

Information Technology for Enabling New Space Economy

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Functions Carried out by Information Technology

- Data Acquisition and Processing
- Data Archival and Life Cycle Management
- Data Analysis
- Data Dissemination
- Data Protection / Security

Information Technology Scenario

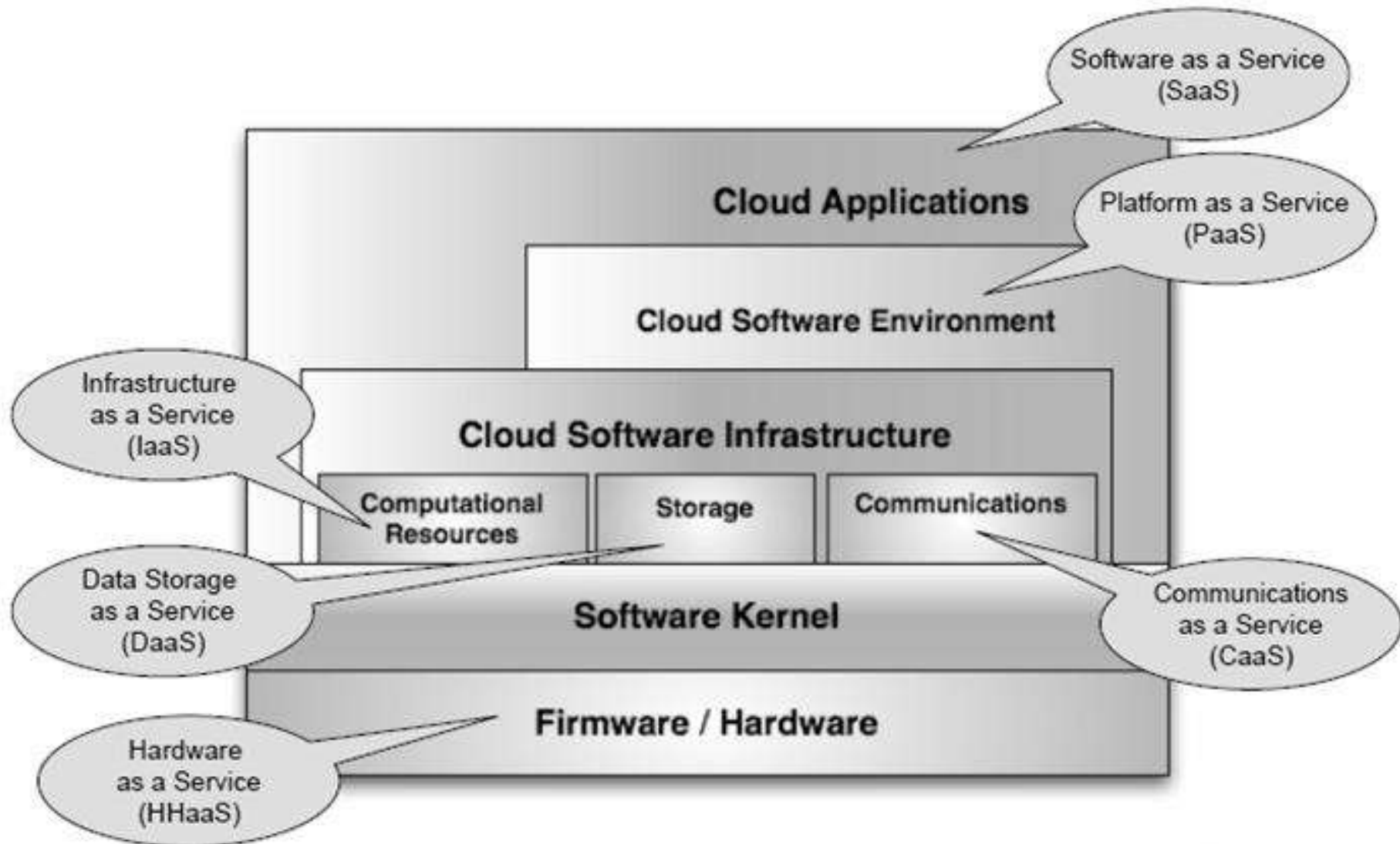
- Evolution of Cloud
- Need for Multi Cloud
- Operational Clouds and Services offered
- Advanced Technologies
- Security Issues and Protection
- Summary / Conclusion
- Question / Answer session

