Introduction to Devops

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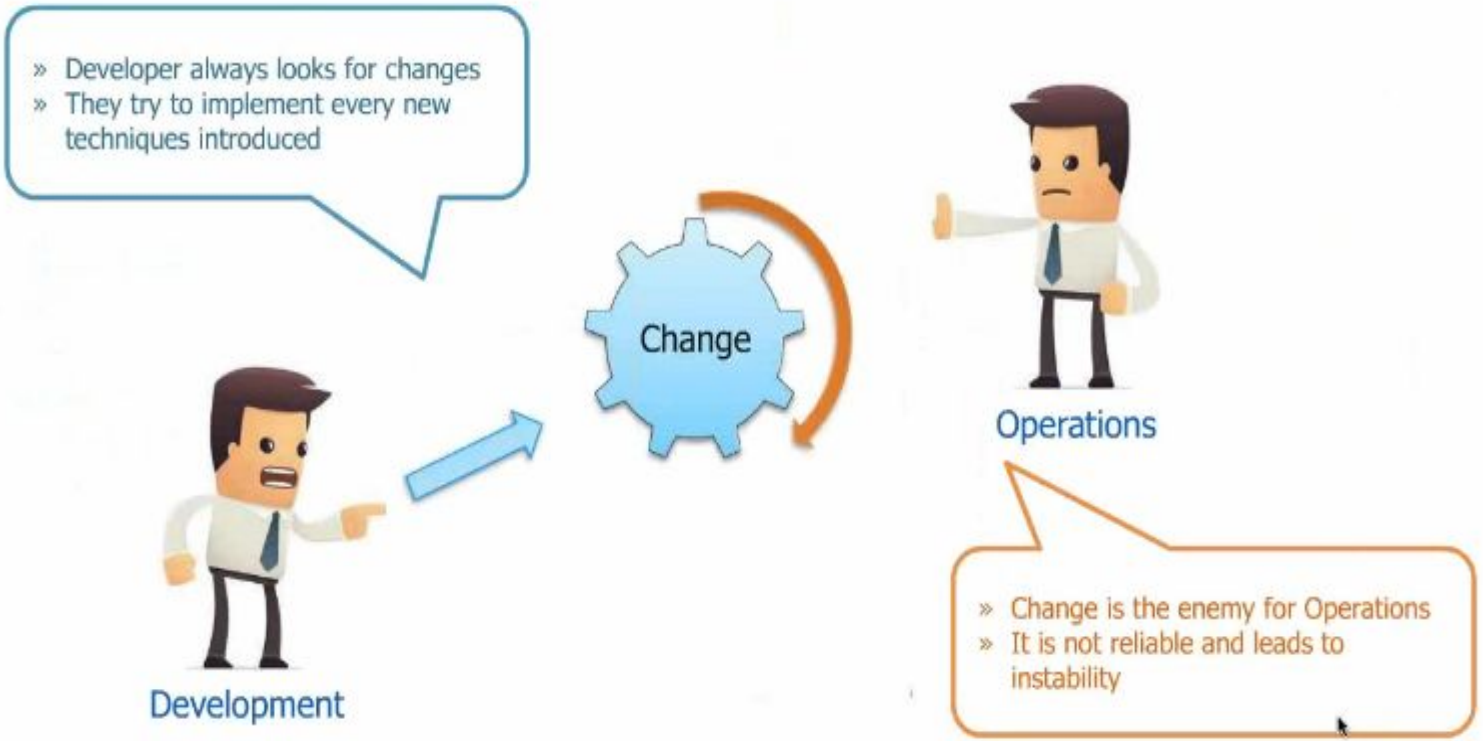
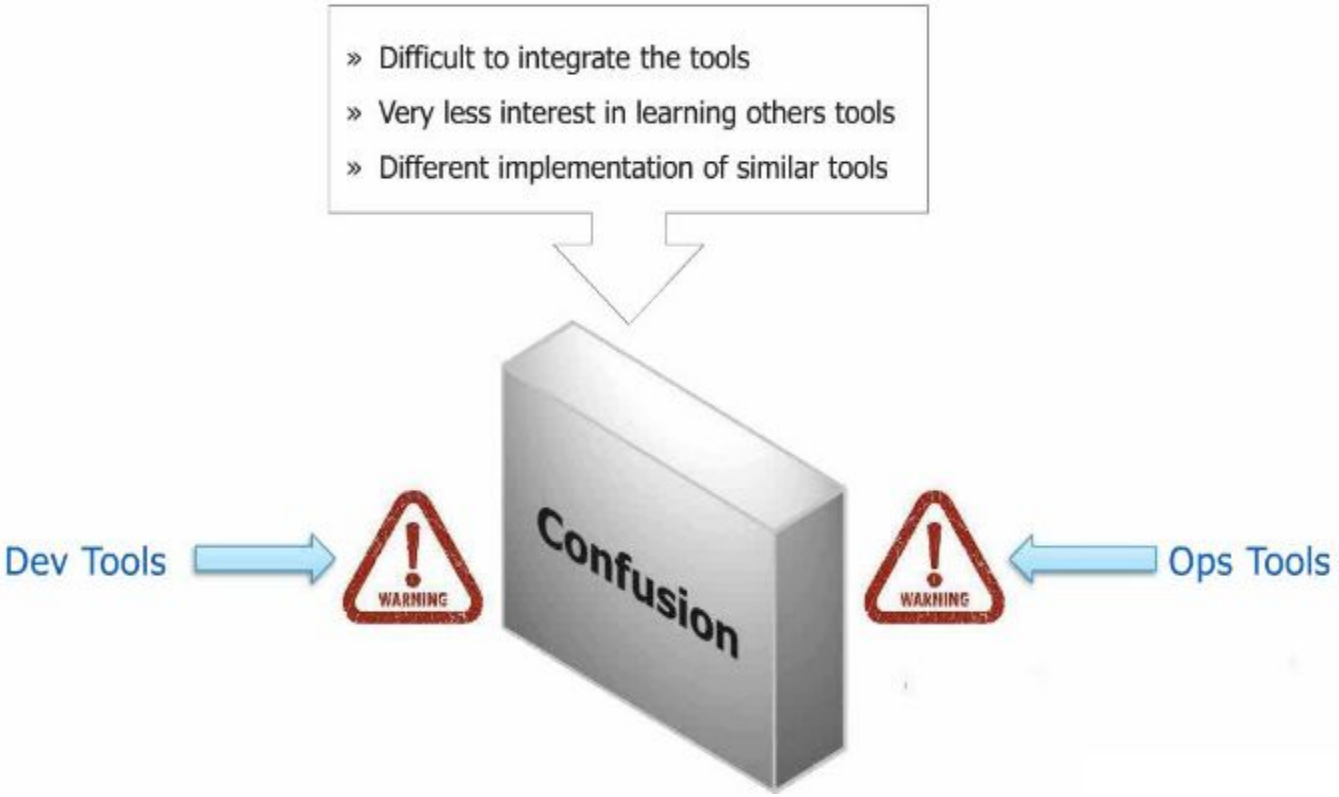
At the end of this module, you will be able to

- Understand Devops, its roles & necessities
- Know about Devops problems and it's solution
- Make a Devops Transition
- Learn to identify cultural impediments and overcome it
- Understand about building Accountability and Trust
- Understand the infrastructure layouts and its challenges
- Learn about scalability and availability
- Learn about networking concepts from an enterprise perspective

