TIM 50 - Business Information Systems
Lecture 18
UC Santa Cruz
June 3, 2014

Announcements

- Teaching Evaluations
  - Monday, May 26 at 12:01 am and closing
  - Sunday, June 8 at 11:59 pm.
- Final Business Papers Due 6/5
- Final Exam
  - Wednesday June 11, 8am – 11am

Networks

OSI Layers

- Application
  - Internet Explorer, Outlook Email, Real Player, ...
- Presentation
- Session
- Transport
  - TCP, UDP
- Network
  - Internet Protocol (IP), ...
- Link
  - Ethernet, Wi-Fi, SONNET, ...
- Physical
  - Modulation Schemes: QAM, OFDM, etc...

Some Typical Topologies

Small/Medium Business

Home Network

Small/Medium Business

Web Site Server

Router with Firewall

T1 Modem

T1 Line

To Local Office

Ethernet Switch

DSL Modem

Telephone Line

(to local Office)
**ISP Topology**

- Telephone Company
- Local Office
- Local Loop
- Telephone Switch
- ISP Point of Presence
- DSL Modem
- DSLAM
- Leased Line to NAP
- To Telephone Network
- To Telephone Network

**Network Service Provider**

- Network Access Point
- Network Access Point

**Large E-Business**

- Load Balancer
- Application Servers
- Databases
- Customers
- Merchandise
- Orders
- Logic Flow of Interaction
- Interconnected with Gigabit Ethernet or other technology
- Presentations Logic (Assembling Web page)

**Web Caching**

- Speed up web page loading by storing previously seen components locally

- http://www.ucsc.edu

**Content Distribution Networks (AKAMAI)**

- Web Page
- Large Company
- Akamai Server
- Local Office or ISP
- Akamai Servers
- Internet

**Essentials of Management Information Systems**

- Chapter 6 Telecommunications, the Internet, and Wireless Technology

- The Global Internet

- The World Wide Web

- Search engines
  - Started in early 1990s as relatively simple software programs using keyword indexes

- Search engine marketing – major source of revenue
  - Keyword auctions

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Cloud computing

Cloud Computing

- 2 flavors:
  - Public Cloud, available to public
    - provides utility computing
  - Private Cloud
    - internal to company

Cloud Computing

Cloud Computing: refers to both
- applications delivered as services over internet
  - aka Software as a Service (SaaS)
  - hardware / software in data centers providing those services -- a cloud

Advantages

- SaaS
  - Control of Versioning
  - Users access anywhere
  - Ease of data sharing
  - Pay as you go

- Additional +’s of Cloud Computing
  - Deploy new services without building and provisioning data centers
    - E.g. Zynga Farmville
  - Scale up/down resources as needed
Context

➢ 2000’s
   ▪ Large investments by web giants (e.g. Google, Amazon) in infrastructure
     ▪ Giant data centers
     ▪ Software Infrastructure for such data centers
       ▪ MapReduce -- allows computations to be distributed to multiple machines “map”, and results collected for further processing “reduce.”
       ▪ Hadoop - open source version of above
     ▪ Above pieces prerequisites to become a cloud provider

Reasons to be a cloud provider

➢ A big player enjoys economy of scale advantage
➢ Leverage existing investments for new revenue stream (e.g. Amazon)
➢ Defend existing markets (e.g. MS enterprise apps with Azure)
➢ Become a platform (facebook)
➢ Leverage relationships (IBM)

Why is the Cloud becoming big only now?

➢ shift from large commitment models to contactless short term model
➢ Mobile interactive applications that need huge data sets
➢ Parallel batch processing - software like Hadoop makes it easier to do this
➢ Analytics - less growth in plain transaction processing, more growth in analyzing trends / predictions from large data sets

Types of Utility Computing

➢ Amazon EC2 - to programmer, each instance looks like physical hardware
   ▪ Can control whole layer stack
   ▪ Other managed services provided (e.g. SimpleDB)
➢ Application Domain specific platforms
   ▪ Google AppEngine (software dev. platform for web applications)
   ▪ Force.com (Salesforce.com) - platform for business apps that use salesforce.com DB
➢ MS Azure -
   ▪ Provides developers a general purpose software framework .NET
   ▪ Compiled to a managed environment (rather than to specific hardware)

Economics

➢ “pay as you go” model
➢ add and remove resources at a fine time scale
   ▪ proprietary data centers have to provision for peak
   ▪ hard to predict demand of new services
   ▪ poor service quality can alienate customer
   ▪ large data centers have significant eco. of scale advantage

Challenges

➢ Availability
   ▪ Can actually be better than in-house data centers
   ▪ More robust to DDOS (Distributed denial of service) attacks by being so large
➢ Lock-in
   ▪ Data lock-in - online storage services have gone bust
   ▪ application programming interfaces not common


**Challenges**

- **Confidentiality and Audits**
  - Sarbanes Oxley, HIPPA
  - Can use encryption
  - Audibility can be added as layer

- **Data Transfer bottlenecks**
  - Slow transfer can offset faster processing
  - Ship hard drives
  - Upload once, use multiple times