accenture technology

Learning and Knowledge Management

Module 1: Introduction to Infrastructure Automation

Module Objectives

At the end of this module, you will be able to:

- Describe infrastructure automation
- Explain the concept of evolving and immutable infrastructure
- Differentiate between virtual machines and containers

Topic List

- Introduction to Infrastructure Automation
- Types of Infrastructure Provisioning
- Virtualization And Containerization

Topic List

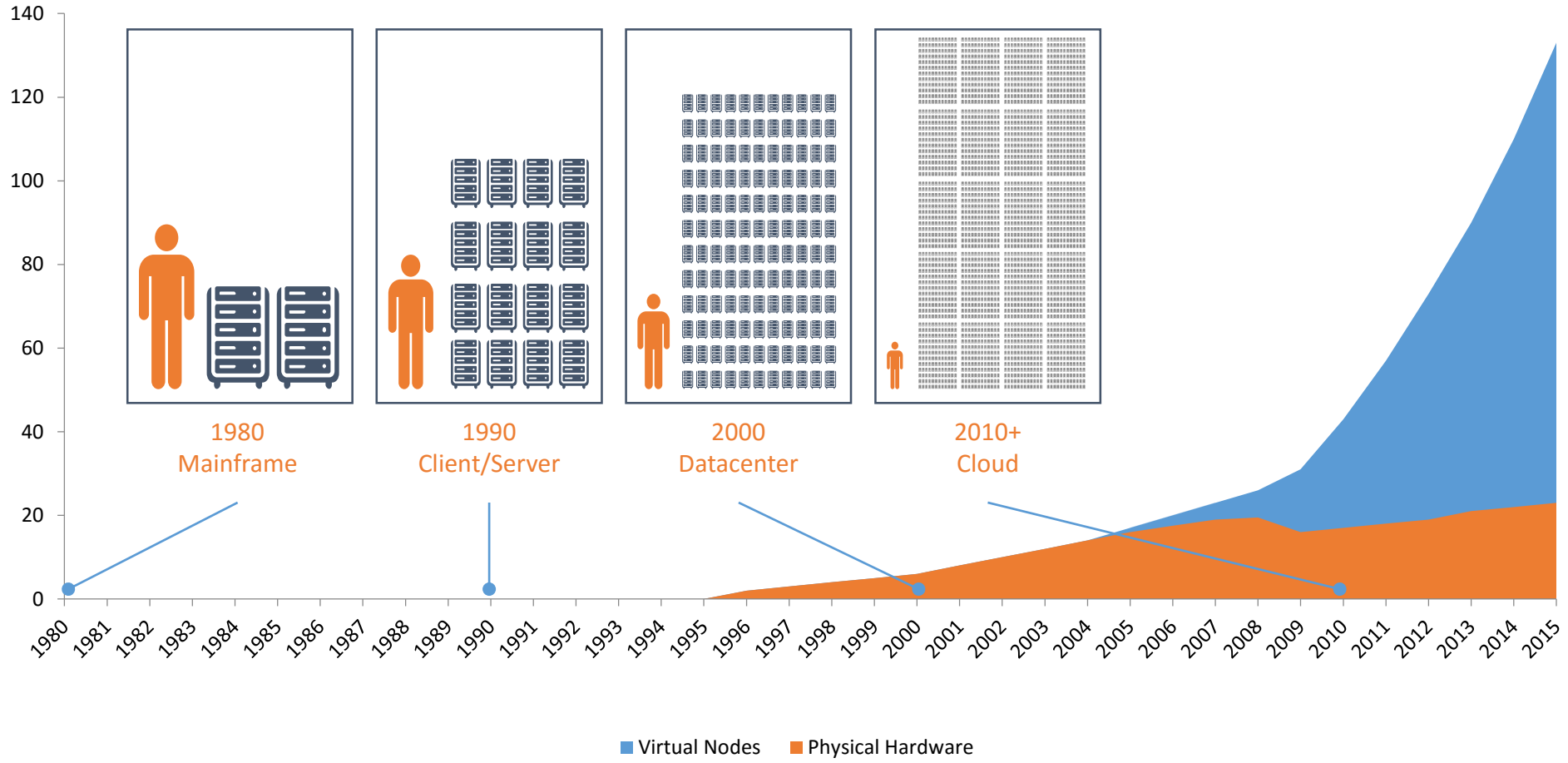
Introduction to Infrastructure Automation

Evolving and Immutable Infrastructure

Virtualization And Containerization

Introduction to Infrastructure Automation (1)

Why Infrastructure Automation?



Introduction to Infrastructure Automation (2)

What is Infrastructure Automation?

Infrastructure automation is the process of scripting environments

It includes:

- Installing an operating system
- Installing and configuring servers on instances
- Configuring how the instances and software communicate with one another
- And much more

By scripting environments, same configuration can be applied to a single node or to thousands

Introduction to Infrastructure Automation (3)

Infrastructure as Code (IaC)

Infrastructure as Code (IaC) is written to:

- ❑ Manage configurations
- ❑ Automate provisioning of infrastructure
- ❑ Assist deployment

Infrastructure code is written using:

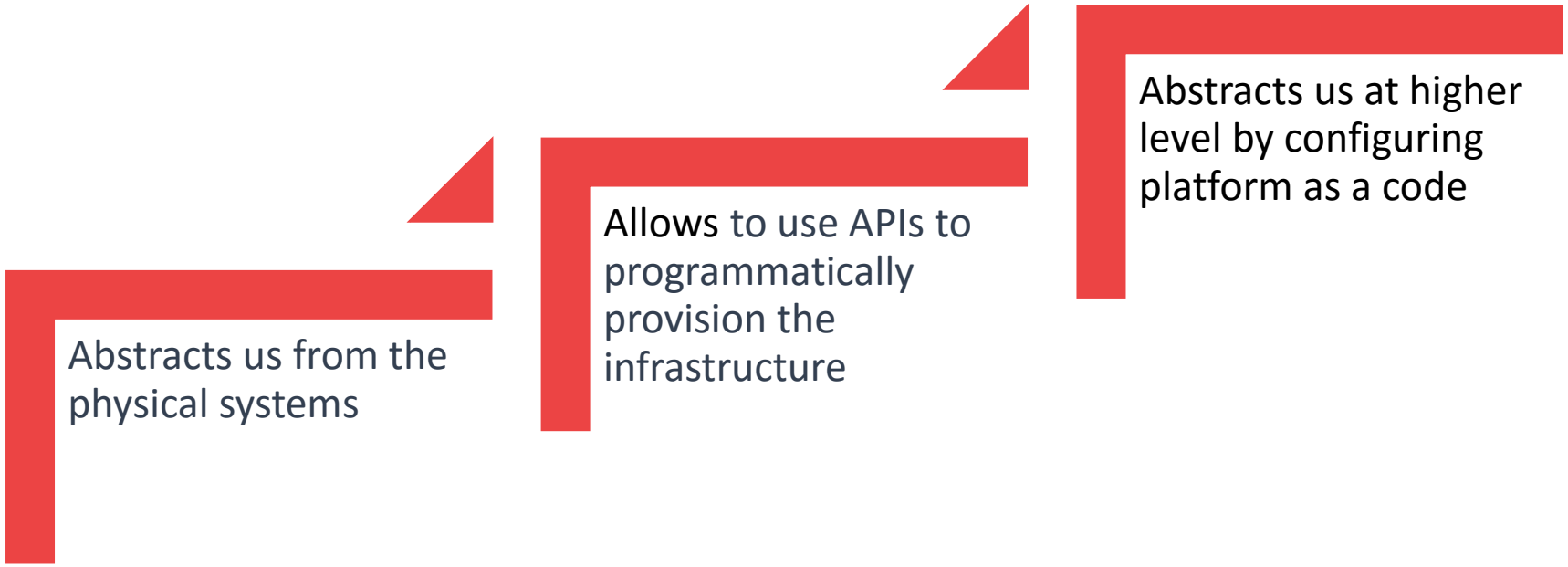
- ❑ A high level language, or
- ❑ Any descriptive language

