Comparative Study of Amazon EC2 and IBM Cloud

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Abstract: Cloud Computing refers to the network used for distribution of computing power, storage and applications among computers with the assistance of net. Within the current era of technology each company needs to form progress i.e., mechanisation. For start-up firms it's not terribly economical to possess personal servers and workers for the upkeep of the servers. An improved choice for them is to use cloud computing as a result of its low-cost and reliable. Amazon EC2 and IBM cloud services are an example of such suppliers. It's terribly troublesome to settle on an improved supplier. During this paper, a comparison of Amazon EC2 and IBM cloud services is given, which can facilitate in selecting the cloud supplier.

Keywords: Cloud Computing, Amazon EC2, IBM cloud, Cloud Foundry.

I. INTRODUCTION

Cloud computing isn't any new concept within the market. Only a few years ago immense firms like Amazon, Microsoft, IBM and plenty of firms began investing in this field because it's an awfully florescence sector. Initially firms like Amazon and IBM started investing in infrastructure, and started renting their unused hardware, leading to cloud computing gaining attention among the computing business. As internet is currently among the foremost crucial part of everyone's life, every person wants to access application from all around the globe this make cloud computing best option for organizations as a result of its economical and secure.

"The term "cloud" is taken from telephony in telecommunication firms. These firms until 1990's offered point-to-point connection, then

started offering Virtual Private Network (VPN) at a very low value" [1].

Some main features of cloud computing are [2]:

- Resource Pooling
- On-Demand Self-service
- Straightforward maintenance
- Pay as you go
- Security
- Economical
- Availability
- Automatic System

"Cloud Computing provide different models like public, private, hybrid and community cloud" [3].

Various Cloud service models:

1. Infrastructure-as-a-Service (IAAS)
   Iaas gives virtual hardware to the user [4].

2. Platform-as-a-Service (PAAS)
   PAAS provides an adequate environment for an application to run it include databases, integration layers, runtime and a plenty of other features [3].

3. Software-as-a-Service (SAAS)
   It provides software so user don't have to install it manually on their end [4].

UNDERSTANDING AMAZON EC2

In 2006, Amazon began supplying IT infrastructure services to businesses within the variety of web services. Amazon Elastic Compute Cloud (Amazon EC2) provide the processing power which can be changed when we needed. Amazon EC2's user interface helps you to accumulate computing capacity very easily. Amazon EC2 provides you total control over the resources and provides an environment to run. Amazon EC2 additionally reduces the time taken to

boot a server. Amazon EC2 also allows you to pay as for the computing power which you are using.

Components of EC2 are:

1) Elastic compute Unit

Elastic Compute Unit (ECU) was introduced by Amazon EC2 and the definition notes "We use variety of benchmark and tests to maintain the consistency of the computing unit"[1].

2) Amazon EC2 Instance Type

6 different types of EC2 instance are standard, micro, high memory, high CPU, Cluster Compute, Cluster GPU [8]:

3) EC2 Storage Type

There are 2 types of storage in EC2:

- Elastic Block Storage (EBS)
- Instance Storage

4) Elastic IP Address

Elastic IP address is similar to static IP which we are familiar with but there is only one key difference. A user can modify the Elastic IP to any virtual machine without the help of a network admin. In this way the Elastic IP address is related to account and not with the virtual machine instance.

UNDERSTANDING IBM CLOUD

IBM started providing public cloud services in 2011. Your application can use IBM in many different ways like you can deploy your web application on IBM cloud. IBM cloud provide a variety of services like storage, computing power, environment and many more other services.

Components of IBM cloud are:

1) *Identity and Access Control*

Identity and access control (IAC) is a service which helps us to define and manage what a person can do on the network. Main goal of this is to give right access to the right person at the right time, so that no unauthorized person can access private data which can be very crucial for the company or application deployed.

IBM cloud have three roles [10]:

- Basic Role
- Predefined roles
- Custom roles

2) *Data Management*

Every application runs in one or more machine and every application is free to use its local storage as needed.

Different data management options provided by IBM cloud are Db2, Db2 hosted, Informix, Database by PostgreSQL and compose for MySQL (Beta) [11].

3) *Networking*

There are many data-centres of IBM in the world. We could use any data-centre when we set-up our application. We can connect to these datacentres using below services:

- Virtual Networking
- Network Gateway
- Traffic Management
- Load Balancer

4) *Auto Scaling*

IBM cloud also provide us with auto scaling which means the computing can be automatically increased or decreased as per the requirement of the application.

IBM cloud adjust the auto scaling by [12]:

- Dynamic Scaling: It is based on the performance of the application
- Static Scaling: It is based on date and time of the application.

5) *Message Queuing Service*

Many times, codes need to interact with each other so that they can provide the advantage which is required. Message Queuing Service (MQS) is the solution to this problem, here MQS provides applications and services to communicate within the cloud environment. IBM cloud provide Event Steams for these type of communications between the applications.

CLOUD FOUNDRY

Cloud Foundry is a platform which provides an open-source cloud application as a service. It allows us to easily deploy, operate and scale applications written in any programming language or framework.

It uses the GitHub system for version control of the source code, Buildpacks for providing an execution or runtime environment for an application, documentation and other services.

It is used for providing continuous delivery of application as it supports the entire development lifecycle of the application starting from the initial development phase to all the testing phase.

