VIRTUAL MACHINE BACKUP TOI

- PART 1

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Agenda

- Backup concepts
- Traditional Backup Pain Points
- VM Backup Use Cases
- Market Analysis

RPO and RTO

- RPO - recovery point objective
  - Key data protection requirements per backup window
    - CDP(Continuous Data Protection)
      - RPO is zero
    - Near CDP or CRR(Continuous Remote Replication)
      - RPO is close to zero
    - Regular backup
      - Could be minutes, hourly, daily, weekly, monthly
- RTO - recovery time objective
  - Maximum allowable or maximum tolerable outage
    - RTO is close to zero
      - Stretched clusters: Active-active data center (Not real DR: see notes)
      - CDP + VMware vCenter Site Recovery Manager
  - Key requirements for recover performance SLA
  - Associate with availability of backup infrastructure

Backup Methods

- Available methods
  - Full
  - Incremental
  - Differential
  - Synthetic
- Factors for choosing the backup methods
  - RPO
  - RTO
  - Backup windows
  - Retention timeframes
  - Infrastructure
  - Budgets

Backup Window

- Backup window is limited by backup performance
  - Simultaneously backup jobs from backup source
    - SDDC caused high application/VM density than physical
  - Backup server workload
  - Data protection performance

Backup Consistent State

- Crash consistent
  - Snapshot without any quiescing
- File system consistent
  - Snapshot with OS quiescing but without app quiescing
- Application consistent
  - Snapshot with both OS and app quiescing

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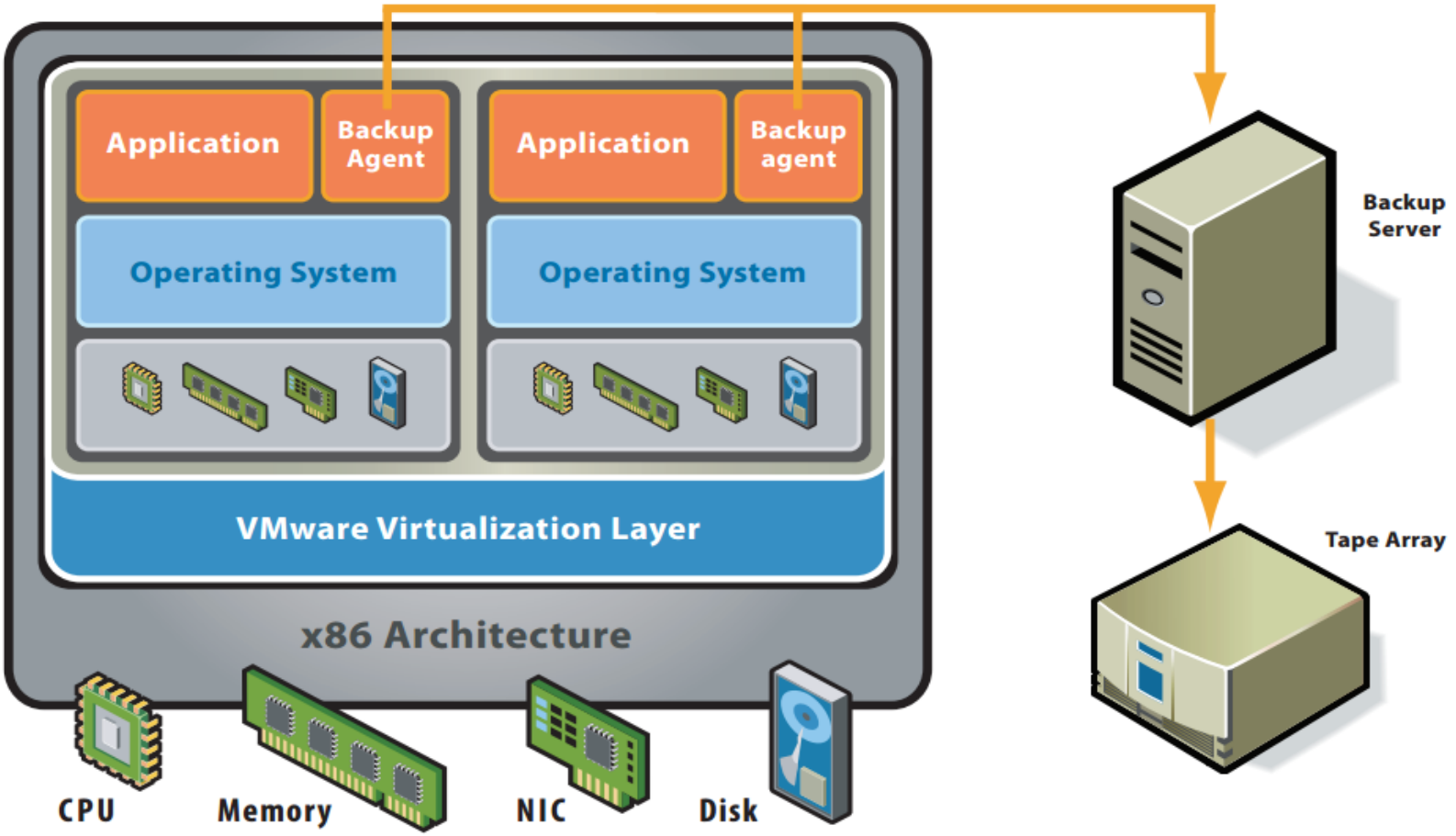
Physical vs. Virtual

