

An Approach to Live Application Server Migration in AWS Public Cloud

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Abstract— virtualization technology is at the heart of cloud computing technology. One particular physical host may contain more than one virtual machine. In cloud computing, Virtual machine may require to migrate on other physical host to perform maintenance of physical host, to run server consolidation process, load balancing and fault tolerance. Online migration can help the client to get uninterrupted service while offline migration increases the downtime. From all available cloud service provider in the market, in this paper Amazon has been chosen to implement the live VM migration. In this paper we described different procedure to perform live migration, an approach to implement live migration in AWS public cloud.

Keywords: Virtual Machine Migration, Data center, Cloud Computing, AWS (Amazon Web Service)

I. INTRODUCTION

Cloud computing is giving its services via internet on pay per use basis. Cloud computing has various service models like Infrastructure as a Service (IAAS) providing computing, storage and network services. Platform as a Service (PAAS) providing required development and runtime environment and Software as a Service (SAAS) providing readymade utility services to end users.

In IAAS model, cloud service provider launches more than one virtual machines in a single datacenter and running their application in virtual machine host. This offers infrastructure services like ready to use network, storage and computing facility resources. Service provider manages all the underlying complexity of installation and maintains hardware or software resources.

To perform scheduled maintenance activity on a host, to balance the load, to survive in faulty situation or to consolidate server, virtual machine running on that particular host needs to be migrated to another host. In live migration downtime must be smallest so that client getting service from Virtual host does not feel any interruption in their services.

Cloud infrastructure consists of varied, distributed and virtual resources.

In Cloud computing there are various deployment models – Private Cloud, Public Cloud, Community Cloud and Hybrid Cloud.

A. Public cloud [12]

These types of clouds are made accessible to the overall population by a service provider who is responsible for hosting the cloud. By and large, open cloud suppliers like Amazon AWS, Microsoft and Google own and manages the infrastructure offer access over the Internet. With this model, clients have zero ability to see or control over where their resources are located. It is essential to note that all clients on public cloud share the pooled resources.

B. Private cloud [12]

Private cloud will be cloud framework committed to a specific association. Private cloud permit organizations to host applications in the cloud, while tending to concerns with respect to information security and control, which is frequently lacking in a public cloud environment. It is not imparted to different associations, whether oversaw inside or by an outsider, and it can be facilitated inside or remotely.

C. Community cloud:[12]

A community cloud is a multi-tenant cloud service model that is shared among several organizations and that is governed, managed and secured commonly by all the participating organizations or a third party managed service provider. Clouds are a hybrid form of private clouds built and operated specifically for a targeted group. These communities have similar cloud requirements and their ultimate goal is to work together to achieve their business objectives. The goal of community clouds is to have participating organizations realize the benefits of a public cloud with the added level of privacy, security, and policy compliance usually associated with a private cloud. Community clouds can be either on-premise or off-premise.

D. Hybrid Cloud [12]

Hybrid Clouds are a structure of two or more clouds (private, group or open) that stay unique substances however are bound together offering the upsides of various arrangement models. In a hybrid cloud, you can influence outsider cloud suppliers in either a full or fractional way; expanding the adaptability of computing. Enlarging a customary private cloud with the assets of an public cloud can be utilized to deal with any surprising surges in workload.

From this all deployment model we have chosen public cloud model to implement the live migration facility because this deployment generally model covers more users.

In this paper, section II describes various techniques to perform live VM migration, section III describes introduction to Amazon Web Services and EC2 instance launch procedure and section IV describes implementation strategy to live VM migration. Section V describes conclusion and future work.

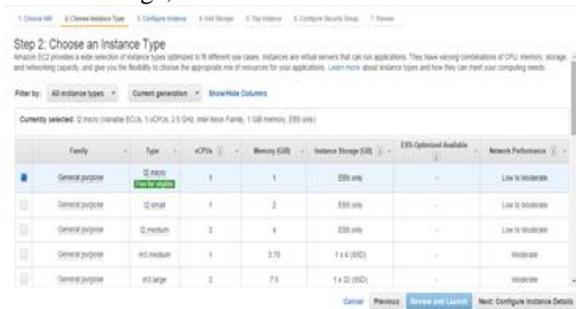
E. Live VM migration advantages: [8]

- 1) Reduce IT costs and improve flexibility with server consolidation.
- 2) Decrease downtime and improve reliability with business continuity and disaster recovery.
- 3) Increase energy efficiency by running fewer servers and dynamically powering down unused servers with our green IT solutions
- 4) Accessing more processing power (in the sense of load balancing).

