AWS Cloud Services for Web Hosting

BACHELOR OF TECHNOLOGY

Information Tehnology

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Contents

Chapter 1

INTRODUCTION

1.1 Introduction to Cloud Computing

Cloud computing is the on-demand delivery of IT resources over the Internet with pay-as-you-go pricing. Instead of buying, owning, and maintaining physical data centers and servers, you can access technology services, such as computing power, storage, and databases, on an as-needed basis from a cloud provider like Amazon Web Services (AWS).

Types of cloud computing:

The three main types of cloud computing include Infrastructure as a Service, Platform as a Service, and Software as a Service. Each type of cloud computing provides different levels of control, flexibility, and management so that you can select the right set of services for your needs.

Infrastructure as a Service (IaaS): IaaS contains the basic building blocks for cloud IT. It typically provides access to networking features, computers (virtual or on dedicated hardware), and data storage space. IaaS gives you the highest level of flexibility and management control over your IT resources. It is most similar to the existing IT resources with which many IT departments and developers are familiar.

Platform as a Service (PaaS): PaaS removes the need for you to manage underlying infrastructure (usually hardware and operating systems), and allows you to focus on the

deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

Software as a Service (SaaS): SaaS provides you with a complete product that is run and managed by the service provider. In most cases, people referring to SaaS are referring to end-user applications (such as web-based email). With a SaaS offering, you don't have to think about how the service is maintained or how the underlying infrastructure is managed. You only need to think about how you will use that particular software.

1.2 Introduction to AWS Cloud

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

1.3 Why move to cloud hosting from traditional hosting?

Traditional Hosting:

Traditional hosting comes mainly in two forms, dedicated and shared. With dedicated hosting, a company pays for the complete resources of one or more servers from a service provider. The client has a set amount of dedicated bandwidth, CPU, RAM, and drive space, and the client has full control over the servers resources. With shared hosting, which is more common among small and medium sized businesses, the client pays for a set amount of space (storage) on a single server, and that server's resources are shared by a number of other websites. Traditional hosting, especially shared hosting, has its drawbacks though. Because the resources of a single server are shared among a number of different websites, spikes in traffic to those websites can mean decreased performance for your own.

Security breaches and other performance issues on other sites make take yours down as well.

Cloud Hosting:

Cloud hosting offers a level of scalability that traditional hosting can't. Cloud hosting companies provide virtual space on an on-demand, that is pay-as-you-go billing service. With cloud hosting, the load is balanced across a cluster of multiple servers. Because of this redundancy, cloud hosting is much more elastic and resilient. Problems with one website or application are unlikely to affect your bandwidth or performance.

1.4 Advantages of the Cloud

1. **Scalability:** Traditional web hosting services are unable to keep up with an increase in website traffic, and therefore, it is difficult to scale and adjust website performance. AWS, on the other hand, is highly scalable and can easily add bandwidth if an increase in website traffic is detected. Another added advantage is that in case of AWS, not only can you add bandwidth, but also reduce it depending upon the traffic. Just a few clicks away, AWS adjusts to the website traffic more efficiently as compared to traditional hosting services.

2. **Flexibility:** When it comes to configuring hosting services to meet your requirements, it is easier in case of AWS rather than traditional hosting. AWS offers high flexibility by allowing its users to select programming language, web application programs, and operating system. You can also customize the AWS set-up to choose the services and software you wish to use. Another added advantage of AWS is the flexibility to create new and improved solutions to hosting issues.

3. **Cost Effective:** Companies prefer to choose hosting services that help reduce overall costs, and therefore AWS is a highly popular choice nowadays as it offers a number of useful features at an affordable price. In case of AWS, you are responsible to pay for only the services you use and there is no upfront contract that ties you to the service. It is, therefore, a cost-effective method to implement effective and efficient hosting.

4. **Understandability:** When compared to traditional web hosting services, AWS

comes out as the clear winner in terms of user understandability. AWS makes sure that a user manages and maintains their website without any hassles. The AWS console is easy on the eye and well laid-out, also allowing application providers to securely host applications. If you're looking for an easy to understand hosting services, AWS is a great choice.

