AWS Cost Tracking and Alert System—Portfolio Project Documentation

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Role: Cloud/DevOps Engineer
Project Type: AWS Cost Monitoring, Alerts, and Visualization
Status: Completed
Tech Stack: Amazon CloudWatch, AWS Lambda (Python), Amazon SNS, Amazon S3 (Static Website Hosting), Amazon EventBridge, AWS IAM, AWS Cost Explorer API, Chart.js
Deployment: AWS CloudShell and AWS Management Console

Executive Summary

This project delivers an end-to-end AWS cost monitoring and reporting solution that translates complex billing data into clear, actionable insights. It combines real-time alerts, automated weekly and monthly reports, and an S3-hosted visual dashboard to provide continuous cost visibility. The system is designed to be low-cost, secure, and easily extensible across teams and accounts.

Key outcomes:

- Real-time CloudWatch billing alarms when costs exceed configured thresholds.
- Automated weekly and monthly reports generated via Lambda and scheduled with EventBridge.
- A user-friendly dashboard hosted on S3 that visualizes costs and top spending services.
- Historical cost data stored in S3 for trend analysis.

Architecture Overview

The solution is composed of the following AWS services:

- CloudWatch Billing Alarms: Real-time threshold alerts based on EstimatedCharges.
- AWS Lambda:
    - Cost Notification Function: Pulls cost data, publishes SNS alerts, and stores JSON data to S3.
    - Report Generator Function: Produces weekly/monthly CSV reports and sends notifications.
- Amazon SNS: Delivers email notifications for cost alerts and report availability.
- Amazon S3:
    - Static website hosting for the cost dashboard.
    - Storage for cost JSON snapshots and CSV reports.
- Amazon EventBridge: Triggers scheduled report generation (weekly and monthly).
- AWS IAM: Granular policies to secure access for Lambda and supporting services.

High-level data flow:

1. CloudWatch monitors billing metrics and triggers SNS alerts when thresholds are breached.
2. Lambda pulls Cost Explorer data, publishes summary alerts, and writes daily JSON to S3.
3. S3 hosts a static dashboard that reads JSON cost data and renders charts with Chart.js.
4. EventBridge triggers the report Lambda on a schedule to build and upload CSV reports.
5. SNS (and optionally SES) notifies stakeholders of new reports.

Security and Operational Considerations

- Least privilege: Scope IAM policies to specific ARNs (S3 bucket and SNS topic).
- Regions: Billing metrics are global; alarms are configured in us-east-1 via the console. Align SNS and Lambda regions for simplicity.
- Public dashboard: For production, prefer CloudFront + OAC or Cognito/auth proxy. For a portfolio demo, S3 static website public read is acceptable.
- Data retention: Consider S3 lifecycle rules to transition old JSON/CSV to infrequent access or Glacier for cost efficiency.
- Cost Explorer API limits: The Lambda runs on demand and via schedule; ensure backoffs if extending.
- Error handling: Functions log to CloudWatch Logs. Set CloudWatch Alarms on Lambda errors/timeouts for operational resiliency.

Cost Estimate

- CloudWatch Alarms: ~$0.10 per alarm per month.
- Lambda: Minimal, pay-per-use; short invocations only a few times per day/week.
- S3: Pennies per GB-month for JSON/CSV and HTML hosting.
- SNS: ~$0.50 per million notifications.
- SES (optional): ~$0.10 per 1,000 emails.

Overall: Very low monthly operational cost for substantial visibility.

Results and Benefits

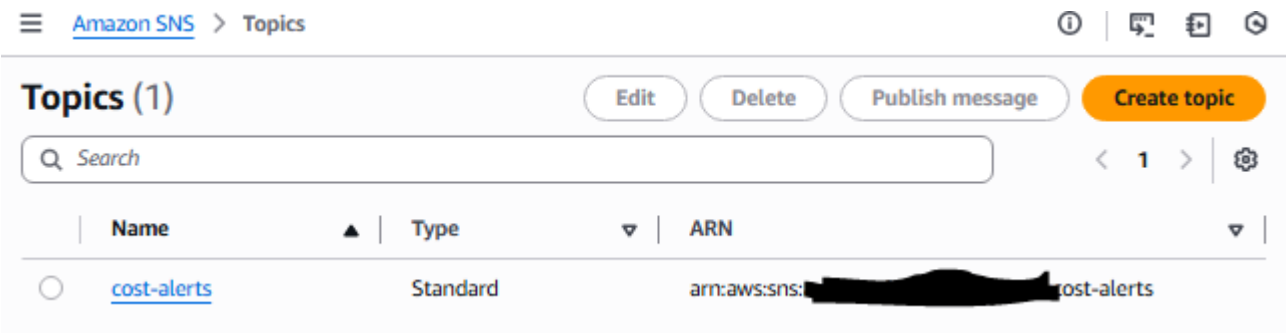
- Real-time monitoring with proactive alerts when spend exceeds thresholds.
- Automated weekly and monthly CSV reporting for stakeholders.
- Visual, self-service dashboard with top services breakdown.
- Historical data retained for trend and anomaly analysis.
- Extensible foundation: multi-account support via AWS Organizations and cross-account roles; additional metrics (e.g., UnblendedCost, AmortizedCost); tag- or account-based groupings.

