



موسسه آموزش عالی غیردولتی غیرانتفاعی بصیر بکیر

INTERNET ENGINEERING

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- Session I

INTERNET HISTORY AND INTRODUCTION TO INTERNET SERVICES

OBJECTIVES



- The evolution of the Internet and the World Wide Web.
- What Web 2.0 is and why it's having such an impact among Internet-based and traditional businesses.
- What Rich Internet Applications (RIAs) are and the key software technologies used to build RIAs.

OUTLINE

- History of the Internet and World Wide Web
- World Wide Web Consortium (W3C)
- Web 2.0
- Personal, Distributed and Client/Server Computing
- Hardware Trends
- Key Software Trend: Object Technology
- JavaScript: Object-Based Scripting for the Web
- Browser Portability
- C, C++ and Java
- BASIC, Visual Basic, Visual C++, C# and .NET
- Software Technologies



HISTORY OF THE INTERNET



- ARPANET
 - Implemented in late 1960's by ARPA (Advanced Research Projects Agency of DOD)
 - Networked computer systems of a dozen universities and institutions with 56KB communications lines
 - Grandparent of today's Internet
 - Intended to allow computers to be shared
 - Became clear that key benefit was allowing fast communication between researchers – electronic-mail (email)

HISTORY OF THE INTERNET (CONT.)



- ARPA's goals
 - Allow multiple users to send and receive info at same time
 - Network operated packet switching technique
 - Digital data sent in small packages called packets
 - Packets contained data, address info, error-control info and sequencing info
 - Greatly reduced transmission costs of dedicated communications lines
 - Network designed to be operated without centralized control
 - If portion of network fails, remaining portions still able to route packets

HISTORY OF THE INTERNET (CONT.)



- Transmission Control Protocol (TCP)
 - Name of protocols for communicating over ARPAnet
 - Ensured that messages were properly routed and that they arrived intact
- Organizations implemented own networks
 - Used both for intra-organization and communication

HISTORY OF THE INTERNET (CONT.)



- Huge variety of networking hardware and software appeared
 - ARPA achieved inter-communication between all platforms with development of the IP
 - Internetworking Protocol
 - Current architecture of Internet
 - Combined set of protocols called TCP/IP
- The Internet
 - Limited to universities and research institutions
 - Military became big user
 - Next, government decided to access Internet for commercial purposes

HISTORY OF THE INTERNET (CONT.)



- Internet traffic grew
 - Businesses spent heavily to improve Internet
 - Better service their clients
 - Fierce competition among communications carriers and hardware and software suppliers
 - Result
 - Bandwidth (info carrying capacity) of Internet increased tremendously
 - Costs plummeted
 - Tim Berners-Lee invents HyperText Markup Language (HTML)
 - Also writes communication protocols to form the backbone new information system = World Wide Web
 - Hypertext Transfer Protocol (HTTP)—a communications protocol used to send information over the web
 - Web use exploded with availability in 1993 of the Mosaic browser
 - Marc Andreessen founds Netscape
 - Company many credit with initiating the explosive Internet of late 1990s.

WORLD WIDE WEB CONSORTIUM (W3C)



- W3C
 - Founded in 1994 by Tim Berners-Lee
- Homepage at www.w3.org
- Goals
 - Internet universally accessible
 - Standardization
 - W3C Recommendations: technologies standardized by W3C
 - include the Extensible HyperText Markup Language (XHTML), Cascading Style Sheets (CSS), HyperText Markup Language (HTML—now considered a “legacy” technology) and the Extensible Markup Language (XML).
 - not an actual software product, but a document that specifies a technology’s role, syntax rules and so forth.

WEB 2.0

- 2003 noticeable shift in how people and businesses were using the web and developing web-based applications
- The term Web 2.0 was coined by Dale Dougherty of O'Reilly
 - Web 2.0 definition = companies use the web as a platform to create collaborative, community-based sites (e.g., social networking sites, blogs, wikis, etc.).
- Web 1.0 (1990s and early 2000s) focused on a small number of companies and advertisers producing content for users to access
 - “brochure web”)
- Web 2.0 involves the
 - Web 1.0 is as a lecture,
 - Web 2.0 is a conversation
- Websites like MySpace , Facebook , Flickr , YouTube, eBay, Gohardasht.com and Wikipedia , users create the content, companies provide the platforms.



