



Lecture 23

JavaScript Variables are Dynamically Typed

Any variable in JavaScript can hold any type of value, and the that type can change midway through the program

Lecture 24

Design Heuristics

Heuristic

Rule of thumb learned through trial & error
Common sense lesson drawn from experience
Qualitative principle, guideline, general judgement

System

A collection of elements which working together produces a result not achieved by the things alone

The structure

(in terms of components, connections, constraints) of a product or a process

Lecture 25

Web Design for Usability

Heuristic:

Heuristics don't always lead to the best results

What's a Good Site?

- The one that achieves the result that it was designed for.

SPEED:

- Users don't read; they scan

- Users don't make optimal choices; they look for the first good-enough solution
- Users don't figure out how things work; they muddle through

Design is Important!

- 62% of shoppers gave up looking for the item they wanted to buy online (Zona Research)
 - 40% visitors don't return to a site if their first visit was a -ive experience (Forrester Research)
 - 83% of users have left sites in frustration due to poor navigation, slowness (NetSmart Research)
 - Simple designs have greater im pact: they can be understood immediately! (Mullet/Sano)

Designs should be consistent & predictable (unified)

Website Navigation:

- The interface/controls that a Website provides to the user for accessing various parts of the Website

A Few Navigation Design Heuristics:

1. Put the main navigation on the left of the page
2. It should be "invisible" until it is wanted
3. It should require an economy of action & time
4. It should remain consistent
5. Labels should be clear, understandable
6. Labels should be legible

Using Motion

1. Use motion to attract the viewer's attention
 2. Avoid the use of motion for —cosmetic“ purposes
- Success is defined by the user, not the builder

Lecture 26

Arrays

:

Array

An indexed list of elements



Arrays in JavaScript

- In JavaScript, arrays are implemented in the form of the "Array" object

- The key property of the "Array" object is "length", i.e the number of elements in an array
- Two of the key "Array" methods are:
 - reverse()
 - sort()

JavaScript Arrays are Heterogeneous

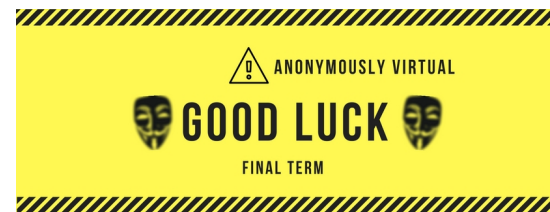
Unlike many other popular languages, a JavaScript Array can hold elements of multiple data types, simultaneously

Pseudo Code

- 1.Declare the array that will be used for storing the words
- 2.Prompt the user and read the user input into the elements of the array
- 3.Now write the array to the document
- 4.Sort the array
- 5.W rite the sorted array to the document

Lecture 27

Computer Networks



Computer Network

Multiple computers that are connected together to share information and other resources

Examples of Computer Network Usage

- I can send an eMail message to a remote computer using the SMTP protocol
- I can browse documents residing on a remote computer using the HTTP protocol
- I can download or upload files to a remote computer using the FTP protocol
- I can run a program on a remote computer using the TELNET protocol

Components of Conventional Computer Networks

- 1.Computers
- 2.Network Interface Cards (NIC)
- 3.Hub
- 4.Cables
- 5.Protocol

Hub

- A device that is used to connect several computers to form a network

Packet

- The smallest unit of data transmitted over a computer network

Private Networks

- Organizations having many computers usually connect them in the form of private networks

Public Networks

- All networks that are not private, are ... public
- Example: Internet

VPN: Virtual Private Network (1)

- A VPN looks like a secure, private network
- Key benefit of VPNs over conventional PNs: Lower cost

Types of Computer Networks

- LAN: Local Area Network)
- WAN: Wide Area Network)

LAN

- A network of computers located in the same building or a handful of nearby buildings

WAN

- A network in which computers are separated by great distances, typically across cities or even continents