Infrastructure code involves:

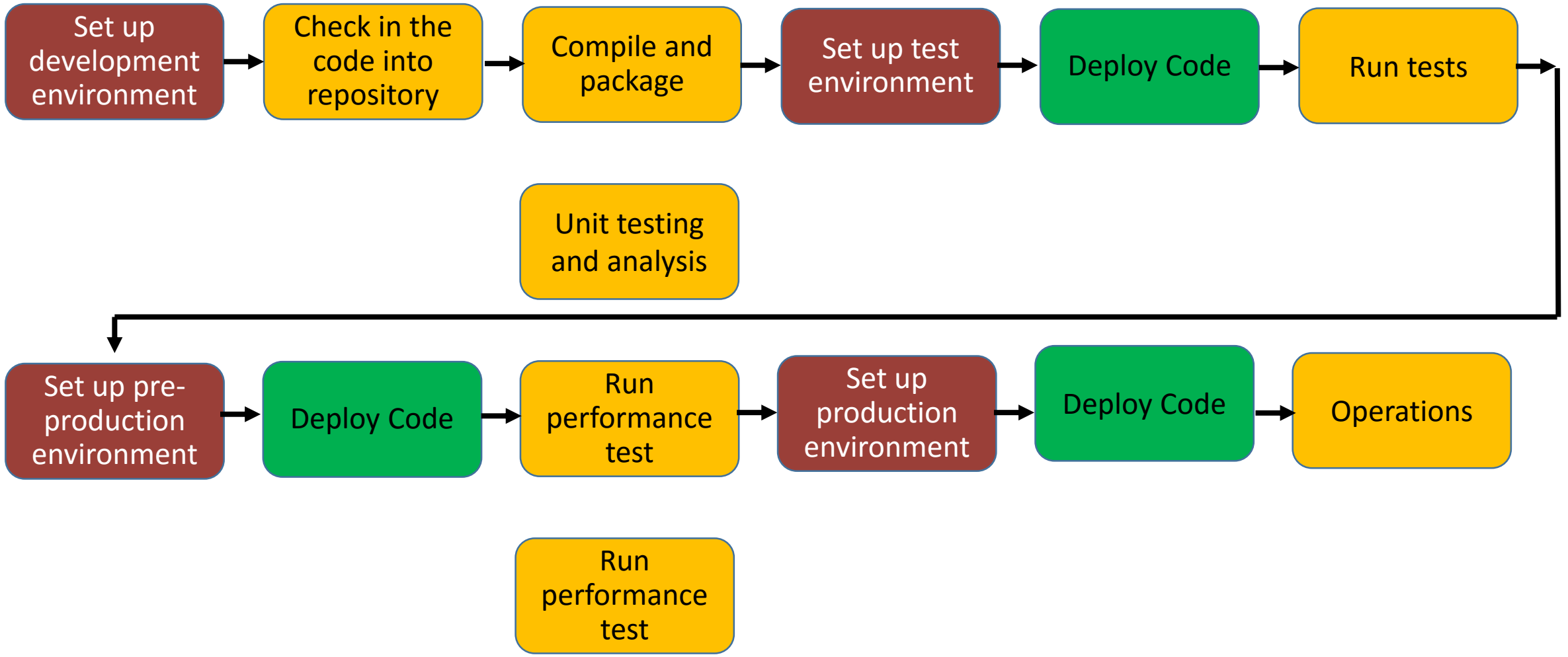
- ❑ Using tested and proven software development practices that are already being used in application development like Version control, Testing and Small deployments

Introduction to Infrastructure Automation (4)

