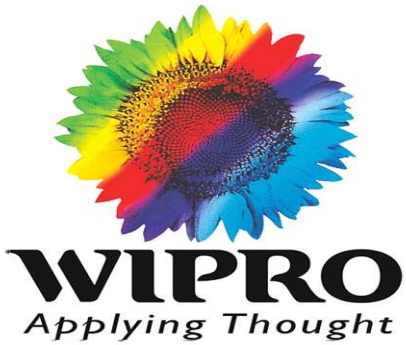

Standardization approach of Hyper-converged Infrastructure in cloud service

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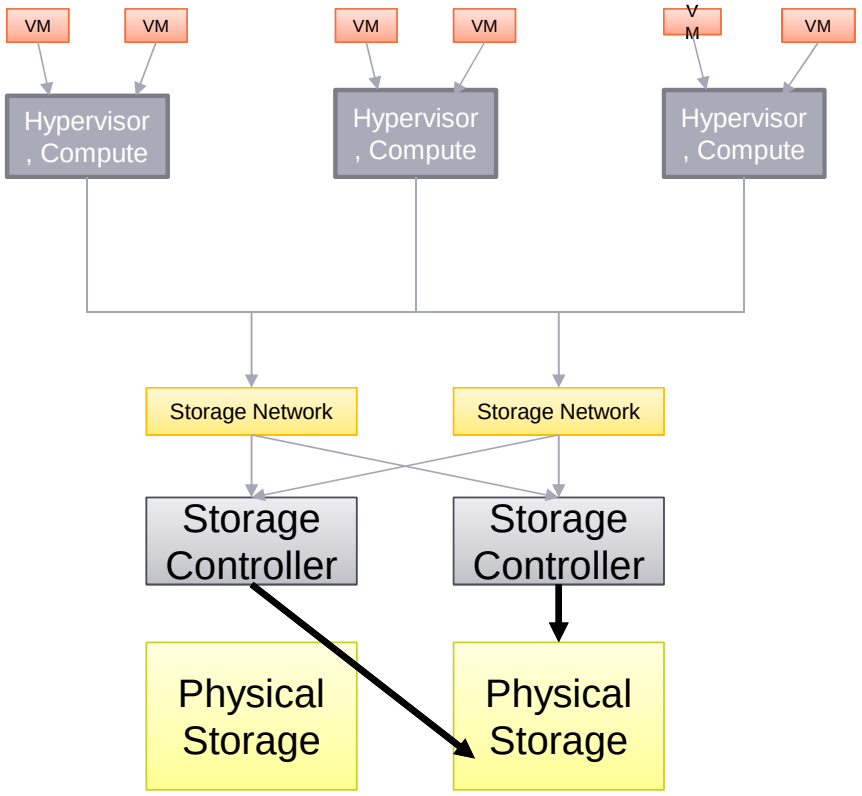
Agenda

- Introduction
- Interoperability/ Portability standardization approach
- Summary, Benefit
- Question
- Contact Details

Introduction

Traditional Architecture in Data Center

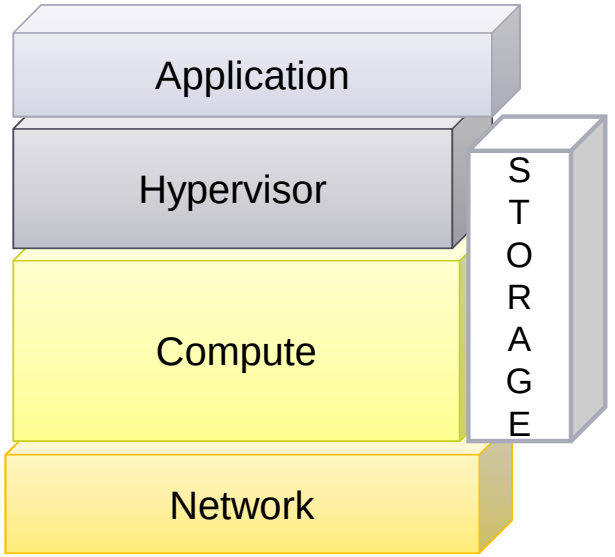
- Compute or Virtualization layer
- VMs are running on top of hypervisor
- Application running inside VM
- Network switch connects Compute with Storage
- Storage Controller sitting between storage network and physical storage to perform replication and other data management operations



