CLOUD COMPUTING

Virtualization and Cloud Computing

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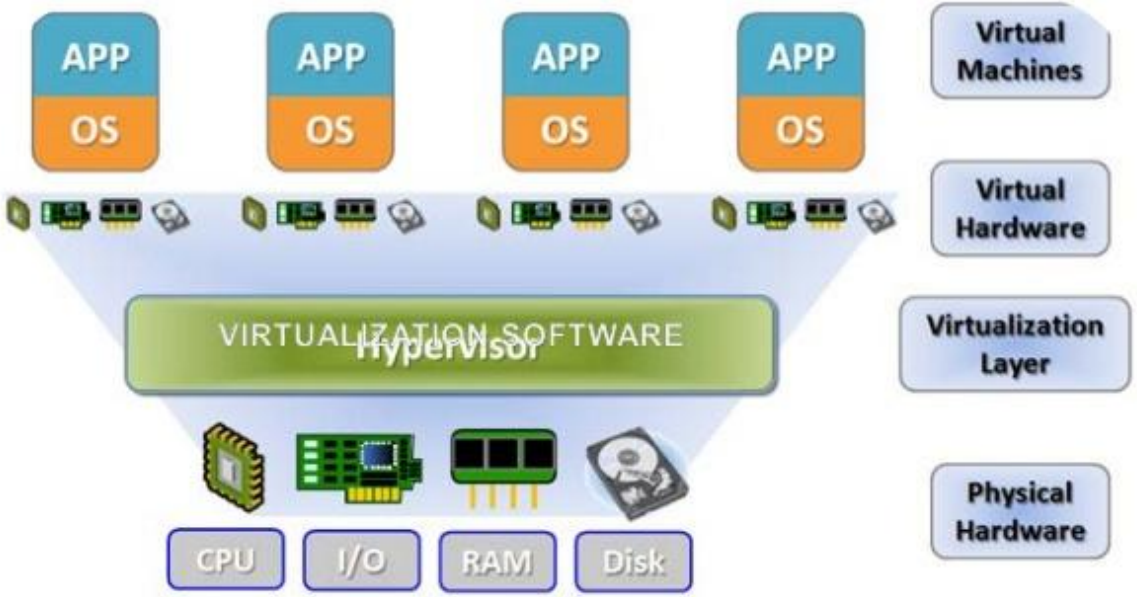
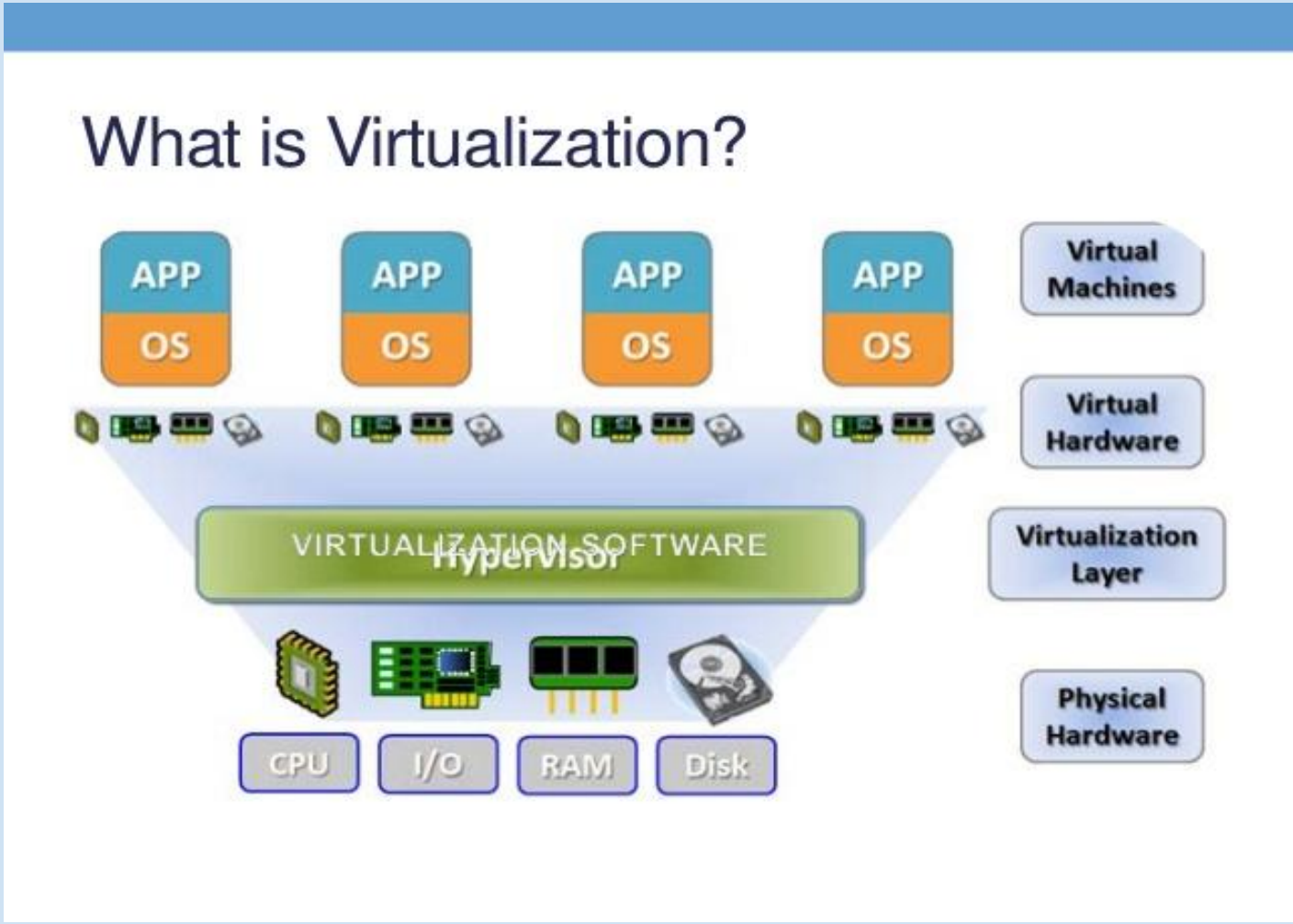
What is Virtualization?

