

# Lab 06: CloudWatch Monitoring & Alerts

## Lab Overview

Explore CloudWatch metrics, build a monitoring dashboard, create an SNS email topic, configure metric alarms, explore CloudWatch Logs, and set up a billing alarm. The billing alarm is the single most important step — it protects your account from unexpected charges.

Service	Purpose	Free Tier
Amazon CloudWatch	Metrics, dashboards, and alarms for all AWS services	10 metrics, 10 alarms free
CloudWatch Logs	Centralized log storage and search	5 GB ingestion free/mo
Amazon SNS	Simple Notification Service — email/SMS/Lambda delivery	1M requests/mo free
AWS Billing Metrics	EstimatedCharges metric for cost monitoring	Always Free

■ **NOTE:** This entire lab runs within the AWS Free Tier. The billing alarm costs nothing and should remain active on every account permanently.

## Key Concepts

Concept	Definition	Exam Weight
Metric	Time-ordered data points from an AWS service — e.g. EC2 CPU over time.	Very High
Namespace	Container for related metrics. Services publish to AWS/EC2, AWS/S3, etc.	Medium
Alarm	Watches one metric and transitions between OK, ALARM, INSUFFICIENT_DATA states.	Very High
Dashboard	Customizable page combining multiple metric graphs and widgets.	Medium
Log Group	Container for log streams from one application or AWS service.	High
SNS Topic	Pub/sub channel. Alarms publish to a topic; SNS delivers to subscribers.	High
Metric Filter	Transforms log content into CloudWatch metrics for alarm-driven monitoring.	Medium

# 1

## Amazon CloudWatch — Metrics Explore the Metrics Console

AWS automatically publishes metrics for every service. No configuration needed.

1. Search for CloudWatch → left sidebar → Metrics → All metrics
2. Browse namespaces: AWS/S3, AWS/Lambda, AWS/EC2, AWS/ApiGateway
3. Click AWS/S3 → BucketName, StorageType
4. Check NumberOfObjects for your Lab 01 bucket
5. Explore the graph — change time range from 1h to 1w
6. Switch graph type from Line to Number to see the current value

✓ **TIP:** Every AWS service publishes metrics automatically at no cost. Lambda publishes Invocations, Errors, and Duration. S3 publishes daily storage metrics.

## 2

### Amazon CloudWatch — Dashboards Create a Monitoring Dashboard

1. Left sidebar → Dashboards → Create dashboard
2. Name: lab-monitoring-dashboard → Create dashboard
3. Add widget: Line → Next → Metrics tab → AWS/S3 → NumberOfObjects → Create widget
4. Add widget: Number → Next → BucketSizeBytes → Create widget
5. Add widget: Alarm status → Create widget (auto-populates after Step 4)
6. Click Save

■ **NOTE:** Dashboards combine metrics from multiple services. In production one dashboard shows EC2, RDS, Lambda, and API Gateway metrics together.

## 3

### Amazon SNS Create an SNS Topic for Notifications

1. Search for SNS → left sidebar → Topics → Create topic
2. Type: Standard → Name: lab-alerts-topic → Display name: CloudPracticeLabs Alerts
3. Click Create topic
4. On the topic page click Create subscription
5. Protocol: Email → Endpoint: your email address → Create subscription
6. Open your inbox → click Confirm subscription in the AWS email
7. Refresh the console → Status should show Confirmed

✓ **TIP:** Once confirmed, any CloudWatch alarm that publishes to this topic will deliver an email to your inbox within seconds.

## 4

### Amazon CloudWatch — Alarms Create a Metric Alarm

1. CloudWatch → Alarms → All alarms → Create alarm
2. Select metric → AWS/S3 → BucketName, StorageType → NumberOfObjects → Select metric
3. Conditions: Greater than → threshold: 10 → Next
4. Notification: In alarm → existing SNS topic → lab-alerts-topic
5. Alarm name: lab-s3-object-count-alarm → Next → Create alarm

■ **NOTE:** INSUFFICIENT\_DATA is the normal starting state. S3 metrics update once per day. EC2 alarms update every 5 minutes.

## 5

### AWS Billing — MOST IMPORTANT Create a Billing Alarm

#### Enable billing alerts (one-time setup)

1. Click account name (top-right) → Billing and Cost Management

2. Left sidebar → Billing Preferences → Edit
3. Check Receive CloudWatch Billing Alerts → Update

### Create the alarm — must be in us-east-1

1. Switch region to US East (N. Virginia) — us-east-1
2. CloudWatch → Alarms → Create alarm → Select metric
3. Billing → Total Estimated Charge → EstimatedCharges USD → Select metric
4. Conditions: Greater than → 5 → Next
5. Notification: lab-alerts-topic → Alarm name: lab-billing-alert-5usd → Create alarm

**X IMPORTANT:** Do not skip this step. A \$5 billing alarm is the most important protection against unexpected charges on any AWS account.

## 6

### CloudWatch Logs Explore Log Groups

1. CloudWatch → Logs → Log groups
2. Open /aws/lambda/ContactFormHandler (from Lab 03) → click most recent log stream
3. Review timestamped execution logs from your Lambda invocations
4. Go back to Log groups → Create log group
5. Name: /cloudpracticelabs/lab06 → Retention: 1 week → Create
6. Optional: Actions → Create metric filter → pattern: ERROR → Next
7. Filter name: ErrorCount → namespace: CloudPracticeLabs → metric: ApplicationErrors → Create

## Verification Checklist

- Explored metrics in at least one CloudWatch namespace
- Dashboard lab-monitoring-dashboard created with at least 2 widgets
- SNS topic lab-alerts-topic created with email subscription Confirmed
- Alarm lab-s3-object-count-alarm created (OK or INSUFFICIENT\_DATA is correct)
- Billing Alerts enabled in Billing and Cost Management Preferences
- Billing alarm lab-billing-alert-5usd created in us-east-1 for EstimatedCharges > \$5
- Explored CloudWatch Logs from a previous lab
- Custom log group /cloudpracticelabs/lab06 created with 1-week retention

## What You Learned

- CloudWatch Metrics — AWS services publish metrics automatically; explored namespaces and time ranges
- CloudWatch Dashboards — unified operational views combining metrics from multiple services
- Amazon SNS — pub/sub messaging connecting alarms to email and other notification targets
- CloudWatch Alarms — threshold-based monitoring that triggers notifications when metrics cross limits
- Billing Alerts — the most critical alarm any AWS user can create; prevents unexpected charges
- CloudWatch Logs — centralized log storage with search for Lambda, EC2, and API Gateway
- Metric Filters — transform log data into metrics for alarm-driven monitoring of applications

## Lab Cleanup

■ **NOTE:** Keep the billing alarm permanently. Delete everything else.

#	Resource	How to Delete
1	Dashboard	CloudWatch → Dashboards → lab-monitoring-dashboard → Delete
2	S3 Alarm	CloudWatch → Alarms → lab-s3-object-count-alarm → Delete
3	SNS Subscription	SNS → Subscriptions → your email subscription → Delete
4	SNS Topic	SNS → Topics → lab-alerts-topic → Delete
5	Log Group	CloudWatch → Log groups → /cloudpracticelabs/lab06 → Delete
KEEP	Billing Alarm	Keep lab-billing-alert-5usd — it protects your account from unexpected charges