- Challenges:
  - Different silos
  - Complex Data Management and monitoring
  - High Data latency

Converged Architecture in Data Center

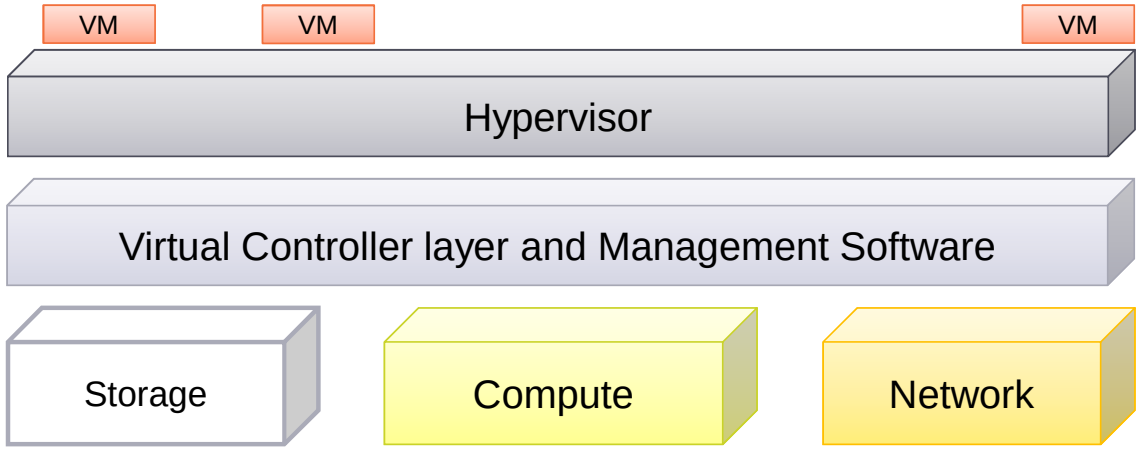
- Different vendors having different components, came together and started integrating different components to build a single appliance
- Separate components that are designed to work together



- Challenges :
  - Storage and hypervisor not natively integrated
  - Management are separate for each component
  - Vendor locking is high
  - Preconfigured and less customizable
  - Hardware centric architecture

Hyper-Converged Architecture in Data Center

- Storage, Compute, Network and virtualization together integrated managed by a single software.
- Easily scalable.
- Converged + SDDC
- More software centric approach
- Data centers are rapidly adapting hyper-converged architecture to provide various cloud services like IaaS, PaaS, SaaS