Physical Data Center	SDDC
• Static, difficult to move • Disruptive maintenance • Slow provision due to manual work • Hardware failure has bigger impacts if no HA solution • Network and storage configuration and connection are static needs multiple teams cooperation	• Flexible, easy to move • Non-disruptive maintenance • Quick provision due to VM features • Hardware failure has smaller impacts even without HA solution • VM move from network or storage from one to another quickly and easily

Backup VM As Physical



Pain Points Of Traditional Backup

- Bigger VM backup overhead
  - SDDC caused high application/VM density than physical
    - One VM backup agent could cause the perf/QOS problems to other VMs
      - CPU, memory, storage, network overheads
- High OPEX by OS none-transparent backup
  - Various backup agents
    - OS level agent with coarse granularity
    - App level agent with fine granularity
  - Shadow copy depends on OS implementation
- Machine backup is complex
  - OS and file need different backup methods

Pain Points Of Traditional Restore

- Machine recovery is complex
- Very difficult to test and verify of backups regularly
  - Need a separate test environment
- Restoring multi-tier applications is a challenge

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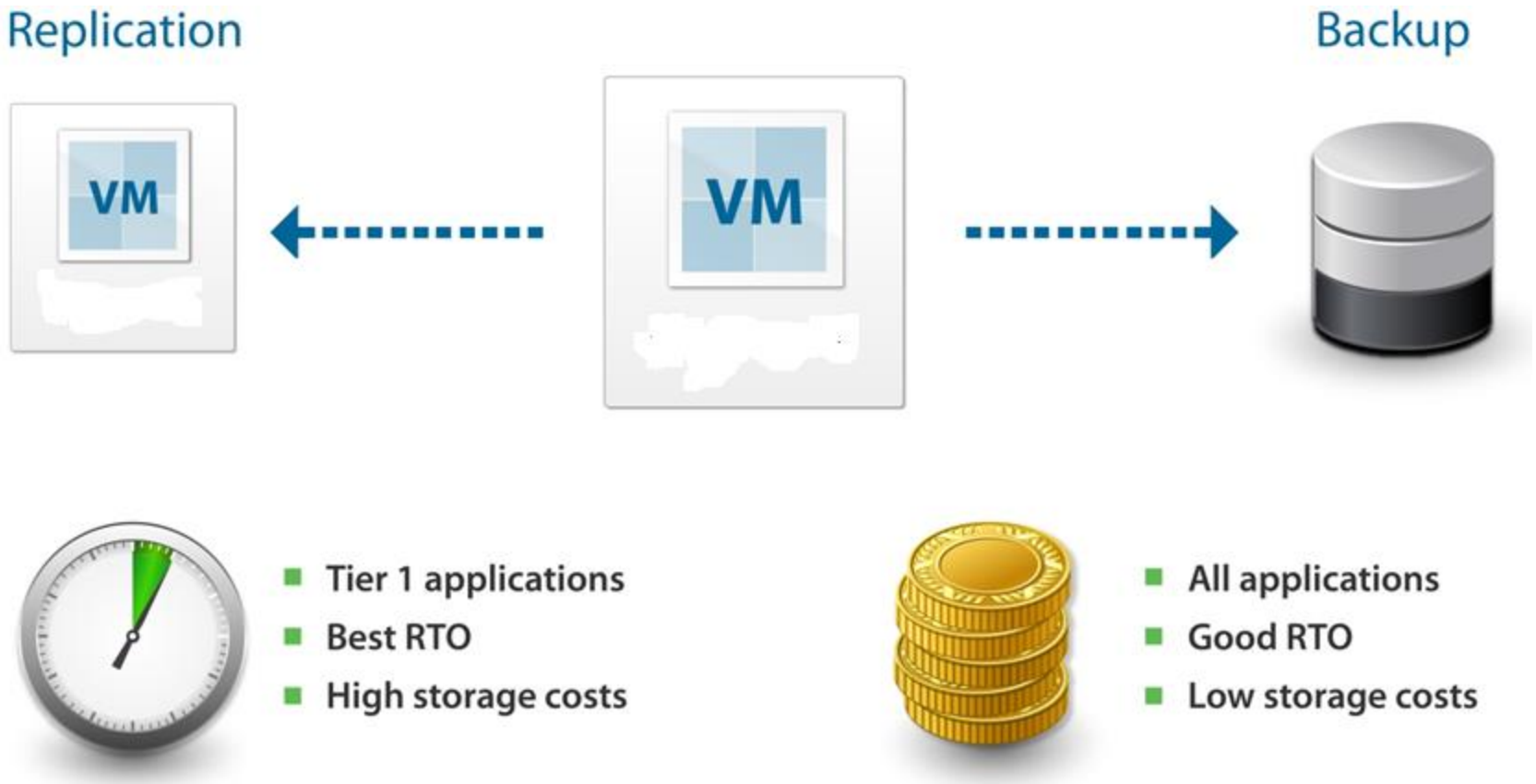
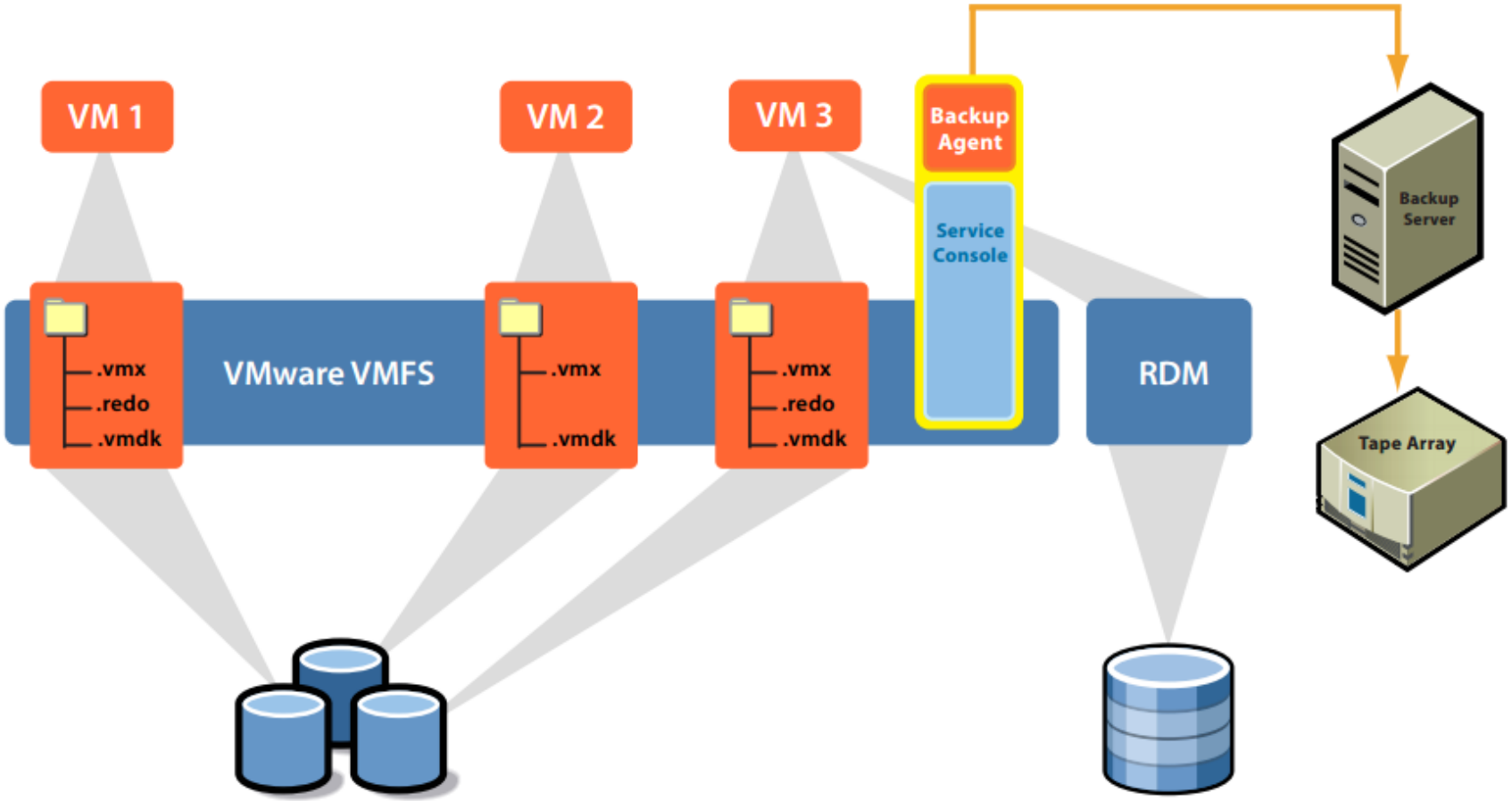
Use Case: VM Replication & Backup



