

## Section 14 : Cloud Monitoring

### # Amazon CloudWatch Metrics

- Cloudwatch provides metrics for every services in AWS.
- Metric is a variable to monitor (CPU Utilization, NetworkIn....)
- Metric have timestamps.
- Can create CloudWatch dashboards of metrics.

• Alarm States: OK, INSUFFICIENT\_DATA, ALARM

## # Amazon CloudWatch Logs →

- CloudWatch Logs can collect log from:-
  - Elastic Beanstalk: collection of logs from appl<sup>n</sup>.
  - ECS: collection from containers
  - AWS Lambda: Collection from function logs
  - CloudTrail: based on filter
  - CloudWatch log agents: on EC2 machines or on-premises servers.
  - Route 53: Log DNS queries.
- Enables real-time monitoring of logs.
- Adjustable CloudWatch Logs retention.



## # CloudWatch Logs for EC2 :-

- By default, no logs from your EC2 instance will go to cloudwatch.
- You need to run a CloudWatch agent on EC2 to push the log files you want.
- Make sure IAM permissions are correct.
- The CloudWatch log agent can be setup on-premises too.

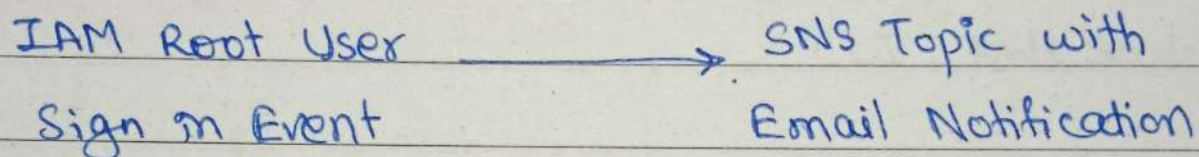


## # Amazon EventBridge (Formerly CloudWatch Events)

- Schedule: Cron Jobs (scheduled scripts)

- Event Pattern: Event rules to react to a service doing something

ex:-



- Trigger lambda functions, send SQS/SNS msgs.
- Schema Registry: model event schema
- You can archive events (all/filter) sent to an event bus (indefinitely or set period)
- Ability to replay archived events



## # AWS CloudTrail :->

- Provides governance, compliance & audit for your AWS Account
- A CloudTrail is enabled by default!
- Get an history of events / API calls made within your AWS Account by: Console, SDK, CLI, AWS services
- Can put logs from CloudTrail into CloudWatch logs for S3.
- A trail can be applied to All Regions (default) or a single Region.
- If a resource is deleted in AWS, investigate CloudTrail first!



## # 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 & log analysis is hard.
  - Debugging : one big monolith "easy", & distributed services "hard"
  - No common view of your entire architecture
- Sol<sup>n</sup> :- use AWS X-Ray
- + Visual analysis of our applications.



## # Advantages of AWS X-Ray :-

- ① Troubleshooting performance (bottlenecks)
- ② Understand dependencies in a microservice architecture.
- ③ Pinpoint service issues.
- ④ Review request behaviour.
- ⑤ Find errors & expectations.
- ⑥ Are we meeting time SLA?  
SLA :- Service Level Agreement
- ⑦ Where I am throttled?
- ⑧ Identify users that are impacted.



## # Amazon CodeGuru

- An ML-powered service for automated code reviews & application performance recommendations.
- Provides two functionalities:-
  - ① CodeGuru reviewer: automated code reviews for static code analysis (development)
  - ② CodeGuru Profiler: visibility/recommendation about application performance during runtime (production)
    - Detect & optimize the expensive lines of code pre-prod.



## ① Amazon CodeGuru Reviewer :->

- Identify critical issues, security vulnerabilities, and hard-to-find bugs.
- Example :- common coding best practices, resource leaks, security detection, input validation.
- Uses Machine Learning & automated reasoning.
- Hard-learned lessons across millions of code reviews on 1000s of open-source & amazon repositories.
- Supports Java & Python.
- Integrates with Git-Hub, Bitbucket, & AWS CodeCommit.



## ② Amazon CodeGuru Profiler :->

- Helps understand the runtime behaviour of your application.
- Example :- identify if your application is consuming excessive CPU capacity on a logging routine
- Features :-
  - ① Identify & remove code inefficiencies
  - ② Improve appl<sup>n</sup> performance (e.g. reduce CPU utilization)
  - ③ Decrease compute cost
  - ④ Provides heap memory (identify which objects using up memory)
  - ⑤ Anomaly detection.
- Supports appl<sup>n</sup>s running on AWS or on-premises.
- Minimal overhead on application.



## # AWS Health Dashboard - service History

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



## # AWS Health Dashboard - Your Account

- Can aggregate data from an entire AWS org.
- Previously called AWS Personal Health Dashboard (PHD).
- AWS Account Health Dashboard provides alerts & remediation guidance when AWS is experiencing events that may impact you.
- While the service Health Dashboard displays the general status of AWS services, A Account Health Dashboard provides you a personalized view into the performance & availability of the AWS services underlying your AWS resource.
- The dashboard displays relevant & timely information to help you manage events in progress & provides proactive notification to help you plan for scheduled activities.



\* Inshort :-

- ① Global Service
- ② Shows how AWS outages directly impact you & your AWS resources.
- ③ Alert, remediation, proactive, scheduled activities.



## Cloud Monitoring - Summary

### ① CloudWatch :-

- a) **Metrics** :- monitor the performance of AWS services & billing metrics.
- b) **Alarms** :- automate notification, perform EC2 action, notify to SNS based on metric.
- c) **Logs** :- Collect log files from EC2 instances, servers, Lambda functions...
- d) **Events** (or EventBridge) :- react to events in AWS or trigger a rule on a schedule

### ② CloudTrail :- audit API calls made within your AWS account

### ③ CloudTrail Insights :- automated analysis of your CloudTrail Events.

(debug)

### ④ X-Ray :- trace<sup>↑</sup> requests made through your distributed applications.



⑤ AWS Health Dashboard:- status of all AWS services across all regions.

⑥ AWS Account Health Dashboard:- AWS events that impact your instances/infrastructure

⑦ Amazon CodeGuru:- automated code reviews & application performance recommendations.