in Systems Manager named `<namespace>/region_names` with a JSON dictionary mapping region IDs to names.

Step 3: Access and Configure

- SSH into EC2: Use SSH to connect to the deployed EC2 instance where the XC3 is set up.
- Run Custodian Policy: Inside the EC2, execute `custodian run iam-role.yml` to trigger processing by the Lambda function.

Step 4: View and Analyze Data

- Access XC3 Dashboard: Open the XC3 URL provided after deployment.
- Explore Metrics: In the dashboard, search for 'IAM_Role_Service' metrics to analyze cost data.

Step 5: Dashboard Customization

- Custom Dashboards: Utilize the metrics to create tailored dashboards for detailed cost monitoring and insights.

6 User Interface Overview (Grafana Panel)

Login panel

- Go to the ec2 Public-ip:3000
- Use the HTTP Protocol
- Login to the dashboard with Grafana Default Credentials
- Enter Username: admin
- Enter Password: admin Home dashboard

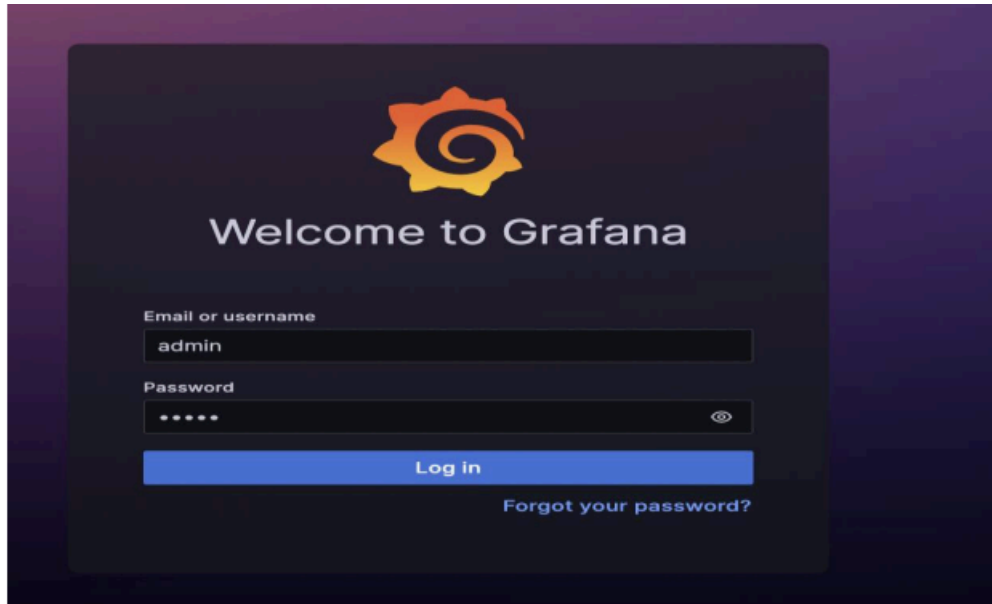


Figure 2: Login Panel

7 Using the feature

The overall project feature's usage is further divided into multiple components and each section defines a way to set up, implement and use it. The "Role Based Breakdown" feature allows you to:

- Visualize the top 5 most expensive roles in the account.
- View a service breakdown of costs for each individual role.
- View a resource breakdown of each individual service of a role.
- Customize the visualization for specific time periods or cost categories.

7.1 Grafana Dashboards

You can use the xc3 platform to visualize cost data based on various filters. For this requirement, we will focus on visualizing data based on roles. Usage of this feature does not require any pre-setup and comes bundled with the xc3 package. The following section explains what each feature represents and how each component can be used.