WEB 2.0 (CONT.)



- Architecture of participation
 - Open source software
 - Collective
 - Rich Internet Applications (RIAs)
 - Software as a Service (SaaS)
- Web services incorporate functionality from existing applications and websites into own web applications
 - Amazon Web Services
 - Maps web services with eBay web services

WEB 2.0 (CONT.)



- Future computers learn to understand the meaning of the data on the web = Semantic Web

PERSONAL, DISTRIBUTED AND CLIENT/SERVER COMPUTING



- 1977 Apple Computer popularized personal computing
 - Computers became economical for personal or business use
- Machines could be linked together in computer networks
 - Local area networks (LANs)
 - Distributed computing
- Workstations
- Servers offer data storage and other capabilities that may be used by client computers distributed throughout the network,
 - Client/server computing
- Popular operating systems
 - UNIX, Linux, Mac OS X and Microsoft's Windows

HARDWARE TRENDS

- Improving technologies
 - Internet community thrives on improvements of
 - Hardware, Software and Communications
 - Cost of products and services
 - Consistently dropping over the decades
 - Computer capacity and speed
 - Doubles every two years (on average) = Moore's Law
 - Microprocessor chip
 - Laid groundwork in late 1970s and 1980s for productivity improvements of the 1990s
 - Hardware moving toward mobile, wireless technology.
 - Hand-held devices more powerful than early supercomputers
 - Portability
 - Wireless data-transfer speeds



THE KEY SOFTWARE TREND: OBJECT PROGRAMMING



- Objects
 - Reusable software components that model items in the real world (classes)
 - Makes software developers more productive
 - Object-oriented programs often easier to understand, correct and modify than older types of programs

THE KEY SOFTWARE TREND: OBJECT PROGRAMMING (CONT.)



- Object technology
 - Packaging scheme that helps create meaningful software units
 - Large and highly focused on particular applications areas
 - Before appeared, programming languages were focused on actions (verbs) rather than on objects (nouns)
 - Programmers would program primarily with verbs
 - Made program awkward
 - We live in a world filled with complex objects and simple actions

THE KEY SOFTWARE TREND: OBJECT PROGRAMMING (CONT.)



- Object technology (continued)
 - Object-oriented programming
 - Programmers work in manner similar to how they see the world
 - More natural process
 - Significant productivity enhancements
 - Procedural programming
 - Not particularly reusable
 - Forces programmers to constantly “re-invent the wheel”
 - Wastes time and resources
 - Objects (classes)
 - Software modules
 - Kept in libraries
 - Reusable – save time and resources

SOFTWARE ENGINEERING OBSERVATION



- Extensive class libraries of reusable software components are available on the Internet. Many of these libraries are free.

SOFTWARE ENGINEERING OBSERVATION



- Some organizations report that the key benefit object-oriented programming gives them is not software that is reusable but, rather, software that is more understandable, better organized and easier to maintain, modify and debug. This can be significant, because perhaps as much as 80 percent of software cost is associated not with the original efforts to develop the software, but with the continued evolution and maintenance of that software throughout its lifetime.

JAVASCRIPT: OBJECT-BASED SCRIPTING FOR THE WEB



- JavaScript
 - Attractive package for advancing level of programming language education
 - Object-based language
 - Supports proper software engineering techniques
 - Free for download in today's most popular Web browsers
 - Powerful scripting language
 - Portable
 - Programs execute interpretively on client machines
 - Microsoft instrumental in the standardization of JavaScript by ECMA
 - ActionScript and JavaScript are converging in the next version of the JavaScript standard (JavaScript 2/ECMA Script version 4) - (ECMA script 9)
 - Universal client scripting language, simplifying web application development

GOOD PROGRAMMING PRACTICE 1.1



- Write your programs in a simple and straightforward manner. This is sometimes referred to as KIS (“keep it simple”). One key aspect of keeping it simple is another interpretation of KIS—“keep it small.” Do not “stretch” the language by trying bizarre uses.

