Cloud Computing

Some Contextual Details

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Five Characteristics of Cloud (NIST*)

- Broad network access
  - Computing capabilities are available over the network
  - Accessed through standard mechanisms
- 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)

- On-demand Self-Service
  - Consumers can provision computing capabilities without human interaction
- Rapid elasticity
  - Computing capabilities can be rapidly and elastically provisioned to quickly scale up and rapidly released to scale down
- Measured service
  - Usage of resources can be monitored, controlled, and reported
  - Provides transparency for both the provider and consumer

Why Another Computing Paradigm?

- Trend towards utility computing
  - Rent vs. own
    - An SME doesn't want to own IT infrastructure for running a web shop
- Advancements in technologies
  - Multicore CPUs, GPGPUs, fast storage and networks etc.
  - Virtualization
    - Offers software abstraction of hardware

1980   1990   2000   Today

Why Another Computing Paradigm?

- Economies of scale
  - Cloud providers buy H/W at cheaper prices than individual businesses
  - Cloud provider can offer better availability etc.
- Need for on-demand provisioning of servers on cloud
  - Allows easy scaling up and down
- Need for concentrating on one's business
  - Developers focus on building applications
  - Underlying infrastructure taken care by someone else

Why Another Computing Paradigm? 3/3

- Pricing and Subscription
  - Need for flexible pricing → Pay as you go
    - Holiday season → More business → You need more processing power and storage → pay more
    - If your business is running "slower" (e.g. economic downturn) you might need fewer processing power and storage → pay less
  - Lowering the entry cost
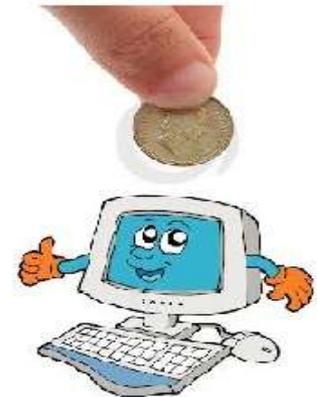
Some Example Applications

- 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