Cloud Evolution

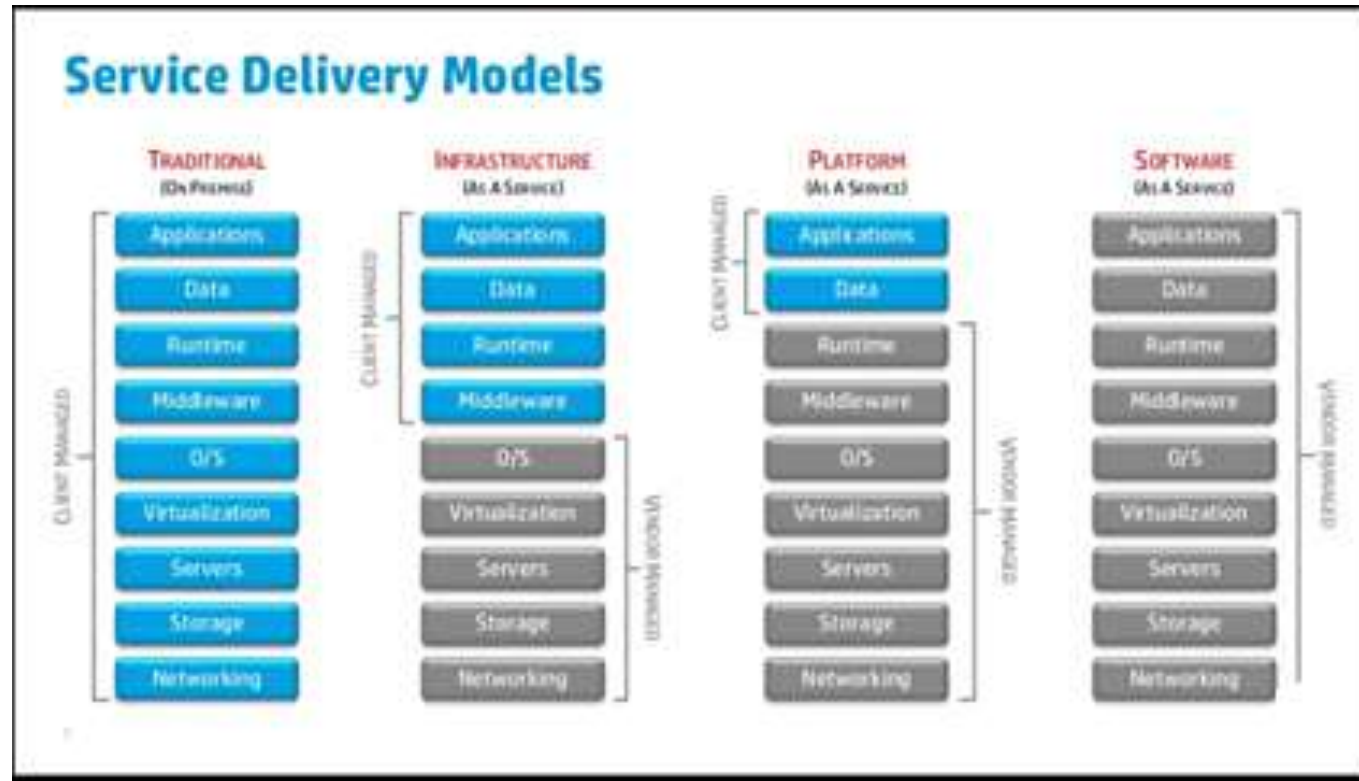
The following are the broad key stages in the evolution of information technology infrastructure

- The centralized mainframe
- Personal computing
- The client/server era
- Enterprise computing
- The cloud
- Edge Computing

Cloud Layers



Cloud Service Delivery Models



Type of Clouds

- Public Cloud
- Private Cloud
- Hybrid Cloud
- Community Cloud
- Virtual Private Cloud
- Cloud Infrastructure made available for Public use
- Cloud Infrastructure Operated for use by an Organisation
- Cloud Infrastructure composed of two or more clouds
- Cloud Infrastructure shared by several organisations and supporting for one community
- Cloud Services that simulates the private cloud services in public cloud Infrastructure