Benefits of IaC



Infrastructure Configuration in SDLC



Topic List

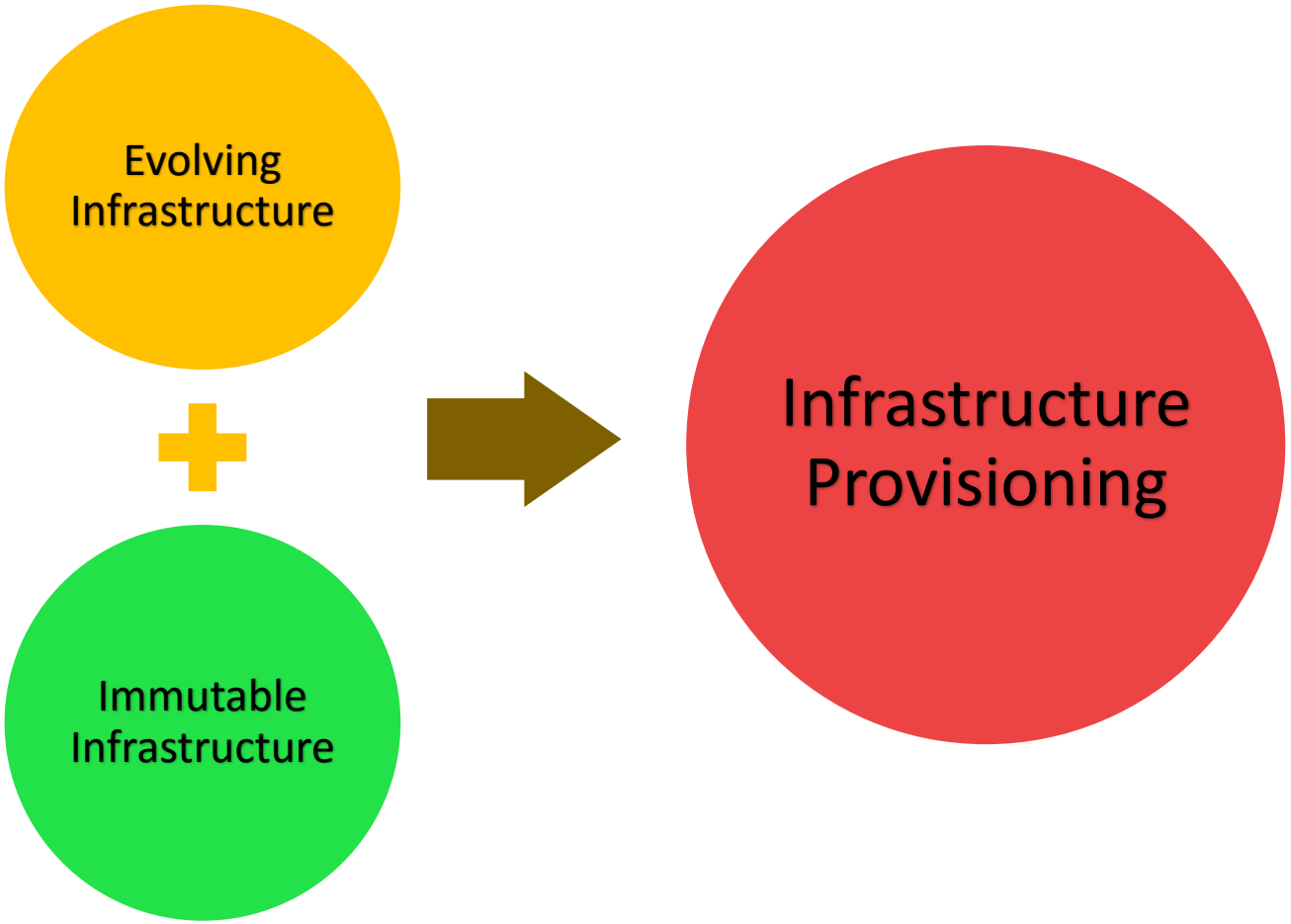
Introduction to Infrastructure Automation

Types of Infrastructure Provisioning

Virtualization And Containerization

Types of Infrastructure Provisioning (1)

Infrastructure Provisioning



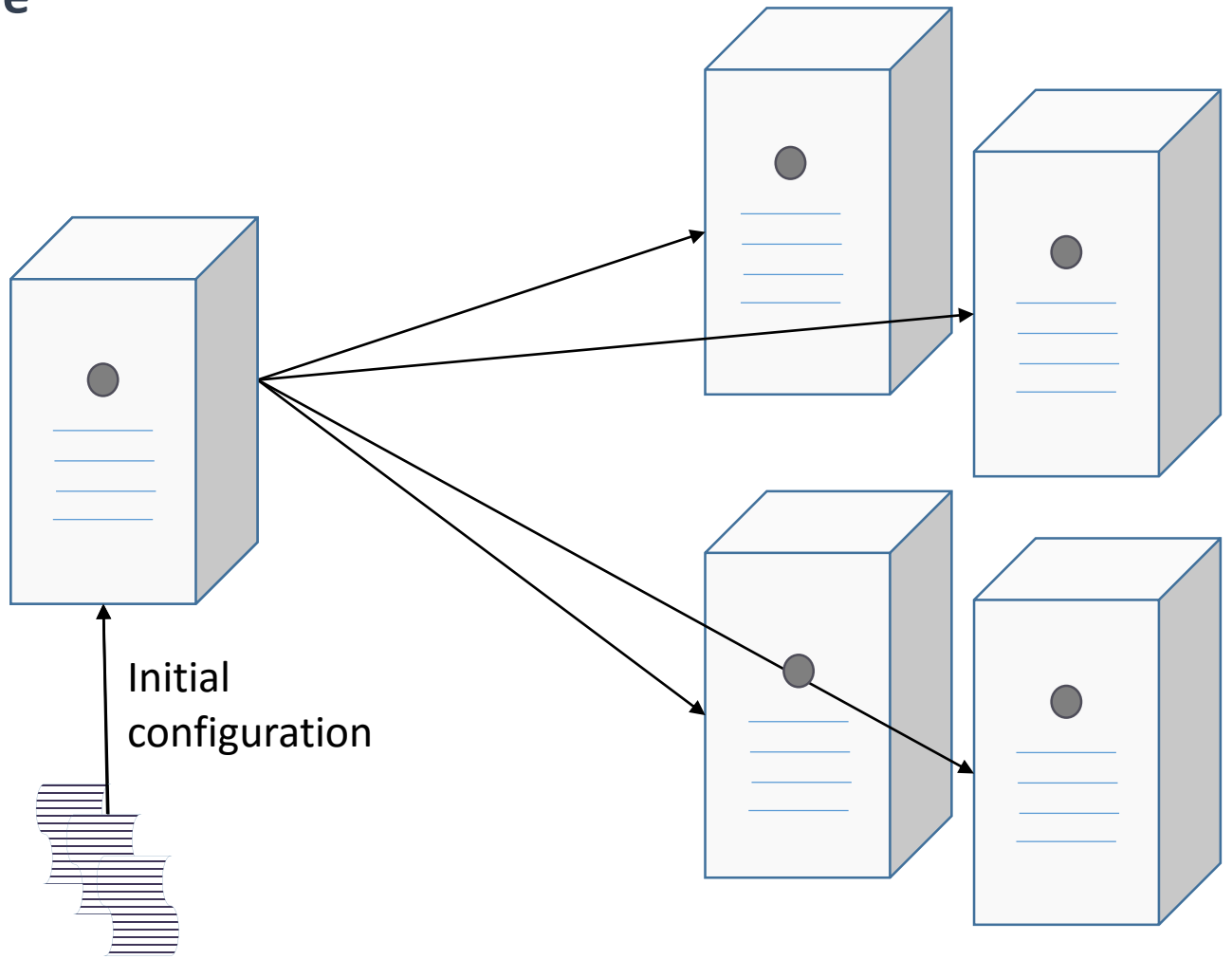
Types of Infrastructure Provisioning (2)

Evolving Infrastructure

- Uses a convergent model of configuration
- One time infrastructure setup
- Change to existing infrastructure on a need basis
- Tools available—Chef, Puppet, Ansible

