


Networks - 4.1




International Diploma in Computer Studies

Computer Technology

Session 4 Networks

V1.1 © NCC Education Limited, 2007

Networks - 4.2




Session Contents

- Development of Computer communications and types of networks
- Major concepts and principles
 - What, where and how?
 - OSI and TCP/IP
- Applications and Technologies of Local and Wide Area Networks
- Communications Hardware
- Network Management

V1.1 © NCC Education Limited, 2007

Networks - 4.3




Development of Computer Communications

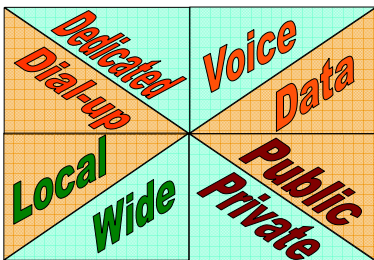
- 1960s - first use of PSTN
- 1970s - telephone systems begin to use digital techniques
- 1980s - computer networks used for mainframe and minicomputers
- 1990s - most business computers connected in networks
- 2000s - use of DSL broadband and wireless networking technologies

V1.1 © NCC Education Limited, 2007

Networks - 4.4




Types of Communication Network



V1.1 © NCC Education Limited, 2007

Networks - 4.5




Communications Viewpoints

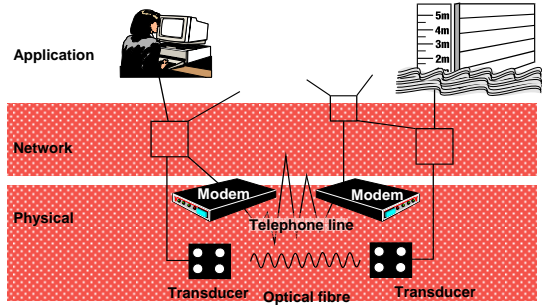
- **WHAT** is to be communicated?
 - APPLICATION viewpoint
- **WHERE** is the other party?
 - NETWORK viewpoint
- **HOW** is the information to be passed?
 - PHYSICAL viewpoint

V1.1 © NCC Education Limited, 2007

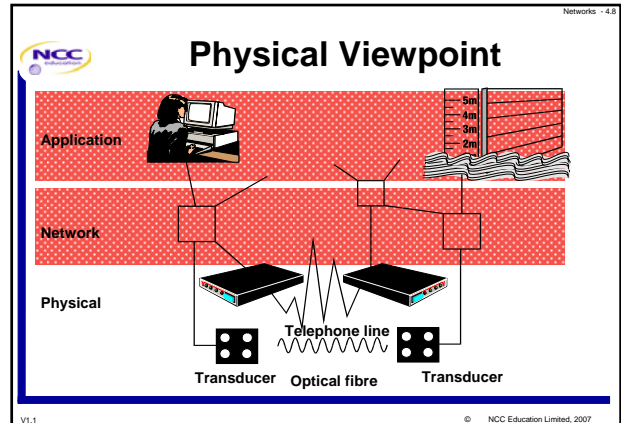
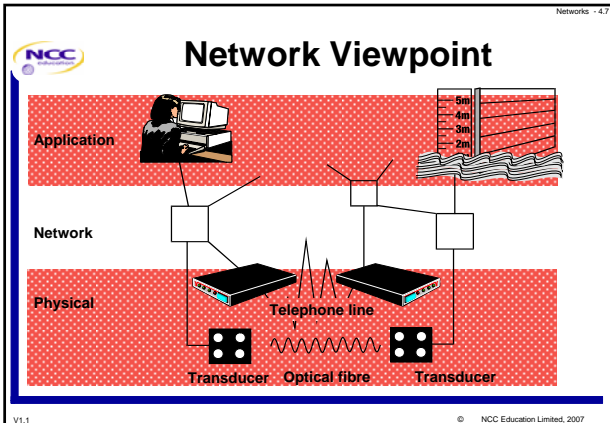
Networks - 4.6



