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

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 (~10×?) advance
  - may lock out some innovation
- In recognition, some standards evolve
  - IETF, CCITT (modems), MPEG
  - backward compatibility

**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

**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**
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

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

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

Approaches

Consensus
- ISO

Collaborative design
- MPEG

Competitive "bake off"
- IETF

Coordination of vendors
- OMG

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

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

Example: one turn at monopoly

Start 
Turn
Throw dice
Move token number of squares indicated on dice
Move to "jail" square
Yes
Land on "go to jail"?
No
Do not move; follow policies for square (like "pay rent")
Finish
Turn

Algorithm building blocks

Start
行动
Decision
Start
行动
Start
行动
Test
Sequence
Selection
Loop

Algorithm

Specified sequence of steps that
- accomplish a designated task
- in a finite number of steps

Representation:
- simple algorithm: flowchart
- complicated algorithm: program
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

Player 1  Player 2

One-turn algorithm

Time

This is a protocol interaction diagram

Application and infrastructure

The application defines its own application-level protocols

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

Example:

HHC

HHC Server

HHC Application

Airline Dataserver

HEADQUARTERS

Wireless Link

Airline Intranet

Application and infrastructure

Layered Protocols Example

HHC Server Application

HHC Server Application

Windows OS

Networking Infrastructure

Networking Infrastructure

Send Pass. Data As Message

Send Packet

Link Layer Protocol

Three simple protocols

One-way message: send-receive
Two-way interaction: request-response
Push: publish-subscribe
Send - Receive

Client

send

receive

Server

Time

Request - Response

Client

request

response

Server

Send - Acknowledge

Client

send

acknowledge

Server

Example: HTTP (Hyper Text Transfer Protocol)

User activates URL

HTTP request

HTTP response (embedded document)

HTTP server

Browser displays document (if HTML) or invokes "helper application"

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

Example
Path from to is (R,D,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.
Client Server

Reference

Name services

1. name
2. address or reference
3. interaction