Devops Problem



Devops Problem



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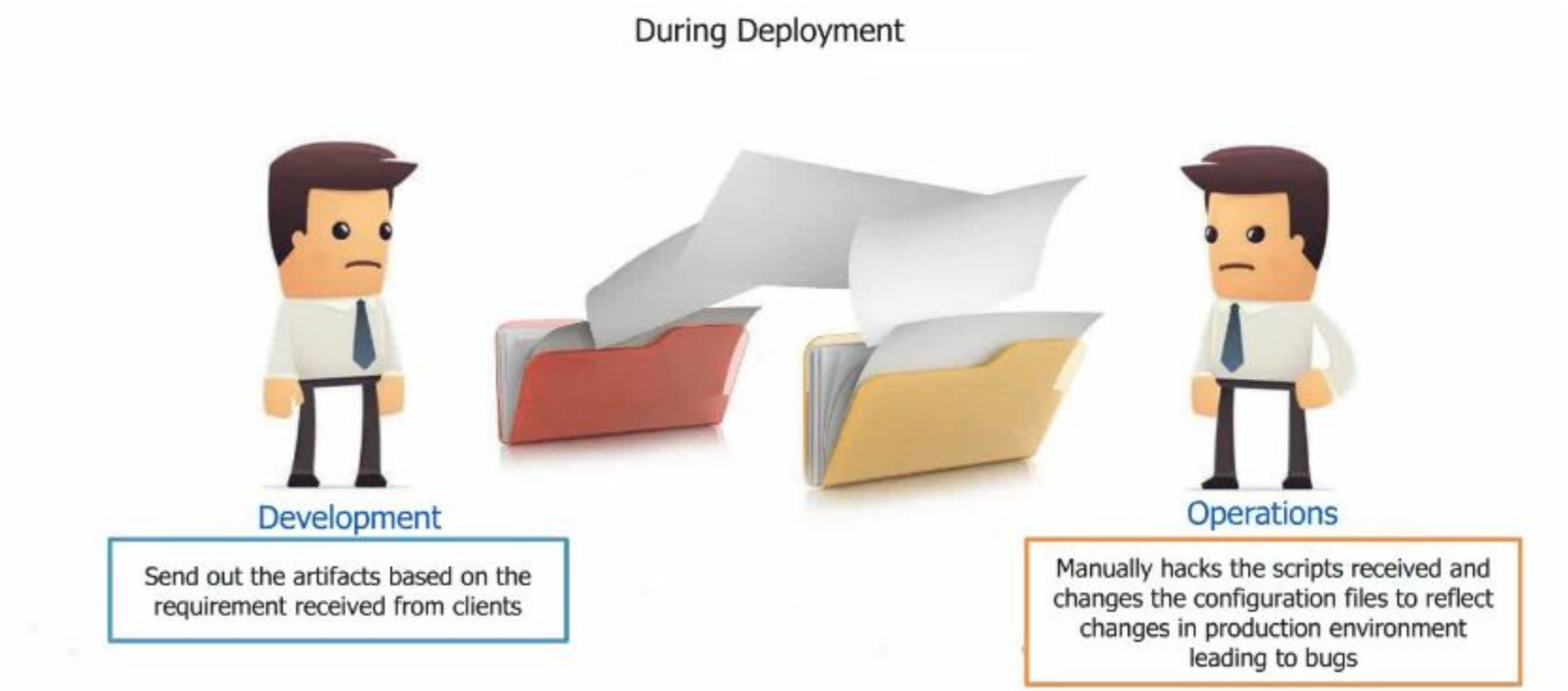
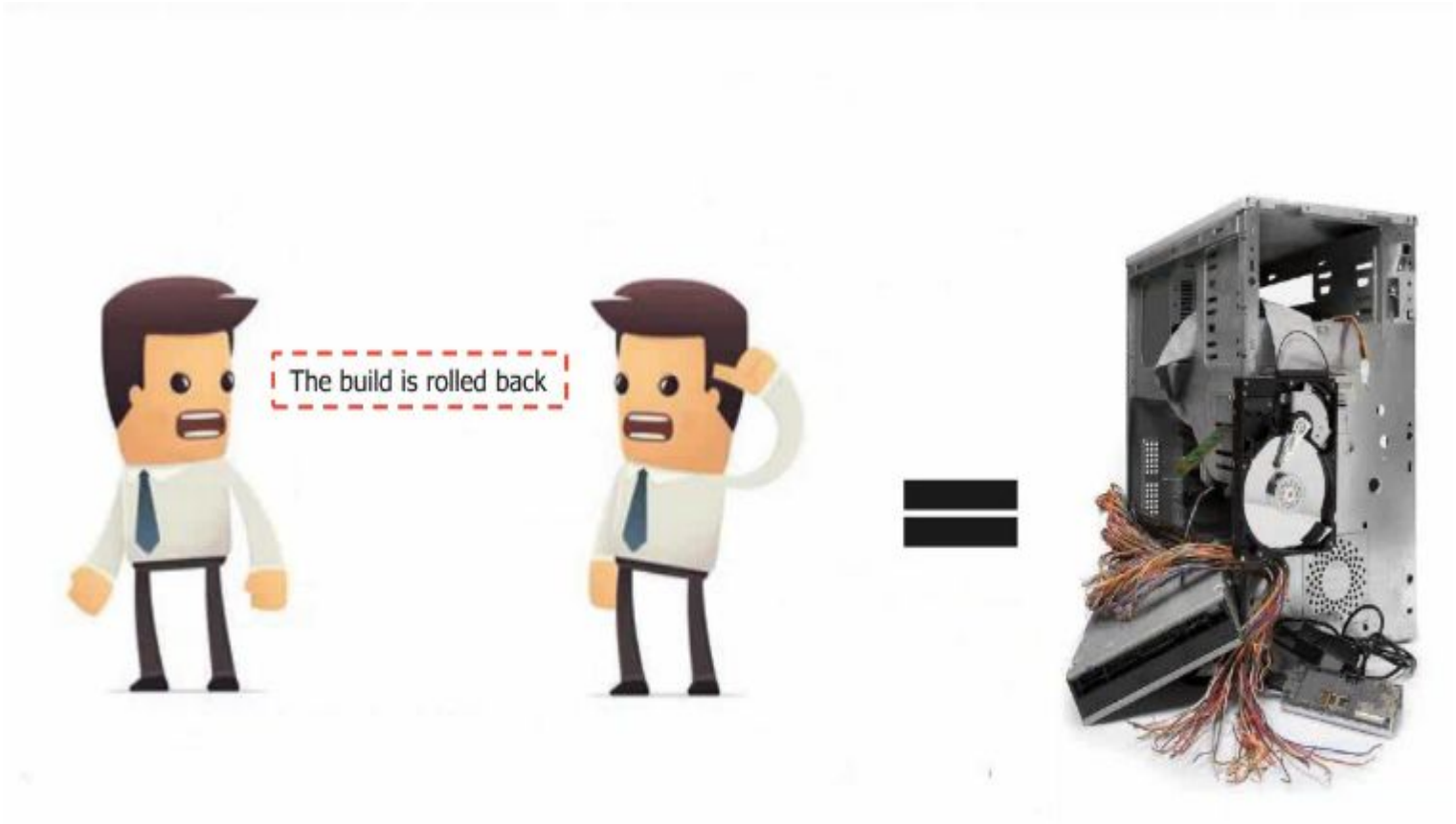
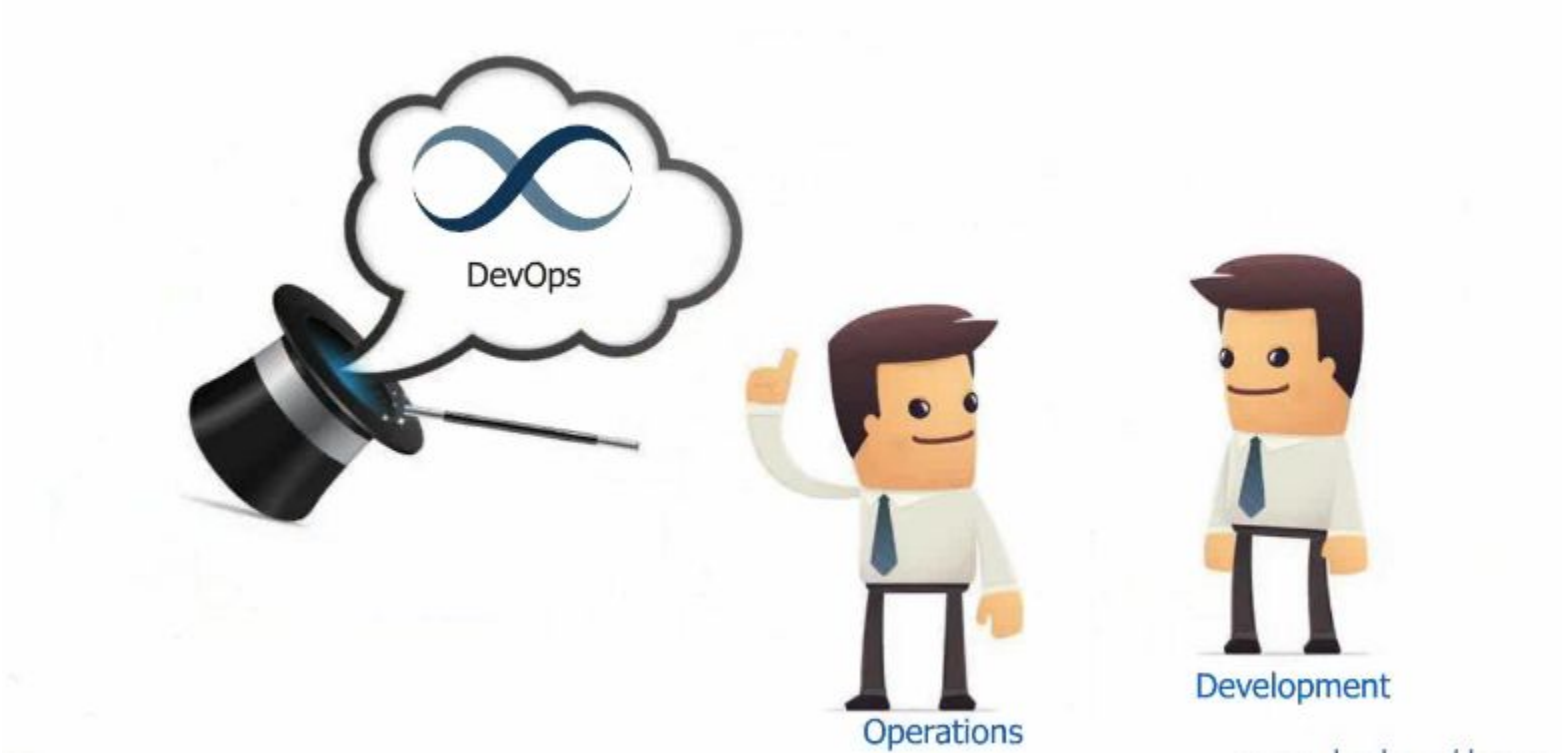