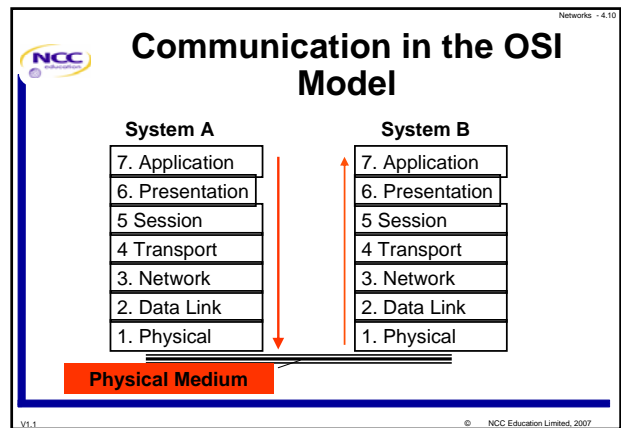
Application Viewpoint



V1.1 © NCC Education Limited, 2007

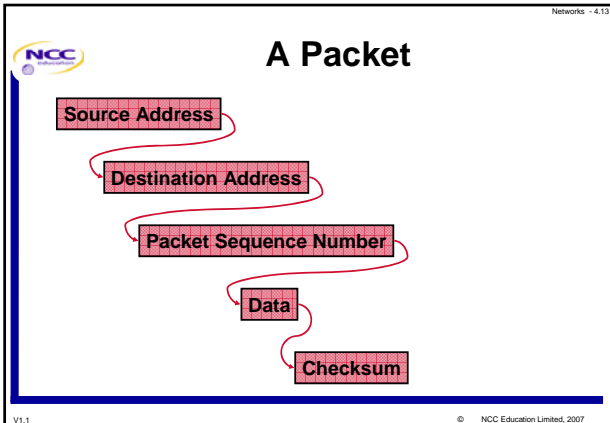


-
- The OSI Reference Model**
- The seven layers:
- 7 Application Layer
 - 6 Presentation Layer
 - 5 Session Layer
 - 4 Transport Layer
 - 3 Network Layer
 - 2 Data-Link Layer
 - 1 Physical Layer
- The NCC logo is in the top left, and 'Networks - 4.9' is in the top right. Copyright information '© NCC Education Limited, 2007' is at the bottom.



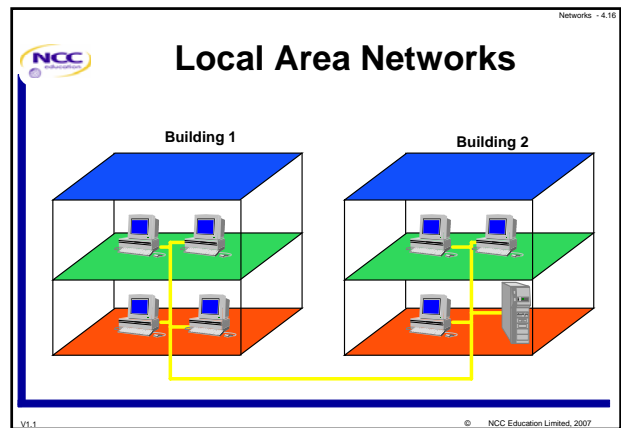
-
- The Internet**
- Federation of autonomous networks
 - TCP/IP protocols
 - Accessible from almost everywhere
 - Use growing dramatically
- The NCC logo is in the top left, and 'Networks - 4.11' is in the top right. Copyright information '© NCC Education Limited, 2007' is at the bottom.

-
- Communications Media**
- Many different media and signalling methods are available, such as:
- Media
 - copper wire
 - coaxial cable
 - optical fibre
 - infra-red
 - radio
 - Signalling
 - analogue waveforms
 - digital pulses
- The NCC logo is in the top left, and 'Networks - 4.12' is in the top right. Copyright information '© NCC Education Limited, 2007' is at the bottom.



