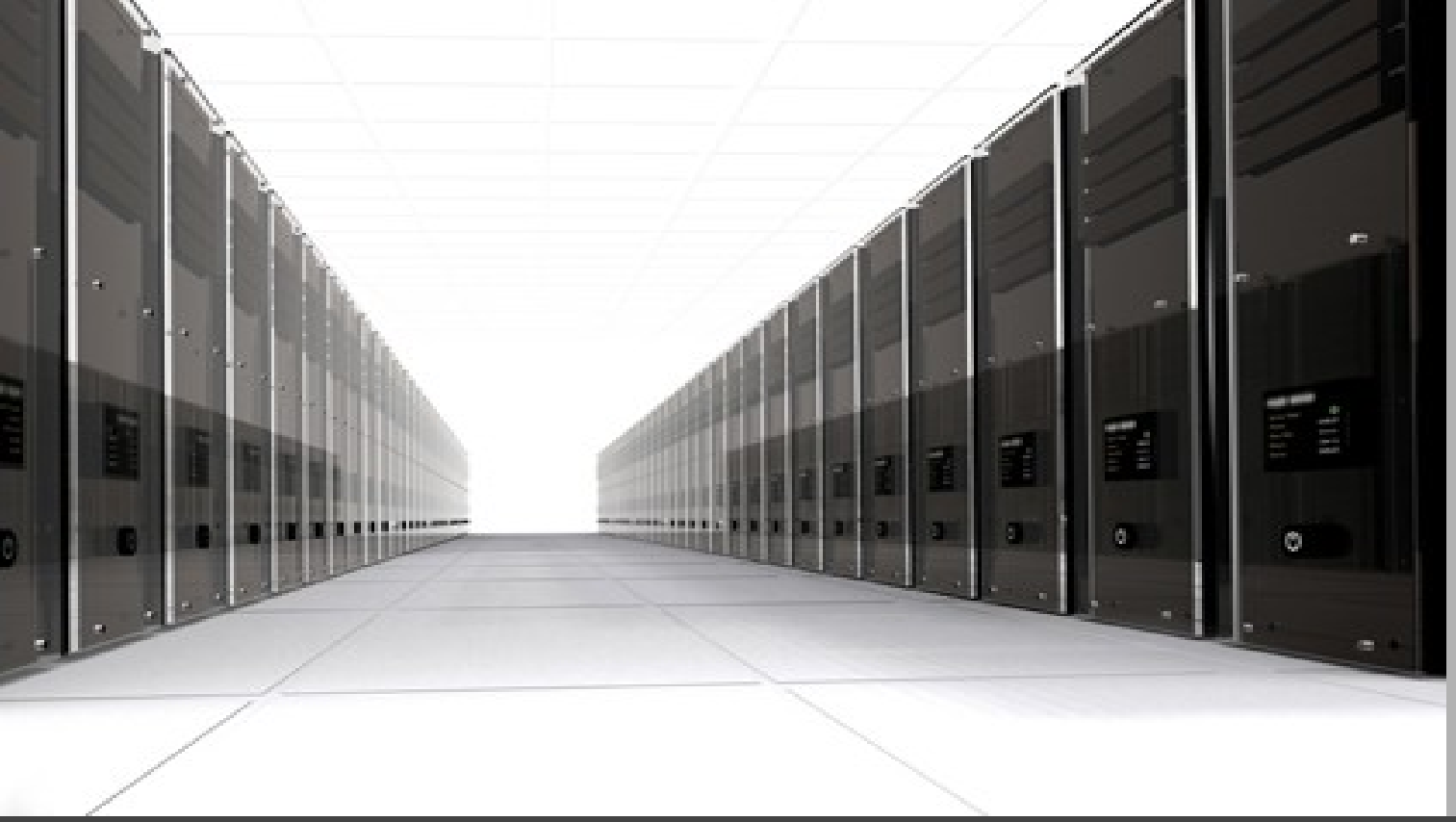

AUTOMATION, ORCHESTRATION, MONITORING

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V.1.1
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DE CATALUNYA
BARCELONATECH

Remember?

General organizations:

1.- Governance

2.- Management

3.- Execution

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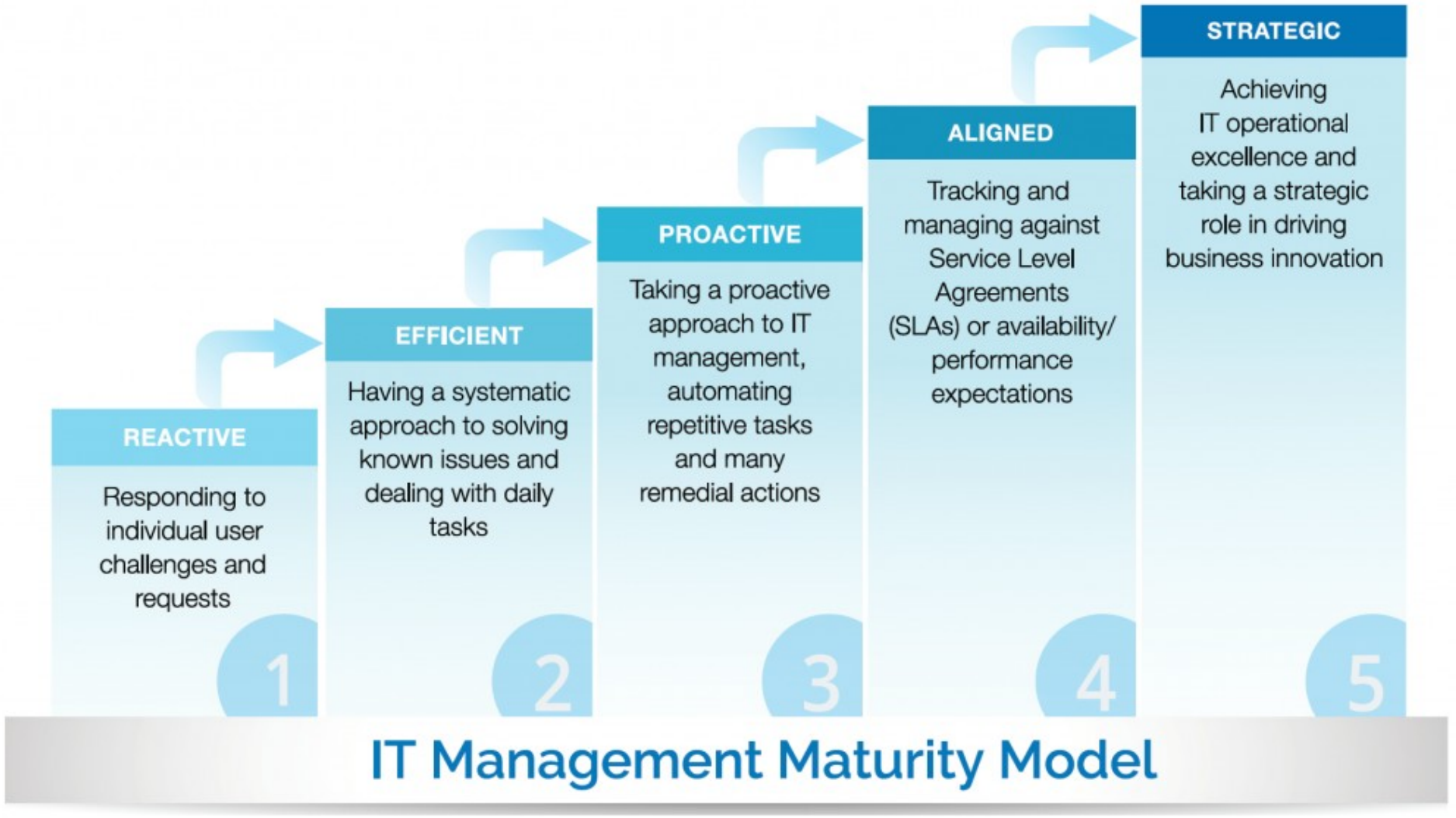
What are the goals?

What do we need?

Type of IT management

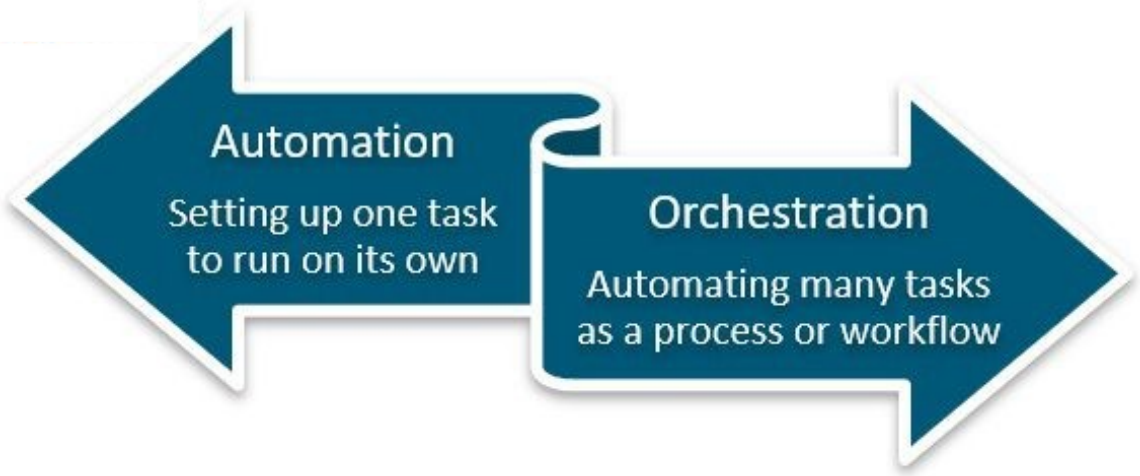


Automation

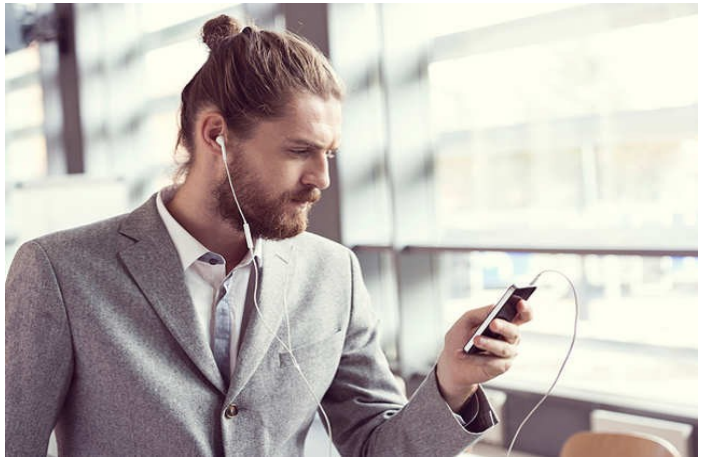
- Take common tasks and script them so that they can be done, for example, with a single command
- Examples: creating a new virtual machine; launching a web service; stopping a service; organizing emails in folders
- This is about automating **tasks**

Orchestration

- Works at a higher level
- Example: deploying an application with a Web server, a middleware server and a database server, analyzing workload of physical servers and move virtual machines
- This is about automating **processes**



Imperative vs. Declarative



Imperative

apt install libreoffice

Declarative

```
package { 'libreoffice':
    ensure => ‘latest’,
}
```

A server

You buy it – Name it – Install an OS – Install software – Configure it – Actualize software – Change configuration – Install new software – Actualize OS – Change configuration- Update OS – Install more and more things – Upgrade hardware – Love it – Maintain it with great effort

What if you have 1000 servers?