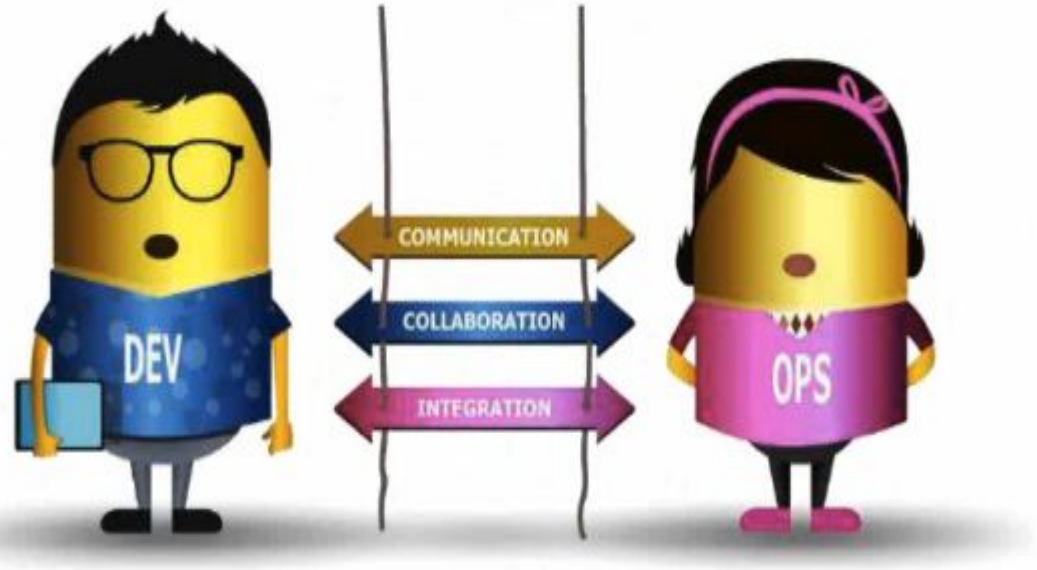
Devops Problem



Devops as the Solution



Development & Operations (Devops)

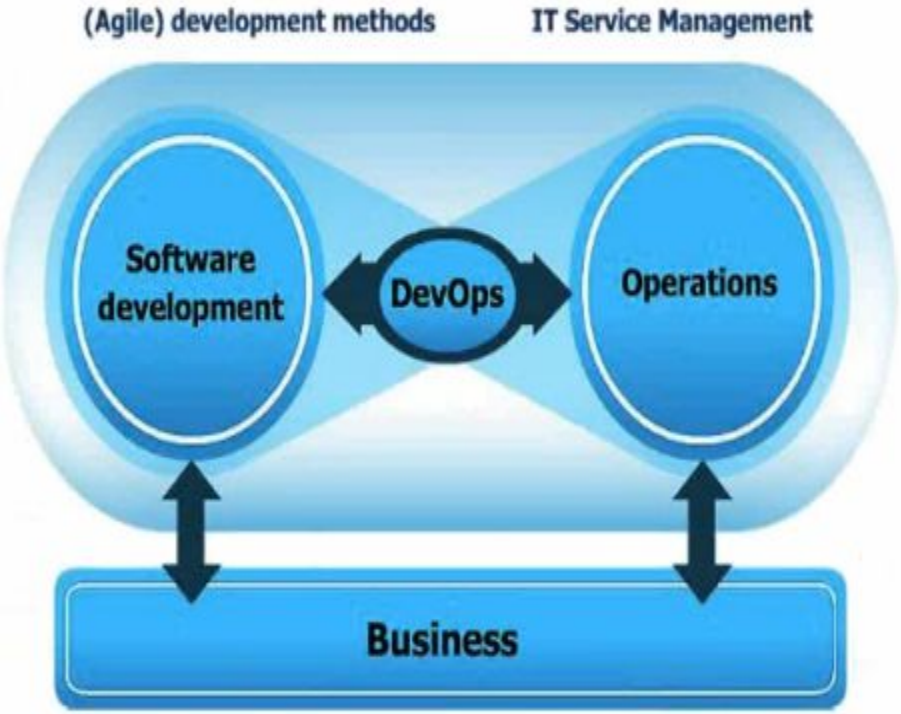


"Dev" is used as a shorthand for developers in particular, but in practice it is even wider and it means that "all the people involved in developing the product," that include the product, QA, and other kinds of disciplines

"Ops" is a blanket term for systems engineers, system administrators, operations staff, release engineers, DBAs, network engineers, security professionals and various other sub-disciplines and job titles"

Devops as the Solution

Instead of seeing these two groups as silos who pass things along but don't really work together, DevOps recognizes the interdependence of software development and IT operations and helps an organization to produce software and IT services more rapidly, with frequent iterations

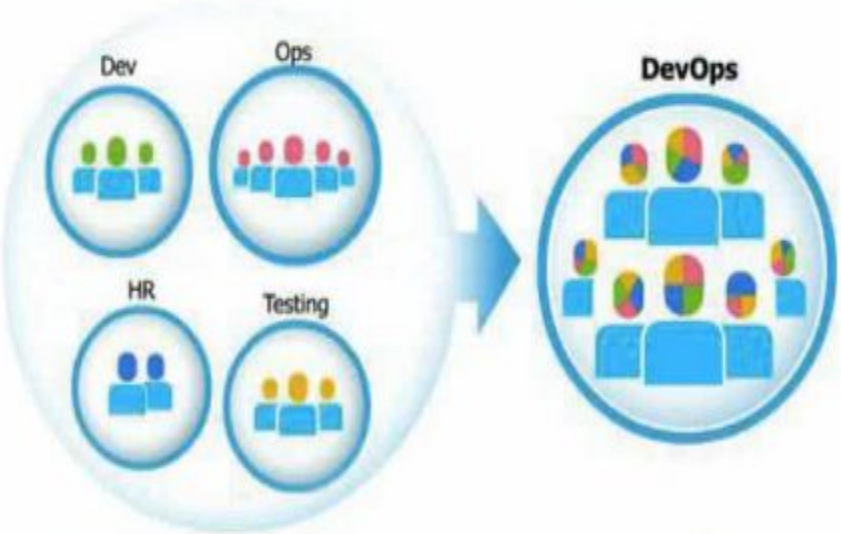


DevOps bridges the gap between agile software development and operations

What is Devops

DevOps is the practice of operations and development engineers participating together in the entire service lifecycle, from design through the development process to production support

Initially there was "Agile Development", when agility aspect was applied to operations it became "agile administration". Thus DevOps was formed



DevOps leads to teams that bring together experts who share their skills and experiences. All experts have at least a basic understanding of the others business subjects

Devops Skills

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→ DevOps Tools – Ability to administer and customize them

→ Scripting Skills – Demonstrates the traditional scripting skills to IT operations

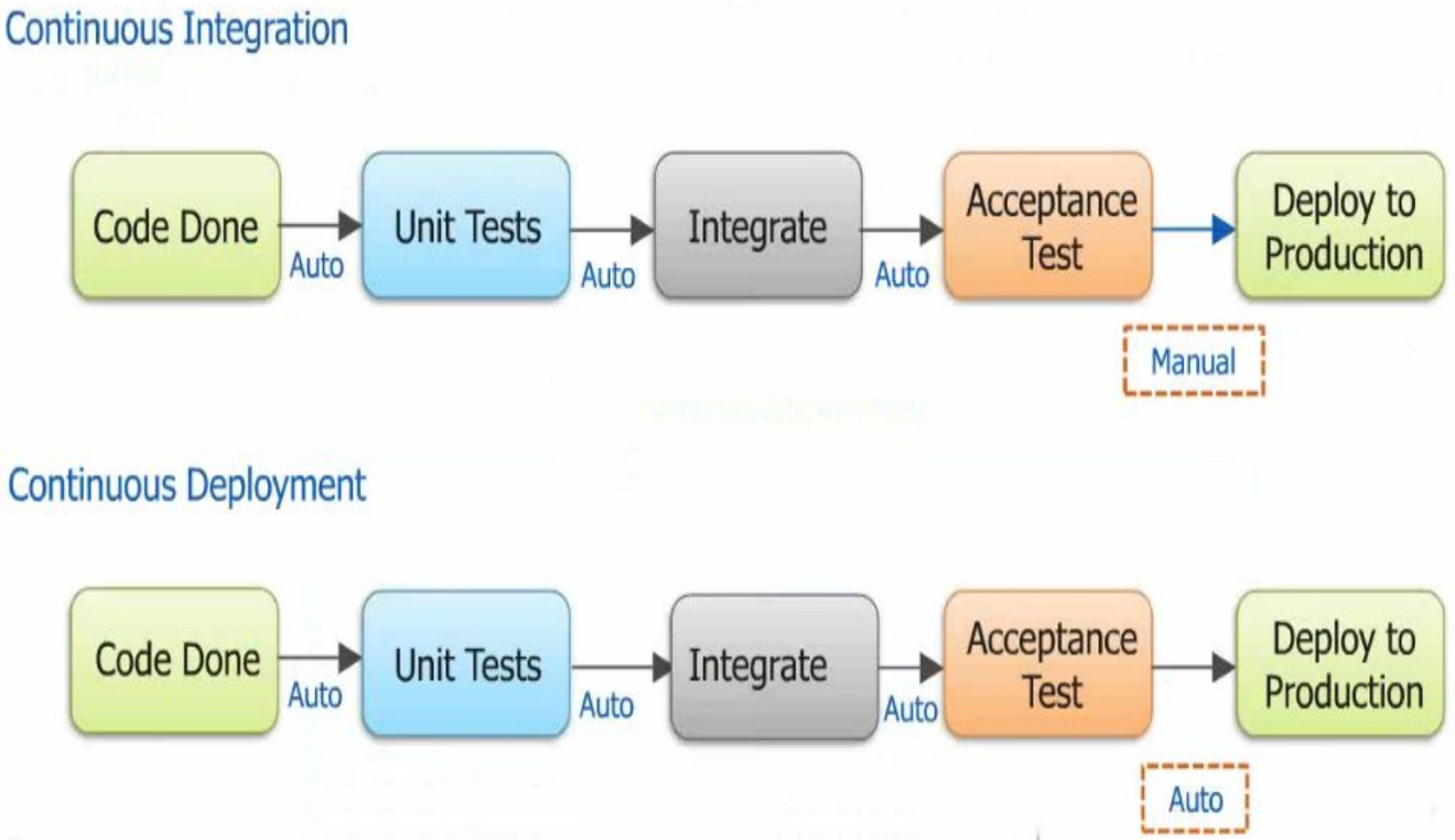
→ Coding Skill – Should possess developer skills in using automation