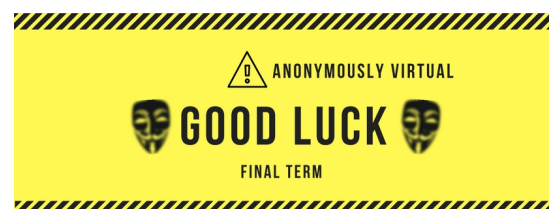
Router

- A special-purpose computer that directs data traffic when several paths are available

Bridge

- Used to form a connection between two separate, but similar networks

Gateway



- A special-purpose computer that connects and translates between networks that use different communications protocols

Modem

- I/O device used for connecting two computers over telephone lines
- modem = modulator + demodulator

Bus

- No server is required
- One computer sends data to another by broadcasting the address of the receiver and the data over the bus

Ring

- No server is required
- A computer sends the message to its neighbor. The neighbor examines the message to determine if it is the intended recipient

Networking Protocols

- Networks use protocols, or rules, to exchange info through shared channels

Ethernet Protocol

- A computer using this protocol checks if a shared connection is in use before transmitting a message
- If not, the computer transmits data

Token Ring Protocol

- This protocol passes a special message called a token through the network

Types of Communication Channels

1. Wire
2. Wireless

Bandwidth

- Capacity of a communication channel for carrying data
- Measured in bits/s (bps), kb/s, Mb/s, Gb/s, Tb/s
- Optical fiber channels have the highest (1 Tb/s)
- Telephone lines the lowest (56 kb/s)

Firewall

- A system that guards a private network, enforcing an access/deny policy to all traffic going to and coming from the Internet

Lecture 28 Introduction to the Internet

Internet

- Enables users located at far-way locations to easily share information with

others located all over the world

Internet Users Worldwide

673M in 2002

1B+ in 2005

1.2M Internet users in Pakistan in 5/2000

In early 2002,

54% of Australian population

51% of Singaporean population

39% of Japanese population

3% of Chinese population

Key Characteristics

Universal Access

Same functionality to everyone

Growth Rate

The fastest growing technology ever

Freedom of Speech

Internal rate of return (IRR)

The Digital Advantage

Is digital: can correct errors



Internet Networking Protocols

Communications on the Internet is controlled by a set of two protocols:

TCP and

IP

TCP/IP Transmission Control Protocol/Internet Protocol

Lecture 29 Functions & Variable Scope

Function

A group of statements that is put together (or defined) once and then can be

used (by reference) repeatedly on a Web page

Arguments of a Function

•Arguments define the interface between the function and the rest of the Web

page

Methods

•Methods are functions

Object:

A named collection of properties (data, state) & methods (instructions, behavior)

Event Handlers

•Special-purpose functions that come predefined with JavaScript

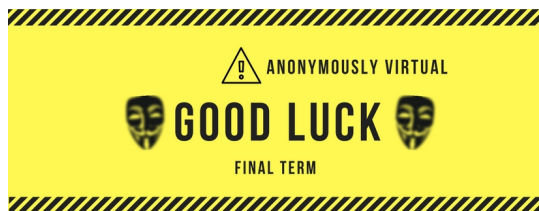
Local and Global Variables

Local or Function-level Variable

Effective only in the function in which they are declared

Global Variables

Visible everywhere on the Web page



Lecture 30

Internet Services

IP Address

•A unique identifier for a computer on a TCP/IP network

Domain Names

•A domain name is a meaningful, easy-to-remember "label" for an IP address

DNS: Domain Name System

•DNS is the way that Internet domain names are located & translated into IP

addresses

- Maintaining a single, central table of domain name/IP address relationships is impractical

FTP: File Transfer Protocol

- Used to transfer files between computers on a TCP/IP network (e.g. Internet)

Telnet Protocol

- Using Telnet, a user can remotely log on to a computer (connected to the user's through a TCP/IP network, e.g. Internet) & have control over it like a local user, including control over running various programs

The Web

- The greatest, shared resource of information created by humankind

email

- Computer-to-computer messaging

email Clients

- Programs used for writing, sending, receiving, and displaying email messages
- Examples: Outlook, Communicator, Hotmail, YahooMail