A ~~server~~ pet

You buy it – Name it – Install an OS – Install software – Configure it – Actualize software – Change configuration – Install new software – Actualize OS – Change configuration- Update OS – Install more and more things – Upgrade hardware – Love it – Maintain it with great effort

From PETS to HERDS

From PETS to HERDS

1.- Buy homogenous servers with IPMI/Redfish

-The Intelligent Platform Management Interface (IPMI) is a set of computer interface specifications for an autonomous computer subsystem (BMC – Baseboard Management Controller) that provides management and monitoring capabilities independently of the host system's CPU, firmware (BIOS) and operating system. in 2014 evolved to Redfish.

From PETS to HERDS

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2.- Service must be independent from hardware

3.- Practical names for servers but also easy to remember

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5.- Use tools (herding dogs)

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5.- Use tools (herding dogs)
6.- Document / codify configuration (IaaC)

Infrastructure as a Code (IaaC) refers to the delivery and management of infrastructure through high-level descriptive code compared to manual processes.

An example: the TSC department at UPC

Foreman

- Graphic interface that can work with other tools
- Group servers in hostgroups
- A new server is installed: foreman detects it
- You identify the hostgroup the new server belongs to
- Other tools organize the new server

Cobbler

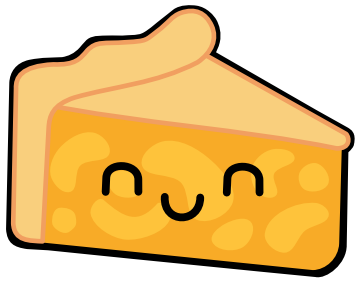
- OS installation

Puppet

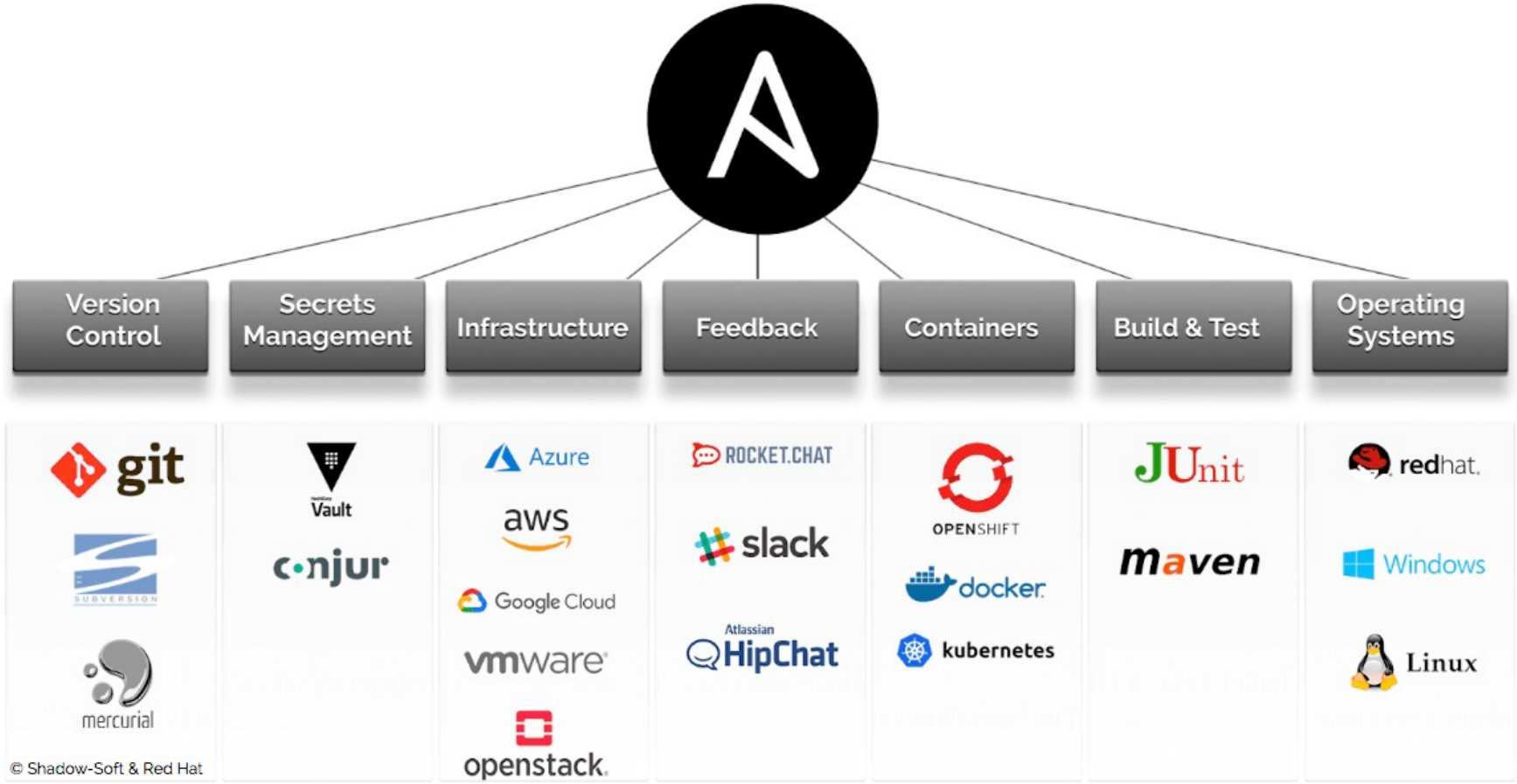
- Software installation
- It is DECLARATIVE