→ Process re-engineering Skills – Reflects the holistic view of IT and development as a single system, instead of two different functions

DevOps Skill Matrix

Skills	Products
Linux/Unix	Commands & Administration
Shell Scripting	Bash, Sed/Awk
Coding	Perl, Python, Ruby
Configuration Management	Puppet, SaltStack, Chef
Bare Metal Configuration	Cobbler, Foreman, PXE, DHCP, DNS

Continuous Integration and Deployment



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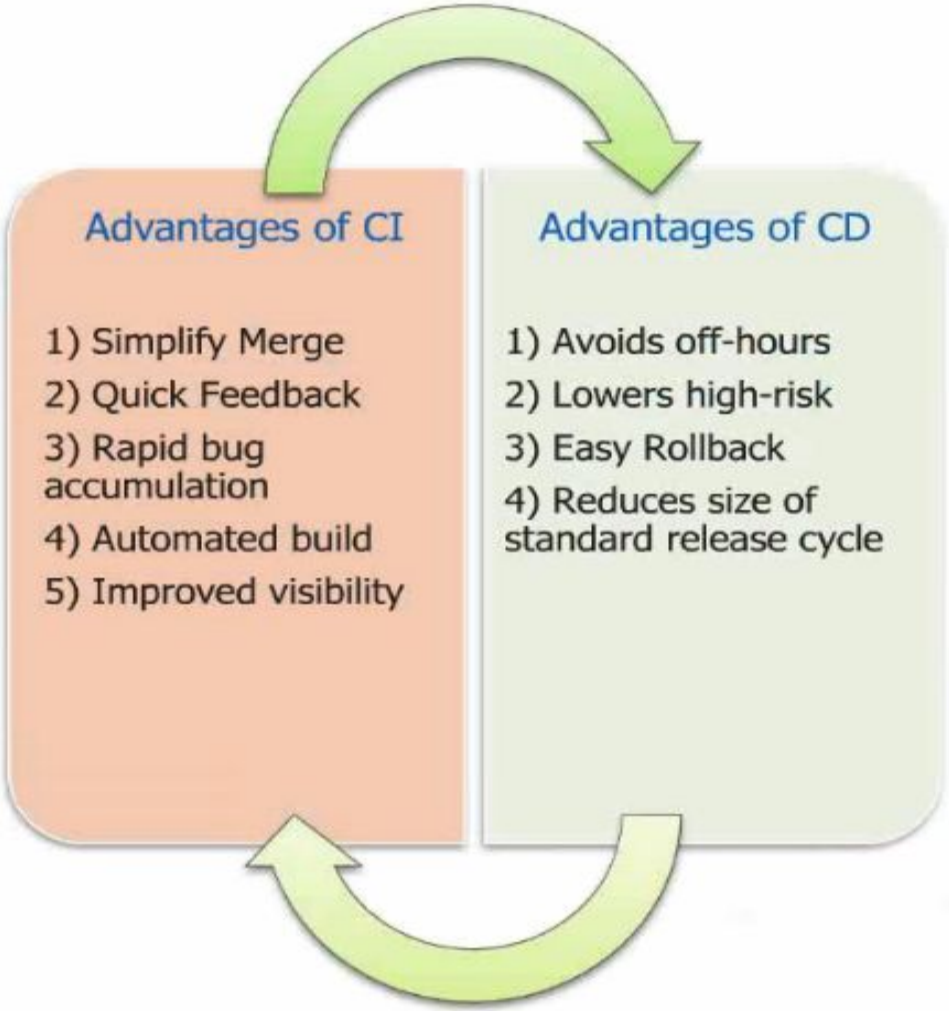