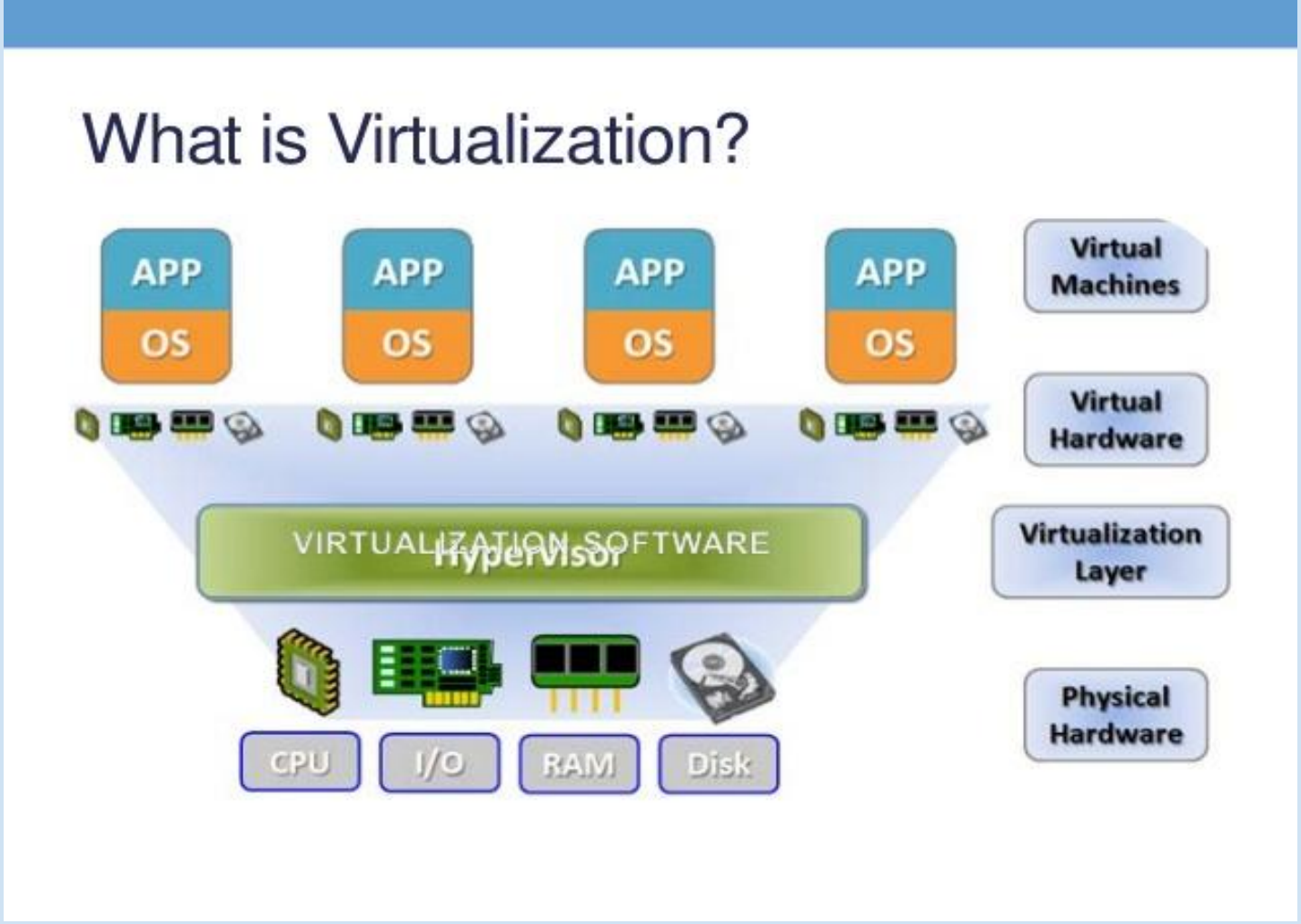


- Virtualization is the ability to run multiple operating systems on a single physical system and share the underlying hardware resources*

*VMWare white paper, *Virtualization Overview*

- It is the process by which one computer hosts the appearance of many computers.

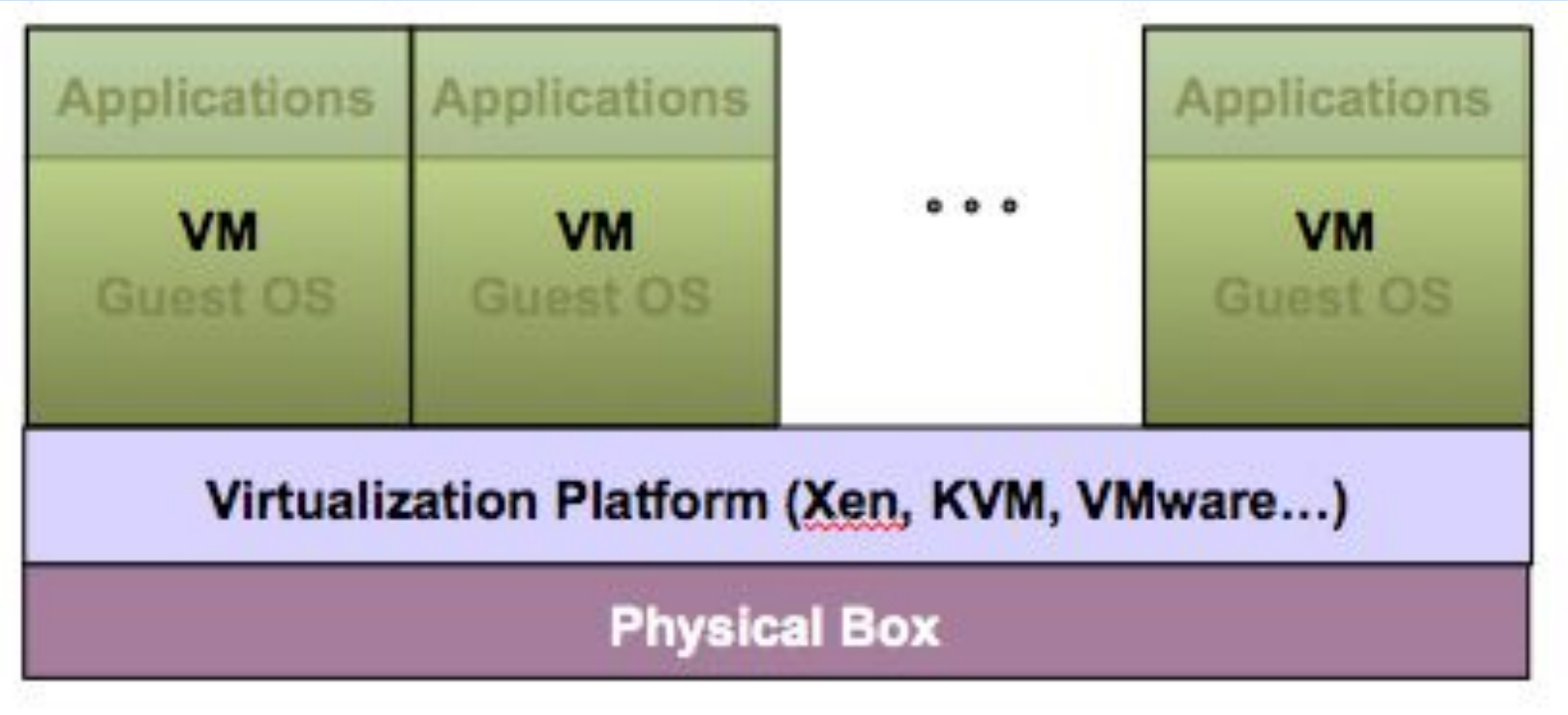




- Virtualization is used to improve IT throughput and costs by using physical resources as a pool from which virtual resources can be allocated.

