Announcements

- Read Messerschmitt Ch 6 & 7 for Monday 5/11
- Homework #2 returned
- Comments on Business Paper proposals
- Wednesday is the midterm!
  - Test will be administered in CU 1 and CU 2
  - CU 1 start time is 5:00
  - CU 2 start time is 5:30
  - If you have a 7:00 class, arrive for the 5:00 session in CU1, otherwise arrive for the 5:30 session in CU2

Today’s Class

- Final midterm review
- News stories
- Sun Case review and discussion
- Class discussion of open source vs. proprietary commercial software and standards
- Business paper research tips and techniques

Midterm review guide

- The Internet
  - Intranet
  - Extranet
  - Network layering
- Client Server
  - User and client
  - 2-, 3-, and N-tier
  - Features
    - Separation of presentation, logic, and shared data
    - Peer-to-peer
- Sun Case

Midterm Review 3

- Data and Information
  - Building blocks
  - Representation
  - Regeneration
- Architecture
  - Decomposition
  - Functionality
  - Interaction
  - Emergence
- Network infrastructure
  - Layering
    - Operating system functions
    - Middleware (storage and communication)
    - Messages and packets

Review continued…
More Terminology

- bit
- backbone
- topology
- Hierarchy
- host
- DBMS
- Web server
- subsystem
- ASCII
- Interface
- application
- platform
- Thin client
- NetPC
- java
- TCO
- legacy system

News Story

Max Hill

News Story

Trevor Seyfried

News Folio Presentation

ISM 50
Trevor Seyfried
5-4-09

What Disney-Hulu Means for Apple
Cliff Edwards
BusinessWeek Online
(www.BusinessWeek.com)

Main Ideas

- When did this partnership begin?
- What does it mean for the companies involved?
- How does it relate to ISM 50 concepts?
Hulu and Disney: Best Friends Forever
- On April 30, Disney announced it would begin putting its content on Hulu
- Hulu was originally formed by NBC Universal and Fox
- Amount paid said to be 30 million
- Disney owns ABC/ABC Family
- Disney will be putting up movies and shows

The Ones That Got Away
- CBS is most obvious company affected
- CBS is the only major broadcasting network that is not in a partnership with Hulu
- Hulu is overshadowing Apple’s renting/buying business (iTunes store)
- Hulu is now #3 online streaming site, reducing the desire to pay for TV and movies

Apple’s Counterattack
- Hulu app for iPhone being developed
- iPhone soon so have a movie capture feature (within 2-3 months) coupled with basic editing software
- Apple devising a strategy to gain a larger foothold in streaming video market

How Article Relates to ISM 50 Concepts
- Hulu was in no way a new idea – TV.com is CBS’s version
- Hulu founded by Fox and NBC (companies that are relatively strict w/ distribution)
- By picking up more contributors, Hulu gained a number of shows with large fanbases
- Originally reamed up with AOL, Yahoo, and Facebook to facilitate initial distribution

Sun Case
- “dominant player in powerful servers for the Internet and the exploding market for corporate intranets.” (p.1)
- “last standing, fully integrated computing company” (p.2)

Sun N-tier case
- Sun's Revenue (Billions) 1999
- Servers 41%
- Workstations 30%
- Services 14%
- Software 15%
How Successful had Sun been up to 1998?
- Founded in 1982
- Open Standards Workstation
  - Unix Operating System (Solaris)
  - TCP/IP networking
- 1988 - Revenues $1 billion
- 1993 - Market value $3.0 billion
- 1997 - Jumped from 3rd to 1st in Unix Server Market.

How Successful had Sun been up to 1998?
- 1993 - "The network is the computer."
- 1994 - Internet explodes in popularity

Microsoft mid to late 90s
- Dominated Desktop software
  - Users familiar with Windows, Office, etc.
- NT servers
  - Fine for small intranets, "not industrial strength"

IT Architecture I
- Sun Microsystems
  - SPARC (processor)
  - Solaris (Multiuser, Unix-like OS)
  - Foothold in large server market
  - $1.3B Cash
  - "the better idea would ultimately prevail"
- Microsoft
  - Intel (processor)
  - Windows (95, 98) single-user OS
  - NT Server (2000) finally a multiuser OS
  - $13B Cash
  - Bill Gates is confident that NT can be improved to "industrial strength"

IT Architecture II
- Sun Microsystems
  - Open Standards Strategy (TCP/IP, Java)
  - Java Virtual Machine (JVM) abstract away hardware and OS concerns
  - Java Applets, Servlets, Webtop Computing
  - N-tier Architecture (an idea or a product?)
  - "Thin Client"
  - Webtop computing
  - More resource efficient engineering (software maintenance and support)
- Microsoft
  - "Embrace and Extend" Strategy
  - Kills Applets in IE (lawsuit)
  - Total Cost of Ownership (TCO) $9900/PC
  - "Fat Client"
  - PCs are difficult to support
  - Dominate Desktop (Office Suite)
  - Domain-controlled networks (Server 2003/2007)

What problems did the micro era produce?
- Desksots are expensive to maintain
  - TCO for windows PC $9900!
- Every PC had a lot of software that had to be maintained
  - Office, Windows, etc...
- Small differences, like the order in which software is installed, could make different PCs behave differently!

Who won? Who had the better idea?
In the Networking Era

- These "bloated" PCs are networked and termed fat clients.
- But networking of PCs offered the possibility of
  - putting most of the functionality into servers
  - getting rid of much of the software on the client
  - These clients would be called thin clients.
- Sun, Oracle, and others saw it as the future.