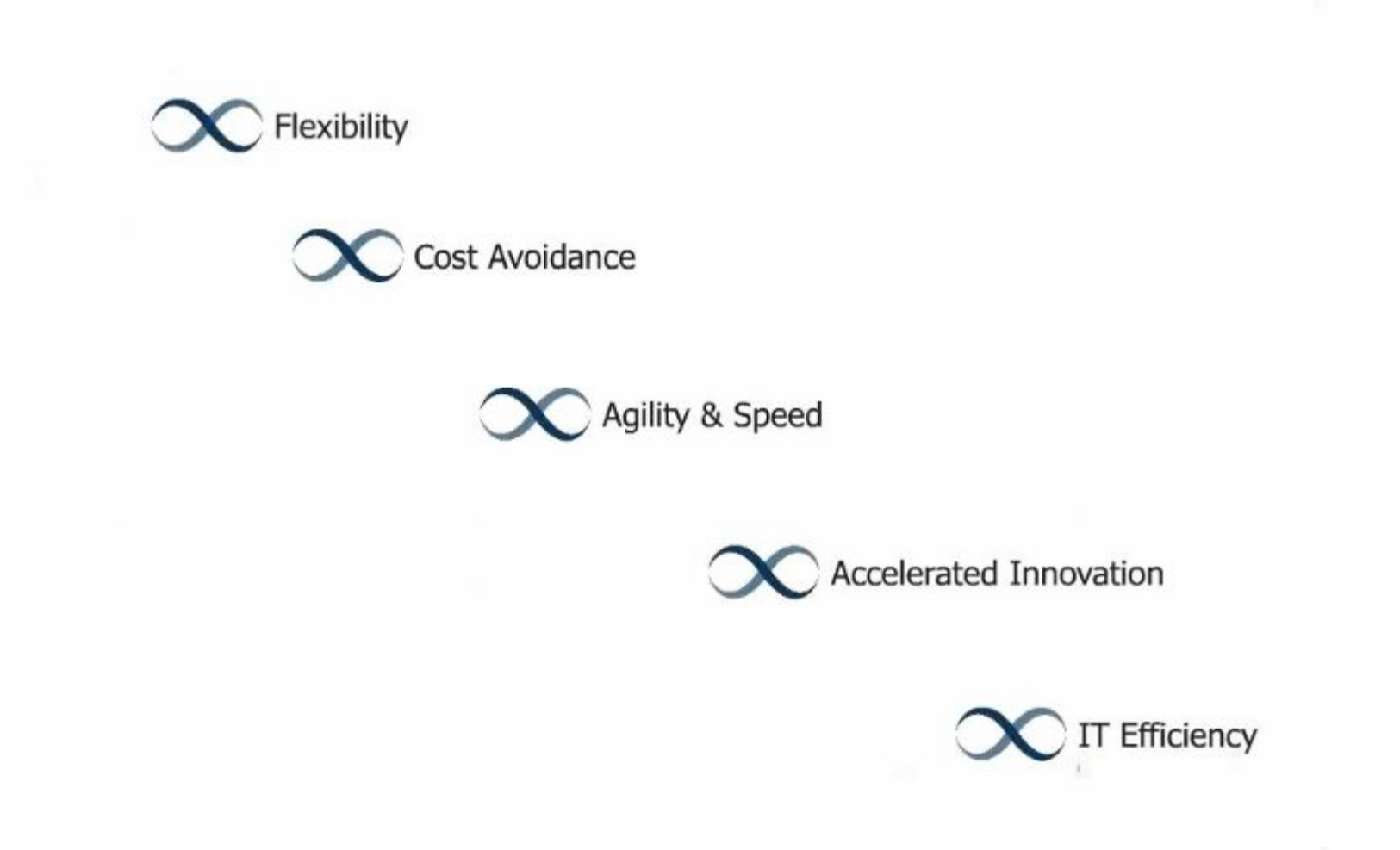
Devops in Real Time

Apple was the among the first company to develop the DevOps team

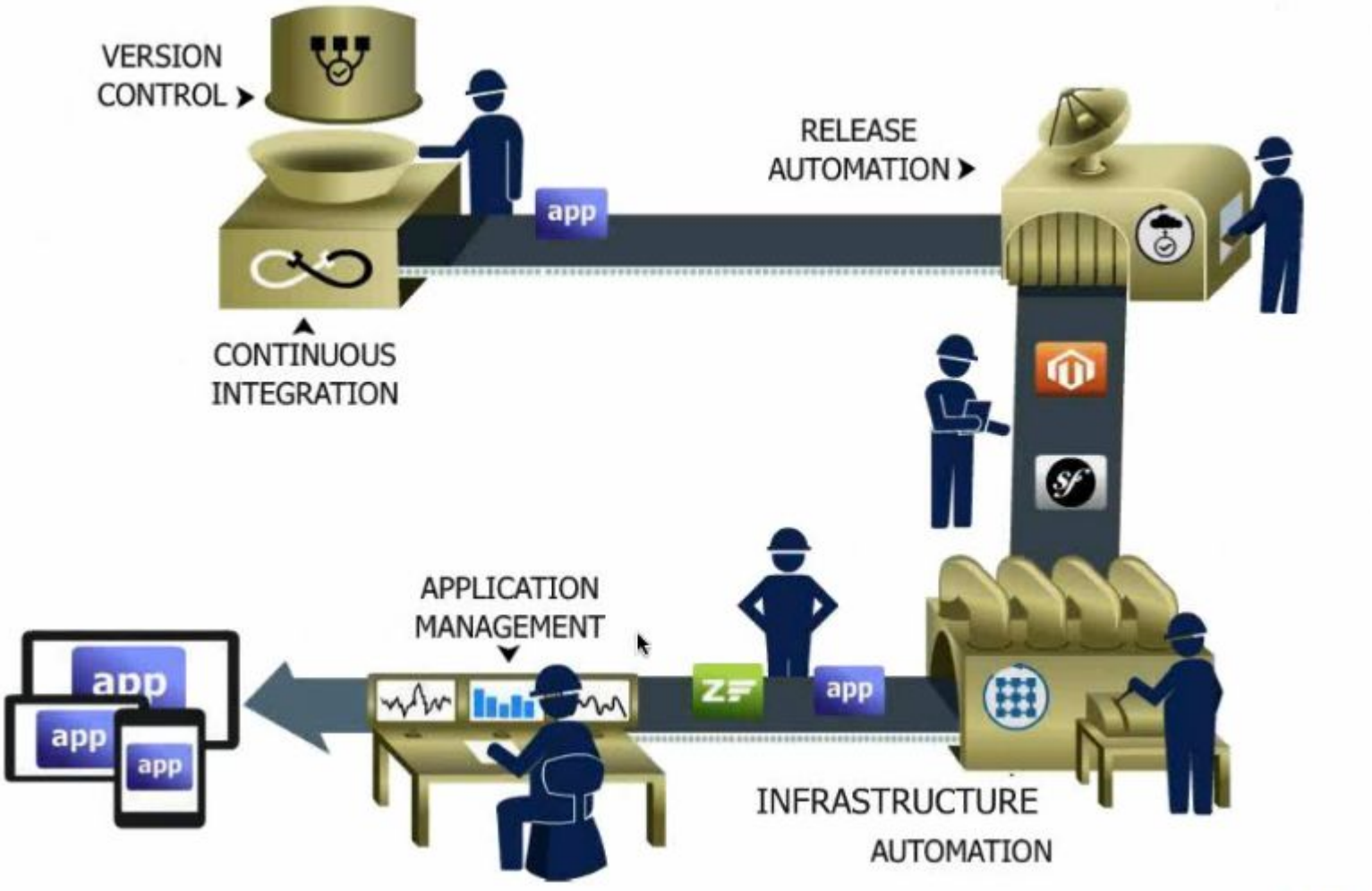
→Ecommerce companies like Amazon, EBay followed the suite & now almost every product based company is trying to use DevOps team to reduce the time to market

→There are companies which have achieved biweekly release cycle targets after introducing DevOps which used to be a month before the introduction of DevOps in their organization

Benefits of Devops



Devops Cycle



Devops Tools

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→ Tools for DevOps can be categorized based on the layer of Automation you choose

→ Each layer has its own tools to build Automation

Infrastructure Automation	1. Cobbler 2. Foreman 3. Crowbar
Configuration Management	1. Puppet 2. SaltStack 3. Chef
Continuous Integration	1. Jenkins, Hudson 2. SVN, Git, Perforce 3. Ant, Maven
Continuous Deployment	1. Capsitrano 2. Custom Tools 3. Yum, Deb, RPM
Monitoring	1. Nagios, Sensu, Zabbix 2. Custom Tools

Devops Roles

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Integration Engineer

Cloud Specialist

Automation Engineer

Release Engineer

Other Devops Challenges

The most common DevOps challenges are:

→ Cultural mindset as "How the typical mindset of people could be taken off "

→ Transitions as "How quickly an organization can build the skill sets and cross train people"

→ DevOps is not a technical problem. It is a business problem as "stake holders are engaged more often"

