

Case study on virtualization and cloud workloads



Unit objectives

- After completing this unit, you should be able to:
- Identify the practical considerations for virtualization
- Understand the need to prepare for virtualization
- Describe the various steps in preparation
- Explain the different transition tools for virtualization
- Define cloud workloads

What this unit is about

- This unit provides the overview of identify the practical considerations for virtualization and understand need to prepare for virtualization. Gain knowledge on various steps in preparation, understand different transition tools for virtualization and explains cloud workloads.

Case study overview



Figure: Case study overview

Customer IT landscape



IBM ICE (Innovation Centre for Education)

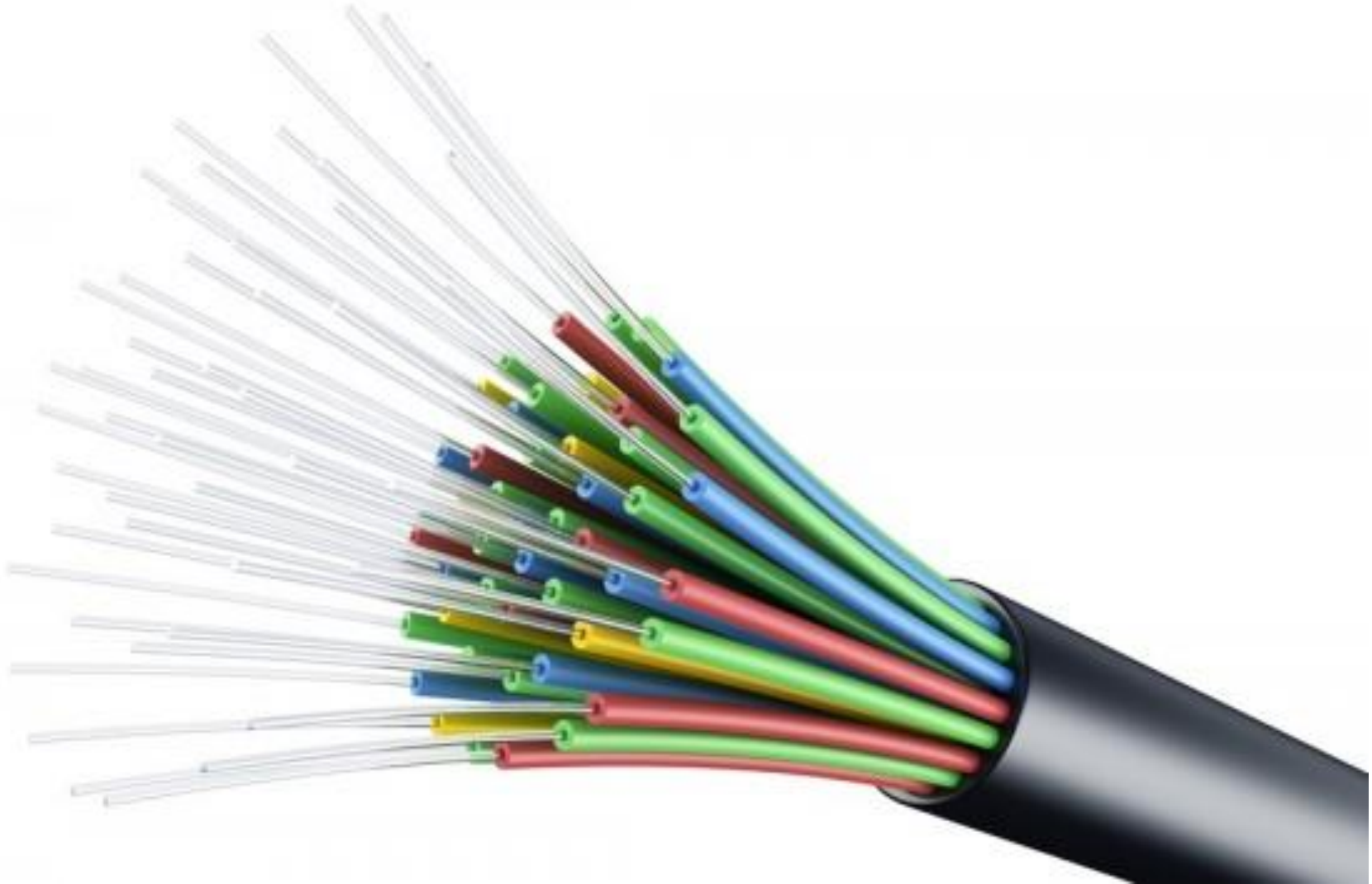


Figure: Customer IT landscape

Functions of the data center

- **Mail Servers:** Provides email to all staff, suppliers, dealers and logistics personnel.
- **Web Servers:** They maintain information on products and services of the company and provide front-end for data-entry.
- **Database Servers:** They maintain the company's database. Each division has its own set of **database servers** to store data.
- **ERP:** They provide functions for supply chain management, business intelligence, asset management, finance, HR, sales etc.
- **Firewalls and Security Systems:** They provide end-to-end IT security to the data center and maintain compliance.
- **Factory Systems:** They control critical systems used in manufacturing processes.
- **Test and Development Environment:** They serve as the test-bed for software upgrades, patches and staging of new software to production systems.
- **Remote Desktops and Servers:** Used by offices that are located at remote places to upload data to the main data center regularly.
- **Disaster Recovery Site:** This data center is an exact replica of the critical systems running at the primary site.

Triggers for virtualization (1 of 2)

- The customer is planning to optimize the current infrastructure and improve overall manageability while reducing costs.
- In addition to this overarching goal of optimization, the customer had additional triggers to begin looking at the latest trends in IT, which includes virtualization.
- A large set of servers in the customer's **datacenter** are approaching the end of their maintenance lifecycle.
- The growth of the customer IT **datacenter** has largely been ad-hoc, primarily driven by immediate need and requirements of individual departments in the organization. This has created several silos within the IT infrastructure.
- There are no specific standards followed for managing the servers. A large part of the administration is still manual requiring several system administrators to manage the growing data-center.

Server selection

- The first step in moving to virtualization is to shortlist the servers that are the best candidate for virtualization.
- As a pre-requisite, the customer must have a detailed inventory list of all the servers in the data centre.
- Each server will be marked with its individual capacity, architecture type, OS version and application version and monitoring tools.