PORTABILITY TIP 1.2



- Although it is easier to write portable programs in JavaScript than in many other programming languages, differences among interpreters and browsers make portability difficult to achieve. Simply writing programs in JavaScript does not guarantee portability. Programmers occasionally need to research platform variations and write their code accordingly.

PORTABILITY TIP 1.3



- When writing JavaScript programs, you need to deal directly with cross-browser portability issues. Such issues are hidden by JavaScript libraries (e.g., Dojo, Prototype, Script.aculo.us and ASP.NET Ajax) which provide powerful, ready-to-use capabilities that simplify JavaScript coding by making it cross-browser compatible.

ERROR-PREVENTION TIP 1.1



- Always test your JavaScript programs on all systems and in all web browsers for which they are intended.

GOOD PROGRAMMING PRACTICE 1.2



- Read the documentation for the JavaScript version you are using to access JavaScript's rich collection of features.

ERROR-PREVENTION TIP 1.2



- Your computer and JavaScript interpreter are good teachers. If you are not sure how a feature works, even after studying the documentation, experiment and see what happens. Study each error or warning message and adjust the code accordingly.

BROWSER PORTABILITY



- Browser portability
 - Great challenge
 - Great diversity of client browsers in use
 - Many different platforms also in use
- Difficult to
 - Know capabilities and features of all browsers and platforms in use
 - Find correct mix between absolute portability, complexity and usability of features

PORTABILITY TIP 1.4



- The web is populated with many different browsers, which makes it difficult for authors and web application developers to create universal solutions. The W3C is working toward the goal of a universal client-side platform.

C, C++ AND JAVA



- C
 - developed by Dennis Ritchie at Bell Laboratories
 - development language of the UNIX operating system
 - virtually all new major operating systems are written in C and/or C++
- C++
 - developed by Bjarne Stroustrup in early 1980s
 - “spruce up” the C language and provides capabilities for object-oriented programming
- Java
 - developed by Sun Microsystems in 1991
 - Sun saw the immediate potential of using Java to add dynamic content (e.g., interactivity, animations and the like) to web pages
 - Sun formally announced Java at an industry conference in May 1995
 - Java is now used to
 - develop large-scale enterprise applications
 - enhance the functionality of web servers
 - provide applications for consumer devices

BASIC, VISUAL BASIC, VISUAL C++, C# AND .NET



- BASIC
 - Developed in the mid-1960s at Dartmouth College
 - Primary purpose was to familiarize novices with programming techniques
- Microsoft's Visual Basic language
 - Based on Basic
 - Has become one of the most popular programming languages in the world
- Microsoft's .NET platform
 - Provides the capabilities developers need to create computer applications that can execute on computers distributed across the Internet
 - Visual Basic (based on the original BASIC)
 - Visual C++ (based on C++)
 - Visual C# (based on C++ and Java)

SOFTWARE TECHNOLOGIES



- Agile Software Development
 - Set of methodologies that try to get software implemented quickly
 - Agile Alliance (www.agilealliance.org)
 - Agile Manifesto (www.agilemanifesto.org)
- Refactoring
 - Reworking code to make it clearer and easier to maintain while preserving its
- Design patterns
 - Proven architectures for constructing flexible and maintainable object-oriented software
 - Open source code

SOFTWARE TECHNOLOGIES (CONT.)



- Linux
 - Open source operating system
- Apache
 - Most popular open source web server
- MySQL
 - Open source database management system
- PHP
 - Most popular open source server-side “scripting” language for developing Internet-based applications

SOFTWARE TECHNOLOGIES (CONT.)



- LAMP
 - Linux, Apache, MySQL and PHP (or Perl or Python)
- Game programming
 - Software techniques used in game programming Adobe Flash CS3
- Ruby on Rails
 - Combines the scripting language Ruby with the Rails web application framework
 - Developed by 37Signals
- Software as a Service (SaaS)
 - Software runs on servers elsewhere on the Internet
 - Google, Microsoft and 37Signals all offer SaaS

Q/A

- End of Session I



THANK YOU!