Gen1: Backup VM By Virtual Disk Files



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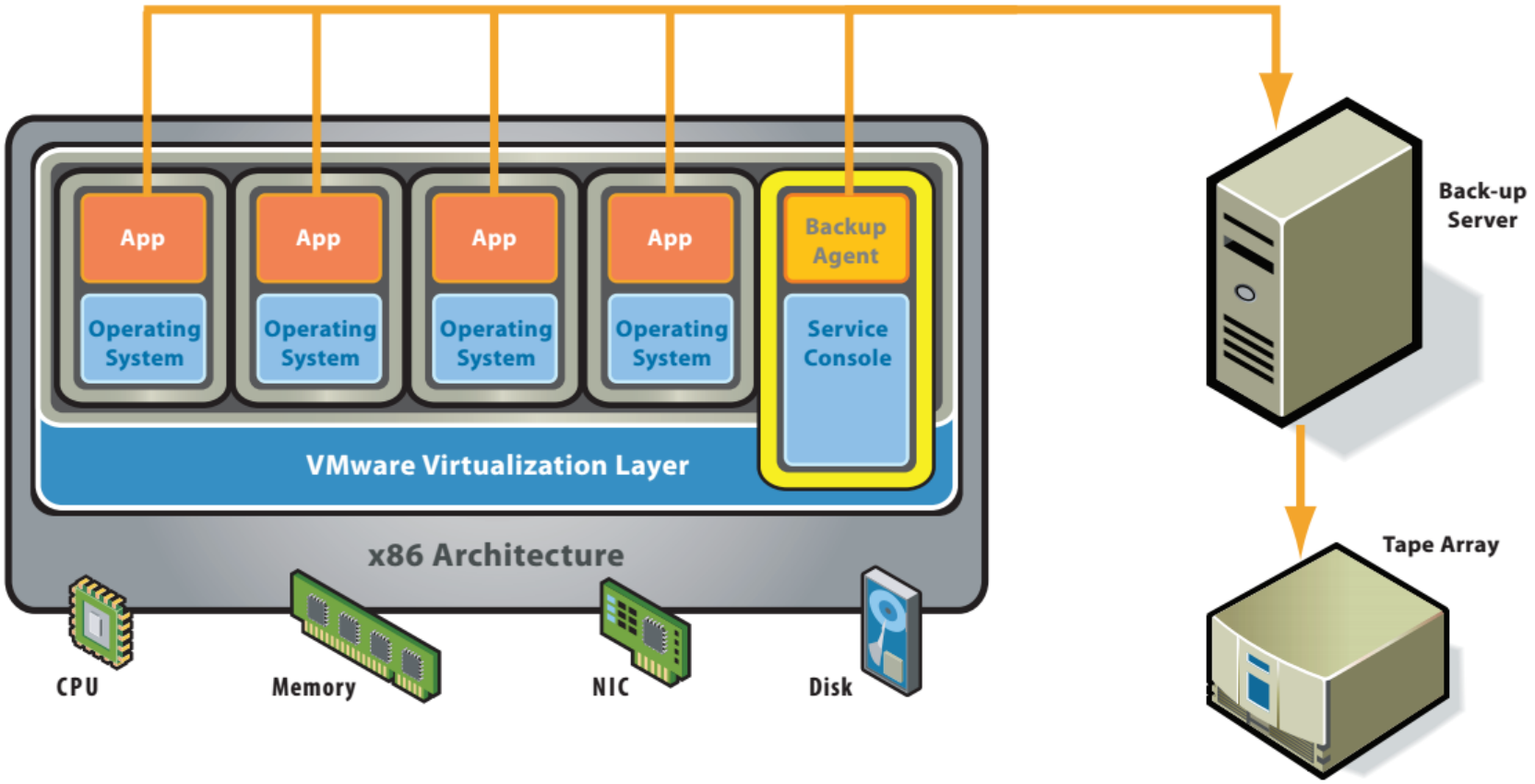
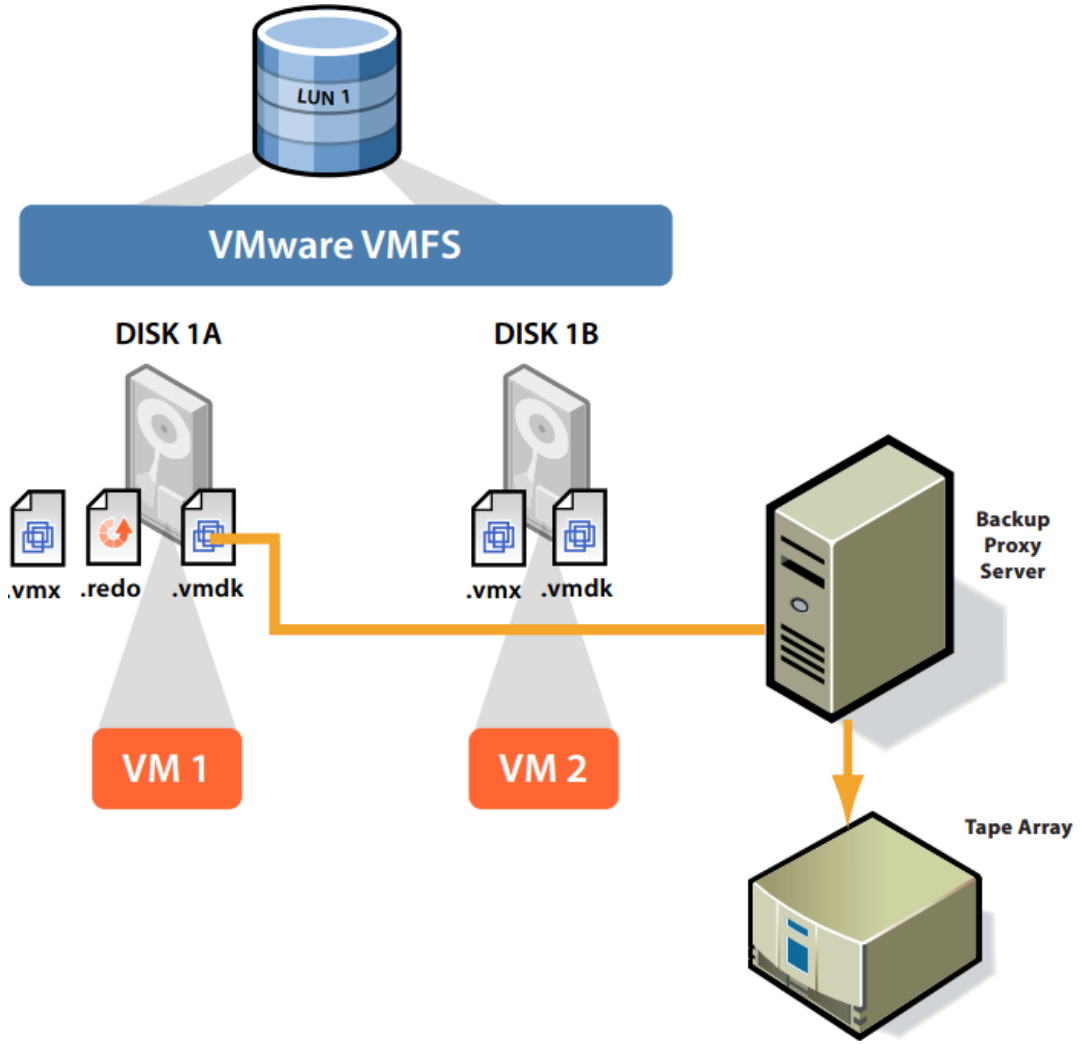
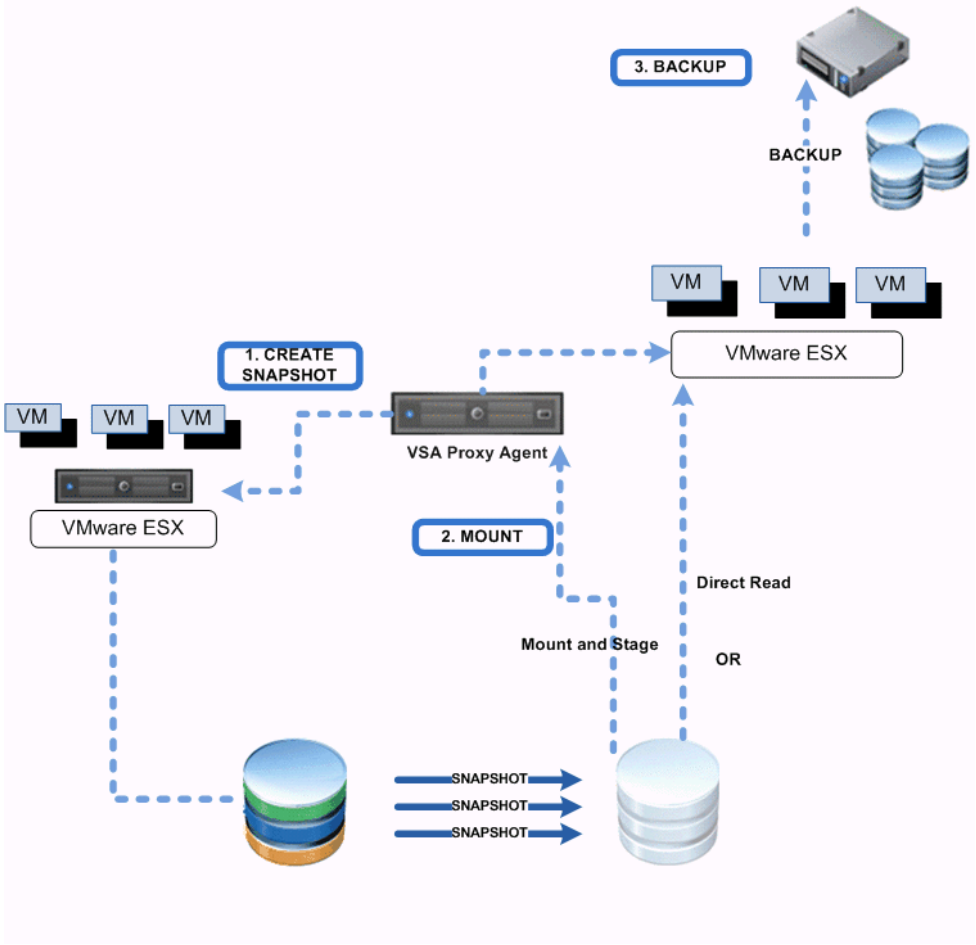


