Class announcements

- **FINAL EXAM**
  - Monday December 6
  - Time: 7:30-10:30pm

- **Review Sessions**
  - Wed Dec 1, 2010
  - 5:00PM to 6:45PM
  - Thimann 003

  - Fri Dec 3 2010
  - 5:00PM to 6:45PM
  - Nat Sci Annex 101
Some Typical Topologies

Home Network

- Ethernet Switch
- Router
- DSL Modem
- Telephone Line (to local Office)
ISP Topology
Large E-Business

Load Balancer

- Incoming HTTP Requests
- Interconnected with Gigabit Ethernet or other technology

Presentation Logic (Assembling Web page)

Web Servers

Logic Flow of Interaction

Application Servers

Databases

Customers

Merchandise

Orders
Web Caching

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

http://www.ucsc.edu

Cache on Hard Drive

Web server
Akamai Case
Akamai Case

In Class Discussion

1) How does Akamai’s content distribution network differ from web caching?

2) In what ways was the “tech-bust” of 2001-02 bad for Akamai? In what ways was it helpful?

3) How did EdgeSuite differ from Freeflow?

4) Why would marketing EdgeSuite be different than marketing Freeflow?
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
Akamai EdgeSuite

Local Office or ISP

Movies in Santa Cruz after 8pm?

Web Page
Movie A
Movie C

Construct Page
Web Page
Movie A
Movie C

Web Page
Movie A
Movie B

INTERNET
NSP 1
NSP 2

Large Company
Web Server
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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<tbody>
<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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<tr>
<td>Total cost and operating expenses</td>
<td>161,048</td>
<td>172,370</td>
<td>327,580</td>
<td>2,577,108</td>
<td>989,359</td>
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<tr>
<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>
</tr>
<tr>
<td>Net income (loss) attributable to common stockholders</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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Chapter 9

Applications and the Organization
Build vs. Buy?

Purchase off the Shelf
  + less time and cost
  + benefits of using a “standard” solution
  + support available
  - must mold org to app
  - no potential for competitive advantage

Outsource
  - developers not as familiar with org as you
  + more opportunity for customizing than off the shelf
  - contractor may share knowledge with competitors
  - contractor may have too much bargaining power

Make
  + most customizable of 3
  + easier iteration between conceptualization and development needed
  - most risky
  - org may lack competency to do it