SECURE INFRASTRUCTURE MIGRATION TO AWS

Malviya Meghna[1], Chavan Shruti[1], Shukla Akash[1], Prof. Pravin Patil[1]

[1]Department of Information Technology PadmabhushanVasantdada Patil Pratisthan's College of Engineering Mumbai, India

ABSTRACT

The term cloud services refer to wide range of services which are delivered on demand to companies and customers on the internet. These services are designed to provide easy and affordable access to application and resources, without the need for internal infrastructure or hardware. From checking email to collaborating on document we use cloud services through the workday weather we are aware or not.

Keywords: Cloud computing, cloud migration, legacy-to-cloud migration,6R's, AWS

1. INTRODUCTION

By using cloud services, organizations deploy their software systems over a pool of resources. These traditional applications are usually deployed on-premise. Cloud computing has been the focus of attention in computing and academic research and industrial initiatives. Many organizations still rely on legacy system and software which are developed over the lifetime of the organization some software application cannot utilize cloud-based environment while some cannot necessarily benefit from cloud environment while some are developed to operate in cloud. Our work is concerned with the migration of moving this legacy on-premise software to the targeted cloud environment.

Cloud migration is the process of moving digital assets like data, workloads, IT resources, or applications to cloud infrastructure. Cloud migration commonly refers to moving tools and data from old, legacy infrastructure or an on-premises data center to the cloud.

TYPES OF CLOUD

Public cloud: The cloud resource that are owned and operated by a third-party cloud service provider is called as public cloud. It provides users with resources like servers, software, storage on the internet.

Private cloud: The cloud resources that are exclusively use in a single organization is called as private cloud. In this private cloud can located in organization on-site data center or can be hosted with a third-party service provider.

Hybrid cloud: As it sounds hybrid cloud is a combination of both the private cloud as well as public cloud which is bounded with technology which allows the data application to be shared between them.

Characteristic	Public Cloud	Private Cloud	Hybrid Cloud
Scalability	Very high	Limited	Very high
Security	Good, but depends on the security measures of the service provider	Most secure, as all storage is on-premise	Very secure; integration options add an additional layer of security
Performance	Low to medium	Very good	Good, as active content is cached on-premise
Reliability	Medium; depends on internet connectivity & service provider availability	High, all equipment is on-premise	Medium to high, as cached content is kept on-premise, but also depends on connectivity & service provider availability
Cost	Very good; pay-as-you-go model & no need for on-premise storage infrastructure	Good, but requires on-premise resources, such as data center space, electricity & cooling	Improved, since it allows moving some storage resources to a pay-as-you-go model

2. METHODOLOGY

As one has been motivated with the benefit of cloud environment there has been significant research on clod enabled software and the migration of on-premise software to cloud. This approach focuses on method, technique, process and framework to form a decision of migration to the cloud. We tried to find answers to question like, what are the motivation behind the migration to cloud? What are the method and technique which enables migration to cloud from on-premise software? Why to choose AWS for startup and enterprise?

- **On-premise VS cloud: On**-premise software requires an enterprise to purchase a license or a copy of software to use it. While on cloud a company host everything in house.
  As the software is licensed the total instance of the software is within the organization's premise, while in cloud a third-party provider hosts all the things thus allowing in to pay as you go based on scaling of up or down depending on usage, user's requirement and growth of company.

Index	Key Features	On-Premises	Cloud-Based
1	Computing Environment	Require physical servers, network infrastructure, and storage.	Provided the physical and logical infrastructure to host services, virtual servers, intelligent applications, and containers for their subscribers.
2	Licensing	OS and software licenses are typically sold per server or per CAL (Client Access License).	Pay per use; Subscription model.
3	Maintenance	Require continuous maintanance for the hardware, firmware, driven, BIOS, operating system, software, and anti-virus software.	Holistic management/view of key infrastructure services such as physical hardware, computer networking, firewalls and network security, datacenter fault tolerance, compliance, and physical security of the buildings.
4	Scalability	Scale horizontally. Server administrators add another server node to a cluster.	Scale vertically. Server administrators add more power (CPU, RAM) to an existing machine. (fully available in Azure)
5	Availability	Must be available most of the time according to Service-level agreements (SLAs).	Many services and platforms use SLAs to ensure that customers know the capabilities of the platform they're using.
6	Support	Server administrators need diverse set of skills to know how to use many different platforms.	Cloud systems are easy to support because the environments are standardized. When Microsoft updates a product, the update applies to all consumers of the product.
7	Multilingual Support	Complex and expensive.	Easy to convert the data into an expected language, particularly with JSON format commonly used in the cloud systems.
8	Total Cost of Ownership (TCO)	Somewhat high in terms of hardware, software licensing, labor (installation x upgrades x maintenance), and datacenter overhead. Difficult to align on-premises expenses with actual	Track the actual Azure consumption costs by subscriptions. In cloud systems, the cost usually aligns more closely with the actual usage.