Virtualization Architecture

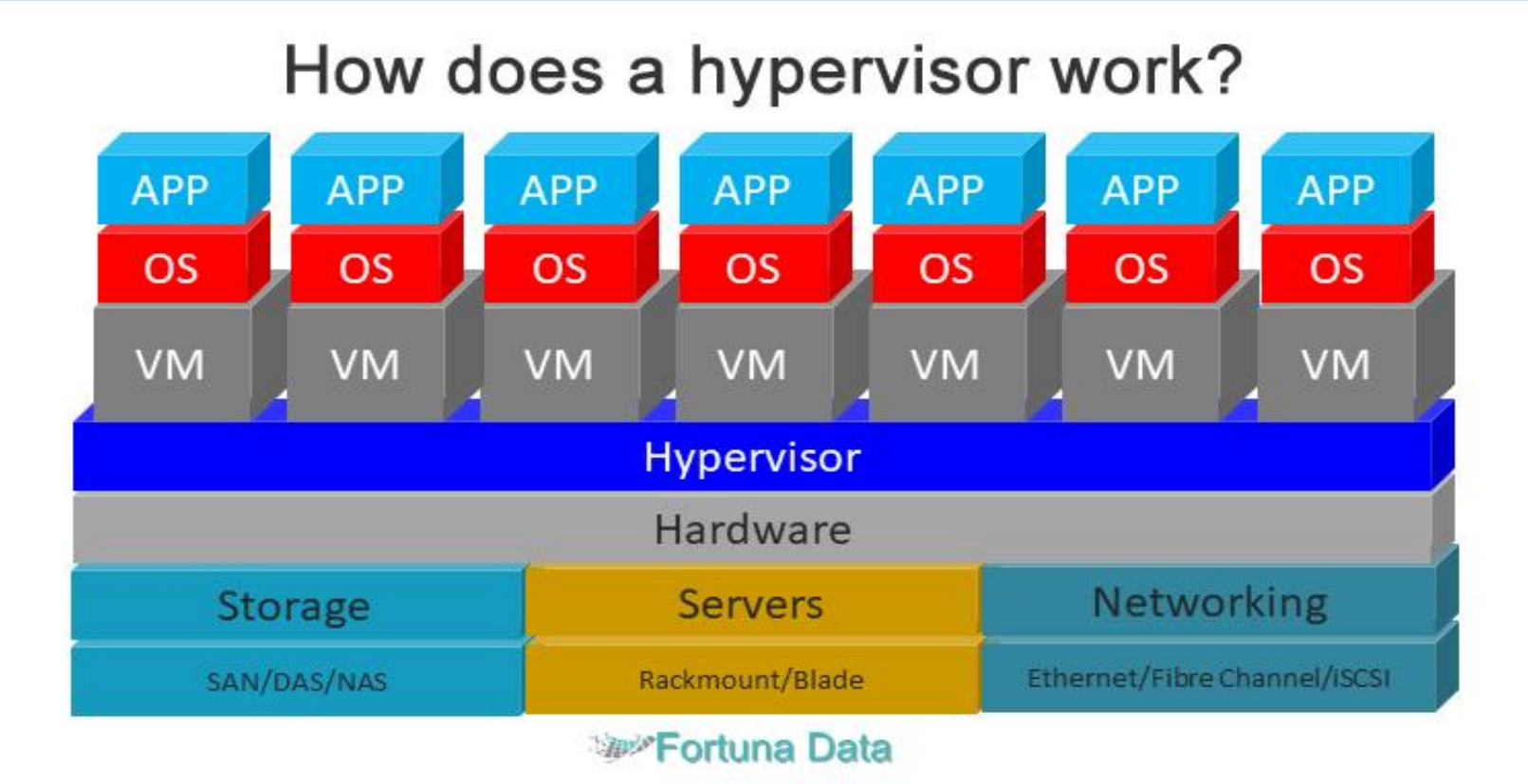
- A Virtual machine (VM) is an isolated runtime environment (guest OS and applications)
- Multiple virtual systems (VMs) can run on a single physical system



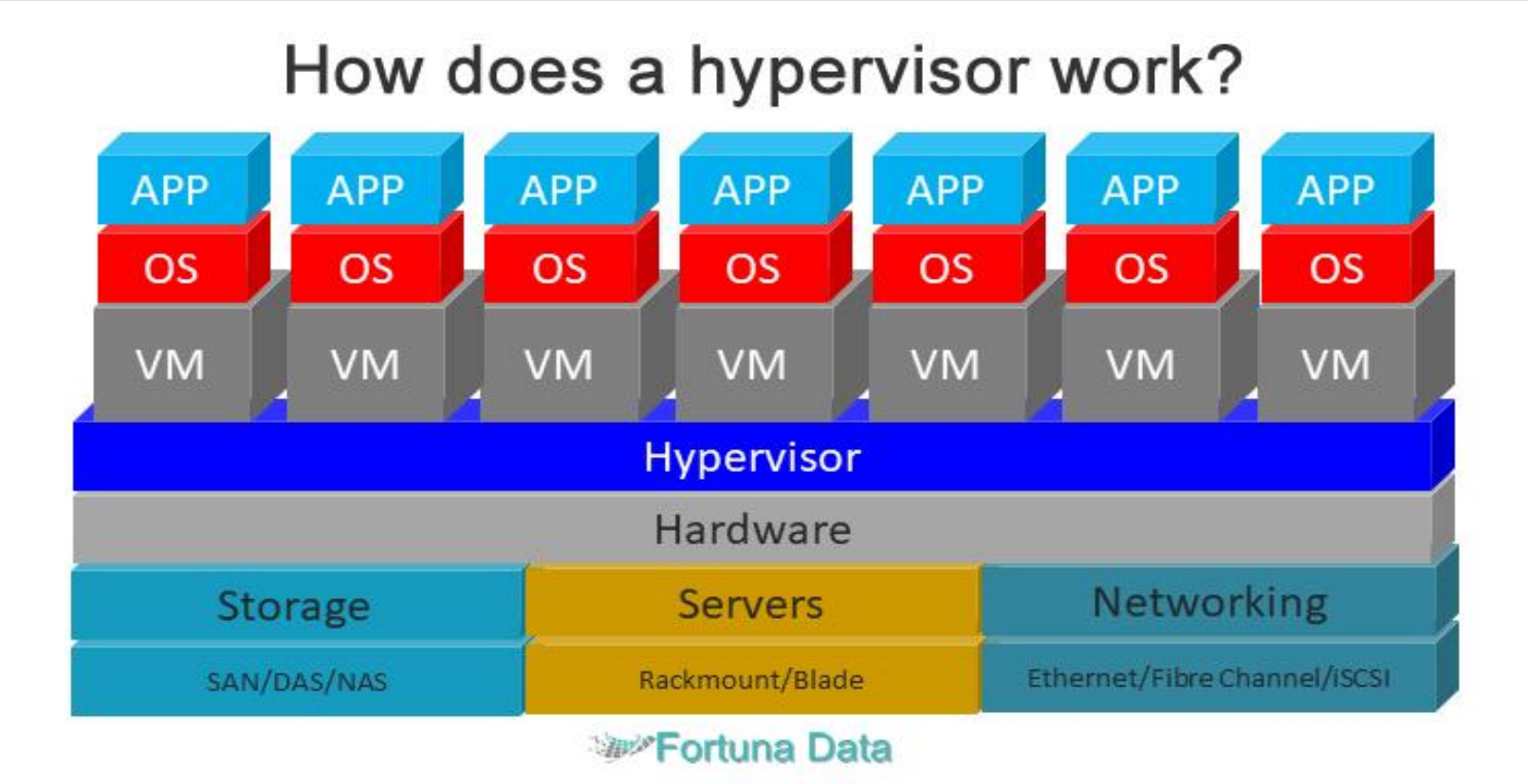
How Does Virtualization Work?

Traditional Architecture

Virtual Architecture



- A hypervisor, a.k.a. a virtual machine manager/monitor (VMM), or virtualization manager, is a program that allows multiple operating systems to share a single hardware host.



- Each guest operating system appears to have the host's processor, memory, and other resources all to itself. However, the hypervisor is actually controlling the host processor and resources, allocating what is needed to each operating system in turn and making sure that the guest operating systems (called virtual machines) cannot disrupt each other.