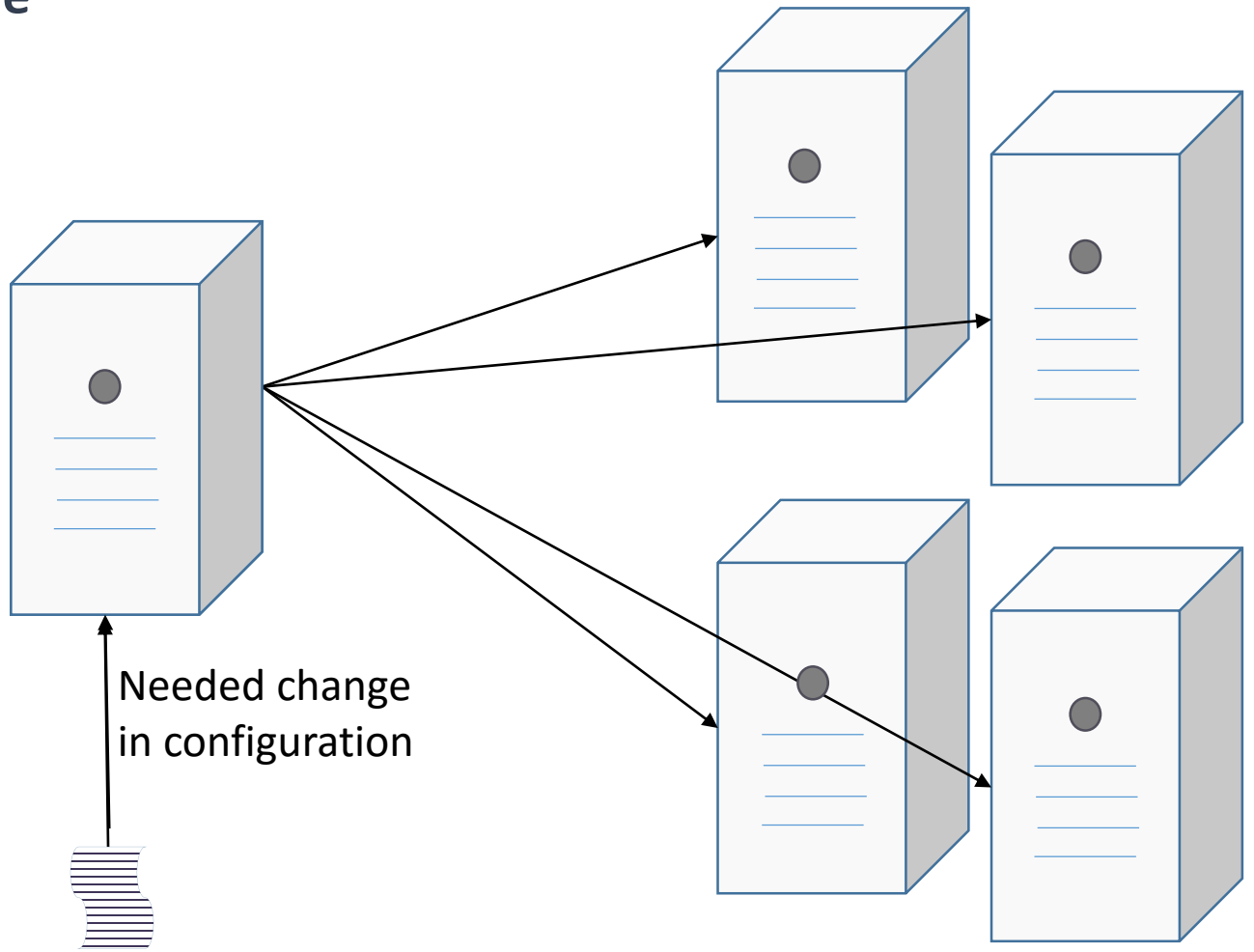
Types of Infrastructure Provisioning (3)

Evolving Infrastructure



Types of Infrastructure Provisioning (4)

Evolving Infrastructure



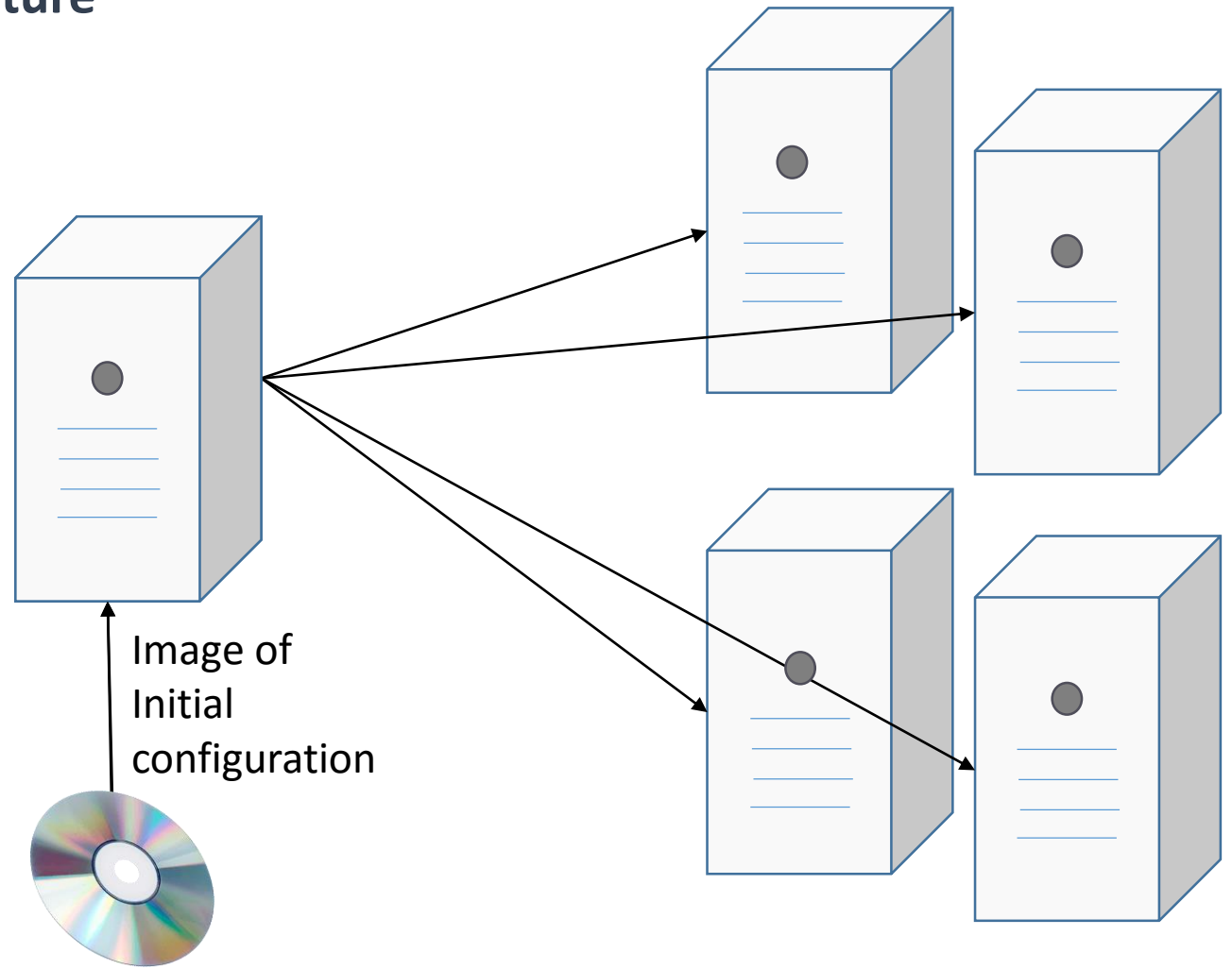
Types of Infrastructure Provisioning (5)