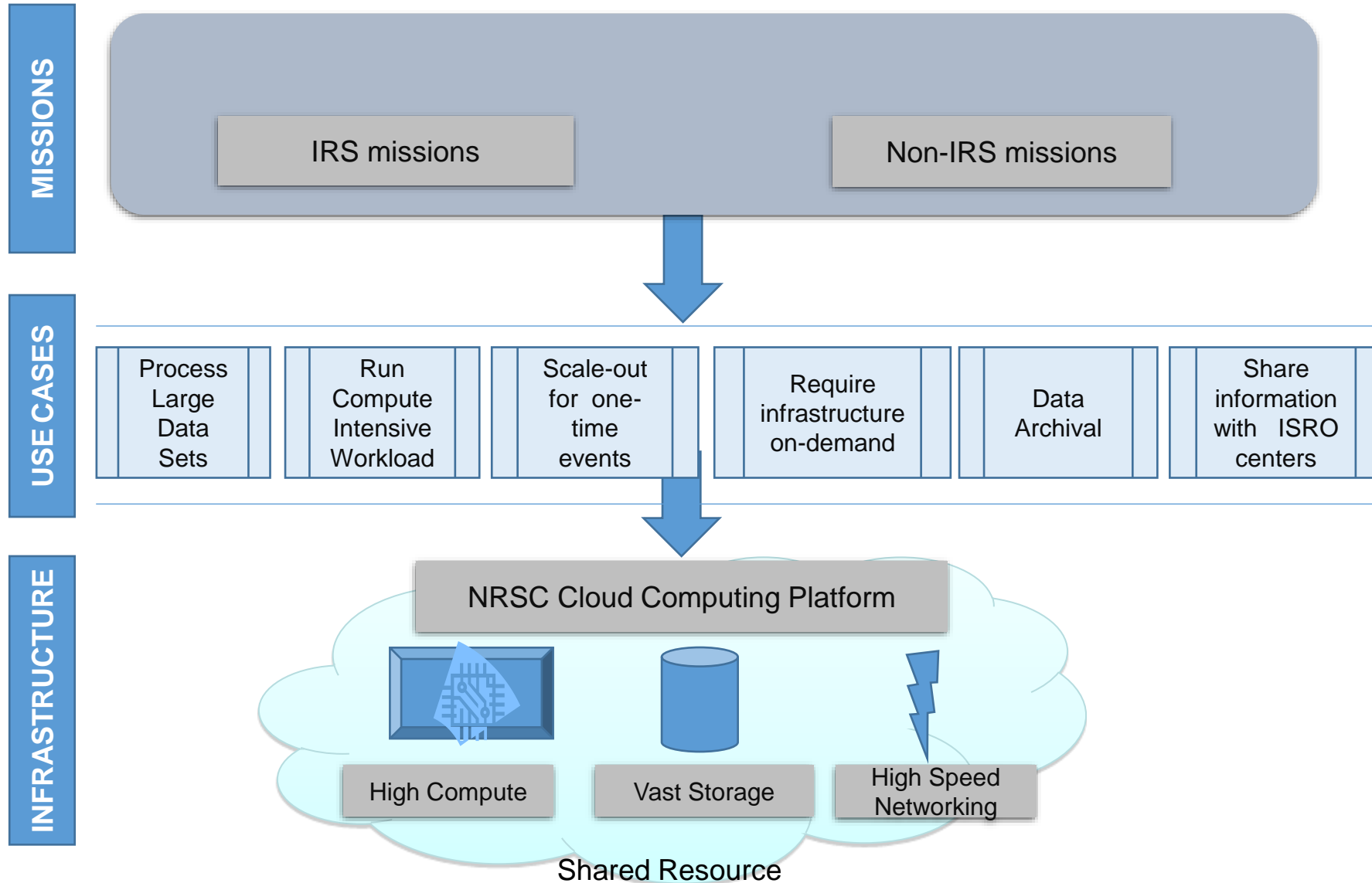
Need for Multi Cloud Architecture

- Building redundant architectures
- Leveraging the best of each cloud
- To have better security and less Latency (on premise cloud)
- To avoid Vendor lock-in
- Better pricing