Hyper-Converged Vendors

Software Solution

Hardware and software from same vendor

Hardware and software from different vendor

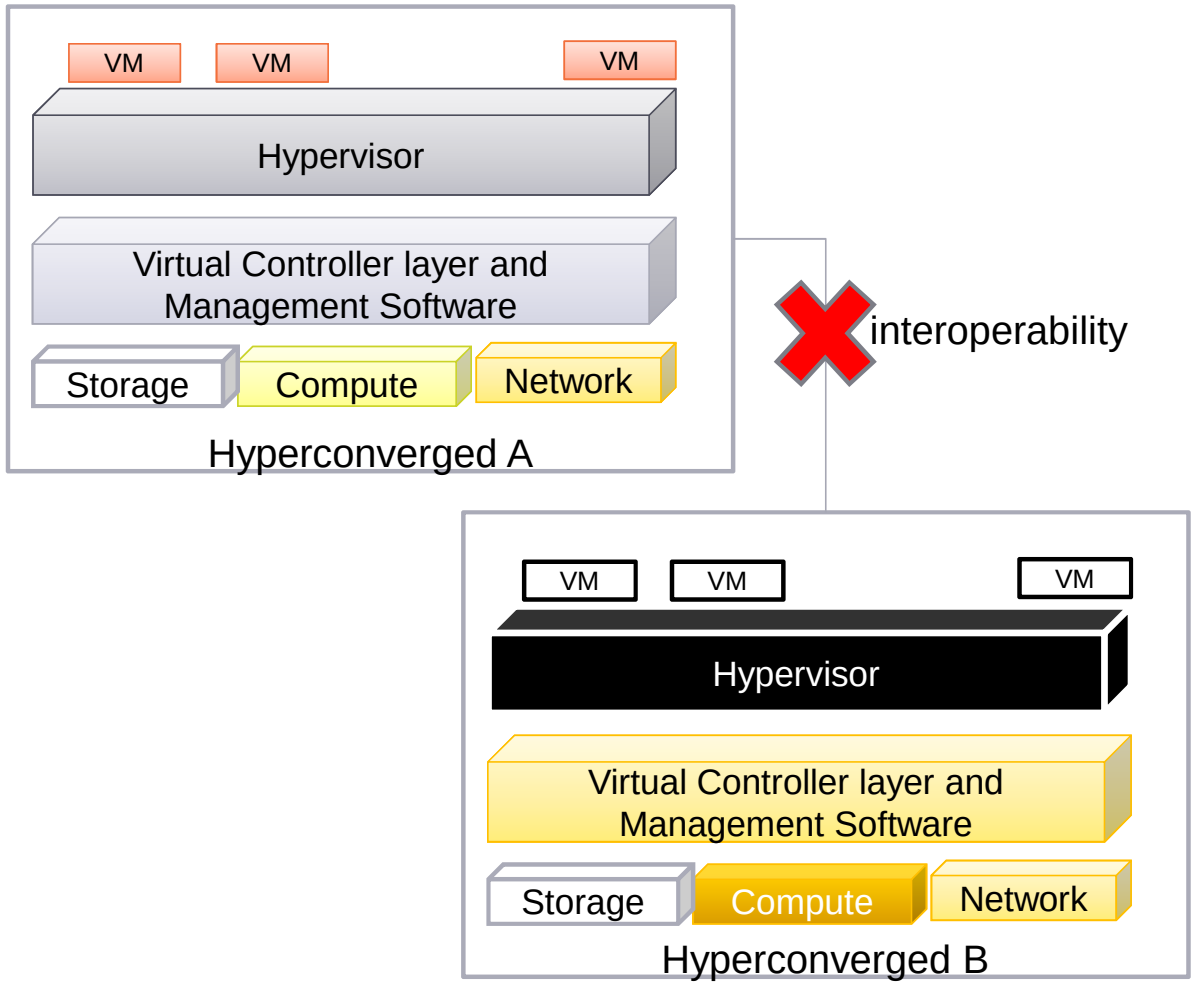
DELL - Own Hardware and Nutanix software

EMC - Own Hardware and VMware software

Hp - Own Hardware and Own/VMware software

Hyper-Converged Challenges

- Gartner analysis outlined the most widespread myths about these systems
- Once you've gone with a hyper-converged vendor, if you want to grow your deployment, all you can do is add more nodes by the same vendor.
- The worry about non-interoperable silos is perennial in the data center industry, and hyper-convergence does not change that in any way.