Ansible

- For punctual tasks
- For instance, some shutdowns



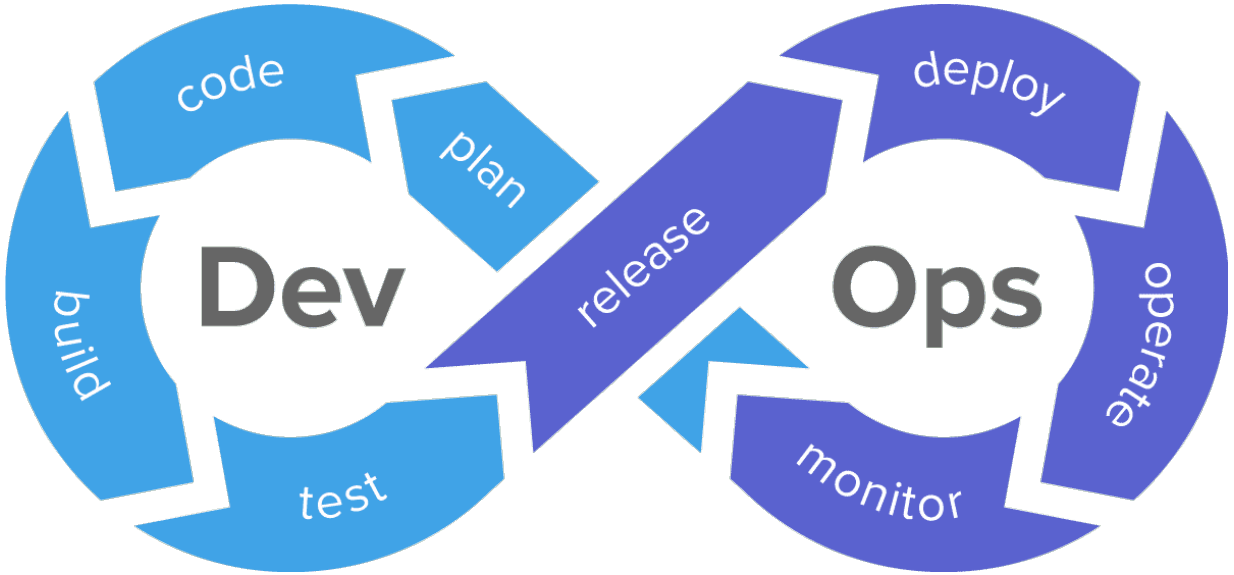
Control multiple tools



Automation in developing

1.- Code repository (e.g. Git, CVS, Vault)
2.- Building automated tools (e.g. PVS-Studio, Crucible, sonarqube)
3.- Automatic integration (e.g. Jenkins, Tekton Pipelines)

DEVOPS and CI/CD (Continuous Integration, Continuous Deployment)