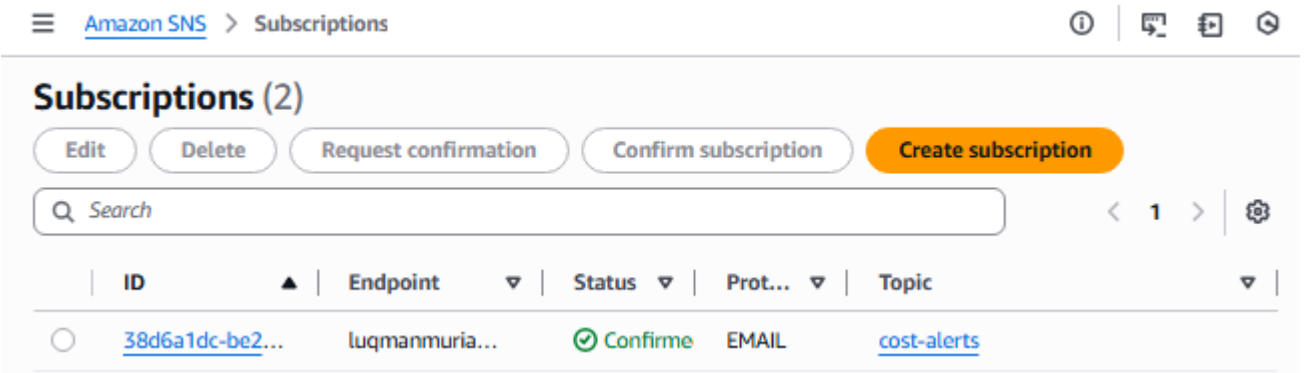
Future Enhancements

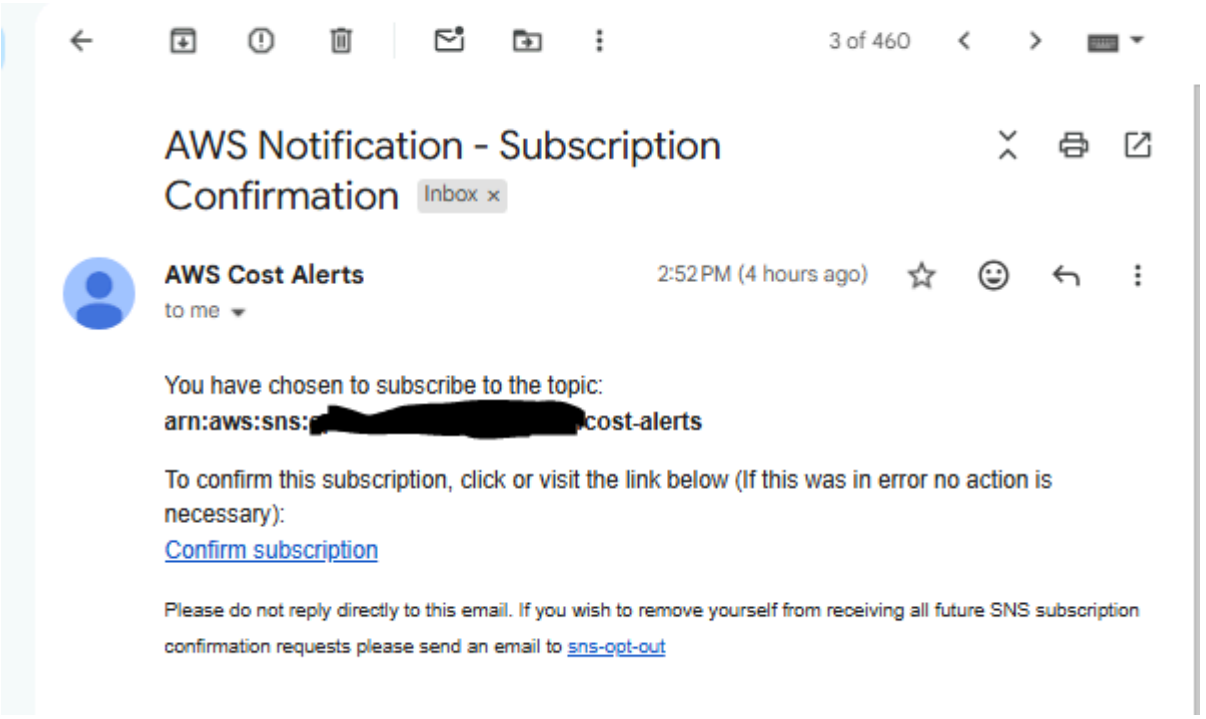
- Multi-account aggregation via AWS Organizations and Cost Categories.
- Add AmortizedCost and SavingsPlans/RIs utilization views.
- Anomaly detection integration (Cost Anomaly Detection).
- CloudFront distribution with SSL and custom domain for the dashboard.
- Role-based dashboard access using Amazon Cognito or IAM Identity Center.
- Store daily snapshots (not just the latest) to build trends on the dashboard.