Benefits of Virtualization

- Sharing of resources helps cost reduction
- Isolation: Virtual machines are isolated from each other as if they are physically separated
- Encapsulation: Virtual machines encapsulate a complete computing environment
- Hardware Independence: Virtual machines run independently of underlying hardware
- Portability: Virtual machines can be migrated between different hosts.

Virtualization in Cloud Computing

Cloud computing takes virtualization one step further:

- You don't need to own the hardware
- Resources are rented as needed from a cloud
- Various providers allow creating virtual servers:
  - Choose the OS and software each instance will have
  - The chosen OS will run on a large server farm
  - Can instantiate more virtual servers or shut down existing ones within minutes
- You get billed only for what you used

Components of Virtual Machines?

- **Configuration file**
  - **Virtual machine configuration** is the arrangement of resources assigned to a **virtual machine**. The resources allocated to a **virtual machine** (**VM**) typically include allocated processors, memory, disks, network adapters and the user interface.

  - The **file** responsible for holding the **configuration** of a particular **VM** is <vmHostName>. vmx. This is the primary **configuration file**, which stores settings chosen in the New **Virtual Machine** Wizard or **virtual machine** settings editor.

Components of Virtual Machines?

- **Hard disk file(s)**
  - This is a **virtual** disk **file**, which stores the contents of the **virtual machine's** hard disk drive.

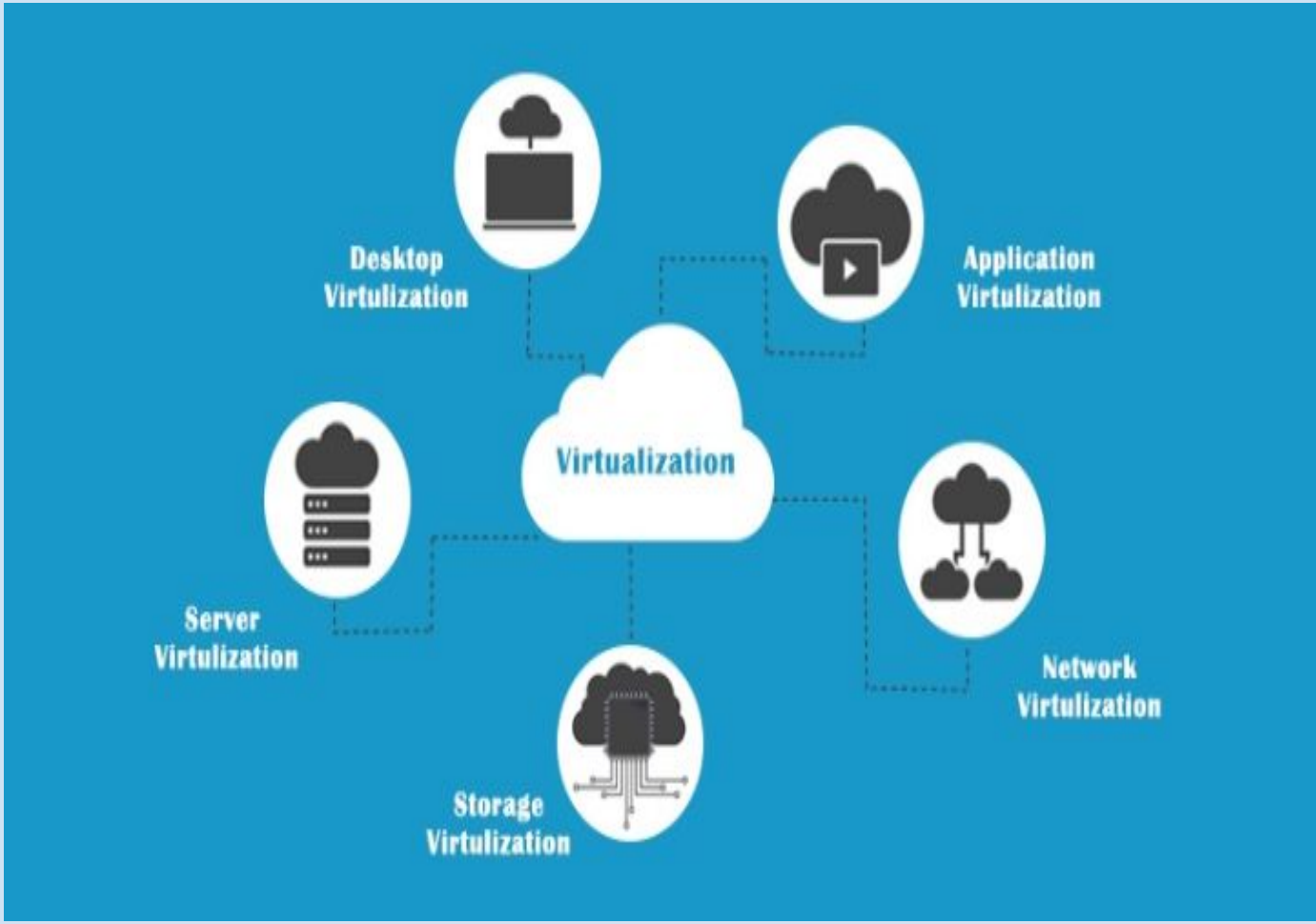
- **Virtual machine state file**
  - This is the **file** that stores the **state** of the **virtual machine's** BIOS

Components of Virtual Machines?