Gen2: VCB(Virtual Consolidated Backup)



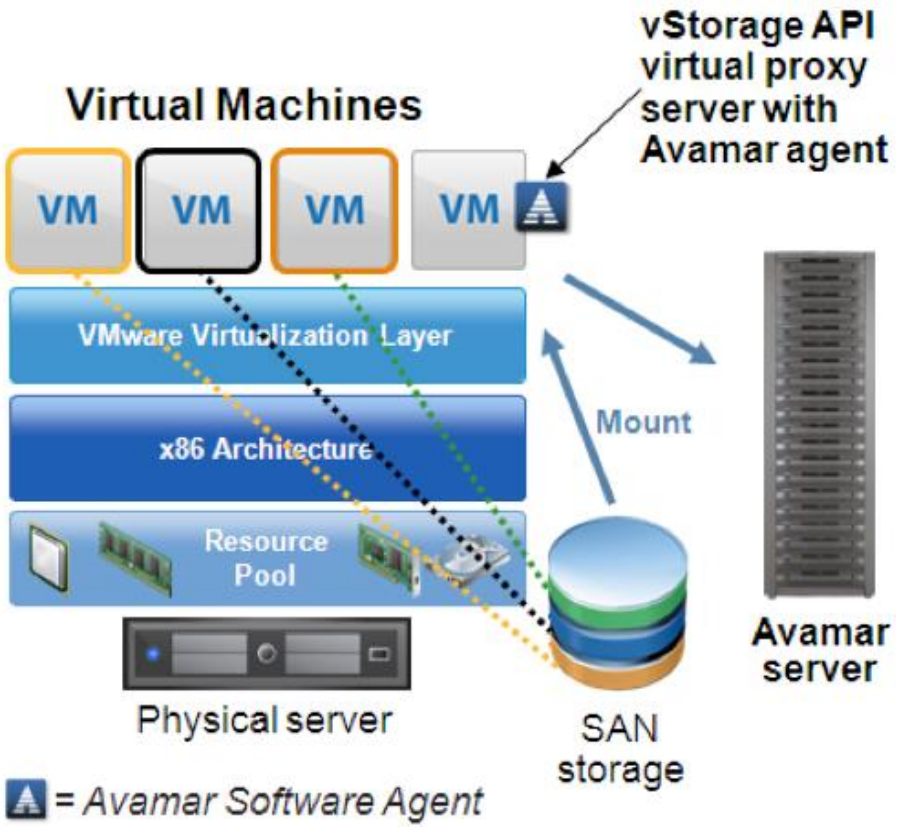
Gen3: VADP Physical Proxy



- Physical proxy appliance
  - Can be merge with backup server
  - Requests a snapshot of the virtual machine hosted on the VMFS datastore.
  - Enables LAN-free data transfer
  - Use CBT for incremental backup
- Deduplication & compress by
  - Backup proxy
  - Backup server
  - Backup target storage