Interoperability/portability standardization approach

Key highlights

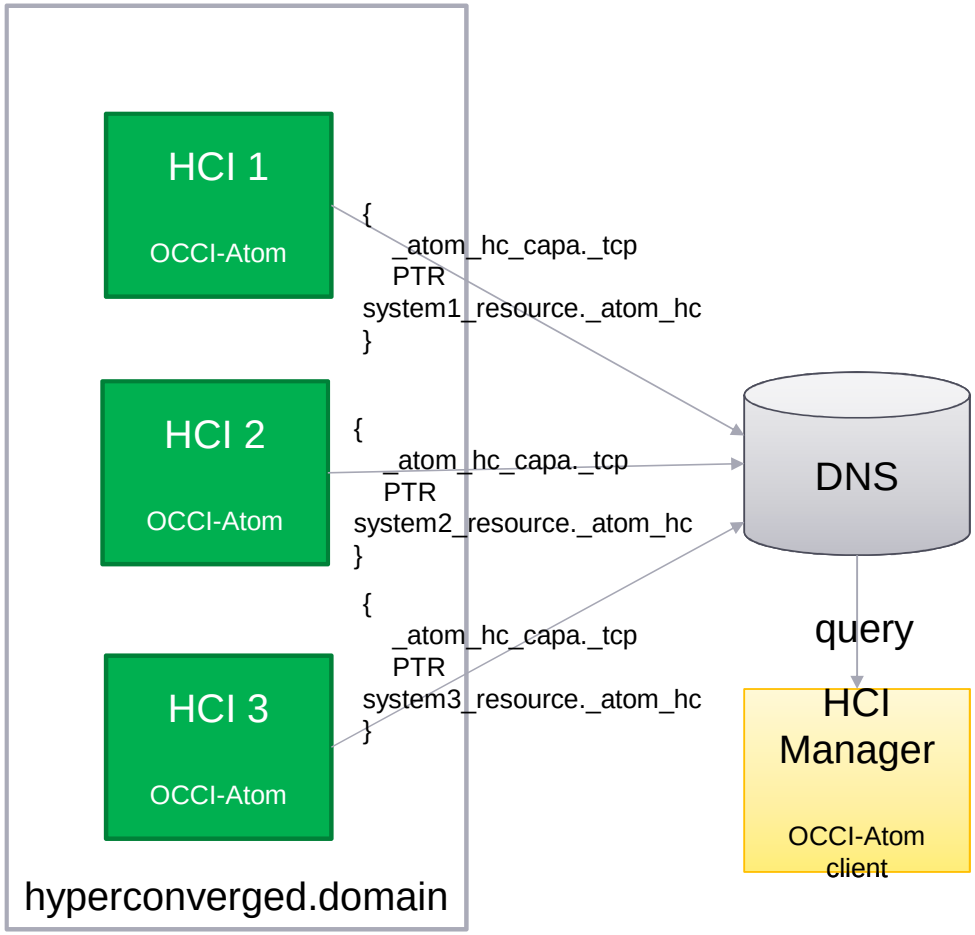
Classification	Area	Subarea	Challenge	Standard Summary
Management Services	Resource Provisioning	Service Discovery	Publishing service: This is not available in OCCI, Atom is introduced for that	OCCI with Amendment, Atom
			Capability enquiring: all required capabilities are not available, additional fields are to be introduced in OCCI	OCCI with amendment
			Service Trust: Assurance that remote storage is not used in fake hyper-convergence service, CTP with additional field will be helpful	CTP with amendment
			Service Ranking – Selection among multiple services	
		Resource Migration	VM Migration – OCCI does not provide option for this	OCCI with amendment
			Application Migration – TOSCA provides required functionality	TOSCA
			Data Migration – CDMI provides required functionality	CDMI

Key highlights (Cont…)

Classification	Area	Subarea	Challenge	Standard Summary
Management Services	Resource Provisioning	Resource Auditing	CADF provides monitoring capabilities. This can be used for billing	CADF
Data Services	Data Storage	Heterogeneous DC	CDMI can be used for transferring data between systems	CDMI
	Tiering	Hot and Cold Swap across systems in DC	CDMI with Deduplication provides functionality for copying between multiple systems.	CDMI

Publishing Service – Atom Protocol

- Systems need to discover capabilities in order to achieve interoperability.
- For Discovery purpose, two new components are introduced in hyper-converged environment.
  - One is a OCCI-Atom Server, where Atom publishing protocol is running within individual hyper-converged node.
  - Atom service provides access to the OCCI hyper-converged infrastructure resources.
  - Other is a DNS Server where the OCCI server loads the information for the hyper-converged services.
  - Query to the DNS Server will answer the following,
    - List of service that support atom publishing protocol
    - Location of the service
    - Meta data for the service



Publishing Service – Atom Protocol (Cont…)

- Each System registers their resource query service with type name and service name. That's part of the PTR-record of DNS-SD.
- Example of a PTR record _atom_hc_resc._tcp PTR system1_resource._atom_hc
- Hyper-Converged manager does a DNS lookup with a type and receives a list of service instances.
- "nslookup -q=ptr _atom_hc_capa._tcp.hyperconverged.domain" and the list returned

  _atom_hc_resc._tcp.hyperconverged.domain name = system1_capability._atom_hc.example.org.

  _atom_hc_capa._tcp.hyperconverged.domain name = system2_resource._atom_hc.example.org.

  _atom_hc_capa._tcp.hyperconverged.domain name = system3_resource._atom_hc.example.org.

- Each service instance in turn described using SRV and TXT records of DNS-SD.
- Example system1_resource._atom_hc

  SRV 0 0 80 system1.hyperconverged.domain.