Immutable Infrastructure

- An infrastructure once deployed is never modified
- Change to existing infrastructure is replaced with a new updated instance
- Tools available—Docker, Amazon Machine Image (AMI)

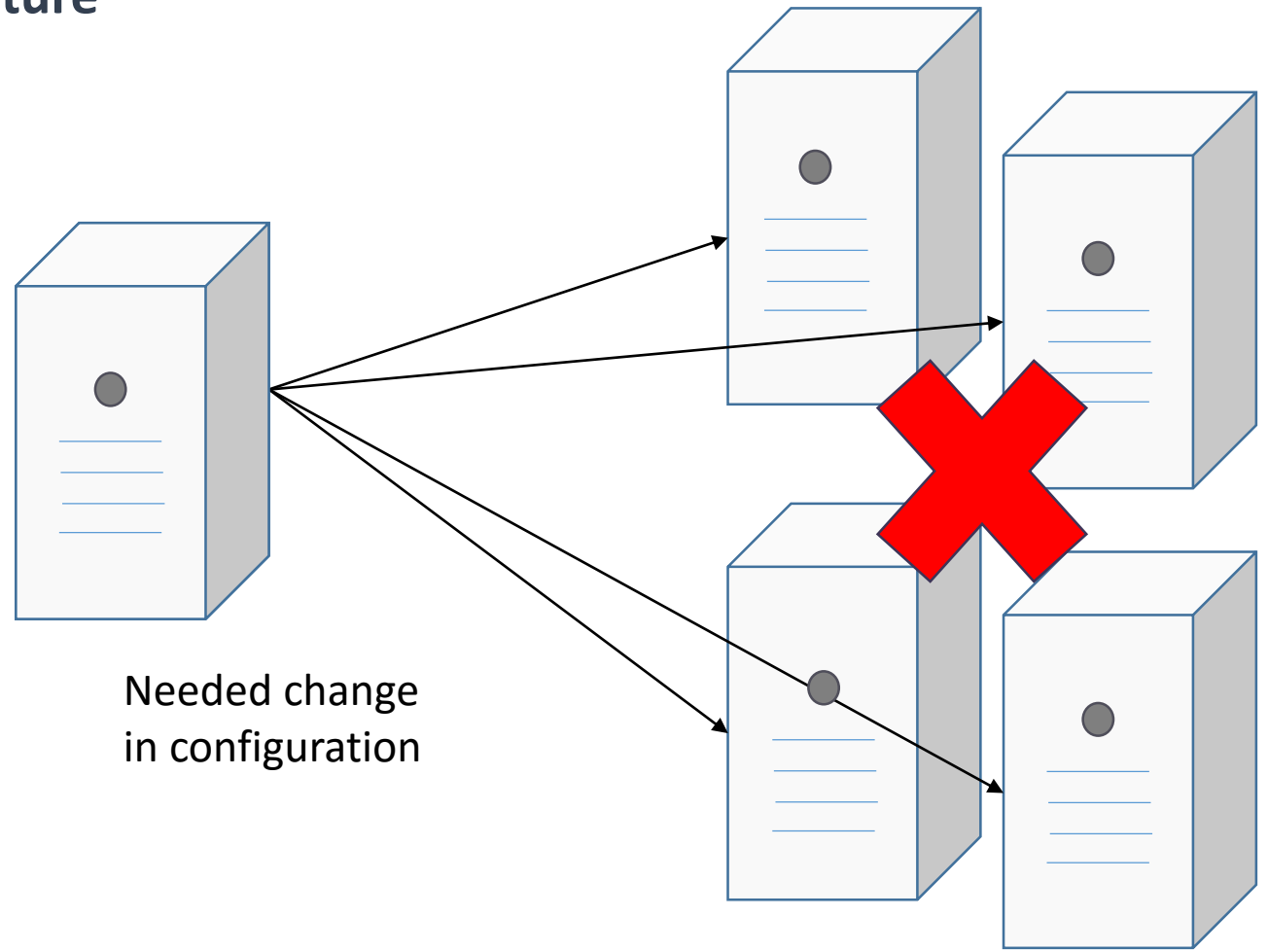
Types of Infrastructure Provisioning (6)

Immutable Infrastructure



Types of Infrastructure Provisioning (7)

Immutable Infrastructure



Topic List

Introduction to Infrastructure Automation

Types of Infrastructure Provisioning

Virtualization And Containerization

Virtualization And Containerization (1)

Need For Multiple Servers

Every application needs:

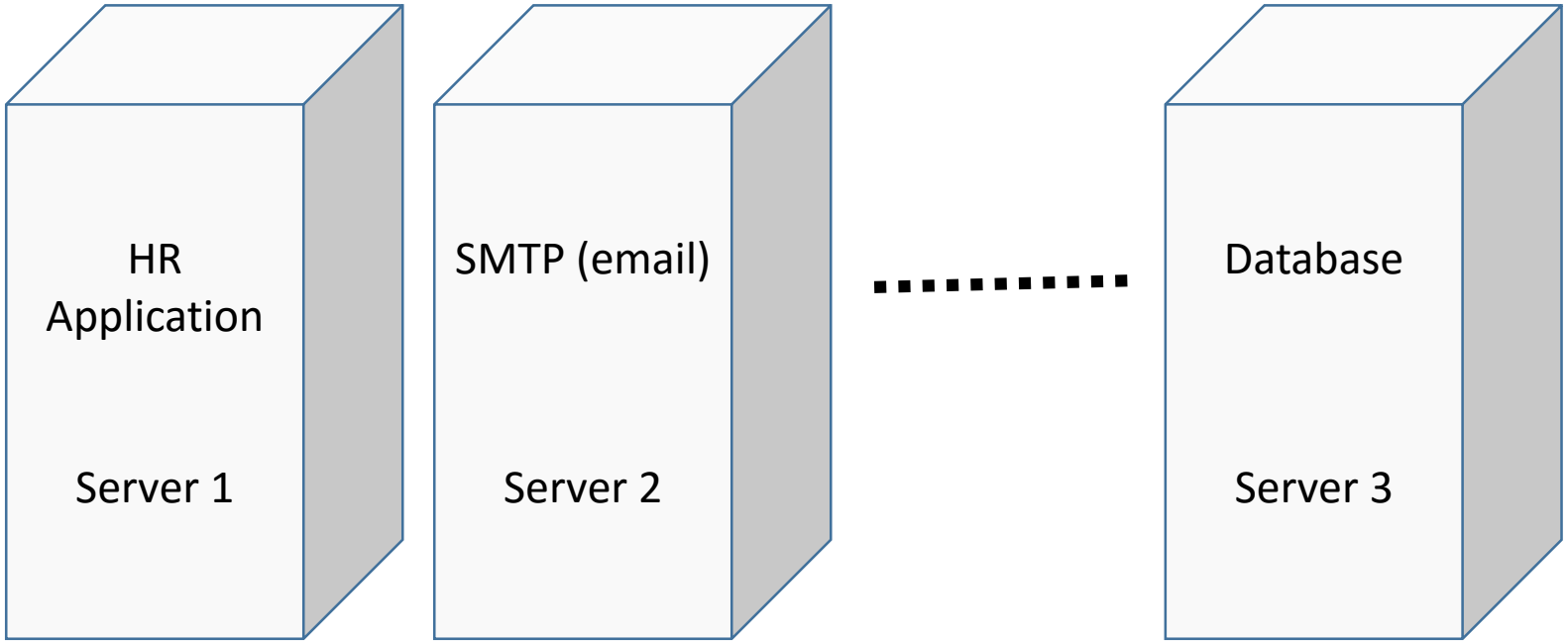
- Different configuration
- Separate disk space and memory
- Separate security configurations

