

- Multiple producers, messages are kept upto  
14 days

- Multiple consumers share the read and  
delete messages when done

- Used to decouple applications in AWS.

SNS:

Notification service

Subscribers: Email, Lambda, SQS, HTTP,

Multiple subscribers; send all messages to all  
of them.

No message retention.

Kinesis: Real-time data streaming, persistence  
and analysis.

Amazon MQ: Managed Apache (MQ) in the  
cloud

\* Cloud Monitoring Section \*

Amazon CloudWatch Metrics

Provides metrics for every service in AWS

Have timestamps

Metric is a variable

Can create Cloudwatch dashboards of metrics

→ Important metrics:

1) EC2 instances: CPU Utilization, Status Checks,  
Network.

Default metrics every 5 min.

EBS volumes: disk / Read / writes

S3 Buckets: bucketsizebytes, Noofobjects, Allrequests

Billing: Total Estimated charge

Service limits: how much you have been using a service API

Custom metrics: push your own metric.

Amazon CloudWatch Alarms:

Triggers Notifications for any metric

Alarm actions:

Auto Scaling - Increase / decrease EC2 instance count

EC2 actions - stop, terminate, reboot or rerecover EC2 instance.

SNS notifications - send a notif into an SNS topic.

Various options: - Sampling, i.e., max, min etc

Can choose the period on which to evaluate an alarm.

Alarm States: OK, insufficient-data, alarm

Amazon CloudWatch Logs.

Can collect log from:

Elastic Beanstalk : from appln

EC2 : from containers

AWS Lambda : from function logs

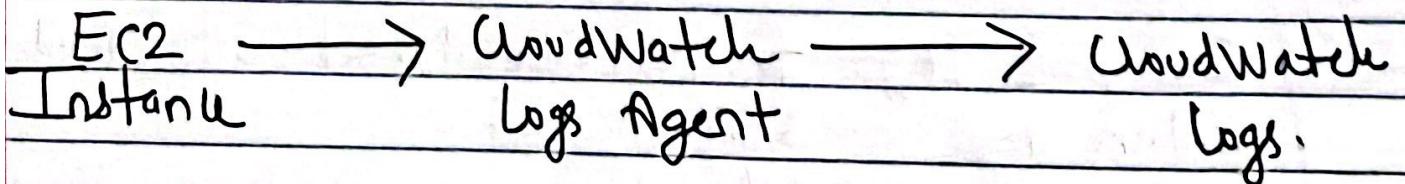
CloudTrail based on filter.

CloudWatch log agents: on EC2 machines or on-premises servers.

Route53: log DNS queries.

Real-time monitoring of logs

Adjustable cloudWatch logs retention.



1) Cloud Watch Events:  
Schedule: cron jobs (scheduled jobs)  
Schedule every hour → Trigger script on Lambda function

2) Event pattern: Event rules to react to a service doing something.

IAM Root User → SNS Topic with Email  
Sign in Event  
Trigger Lambda functions, send SNS/SMS messages.

→ Amazon EventBridge  
Next Evolution of CloudWatch Events  
Default event bus: generated by AWS services  
Partner event bus: receive events from SaaS services or applications  
Custom event buses: for your own applications.  
Schema Registry: model event schema  
CloudWatch events will be replaced with EventBridge.

### → AWS CloudTrail

Provides governance, compliance and audit for your AWS account.

Enabled by default

Get an history of events / API calls by:

1) Console

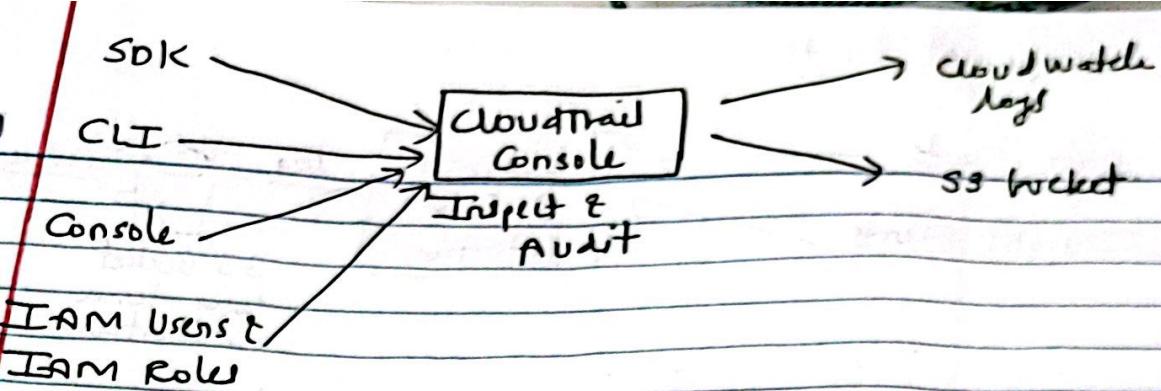
2) SDK

3) CLI

4) AWS Services.