  TXT path=/core#resource

- Hyper-Converged manager does a query with each service instance it received,
- $ nslookup -q=any system1_resource._atom_hc.example.org.

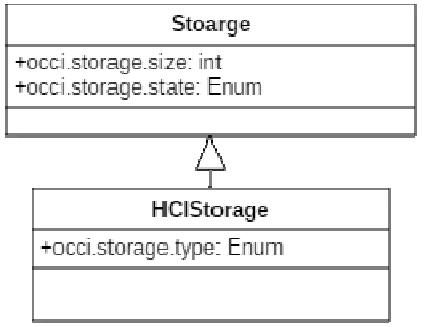
  system1_capability._atom_hc.example.org service = 0 0 80 system1.hyperconverged.domain.

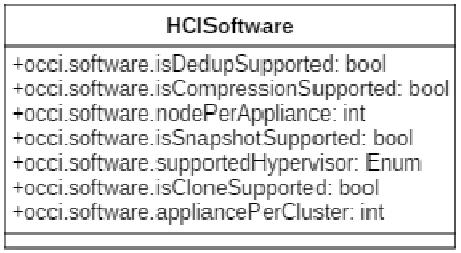
  system1_capability._atom_hc.example.org text = "path=/core#resource"

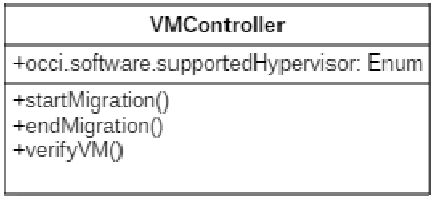
- Based on the above result Hyper-converged manager gets the final URI to enter the hyper-converged OCCI server.

Enquiring Capability – Amendment to OCCI

- OCCI infrastructure specification defines core classes required for IaaS. This includes Compute, Storage and Network.
- Here we are extending that further for standardizing VM migration process in hyper-converged environment.
- First one to be extended is Storage. Some additional attributes need to be added.
- The second one to be added is a new resource class, that ‘s HCISoftware. This class will describe all the key features that the hyper-converged software supports.
- Third one to be added is another new resource class, that’s VMController. Action supported by resource….



