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 dashbords of metrics.

- Alarm States: OK, INSUFFICIENT_DATA, ALARM

Amazon CloudWatch Logs:→

- CloudWatch logs can collect log form:-
  - Elastic Beanstalk: collection of logs from appl^n.
  - 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 EvenBridge (Formerly CloudWatch Events)

- Schedule : Cron Jobs (scheduled scripts)
- Event Pattern : Event rules to react to a service doing something

ex:-

IAM Root User Sign in Event ⟶ SNS Topic with Email Notification

- 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", d distributed services "hard"

- No common view of your entire architecture

Soln :- 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 & applications performance recommendations.

- Provides two functionalities:-

① Codeguru reviewer: automated code reviews for static code analysis (development)

② CodeGuru Profiler: visibility/recommendations 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, scurity detection, input validation.

- Uses Machine learning & automated resoning.

- Hard-learned lessons across millions of code reviews on 10000s 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^n performance (e.g. reduce CPU utilization)
③ Decrease compute cost
④ Provides heap memory (identify which objects using up memory)
⑤ Anamoly detection.

- Supports appl^{n}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 - You 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 relevent & 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.

④ X-Ray :- trace (debug) requests made through you 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/infrastructur

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