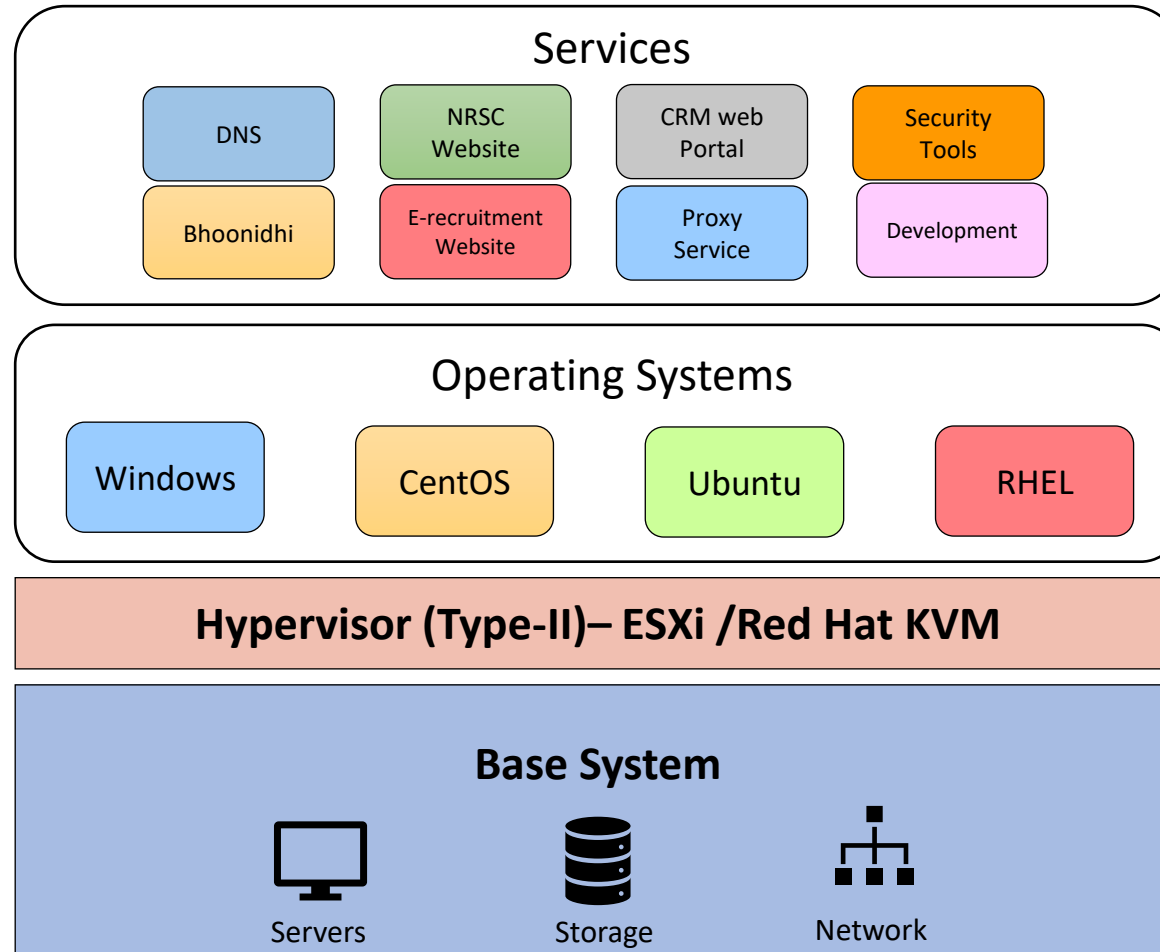
On premise Operational Clouds

- Private Cloud for Data Processing
- Public Cloud for Data Dissemination
- VDI based Data Analysis Private Cloud
- Public Cloud for convergence
- Cloud Services offered
 - Infrastructure as a Service (IaaS)
 - Platform as a Service (PaaS)
 - Data as a Service (DaaS)
 - Software as a Service (SaaS)

Private Cloud - Architecture Overview



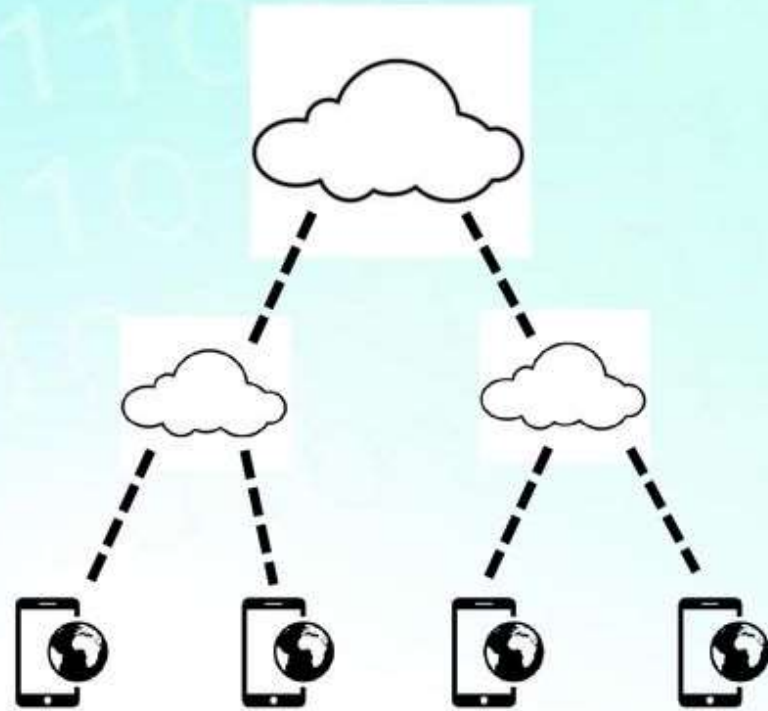
Public Cloud IT Architecture



Edge Computing

Three-level Architecture

- First level:
 - unmodified cloud infrastructure
- Second level:
 - dispersed elements called cloudlets with state cached from the first level
- Third level:
 - Mobile-device or IoT device