Can put logs from CloudTrail into CloudWatch Log or S3.

All Regions (default) or a single region.



### Cloud Trail Events:

#### Management Events:

By default, log management events  
Can separate read / write events.

#### Data Events:

By default, not logged  
Can separate read / write events.

AWS Lambda function execution activity

#### CloudTrail Insight events:

To detect unusual activity

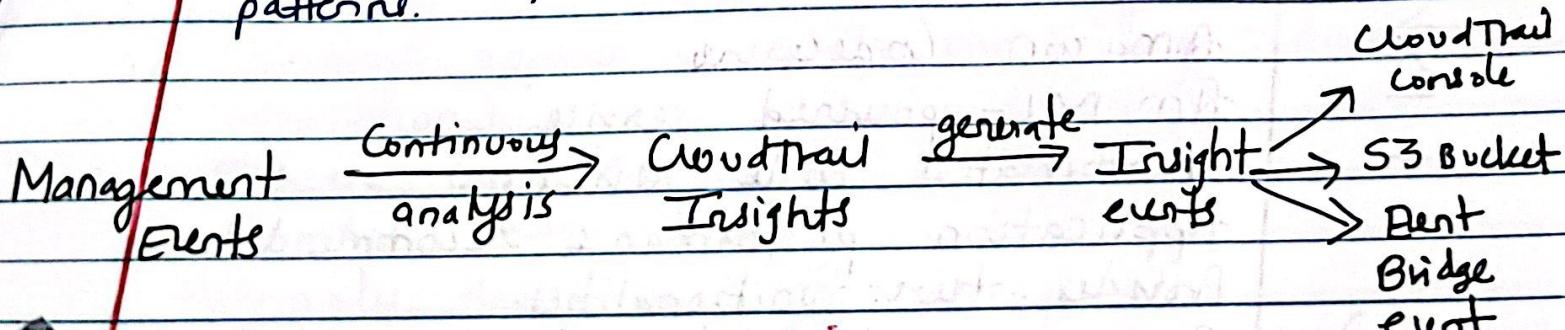
inaccurate resource provisioning  
hitting service limits

Bursts of AWS IAM actions

Gaps in periodic maintenance activity.

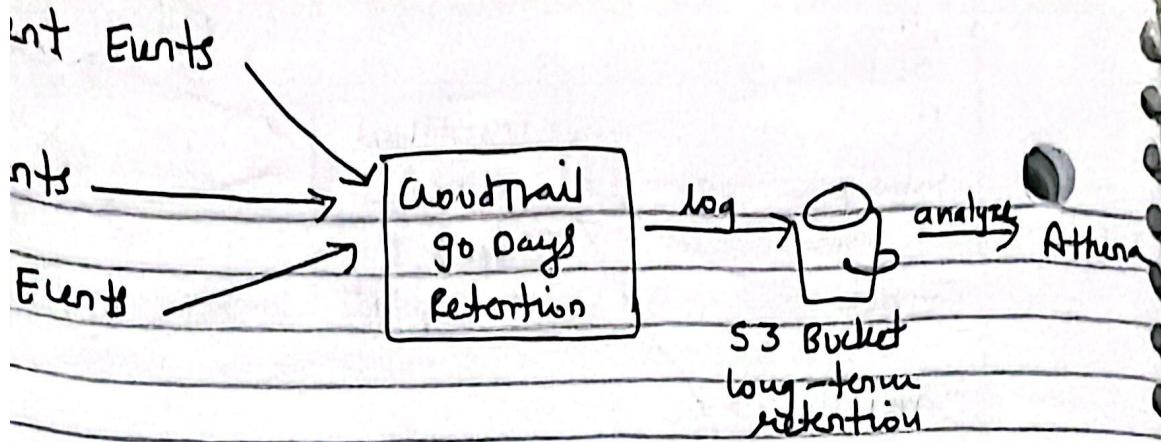
Insights analyzes normal management events to  
create a baseline.