II. LITERATURE REVIEW

Abdullah Alqahtani et al. [5] projected a brief survey on the security issues looked by cloud framework. They have also talked about different security weaknesses that are going about as an obstruction to the utilization of Amazon Web Services (AWS).

Mr. Arabolu Chandra Sekhar *et al*. [6] explained regarding the Amazon Web Services (AWS) and briefly also examined regarding each service provided by AWS such as Amazon EC2, Amazon S3, etc.

Mr. Vaibhav A Gandhi et al. [1] proposed which cloud service is better AWS EC2 or Microsoft Azure and also explained each EC2 and Azure with advantages and drawback of both services.

Pranay Dutta et al. [7] gave the insight about the differences in cloud services provided by Amazon, Google and Microsoft. He clarified about different preferences and weaknesses of every cloud supplier.

III. DEPLOYMENT PROCEDURE

Amazon AWS EC2 -

Pre-requisite –

Eclipse IDE

Amazon EC2 account

Steps to deploy java web application using eclipse –

1. Click on "Launch Instance" Button in the EC2 Dashboard and choose the appropriate AMI.
2. Choose an Instance Type which can be any one among the free or paid versions available. Then click on review and launch
   Note: - t2.micro is provided for free demo purposes.
3. The next step involves configuring the instance which is priorly set to the standard version.
4. Then you can add more storage when required, or click on next.
5. The next step allows you to add tag which is a case-sensitive key-value pair.
6. Then edit security groups to allow 8080 ports for everyone in the Configure Security Group Section.
7. Then click on Launch after reviewing the instance configurations.
8. Upload the .pem file and click on Launch Instance.
9. Assign Elastic IP to that instance and then allocate a new address.
10. Then select the newly created address from the list and associate this address with the currently launched EC2 instance.
11. Then using SSH connect your Linux Instance.
12. Now deploy your project .war file and then link your backend code with API access.

IBM Cloud –

Pre-requisite –
IBM Cloud Account
IBM Cloud CLI (Command Line
        Interface)
Git
Maven

Steps to deploy java web application using eclipse-

1. Once you log into your IBM Cloud, click on create resource.
2. Then click on services section in the dashboard where you will get 6 options. Select Cloud Foundry and then proceed.
3. In the Cloud Foundry Services, click on public applications and select create.

4. In the Create Sample Cloud Foundry Sample App window you first need to select the location out of the available five options.
5. Then you need to select the pricing plan which can either be the lite free version which provides up to 256 MB of memory or the standard pricing plan for deploying applications having 256 MB+ of requirement which works on the pay as you go feature provided by IBM and cost $0.07 USD/GB-Hour.
6. Then you need to select the runtime – Liberty which is used for deploying java applications.
7. Then you need to provide a name for your app which will also be the host name and provide a tag for the application and then click on create.
8. The Liberty for Java tutorial page opens which provides the information on how to get started with liberty and enabling the code and then click on overview which provides the information regarding the status of the instance and enable continuous delivery.
9. In the continuous delivery toolchain page, you need to select the server if not already selected and then select Delivery pipeline section where you need to input the IBM Cloud API key by generating a new key and then select create.
10. The Toolchain gets created and now click on Eclipse Orion Web IDE which creates the workspace by creating a clone of your application.
11. Deploy the application using Delivery Pipeline.

IV. COMPARISON BETWEEN AMAZON EC2 AND IBM CLOUD

Memory is a very crucial and important part of any computer. Many big firms have large amount of data, so memory is essential. EC2 and IBM cloud computing provides you memory, so you don't have to install software in your local storage.

We will compare EC2 and IBM Cloud Computing with various parameters.

Features	Amazon EC2	IBM Cloud Computing
Relational Database Support	SQL MySQL Oracle	Db2 Db2 Hosted Informix Databases For PostgreSQL Compose for SQL(Beta)
Virtualization Technology	XEN virtualization Technology	Hyper V virtualization Technology
Base Price	$0.11/hr	$ 0.07/Gb-hr
Virtual CPU	1 VCPU	1 VCPU
Subscription Option	Hourly Monthly/Fixed Reserved Spot	Hourly Monthly
Administration and Compliance Details	Access Management Compliance Management Detailed Invoice	FFIEC FISC HIPAA HITRUST ITAR PCI ISO 27001 Certified
Support Service Available	Forum Online Resources	Phone Chat Tickets
Accessible Runtime	.NET Java PHP Python Ruby	.NET Java Python Ruby PHP Swift Node Go
Middleware	Tomcat	IBM middleware

Frameworks	Django Drupal	Drupal Symfony

V. CONCLUSION

Navigating the perfect Cloud computing provider for deploying our application on a virtual server can be very difficult at time. Generally, people have only heard about EC2 because of the features it provides. EC2 is less costly. EC2 is like having your own windows server without paying for the hardware IBM provides their own special set of services. We found that EC2 is preferred more among single user whereas IBM cloud is preferred more among the big enterprises. IBM cloud have integrations with open-source technologies like PostgreSQL, Docker and many more. Scalability is impeccable with IBM cloud. Although AWS EC2 leads here, but it'll be wrong to claim it provide the best solution. IBM Cloud have its own advantages. The concept is that there is no perfect cloud computing which is the best.

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