SMTP: Simple Mail Transfer Protocol

A protocol used to send and receive email messages over a TCP/IP network

POP3: Post Office Protocol

- A protocol used for receiving email messages

Instant Messaging

- The IM services available on the Internet (e.g. ICQ, AIM, MSN Messenger,

Yahoo! Messenger) allow us to maintain a list of people (contacts) that we interact with regularly

VoIP: Voice over IP

- Voice delivered from one device to another using the Internet Protocol

Pro

Much cheaper than traditional phone service

Con

Noticeably poor quality of voice as compared with land-line phone service, but not much worse than cell phone service

Lecture 31

Developing Presentations

Spreadsheets:

- Electronic replacement for ledgers

The Structure of A Spreadsheet:

- Collection of cells arranged in rows and columns

Presentation Development SW :

- One can use a word processor to develop presentations of reasonable quality

Popular SW :

- Microsoft PowerPoint
- CA Harvard Graphics
- Lotus Freelance Graphics
- Corel Presentation

Lecture 32

Event Handling

What is Event Handling?

- Capturing events and responding to them
- The system sends events to the program and the program responds to them as

they arrive

Event Driven Programs:

- Programs that can capture and respond to events are called "event-driven programs"

JavaScript Handling of Events:

- Events handlers are placed in the BODY part of a Web page as attributes in HTML tags

In-Line JavaScript Event Handling :

- The event handler attribute consists of 3 parts:
 1. The identifier of the event handler
 2. The equal sign
 3. A string consisting of JavaScript statements enclosed in double or single quotes
- onFocus & onBlur:
 - onFocus executes the specified JavaScript code when a window receives focus or when a form element receives input focus
 - onBlur executes the specified JavaScript code when a window loses focus or a form element loses focus
- onLoad & onUnload:
 - onLoad executes the specified JavaScript code when a new document is loaded into a window
 - onUnload executes the specified JavaScript code when a user exits a document

Lecture 33

Graphics & Animation

Computer Graphics:

- Images created with the help of computers

Pixel:

- The smallest image forming element on a computer display

Color Mapping :

- Instead of letting each pixel assume one out of 16 million possible colors

colors, only a

limited number of colors ϵ called the palette ϵ are allowed

Dithering:

- In this scheme, pixels of alternating colors are used to simulate a color that is not present in the palette

Aliasing:

- The computer screen consists of square-ish pixels arranged in a fixed grid

Anti-Aliasing:

- Anti-aliasing is another technique used for managing the "staircase" effect

Vector or Object-Oriented Graphics:

- Treats everything that is drawn as an object
- Relatively small file size
- Examples: swf, svg, wmf, ps

Bitmap or Raster Graphics:

- Treats everything that is drawn as a bitmap
- Relatively large file size

- Examples: gif, jpg, bmp

3-D Graphics:

- Flat images enhanced to impart the illusion of depth

3-D Graphics: Applications:

- Games
- Medical images
- 3-D CAD

3-D Rendering:

- The process of converting information about 3-D objects into a bitmap that can be displayed on a 2-D computer display

Animation:

- Graphics in motion, e.g. cartoons

Computer Animation: Examples

- Games

- Cartoons, movies
- Visualization of processes, e.g the IM process

Tweening:

- This process of creating these in-between images from key images is called inbetweening (or tweening for short)

Lecture 34

Intelligent Systems

Genetic Algorithms (2):

An initial set of random solutions is ranked in terms of ability to solve the problem at hand

Fuzzy Logic:

- Based on the principles of the approximate reasoning faculty that humans use when faced with linguistic ambiguity

Robotics:

- Automatic machines that perform various tasks that were previously done by humans
- Example:
 1. Pilot-less combat airplanes
 2. Land-mine hunters
 3. Autonomous vacuum -cleaners

Autonomous Web Agents:

- Also known as mobile agents, softbots
 - Computer program that performs various actions continuously, autonomously on behalf of their principal!

