CLOUD COMPUTING AND M4D

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Broad Components in a S/W Soln.

• Information acquisition/input component
  – GUI or some input mechanism
• Business logic component
  – “Algorithm” that solves the business problem
• Information dissemination/output component
  – GUI of some output mechanism
Component are Deployed on a Platform

• Platform for us may be:
  – A user facing client environment
    • A mobile phone, tablet or a laptop etc.
  – A backend server environment
    • Database server
    • Application/web server
Where Does Cloud Computing Fit?

• Mainly for backend component hosting
  – Data processing
  – Data storage

• For consuming other “heavy lifting” services
  – Bulk video format conversions/enhancements
  – Apply some 3\textsuperscript{rd} party algorithms to data
What is Cloud Computing?

- Computing on remote servers (instead of local/personal computer)
  - Typically hosted on the Internet
  - Can also be within the organization
  - Exhibits some special properties (more on this shortly)
- Computing here typically means:
  - Processing of data
  - Storing or managing data
- Computing capabilities available on-demand
  - Typically in utilities model (pay per use)
A Historical Perspective

- Concept dates back to 1950s
  - Accessing mainframes via thin clients; used time-sharing for improving utilization
- Cheap computers, storage devices and high-speed networks have become ubiquitous
- Mature hardware virtualization technologies
  - Virtualization helps in server consolidation
Some Driving Factors

• Enterprises wanted to improve resource utilization
  – Low datacenter utilization: ~ 10% of its peak capacity
  – Resource consolidation via virtualization technologies

• Amazon Inc. played a key role
  – Initiated efforts to “rent out” computing resources to external customers
  – In 2006 launched Amazon Web Service (AWS) as utility computing
Five Characteristics of Cloud (NIST*)

1. Broad network access
   – Computing capabilities are available over the network
   – Accessed through standard mechanisms

2. Resource pooling
   – Computing resources are pooled to serve multiple consumers
   – Different resources dynamically assigned according to consumers' demands

Five Characteristics of Cloud (NIST)

3. On-demand Self-Service
   – Consumers can provision computing capabilities without human interaction

4. Rapid elasticity
   – Computing capabilities can be rapidly and elastically provisioned to quickly scale up and rapidly released to scale down

5. Measured service
   – Usage of resources can be monitored, controlled, and reported
   – Provides transparency for both the provider and consumer
Some Example Applications

• Google Apps
  – Gmail, Calendar, Sites etc.

• VMWare CloudFoundry
  – “Focus on Your App, Not Plumbing”
  – Offers a range of application development frameworks
Some Of The Cloud Providers

• Commercial
  – Amazon EC2 (Computing), S3 (Storage)
  – Microsoft Azure (Computing and Storage)
  – Google AppEngine (Computing), BigTable (Storage)
  – Also Salesforce, IBM, Yahoo etc.

• Open Source
  – OpenNebula
  – Nimbus
  – Eucalyptus
  – OpenStack
  – CloudStack
  – AppScale
THANK YOU