OpenCloud: Value-Add Cloud on Internet2

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Open Networking Lab
Virtualized Network Infrastructure
Virtualized Network Infrastructure – OpenCloud –

Services are instantiated in a set of VMs connected by a set of VNs
Instantiating a Service

Service

Data Centers

Internet2 Backbone

Regional & Campus

End Users

Nintendo Wii

VM
VM
VM
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VM
VM
VM
VM
Instantiating a Service

Commodity Clouds

Data Centers

Internet2 Backbone

Regional & Campus

End Users

Amazon AWS

Google Cloud Platform

Nintendo Wii

End Users

VM

VM

VM

VM

VM
Value-Added Cloud

• Cloud = Data Center + Backbone + Edge
• Commodity clouds provide a robust “4th Tier”
• Leverage Internet2 infrastructure to provide better...
  – Responsiveness
  – Bandwidth
  – Privacy
  – Trust
  – Predictability
  – Customization

• Key Enabler → Service Composition + Isolation
  – Service Orchestration (XOS)
  – Network Hypervisor (OpenVirteX)
Service Composition

 Syndicate = CDN ⊕ Object Store ⊕ NoSQL DB

- Value-Add Storage Service
- Scalable Read Bandwidth (Akamai HyperCache & RequestRouter)
- Data Durability (S3, Glacier, Dropbox, Box, Swift)
- Data Consistency (Google App Engine)
Value-Added Storage Service

Commodity Clouds

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Amazon

AWS

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

Internet2

Backbone

Regional

Campus

End Users

Nintendo Wii

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

Mobile

Device

HPC

HPC

HPC

HPC

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

End Users

Nintendo Wii

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

Mobile

Device

HPC

HPC

HPC

HPC

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

End Users

Nintendo Wii

S3

S3

S3

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HPC

RR

RR

RR

RR

Mobile

Device

HPC

HPC

HPC

HPC

S3

S3

S3

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HPC

RR

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RR

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End Users

Nintendo Wii

S3

S3

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RR

RR

Mobile

Device

HPC

HPC

HPC

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RR

RR

RR

RR

End Users

Nintendo Wii

S3

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S3

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RR

Mobile

Device

HPC

HPC

HPC

HPC

S3

S3

S3

HPC

HPC

HPC

HPC

RR

RR

RR

RR

End Users

Nintendo Wii
Pilot Implementation (Beta)