Lecture 36

Data Management

JavaScript doesn't support drawing of graphics

Data Entry:

- New titles are added every day

- New customers are being added every day
- That new data needs to be added accurately

Data Updates :

- Old titles are deleted on a regular basis

Data Security :

- The security of the customers' personal data is of utmost importance.

Hackers

are always looking for that type of data, especially for credit card numbers

Data Integrity:

- Integrity refers to maintaining the correctness and consistency of the data

Data Accessibility:

- œ Data be stored in an organized manner
- œ Additional info about the data be stored

DBMS :

- A DBMS is the SW system that operates a database, and is not the database itself

Database:

- A collection of data organized in such a fashion that the computer can quickly search for a desired data item

Tabular Storage: Features & Possibilities:

- Similar items of data form a column

CONCLUSION:

Tabular storage is better than flat-file storage

Lecture 37

Database Software

Relational Databases

- Databases consisting of two or more related tables are called relational databases

RDBMS

- Relational DBMS software
 - Contains facilities for creating, populating, modifying, and querying relational databases
- Examples:
 - œ Access
 - œ FileMaker Pro
 - œ SQL Server
 - œ Oracle

Some Terminology

- Primary Key is a field that uniquely identifies each record stored in a table
- Queries are used to view, change, and analyze data. They can be used to:
 - Forms can be used for entering, editing, or viewing data, one record at a time
 - Reports are an effective, user-friendly way of presenting data. All DBMSes provide tools for producing custom reports.
- Data normalization is the process of efficiently organizing data in a database.

Data Mining

- The process of analyzing large databases to identify patterns.

Lecture 39 Cyber Crime

What was going on?

- A coordinated, distributed DoS (Denial of Service) attack was taking place

Three Phases of the DoS

1. Search
 2. Arm
 3. Attack
1. Search for Drones
 - The attackers set about acquiring the control over the computers to be used in

the attack ...

- by scanning & using e.g. Sscan SW & a large numbers of computers attached to the Internet
- Once a computer with a weak security scheme is identified, the attackers try a break-in
- Once conquered, that computer & called a drone & will be used to scan others

2. Arming the Drones

- After several drones have been conquered, the DoS SW is loaded on to them
- Examples: Tribal Flood Network, Trinoo, TFN2K
- Like a time-bomb, that SW can be set to bring itself into action at a specified time

3. The Actual Attack

- At the pre-specified time or on comm and, the SW implanted on all of the drones wakes up and starts sending a huge number of messages to the targeted servers

Neutralizing the Attack

- They setup filters that blocked all those packets
- It took them around 3 hours to identify and block most of the hostile packets
- BTW , the sender's IP address can be spoofed, making it impossible to block the attack just by blocking the IP addresses

Who Done It?

- The DoS SW is not custom SW , and can be downloaded from the Internet. Therefore, it is difficult to track the person who launched the attack by analyzing that SW

DoS Attack: A Cyber Crime

- DoS is a crime, but of a new type - made possible by the existence of the Internet

Cyber crime can be used to ...

- Damage a home computer
- Bring down a business
- Weaken the telecom, financial, or even defense-related systems of a country

Cyberwarfare:

A clear and present threat as well opportunity for all of the world's armed force!

Mail Bombing

- A stream of large-sized eMails are sent to an address, overloading the destination account

Break-Ins

- Hackers are always trying to break-in into Internet-connected computers to steal info or plant malicious programs

Credit Card Fraud

- A thief somehow breaks into an eCommerce server and gets hold of credit numbers and related info

Software Piracy

- Using a piece of SW without the author's permission or employing it for uses not allowed by the author is SW piracy

Web Store Spoofing

- A fake Web store (e.g. an online bookstore) is built
- Customers somehow find that Web site and place their orders, giving away their credit card info in the process

Viruses

- Self-replicating SW that eludes detection and is designed to attach itself to other files

Anatomy of a Virus

- A virus consists of 2 parts:

- Transmission mechanism
- Payload

Other Virus-Like Programs

- There are other computer programs that are similar to viruses in some ways but different in some others
- Three types:
 - œTrojan horses
 - œLogic- or time-bombs
 - œWorms