Note: Applications don’t sync well together, hence they need separate machines. The other reason is that one non-functional application should not bring down the other.

Virtualization And Containerization (2)

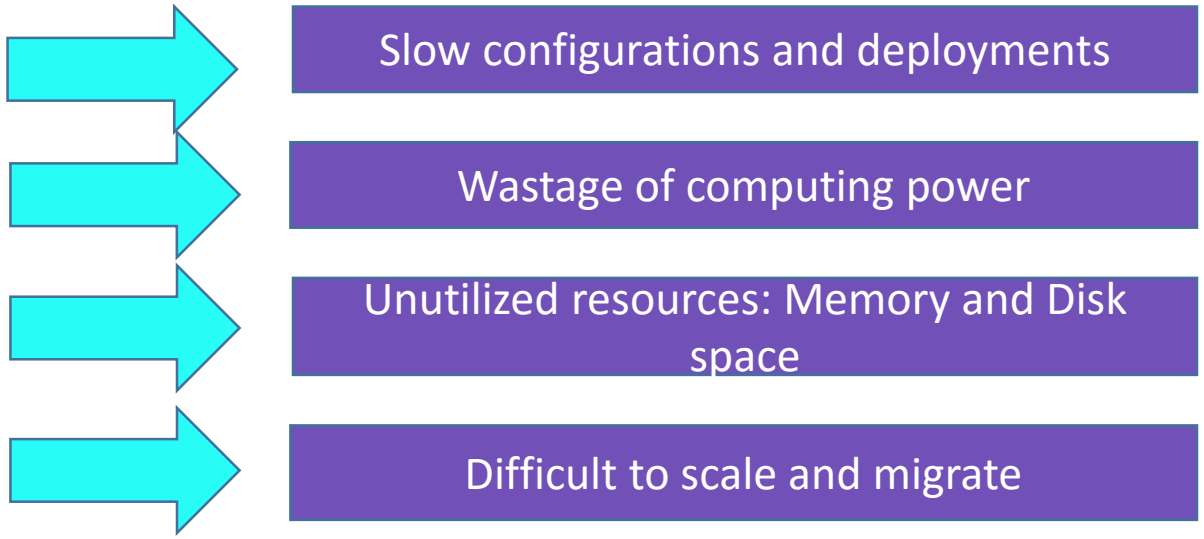
Need For Multiple Servers

One Physical Server Per Application

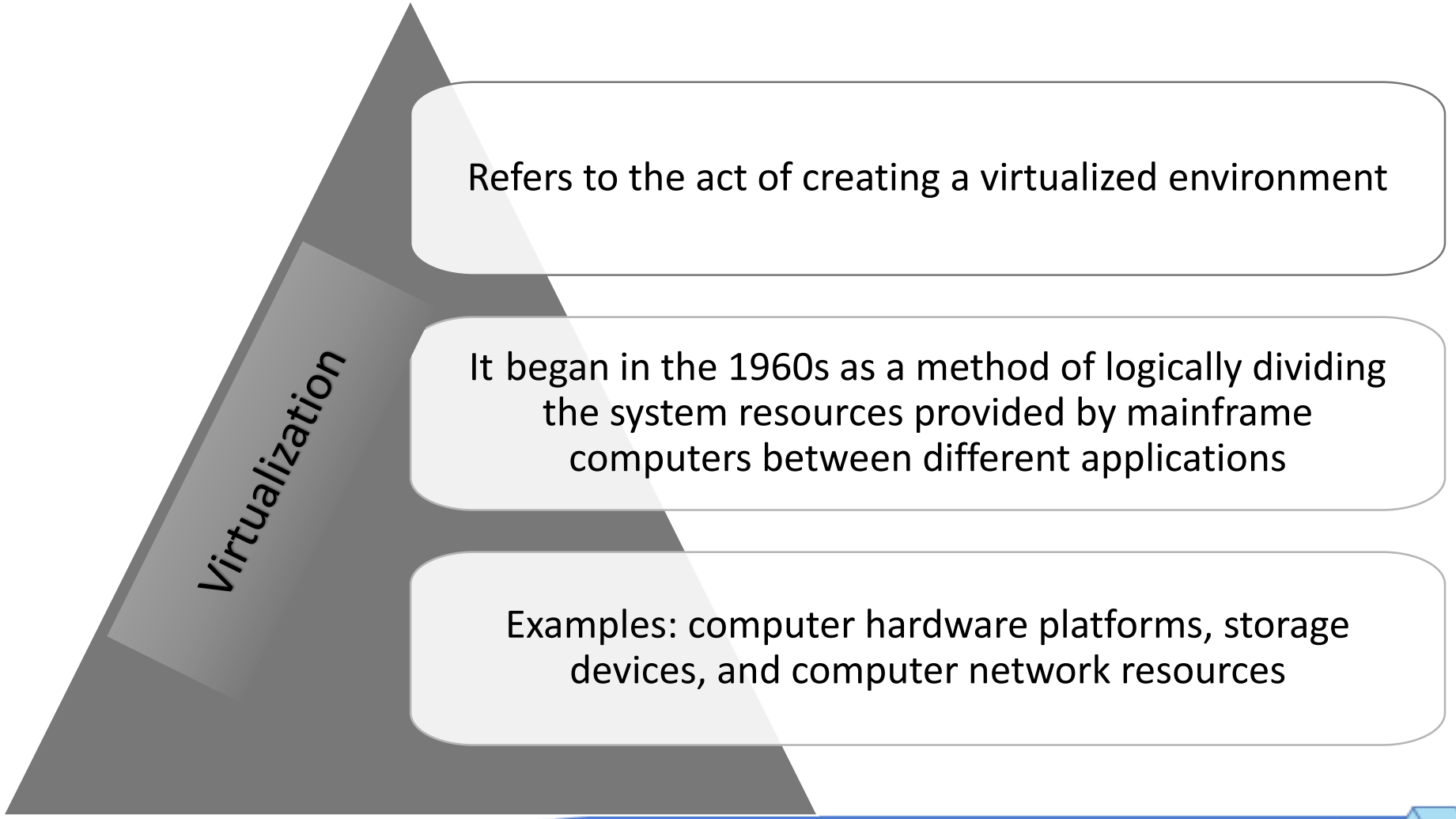


Virtualization And Containerization (2)

