Who is this?
Case 1: Microsoft looking at how companies do business

- Microsoft focusing on different industries and writing software products to support them
  - Examples, financial services, communications, government, education, automotive, retail & hospitality, health care, manufacturing, media
  - Vertical segments: a specific industry
  - Accelerators: software add-ons aimed at business processes common to a given industry
  - Software layers: software that serves the needs of a broad base of companies in a particular sector inserted into enterprise applications
Case Study Questions

1. A common phrase among IT professionals: “The world views its data through Windows.” Why does Microsoft dominate the desktop and networked software market? Visit its website at www.microsoft.com Review its broad range of software products and services to help with your answer.

2. How successful will Microsoft be in competing with software vendors who specialize in specific market applications like health care, retail and other specialty services? Why?
Case Study Questions

3. Do you agree with Microsoft’s strategy to develop industry-specific partners to capitalize on opportunities in both large and small business sectors? Is there an advantage or a disadvantage to being one of Microsoft’s partners in this type of relationship? Explain.
Real World Internet Activity

1. Industry-specific software applications are everywhere. Despite this, many industries still do not have a wide variety of software applications to meet their needs. Using the Internet,

- See if you can find one example of an industry that has a wide variety of vertical applications,
- One industry that does not have a variety of software solutions to choose from.
Real World Group Activity

2. Using the industries who do not have a wide variety of support applications you found from the first activity, in small groups,
   - Discuss what types of applications would be valuable to your industries.
   - Why do you think the applications you came up with have not been developed?
Types of software

- **Computer Software**
  - **Application Software**
    - General-Purpose Application Programs
      - Software Suites
      - Web Browsers
      - Electronic Mail
      - Word Processing
      - Spreadsheets
      - Database Managers
      - Presentation Graphics
      - Personal Information Managers
      - Groupware
    - Application-Specific Programs
      - Business-Accounting, Transaction Processing, Customer Relationship Management, Enterprise Resource Planning, Electronic Commerce, etc.
      - Science and Engineering
      - Education, Entertainment, etc.
  - Performs Information Processing Tasks for End Users
  - System Software
    - System Management Programs
      - Operating Systems
      - Network Management Programs
      - Database Management Systems
      - Application Servers
    - System Utilities
      - System Utilities
    - Performance and Security Monitors
    - Manages and Supports Operations of Computer Systems and Networks
    - System Development Programs
      - Programming Language Translators
      - Programming Editors and Tools
      - Computer-Aided Software Engineering (CASE) Packages
Software Trends

Visual or Conversational Programming Languages & Tools

Easy-to-Use Multipurpose Network-Enabled Application Suites for Productivity and Collaboration

COTS
Intelligent Agents
ASP
Wizards
GUI
Natural Language
Application software

- **General purpose**
  - Programs that perform common information processing jobs for end users
  - E.g., word processing, spreadsheet, etc.
  - Also called *productivity packages*

- **Application-specific**
  - Programs that support specific applications of end users
  - E.g., electronic commerce, customer relationship management, etc.
Software classifications

- Classify based on how it was developed
- Custom software
  - Software applications that are developed within an organization for use by that organization
- COTS software
  - Commercial Off-the-shelf (COTS)
  - Software developed with the intention of selling the software in multiple copies

- Why would you choose Custom over COTS?
- Why would you choose COTS over Custom?
## Software Suites

<table>
<thead>
<tr>
<th>Programs</th>
<th>Microsoft Office</th>
<th>Lotus SmartSuite</th>
<th>Corel WordPerfect Office</th>
<th>Sun StarOffice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word Processor</td>
<td>Word</td>
<td>WordPro</td>
<td>WordPerfect</td>
<td>Writer</td>
</tr>
<tr>
<td>Spreadsheet</td>
<td>Excel</td>
<td>1–2–3</td>
<td>Quattro Pro</td>
<td>Calc</td>
</tr>
<tr>
<td>Presentation Graphics</td>
<td>PowerPoint</td>
<td>Freelance</td>
<td>Presentations</td>
<td>Impress</td>
</tr>
<tr>
<td>Database Manager</td>
<td>Access</td>
<td>Approach</td>
<td>Paradox</td>
<td>Base</td>
</tr>
<tr>
<td>Personal Information Manager</td>
<td>Outlook</td>
<td>Organizer</td>
<td>Corel Central</td>
<td>Schedule</td>
</tr>
</tbody>
</table>
Software Suites

