Cloud Computing

Intro to Cloud Computing

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Contents

Learning Outcomes

- What is cloud computing?
- Cloud computing economics
- Top cloud providers
- Core cloud architectures
- Cloud computing roles
- Intro to Amazon Web Services (AWS)

Reading

- Cloud Computing: Concepts ..., Ch. 1, 3, 4

Terminology

- **Cloud -** a distinct IT environment designed for remotely provisioning scalable and measured IT resources (not internet)
- **Consumer** - party consuming cloud-based IT services
- **Provider** - party providing cloud-based IT services
- **On-premise** - resources hosted in-house by the consumer
- **Virtualization** - abstraction of a physical IT resource so underlying capabilities can be shared by multiple users
- **Container** - highly optimized virtual hosting environments
- **Scaling** - responding to changes in usage demands
- **SLA** - Service-level Agreement - service contract between a cloud provider and cloud consumer that describes quality of service (QoS) expectations

Terminology, cont.

- **Trust boundary** - a logical perimeter representing the extent to which IT resources are trusted
- **Cloud-native** - Applications with no preference for any particular operating system or computer, running on infrastructure that is virtualized, shared, and elastic.

What is Cloud Computing?

Provision of IT computing, storage, & networking services via remote, distributed, scalable, & elastic infrastructure.

- Typically refers to on-demand computing services delivered by an external provider
- Depends heavily on virtualization of physical resources
- Can involve a mix of service providers
- Can involve a mix of service models
- Can involve horizontal or vertical scaling

Cloud Environment Characteristics

- On-demand usage
- Ubiquitous access
- Multitenancy (and resource pooling)
- Elasticity
- Measured usage
- Resiliency

Scaling

- **Horizontal** - Allocation or release of IT resources of the same type. AKA **scaling out / in**
- **Vertical** - replacing an IT resource by another with higher or lower capabilities. AKA **scaling up / down**

Cloud Computing Advantages

- Allows for lower up-front and sunk costs
- Allows for business agility as computing needs change, e.g:
  - To add or remove IT resources quickly
  - To migrate applications if needed
- Cloud providers can better optimize maintenance costs & reliability

Cloud Computing Risks

- **Overlapping trust boundaries** - responsibility for security shared between consumer & provider
- **CyberSecurity threats** due to increased internet exposure
- **Lower governance control** over resources
- **Vendor lock-in** - limited portability between cloud providers
- **MultiRegional compliance** & legal issues

Cloud Delivery Models - IaaS

Infrastructure as a Service (IaaS)

Self-contained environment of “raw” IT resources.

Provides cloud consumers with a high level of control and responsibility over configuration and utilization.

IaaS IT resources are generally not preconfigured, placing the administrative responsibility directly upon the cloud consumer.

Cloud Delivery Models - PaaS

Platform as a Service (PaaS)

Predefined “ready-to-use” environment typically comprised of already deployed and configured IT resources.

Cloud consumer is spared the administrative burden of setting up and maintaining the bare infrastructure IT resources.

Cloud consumer has less control over the underlying IT resources for customization.

Examples - Google App Engine, Firebase

Cloud Delivery Models - SaaS

Software as a Service (SaaS)

A shared cloud service made available as a “product” or generic utility for a wide range of consumers.

Examples - Office365, Salesforce, Tableau, Airtable

Cloud Delivery Models - sub-models

- Communication as a Service
- Security as a Service
- Storage as a Service

Cloud Deployment Models

- **Public cloud** - a publicly accessible cloud environment owned by a third-party cloud provider
- **Private cloud** - owned by a single organization that is both consumer and provider
- **Multi-cloud** - cloud consumer uses cloud services from different public clouds provided by multiple cloud providers
- **Hybrid cloud** - a cloud environment comprised of two or more different cloud deployment models

Top Cloud Providers

- Amazon (AWS) - https://aws.amazon.com/
- Microsoft (Azure) - https://azure.microsoft.com/en-us/
- Google (Google Cloud) - https://cloud.google.com/
- Others
  - IBM - https://www.ibm.com/cloud
  - Oracle
  - Salesforce (https://www.heroku.com/)