Information Technology Architecture

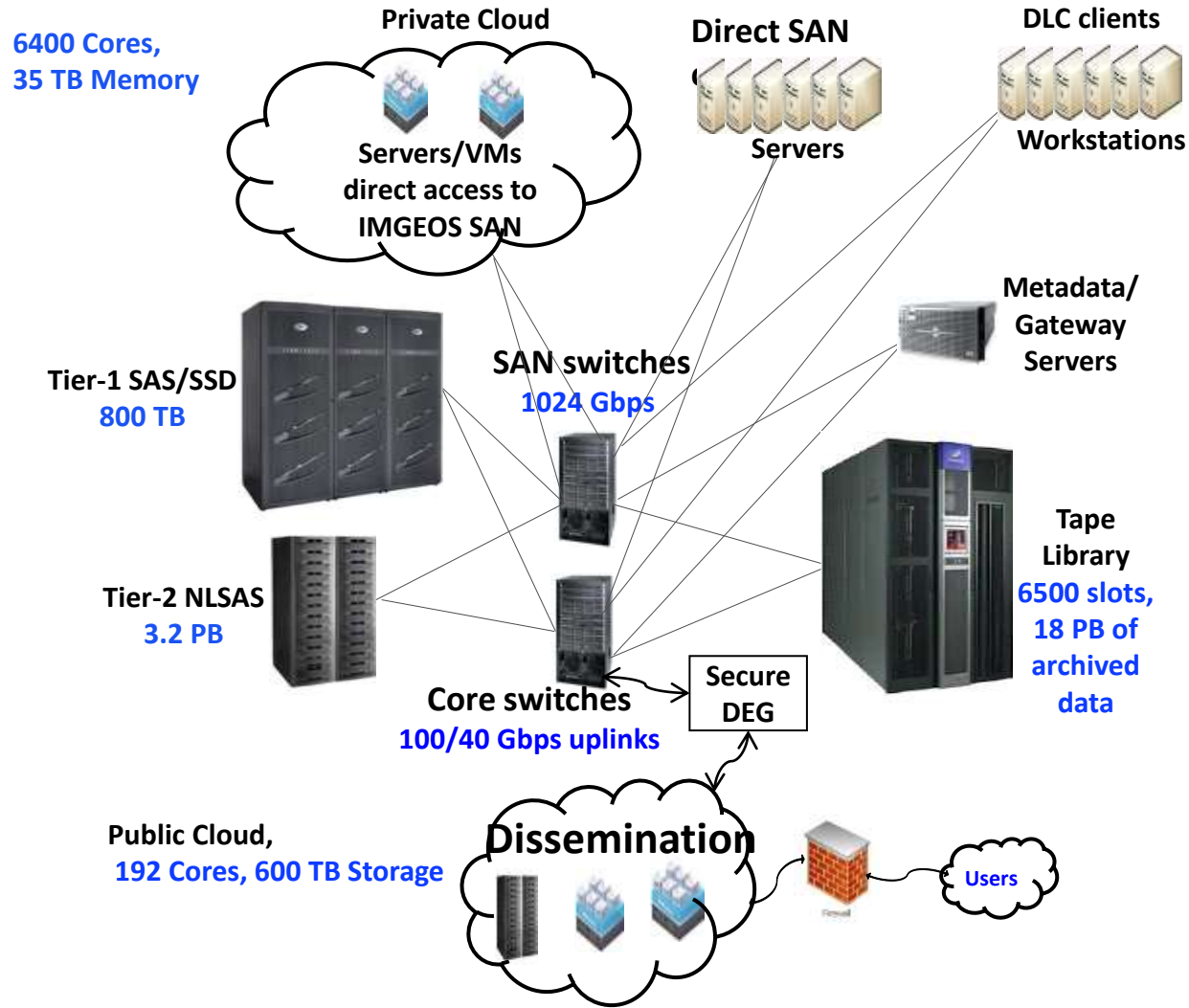
Integrated

Virtualization

On-premise
Public & Private
Clouds

Containerization

Archival
Tape Library/
Object Storage



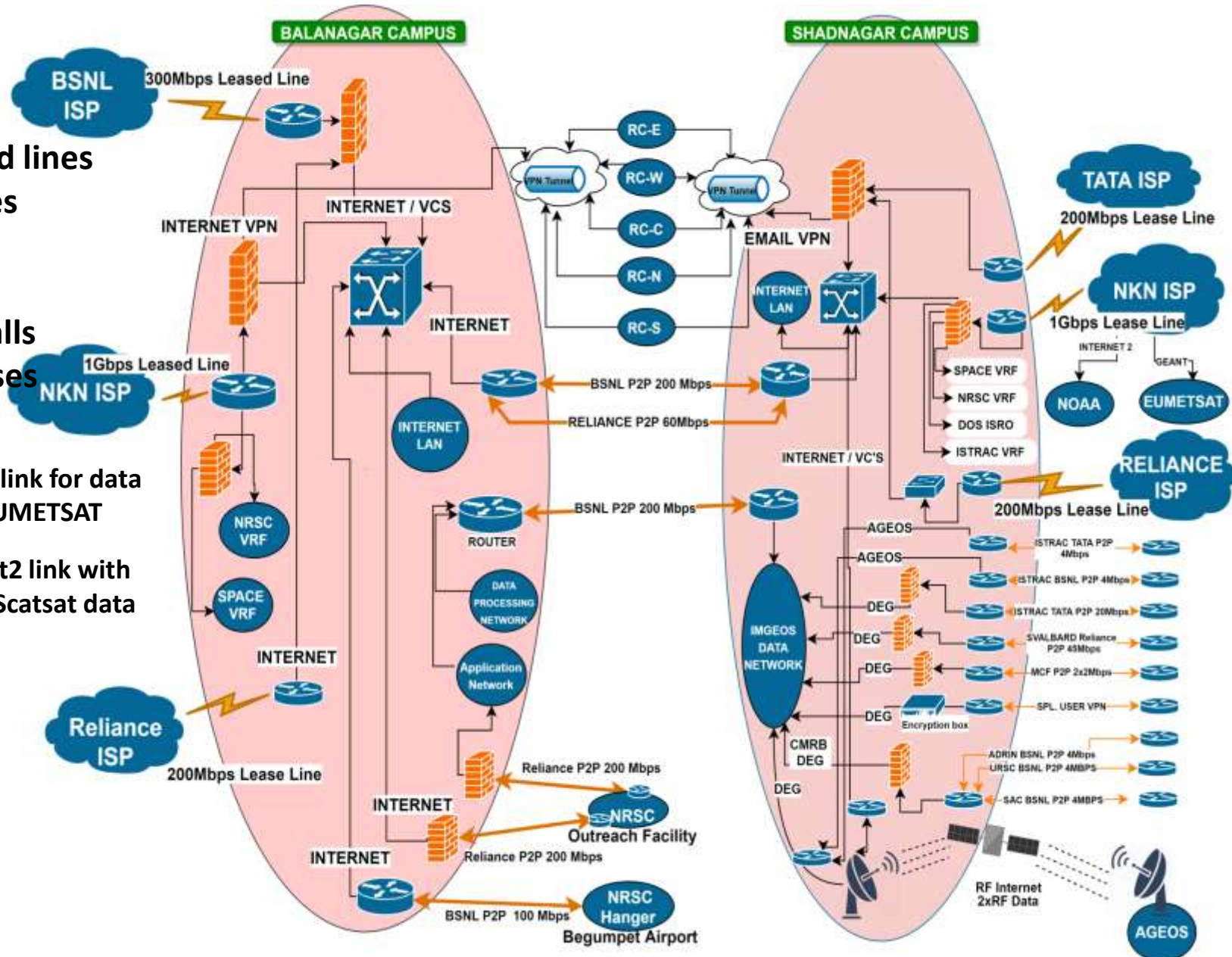
Data Life Cycle Management

- Once the Data is acquired, data will be moved to high performance storage and two copies on tape / one copy on object storage
- The acquired data will be on High Performance Storage for about 3 Months
- After 3 Months data will be automatically moved to Medium Performance Storage and will be there for about 12 Months
- All the data will be available in Tape / Object Storage. There will be two vaulted copies of data for DR purpose.
- Data was automatically copied from one generation of LTO to the next higher generation of LTO (LTO5 to LTO7)