Drawbacks of Multiple Servers



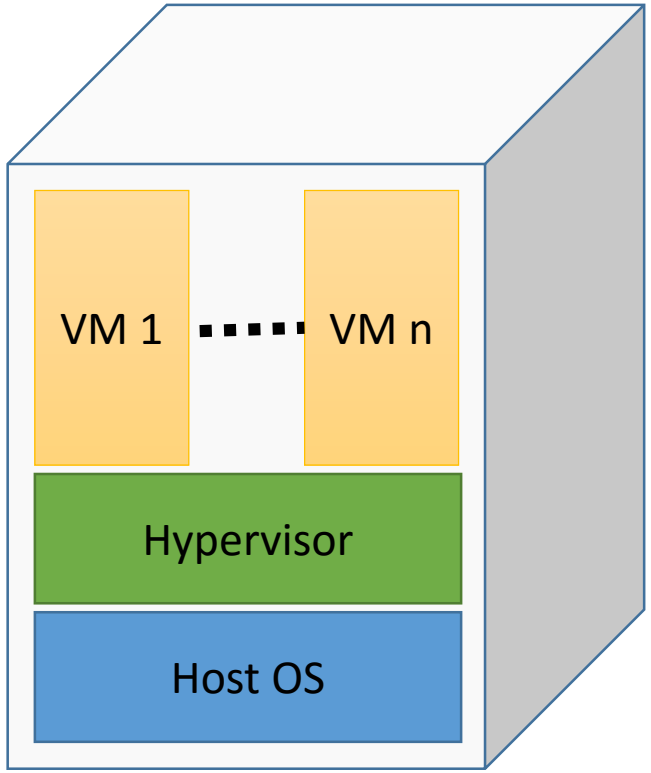
Virtualization And Containerization (3)



Virtualization And Containerization (3)

Virtualization: Use of Hypervisor

- One physical server contains multiple virtual machines
- Each VM has its own Operating System (Guest OS)
- One VM contains one applications



VM 1 → HR Application
VM 2 → SMTP

VM n → Database

Virtualization And Containerization (3)

Virtualization: Pros and Cons

Pros

- Better utilization of resources
- Easier to scale
- Used in cloud

Cons

- Each VM needs its own OS
- Waste of RAM, disk space and computing capacity
- Slow Setup (or scale-up) as it includes installation of OS
- Degraded performance

Virtualization And Containerization (4)

Containerization

Application containerization is an operating system level (OS-level) virtualization method

Used for deploying and running distributed applications without launching an entire virtual machine (VM) for each app

Multiple isolated systems are run on a single control host and access a single kernel

Containers hold the components such as files, environment variables and libraries necessary to run the desired software

Virtualization And Containerization (5)

Containerization

Container only contains an application and its dependencies

It runs as an isolated process on the host system, shares the kernel with other containers

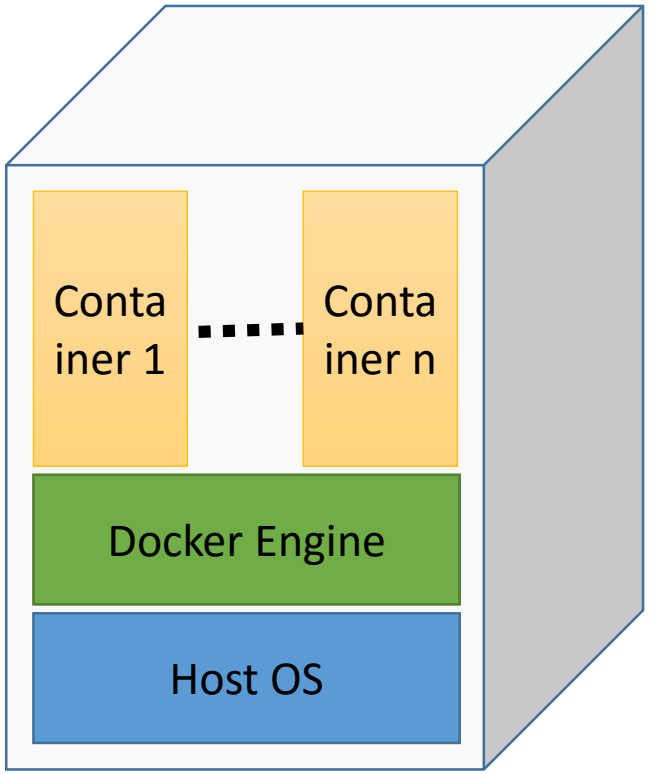
It enjoys the resource isolation and allocation benefits of VMs but is more portable and efficient

It shares resources from the host system

Virtualization And Containerization (6)

Containerization: Features

- Each container has its own processes, memory, devices, network stack
- One physical server contains multiple containers
- Container does not need its own OS
- One container contains one application