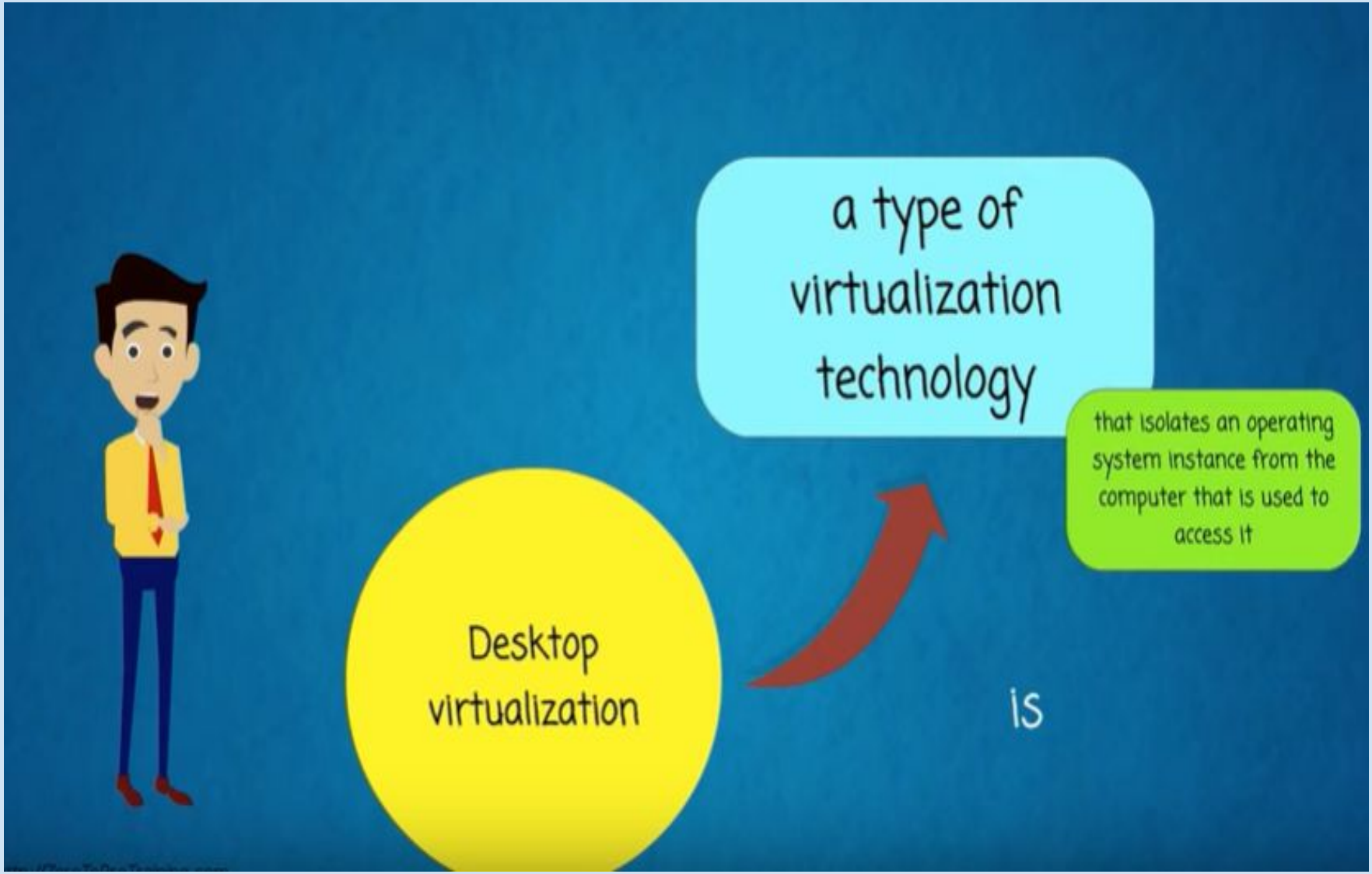
- **In-memory file**
  - The **virtual machine** paging **file**, which backs up the guest main **memory** on the host **file** system. This **file** exists only when the **virtual machine** is running or if the **virtual machine** fails. It is stored in the working directory. Each snapshot of a **virtual machine** that is powered on has an associated

Virtualization Types

* Desktop Virtualization
* Server Virtualization
* Network Virtualization
* Storage Virtualization
* Application Virtualization



Desktop Virtualization



Desktop Virtualization

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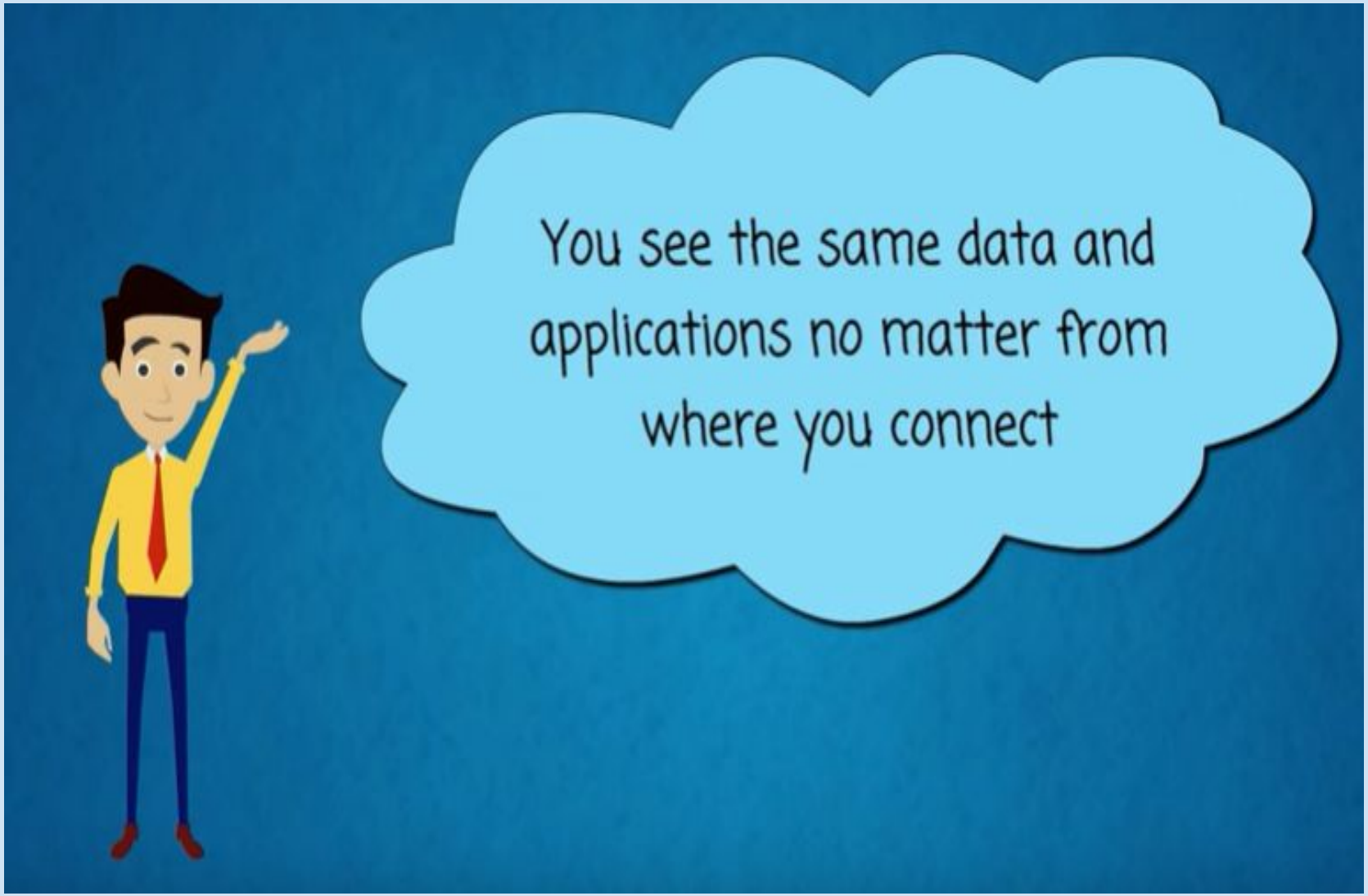