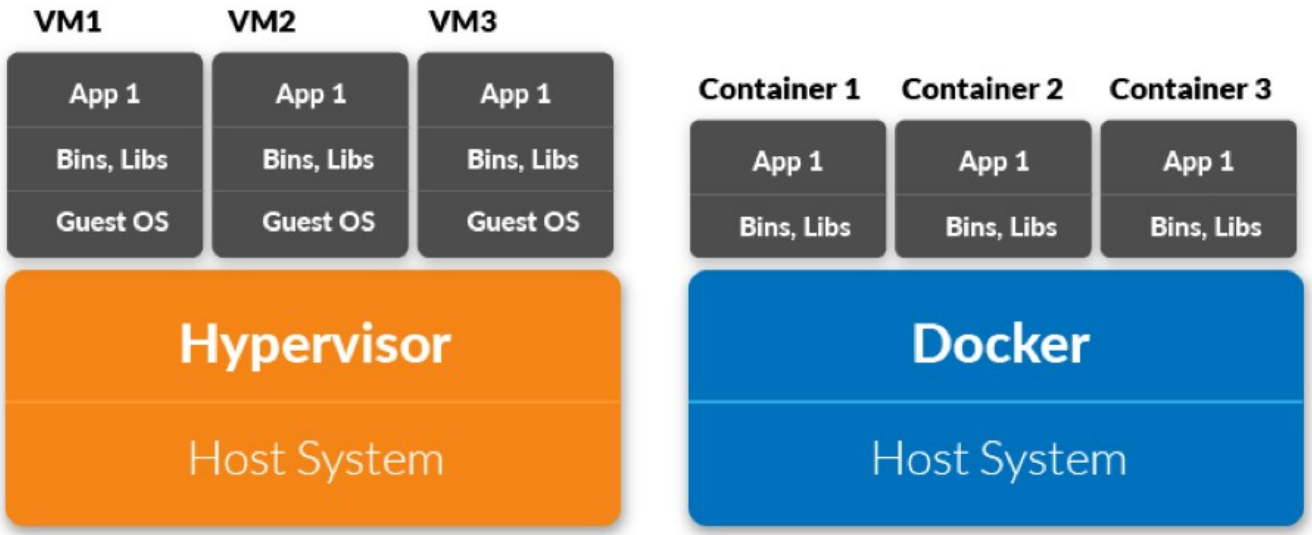


- Plan: something new, some new feature, fixing some problem…
- Code: following patterns
- Build: creating a new version (in a sandbox)
- Test: does it works? strong test system
- Release: new version (beta) for some users or working in parallel with old version
- Deploy: new version available for all clients
- Operate: working in normal basis
- Monitor: QoS, client response, …

Greg Lavender, CTO Intel
The Phoenix Project (book)

Company	Deployment frequency
Amazon	23,000 per day
Google	5,500 per day
Netflix	500 per day
Facebook	1 per day
Twitter	3 per week
Typical enterprise	1 every 9 months

Containers



Traditional Hypervisor

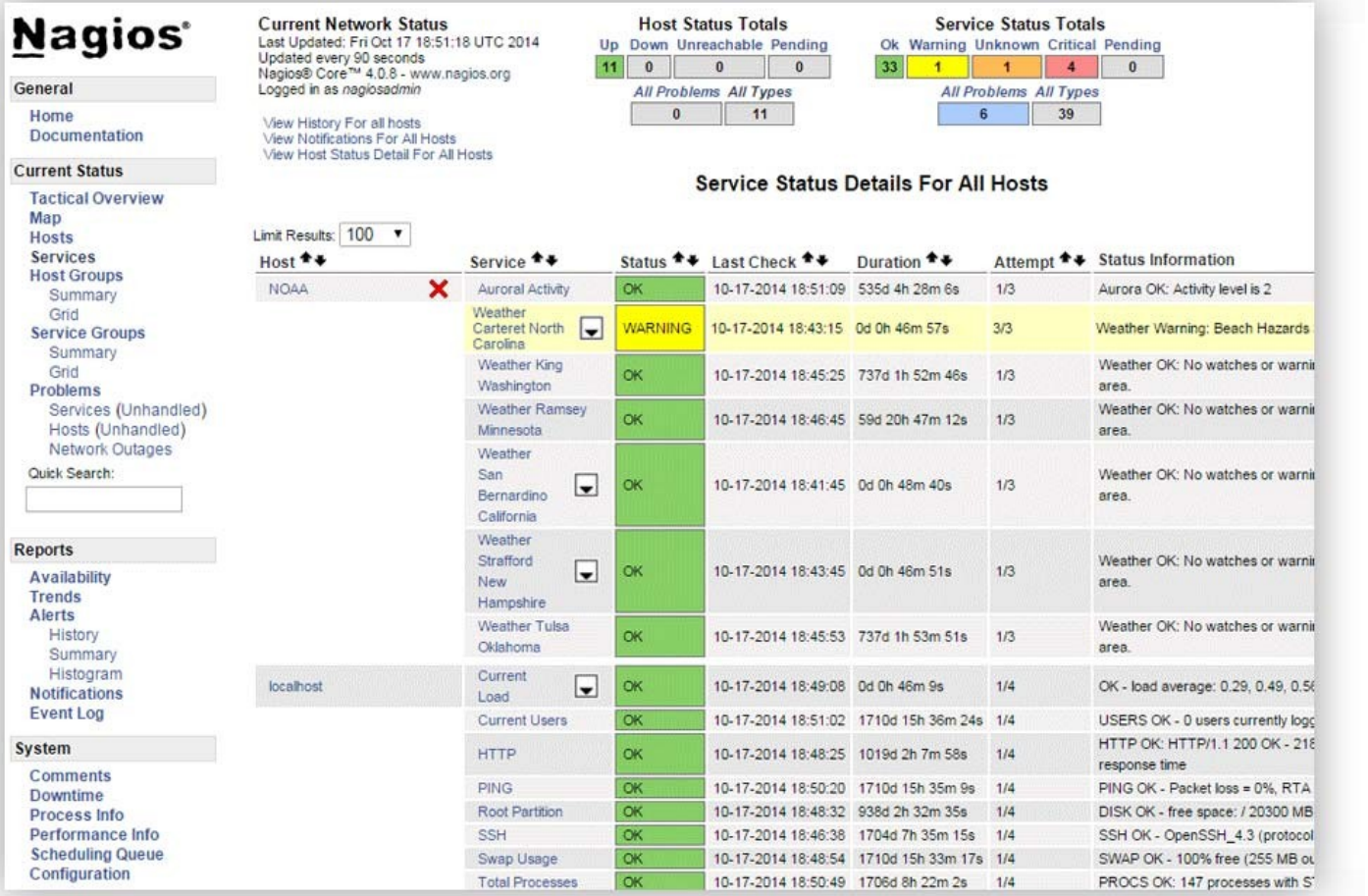
A Docker Host

Monitoring:

- You need good, trustful and up-to-date information to take decisions
- Different tools

Monitoring:

- You need good, trustful and up-to-date information to take decisions
- Different tools: Nagios



Monitoring:

- You need good, trustful and up-to-date information to take decisions
- Different tools (Grafana + Vault)

