Security of Cloud Computing

Topic Overview

- Introduction
- Cloud Basics
- Securing the Cloud
- Leveraging the Cloud

Introduction

- Cloud Computing Industry is growing
  - According to Gartner, worldwide cloud services revenue is leading
- Businesses are increasing Cloud adoption
  - "We expect a great deal of migration towards cloud computing worldwide
- How can IT leaders ensure security in the cloud?

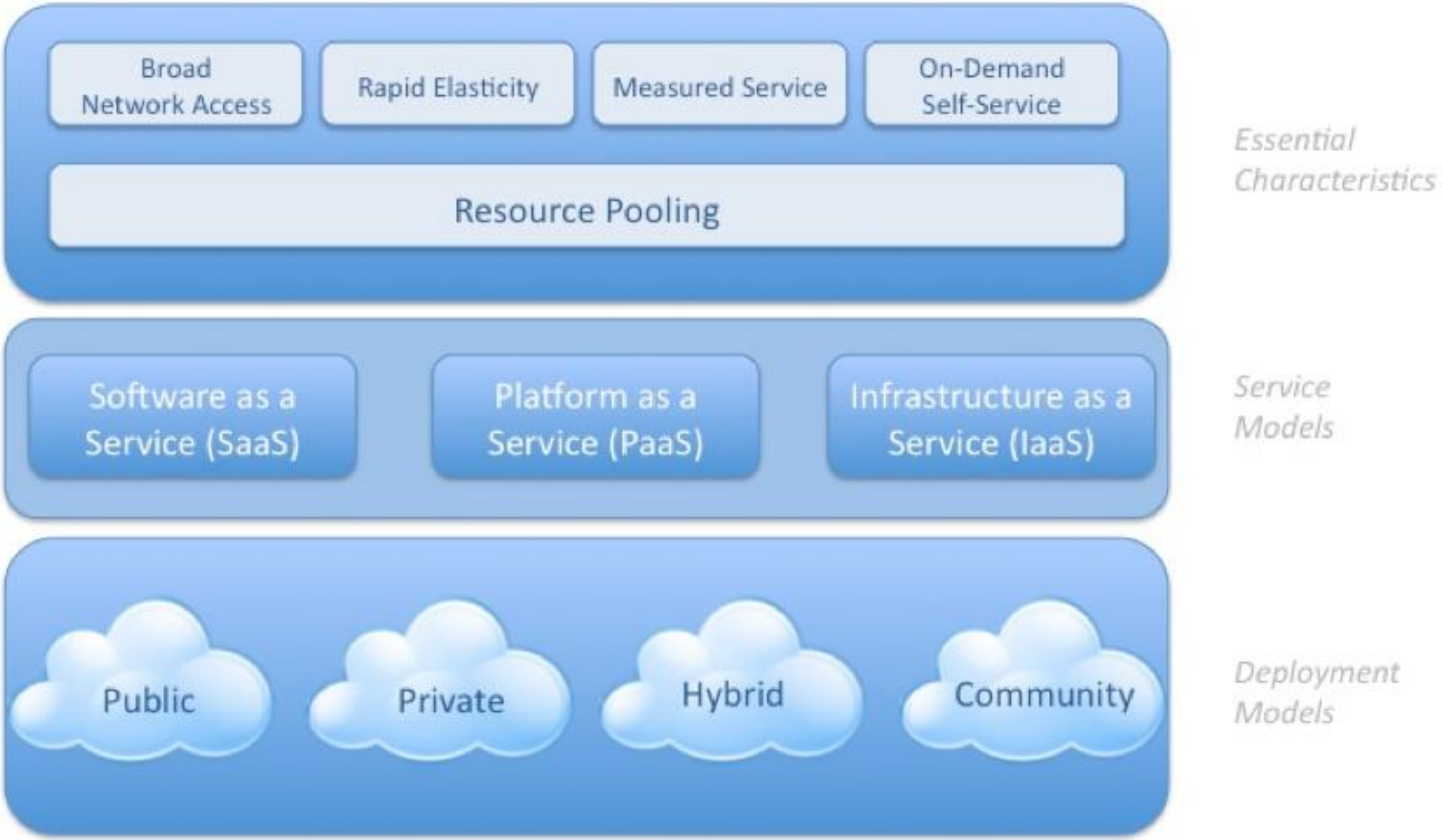
Cloud Basics

- Cloud Characteristics
- Service Models
  - SaaS
  - IaaS
  - PaaS
- Deployment Models
  - Public
  - Private
  - Community
  - Hybrid