Appendix: Alternative Console-First Setup Implementation Guide

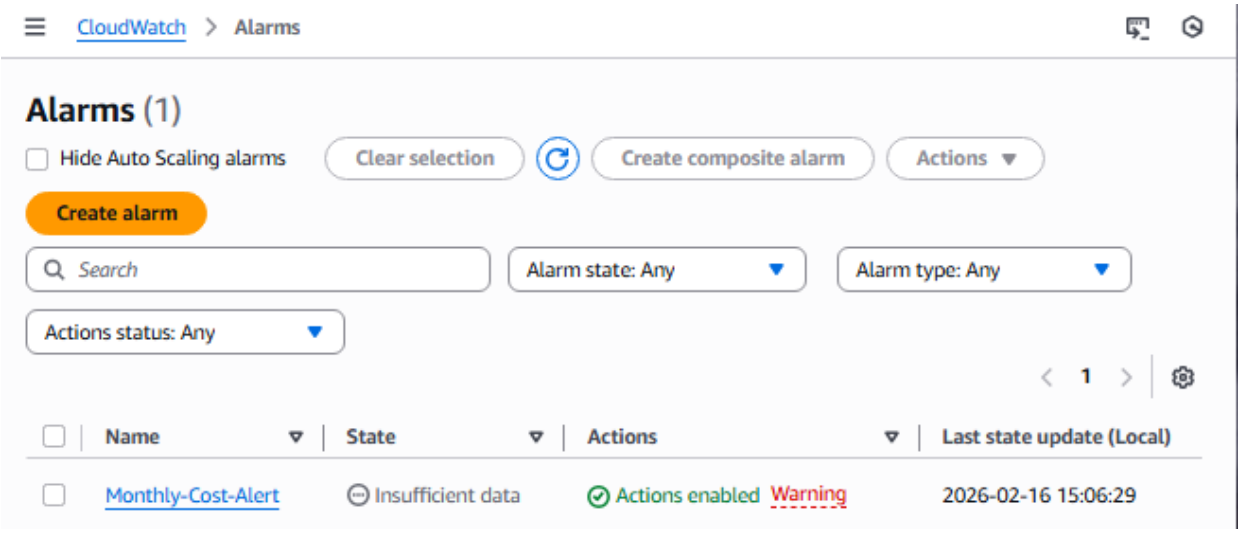
- SNS Topic and Subscription:
    - SNS → Topics → Create topic (Standard) → Name: cost-alerts → Create subscription (Email) → Confirm via email.



