Advanced Topics

Situations
- Mailing list
- Mail merge: form letter + mailing list
- Office budget
- Employee data
  - single record type
  - multiple record types
- Reports using employee data
- “What if” financial analysis

PC Layout

Cache Levels
1. Inside CPU 16 - 128 KB
2. Onboard ½ - 2 MB
3. RAM 64 MB - 2 GB
4. Disk 128 MB - 4 GB

CPU Issues
- Faster clock speed
  - Can make relative comparisons within family
    - Intel Pentium 4
    - Intel Pentium 3
    - AMD Athlon
    - AMD Duron
- Cache memory
  - More is better

Video Resolution
- Pixels (picture elements)
  - 640 x 480
  - 800 x 600
  - 1024 x 768
  - 1280 x 1024
  - 1600 x 1200
- Video card and monitor must harmonize
- Pixel count and color depth determines video RAM requirement
**CRT Video Issues**

- Non-interlaced
- Fast refresh rate
  - 75 Hz minimum, 80 to 85 Hz better
- Related to resolution
- Small dot pitch
  - .28 mm or smaller
- True viewable area
  - 17” = 14.7” to 16.0” depending on manufacturer

**Device Interfaces**

- IDE: 33 / 66 / 100 / 133 MB/sec
  - Disk, tape, CD-ROM, CD-RW, DVD, Zip
- SCSI: 20 / 40 / 80 / 160 MB/sec
  - Disk, tape, scanner, Zip, Jaz
- USB 2.0: 60 MB/sec
  - Scanner, printer, ZIP, keyboard, mouse, digital camera, external hard drive, digital music recorder
- IEEE 1394 (Fire Wire): 50 MB/sec
  - Digital camera, camcorder, external hard drive, digital music recorder

**Plug and Play (PnP)**

- Automatically sets
  - Interrupt
- Direct memory access (DMA) channel
  - I/O address
- BIOS detects and resolves conflicts
- BIOS saves configuration information
- Windows 95 and 98 helps configure older adapter cards

**Computer Virus**

- Software that infiltrates your computer
  - Boot sector
  - E-mail
  - Macro
  - Infected program
- Effect
  - Benign
  - Destructive
  - Replication likely

**Local Area Network**

- PCs communicating with each other
- Peer-to-peer
  - Each machine can host shared resources
    - Microsoft (WFW, 95, 98, ME, NT, 2000, XP), Artisoft (Lantastic)
- Dedicated server
  - Server never used as client machine
  - Novell (Netware), Microsoft (NT, 2000 server)
- Server resources appear as logical extension of client resources

**Logical Drive Mapping**

- Server must first make resource shareable
- Can use Windows Explorer to do this
  - Right click on drive letter or folder
  - Click on Sharing…
- Unused drive letter mapped to server resource
- Can use Windows Explorer to do this
  - Tools | Map Network Drive…
  - \<server name><share name> equates to <drive>
Network Attacks
- Denial of service
  - Ping of death
- Infiltration
  - Once broken into, anything is possible

Protect Yourself
- Anti-virus software
  - McAfee
  - Norton
- Software firewall
  - Black Ice Defender
  - Norton Personal Firewall
- Hardware firewall
  - Router between cable modem and PC

Authentication
- Something you know and something you have is best situation
- Userid and PIN
- Userid and password
- Userid, token and PIN
  - Token generates “random” number every minute
- Userid and biometric
  - Finger, eye, face
  - False positive and false negative
- Userid and smart card

Password dilemmas
- Increased level of safety if
  - Different for each userid
  - Changed frequently
  - Long and has special characters
- How do you keep track of them all?
- Single Sign On
  - SSO password is single point of compromise
  - Each userid can have different, complex passwords

Digital Signature
- Authentication
- Non-repudiation
- Legally, same as real signature

Public Key Infrastructure (PKI)
- Certificate Authority (CA) issues digital certificate
- Use digital certificate to “sign” files
- When files are retrieved, can determine if altered since being signed
Popular PC Upgrades