Cloud Characteristics

Visual Model Of NIST Working Definition Of Cloud Computing

http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html



Broad Network Access

Rapid Elasticity

Measured Service

On-Demand Self-Service

Resource Pooling

Essential Characteristics

Software as a Service (SaaS)

Platform as a Service (PaaS)

Infrastructure as a Service (IaaS)

Service Models

Public

Private

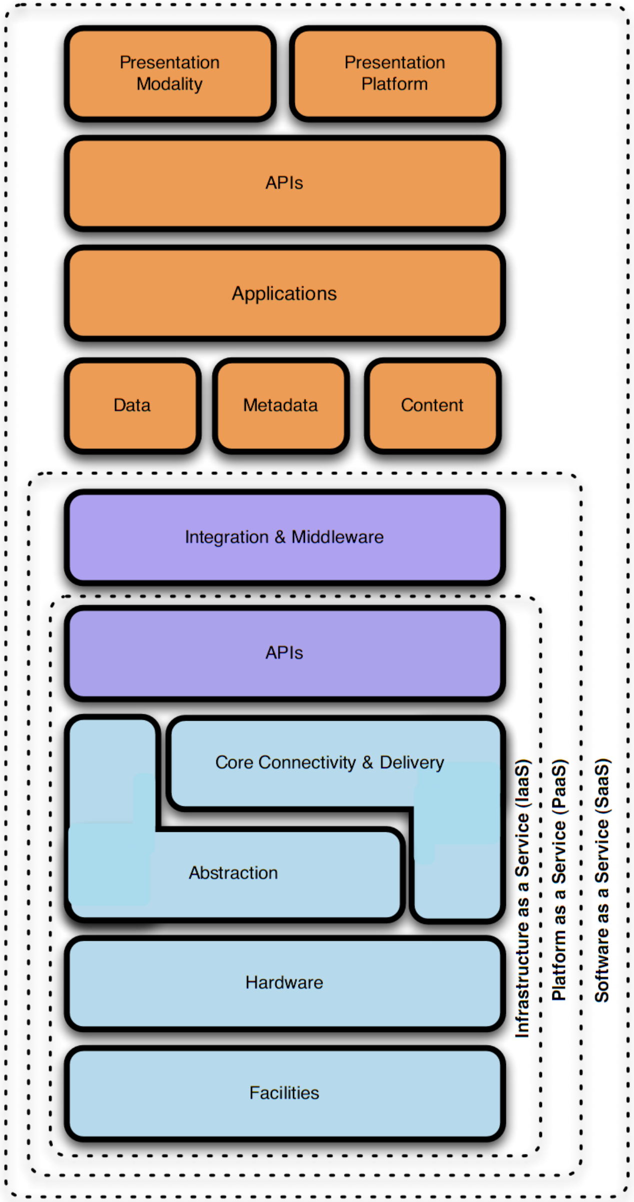
Hybrid

Community