5. **Speed:** As traditional hosting services fall back on adjusting to website traffic as compared to AWS, it is evident that AWS will offer services that don't slow down the performance of your website. Nobody, in today's high-tech world, is patient enough to wait for a slow website. It is, therefore, advisable to choose AWS to optimize the performance of your website.

Chapter 2

Objective

The objective of our minor project **AWS Cloud Services for Web Hosting** is to :

- Web hosting using AWS cloud services
- Attain ease of scalability
- Attain economies of scale
- Attaining strong security for our website to safegaurd it from threats and security breaches
- Spreading awareness among related people about cloud, and how many companies is moving today cloud from their traditional method

Chapter 3

Feasibility

- Cloud services are feasible in the sense that in market specially AWS provides almost every type of cloud services like compute service, storage service, management service, security, networking and content delivery, AWS cost management services.
- AWS more economical than traditional data centers for applications with varying compute workloads. Amazon Elastic Compute Cloud (Amazon EC2) costs are billed on a monthly basis. Customers (individual one) retain full administrative access to their Amazon EC2 instances. Amazon EC2 instances can be launched on-demand when needed.
- In cloud computing the ability to support development and run workloads effectively, gain insight into their operations, and to continuously improve supporting processes and procedures to deliver business value.
- Using cloud computing platforms are more feasible as platforms like AWS Training and Certification launched a new course entitled AWS Cloud Technical Essentials. Available for free on Coursera and edX, this course uses video lectures and demonstrations to teach the technical fundamentals of AWS.

Chapter 4

Facilities and Services

AWS Services for Hosting Website

4.1 Amazon Elastic Compute Cloud

- Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the AWS Cloud. Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster.
- When you buy an on-premises server, you get CPU, memory, storage, and IOPS, all bundled together. With Amazon EC2, these are split apart so that you can scale them independently. If you need more CPU, less IOPS, or more storage, you can easily allocate them.
- For a relational database in an on-premises server, you assume full responsibility for the server, operating system, and software. For a database on an Amazon EC2 instance, AWS manages the layers below the operating system.

4.2 Cloud Security:

- Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that are built to meet the requirements of the most security-sensitive organizations.

- AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS compliance programs

- Apart from it AWS provides flexibility to add your security layer or you want to make your own security group for particular instance , including the sensitivity of your data, your organization's requirements

4.3 Storage:

Cloud storage is typically more reliable, scalable, and secure than traditional on-premises storage systems. Cloud storage is a critical component of cloud computing because it holds the information that applications use.

- AWS Elastic Block Store (EBS) is Amazon's block-level storage solution used with the EC2 cloud service to store persistent data. This means that the data is kept on the AWS EBS servers even when the EC2 instances are shut down.

- Amazon S3 is object storage built to store and retrieve any amount of data from anywhere. It's a simple storage service that offers industry leading durability, availability, performance, security, and virtually unlimited scalability at very low costs.

- Amazon Elastic File System (Amazon EFS) is a simple, serverless, set-and-forget, elastic file system. You pay only for the storage you use, for read and write access to data stored in Infrequent Access storage classes, and for any provisioned throughput.

- Amazon Glacier provides storage for data archiving and backup of cold data. Cold data refers to files that are infrequently accessed but are kept in case they are needed at a later date.

4.4 AWS Monitoring:

Organizations are increasingly moving their IT to the cloud and AWS remains the most sought after service with its diverse line of products offered in IaaS, PaaS, DaaS,etc. Ma-

jority of businesses work with an amalgam of various products offered by Amazon Cloud which generates a greater need for monitoring AWS with an AWS monitoring software to ensure security, high performance and proper resource allocation. Optimal AWS Cloud monitoring solutions should help track some of the important AWS Cloud performance metrics need constant monitoring like availability and CPU utilization.

Applications Manager's AWS performance monitoring software collects all the performance data in the form of logs, metrics, and events, and provides you with a unified view of AWS resources and applications and services that run on AWS. With the help of AWS monitoring tools, administrators will be able to perform easy Amazon web services monitoring for multiple AWS instances; track a wide variety of helpful AWS Cloud performance metrics, including CPU usage, latency, network traffic, storage space, memory and other custom performance counters for optimal application performance at any scale.