- Add RAM
  - Need empty slot(s)
  - Same type, speed (e.g., PC 133)
- Add second hard drive
- Replace graphics card
- Replace CPU
  - Check system board manual

Seriously Consider…

- Dual CPUs
- RAID – Redundant Array of Independent Disk
  - Level 0 – data striping (performance)
    - Minimum of 2 drives
  - Level 1 – data mirroring (fault tolerance)
    - Doubles required disk drives
    - Available capacity = total capacity / 2
  - Level 0+1 – both data striping and mirroring
- Putting all data files in separate disk partition

Maintenance Activities

- Defragment hard drive(s)
- Keep emergency boot disk set current
  - Add/Remove Programs | Startup Disk
- Back up data
  - Keep offsite copy
  - CD-RW or CD-ROM great choice
- Update (patch) your software
  - Windows Update: operating system, drivers
  - Applications
  - Virus signature file

Useful Software

- Add / modify / delete partitions
  - Partition Magic by Powerquest
  - Partition Commander by V Communications
- Boot multiple operating systems
  - Boot Magic by Powerquest
  - System Commander by V Communications
- Boot from different hard drives
  - Trios hard drive selector by Romtec

Application Environment

- Presentation management (user interface)
- Business logic
  - Non-database edits
    - Data type, value range, etc.
  - Database edits
    - Same record: key, field combination
    - Multiple records: head count, total salary by dept
- Data storage - where data resides
- Database Management System

“Traditional” Mainframe-Centric

<table>
<thead>
<tr>
<th>Client</th>
<th>Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>Text-based UI</td>
</tr>
<tr>
<td></td>
<td>Business logic</td>
</tr>
<tr>
<td></td>
<td>Data storage</td>
</tr>
<tr>
<td></td>
<td>DBMS</td>
</tr>
</tbody>
</table>
Single User PC

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</thead>
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File Server Model

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Why Use File Servers

- Share
  - Printer
  - CD-ROM / DVD
  - Disk storage
  - Data files
  - Application programs
- Hardware cost avoidance and higher utilization rates... but may waste personnel time

File Server Drawbacks

- Remote disk drive connected via network
- Highly inefficient for I/O intensive database tasks
- Crude concurrent access

Schematic Key

Disk
Internal Bus
Main Memory (RAM)
Processor Cabinet

Two Scenarios

- Query that scans 100,000 rows and returns only 20 rows
- Add a new employee to a department that already has 10 employees
Client / Server

- Split application workload
  - User interface on (thin) client
  - Business logic on server
- Business logic and database system on
  - Same machine - two tier
  - Different machines - three tier
- Alternate two tier
  - User interface and business logic on (fat) client
  - Database system on server

Common Practice

Client
Graphical UI
Business logic

Server
Data storage
DBMS

Fat Client - Database Server

Client
Graphical UI
BL: non-DB edits

Server
BL: DB edits (triggers)
Data storage
DBMS
Best Client Approach

Client
Graphical UI

Server
Business logic
Data storage
DBMS

Thin Client & Database Server

Client
Server

UI

Data
BL
DBMS

Network

Only result dataset returned to Client

Three Tier Client / Server

Client

App Server

DB Server

UI
BL
Network

UI
BL
Network

Data
DBMS

Internet Application

Client

Server

Browser

Data
BL
DBMS

UI

Browser

UI

Network

Network

From the client’s perspective…

- Fat client
  - Rich user interface controls
  - Large client footprint
  - Update client every time business logic changes
- Browser-based app
  - Minimal user interface controls
  - No client footprint
Markup Languages

- **HyperText Markup Language (HTML)**
  - Used to display data
  - Static – data being display doesn’t change
  - Dynamic – data added before page is displayed
- **Extensible Markup Language (XML)**
  - Used to describe data
  - Facilitates data exchange (not display)
- HTML and XML complement each other

Suggested Periodicals

- BusinessWeek
- InformationWeek
- Datamation
- ComputerWorld
- Infoworld
- PC Week
- PC Magazine

Suggested Books