A cloud migration is when a company moves some or all of its data center capabilities into the cloud these usually runs on cloud-based infrastructure provided by a cloud service provider such as AWS, Google Cloud, Or Azure. As more and more companies have transitioned to the cloud, cloud migration is increasingly taking place in the cloud. Here are some benefits of cloud which migrate their resource to public cloud

- **Scalability** –The architecture is made scalable through the process of virtualization unlike the physical machines in which the performance and resources are set, virtual machines are used. These VMs are easy to scale and can be move to different servers or can be host on different server at once. Third party cloud providers also have vast amount of hardware and software in place for rapid scaling.
- **Cost**- Traditional companies must spend on capital cost (servers, software, licensing hardware etc.) Operational cost (servers, network infrastructure storage datacenter etc.) indirect business cost (unplanned and planned downtime). While cloud have only direct cost (hardware, software) and indirect costs such as loss of productivity etc. The company in cloud can devote themselves into innovating and developing new product or improving the existing product.
- **Performance**-Cloud has faster product development and deployment also it has automatic scaling and load balancing it's also encourages standardization which increases the performance of the application or website.
- **Digital experience**-The cloud provides a omni channel for customer experience, its reduces the waiting time and it can react with the customer 24-7.

3. MODELLING & ANALYSIS

Brief about AWS: AWS is cloud computing platform known as Amazon Web service. It provides storages, servers, security, networking etc to user. It has many products but the three main products of AWS are EC2, low-cost cloud storage, and Amazon virtual machine service and S3.Amazon had recorded a sale of $14.8 billion in second quarter of 2021. It has 81 availability zone in which their servers are located. And it has reached around 245 countries. AWS has market share of around 32% after which comes Azure which is around 20% and lastly google cloud around 9%.

Formulating a migration strategy is an in-depth process, but the planning stage often identifies what is in the potential migration environment, what interdependencies are involved with migrating elements, what will migrate, and what will stay. Collectively known as the "6Rs of migration,"

- **Retire:** The importance of this stage is to look at all of application workload and to determine which are ready to be migrated to the cloud and which are not. It also helps in determining which elements should get retire from the user perspective which also results in saving some money.

- **Retain:** Some applications are not designed for the cloud it may be difficult to migrate, thus while mapping your cloud migration process one should find system which should be kept on premise to retain the system. This may depend on factors such as application works fine as it stands and doesn't add benefit while migrating to cloud, it has strict compliance regulation which require the data to be kept on premise the Operating System on the application is not supported in the targeted cloud environment.

- **Rehost:** Rehosting is a method in which you move your organization application to the clod platform as it is. Therefore, it is also called as "lift and shift method". It means the core infrastructure is same, but we also get the benefit of the cloud and consumption rate based on cloud. It takes infrastructure as network, computer storage from on premise to cloud service provider, as its doesn't utilize the benefit of cloud the organization can see a reduction of nearly 20% on their expenses.

- **Replatform:** Replatforming is the middle ground of the tow strategies we covered above. It is like rehosting, but it involves modification to the application to take advantage of the cloud infrastructure, it enables better scaling and leverages reserved resources in the cloud environment with minimal changes in the code.
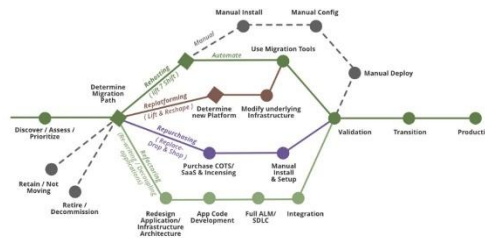

- **Repurchase:** As the application is not the gold standard of the technology. We can repurchase the application framework with AWS marketplace. Repurchasing can help let go of past and help us to get antiquated to modern appliance and SaaS, AWS marketplace includes SaaS product like VM template, virtual appliances, machine learning model etc. Repurchasing can reduce the effort and can increase the speed of the migration process.

.

- **Refractor & Re-Architect:** Refactoring means to rewrite one or more component of the application to take the advantage of the cloud services it also involves new language and tools to utilize the API to communicate between services and to add support through the platform this makes the code easier to read, update and maintain in longer run.
  The goal of the re architect is to take the advantages of the cloud native capabilities. It breaks the application and rebuilt in a service oriented, scalable design. Re architect requires to have a good understanding of the cloud platform and the application including its functionality, data performance, requirement etc. It takes longer time than re hosting approach.