- ### Circuit Switching and Packet Switching Networks
- **Circuit Switching**
 - suited for voice connections
 - dedicated path
 - continuously connected for duration
 - **Packet Switching**
 - suited for data connections
 - share paths with other users
 - packets may travel different routes
 - may not arrive in same order as sent
- V1.1 © NCC Education Limited, 2007 Networks - 4.14

- ### Local and Wide Area Networks
- **Local Area Networks (LAN)**
 - usually single building or small site
 - shared connection - loop or linear
 - devices may include special servers, such as printers, file servers, database servers, WAN gateways and LAN bridges
 - **Wide Area Networks (WAN)**
 - geographically distributed
 - point-to-point links
 - permanent or dial-up connections
 - complex topologies possible
- V1.1 © NCC Education Limited, 2007 Networks - 4.15

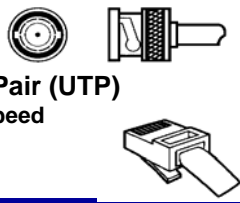


- ### Applications of LANs
- **Sharing resources**
 - computers
 - printers
 - fax
 - **Sharing data**
 - databases
 - file servers
 - Intranet support
- V1.1 © NCC Education Limited, 2007 Networks - 4.17

- ### Local Area Communications
- **Token Ring**
 - tokens passed from device to device round the ring
 - message placed in a passing empty token
 - receiver empties token and passes it on
 - **Ethernet**
 - end to end cable - no master device
 - length of cable limited by propagation speed and packet size
 - message collisions possible, so retransmission may be needed
- V1.1 © NCC Education Limited, 2007 Networks - 4.18

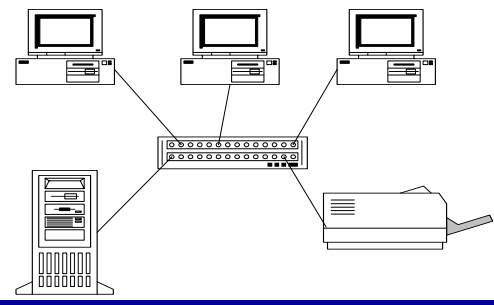
Ethernet Wiring

- **Thick Ethernet**
 - now rarely used
- **Thin Ethernet**
 - coaxial cable
 - BNC connectors
- **Unshielded Twisted Pair (UTP)**
 - can support higher speed
 - RJ45 connectors



V1.1 © NCC Education Limited, 2007

Ethernet Hub



V1.1 © NCC Education Limited, 2007


CSMA/CD

- **Carrier Sense Multiple Access / Collision Detection**
- **Wait until cable quiet**
- **Transmit**
- **Check if collision**
- **If collision**
 - wait
 - retransmit

V1.1 © NCC Education Limited, 2007

Wireless LAN

- **Based on radio technology**
- **Main advantages**
 - no cabling required
 - flexible
 - provides mobility



V1.1 © NCC Education Limited, 2007

Personal Area Network (PAN)

- **Used to connect small devices**
 - Mobile phones
 - PDAs
 - Portable printers
 - Digital cameras
 - MP3 players
 - GPS modules


V1.1 © NCC Education Limited, 2007

Exercise - LANs

- **What are the main benefits to an organisation from the installation of a Local Area Network?**