- The worksheet must also provide a detailed view of the network and storage (external and internal) designated for application usage.

Server sizing

- All qualified servers for virtualization will be classified into two major categories – hypervisors and VMs. A section of physical servers will be configured as hypervisors. The sizing for the hypervisors would be based on the following points
- Add up the resource requirements for all the qualifying physical servers.
- Add 35% headroom to the calculated total capacity to handle peak loads
- Add 10% extra capacity to the calculated total capacity to account for hypervisor and management overhead

Provisioning

- A central idea behind virtualization is to bring down the average provisioning time of servers.
- Fiber Coils has seen a rapid growth in demand and reliance on IT in the last few years. This demand will continue to grow in the future with the growth of the organization.
- New demand will require new servers. The current provisioning time for a physical server in Fiber Coils is about 6-8 weeks.
- Virtualization can bring down the provisioning times to about 1 day. The following areas would see a drastic improvement in turnaround time once virtualization is deployed.

Proximity and locality

- Virtualization enables dependent servers to be placed together on the same physical server and colocated locally to enable better communication and reduction in communication and IO latency. Fiber Coils could make use of locality in the following ways:
- The application servers and the database server VM can be colocated together. The server VM will have a VLAN between them on the same hypervisor.
- Hence, the traffic between these servers will pass through the VLAN without being routed on the physical network interface.
- This way the network latency can be reduced. The firewall, proxy and the VPN servers can be co-located on the same hypervisor, thus allowing for reduced network latency between these servers. This is implemented through VLAN.

Transition tools for virtualization

- A virtualization vendor provides its own custom tools for consolidating a physical infrastructure.
- However, these tools can be broadly classified under the following major categories.
Virtualization assessment and planning toolkits:
 - These toolkits in-effect take the current IT landscape as the input and current constraints and provide a plan for virtualization and consolidation
- TCO calculator: These worksheets provide mechanisms for calculating the total saving and the cost of ownership after moving to virtualization
- P2V: [Physical-to-Virtual tools](#) are used to move from a physical state to a virtual state. These tools enable an administrator to create a virtual copy of the physical server for deployment.
- Manageability Tools: These tools provide mechanisms for creating, managing, storing and deleting virtual machines in the data center. In addition to the basic functionality, the tools provide mechanisms for monitoring and ongoing optimization of the current IT infrastructure.

Cost Savings



IBM ICE (Innovation Centre for Education)



Figure: Cost Savings

Cloud workloads overview

- We are going to discuss in detail the workloads that are most suitable for cloud environments.
- Here we will be understanding workloads that are not appropriate for the cloud.