4. RESULT

Enterprise needs to research, test and decide which Cloud services to pick, customize, and implement to make most of the available Cloud opportunities. They will need to analyze the impact of moving to Cloud on business processes, come up with decision on what should be moved and when and what should not be moved to Cloud.Cloud migration strategies should be looked with the lens of companies' current state in terms of culture, politics, sponsorship and future IT goals Looking at current trends, future seems to be on the side of broader Cloud computing adoption

Amazon S3 (Simple storage service) is web-based service to provide online backup for data and application. In S3 each object is stored as file with its metadata in included the object gives an id number, then these application uses the ID number to access objects. It allows user to upload, store, and download any type of file up to 5TBin size.
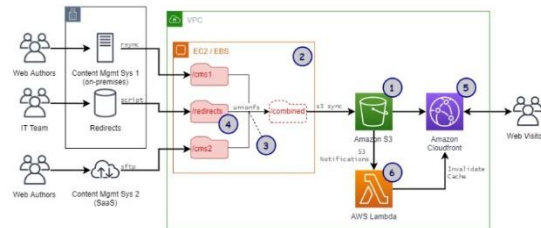
S3 is also integrated with different services like cloud font, Amazon RDS, Amazon VPC, AWS Lambada, Amazon EBS, Amazon Dynamo DB etc. S3 is scalable, secure, has low cost and easy to use, and has high performance. Its also has different storage classes

1. S3 standard the data which is need to be access frequently which are needed to be delivered with less latency and high throughput. It targets application like dynamic website, application, big data workload.
2. S3 intelligent-tiering which is suitable for data which needs access for changing data etc.
3. S3 standard-IA provides less storage price for data which is needed less often but require quick access. It is used for backup and long-term data storage.
4. S3 One Zone -IA for data which is used infrequently but needs rapid access when needed.
5. S3 Glacier this is the least expensive storage option. It is designed for archival of storage as it takes time to access the data. It provides rates that ranges from minutes to hours.
6. S3 Glacier deep archive is the lowest price option for storage. As archived data is made to retain data which is needed to be accessed once or twice in year.
7. S3 outpost has storage features like APIs to an on-premise AWS Outpost environment. The use case is when a data stored near on-premise application to satisfy some data residency requirement

	S3 Standard	S3 Intelligent-Tiering*	S3 Standard-IA	S3 One Zone-IA†	S3 Glacier	S3 Glacier Deep Archive
Designed for durability	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)	99.999999999% (11 9's)
Designed for availability	99.99%	99.9%	99.9%	99.5%	99.99%	99.99%
Availability SLA	99.9%	99%	99%	99%	99.9%	99.9%
Availability Zones	≥3	≥3	≥3	1	≥3	≥3
Minimum capacity charge per object	N/A	N/A	128KB	128KB	40KB	40KB
Minimum storage duration charge	N/A	30 days	30 days	30 days	90 days	180 days
Retrieval fee	N/A	N/A	per GB retrieved	per GB retrieved	per GB retrieved	per GB retrieved
First byte latency	milliseconds	milliseconds	milliseconds	milliseconds	select minutes or hours	select hours
Storage type	Object	Object	Object	Object	Object	Object
Lifecycle transitions	Yes	Yes	Yes	Yes	Yes	Yes

5. CONCLUSION

Cloud has become the new normal as companies of every size have realized the benefits of the cloud.

We studied about the 6R's in cloud retire, retain, rehost, replatform, repurchase, and refactor & rearchitect. Along with Amazon S3 and its storage classes. These cloud application helps in migration of on-premise application to cloud for better experience and understanding of your application along with better scalability and cost-efficient methods and helps adapt new approach for business and upgrade the application according new golden standard.

As the availability of cloud services continues to expand the application will also increase in our day-to-day life. Whether a company decides to extend existing on-premises software deployments or move to the cloud, these services will continue to simplify how organizations deliver mission-critical apps and data to the users. We also have observed there has a lot of tools available for migration of on-premise to cloud compare to previous years.

REFERENCE

[1]   N. Ahmad, Q. N. Naveed and N. Hoda, "Strategy and procedures for Migration to the Cloud Computing," 2018 IEEE 5th International Conference on Engineering Technologies and Applied Sciences (ICETAS), 2018,

[2]   A. Khajeh-Hosseini, D. Greenwood and I. Sommerville, "Cloud Migration: A Case Study of Migrating an Enterprise IT System to IaaS," 2010 IEEE 3rd International Conference on Cloud Computing, 2010,

[3]   P. Jamshidi, A. Ahmad and C. Pahl, "Cloud Migration Research: A Systematic Review," in IEEE Transactions on Cloud Computing, vol. 1, no. 2, pp. 142-157, July-December 2013,

[4]   S. Kolb, J. Lenhard and G. Wirtz, "Application Migration Effort in the Cloud - The Case of Cloud Platforms," 2015 IEEE 8th International Conference on Cloud Computing, 2015.

[5]   A. Kandil and H. El-Deeb, "Exploration of application migration to cloud environment," 2016 6th International Conference - Cloud System and Big Data Engineering (Confluence), 2016,

[6]   A. Gupta, A. Mehta, L. Daver and P. Banga, "Implementation of Storage in Virtual Private Cloud using Simple Storage Service on AWS," 2020 2nd International Conference on Innovative Mechanisms for Industry Applications (ICIMIA), 2020,