→ DevOps is not about cool tools

How to Adopt Devops

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People in DevOps

- DevOps culture
- DevOps team

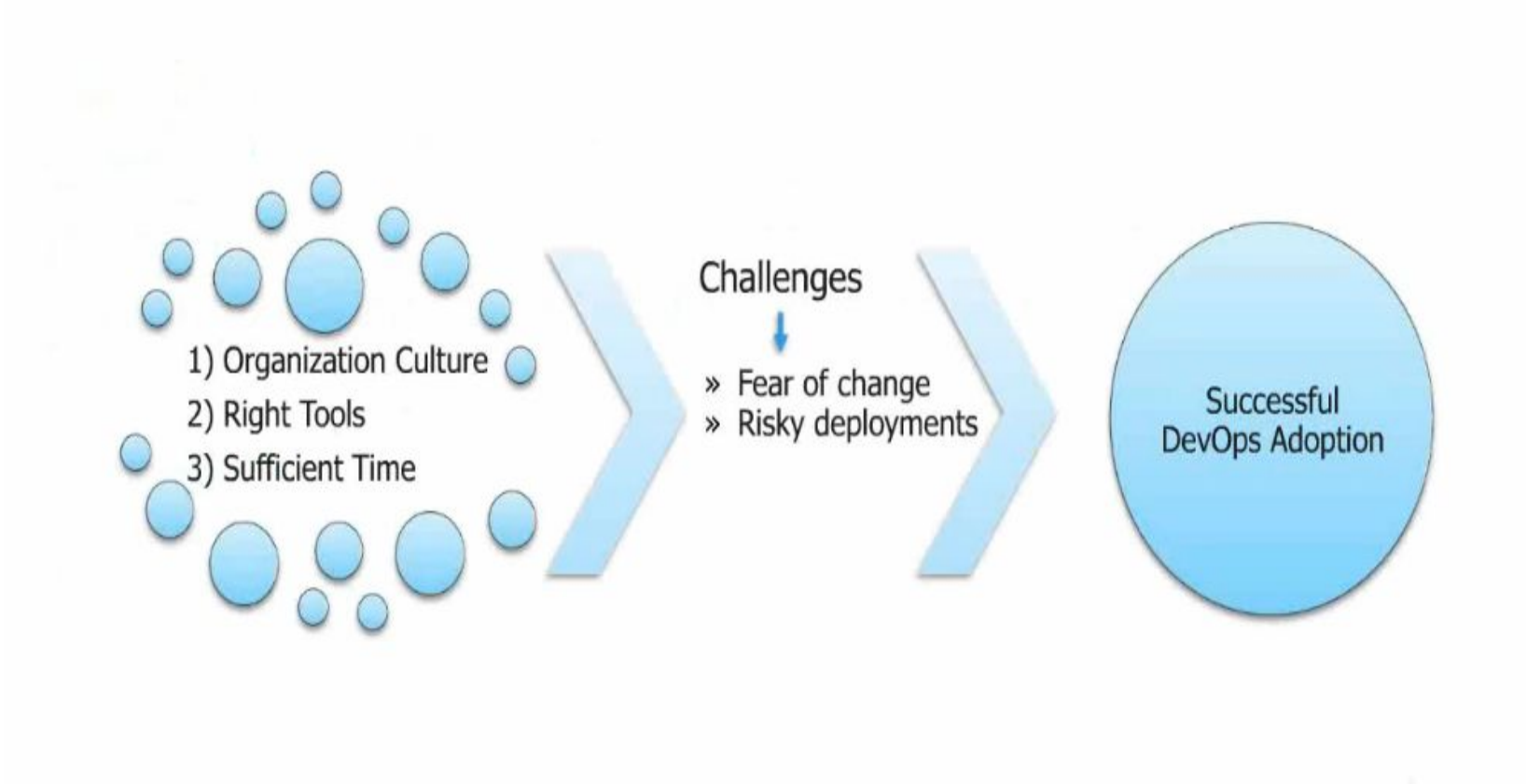
Process in DevOps

- DevOps as a business process
- Change management process

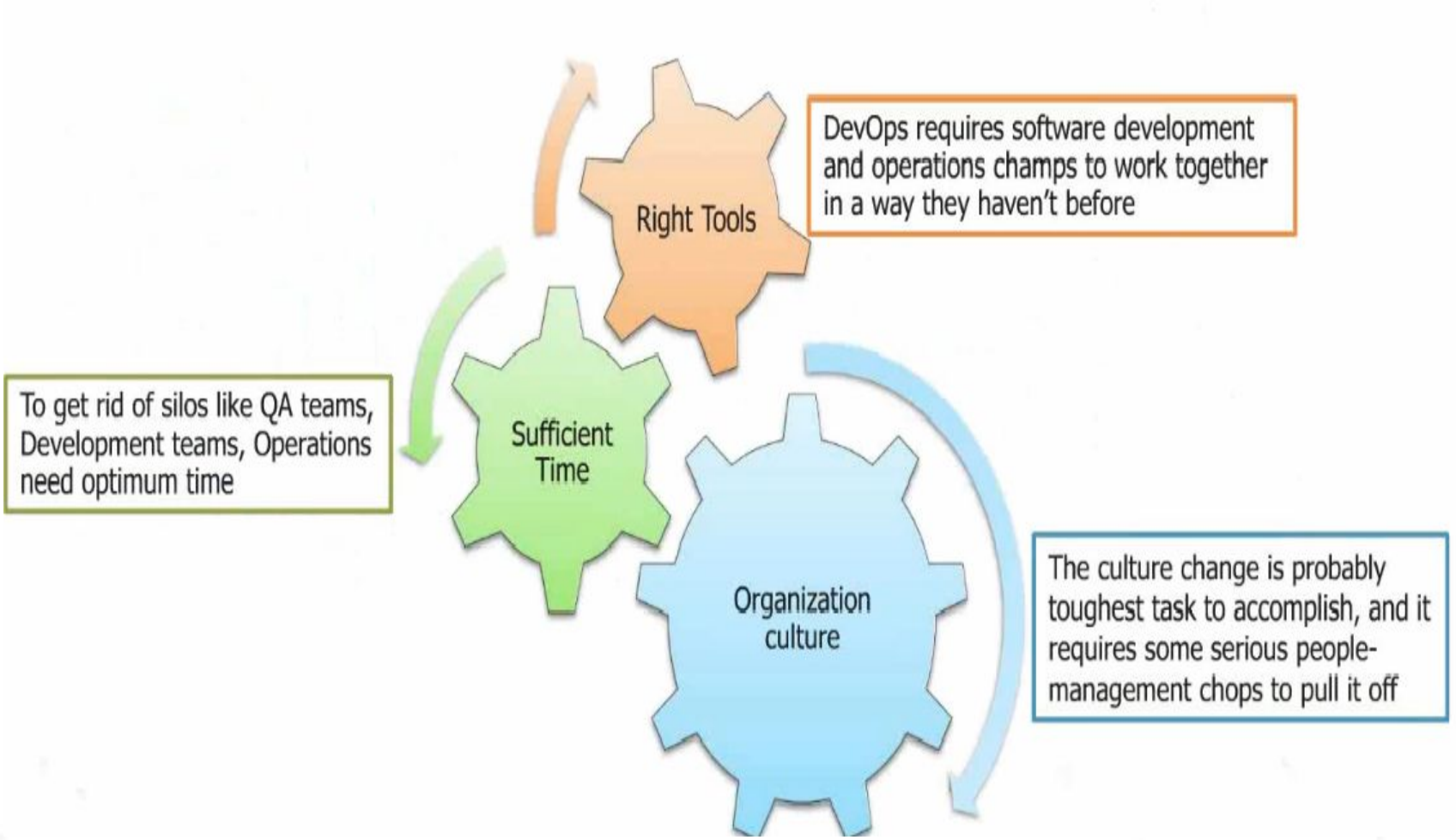
Technology in DevOps

- Delivery pipeline
- Deployment pipeline

Making a Devops Transition



Making a Devops Transition



Making a Devops Transition

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Streamline processes within the Organization

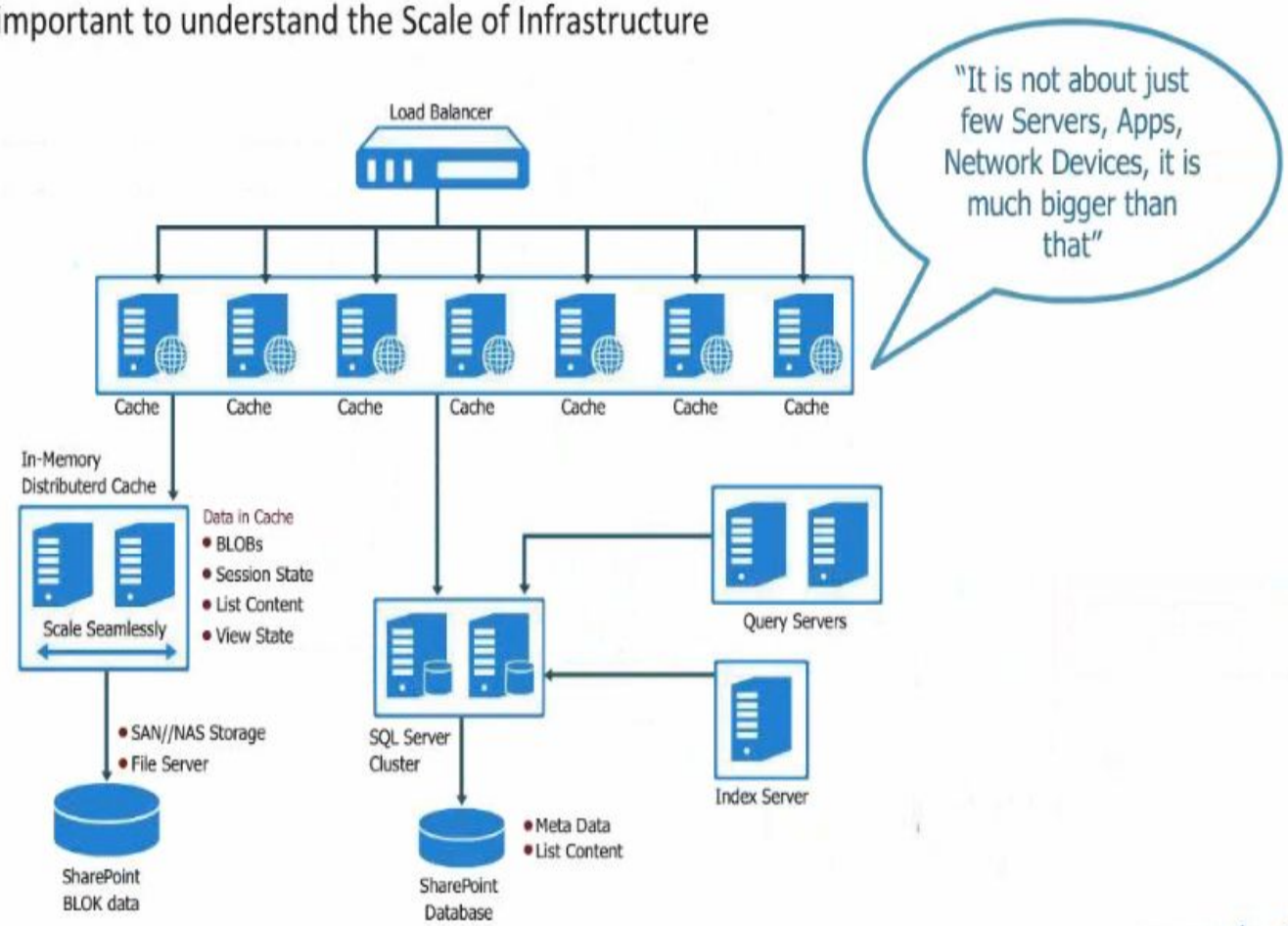
1. Unified processes – The important concept of DevOps is that the complete development-to-operations lifecycle must be considered as one end-to-end process
2. Unified tooling – The tools used across the system must be unified, so that they can be easily utilized, maintained and improved

To achieve the process

- » Bring teams together and have cross trainings
- » Let people change roles
- » Get rid of bureaucracies that resist change and protect the old order of things