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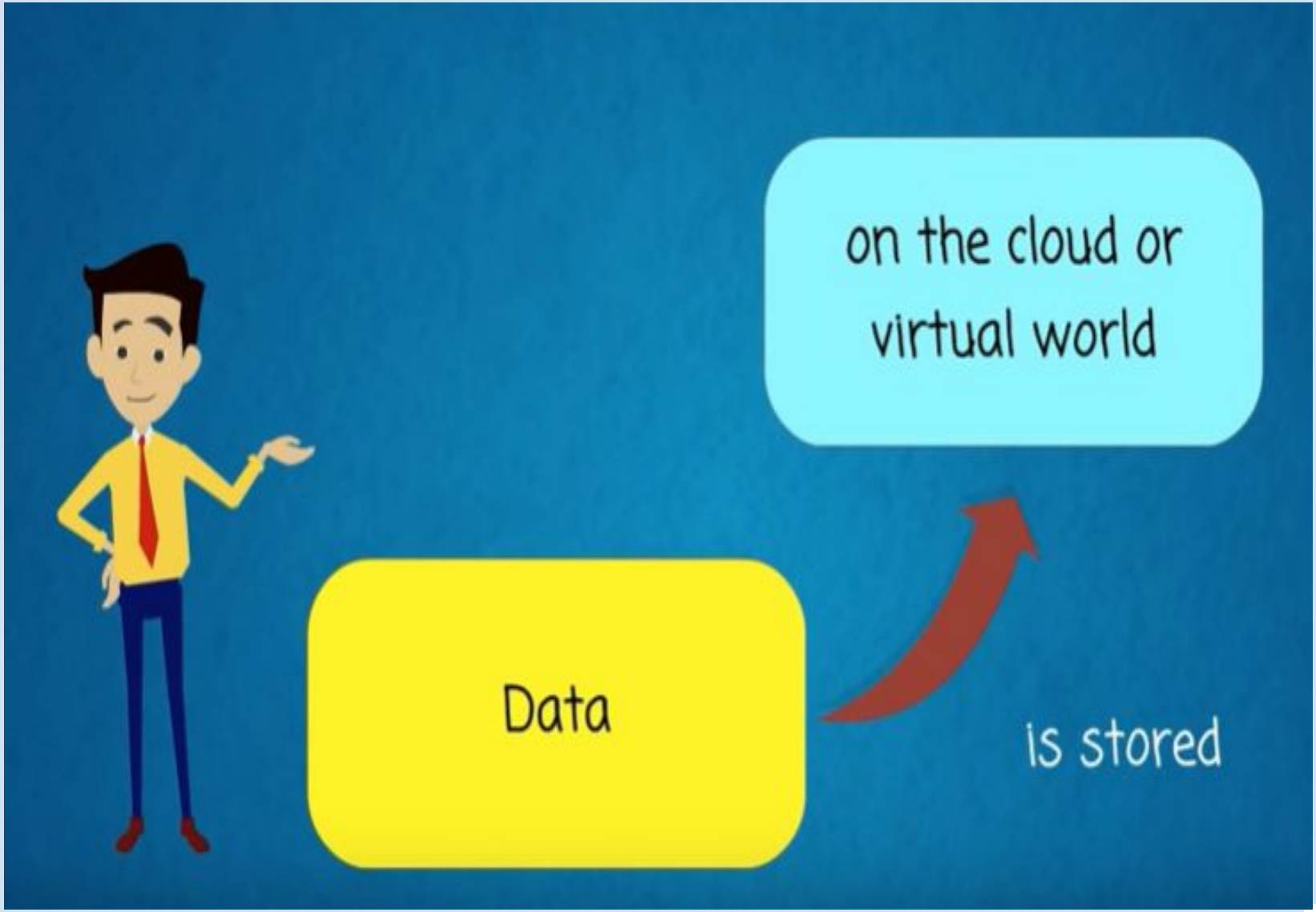

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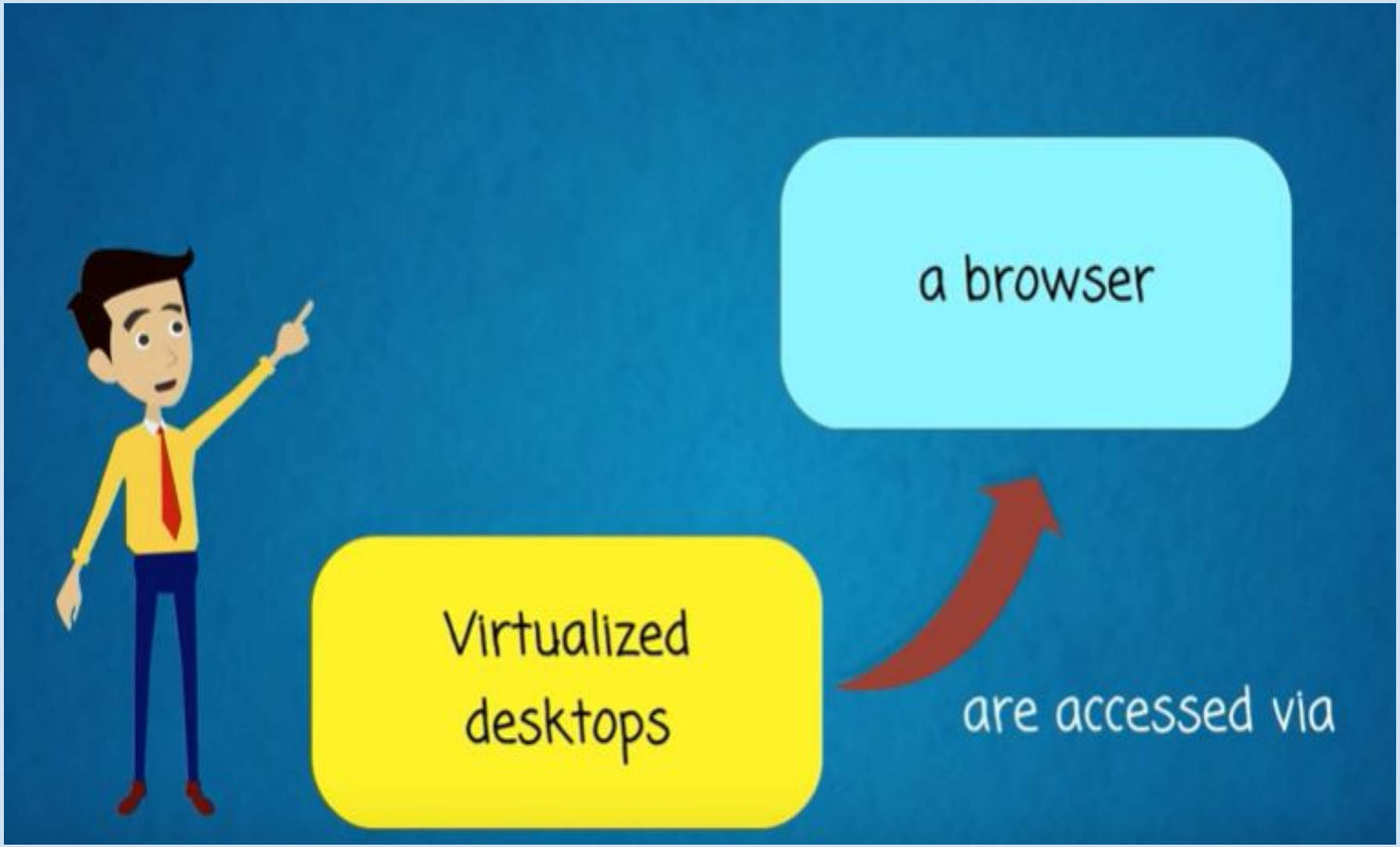