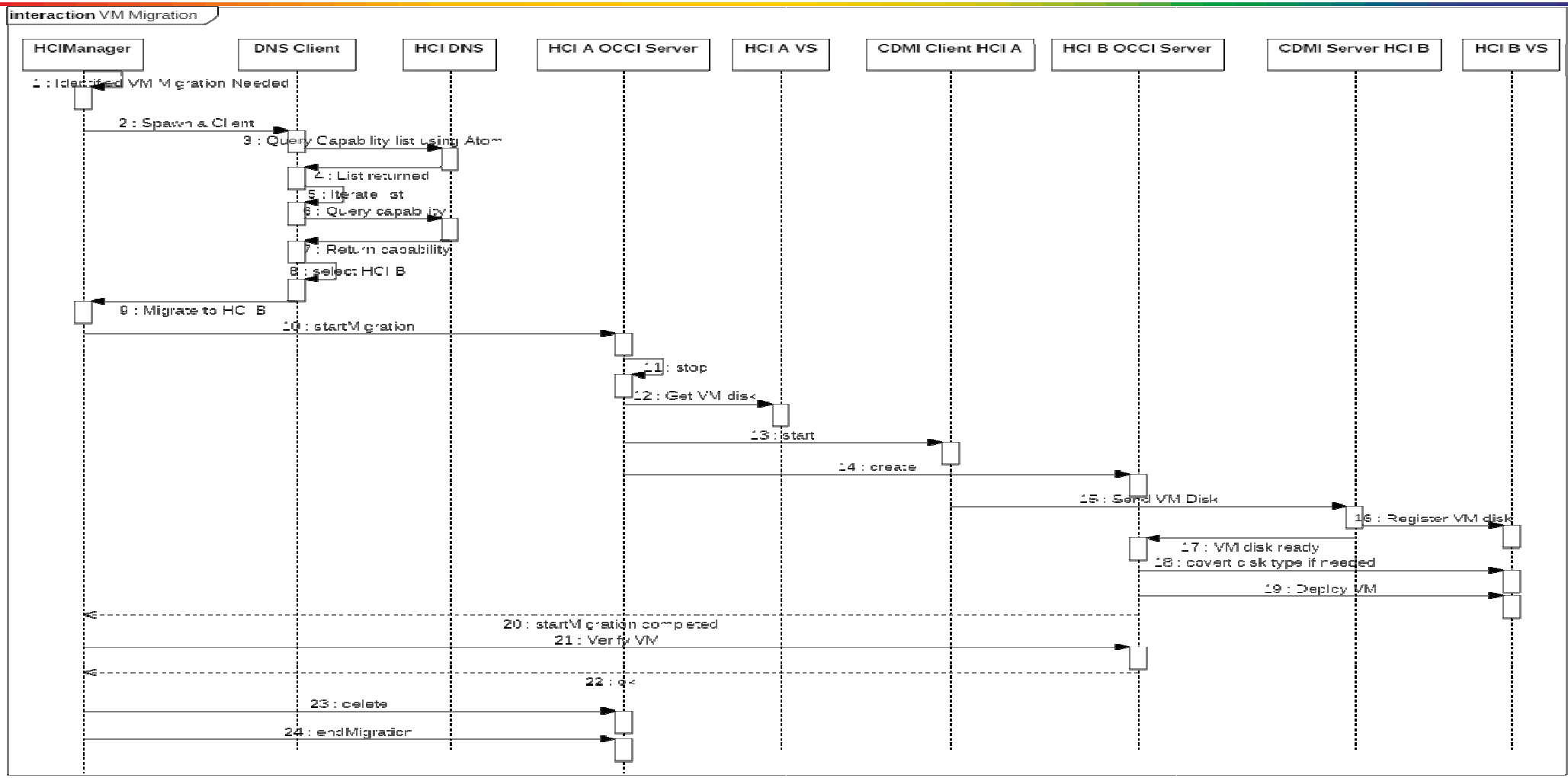




Service Trust and Ranking

- Service trust for hyper-converged systems for interoperability
- CTP is proposed as the protocol to support TaaS.
- CTP needs two entity. CTP Provider is the hyper-converged system and consumer is Hyper-converged Manager.
- CTP requires Element of transparency to be supplied by the hyper-converged systems.
  - Hyper-converged EoT : Type -> Evidence Request , Family -> Configuration
  - Configuration provided/measured in SCAP standards.
  - Storage attributes : local/remote, storage type, speed.

VM and Data Migration



Application and Data Migration

- Applications may require to migrate from one VM running in one hyper-converged system to another VM running in another hyper-converged VM
- TOSCA is identified as the standard for application migration.
- TOSCA templates defines various elements involved in application migration.
- Hyper-converged elements can also be added in TOCSA template as per application migration requirement.
- Data Migration is required between multiple hyper-converged infrastructure.
- CDMI is identified as the preferred standard for data migration

Data Services

Extended Automatic Tiering

- VM of one Hyper-converged system is accessing data from another hyper-converged system (cold tier)
- Reading Data From one hyper-converged system to another hyper-converged system using CDMI
- Reading data efficiently requires de-duplication support, needs amendment to “SNIA standardization for Data Deduplication Metadata Extension”

Summary, Benefit

Summary, Benefit

Summary

- Various Standards are discussed in context to Hyper-converged infrastructure.
- These standards are introduced to solve interoperability/portability challenges in hyper-converged environment.
- The focus of the discussion was VM migration, application migration and data migration in hyper-converged environment.
- Service discovery, trust, ranking standards are discussed for supporting hyper-converged interoperability.

Benefit

- An attempt to standardized interoperability/portability for hyper-converged infrastructure.
- The discussed methods can be used by hyper-converged cloud consumers to achieve vendor independence
- Standards can evolve for hyper-convergence based on the discussed proposals.

Question?

Reference

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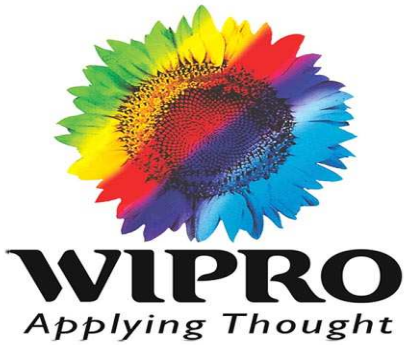

Thank you

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