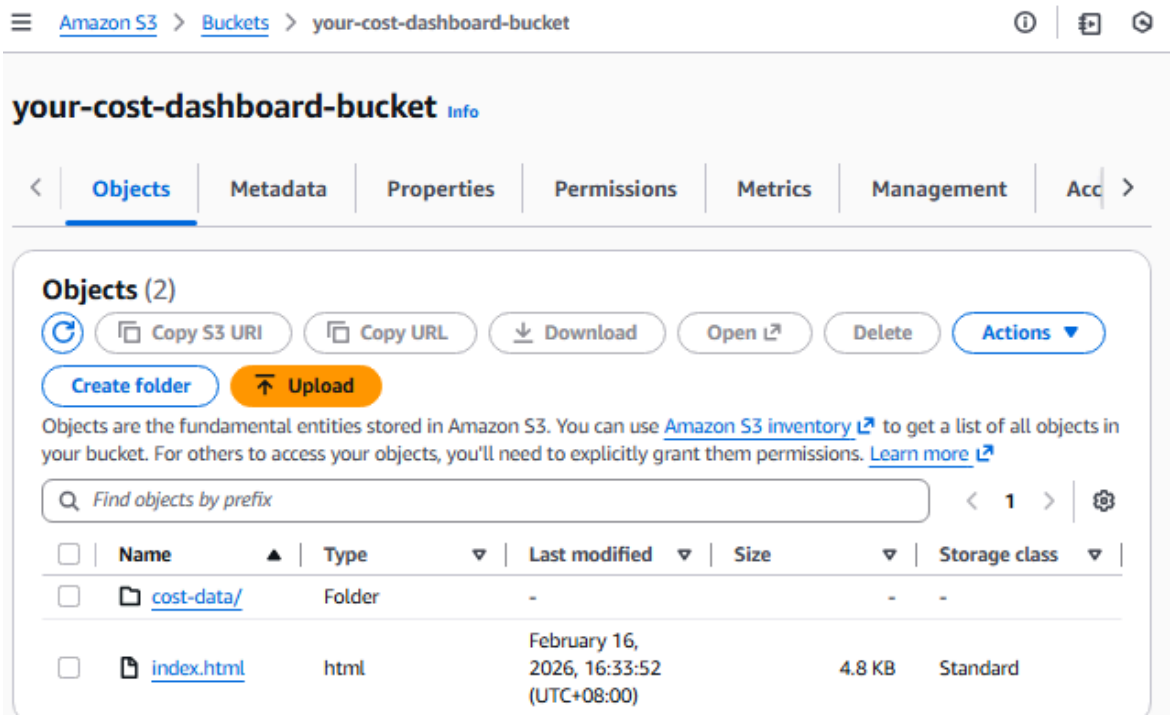




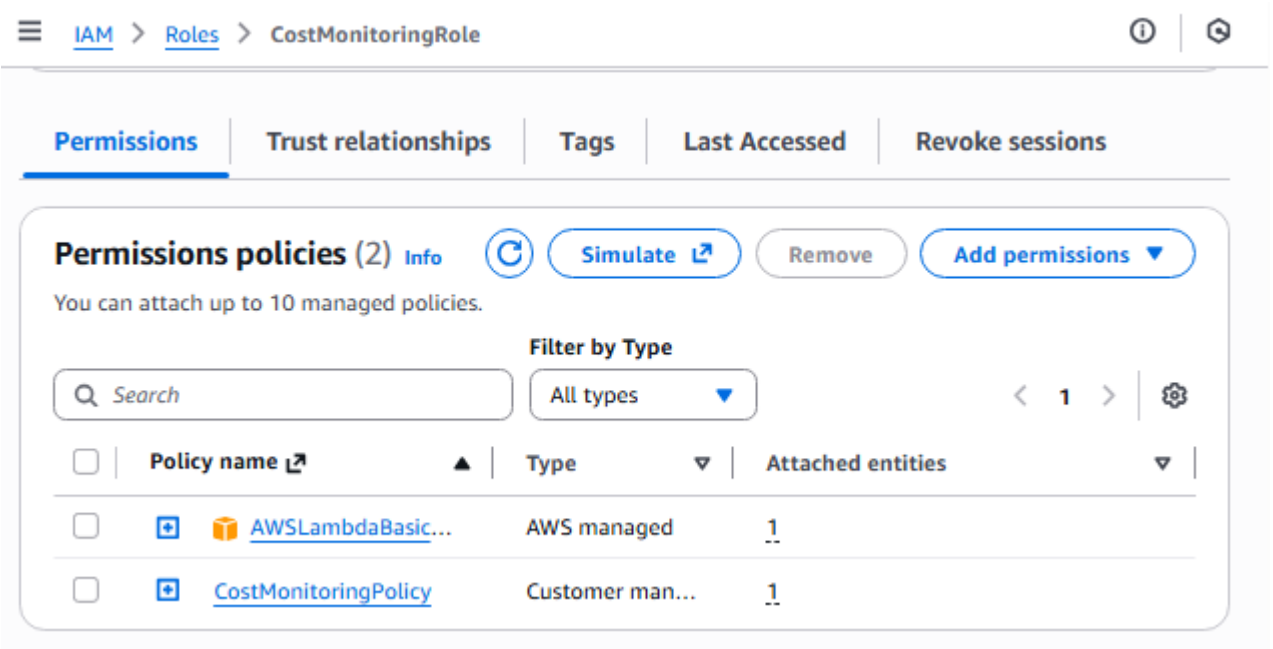
- CloudWatch Billing Alarm:
    - CloudWatch → Alarms → Billing → Create alarm.
    - Metric: Billing → Total Estimated Charge; Currency: USD; Statistic: Maximum; Period: 6 hours.
    - Threshold: Static, Greater than, e.g., 100.
    - Action: In-alarm → SNS topic: cost-alerts.
    - Name: Monthly-Cost-Alert.