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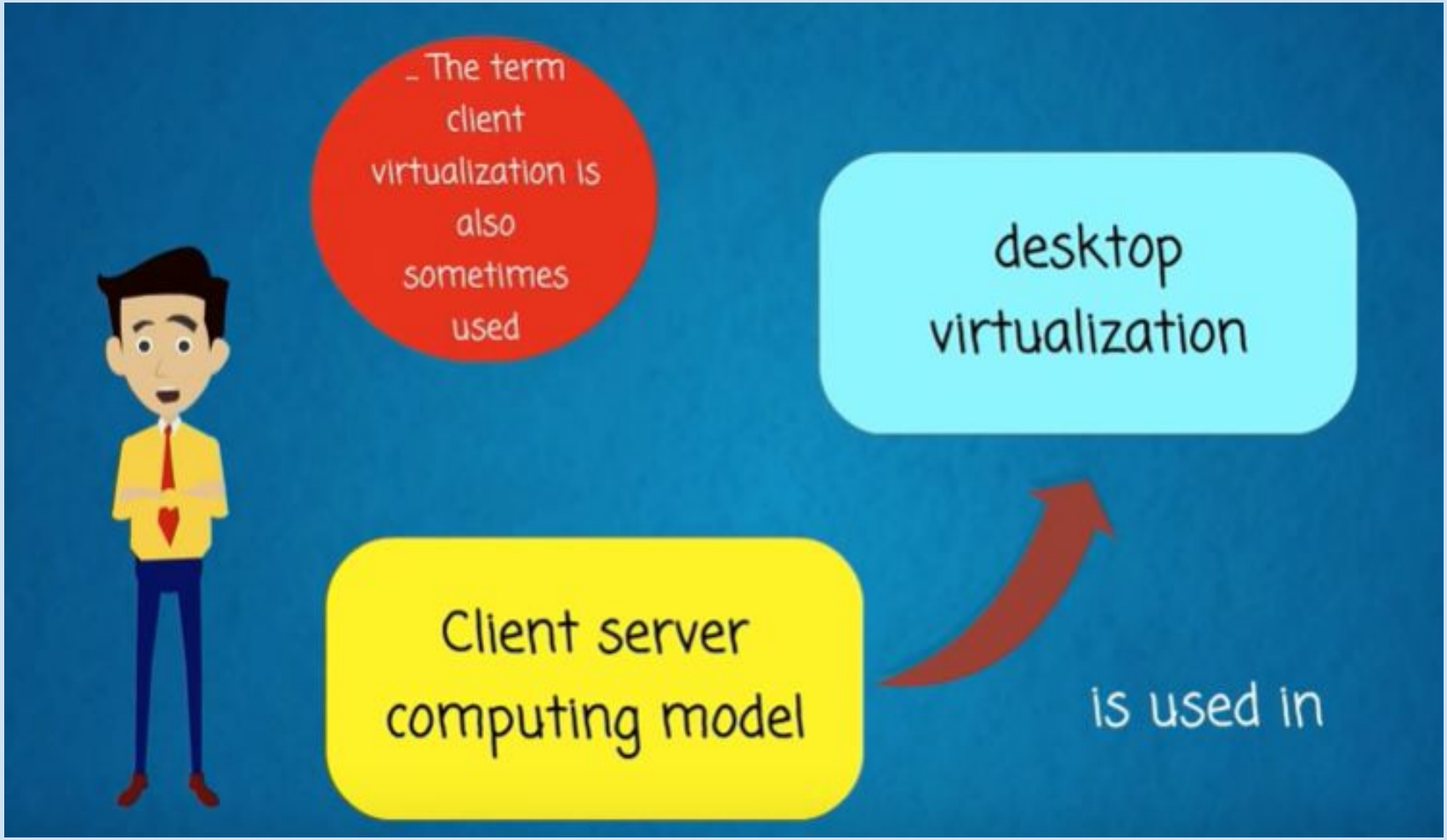

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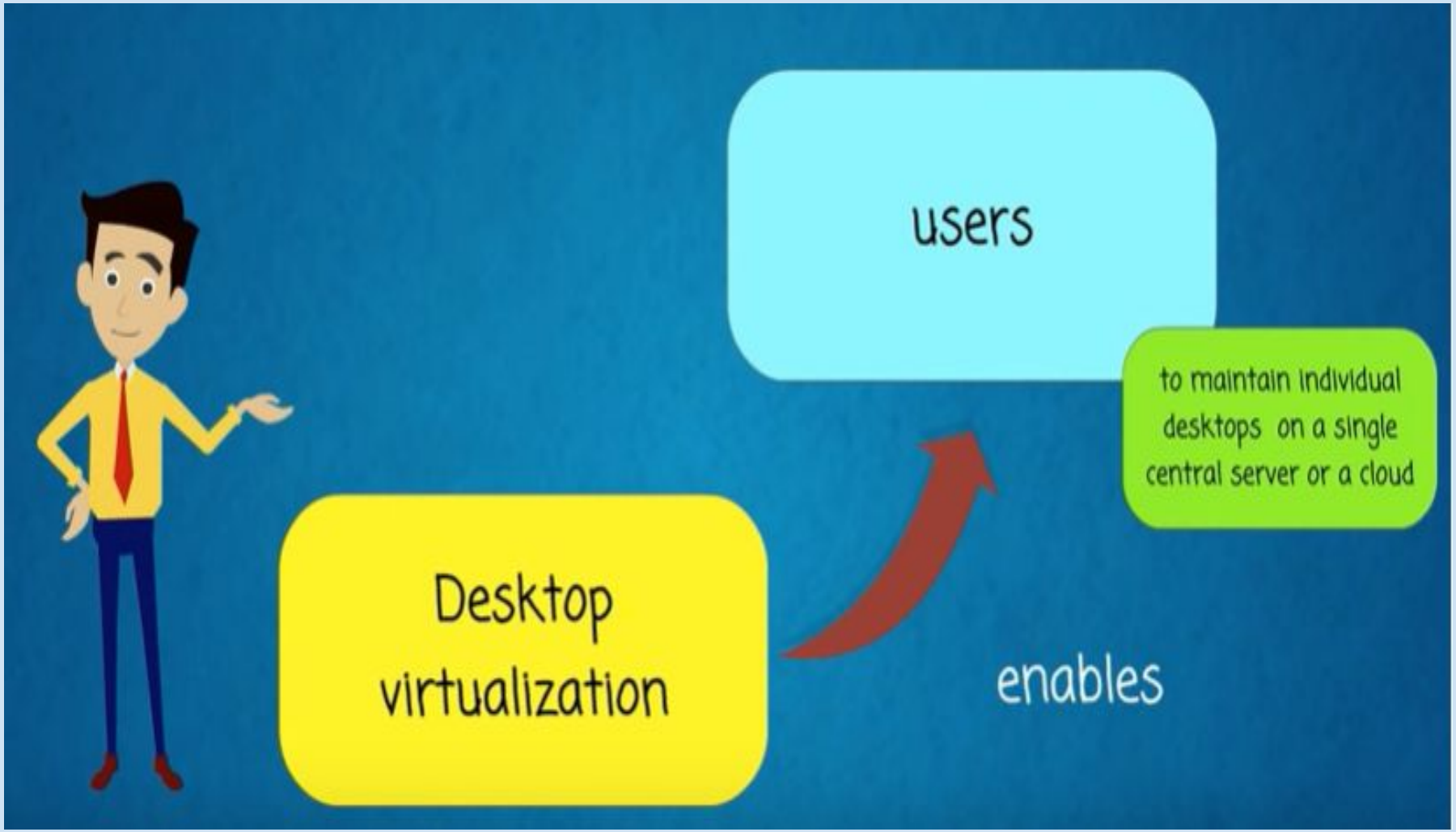

