Class announcements

- Business Paper Project Due Thursday

- Reading for Thursday
  - American Airlines Case

- Student Presentations Thursday
  - Svetlana Tsodikova (American Airlines Case)
  - Nicole Dougherty (Business Paper)
Student Presentations

- Lawrence Suen (Business Paper)
- The Phuong Truong (Business Paper)
Information Systems Management (ISM) at UC Santa Cruz
What is Information Systems Management (ISM)?

ISM addresses 2 major areas:

The Technology of Management:
- information technology to efficiently operate enterprises

The Management of Technology:
- the management, development, and commercialization of technologies
Why is ISM important?

- **Success requires an understanding of both**
  - technology
  - The context in which it is used
  - The business environment in which it competes

- **ISM is a rigorous engineering program which teaches**
  - Technology/product development
  - How to market ideas and products
  - Develop Information systems to support an enterprise’s needs
Undergrad ISM degree:

**Base:** foundation of mathematics, science, engineering, and computer programming courses.

**Specialization:** business, economics, information systems, and the management of technology

**Electives:** (e.g., Robotics, Nanotechnology) and Economics (e.g., Business Strategy, Finance)

**Internships and Projects:** local technology companies, research projects in the School of Engineering
Internship Program

Typical (quarter-long) projects:

• Document Capture Project (Liz Watt, Ming Chao): Create a custom software application for Seagate to automate customer purchase orders

• Forecasting Accuracy Tracking Process to improve Sales Performance

• Development of the eBusiness mySeagate Portal:
  • Work with the eBusiness, Marketing, and Information Technology groups to identify, document and validate the business, customer, and technology requirements for the portal.

Seagate is hiring our interns for full-time positions
We also have interns at Cisco, Sun, and Borland
Jobs for ISM majors

Management of Technology (Seagate, Cisco, Apple, Sun, small start-ups)
- Systems engineer or Business analyst
- Product development engineer/manager
- Project Manager

Technology of Management (Seagate, Cisco, Microsoft, Oracle, SAP)
- Information systems/technology engineer
- Business systems developer
- Enterprise software developer
TIM (ISM) Grad Program

- Sample of Research
  - Personalized Search Engines
  - Knowledge Management in Enterprises
  - Market Mechanisms for the Future Internet
  - Resource Allocation / Scheduling in Call Centers or Service Facilities
Next steps

For more information about the program visit our Web-site
http://www.soe.ucsc.edu/programs/ism/

contact one or both of the following

- Subhas Desa, Undergraduate Director, (phone: 408-735-0820; e-mail: sdesa@soe.ucsc.edu)
- Monique Vairo, Undergraduate Advisor (phone: 831-459-2565; e-mail: monique@soe.ucsc.edu)
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

Home Network

- Ethernet Switch
- Router
- DSL Modem
- Telephone Line (to local Office)
Small/Medium Business

Web Site Server

T1 Line

T1 Modem

To Local Office

Router with Firewall

Ethernet Switch
Large E-Business

Load Balancer

Incoming HTTP Requests

Interconnected with Gigabit Ethernet or other technology

Web Servers

Application Servers

Databases

Presentation Logic (Assembling Web page)

Logic Flow of Interaction

Customers Merchandise Orders
Web Caching

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

http://www.ucsc.edu

Cache on Hard Drive
Akamai Case
Internet Bottlenecks

- **First Mile** (Server Capacity) - 70% of website performance problems according to one study

- **Backbone** - Plentiful, but some shortage within metropolitan areas

- **Peering** - Exchange of traffic between NSPs

- **Last Mile** to home
  - 56 K modems are slow
  - Shared LAN limitations
Solutions

- Expand Bandwidth
  - Being done
- Mirroring web cites
  - Put exact copy of same web page to multiple servers
  - Tricky to duplicate content
- Caching
  - Problem: Stale Content
  - Problem: Hard to count “click throughs”
- Content Distribution Networks...
Freeflow

- Deployed in 1999
- Akamai Infrastructure
  - 13000 servers in 954 networks by 2001
- Customers -
  - Large Commercial Websites
- Revenue model - $2000 per mbps served
  - (For comparison, normal Internet access cost 500 mbps at time)
2000 Financials

- $196 Million Loss (Before special charges)
- $90 million revenue
- %20 gross margin, after deducting
  - server depreciation
  - payments to network partners
  - Data center space
  - But, most expenses of shouldn’t grow at same rate as number of customers, so margin should improve

- $201.5 million SG&A
  - (selling general and administrative)
  - (largely sales force cost)
  - Again, this might not grow at same rate as the number of customers.

- $40 million R&D
Competition

- Hosting firms (substitute)
  - Exodus
- Other CDNs
  - Sandpiper, Adero, Mirror Image
- Content Alliances
  - Akamai’s competitors banded together to share networks
2001 Market Changes

Bad
- Dot-coms bust
- Customers leave
  - “churn rate goes to 22% per quarter”

Good
- Hosting firms go bust (exodus)
- Some CDN competitors go bust.
- Competing CDN alliances mired in problems
EdgeSuite

- Assemble dynamic pages at edges rather than just serve heavy objects
- Value proposition
  - Performance improvement
  - Cost and complexity reduction
  - Scalability
  - Security
- Pricing - higher than old service
- Soon edge suite dominated revenue
Technology

Dynamic CDN technology: ESI (edge sides includes)

Develop as open standard why?

Akamai not big and credible enough to force a de-facto standard on market
Marketing

- Difference in selling old vs new products:
  - Old product
    - Geared toward speeding up websites
    - Revenues of their clients depended on speed
    - Easier to get sale
  - New Product
    - Simplify company IT function
    - Cost vs. revenue center
    - Harder sell. More data driven...
  - Consequently new product needs more professional sales force

- Channels?
  - Distribution Partners (IBM) credibility
  - Direct Sales Force too
Recent Performance

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<td><strong>Consolidated</strong></td>
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<td><strong>Statements of</strong></td>
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<td><strong>Operations Data:</strong></td>
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<tr>
<td>Revenues</td>
<td>$ 210,015</td>
<td>$ 161,259</td>
<td>$ 144,976</td>
<td>$ 163,214</td>
<td>$ 89,766</td>
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<td>Total cost and</td>
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<td>172,570</td>
<td>521,280</td>
<td>2,311,108</td>
<td>989,359</td>
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<td>Net income (loss)</td>
<td>34,364</td>
<td>(29,281)</td>
<td>(204,437)</td>
<td>(2,435,512)</td>
<td>(885,785)</td>
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<td>Net income (loss)</td>
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<td>attributable to</td>
<td>34,364</td>
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<td>common stockholders</td>
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(In thousands, except share data)