- Software suites integrate software packages
  - Advantages:
    - Cost less than buying individual packages
    - All have a similar GUI
    - Work together well
  - Disadvantages
    - Features not used by all users
    - Take a lot of disk space
Integrated Packages

- Integrated packages
  - Combine the functions of several programs into one package
  - E.g., Microsoft Works, AppleWorks
  - Advantages:
    - Many functions for lower price & smaller disk space
  - Disadvantage
    - Limited functionality
Web Browser

- Software applications that support navigation through the point-and-click resources of the Web
- Surfing the web
- Becoming a universal software platform for Internet-based applications
- Microsoft Explorer, Netscape Navigator, Firefox (from Mozilla), Opera (Norwegian, small, DL)
- Mozilla is a framework for building web applications using web standards like CSS, XML, RDF
E-mail, Instant Messaging and Weblogs

- **E-mail**
  - Software to communicate by sending and receiving messages and attachments via the Internet, intranet or extranet

- **Instant messaging (IM)**
  - Receive electronic messages instantly

- **Weblog or blog**
  - A personal website in dated log format
  - Updated with new information about a subject or range of subjects
Word processing and Desktop publishing

- **Word processing**
  - Create, edit, revise and print documents
  - E.g., Microsoft Word, Lotus WordPro & Corel WordPerfect

- **Desktop Publishing**
  - Produce printed materials that look professionally published
  - E.g., Adobe PageMaker, Microsoft Publisher & QuarkXPress
Electronic Spreadsheets and Presentation Graphics

➢ **Electronic Spreadsheets**
  ▪ Worksheet of rows & columns
  ▪ Used for calculations & charts
  ▪ E.g., Lotus 1-2-3, Microsoft Excel, Corel QuattroPro

➢ **Presentation Graphics**
  ▪ Convert numeric data into graphics displays
  ▪ Prepare multimedia presentations including graphics, photos, animation & video clips
  ▪ E.g., Microsoft PowerPoint, Lotus Freelance, Corel Presentations
Personal Information Manager and Groupware

- **Personal Information Manager (PIM)**
  - Software for end user productivity & collaboration
  - Store information about clients, schedules, manage appointments, manage tasks
  - E.g., Lotus Organizer, Microsoft Outlook

- **Groupware**
  - Software that helps workgroups collaborate on group assignments
  - E-mail, discussion groups, databases, videoconferencing
  - E.g., Lotus Notes, Novell GroupWise, Microsoft Exchange
Software alternatives

- Outsourcing development & maintenance of software
- Application service providers (ASPs)
  - Companies own, operate & maintain application software and computer system resources
  - Use the application for a fee over the Internet
  - Pay-as-you-go
Software Licensing

- All software (COTS, ASP) is licensed
- You don’t buy software: you buy a license to use the software under the terms of the licensing agreement
- Licensed to protect the vendor’s property rights
Case 2: Open-Source Software

- Open-source software
  - Also referred to as free software
  - Software can be modified
  - Typically acquired with a license
  - License grant you the right to run the software, own the source code, modify the source code & distribute copies of the software
  - Free but have to pay for training, support, documentation

- Examples: Linux, Apache Web server, Sendmail, Perl scripting language
Case Study Questions

1. What are the business benefits of adopting open-source software?
2. What are the risks associated with open-source software? How can these risks be addressed?
3. Do you see open-source software eventually replacing the current proprietary software model? Explain your answer.
Real World Internet Activity

1. A wide variety of organizations have been formed to advance the open-source initiative. Using the Internet,
   - See if you can find information on these open-source advocate organizations.
   - A good place to start is www.opensource.org
Real World Group Activity

2. Supporters as well as detractors of open-source operating systems such as Linux are quite passionate about their feelings. In small groups,
   - Discuss the advantages and disadvantages of open-source applications.
   - If any of your classmates have experience with systems such as Linux, ask them to explain their feelings and experiences.
System software

- Software that manages and supports a computer system

- System management programs
  - Programs that manage hardware, software, network, and data resources
  - E.g., operating systems, network management programs, database management systems, systems utilities

- Systems development programs
  - Programs that help users develop information system programs
Operating System basic functions