What is workload?



Figure: What is workload?

Factors that influence cloud workload

- The decision to fit a particular workload on the cloud must take two factors into consideration.
- The environment to which the workload belongs to a Delivery model that is most suitable for the workload.
- The environment for workload determines the deployment model of the target cloud
 - Public
 - Private or
 - Hybrid.
- The Delivery model for workload determines the cloud service model viz. IaaS, PaaS and SaaS.

Types of workload

Types of workload are:

- Temporary workloads.
- Mission-critical production workloads.
- Mixed workloads.
- Industry-specific cloud workloads.

Production only workload most suitable for a hybrid cloud



IBM ICE (Innovation Centre for Education)

- A hybrid cloud uses an external service provider for the public portion of the cloud. Before an organization sets up a hybrid cloud, the SLAs for availability must be discussed with the public cloud service cloud vendor to ensure a good integration and higher availability of services hosted on the hybrid cloud.
- **Industry-specific cloud workloads**
 - Examples:
 - E-commerce
 - Healthcare
 - Education Sector
- **Workloads not suitable for public cloud**
- **Workloads not suitable for private cloud**

Workloads made possible by cloud

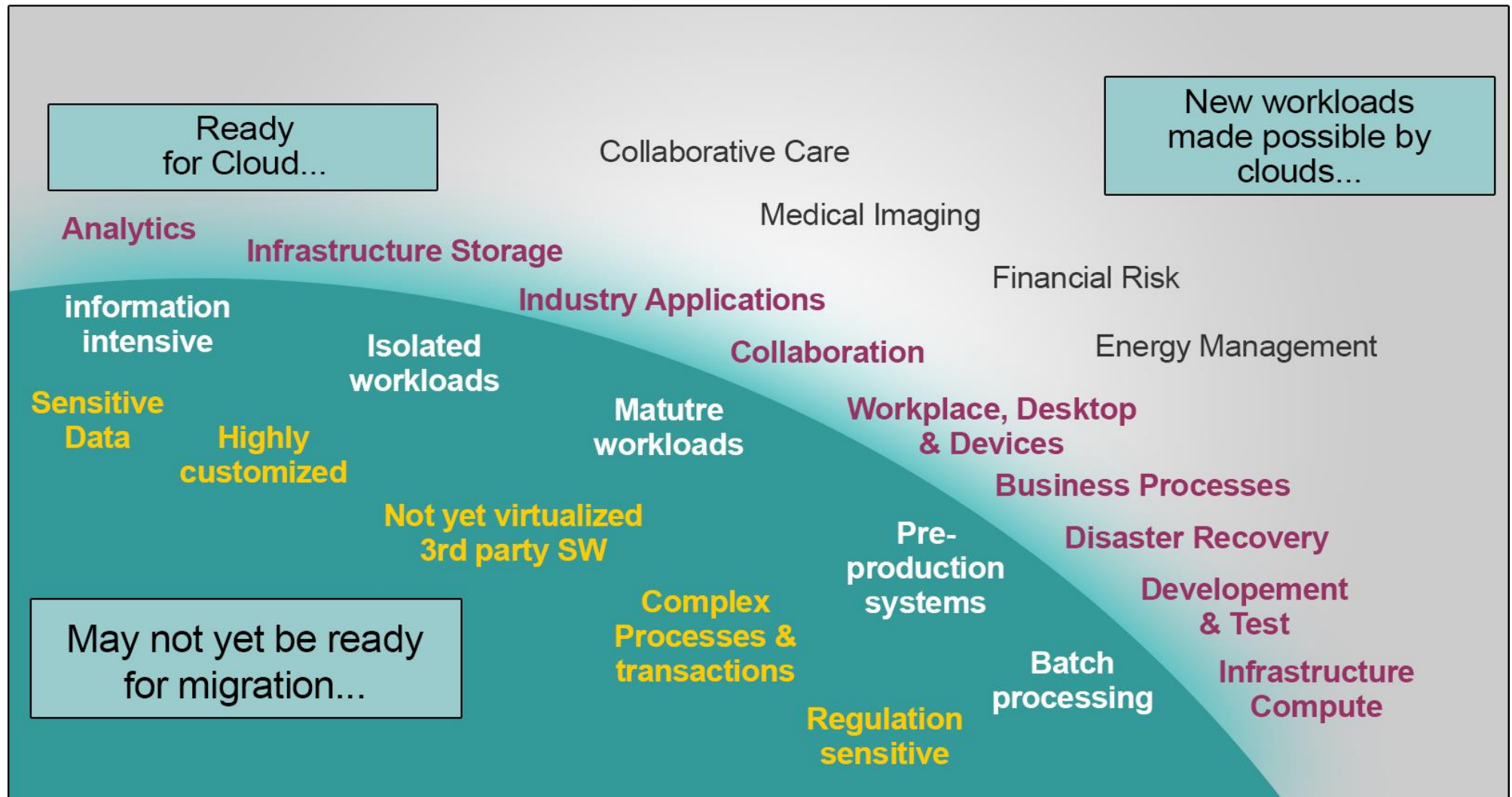


Figure: Workloads made possible by cloud

Checkpoint (1 of 2)

Fill in the blanks:

1. The customer must run _____ tools to determine the effective utilization of each server.
2. All qualified servers for virtualization will be classified under two major categories are _____.
3. _____ enables dependent servers to be placed together on the same physical server and collected locally to enable better communication and reduction in communication and IO latency.
4. A virtualization vendor provides its own custom tools for consolidating a physical infrastructure. Among many tools one major category of tools is _____.

True/False:

1. Set of servers that serve critical functions in the organization and Servers that constantly run at a higher utilization about 95% of the time can be retained as physical servers. True/False.
2. The workload consists of some amount of application program running in the computer and number of users connected to it and interacting with the computer's applications. True/False
3. Temporary non-production workloads are preferably placed on a public cloud. True/False

Checkpoint Solution (1 of 2)

Fill in the blanks:

1. The customer must run performance tools to determine the effective utilization of each server.
2. All qualified servers for virtualization will be classified under two major categories are VMs and Hypervisors.