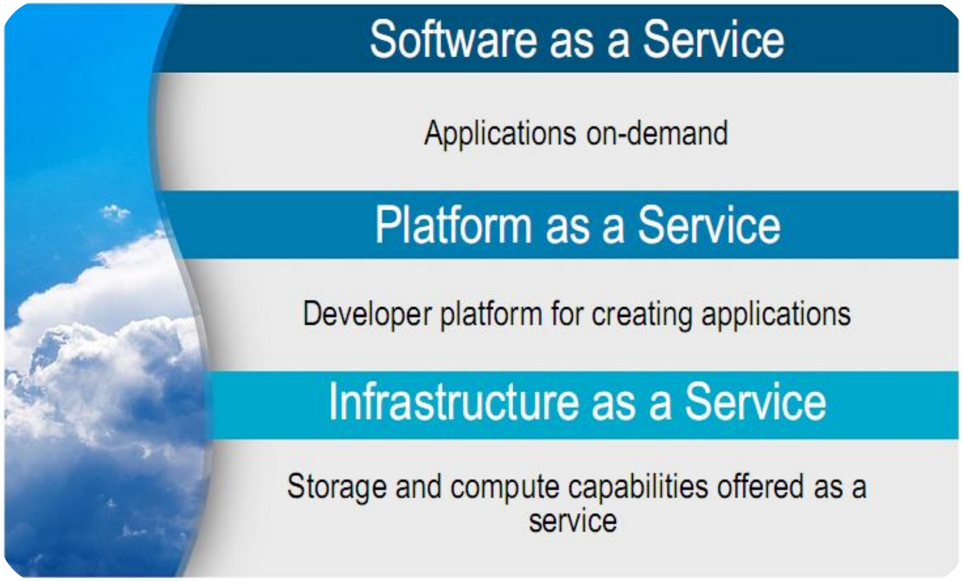
Deployment Models

Cloud Service Models

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



Natural Evolution of the Web



Software as a Service

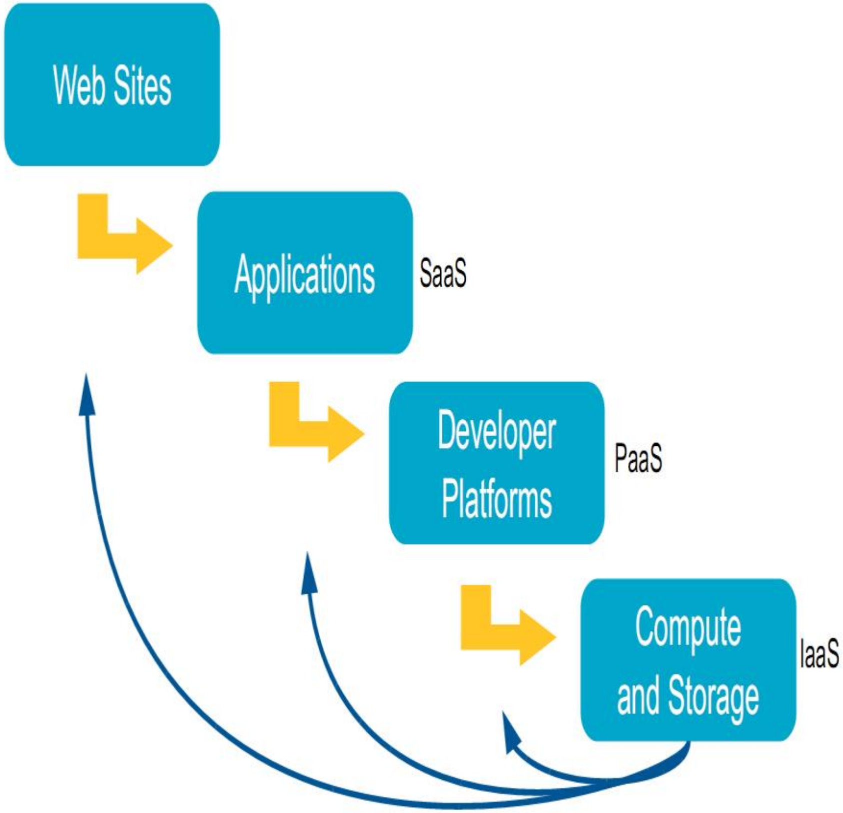
Applications on-demand

