Introduction

Every business, including this coffee shop, can use metrics to measure how well systems and processes are running. This idea of observing systems, collecting metrics, evaluating those metrics over time, and then using them to make decisions or take actions, is what we call monitoring.

It's important to set up monitoring in the cloud. With the elastic nature of AWS services that dynamically scale up and down, you'll want to keep a close pulse on your AWS resources to ensure that your systems are running as expected.

For example, if an EC2 instance is being over-utilized, you can trigger a scaling event that automatically would launch another EC2 instance. Or if an application starts sending error responses at an unusually high rate, you can alert an employee to go take a look at what's going on.

Amazon CloudWatch

**Amazon CloudWatch** is a web service that enables you to monitor and manage various metrics and configure alarm actions based on data from those metrics.

CloudWatch uses **metrics** to represent the data points for your resources. AWS services send metrics to CloudWatch. CloudWatch then uses these metrics to create graphs automatically that show how performance has changed over time.

CloudWatch alarms

With CloudWatch, you can create **alarms** that automatically perform actions if the value of your metric has gone above or below a predefined threshold.

For example, suppose that your company’s developers use Amazon EC2 instances for application development or testing purposes. If the developers occasionally forget to stop the instances, the instances will continue to run and incur charges.

In this scenario, you could create a CloudWatch alarm that **automatically stops an Amazon EC2 instance** when the CPU utilization percentage has remained below a certain threshold for a specified period. When configuring the alarm, you can specify to receive a notification whenever this alarm is triggered.

Even better, CloudWatch alarms are integrated with **SNS**.

CloudWatch dashboard

The CloudWatch **dashboard** feature enables you to access all the metrics for your resources from a single location. This enables you to collect metrics and logs from all your AWS resources applications, and services that run on AWS and on-premises servers, helping you break down silos so that you can easily gain system-wide visibility.

For example, you can use a CloudWatch dashboard to **monitor the CPU utilization of an Amazon EC2 instance**, the **total number of requests made to an Amazon S3 bucket**, and more. You can even customize separate dashboards for different business purposes, applications, or resources.

You can get visibility across your applications, infrastructure, and services, which means you gain insights across your distributed stack so you can correlate and visualize metrics and logs to quickly pinpoint and resolve issues. This in turn means you can reduce **mean time to resolution, or MTTR**, and improve **total cost of ownership, or TCO**

AWS CloudTrail

**AWS CloudTrail** is a comprehensive API auditing tool that records API calls for your account. The recorded information includes the identity of the API caller, the time of the API call, the source IP address of the API caller, and more. You can think of CloudTrail as a “trail” of breadcrumbs (or a **log of actions**) that someone has left behind thm.

Recall that you can use API calls to provision, manage, and configure your AWS resources. With CloudTrail, you can view a **complete history of user activity and API calls** for your applications and resources.

Events are typically updated in CloudTrail **within 15 minutes** after an API call. You can filter events by specifying the time and date that an API call occurred, the user who requested the action, the type of resource that was involved in the API call, and more.

**CloudTrail can save those logs indefinitely in secure S3 buckets**. In addition, with tamper-proof methods like Vault Lock, you then can show absolute provenance of all of these critical security audit logs.