Gen3: VADP VM Appliance

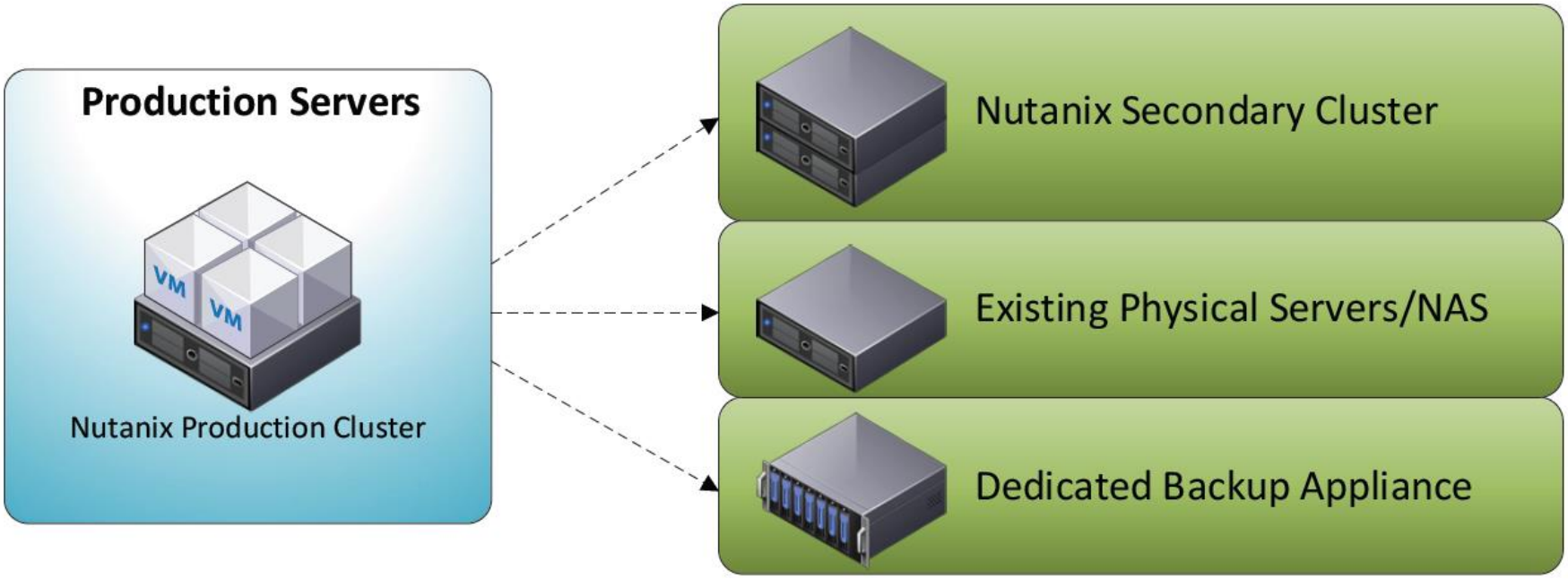
- VM proxy appliance
  - A VM with HotAdd access to VM disks on the datastore.
  - Enables LAN-free data transfer
- Deduplication & compress
  - By backup proxy
  - By backup server
  - By target storage



Avamar client software runs on the proxy server

Veeam SDDC Solution (Nutanix)

- Nutanix could be secondary cluster as data protection storage
- Nutanix defined capacity-rich nodes for data protection use cases