Platform as a Service

Developer platform for creating applications

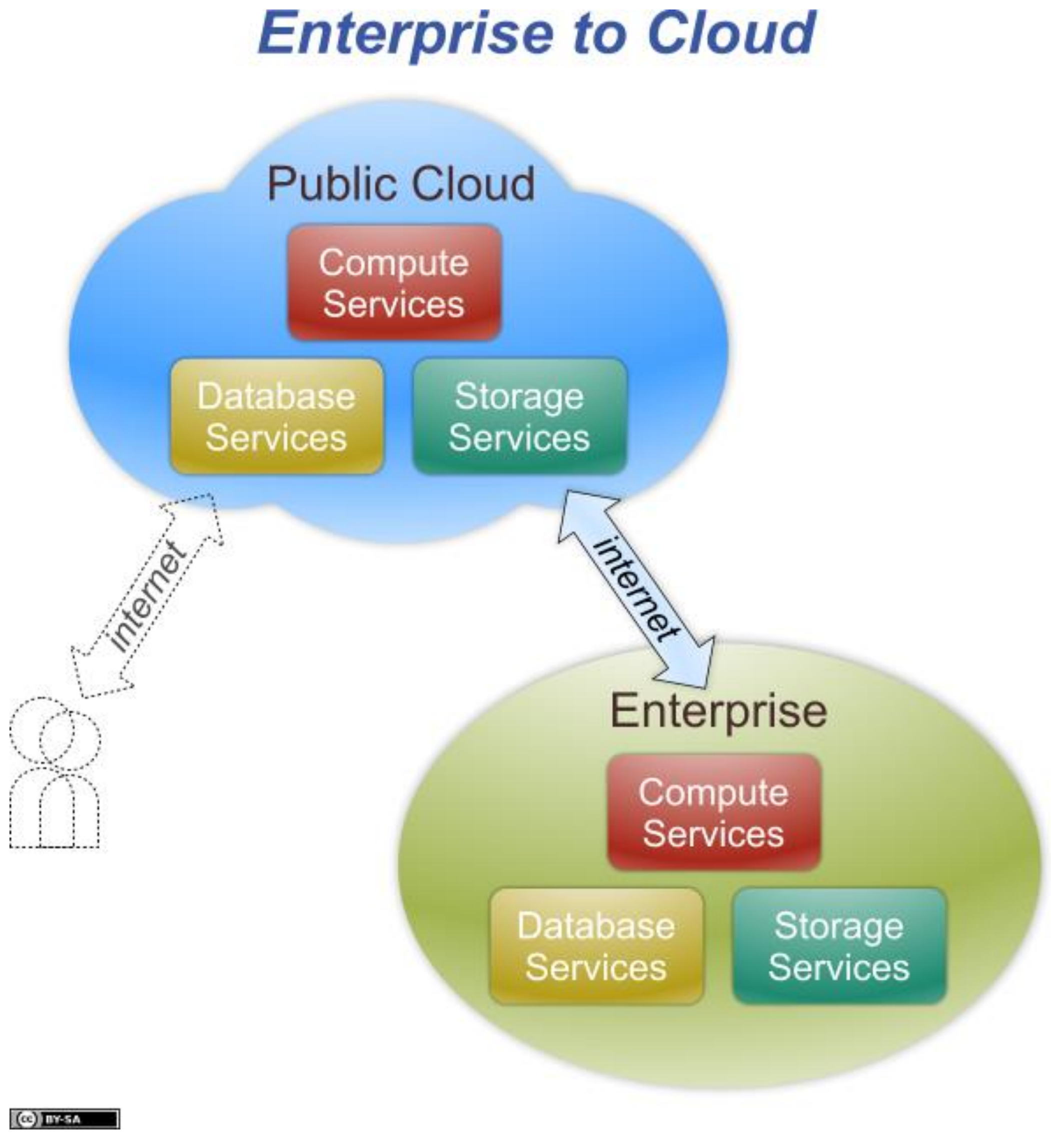
Infrastructure as a Service

Storage and compute capabilities offered as a service

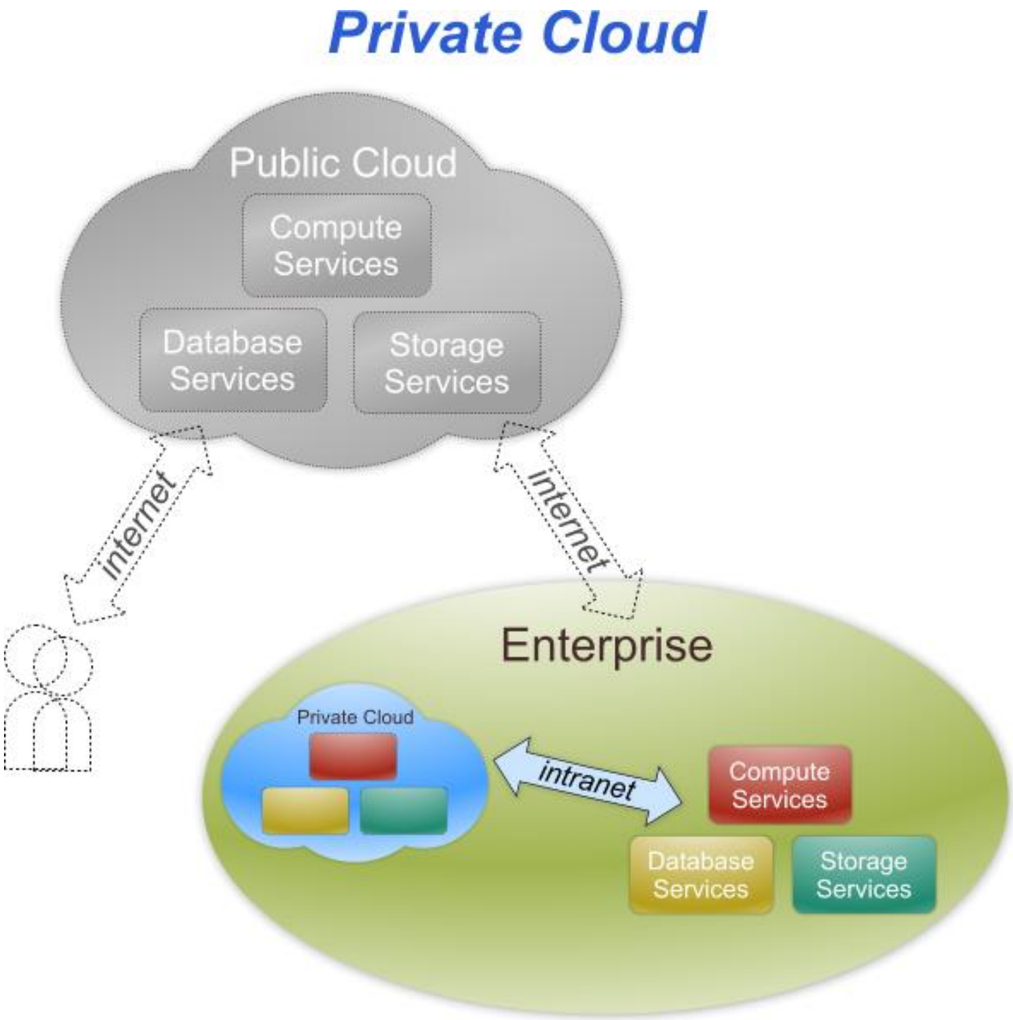