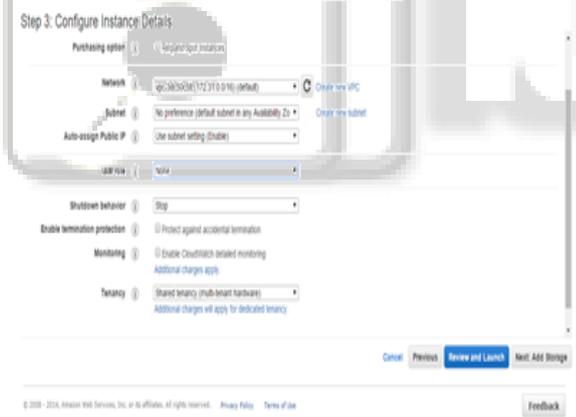
- Choose EC2 service from AWS list shown in figure 3.1
- Choose an appropriate Amazon machine image.



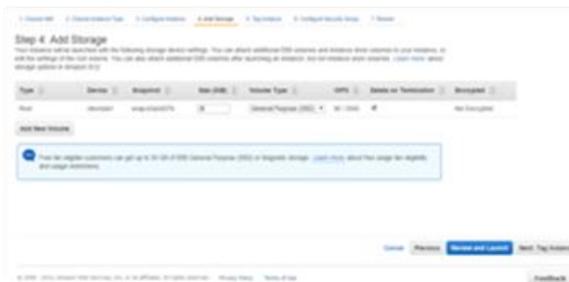
- Choose an instance type like micro, small, large, etc.



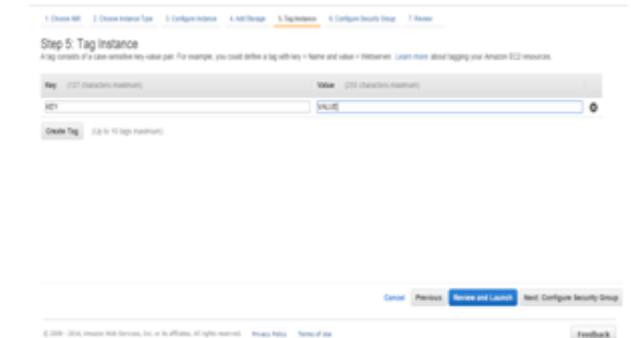
- Configure instance details like network, subnet, shutdown behavior, monitoring, tenancy etc.



- Add required storage and set storage configuration like size, type (SSD or magnetic storage), edit the settings of the root level



- Tag the instance with key-value pair.



- Configure a security group via a set of firewall rules which controls the traffic to the created instance. We can set protocol type, port range or source IP address.



After configuring all above mentioned details it will ask for review instance launch.



While clicking a launch button it asks for choosing the existing key pair or creating the new key pair. It is asymmetric way to securely connect to the instance. In which AWS stores the public key and a private key file stored by user. To log into the windows image private key pair file is required to obtain the password. For Linux Machine Image, private key file is used to securely SSH into the instance.



After successful completion of the above mentioned steps in our AWS account we can see the running

instance with its entire predefined configuration.

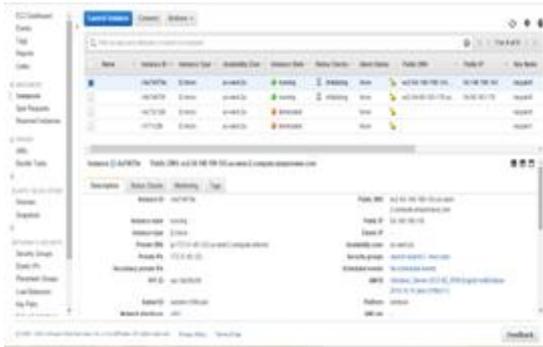


Fig. 3.2: Successful launch of an instance in AWS account

To launch an instance programmatically instead of graphically, then AWS provides toolkit containing API required developing the code to launch an instance. We have chosen java as a development language and Eclipse Luna as an IDE. Development machine should be configured with latest version of java SDK and Eclipse Luna. To get support of AWS java sdk toolkit, configure AWS toolkit with the Eclipse Luna. Following screen shows the coding screen with eclipse supporting AWS toolkit indicated by orange color logo in toolbar.