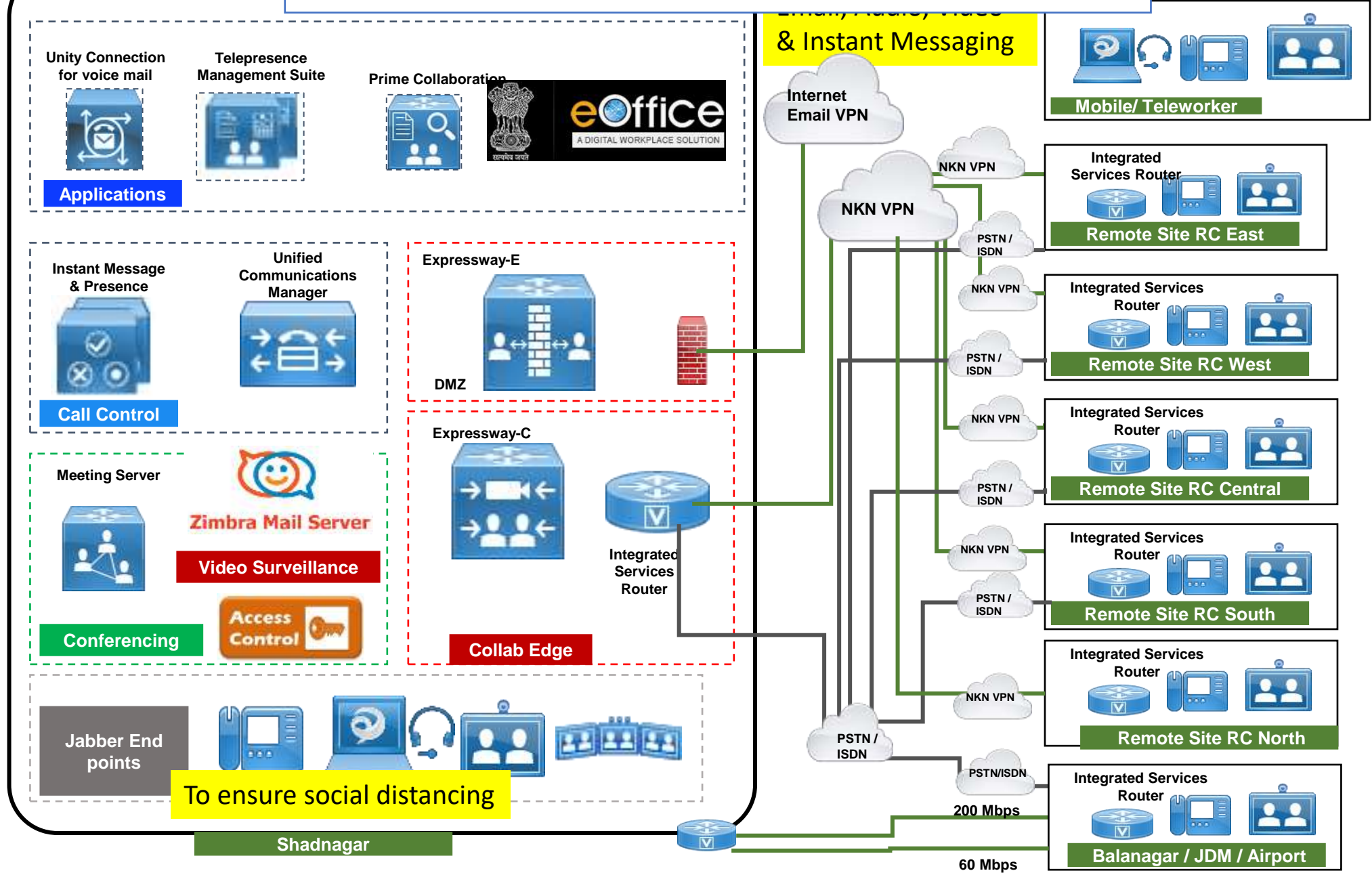
Organisation NETWORKS

- 18 Leased lines
- 6 ISP lines
- 7 VPNs
- 10 LANs
- 20 Firewalls
- 9 Campuses

- NKN-GEANT link for data products to EUMETSAT
- NKN-Internet2 link with Fairbanks for Scatsat data



Seamless Unified Services



Security Threats to Cloud Computing

- The cloud acts as a big black box, nothing inside the cloud is visible to the clients
- Clients have no idea or control over what happens inside a cloud
- Even if the cloud provider is honest, it can have malicious system admins who can tamper with the VMs and violate confidentiality and integrity
- Clouds are still subject to traditional data confidentiality, integrity, availability, and privacy issues, plus some additional attacks

