CLOUD COMPUTING AND M4D

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Broad Components in a S/W Soln.

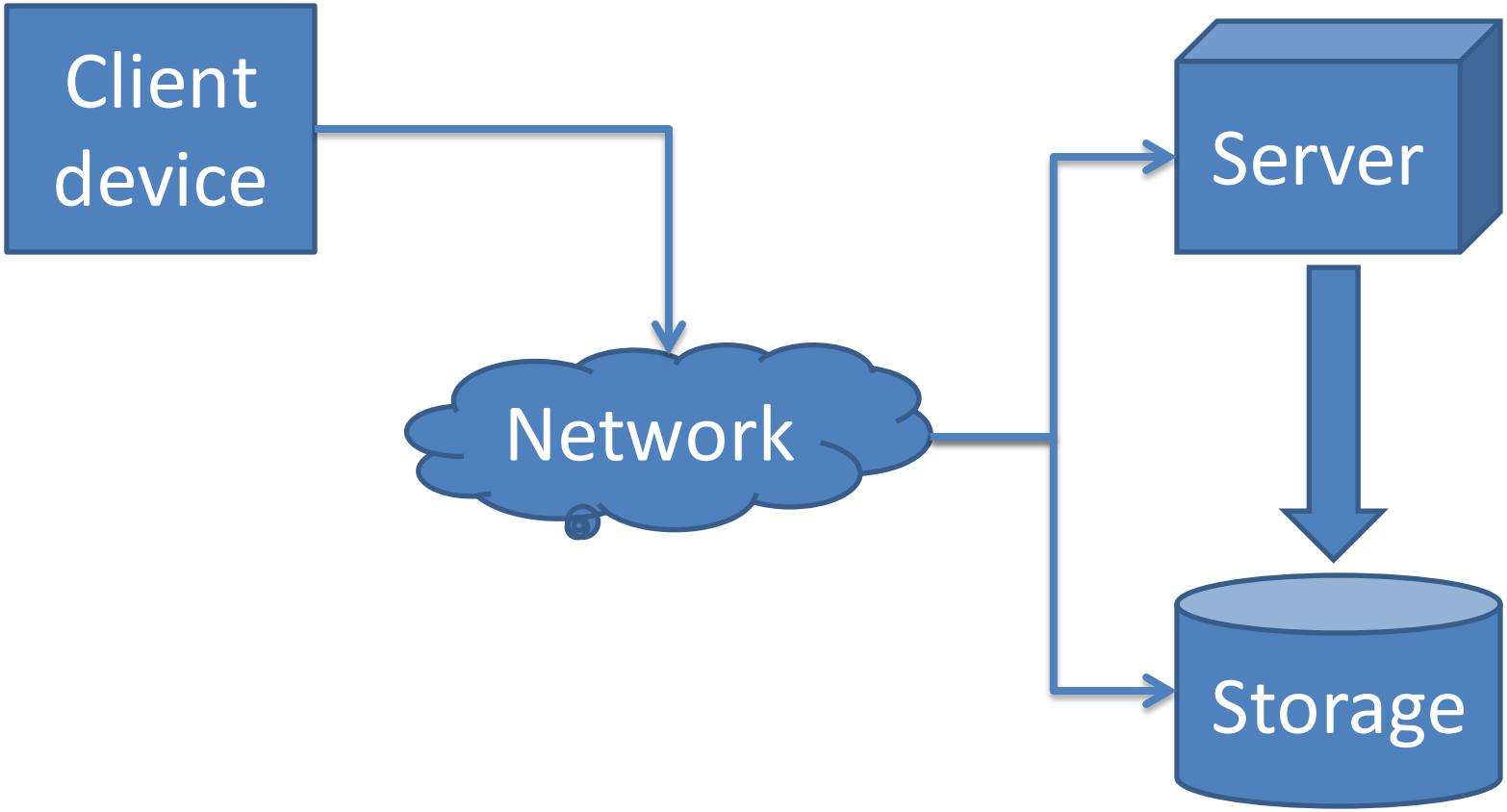
- Information acquisition/input component
  - GUI or some input mechanism
- Business logic component
  - "Algorithm" that solves the business problem
- Information dissemination/output component
  - GUI of some output mechanism

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?

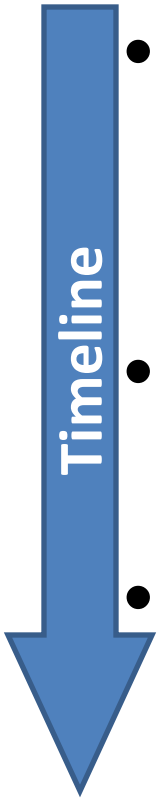
- Mainly for backend component hosting
  - Data processing
  - Data storage
- For consuming other “heavy lifting” services
  - Bulk video format conversions/enhancements
  - Apply some 3rd party algorithms to data


Client device
Network
Server
Storage

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 it 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

* http://www.nist.gov/itl/cloud/upload/cloud-def-v15.pdf

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

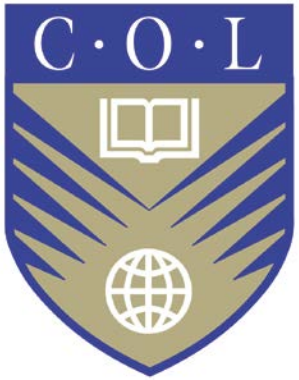
Some Example Applications

- 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



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