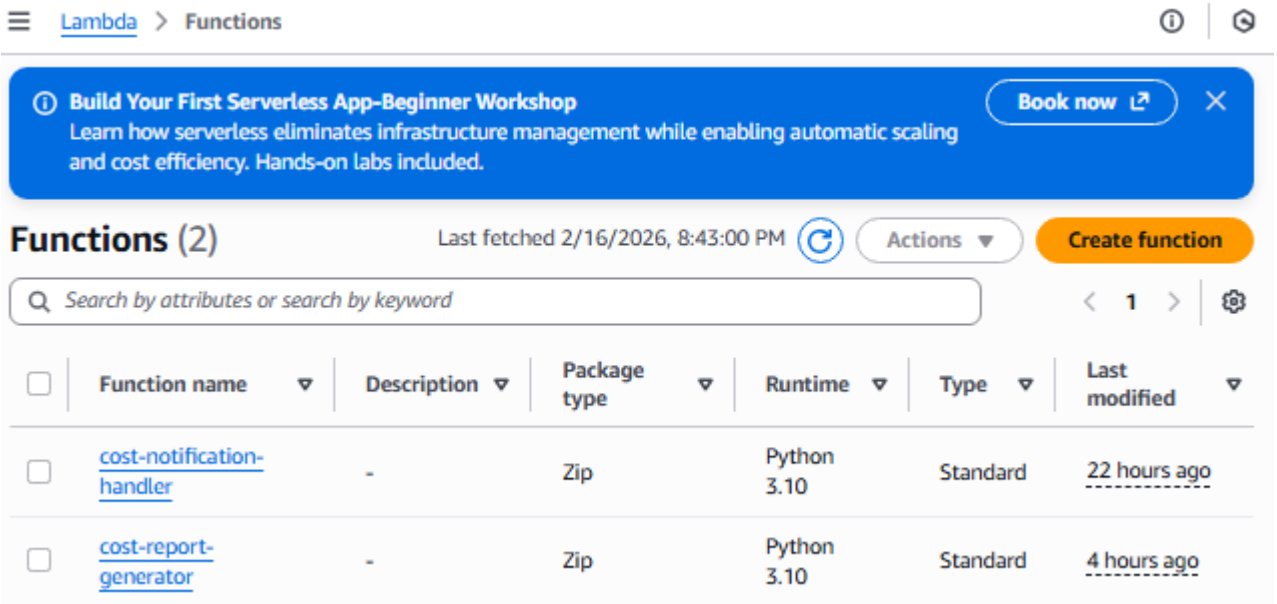
- S3 Dashboard:
    - S3 → Create bucket → Enable static hosting → Upload index.html → Add bucket policy for public read.