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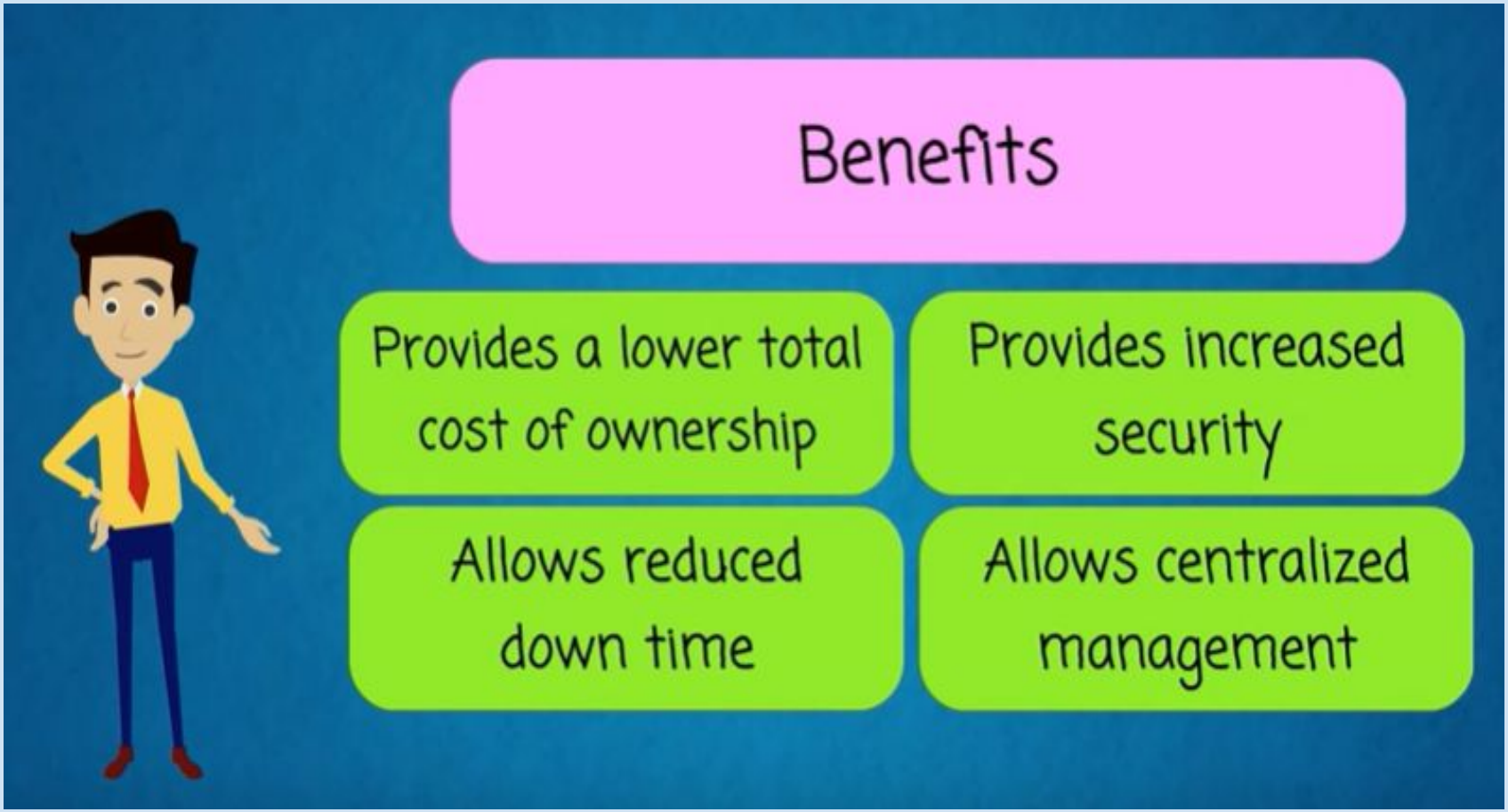

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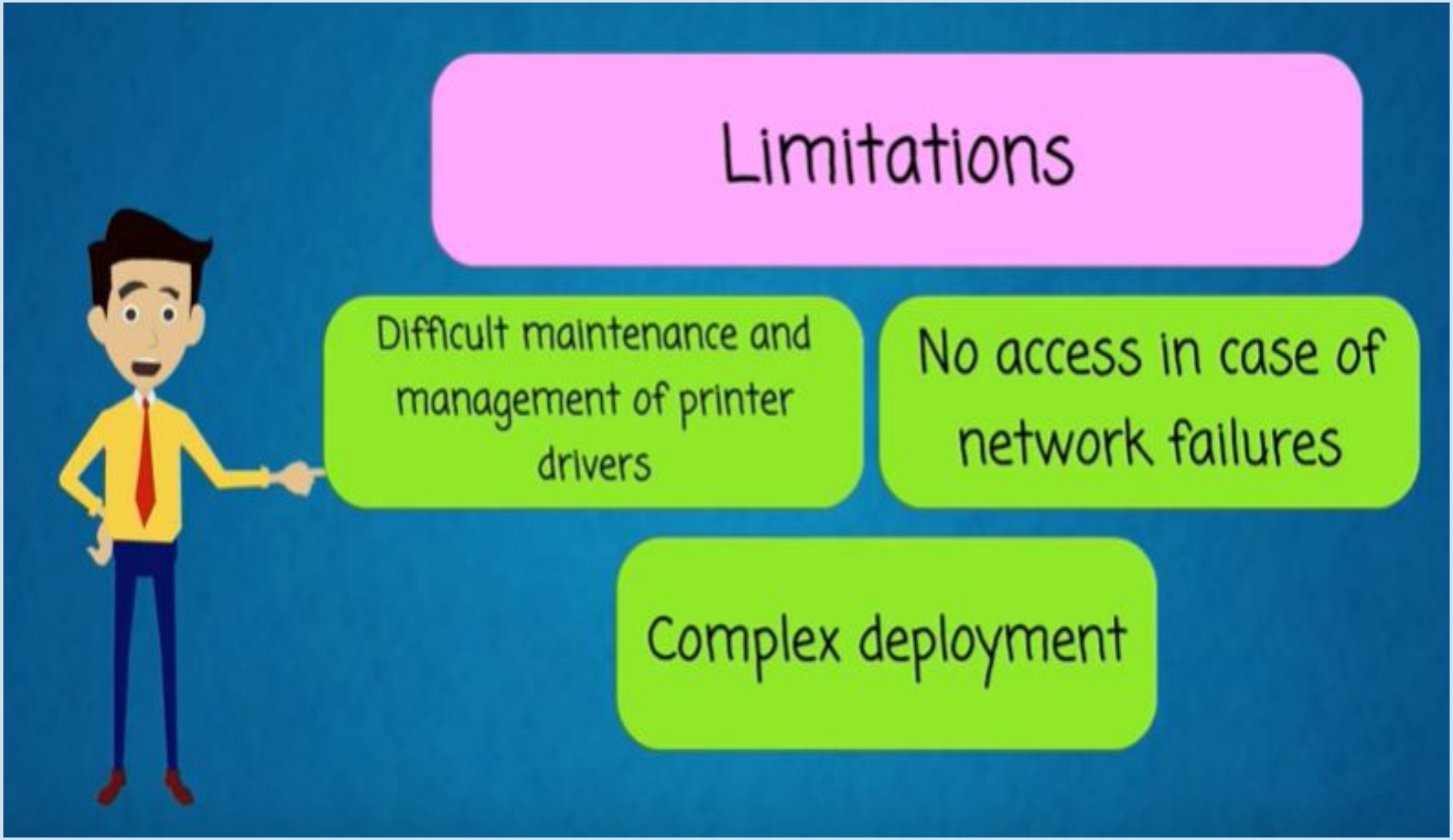

References

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- Network: https://youtu.be/5xTx6qQ-kfo
  https://youtu.be/HFQdbOY8Ams
- Server: https://youtu.be/p11lJOnALS4
  https://youtu.be/jHcvNxGfqfs