LECTURE 2

INTRODUCTION TO CLOUD COMPUTING

Lecturer: Mr. Victor Mony

Virtualization

- Virtualization is an enabling technology for the different cloud computing services. In recent years, computing has become more complex and requires large infrastructure.
- As as a result, organizations are investing huge amount on buying additional physical infrastructure as and when there is a need for more computing resources.
- The capital expenditure (CapEx) and operational expenditure (OpEx) of buying and maintaining large infrastructure, is really high while at the same time, resource utilization and return on investment (ROI) on buying additional infrastructure are very low.
- To increase resource utilization and ROI, companies have started using a technology called *virtualization* where a single physical infrastructure is used to run multiple operating systems (OSs) and applications.

Virtualization: Scenario

- Before virtualization, a single physical infrastructure was used to run a single OS and its applications (eg. Your laptop), which results in underutilization of resources.
- The non-shared nature of the hardware forces the organizations to buy a new hardware to meet their additional computing needs.
- For example, if any organization wants to experiment or simulate their new idea, they have to use separate dedicated systems for different experiments. So to complete their research work successfully, they tend to buy a new hardware that will increase the Capital Expenditure and Operational Expenditure.
- Sometimes, if the organization does not have money to invest more on the additional resources, they may not be able to carry out some valuable experiments because of lack of resources. **So, people started thinking about sharing a single infrastructure for multiple purposes in the form of virtualization.**

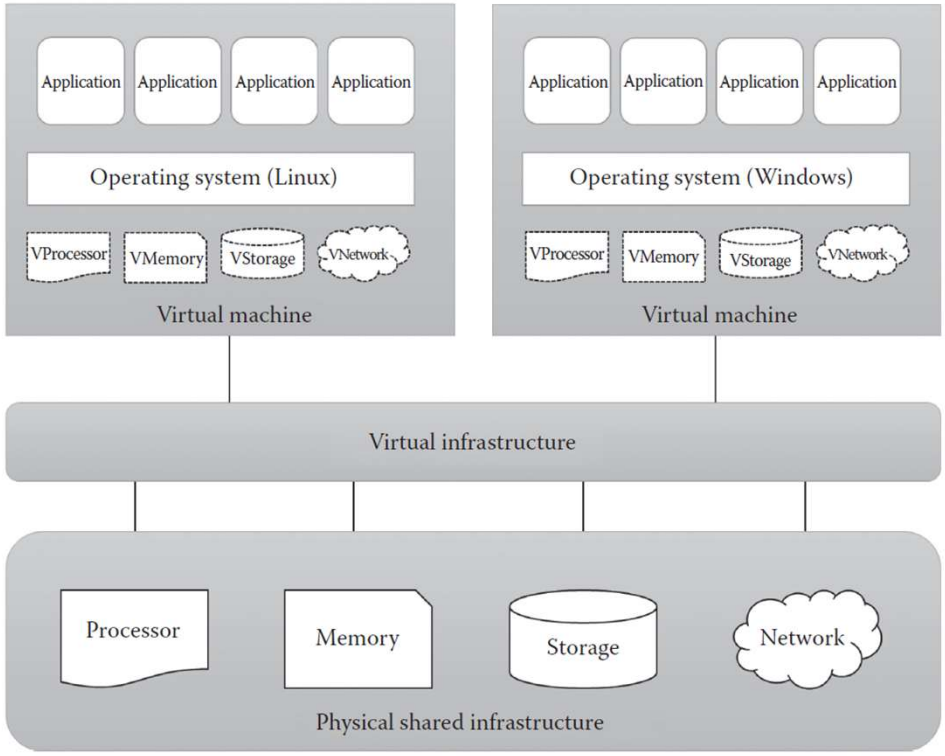
Virtualization: Scenario

- Thus Virtualization is a technology which enables a single physical infrastructure to function as multiple logical units or resources.
- Virtualization is not only limited to hardware, but can take many forms such as memory, processor, I/O devices, network, OS, data, and many other applications.
- After the introduction of virtualization, different OSs and applications were able to share a single physical infrastructure.
- Thus, virtualization reduces huge amounts invested in buying additional resources and becomes a key driver in the IT industry, especially in cloud computing. **Generally, the terms *cloud computing* and *virtualization* are not same.**

