RA Taxonomy

Cloud Taxonomy
Level 1: Roles
Level 2: Activities
Level 3: Component
Level 4: Sub Component

Cloud Service Consumer
- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Cloud Service Provider
- Cloud Broker
- Service Consumption
- Service Intermediation
- Service Provision
- Service Aggregation
- Service Arbitrage

Cloud Service Provider
- Security
- Privacy

Cloud Services Management
- Business Operations
- Security
- Privacy

Cloud Service Provider
- Electronic Transfer
- Physical Transfer
- Mobile Endpoints
- Fixed Endpoints

Cloud Service Provider
- Cloud Distribution
- Cloud Carriers
- Cloud Access

Cloud Service Provider
- Cloud Auditor
- Security Audit
- Privacy-Impact Audit
- Performance Audit

Private Cloud
Community Cloud
Public Cloud
Hybrid Cloud
Service Layer
Resource Abstraction and Control Layer
Physical Resource Layer

Service Deployment
Service Orchestration

Data Portability
System Portability
Rapid Provisioning
Resource Change
Monitoring and Reporting
Metering
SLA Management

Software as a Service (SaaS)
Platform as a Service (PaaS)
Infrastructure as a Service (IaaS)
The NIST Cloud Computing Reference Architecture

Cloud Consumer

Cloud Auditor

Cloud Provider

Service Layer
- SaaS
- PaaS
- IaaS

Resource Abstraction and Control Layer

Physical Resource Layer
- Hardware
- Facility

Cloud Service Management
- Business Support
- Provisioning/Configuration
- Portability/Interoperability

Cloud Carrier

Cloud Broker

Service
- Intermediation
- Aggregation
- Arbitrage
Cisco Cloud Provider Reference Architecture

- Cloud Services Consumer Interface
- Service Delivery and Management Architecture
- Service Orchestration Architecture
- Security Architecture
- Network
- Storage
- Compute
- Infrastructure Architecture
Cisco Cloud Provider Infrastructure Reference Architecture

<table>
<thead>
<tr>
<th>Application Software</th>
<th>Virtual Machine</th>
<th>VSwitch</th>
<th>Storage &amp; SAN</th>
<th>Compute</th>
<th>Access</th>
<th>Aggregation</th>
<th>Core</th>
<th>Peering</th>
<th>IP-NGN Backbone</th>
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<tbody>
<tr>
<td>Subscriber “A”</td>
<td>VMware</td>
<td>VSwitch</td>
<td>Cisco Nexus</td>
<td>UCS</td>
<td>Nexus</td>
<td>Nexus 7000</td>
<td>Nexus 7000 CRS-1 7600 6500 CRS-1 ASR 9000 ASR 1000 7600</td>
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<tr>
<td>Application 1</td>
<td>Xen</td>
<td></td>
<td>1000v</td>
<td>(Rack or Blade Servers)</td>
<td>5000 w/ Nexus 2000 Fabric Extender</td>
<td>7000 (w/ Cat 6500 as Services Chassis)</td>
<td>6500</td>
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<tr>
<td>Subscriber “B”</td>
<td>Hyper-V</td>
<td></td>
<td>MDS 9000 + Consolidated Storage Arrays</td>
<td>UCS (Rack or Blade Servers)</td>
<td>Nexus 5000 w/ Nexus 2000 Fabric Extender</td>
<td>Nexus 7000 (w/ Cat 6500 as Services Chassis)</td>
<td>6500</td>
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<td>VMware</td>
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<td>Cisco Nexus</td>
<td>UCS</td>
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<tr>
<td>Application 2</td>
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<td>Cisco Nexus</td>
<td>UCS</td>
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<tr>
<td>Cisco and Third-Party Applications</td>
<td>VMware</td>
<td>VMware</td>
<td>Cisco Nexus</td>
<td>Cisco Nexus</td>
<td>MDS 9000</td>
<td>UCS (Rack or Blade Servers)</td>
<td>Nexus 5000 w/ Nexus 2000 Fabric Extender</td>
<td>Nexus 7000</td>
<td>10G Ethernet 10G FCoE 4G FC 1G Ethernet VM to vSwitch vSwitch to HW App to HW / VM</td>
</tr>
</tbody>
</table>

Cisco Cloud Provider Infrastructure Reference Architecture

Internet

IP-NGN

Partners

Cisco and Third-Party Applications

VMware

Xen

Hyper-V

Cisco Nexus 1000v

MDS 9000 + Consolidated Storage Arrays

UCS (Rack or Blade Servers)

Nexus 5000 w/ Nexus 2000 Fabric Extender

Nexus 7000 (w/ Cat 6500 as Services Chassis)

Nexus 7000

CRS-1 7600 6500

CRS-1 ASR 9000 ASR 1000 7600

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Cloud RA Collection

Cisco Cloud Provider Reference Architecture

Cloud Services Consumer Interface

Service Delivery and Management Architecture

Service Orchestration Architecture

Security Architecture

Network

Storage

Compute

Infrastructure Architecture

Cloud Service Management Reference Framework

Customer Portal | Scheduling | Ordering | Price
| Management Dashboard | Financial | Quality | SLA |

End User

| Infrastructure Management | Service Delivery | Service Management |
| Optimization | Selection (SDL/BCP) | Quality |
| Capacity Planning | Cost |
| HW/SW Management | Availability |
| Audits | SLA |
| Operations | RTD/RPO |

Service Orchestration

| Infrastructure Architecture Abstraction (Includes EEB and Domain Managers) | Service Catalogue | Asset Inventory | Mappings / Relationships | Human Resources |
| CMDB |

End-to-End Security

Network

Compute

Storage

Technology Architecture

Cisco Cloud Provider Infrastructure Reference Architecture

Application Software | Virtual Machine | VSwitch | Storage & SAN | Compute | Access | Aggregation | Core | Peering | IP-NGN Backbone |
| Subscribed "A" Application 1 | Subscribed "B" Application 1 | Subscribed "C" Application 2 |

Cloud Infrastructure Management Platform

VMware vSphere

Nexus 1000v

MOSS 9000 + Consolidated Storage Arrays (EMC, HDS)

UCS (Blades or Blade Servers)

Nexus 9000 (w/ Nexus 2000 as Services Chassis)

Nexus 7000 (w/ Cat 6500 as Services Chassis)

Nexus 7000

CRS-1 7600

CRS-1 6600

CR-1 5600
Do we need one or several cloud RAs?

- We certainly need a single Taxonomy
- Hierarchy or collection of Ref Architectures – perhaps RA Catalogue
- Ref Architecture collection should detail the components of an abstracted RA – extensible RA.
- A Single Ref Architecture – great starting point and opportunity for adoption and refinement.