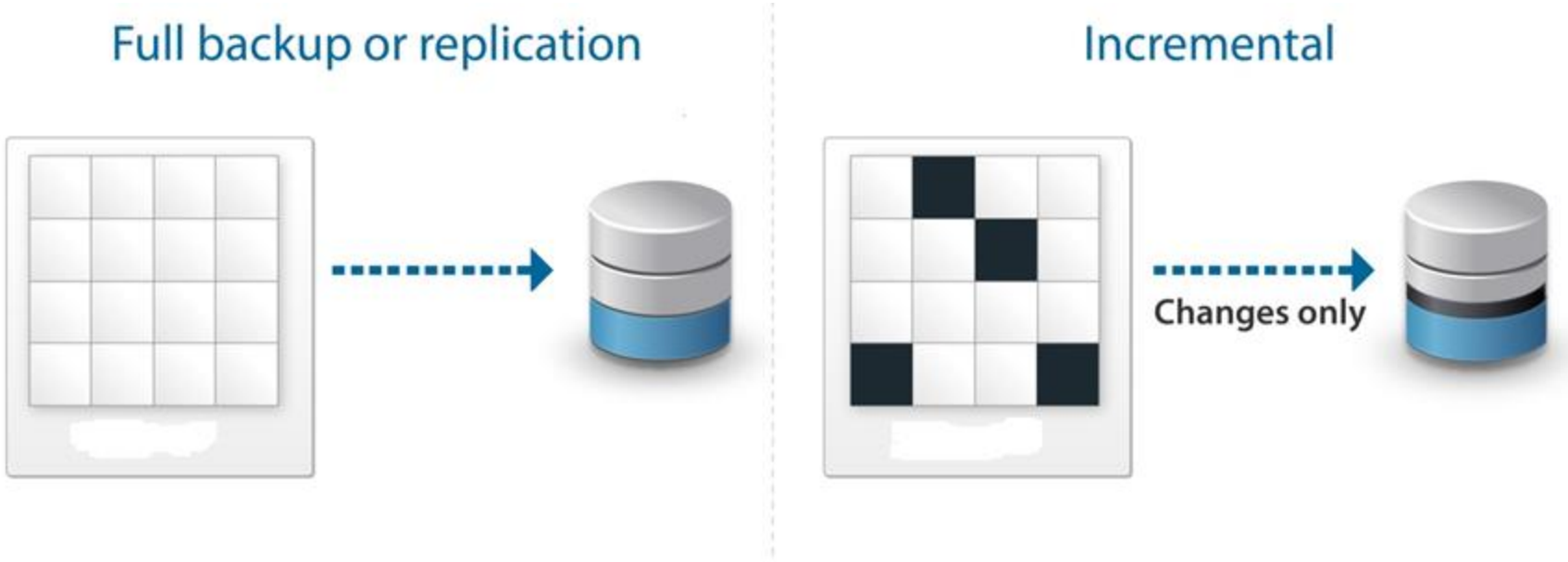


Veeam Features For VM Backup

- Off-host LAN free backup
  - Less overhead by VADP
  - Using storage network instead of VM network
- Uniform backup method: Image-level backup
  - Near CDP (<15min RPO & RTO)
  - Empty block, deleted data ignorance
  - Inline deduplication and compression
  - App level data consistence with fine granularity
    - Quiesce the VM by VM tools/drivers
      - Windows: Microsoft VSS service
    - One time full backup and incremental forever
      - Block level incremental backup
      - VM snapshot -> VADP(CBT) -> snapshot merge back
        - VMware: VADP(vStorage APIs for Data Protection)
    - Easy and portable restore for whole VM

Note: Red color indicates Veeam strengths over other VM backup products

CBT – Change Block Tracking



- 10x faster
- Small backup window
- Near-CDP replication

Veeam Features For VM Restore

- Easier and quick restore
  - 1 click restore with a single or group VMs
- Easier test and verify backup
  - Automatic verification
  - On demand sandbox vs. dedicate virtual lab
- High backup usability
  - Instant recover + Storage vMotion
- Fine granularity restore based on one method
  - Image level restore
    - Full or incremental VM recovery with efficient VM search
  - File level restore
    - File instant index and search
    - Explorer for any type of file systems per VM images
  - Application level restore
    - RDB table & records, Exchange mail items, Active Directory etc…

Note: Red color indicates Veeam strengths over other VM backup products

Other Veeam Features

- Unlimited Scale-out Backup Repository
  - Management overheads with massive VMs
  - Global Pool - break backup target storage silos
  - Storage Aware Placement
  - Self-service backup - a backup storage cloud
- Cloud backup & recovery

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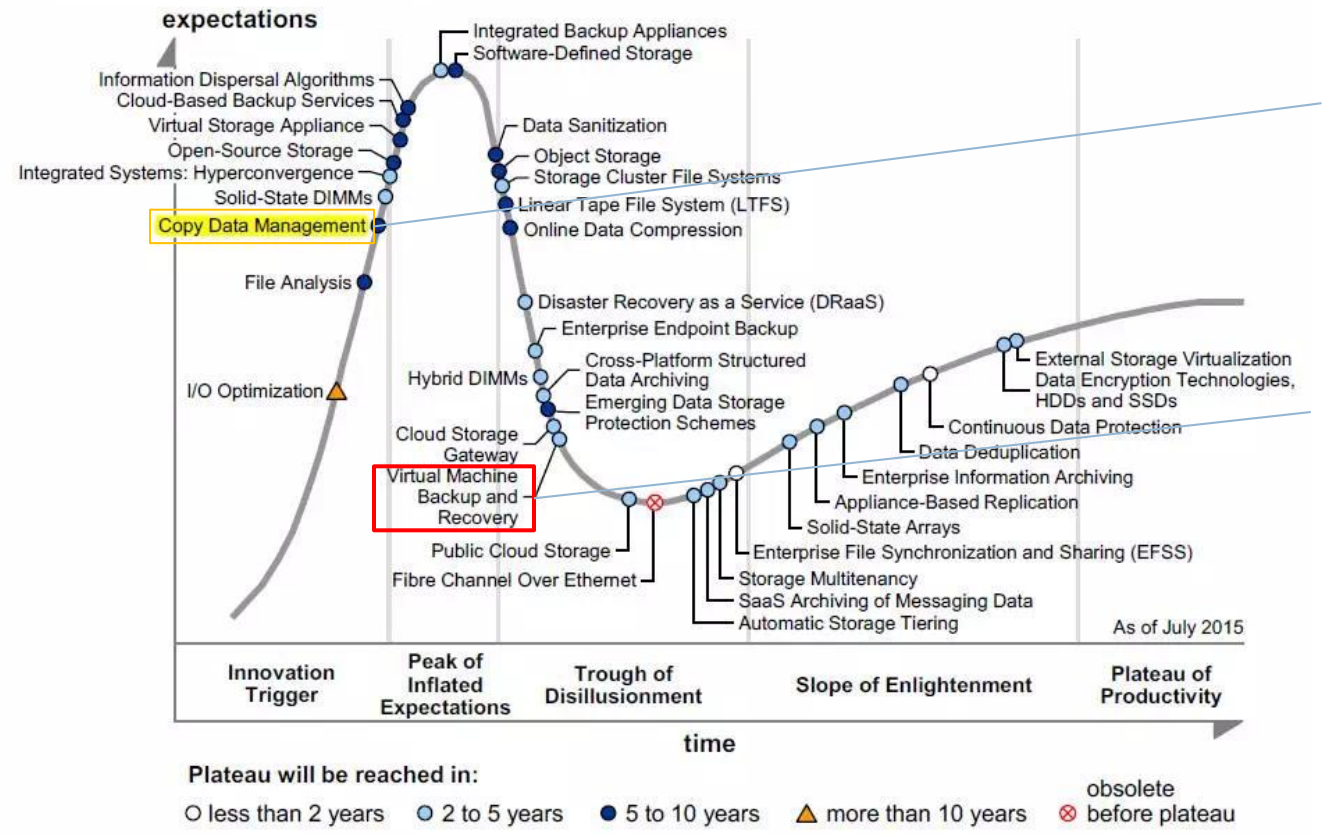
Gartner Hyper Cycle