3. Virtualization enables dependent servers to be placed together on the same physical server and collected locally to enable better communication and reduction in communication and IO latency.
4. A virtualization vendor provides its own custom tools for consolidating a physical infrastructure. Among many tools one major category of tools is Manageability Tools.

True/False:

1. Set of servers that serve critical functions in the organization and Servers that constantly run at a higher utilization about 95% of the time can be retained as physical servers. **True.**
2. The workload consists of some amount of application program running in the computer and number of users connected to it and interacting with the computer's applications. True.
3. Temporary non-production workloads are preferably placed on a public cloud. True

Checkpoint (2 of 2)

Multiple choice questions:

1. Which is the best way to profile a workload in a cloud types to classify the application?
 - a) Tier-1 to Tier-4
 - b) Tier-2 to Tier-4
 - c) Tier-4 to Tier-2
 - d) Tier-1 to Tier-3

2. Regulated Industry workloads adhering to PCI, HIPPA compliance regulations are not suitable for which clouds.
 - a) Private
 - b) Hybrid
 - c) Public
 - d) None

3. Industry-specific cloud workloads
 - a) Examples:
 - b) E-commerce
 - c) Healthcare, Education Sector
 - d) All the above

Checkpoint Solution (2 of 2)

Multiple choice questions:

1. Which is the best way to profile a workload in a cloud types to classify the application?
 - a) **Tier-1 to Tier-4**
 - b) Tier-2 to Tier-4
 - c) Tier-4 to Tier-2
 - d) Tier-1 to Tier-3

2. Regulated Industry workloads adhering to PCI, HIPPA compliance regulations are not suitable for which clouds.
 - a) Private
 - b) Hybrid
 - c) **Public**
 - d) None

3. Industry-specific cloud workloads
 - a) Examples:
 - b) E-commerce
 - c) Healthcare, Education Sector
 - d) **All the above**

Question bank

Two-mark questions:

1. Mention preparation for virtualization.
2. Define cost savings.
3. Mention types of workload.
4. Explain in brief proximity and locality.

Four-mark questions:

1. Explain in brief functions of the data center.
2. Explain in brief factors that influence cloud workload.
3. Explain in brief provisioning.
4. Explain in brief server sizing.

Eight-mark questions:

1. Explain in detail production only workload most suitable for a hybrid cloud.
2. Explain in detail the types of cloud.

Unit summary

Having completed this unit, you should be able to:

- Identify the practical considerations for virtualization
 - Understand the need to prepare for virtualization
 - Describe the various steps in preparation
 - Explain the different transition tools for virtualization
 - Define cloud workloads
-