7.1.1 Home Dashboard

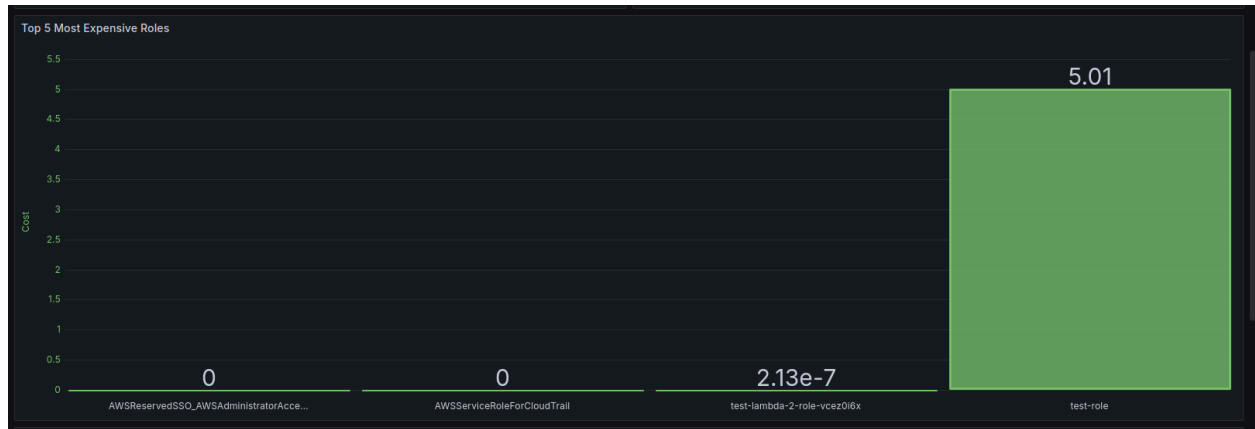


Figure 3: Home Dashboard

Our newly created explorer will be right in the middle of the home dashboard. The panel title is 'Top 5 most expensive roles' and as the name suggests, the top 5 roles are displayed.

If you click on any role, an option to view the breakdown by that role is displayed. On clicking, you will be redirected to a new dashboard.

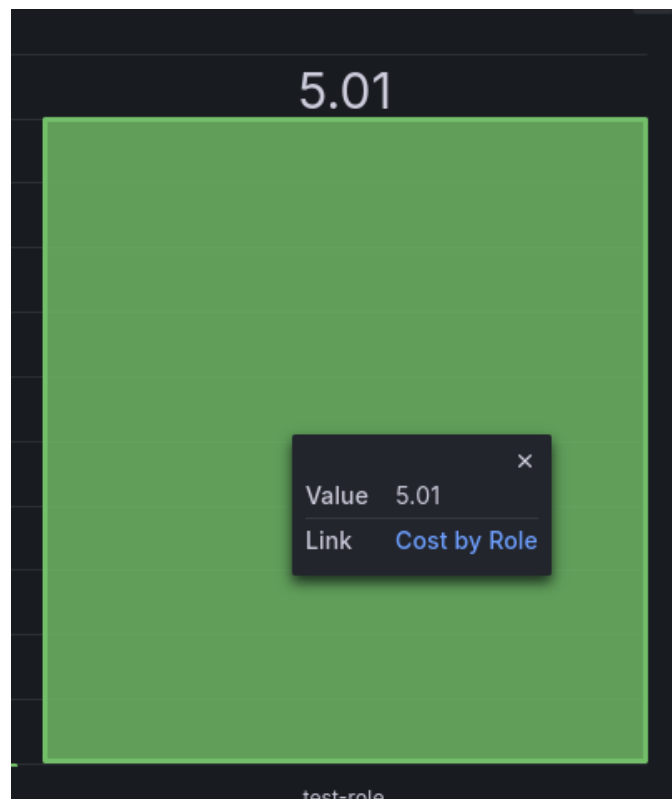


Figure 4: Data link

7.1.2 Services Dashboard

This new dashboard breaks down the cost depending on the role selected in the option menu or clicked on the previous dashboard. This dashboard has two panels for service and resource visualization.