Figure 1. Hype Cycle for Storage Technologies, 2015

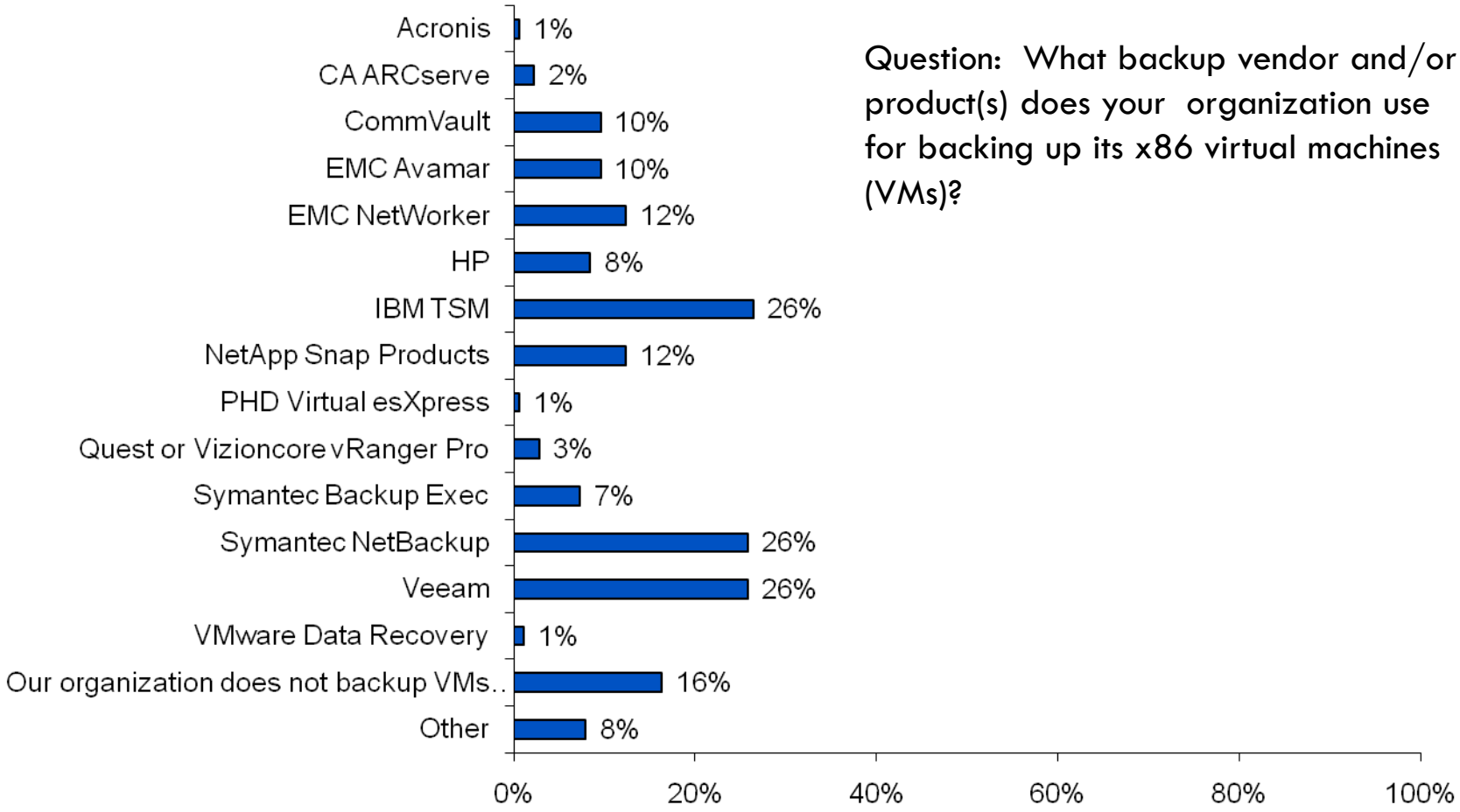


Source: Gartner (July 2015)

Still has a long way to go

2 to 5 years to be a mature technology

Gartner Market Survey



Question: What backup vendor and/or product(s) does your organization use for backing up its x86 virtual machines (VMs)?

* From the Gartner US and EMEA Data Center Conferences in 4Q2010