Sun had the better ideas!

"Sun’s goal was to create a fully developed network environment that could serve as a universal open standard for corporations that did not want to be tied to proprietary technology." (p. 13)

James A. Gosling, O.C., Ph.D (born May 19, 1955 near Calgary, Alberta, Canada) is a famous software developer, best known as the father of the Java programming language.

Compiling C Code

- Library files are difficult to keep synchronized for all of the software on a system.
- This makes maintaining systems difficult.
- Each system becomes unique.
- N-tier architecture attempted to avoid this problem.

Java: “compile once, run anywhere”


Hardware for thin clients

- A Network Computer (NC) - a computer with minimal hardware that depends on a network connection to a server to function
  - Be careful not to confuse it with the phrase "networked computer!"
  - Example: Sun’s JavaStation (1996-2000)
  - It is the hardware one would use to implement a thin-client computing model.
  - TCO of $6,500 per year ($3,400 cheaper than a PC)

Another term from that era..

- A NetPC was a PC introduced by Microsoft and Intel in 1996
  - Same software as a normal PC
  - Did not allow users to install their own software
  - NetPC died out
  - Features of it, and Microsoft’s Zero Administration Kit, live on in today’s version of windows.
Microsoft Vision

- Keep "fat-client" model
- Add some features to Windows to reduce administration costs

Sun’s Vision

- Thin Client model.
- Application Servers with Applications written in Java.
- NCs could retrieve applications from application server as needed.
- Applications compatible with any NC hardware and OS.
- Applications could be fixed, added, updated at the server level, rather than maintaining each PC.

Java Applets

- Killed by Microsoft in IE by "embracing and extending" (lawsuit)
- Javascript (Unrelated to Java, Brendan Eich of Netscape 1995) becomes defacto standard for client-side programming

IT Architecture III – Bill Joy

- [http://www.wired.com/wired/archive/6.08/joy_pr.html](http://www.wired.com/wired/archive/6.08/joy_pr.html)
- Q: You’ve been writing computer languages like Java. Do you envision a computer-language dislocation?
- A: The common programming languages of C and C++ basically beached us. These languages are like whales. Sun and Microsoft maintain these monstrous C programs - Solaris and Windows NT - that are built out of materials that are very difficult to work with.

- Windows NT 4.0 is 16.5 million lines of code that will never be debugged. It is infinitely complex. It is like having an elephant living in your apartment. The thing is just monstrous.
- NT for consumers is an oxymoron because NT is basically mainframe software with all these windows and very little architecture. It is a mess.
**IT Architecture III - Bill Joy**

- [http://www.wired.com/wired/archive/6.08/joy_pr.html](http://www.wired.com/wired/archive/6.08/joy_pr.html)

Q: Yet NT is a hit. Everyone is moving on to it.

A: Many people were happy with the cars they bought from Detroit before Honda came along. I’d like to think that Java is more like when the Japanese came along with quality cars. With Java-based programming, instead of having one big system with infinitely complex buggy software, we can get a federation of machines working together to solve problems. The individual components are simpler. **–interview with James Gosling**
Sun N-tier case

Today

- 3-tier model common.
- Sun's version of 4-tier model not-common.
- N-tier model where Webserver and Application Server on separate equipment also common.
- Sun's hardware business not strong.
  - Linux on cheap PCs most common servers
  - Microsoft desktops replacing Sun workstations

Sun case – questions (1)

1. How much time did Sun estimate developers could save when writing new applications by reusing Java objects?
2. Name one or two key differences between the 3-tier architecture and Sun's 4-tier architecture.
3. What benefits are provided to Sun's customers by the 4-tier architecture?
4. What is meant by a "high-latency servlet?"

Sun case – questions (2)

5. Bill Joy and James Gosling think Java is a superior programming language, but does Java have any weaknesses?
6. Which is more expensive: Sun's application server, or the ongoing maintenance of heterogeneous software applications on diverse platforms?
7. What advantage did Microsoft have over Sun in dealing with line of business managers in customer firms? (See p. 158)

What could have Sun done?

- Compete on price with cheap PC servers running Linux?
- Sell a fat-client workstation that runs Windows and is price competitive with Dell, HP PCs, etc.
- Sell workstations at a price premium over PCs, focus on software reliability, run some Microsoft application, build brand cachet.
- Focus on Java based software and IT services for enterprises, withdraw from low-end hardware...
- Something else?
Storage Middleware example: DBMS
- Database Management System (DBMS)
  - Manage Multiple databases
  - Allow multiple applications to access common databases
  - Implement standard data "lookup" (query) functions.
  - It just so happens that Oracle databases run very reliably on Sun Solaris-based servers

Oracle Buys Sun! (Announced 4/20)
- ...more details to follow

Oracle/Sun Discussion
- ...more details to follow

Break into groups of 3 or 4
Discuss
A) Is the acquisition of Sun a basic change in strategy for Oracle - why or why not?
B) What made Sun an attractive acquisition target for Oracle?
C) Has Sun been an Oracle rival, a substitute, or supplier?
D) What’s your best guess at the long term role of Sun in the industry? (What’s the industry?)
Write your ideas down.

Researching the Business Paper
- To help organize and insert citations, check out:
  http://www.zotero.org/

Last chance for midterm questions...