Trojan Horses

- They appear to be something interesting and harmless (e.g. a game) but when they are executed, destruction results

Logic- or Time-Bombs

- It executes its payload when a predetermined event occurs

Worms

- Harmless in the sense that they only make copies of themselves on the infected computer
- Harmful in the sense that it can use up available computer resources (i.e. memory,

Lecture 41 Images & Animation

Flash Animation

- Designed for 2-D animations, but can be used for storing static vector-images as well
- A special program (called a plug-in) is required to view Flash files in a Web browser
- Can be used to design complete, animated Web sites with hardly any HTML in it
- Binary-file storage

Structured Vector Graphics

- New format; may become more popular than Flash

- Plug-in required
- Text-file storage; search engine friendly

Lecture 42

The Computing Profession

IT: Information Technology

The group of technologies concerned with the capture, processing and transmission of information in the digital-electronic form

Who is a computing professional?

- Professionals involved in the development and/or maintenance of SW and/or computer HW
 - Computer scientists, software engineers, computer engineers, and some of the telecom engineers are generally classified as computing professionals

Development Team

- The number of development teams has varied between 3-7 at this organization
 - Team-size has varied between 3-35
 - Large teams are organized as a collection of sub-teams
 - Lowest-level team: No more than 7 members
 - Responsible for a project from after the specifications stage till the very end

Project Manager

- Responsibilities:
 - œ Planning and tracking of the project
 - œ Arranging of the appropriate resources
 - œ Client relationship management
- Profile:
 - œ 5+ years of team-lead experience
 - œ Professional development course(s) in SW project management
 - œ Technical MS and/or Technical BS + MBA

Team Lead

- Responsibilities:
 - œ Planning and tracking of the project
 - œ Detailed design
 - œ Professional development of team members

œIn case of small teams, development activities

•Profile:

- œ5+ years of development experience
- œExcellent interpersonal skills
- œGood planning skills
- œGood design skills

Developer

•Responsibilities:

- œModule-level design
- œCoding
- œUnit-testing

•Profile:

- œTechnical BS

Executive Team

- CEO œ Chief Executive Officer
 - œDeveloper of the vision of the organization
- COO œ Chief Operating Officer
 - œResponsible for the day-to-day operations
 - œGreat organizational & interpersonal skills
- CM SO œ Chief Marketing & Sales Officer
 - œResponsible for bringing in work

Configuration Management Team

- 2-3 members

Process Team

- 1-2 members
- Team's goal: To continuously improve the SW development process to achieve improvements in cost, schedule, and quality

Quality Assurance Team

- Around 20 members
- Responsible for assuring the quality of all SW (i.e. making sure that it does what it is supposed to) that is produced at the organization

Technology Transfer Team

- This team is responsible for:
 - œEvaluating new technologies, products, processes
 - œSelecting the ones that are right for the organization

- œDeveloping an expertise in their use
- œIntroducing them in various ongoing/future projects

Support Team

- 2-3 members
- Members possess expertise in both HW & SW

Ethics

•Ethics is a collection of heuristics that, when followed, improves our way of life

Professional Ethics

•Professional ethics are a category of ethics, and here we discuss the professional ethics relevant to computing

Lecture 43

The Future of Computing

The key weakness of the Web?

- The Web (as it currently exists) was designed for humans to read, not for computers to understand and manipulate meaningfully
- Computers face great problems in dealing with the current text- and graphics-based content of the Web

Future of the Web: Semantic Web

Whereas, today's Web's content is designed for humans to read; the Semantic Web's content will be designed for computers to understand meaningfully. However, the Semantic Web is not a replacement but an extension of the present Web, in which info is given well defined meaning

Holographic Storage

- Digital data stored in and read from a 3-D optical material with the help of lasers
- Depending upon the material, they could be read-only or R/W

Slave _ Master

- The way things are progressing right now, the roles may reverse over a 50-100 year time frame
- Computers may become self-replicating, self-healing, and self-programming just like humans

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SUPER MODERATOR

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WISH U ALL THE BEST.
REMEMBER ME IN YOUR PRAYERS