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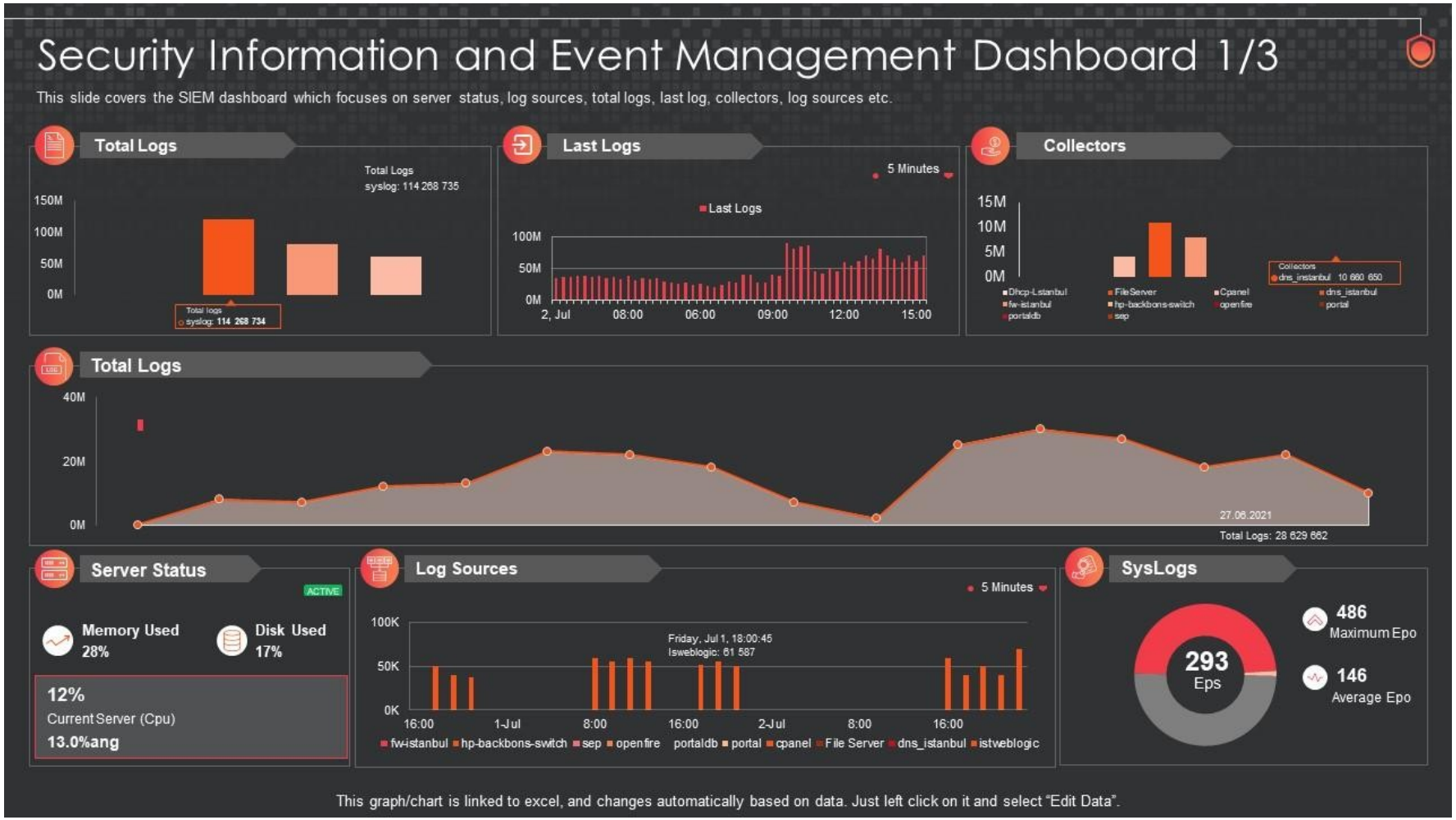
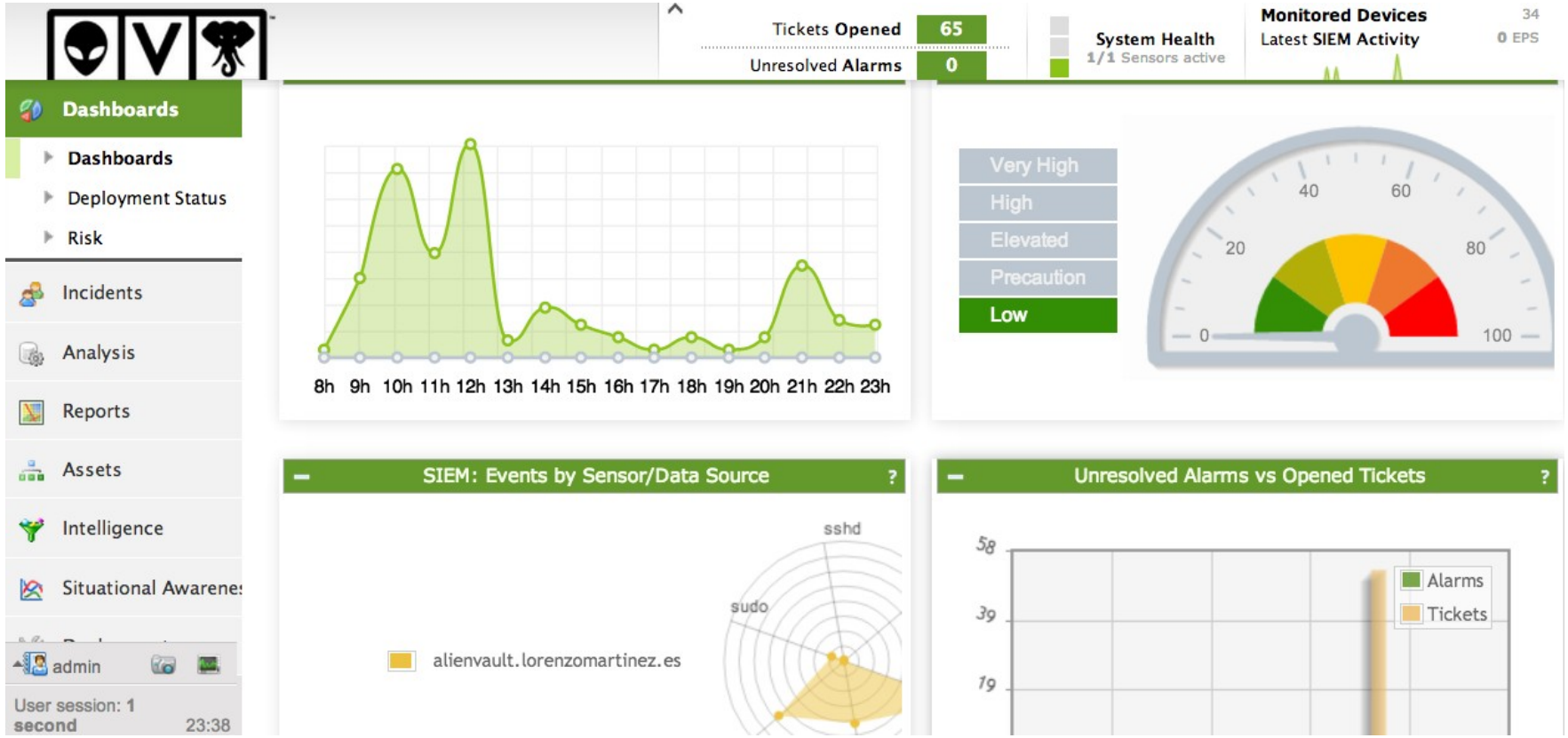
- You need good, trustful and up-to-date information to take decisions
- Different tools (SIEM – a lot of software)