Continuously analyze write events to detect unusual  
patterns.



### CloudTrail Events Retention:

- Stored for 90 days in CloudTrail
- To keep beyond this period, log them to S3 and use Athena.



## AWS X-Ray

Debugging in production, the good old-way

Test locally

Add log statements everywhere

Re-deploy in production.

Log formats differ across applications and log analysis is hard.

Debugging: Distributed-service: hard

Advantages:

Troubleshooting performance (bottlenecks)

Understand dependencies in a microservice architecture.

Pinpoint service issues

Review request behavior

Find errors and exceptions

Are we meeting time SLA?

Where am I throttled?

Identify users that are impacted.

## Amazon CodeGuru

An ML-powered service

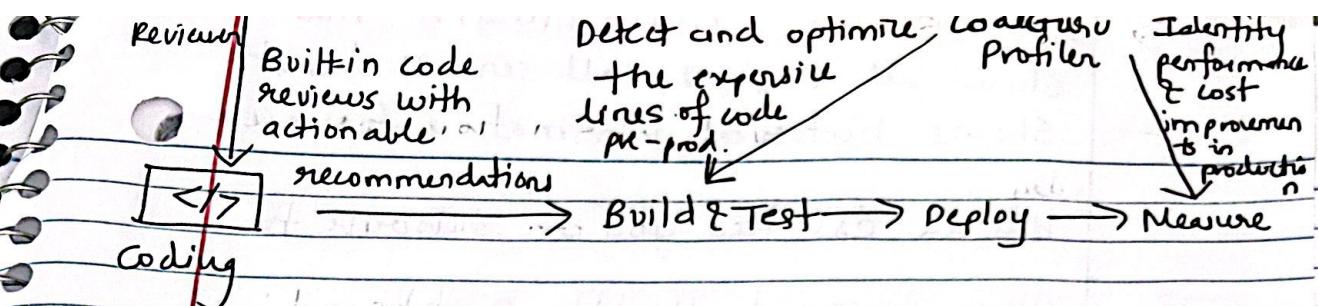
Automated code reviews

Application performance recommendations

Provides two functionalities:

Reviewer: Automated code reviews for static code analysis (development)

Profiler: Visibility / recommendations about application performance during runtime (production).



### → Amazon CodeGuru Reviewer:

- Identify critical issues, security and vulnerabilities, and hard-to-find bugs.

- Eg: Common coding best practices, resource leaks, security detection, input validation. Uses ML and automated reasoning.

- Hard-learned lessons across millions of code reviews on 1000s of open-source and Amazon repos.

- Supports Java & Python.

- Integrates with Github, Bitbucket and AWS CodeCommit.

### → Amazon CodeGuru Profiler

- Helps understand runtime behavior of your application.

- Eg: Identify if your app is consuming excessive CPU capacity on a logging routine.

- Features:

- Identify & remove code inefficiencies.

- Improve application performance (e.g. reduce CPU utilization).

- Decrease compute costs

- Provides heap summary

- Anomaly detection.

- Support applications running on AWS or non-premises.

- Minimal overhead on application.

**AWS Status - Service Health Dashboard**  
Shows all regions, all services health  
Shows historical information for each day.  
Has an RSS feed you can subscribe to.

**AWS Personal Health Dashboard:**  
Provides alerts and remediation guidance.  
Personalized view into the performance and availability of the AWS services underlying your AWS resources.  
Relevant and timely information.  
Proactive notification  
Scheduled activities.  
Shows how AWS outages directly impact you & your AWS resources.  
Alert, remediation, proactive, scheduled activities.

## Monitoring Summary \*

### CloudWatch

Metrics: monitor the performance of AWS services and billing metrics.  
Alarms: automate notification, perform EC2 action, notify to SNS based on metric.

Logs: collects log files from EC2 instances, servers, Lambda functions.

Events (EventBridge): react to events in AWS, or trigger a rule on a schedule.

**CloudTrail:** Audit API calls made within your AWS account.

**CloudTrail Insights:** Automated analysis of your CloudTrail events.

**X-Ray:** Trace requests made through your distributed applications.

Some Health Dashboard - Status of all AWS services across all regions.

- Personal Health Dashboard - AWS events that impact your infrastructure.

- Amazon CodeGuru - Automated code reviews and application performance recommendations.