V1.1 © NCC Education Limited, 2007

Networks - 4.25

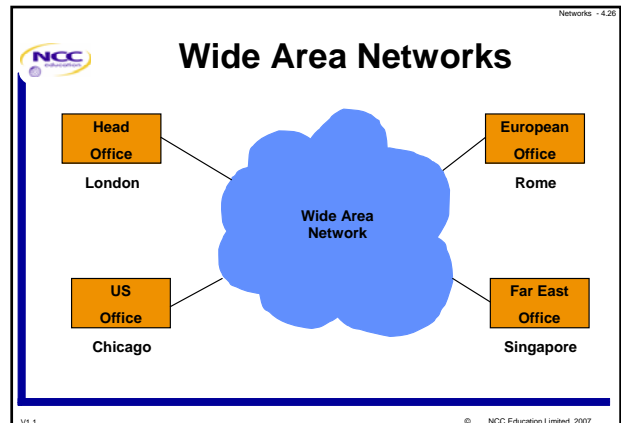


Suggested Answer - LANs


Possible benefits include:

- More cost efficient use of printing facilities
- Ability to share electronic information
- Pass messages electronically
- Make use of an Intranet for staff information and on-the job training

V1.1 © NCC Education Limited, 2007



Networks - 4.27




Communication Links - 1

- Public switched telephone network
 - needs modems
 - slow
- Leased line
 - permanent point to point connection
- ISDN
 - higher speed digital dial-up
- Digital Subscriber Line (DSL)
 - commonly known as broadband
- WiMAX
 - wireless alternative to DSL

V1.1 © NCC Education Limited, 2007

Networks - 4.28




Communications Links - 2

- X25
 - robust packet switched network
- Frame-relay
 - variable sized data frames
 - frames may travel different routes
 - retransmission left to end-points
- ATM
 - implemented in hardware
- Point to point - T and E carriers
 - T carrier - North America system
 - E carrier - European system

V1.1 © NCC Education Limited, 2007

Networks - 4.29




WAN Applications

- WWW and eCommerce
- Virtual Private Networks
 - Intranets over the Internet
- Voice over IP
 - potential for very cheap telephone conversations!
- Video On Demand
 - film distribution and online video player

V1.1 © NCC Education Limited, 2007

Networks - 4.30




General Purpose Communications Hardware

- Network Interface Cards
- DSL and Cable modems
- Hubs
- Bridges
- Routers
- Brouters
- Switches
- PBX and PABX

V1.1 © NCC Education Limited, 2007

Networks - 4.31

Hub




Source: www.cisco.com

V1.1 © NCC Education Limited, 2007

Networks - 4.32

Router




Source: www.cisco.com

V1.1 © NCC Education Limited, 2007

Networks - 4.33

Management System

- Management console programmes use graphical maps to represent the network
- Shows traffic flows if system reports problems
- Needed if networks are a vital part of the business operations



V1.1 © NCC Education Limited, 2007


Networks - 4.34

Summary

- Development of Computer communications and types of networks
- Major concepts and principles
 - What, where and how?
 - OSI and TCP/IP
- Applications and Technologies of Local and Wide Area Networks
- Communications Hardware
- Network Management

V1.1 © NCC Education Limited, 2007

The Internet - 5.1



International Diploma in Computer Studies


Computer Technology

**Session 5
The Internet**

V1.1

© NCC Education Limited, 2007

The Internet - 5.2




Session Contents

- What Is the Internet?
- History of the Internet
- Underpinning Technology
- Facilities Available on the Internet
- Effects on Society and Industry
- Electronic Commerce and Security

V1.1


© NCC Education Limited, 2007

The Internet - 5.3



The Internet - What is it?


The Internet is a worldwide collection of computer networks, connected by computers, and powerful data transmission systems



V1.1

© NCC Education Limited, 2007

The Internet - 5.4




Origins

- Key date = July 1968, request issued
- United States Department of Defense
- 4 Universities connected in Autumn 1969 by the ARPANet
- Telnet and FTP available