Monitoring:

- You need good, trustful and up-to-date information to take decisions
- Different tools: AlienVault/ OSSIM

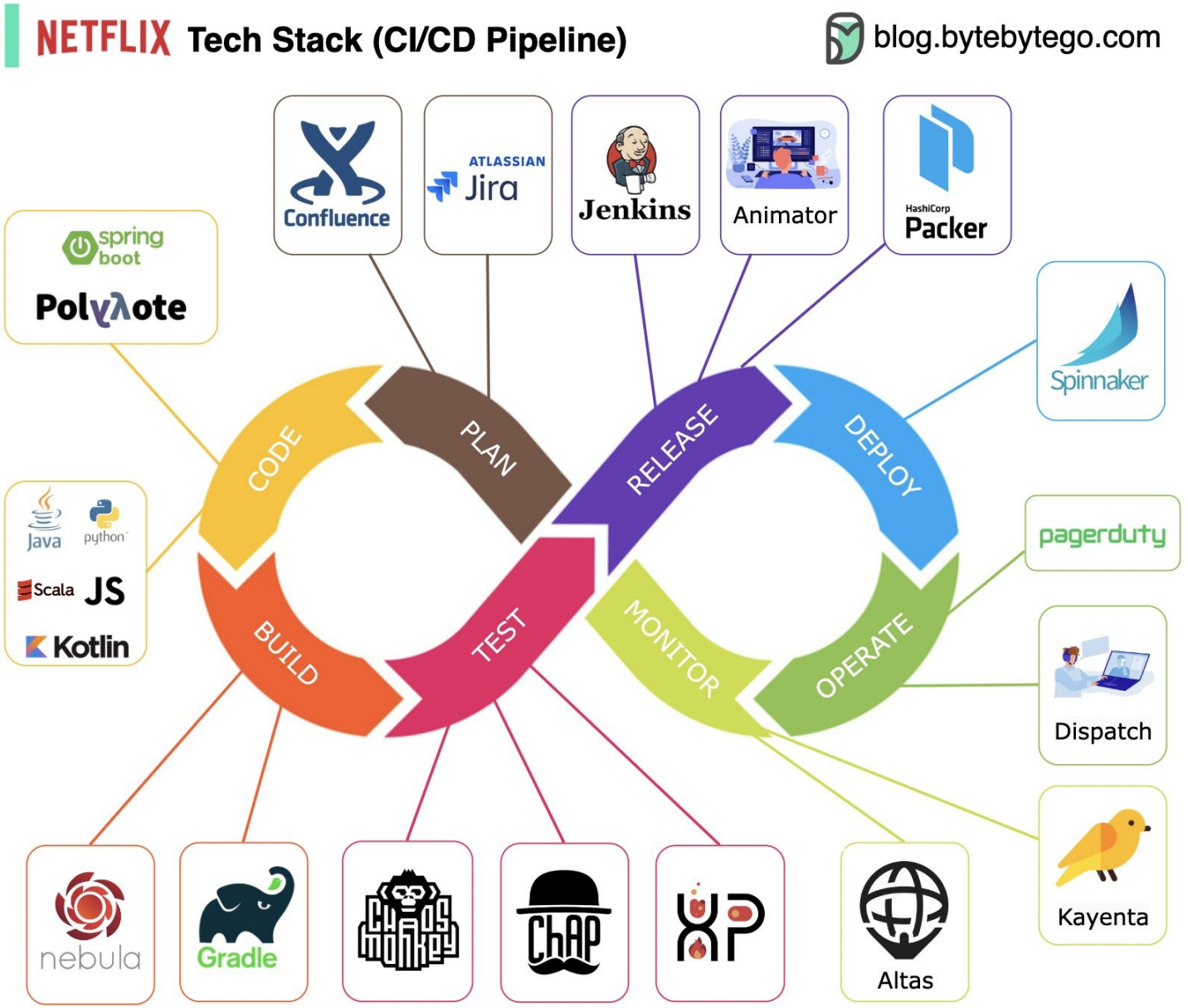


KPI (Key Performance Indicators): in IT they are indicators of how are we achieving our goals

- Quality of Service (QoS) – user's experience
- Operation
- Crisis Management
- Security

Some examples (monitoring to control KPIs)

- Free storage available
- Storage access
- Real IOPS / time to read/ write a data
- VM information (number, physical server …)
- Physical servers workload / performance
- CPU/ Memory utilization