Source: Lew Tucker, Introduction to Cloud Computing for Enterprise Users

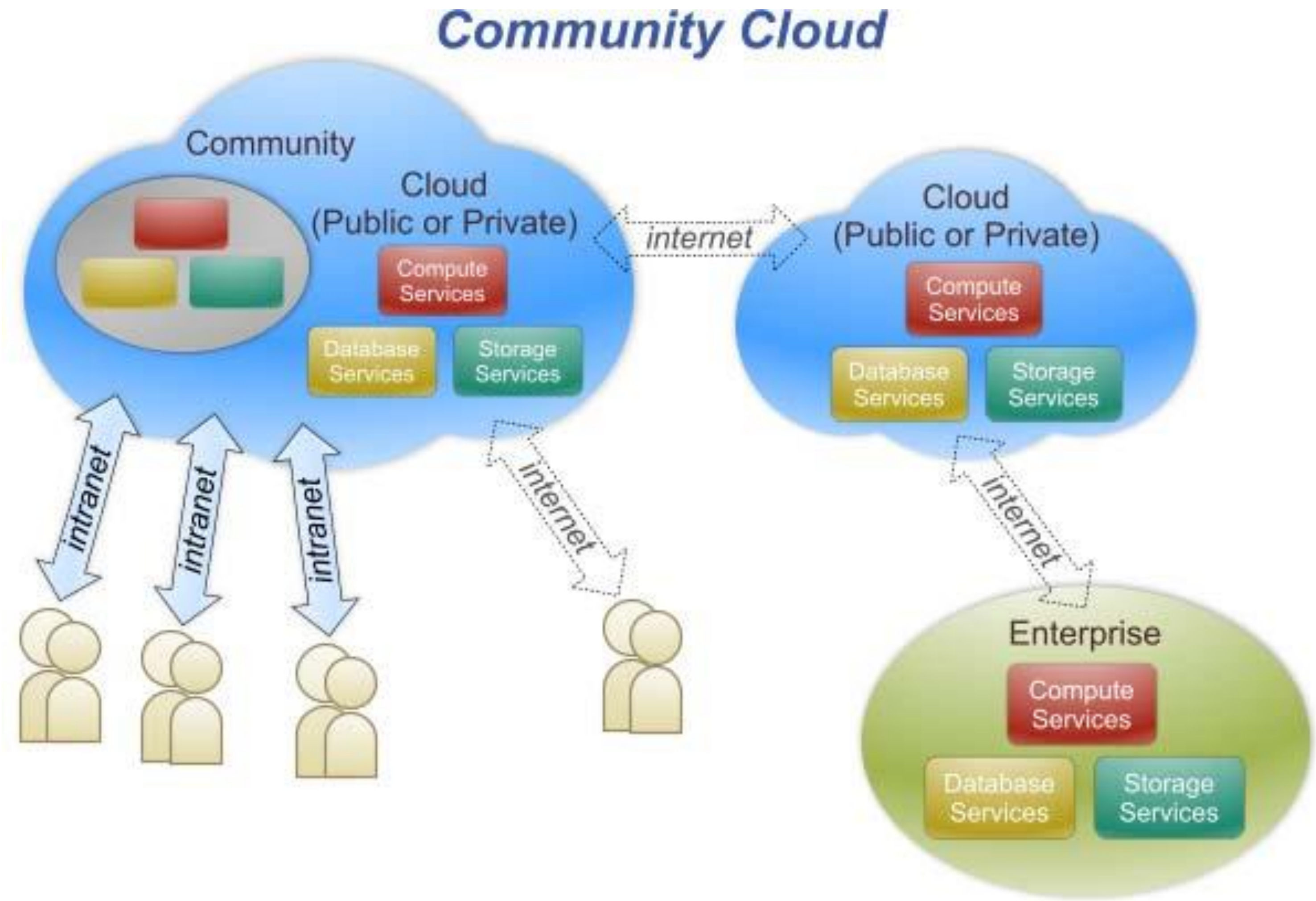
Four Deployment Models


Enterprise to Cloud

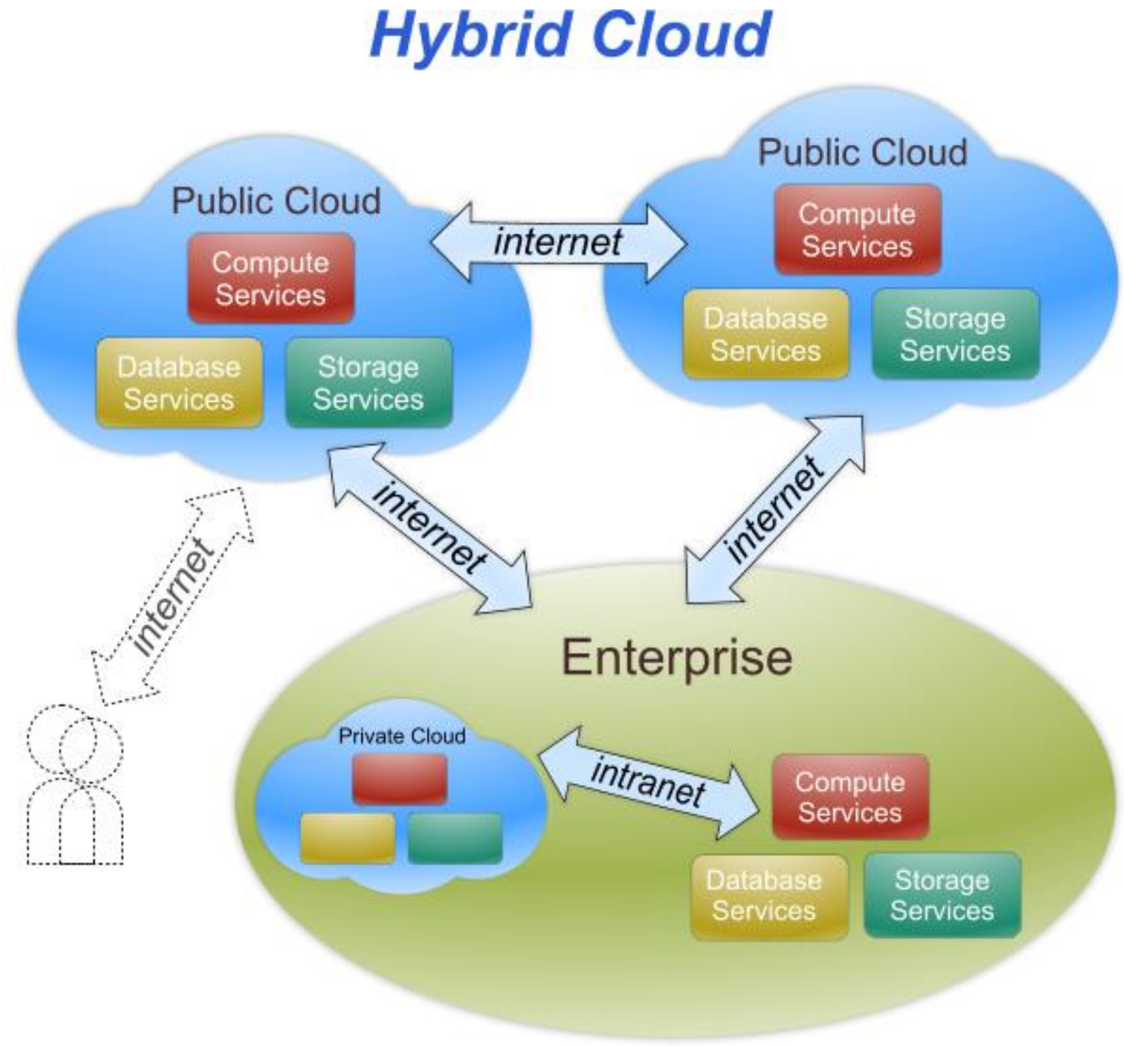
Four Deployment Models