Understanding Infrastructure Layout

It is very important to understand the Scale of Infrastructure



Virtualization

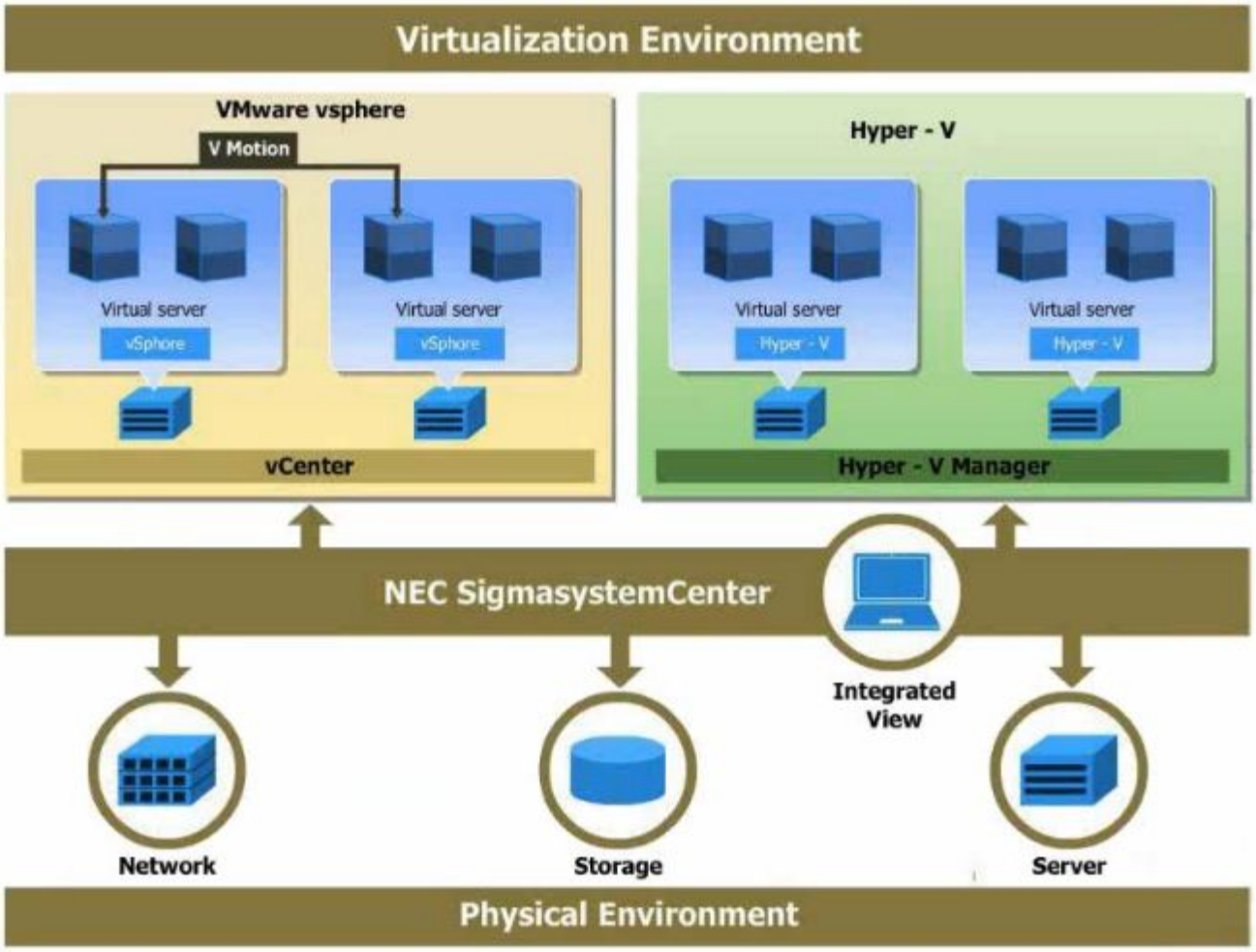
With so many features being developed, it is very important to address the issues reported by various client

Huge request for servers so that the releases can be deployed and tested in isolation

With the advent of virtualization management software's huge number of servers can be created and allocated in isolation

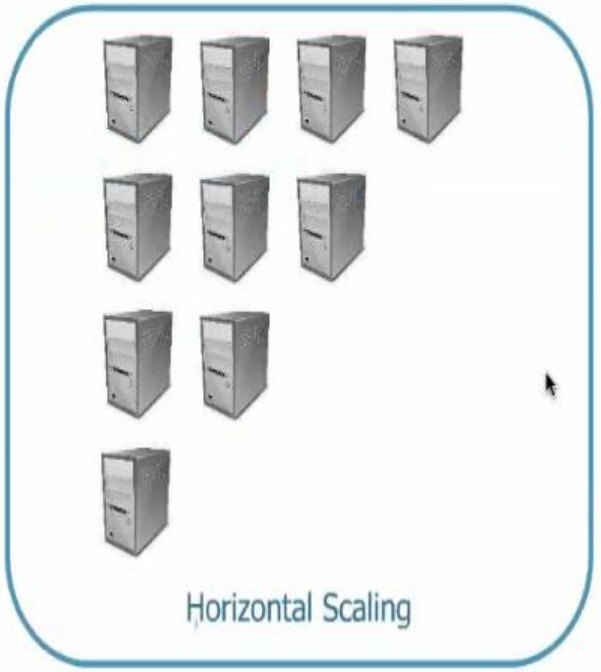
In big organization there are huge farms of servers and the number of virtual servers and physical boxes can range between 10000 to 50000

Virtualization



Scalability & Availability

Scalability: It is the process of extending your existing infrastructure, to serve the need for increasing storage, processing power in terms of CPU & network bandwidth



Scalability & Availability

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Scalability is not just about expanding servers, router or databases. Layering your Infrastructure is a very important part of it. The more traffic you can offload, the better it will be.

Off loading

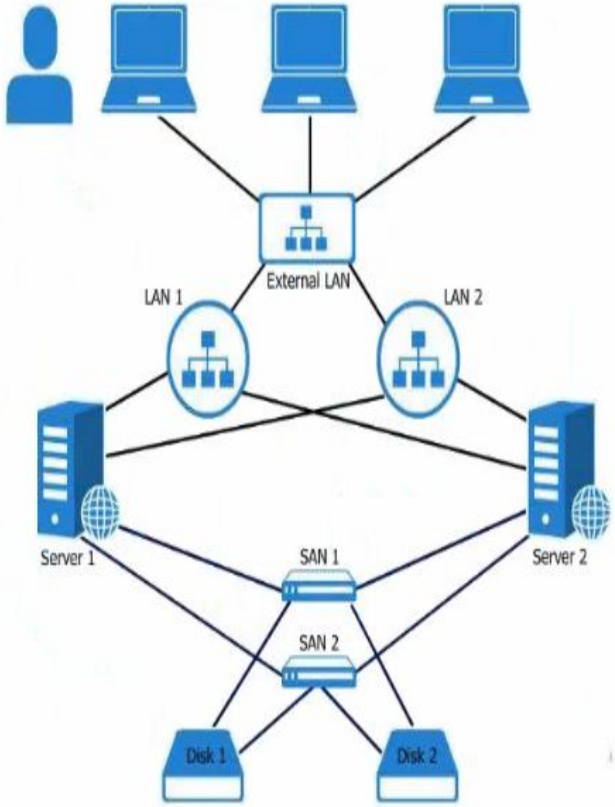
Cache is a component that transparently stores data so that future requests for that data can be served faster. It can be divided into various levels:

1. The Web Server Caching
2. The Application Caching
3. The Database Caching
4. Network Level Caching

Caching makes things faster, but also poses challenges that how you will make sure the that contents served are the latest

Scalability & Availability

Availability is more important then scalability, as the lights need to be kept ON. It might have degraded performance, but it must serve the request



Understanding the Scale of Things

"Sometimes it is thought that working with one server is same as working with thousand servers ,which is false. It is very important to understand the scale and the challenges it poses."

→There may be thousands of Servers, Router, Switches at multiple locations

→Also, there can be many application stacks running in an Organization

Let us see working of components at

- Network Layer
- Server Layer
- Load balance layer
- Backend layer
- Caching layer