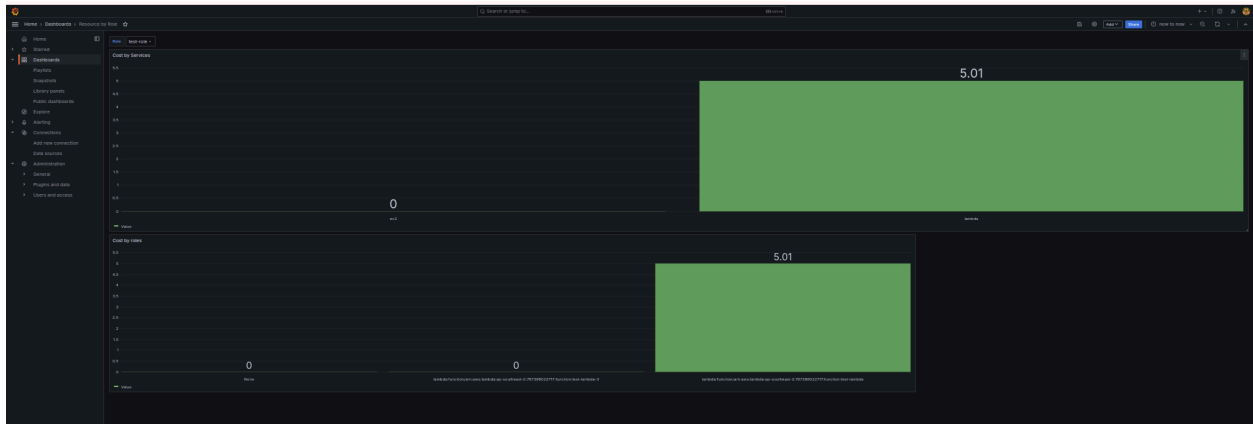


Figure 5: Service Dashboard

The first panel shows breakdown of roles by services. If multiple services are associated with a role, the top 5 services will be displayed. On clicking any service in the dashboard, you can see further breakdown of cost based on service and role.

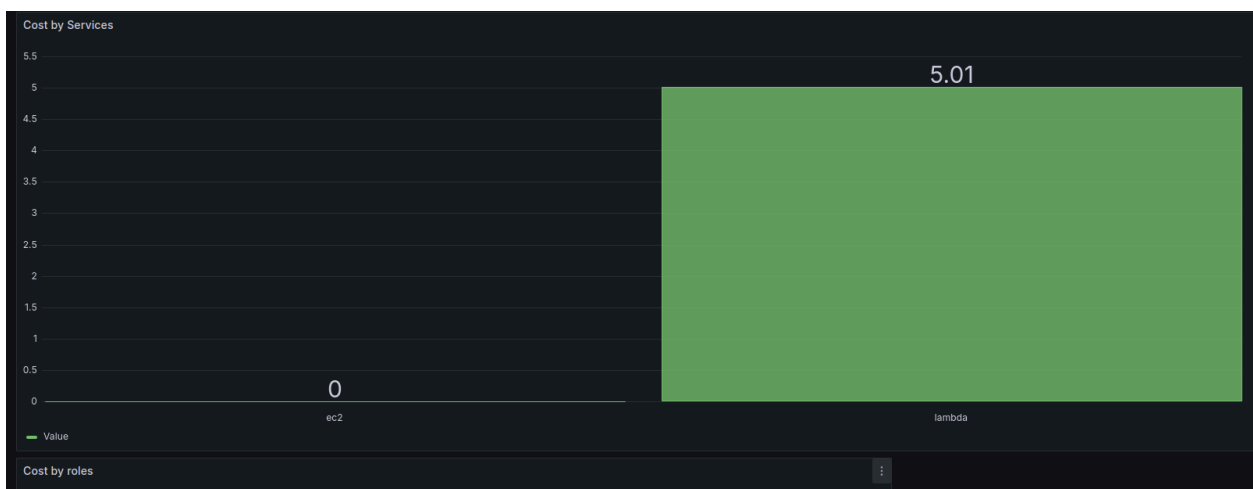


Figure 6: Cost breakdown by service

The second panel shows breakdown by resource. The top 5 resources associated with the role will be displayed irrespective of the service.