Container 1 → HR Application
Container 2 → SMTP

Container n → Database

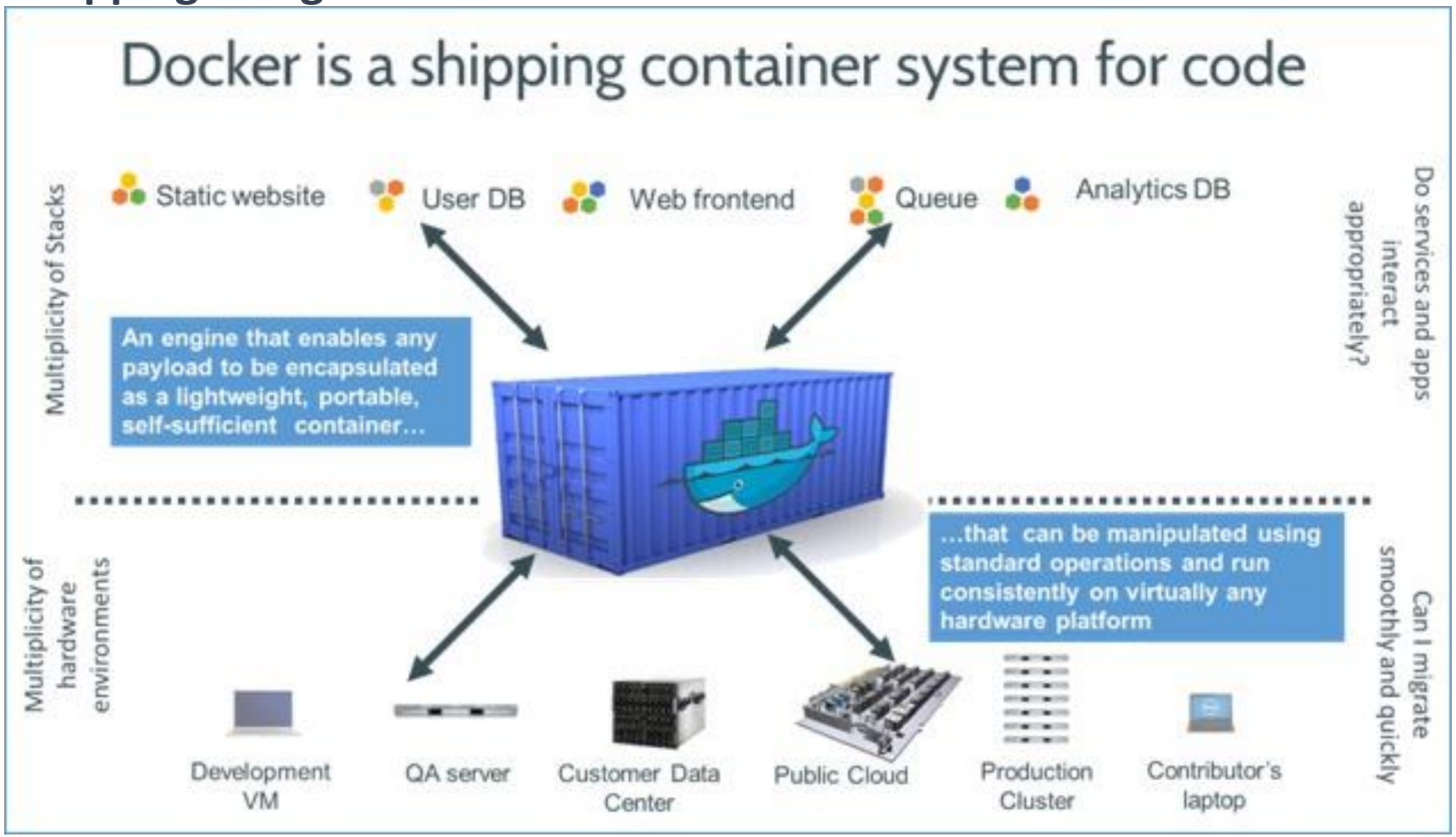
Virtualization And Containerization (7)

VMs Vs. Containers

VMs	Containers
Virtualized applications include applications, binaries, libraries and entire (guest) Operation System	Container (should) only contains an application and its dependencies
A virtual machine emulates a physical computing environment	Runs as an isolated process on the host system, shares the kernel with other containers
Requests for CPU, memory, disk, network and other hardware resources to a virtualization layer	It enjoys the resource isolation and allocation benefits of VMs but is more portable and efficient
VMs provide complete isolation, there is minimal resource sharing	Less isolated compared to fully virtualized systems

Virtualization And Containerization (8)

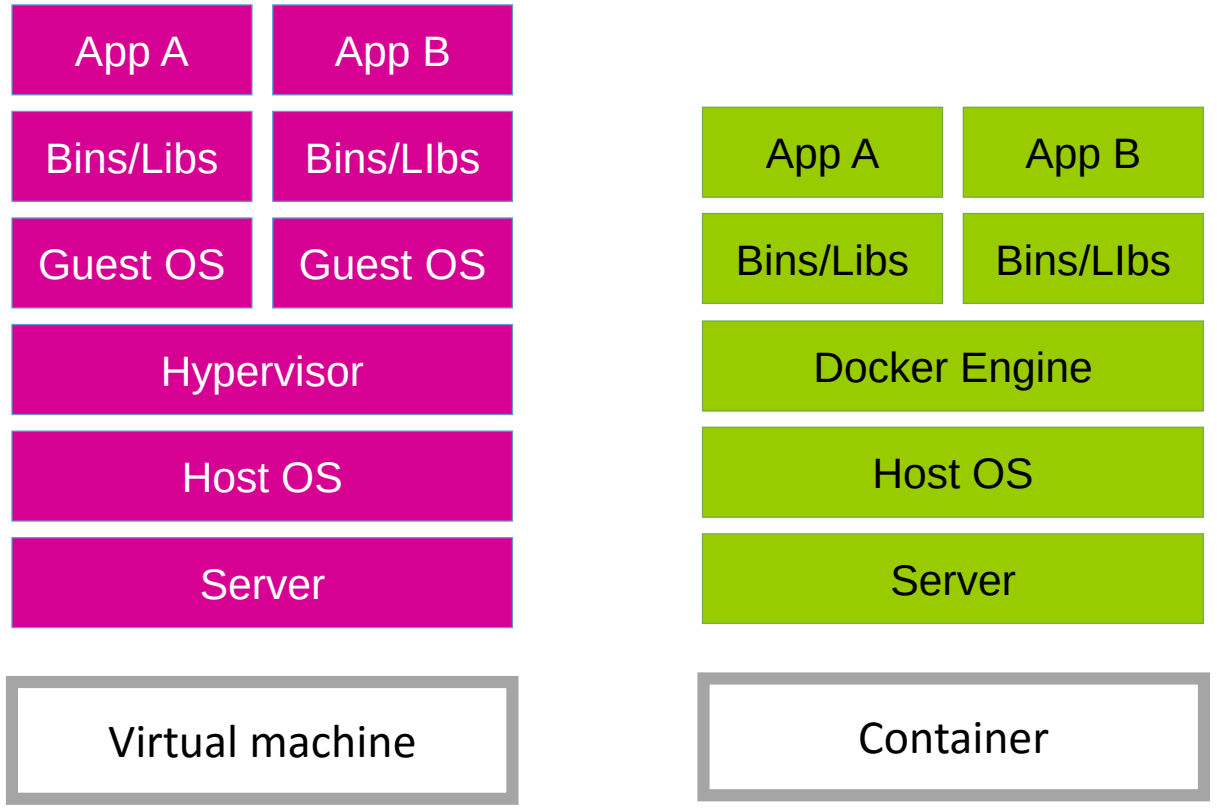
Shipping Using Docker



- Applications can be shipped easily using docker containers
- Image courtesy: Docker

Virtualization And Containerization (8)

VMs Vs. Containers



Module Summary

Now, you should be able to:

- Describe infrastructure automation
- Explain the concept of evolving and immutable infrastructure
- Differentiate between virtual machines and containers

Thank You