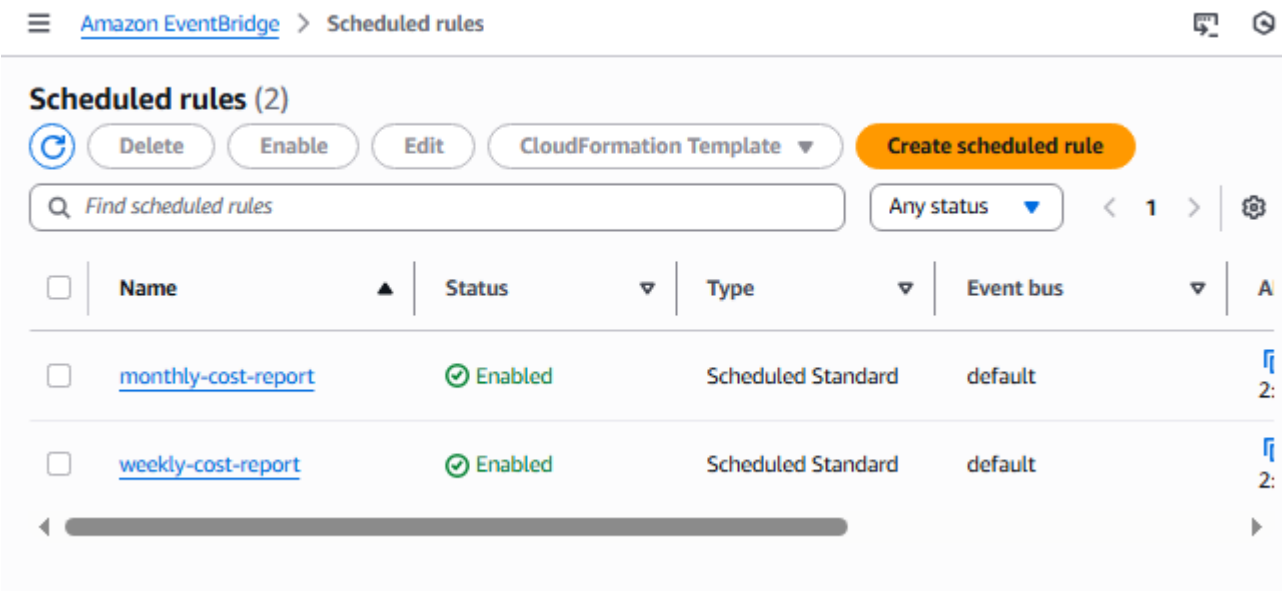
- IAM Role:
    - IAM → Roles → Create role for Lambda → Attach AWSLambdaBasicExecutionRole + custom CostMonitoringPolicy.



- Lambda Functions:
    - Create cost-notification-handler and cost-report-generator.
    - Add environment variables and increase timeout to 1 minute for the notification function.



- EventBridge:
    - Create rules for weekly and monthly schedules with constant JSON inputs to trigger cost-report-generator.