Four Deployment Models



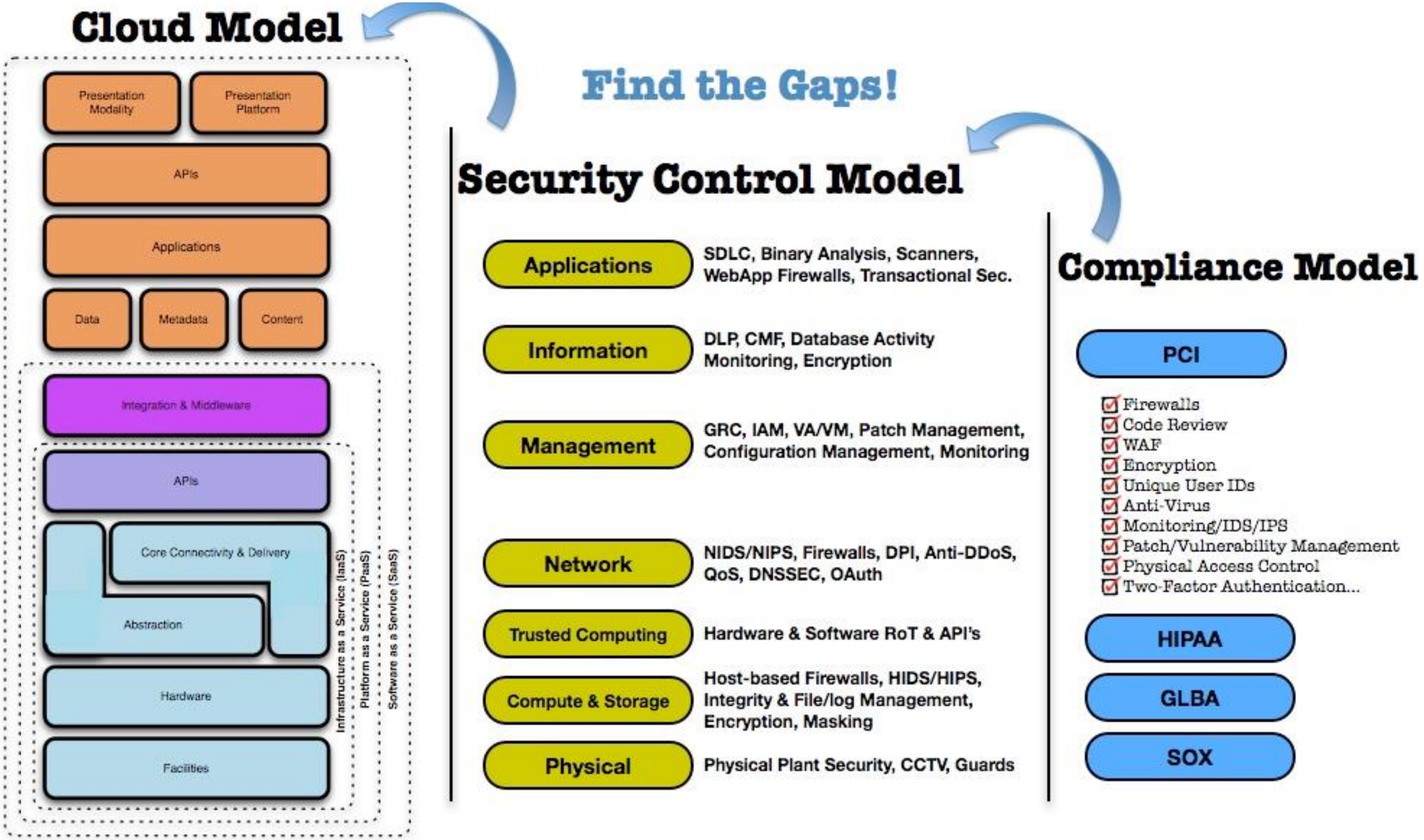
Four Deployment Models



Securing the Cloud

- Security Interaction Model
- Top Security Threats
- Cloud Provider Security Practices –

Security Interaction Model



Find the Gaps!