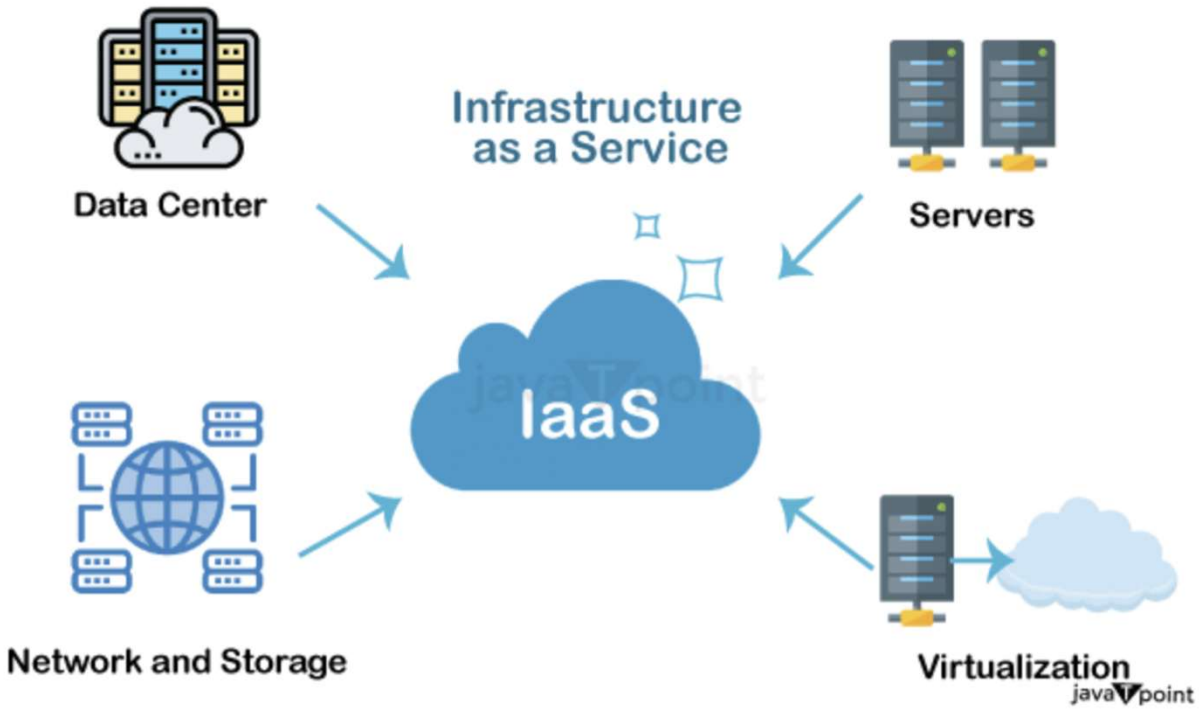
Virtualization Scenario: Differences with CC

Virtualization	Cloud Computing
makes various simulated environments through a single physical hardware system	provide pools and automated resources that can be accessed on-demand.
virtualization setup is simple and straightforward	Cloud computing setup is tedious, complicated.
virtualization is has low scalability	Cloud computing is highly scalable.
Virtualization is not as flexible	Cloud computing is Very flexible.
Virtualization relies on a single machine	cloud computing relies on multiple machines in the condition of disaster recovery
Virtual workload can be stated	cloud computing, the workload is stateless.
Total Cost is low	The total cost of cloud computing is high
Dependent on a single dedicated hardware	Dependent on multiple hardware
Storage space depends on server capacity	Unlimited storage space
Payment dependent on infrastructure costs	Payment dependent on consumption

Virtualization: Scenario



Virtualization: Scenario



CC Services: Case IaaS

Infrastructure as a Services

- In traditional hosting services, IT infrastructure was rented out for a specific period of time, with pre-determined hardware configuration.
- The client paid for the configuration and time, regardless of the actual use.
- With the help of the IaaS cloud computing platform layer, clients can dynamically scale the configuration to meet changing requirements and are billed only for the services actually used.

CC Services: Case IaaS

Infrastructure as a Services

- One of the primary reasons businesses choose IaaS is to reduce their capital expenditures and transform them into operational expenses. IaaS provides storage, compute, and networking options that don't require them to purchase and maintain vast private server rooms that take up a lot of energy and space.
- Iaas provides users high-level APIs to control details of underlying network infrastructure such as backup, data partitioning, scaling, security and physical computing resources. Services can be scaled on-demand by the user. According to the Internet Engineering Task Force (IETF), such infrastructure is the most basic cloud-service model. IaaS can be hosted in a public cloud (where users share hardware, storage, and network devices), a private cloud (users do not share resources), or a hybrid cloud (combination of both).

CC Services: Case IaaS

- **Why Use IaaS?**

Run testing and development

The computing and networking power of IaaS makes it a perfect environment to run and manage testing and development cycles.

Improve disaster recovery preparation

Because IaaS is scalable and reliable, businesses can consolidate disparate disaster recovery systems into one virtualized environment.

Perform big data analysis

Storing and analyzing big data requires a lot of processing power. IaaS is an appropriate environment for big data because it can handle large workloads.

Handle spikes in traffic

IaaS can handle unexpected traffic spikes by scaling as necessary.

Provision resources quickly

IaaS makes it possible to get new projects up and running quickly when urgent business priorities arise.

CC Services: Case Studies

Infrastructure as a Services, Platform as a Service, Software as a Service

- Best Android Emulators (e.g Bluestacks):

https://www.androidauthority.com/best-android-emulators-for-pc-655308/

- Best Virtual machine (Microsoft Azure): https://azure.microsoft.com/en-us/products
- Best Virtuual machines (oracle virtual box): https://www.virtualbox.org/
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CC Services: Discussion on Ethical Considerations

Ethical Considerations Discussion

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