UbuntuNet Alliance Webinar series: Building an NREN Cloud

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Planning and Design considerations for an NREN Cloud

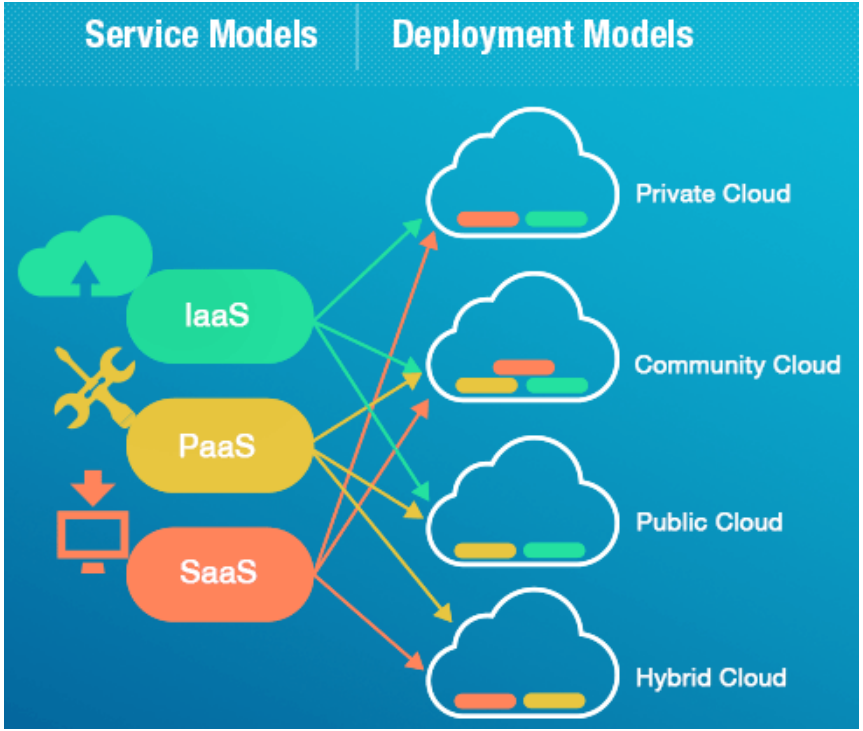
25th August 2020

Outline

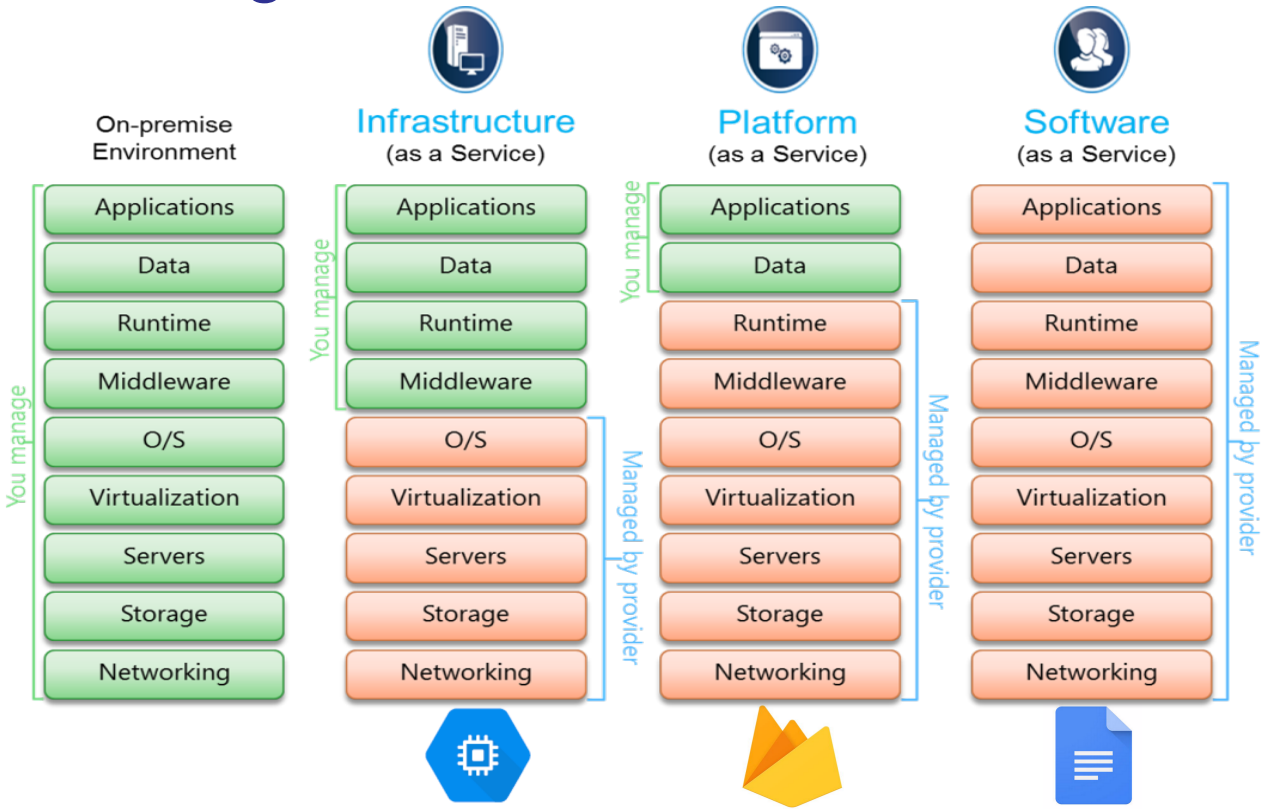
- Understanding Cloud
- Cloud Modeling
- Planning and Design Considerations
- Case study: RENU Cloud
- QnA