Security Control Model

Applications	SDLC, Binary Analysis, Scanners, WebApp Firewalls, Transactional Sec.
Information	DLP, CMF, Database Activity Monitoring, Encryption
Management	GRC, IAM, VA/VM, Patch Management, Configuration Management, Monitoring
Network	NIDS/NIPS, Firewalls, DPI, Anti-DDoS, QoS, DNSSEC, OAuth
Trusted Computing	Hardware & Software RoT & API's
Compute & Storage	Host-based Firewalls, HIDS/HIPS, Integrity & File/log Management, Encryption, Masking
Physical	Physical Plant Security, CCTV, Guards

Compliance Model

PCI

- ☑ Firewalls
- ☑ Code Review
- ☑ WAF
- ☑ Encryption
- ☑ Unique User IDs
- ☑ Anti-Virus
- ☑ Monitoring/IDS/IPS
- ☑ Patch/Vulnerability Management
- ☑ Physical Access Control
- ☑ Two-Factor Authentication...

HIPAA

GLBA

SOX

Top Security Threats

- Abuse and nefarious use of cloud computing
- Insecure interfaces & API's
- Unknown risk profile
- Malicious insiders
- Shared technology issues
- Data loss or leakage
- Account or service hijacking

Threat Mitigation

Abuse and nefarious use of cloud computing	▪ Stricter initial registration and validation processes. ▪ Enhanced credit card fraud monitoring and coordination. ▪ Comprehensive introspection of customer network traffic. ▪ Monitoring public blacklists for one’s own network blocks.
Insecure interfaces & API’s	▪ Analyze the security model of cloud provider interfaces. ▪ Ensure strong authentication and access controls are implemented in concert with encrypted transmission. ▪ Understand the dependency chain associated with the API.
Unknown risk profile	▪ Disclosure of applicable logs and data. Partial/full disclosure of infrastructure details ▪ Monitoring and alerting on necessary information.

Threat Mitigation

Malicious insiders	▪ Enforce strict supply chain management and conduct a comprehensive supplier assessment. ▪ Specify human resource requirements as part of legal contracts. ▪ Require transparency into overall information security and management practices, as well as compliance reporting. ▪ Determine security breach notification processes.
Shared technology issues	▪ Implement security best practices for installation and configuration. ▪ Monitor environment for unauthorized changes/activity. ▪ Promote strong authentication and access control for administrative access and operations. ▪ Enforce service level agreements for patching and vulnerability remediation. ▪ Conduct vulnerability scanning and configuration audits.

Threat Mitigation

Data loss or leakage	▪ Implement strong API access control. ▪ Encrypt and protect integrity of data in transit. ▪ Analyze data protection at both design and run time. ▪ Implement strong key generation, storage and management, and destruction practices. ▪ Contractually demand providers wipe persistent media before it is released into the pool. ▪ Contractually specify provider backup and retention strategies.
Account or service hijacking	▪ Prohibit the sharing of account credentials between users and services. ▪ Leverage strong two-factor authentication techniques where possible. ▪ Employ proactive monitoring to detect unauthorized activity. ▪ Understand cloud provider security policies and SLAs.

Security Practices

- Organizational and Operational Security
- Data Security
- Threat Evasion
- Safe Access
- Privacy

Organizational and Operational Security

- Holistic approach to security
- Security team
- Develop with security in mind
- Regularly performs security audits and threat assessments
- Employees screened, trained
- Works with security community and advisors

Data Security

- Google Code of Conduct – "Don't be evil."
- Physical security
- Logical Security
- Accessibility
- Redundancy

Threat Evasion

- Spam and virus protection built into products
- Protects against application & network attacks

Safe Access

- Avoids local storage
- Access controls
- Encrypted connections
- Integrated security

Privacy

- Privacy policy
- Does not access confidential user data
- Does not alter data
- Maintain own IP rights
- Indemnification, liability
- End of use

Leveraging the Cloud

- Decision Making Process
- Clan Wars Case Study

Decision Making Process

- Identify the asset for cloud deployment
- Evaluate the asset requirements for confidentiality, integrity, and availability
- Map the asset to potential cloud deployment models
- Evaluate potential cloud service models and providers
- Sketch the potential data flow
- Draw conclusions

Rackspace Security Practices

- Physical Security
- System Security
- Operational Infrastructure Security
- Client Application Security

Cloud Consumer Best Practices

Governance Domains

- Governance & Enterprise Risk Mgmt
- Legal and Electronic Discovery
- Compliance and Audit
- **Information Life Cycle Management**
- Portability and Interoperability

Operational Domains

- Traditional Security, Business Continuity, and Disaster Recovery
- Data Center operations
- Incident Management
- **Application security**
- Encryption & Key Mgmt
- Identity & access Mgmt
- Virtualization