Class announcements

- Assignment 4 out!
  Due next Tuesday (November 8th)

- Reading for Tuesday (nov 8th):
  - MySQL Database Case

- Student Presentations Tuesday (nov 8th)
  - Katie Colburn
  - Raymund Rosario: MySQL Database case
Student Presentations

- Keith Lucitt
- Ryan Fargo
Standardization
Purpose of a standard?

- Allow products or services from different suppliers or providers to be interoperable
Scope of a standard

Included:
- interfaces (physical, electrical, information)
- architecture (reference model)
- formats and protocols (FAP)
- compliance tests (or process)

Excluded:
- implementation
- (possibly) extensions
Reference model

Decide decomposition of system
- where interfaces fall

Defines the boundaries of competition and ultimately industrial organization
- competition on the same side of an interface
- complementary suppliers on different sides
- hierarchical decomposition at the option of suppliers
- (possibly) optional extensions at option of suppliers
Some issues

Once a standard is set

- becomes possible source of industry lock-in; overcoming that standard requires a major (~10x?) advance
- may lock out some innovation

In recognition, some standards evolve

- IETF, CCITT (modems), MPEG
- backward compatibility

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Types of standards

*de jure*
- Sanctioned and actively promoted by some organization with jurisdiction, or by government

*de facto*
- Dominant solution arising out of the market
- Voluntary industry standards body

Industry consortium
Common or best practice

Examples?
Examples

**de jure**
- GSM, ISDN Telephone interface

**de facto**
- Hayes command set, Windows API, Pentium instruction set, Ethernet

Voluntary industry standards body
- OMG/CORBA, IAB/IETF, IEEE

Industry consortium
- W3C/XML, SET

Best practice
- Windowed GUI
The changing process

- As technology and industry move more quickly, the global consensus standards activity has proven too unwieldy
  - e.g. ISO
- “New age” standards activities are more informal, less consensus driven, a little less political, more strategic, smaller groups
  - e.g. OMG, IETF, ATM Forum, WAP

Programmable/extensible approaches for flexibility
- e.g. XML, Java
Old giving way to the new

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Reasons for change

- From government sanction/ownership to market forces
  - Increasing fragmentation
  - Importance of time to market

Greater complexity

- Less physical/performance constraint for either hardware or software
Lock-in

(Particularly open) standards reduce consumer lock-in

- Consumers can mix and match complementary products

Increase supplier lock-in

- Innovation limited by backward compatibility
- e.g. IP/TCP, x86, Hayes command set

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Network effects

Standards can harness network effects to the industry advantage

- Revenue = (market size) x (market share)

Increases value to customer

Increases competition

- Only within confines of the standard
- But forces customer integration or services of a system integrator

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Why standards?

*de jure* are customer driven to reduce confusion and cost
*de facto* standards are sometimes the result of positive feedback in network effects

Customers and suppliers like them because they
- increase value
- reduce lockin

Governments like them because they
- promote competition in some circumstances
- May believe they can be used to national advantage

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Approaches

Consensus
- ISO

Collaborative design
- MPEG

Competitive “bake off”
- IETF

Coordination of vendors
- OMG

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Open Standards

- Open standard - a standard that is well documented, unencumbered by intellectual property rights and restrictions, and available to any vendor.

- What are the advantages?

- What are the disadvantages?
Why companies participate

Pool expertise in collaborative design
  - e.g. MPEG

Have influence on the standard

Get technology into the standard
  - Proprietary, with expectation of royalties
  - Non-proprietary

Reduced time to market

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Standards applied to Business Processes?

- Can you standardize business processes?

- Yes!:
  - ISO 9000
    - A set of standardized business processes for Quality Management.
    - Supports TQM (Total Quality Management)
  - RosettaNet
    - A set of standardized business processes, and accompanying standardized data interfaces/formats for conducting e-business.
Algorithms and protocols

Adapted from
David G. Messerschmitt
Algorithm

Specified sequence of steps that

- accomplish a designated task
- in a finite number of steps

Representation:

- simple algorithm: flowchart
- complicated algorithm: program
Example: one turn at monopoly

1. Start turn
2. Throw dice
3. Move token number of squares indicated on dice
4. Land on “go to jail”? (Yes/No)
   - Yes: Move to “jail” square
   - No: Do not move; follow policies for square (like “pay rent”)
5. Finish turn
Programming languages support these three building blocks.
Protocol

- Distributed algorithm ...
- Realized by two or more modules to coordinate their actions or accomplish some shared task
- Module interoperability requires a protocol
  - Prescribed order of method invocations
  - Part of interface documentation
Monopoly players protocol

This is a protocol interaction diagram

Player 1

Player 2

One-turn algorithm

Time
Application and infrastructure

The application defines its own application-level protocols

Internally, the network uses protocols to implement the services it provides
Example:

- HEADQUARTERS
- Airline Dataserver
- Airline Intranet
- HHC Server
- Wireless Link
- HHC
Layered Protocols Example

HHC Server Application

Windows OS
Break Messages into Packs
Networking Infrastructure

Send Pass. Data As Message

HHC Server

Request Pass. Data

Application Level Protocol

Send Packet

Palm OS
Networking Infrastructure

HHC Application

Link Level Protocol

Acknowledge Packet
Three simple protocols

One-way message: send-receive
Two-way interaction: request-response
Push: publish-subscribe
Send - Receive
Request - Response
Send - Acknowledge
Example: HTTP

( Hyper Text Transfer Protocol )

User activates URL

HTTP request

HTTP client (browser)

HTTP response (embedded document)

HTTP server

HTML documents

☆ User activates URL

(HTTP server)

HTTP client (browser)

(HTTP request)

Browser displays document (if HTML) or invokes “helper application”

(HTTP response)

HTML documents
Locating things

by

David G. Messerschmitt
Three ways of locating things

Name
- “Joe Bloe”

Address
- “1299 Hearst St, Berkeley, CA”

Reference
- “Postmaster of Berkeley CA”
Name

- Symbolic (character string) representation
- Easy for people to remember or guess
- Identifies, but
  - *Does not locate* directly
    - Distinction important for mobile entities
  - *Not unique*: entities can have more than one name (called aliases)
Hierarchical names

Hierarchy makes names easier to remember or guess

Host domain names:
- “info.sims.berkeley.edu”
- designates administrative hierarchy

File names:
- “c:\My Documents\Docs\Resume.doc”
- designates folder hierarchy
Address

- Route or path to entity
  - is directly specified, or
  - can be inferred

- Independent of who or what is locating entity

- Topological specification
Path from blue to green is (R,D,D,D,R,R,R,R)

Is (R,D,D,D,R,R,R,R) an address?
No! -- not an address, because it depends on starting point
Example

Address of is (6,5)

Route from can be inferred
Reference

Abstract representation of an entity

Interaction is with representation

- infrastructure arranges redirection to actual entity
- especially appropriate for things that move

Example

- A Cell phone number is a reference.
- A Wired phone number is an address.
Name services

1. Name
2. Address or reference
3. Interaction