- User Interface
  - End User/System and Network Communications
    - Resource Management: Managing the Use of Hardware Resources
    - Task Management: Managing the Accomplishment of Tasks
    - File Management: Managing Data and Program Files
    - Utilities and Other Functions: Providing a Variety of Support Services
User Interface

- Part of the operating system that allows you to communicate with it
- Three main types:
  - Command-driven
  - Menu-driven
  - Graphical user interfaces (GUI)
Resource management

- Part of operating system that manages the hardware & networking resources of a computer system
  - Includes CPU, memory, secondary storage device, telecommunications & input/output peripherals

- Virtual memory
  - Swapping parts of programs & data between memory & magnetic disks
File management

- Part of the operating system that controls the creation, deletion & access of files of data & programs
Task Management

- Part of the operating system that manages the accomplishment of computing tasks of the end users

- **Multitasking**
  - Task management approach that allows for several tasks to be performed in a seemingly simultaneous fashion
  - Assigns only one task to CPU but switches between tasks so quickly looks like executing all programs at once
  - Also called multiprogramming or time-sharing
Popular Operating Systems

- **Windows**
  - GUI, multitasking, networking, multimedia
  - Microsoft’s operating system
  - Different versions manage servers
- **Unix**
  - Multitasking, multiuser, network-managing
  - Portable – can run on mainframes, midrange & PCs
- **Linux**
  - Low-cost, powerful reliable Unix-like operating system
  - Open-source
- **MAC OS X**
  - Apple operating system for the iMac
  - GUI, multitasking, multimedia
### Other types of system software

<table>
<thead>
<tr>
<th>Software Category</th>
<th>What It Does</th>
<th>IBM Product</th>
<th>Customers</th>
<th>Main Competitor</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network management</td>
<td>Monitors networks to keep them up and running.</td>
<td>Tivoli</td>
<td>T. Rowe Price uses it to safeguard customer records.</td>
<td>HP OpenView</td>
<td>Amazon.com uses it to monitor its servers.</td>
</tr>
<tr>
<td>Application server</td>
<td>Shuttles data between business apps and the Web.</td>
<td>WebSphere</td>
<td>REI uses it to set up its website and distribute data.</td>
<td>BEA WebLogic</td>
<td>Washingtonpost.com builds news pages with it.</td>
</tr>
<tr>
<td>Database manager</td>
<td>Provides digital storehouses for business data.</td>
<td>DB2</td>
<td>Mikasa uses it to help customers find its products online.</td>
<td>Oracle 9i</td>
<td>It runs Southwest Airlines’ frequent-flyer program.</td>
</tr>
<tr>
<td>Collaboration tools</td>
<td>Powers everything from e-mail to electronic calendars.</td>
<td>Lotus</td>
<td>Retailer Sephora uses it to coordinate store maintenance.</td>
<td>Microsoft Exchange</td>
<td>Time Inc. uses it to provide e-mail to its employees.</td>
</tr>
<tr>
<td>Development tools</td>
<td>Allows programmers to craft software code quickly.</td>
<td>Rational</td>
<td>Merrill Lynch used it to build code for online trading.</td>
<td>Microsoft Visual Studio .NET</td>
<td>Used to develop Allstate’s policy management system.</td>
</tr>
</tbody>
</table>

*Source: Adapted from Susan Orenstein, Erik Schonfeld, and Scott Herhold, “The Toughest Guy in Software,” Business 2.0, April 2003, p. 82.*
Other system software

- Utilities
  - Miscellaneous housekeeping functions
  - Example, Norton utilities includes data backup, virus protection, data compression, etc.

- Performance monitors
  - Programs that monitor & adjust computer system to keep them running efficiently

- Security monitors
  - Programs that monitor & control use of computer systems to prevent unauthorized use of resources
Application servers

- Provide an interface between an operating system & the application programs of users
- Middleware
  - Software that helps diverse software applications exchange data & work together more efficiently
# Programming Languages

## Four Levels of Programming Languages

<table>
<thead>
<tr>
<th>Machine Languages:</th>
<th>High-Level Languages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use binary coded instructions</td>
<td>Use brief statements or arithmetic notations</td>
</tr>
<tr>
<td>1010 11001</td>
<td>BASIC: ( X = Y + Z )</td>
</tr>
<tr>
<td>1011 11010</td>
<td>COBOL: COMPUTE ( X = Y + Z )</td>
</tr>
<tr>
<td>1100 11011</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assembler Languages:</th>
<th>Fourth-Generation Languages:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use symbolic coded instructions</td>
<td>Use natural and nonprocedural statements</td>
</tr>
<tr>
<td>LOD Y</td>
<td>SUM THE FOLLOWING NUMBERS</td>
</tr>
<tr>
<td>ADD Z</td>
<td></td>
</tr>
<tr>
<td>STR X</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Programming Languages