Understanding the Scale of Things

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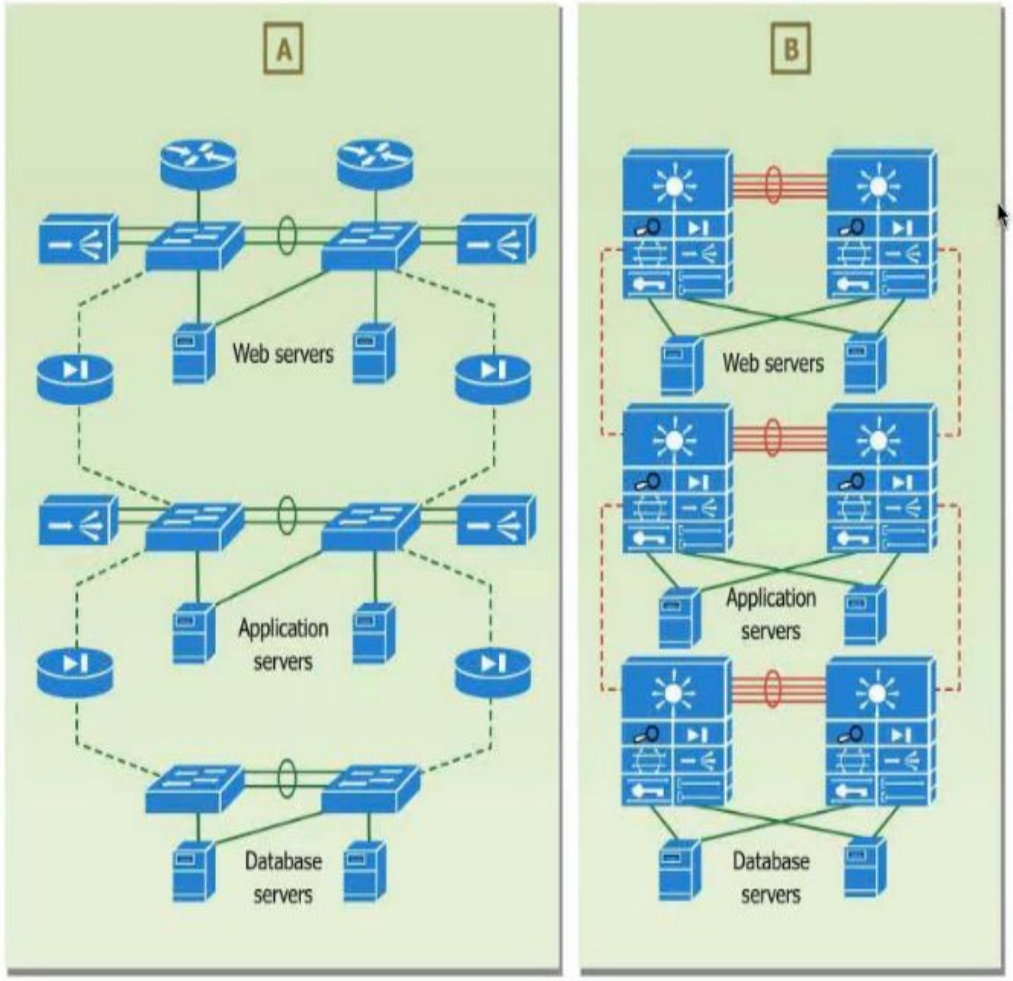
Network Layer



Understanding the Scale of Things

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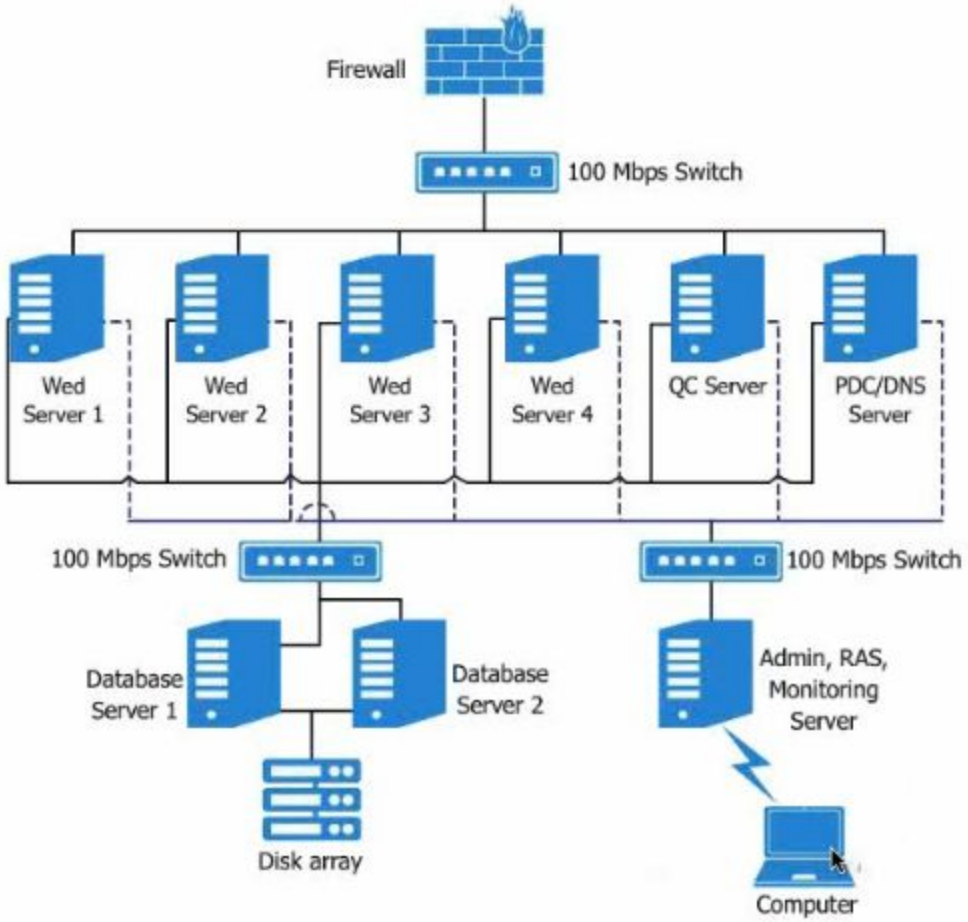
Server Layer



Understanding the Scale of Things

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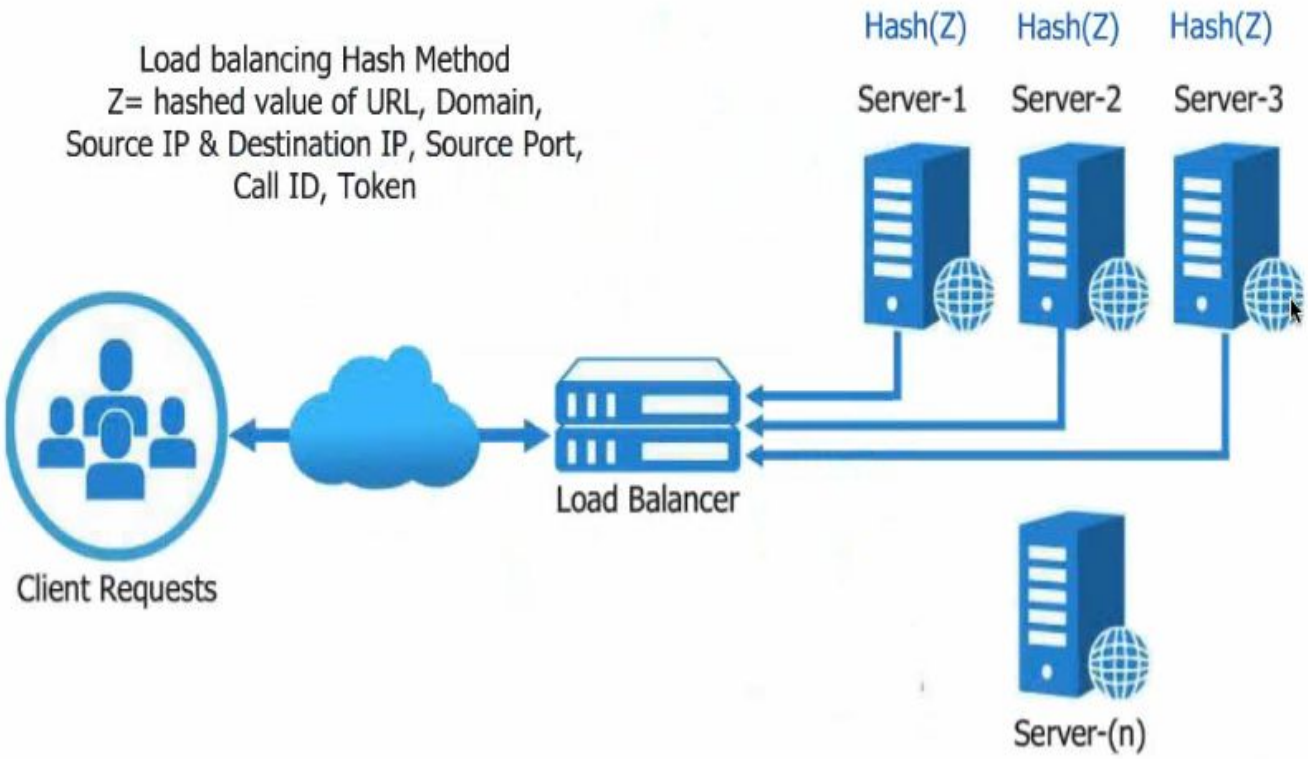
Load balance Layers



Understanding the Scale of Things

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Load balance Layers

CPU- bound Load	Out of memory	I/O bound Load
When you have too many CPU-intensive processes running at once. Because each process needs CPU resources, they all must wait for their turn which increases the load on CPU	When a system runs out of available RAM and has started to go into swap. Because swap space is usually on a hard drive that is much slower than RAM, so complete process slows down	I/O wait is the total time that working processes are blocked, waiting for the I/O operation to complete. When there are lot of waiting thread, it increases the load on I/O

By default, the columns in `vmstat` stand for the following:

`Procs - r` : Total number of processes waiting to run

`Procs - b` : Total number of busy processes

`Memory - swpd` : Used virtual memory

`Memory - free` : Free virtual memory

`Memory - buff` : Memory used as buffers

`Memory - cache` : Memory used as cache.

`Swap - si` : Memory swapped from disk (for every second)

`Swap - so` : Memory swapped to disk (for every second)

`IO - bi` : Blocks in (in other words) the blocks received from device (for every second)

`IO - bo` : Blocks out (in other words) the blocks sent to the device (for every second)