IV. APPROACH TO PERFORM LIVE APPLICATION SERVER MIGRATION IN AWS PUBLIC CLOUD

We have launched a VM with Ubuntu OS image in our account. VM instance has configured with apache web server and tomcat application server. To connect to the Ubuntu image instance from windows desktop putty is required. Putty ask for private key-pair file in .ppk format so puttygen is required to convert .perm file to .ppk file.

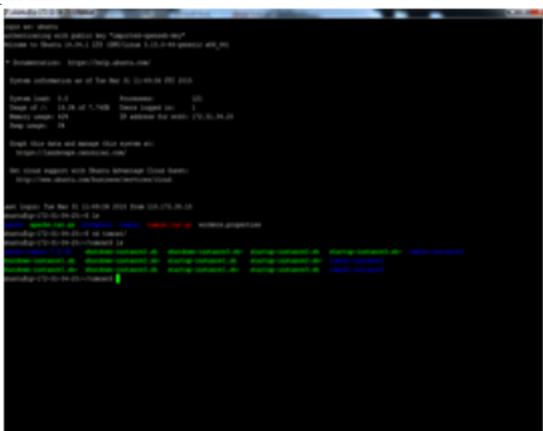
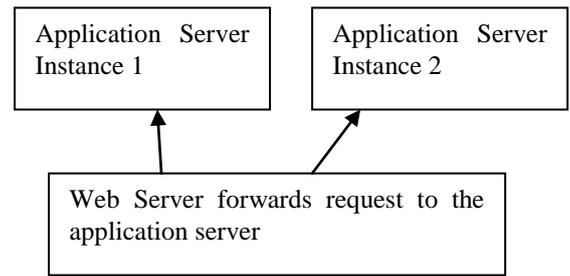


Fig. 3.3: Connected Ubuntu image

Fig 3.3 shows the connected Ubuntu machine image. Apache web server has been started. To perform live application server migration right now following scenario is implemented.



User gives request to the Web Server

Overhere it is assumed that both the application server instance has similar configuration .Both instance are deployed with two simple java server pages to check the responding instance.

Whenever user gives request to web Server, it will forward the request to the server instance 1 and it will respond. Following figure shows the user request and response generated by instance 1.



Fig. 3.4:response served by instance 1

As shown in fig 3.4 right now user request is served by the instance 1. It also maintains session detail containing session id and user name.

If Planned shut down for maintenance purpose or auto shutdown of instance 1 happens. Following figure shows the planned shutdown of instance 1.

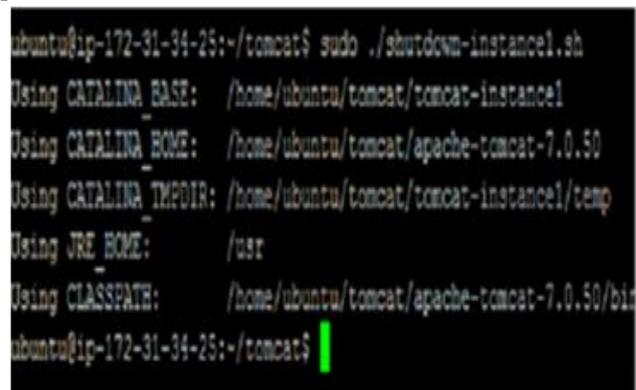


Fig. 3.5:Planned Shutdown of instance 1

As per live migration of application server user should started to get response from application server instance 2.

Negligible downtime may occur while migrating session data from instance 1 to instance 2.It is mentioned as negligible because the user does not feel any interruption while movement happens.

Following figure shows after shutting down instance 1 user started to get response from instance 2.