- **Machine languages** - first-generation
  - All program instructions written using binary codes unique to each computer
  - Programmers had to know the internal operations of the specific type of CPU

- **Assembler Languages** – Second generation
  - Symbols used to represent operation codes and storage locations
  - Need language translator programs to convert the instructions into machine instructions
  - Used by systems programmers (who program system software)
High-Level Languages

- **Third-generation languages**
- Instructions use brief statements or arithmetic expressions
- Macroinstructions: each statement generates several machine instructions when translated by compilers or interpreters
- Easier to learn than assembler
- Machine independent (sort of)
- Less efficient than assembler
Fourth-Generation Languages

- Variety of programming languages that are nonprocedural and conversational
- **Nonprocedural** – users specify results they want while computer determines the sequence of instructions that will accomplish those results
- **Natural Language** – very close to English or other human language
Object-Oriented Languages

- Combine data elements & procedures that will be performed upon them into **Objects**
- E.g., an object could be data about a bank account & procedures performed on it such as interest calculations
Object-Oriented Languages

- Most widely used software development languages today
- Easier to use & more efficient for graphics-oriented user interfaces
- Reusable: can use an object from one application in another application
- E.g., Visual Basic, C++, Java
Web Languages

- **HTML**
  - A page description language that creates hypertext documents for the Web

- **XML**
  - Describes the contents of Web pages by applying identifying tags or contextual labels to the data in Web documents

- **Java**
  - Object-oriented programming language that is simple, secure and platform independent

- Java applets can be executed on any computer
Java

Simpler, more secure version of C++

Applets

Interpreted

Plays in the Sandbox

Java Virtual Machine

System Independent

Active-X
Web Services

- Collection of Web & object-oriented standards & technologies
  - UDDI (yellow pages)
  - SOAP, XML-based, links applications running on different computer platforms
- Use the Web
  - to electronically link the applications of different users & different computing platforms
.Net versus J2EE

- Microsoft’s .Net
  - collection of programming support for web services
  - support for developing interoperable, Web-enabled applications
  - makes computing increasingly Web browser oriented
- Java2 Enterprise Edition
  - primary alternative to .Net
Web Services Applications

1. Client Application

2. Uses UDDI Web Services Directory to Locate Desired Web Service

3. Web Service Components Communicate Via SOAP, an XML-Based Protocol for Connecting Applications and Data

4. Web Services is Translated to XML, Which Acts as a Platform-Neutral Wrapper

5. Web Service is Delivered Back to Client in XML
Programming Language Translation

Source Program

Written in BASIC, COBOL, etc.

IF A := B THEN

Language Translation Process

• Compiler
• Interpreter
• Assembler

Language Translator Program

Machine Language Object Program

1001101111010100101100010110
Compiler versus Interpreter

- What do they have in common?
- How do they differ?
- For what situation(s) do you want
  - An interpreter
  - A compiler
Case 3: Amazon and eBay
New Face of Web Services

- Amazon provides access to some of its data & website functionality
- eBay opened up e-commerce software
- Opened to programmers & any company interested in e-commerce
Case Study Questions

1. What are the purpose & business value of Web services?

2. What are the benefits of Web services to Amazon, eBay & their developer partners?

3. What are the business challenges of Web services? Visit the Web services websites of IBM (www.ibm.com/solutions/webservices) & Microsoft (www.microsoft.com/webservices) to help with your answer
Real World Internet Activity

1. The concept of Web services and the opportunities they provide are growing everyday. Using the Internet,
   - See if you can find ways in which companies are using Web services beyond those listed in the case.
Real World Group Activity

2. Being able to integrate one organization’s website with another’s poses some interesting questions of privacy, intellectual property protection & technical challenges. In small groups,

- Discuss privacy, intellectual property protection & technical challenges issues.
- Do you think there is any risk associated with this type of cooperation?
Dear World,

I just can't take it anymore! I've decided...