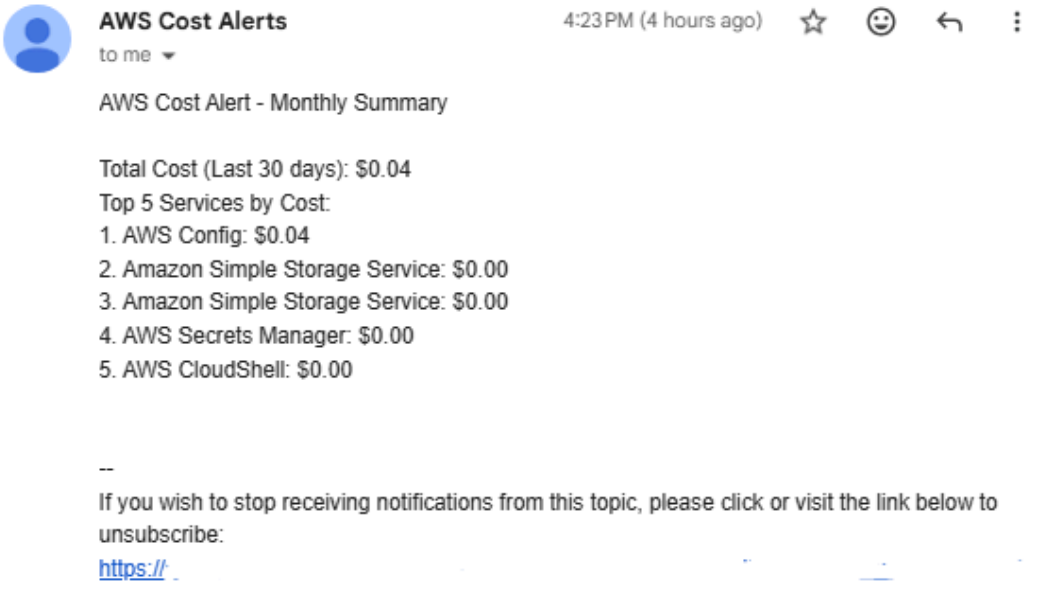


System Test

- **Test Lambda Function**



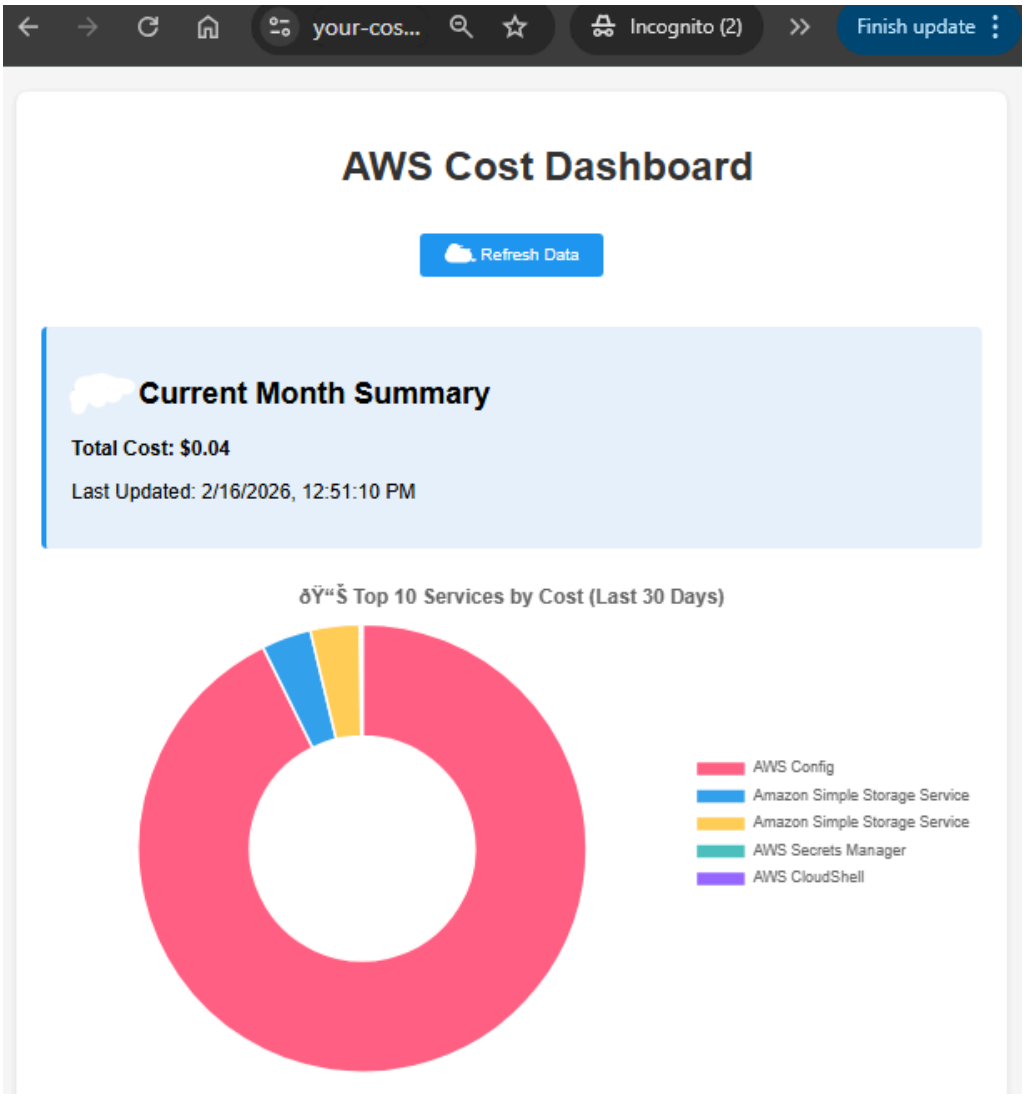
- Check Results
  1. Check **your email for cost notification**