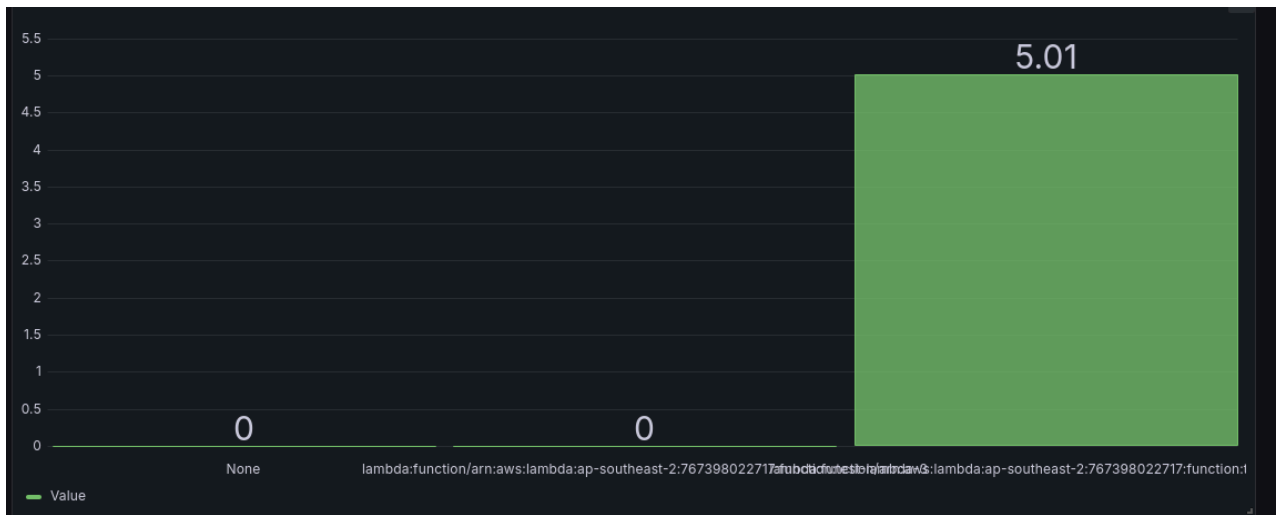


Figure 7: Cost breakdown by resources all

7.1.3 Resources Dashboard

This new dashboard breaks down the cost depending on the role and services selected in the option menu. If the user clicks on any services in the previous “Service Dashboard”, it will take them to the new resource dashboard. Here, the user can select the role and service from the dropdown menu to see the cost of the resources depending on the selected role and service.



Figure 6: Resource Dashboard

8 Estimated Cost

The cloud custodian policy is set to run at 5pm everyday. It puts the list of IAM roles in S3 bucket which then triggers the first lambda - iam_roles_all (iamrolestografana). It then triggers the second lambda (iamrolesservicemapping) once. The second lambda then triggers the last lambda (iamrolesservice) for each role.

The number of execution for each lambda supposing we have 100 roles is as follows:

- iamrolestografana: 1 time per day (30 times per month)
- iamrolesservicemapping: 1 time per day (30 times per month)
- iamrolesservice: 100 number of times per day (3000 times per month)

So, the duration value that we can see in cloudwatch logs for each lambda has average values as follows:

- iamrolestografana: 1 second	2024-04-22T14:28:57.208+10:00	START R
	2024-04-22T14:28:57.640+10:00	END Req
	2024-04-22T14:28:57.640+10:00	REPORT
	2024-04-22T14:29:46.806+10:00	START R
	2024-04-22T14:29:47.220+10:00	END Req
- iamrolesservicemapping: 8 seconds	2024-04-22T14:28:58.346+10:00	START R
	2024-04-22T14:29:06.679+10:00	END Req
	2024-04-22T14:29:06.679+10:00	REPORT
	2024-04-22T14:29:47.221+10:00	START R
	2024-04-22T14:29:54.942+10:00	END Req
- iamrolesservice: 3 seconds	2024-04-22T14:29:53.068+10:00	START
	2024-04-22T14:29:54.908+10:00	END Req
	2024-04-22T14:29:54.908+10:00	REPORT
	2024-04-22T14:29:54.933+10:00	START
	2024-04-22T14:29:57.184+10:00	END Req

Calculating the cost:

- iamrolestografana: $30 / 1000000 * 0.2 + 1 * 30 * 128 / 1024 * 0.00001667 = 0.0000685$

- iamrolesservicemapping: $30 / 1000000 * 0.2 + 8 * 30 * 128 / 1024 * 0.00001667 = 0.000506$

- iamrolesservice: $3000 / 1000000 * 0.2 + 3 * 3000 * 128 / 1024 * 0.00001667 = 0.0194$

Total cost per month for lambda functions: USD 0.0199745

9 Troubleshooting

If you encounter any issues while using the "Role Based Cost Breakdown" feature, consider the following steps:

- Make sure you have created the appropriate SSM parameter.
- Make sure you have the updated CUR report in the s3 bucket.
- Make sure your XC3 installation is up to date.
- Make sure there were no errors while installing XC3.
- Ensure that your AWS credentials have sufficient permissions to access the necessary resources.
- Verify that the environment variables (Prometheus Ip, bucket name) are correctly configured.
- Ensure that your Prometheus push gateway is reachable from the Lambda function's execution environment.

10 Contacting Support

If you need further assistance or encounter persistent issues, please contact our support team at 104055570@student.swin.edu.au. Our dedicated team is here to help you 24/7 with any questions or concerns you may have.