- Network load
- Communication time between servers
- Power usage (%)
- Humidity
- Temperature of servers/ racks
- Cooling consumption
- Storage servers real workload
- Change Requests per user, stage and type
- PUE
- Traffic patterns
- Data Center Optimization Initiative (DCOI) Compliance
- Cost per customer
- Deployment trends
- Anomaly detection
- Availability of host and services
- Net services (http, SMTP,… with safety probes)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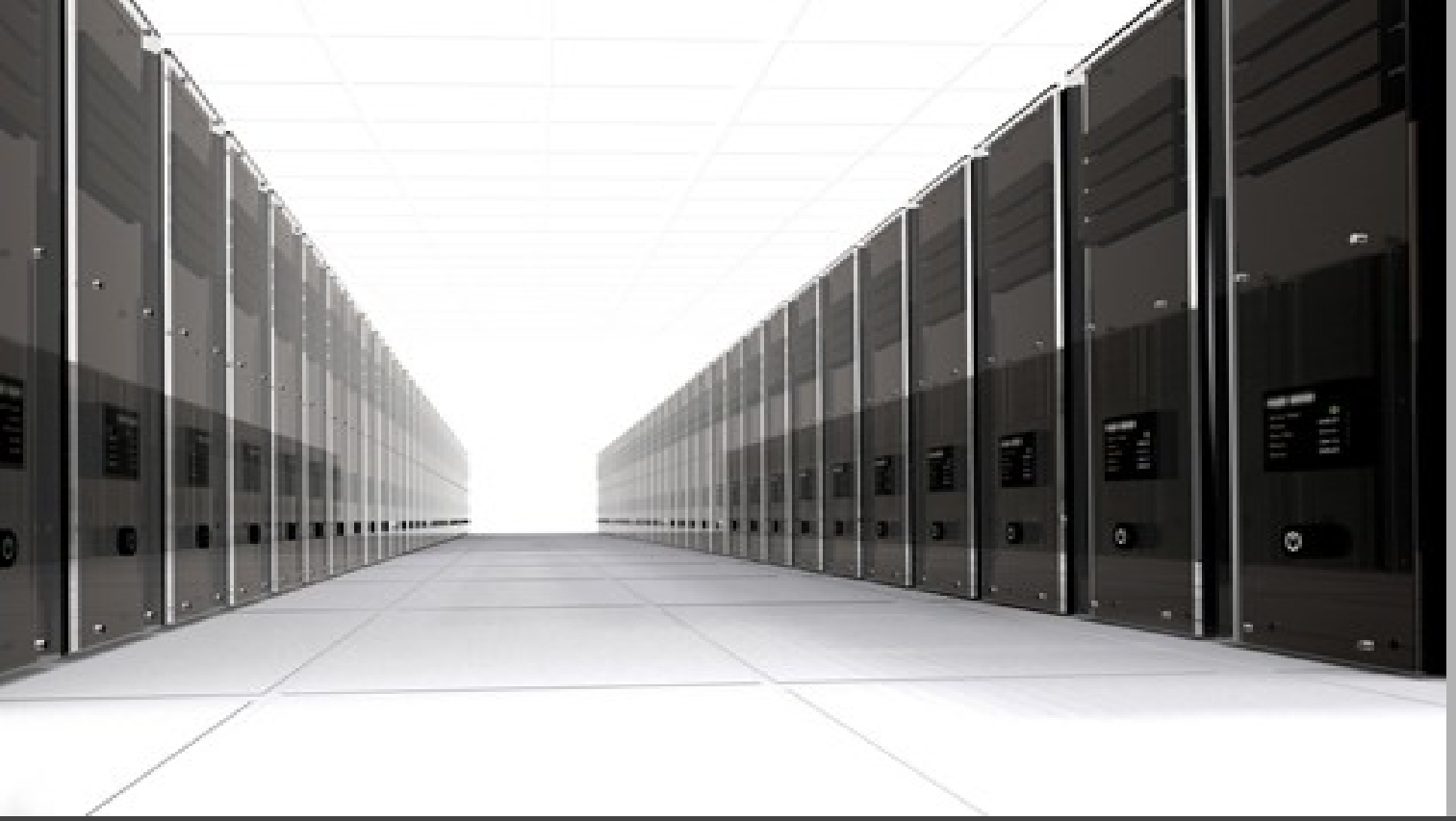

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