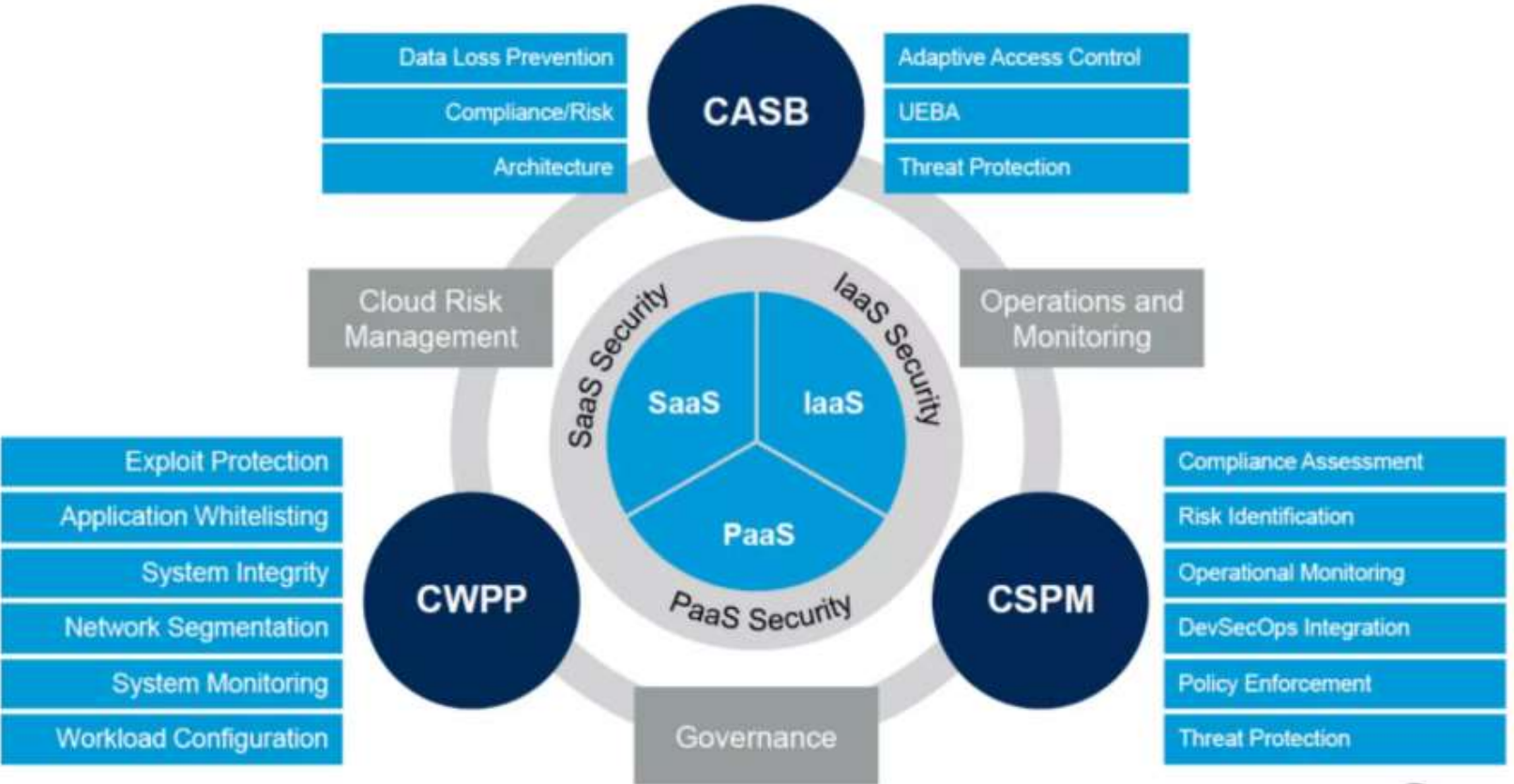
Security Threats to Cloud Computing – Contd..

- Abuse and nefarious use of cloud
- Insecure APIs and Interfaces
- Shared Technology
- Data Loss
- Account or Service Hijacking
- Unknown risk profile

Multi-tenancy Issues in the Cloud

- Conflict between tenants' opposing goals
 - Tenants share a pool of resources and have opposing goals
- How does multi-tenancy deal with conflict of interest?
 - Can tenants get along together and 'play nicely' ?
 - If they can't, can we isolate them?
- How to provide separation between tenants?
- Cloud Computing brings new threats
 - Multiple independent users share the same physical infrastructure
 - Thus an attacker can legitimately be in the same physical machine as the target

Multi-Cloud Security Tools



CASB – Cloud Access Security Broker
 CWPP – Cloud Workload Protection Platform
 CSPM – Cloud Security Posture Management

Source: 2019 Gartner

Multi Cloud Security Solutions

- To protect resources and workloads running on public and hybrid cloud services managed by cloud providers, as well as private clouds
- Cloud workload protection platform (CWPP)
- Cloud security posture management (CSPM)
- Cloud access security broker (CASB)
- Cloud data security
- Cloud compliance

Summary

- IT Plays a critical role in data life cycle management of the remote sensing data tens / hundreds of Peta bytes
- The cloud based infrastructure helps in Big data analytics by supporting elasticity
- The edge computing enables collecting the real-time data
- Advanced Technologies like AI/ML gives accurate results in the analysis of the data

Thank You