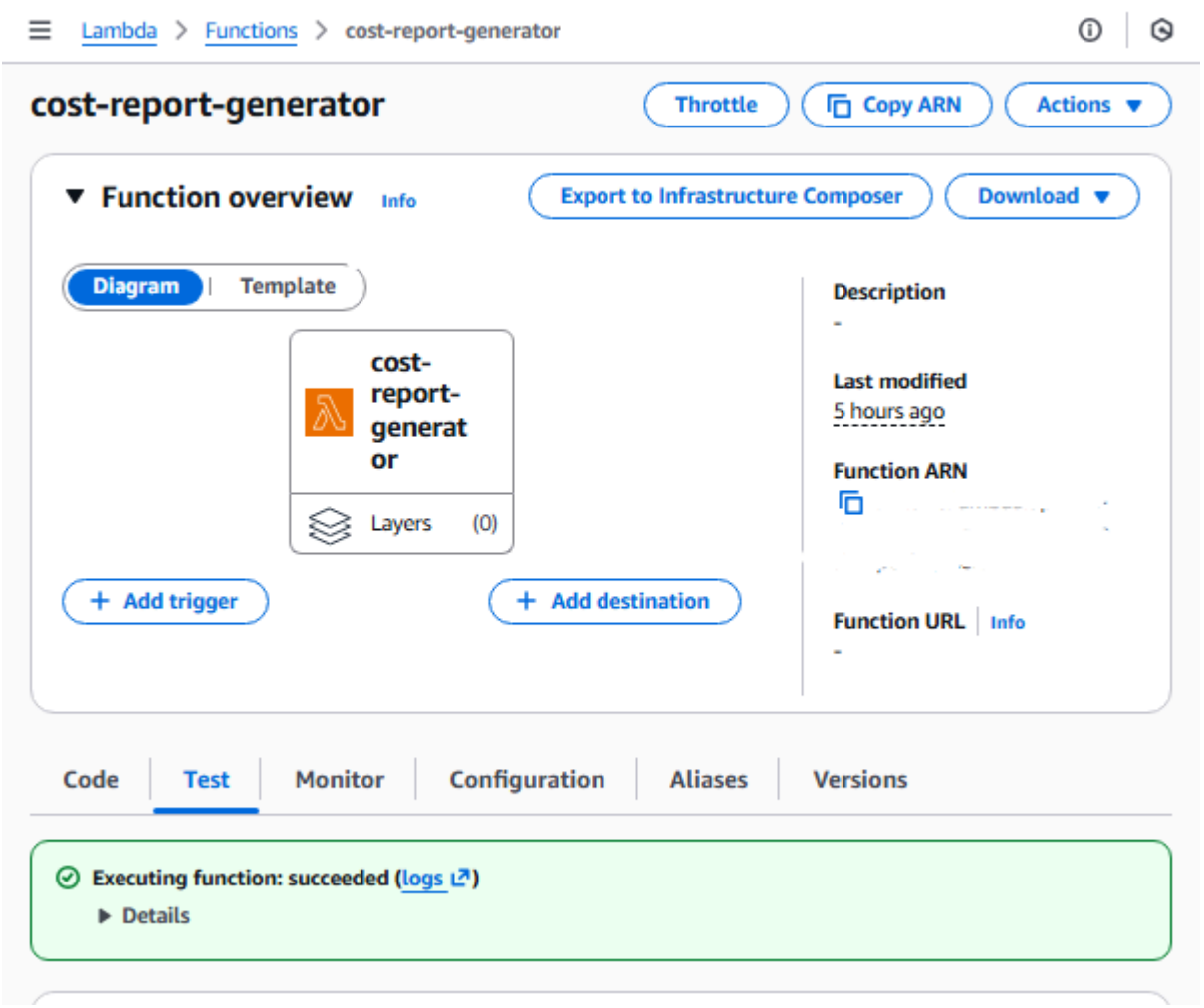
2. Check S3 bucket for generated cost data


```
{
  "timestamp": "2026-02-16T06:11:45.356149",
  "total_cost": 0.0420654256,
  "services": [
    {
      "service": "AWS Config",
      "cost": 0.039
    },
    {
      "service": "Amazon Simple Storage Service",
      "cost": 0.0015000425
    },
    {
      "service": "Amazon Simple Storage Service",
      "cost": 0.00149502
    },
    {
      "service": "AWS Secrets Manager",
      "cost": 0.00007
    },
    {
      "service": "AWS CloudShell",
      "cost": 3.631e-7
    }
  ]
}
```


3. Visit your dashboard URL:



- **Test Report Generation**



Links and Access

- Dashboard: http://your-cost-dashboard-bucket.s3-website-YOUR-REGION.amazonaws.com
- S3 paths:
  - JSON snapshots: s3://your-cost-dashboard-bucket/cost-data/YYYY-MM-DD.json
  - Reports: s3://your-cost-dashboard-bucket/reports/*.csv
- SNS Topic: arn:aws:sns:YOUR-REGION:YOUR-ACCOUNT-ID:cost-alerts
- Lambda Functions: cost-notification-handler, cost-report-generator
- EventBridge Rules: weekly-cost-report, monthly-cost-report