Applications Manager's AWS monitoring tool provides the means to identify the source of various performance bottlenecks with Root Cause Analysis. Detect and resolve the performance issues before it affects the end-users. Applications Manager's AWS monitor enables you to identify the erroneous zones and prevent bottlenecks by setting thresholds for various key performance metrics and get alerted when they are violated. Associate alerts with notification actions to get trigger SMS or Email notifications or configure automated actions wherever needed. Configure dynamic baselines identify gradual performance degradation and ensure your application always run at peak performance devoid of anomalies. With AWS Cloud Monitoring, identify resolve application problems before it impacts your end-users.

4.5 Database:

- **Amazon RDS:** AWS manages installing and patching the operating system, installing and patching the database software, automatic backups, and high availability. AWS also scales resources, manages power and servers, and performs mainte-

nance. Offloading these operations to the managed Amazon RDS service reduces your operational workload and the costs that are associated with your relational database.Amazon RDS currently supports six databases: MySQL, Amazon Aurora, Microsoft SQL Server, PostgreSQL, MariaDB, and Oracle.

- **DynamoDB:** is a fast and flexible NoSQL databaseservice for all applications that need consistent, single-digit-millisecond latency at any scale. Amazon manages all the underlying data infrastructure for this service and redundantly stores data across multiple facilities in a native US Region as part of the fault-tolerant architecture.DynamoDB works well for mobile, web, gaming, ad tech, and Internet of Things (IoT)applications.It's accessible via the console, the AWS CLI, and API calls.

4.6 EC scaling

Amazon EC2 Auto Scaling helps you ensure that you have the correct number of Amazon EC2 instances available to handle the load for your application. You create collections of EC2 instances, called Auto Scaling groups. You can specify the minimum number of instances in each Auto Scaling group, and Amazon EC2 Auto Scaling ensures that your group never goes below this size. You can specify the maximum number of instances in each Auto Scaling group, and Amazon EC2 Auto Scaling ensures that your group never goes above this size. If you specify the desired capacity, either when you create the group or at any time thereafter, Amazon EC2 Auto Scaling ensures that your group has this many instances. If you specify scaling policies, then Amazon EC2 Auto Scaling can launch or terminate instances as demand on your application increases or decreases.

For example, the following Auto Scaling group has a minimum size of one instance, a desired capacity of two instances, and a maximum size of four instances. The scaling policies that you define adjust the number of instances, within your minimum and maximum number of instances, based on the criteria that you specify.

4.7 AWS Budgets

You can use AWS Budgets to track and take action on your AWS cost and usage. You can use AWS Budgets to monitor your aggregate utilization and coverage metrics for your Reserved Instances (RIs) or Savings Plans.

- Setting a monthly cost budget with a fixed target amount to track all costs associated with your account. You can choose to be alerted for both actual (after accruing) and forecasted (before accruing) spends.
- Setting a monthly usage budget with a fixed usage amount and forecasted notifications to help ensure that you are staying within the service limits for a specific service. You can also be sure you are staying under a specific AWS Free Tier offering.
- Setting a daily utilization or coverage budget to track your RI or Savings Plans. You can choose to be notified through email and Amazon SNS topics when your utilization drops below 80 percent for a given day.

You can create the following types of budgets:

- Cost budgets – Plan how much you want to spend on a service.
- Usage budgets – Plan how much you want to use one or more services.

Chapter 5

Methodology

This chapter describes the methodology applied for this minor project which is web hosting using AWS Cloud Services. The basic services required to implement this project includes Amazon EC2, Cloud Security, Amazon Storage S3 and Database RDS, each of this services offered by Amazon is elaborated in detail in the chapter 'Facilities and Services'. Firstly, we would create an EC2 instance and select the prefered cloud security from the options available. Create a database instance and Amazon S3 bucket for storage of the data which is easily scalable. A website would be created which is configured such that database is Amazon database RDS, server is EC2, and storage is Amazon S3 which would be then hosted on the cloud.

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