Understanding Cloud

Cloud Modeling: Services vs Deployments



Cloud Modeling: Services



Cloud Modeling: Deployment

Model	Description	Offers	Challenges
Public	• For general public use • Externally hosted • E.g. Google Cloud	• Rapid elasticity • Faster deployments	• Data security & privacy • Availability
Private	• Used by a single organisation • Internally or Externally hosted • E.g. An Insititution's Cloud	• Security and control • Higher customisability	• Cost of ownership • Required skillset
Community	• Shared by several organisations • Usually externally hosted • E.g. MS Gov't Community Cloud	• Collaboration • Elasticity	• Complex IT governance • Required skillset
Hybrid	• Composed of 2 or more clouds • E.g. VMware vCloud	• Security & control • customisable • Elasticity	• Interoperability • Integration

Planning and Design Considerations

- Non-technical considerations
  - User / Institution needs (**the most IMPORTANT factor**)
  - Budget (**the most LIMITING factor**)
  - Technical ability of staff
  - Location
    - Physical security
    - Power supply

Planning and Design Considerations

- Technical considerations
  - Redundancy (Availability)
  - Performance (Hardware & Networking)
  - Choice of platform
    - Flexibility, Scalability, Usability
  - Security (Data & Systems)
  - IP address space allocation

Planning and Design Considerations

- Technical considerations: Redundancy
  - Clustering:
    - to achieve high-availability
    - to facilitate fail-over
  - Hypervisors: migration or auto-reinstantiation of VMs across the cluster
  - Storage: replicate across **at least 2** nodes in **2 separate locations**
  - Disaster recovery: Use the 3-2-1 rule: **at least 3 copies**/versions of data, on **2 different media**, **1** being **off-site**.

Planning and Design Considerations

- Technical considerations: Performance
  - Servers:
    - Storage: Disks with
      - High capacity (50+ TB),
      - High R/W speed (SSD)
    - Hypervisor:
      - High CPU count (32+),
      - High capacity RAM (128+ GB)

Planning and Design Considerations

- Technical considerations: Performance
  - Network:
    - Interface cards:
      - **at least 2** Fiber-optic ports (for high traffic loads, 1+ Gbps)
      - **at least 2** Ethernet ports (for low traffic loads, 250+ Mbps)

Planning and Design Considerations

- Technical considerations: Choice of platform
  - Offers the services needed
  - Usability (both for users/institutions and administrators)
    - GUI dashboard, REST APIs, CLI tools
  - Documentation & community support
  - Scalability (serving increased demand)
  - Flexibility (adapt to changes)

Planning and Design Considerations

- Technical considerations: Choice of platform

Microsoft Azure

Google
Cloud Platform

Case study: RENU Cloud

- User needs:
  - off-site backups, storage space
  - tenancy
- Cloud solution: **Openstack**
- Service model:
  - **IaaS** (VMs or tenant quotas),
  - **SaaS** (many apps and services e.g. Moodle, BBB)

Case study: RENU Cloud

- Redundancy:
  - **at least 2** nodes per role (e.g. Hypervisor, Storage)
  - nodes geographically **distributed**
- Security:
  - Port-based security
  - Limited SSH access
  - No shared file systems
- IP address allocation: **2** IPv4 /25s

FURTHER READING

- https://www.rishabhsoft.com/blog/basics-of-cloud-computing-deployment-and-service-models
- https://computingforgeeks.com/top-open-source-cloud-platforms-and-solutions/
- https://www.newgenapps.com/blog/top-5-cloud-platforms-and-solutions-to-choose-from/
- https://www.techno-pulse.com/2011/10/cloud-deployment-private-public-example.html
- https://docs.openstack.org
- https://cloud.google.com

QnA

The End