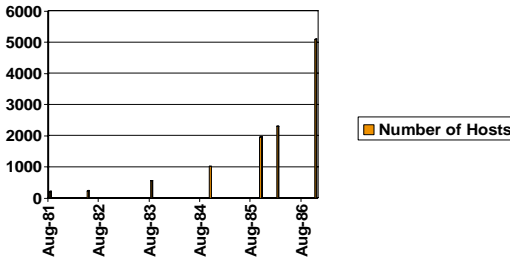
V1.1

© NCC Education Limited, 2007

The Internet - 5.5



Evolution through 1980s




Month	Number of Hosts
Aug-81	~100
Aug-82	~200
Aug-83	~500
Aug-84	~1000
Aug-85	~2000
Aug-86	~5000

V1.1

© NCC Education Limited, 2007

The Internet - 5.6



Beginnings of the WWW

- Early 1989 HTML and HTTP specified
- November 1990 Hypertext client/server prototype
- August 1991 WWW name used
- January 1993 50 Servers, 2 X Windows browsers
- Autumn 1993 Mac and PC browser
- End of 1993 700 servers on the WWW

V1.1

© NCC Education Limited, 2007

The Internet - 5.7

Exercise - The Internet

What effect has the Internet had on:

- Your home life?
- Your education?
- Your professional life?

V1.1 © NCC Education Limited, 2007

The Internet - 5.8

The Internet - Advantages

- Not as necessary to visit the shops to purchase the goods
- Information readily available for study and research work, as well as entertainment schedules and television schedules
- Easier to communicate quickly with individuals/colleagues, when a telephone conversation is neither appropriate nor practical

V1.1 © NCC Education Limited, 2007

The Internet - 5.9

Underpinning Concepts

- Computer addressing
- Internet Service Providers (ISPs)
- Protocols
- File format standards

V1.1 © NCC Education Limited, 2007

The Internet - 5.10

Computer Addressing

IP Address = a.b.c.d

a
b
c
d

} All between 0 and 255

Example = 110.84.10.245

V1.1 © NCC Education Limited, 2007

The Internet - 5.11

Internet Service Provider

- Connect to ISP by:
 - dial up telephone line
 - leased telephone line
 - Digital Subscriber Line (DSL)
 - microwave
 - satellite link

V1.1 © NCC Education Limited, 2007

The Internet - 5.12

Protocols

- Internet Protocol (IP)
- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)
- Domain Name System (DNS)

V1.1 © NCC Education Limited, 2007

The Internet - 5.13

Standards

- HTML
- Adobe Acrobat PDF
- JAVA
- GIF
- JPEG and MPEG
- RealAudio
- Shockwave

V1.1 © NCC Education Limited, 2007

The Internet - 5.14

Internet Facilities


- Electronic Mail (email)
- File Transfer (ftp)
- Remote Login (Telnet)
- Newsgroups (UseNet)
- World Wide Web (WWW)

V1.1 © NCC Education Limited, 2007

The Internet - 5.15

Email

fred@ncceducation.co.uk



joe@smithco.com

V1.1 © NCC Education Limited, 2007

The Internet - 5.16

File Transfer Protocol (FTP)

- Transfer files across Internet
- Useful for archives and software upgrades
- Anonymous ftp
- Security is an issue

Commands

- open
- ls or dir
- cd remote folder
- get file name
- put file name
- close
- quit

V1.1 © NCC Education Limited, 2007

The Internet - 5.17

Telnet and Newsgroups

<ul style="list-style-type: none"> ● Telnet <ul style="list-style-type: none"> – Remote login – Run programs on remote machine – No anonymous access 	<ul style="list-style-type: none"> ● Newsgroups <ul style="list-style-type: none"> – Public Bulletin Boards – Threads of email messages – See http://www.deja.com
---	--

V1.1 © NCC Education Limited, 2007

The Internet - 5.18

Newsgroup Categories


<ul style="list-style-type: none"> ● comp ● news ● rec ● sci ● soc ● alt ● bionet ● de, fr, uk 	<ul style="list-style-type: none"> Computer related topics Information about newsgroups and software Recreational software Science research and application Society and politics Alternative topics Biology German, French, UK and many other national interest groups
--	--

V1.1 © NCC Education Limited, 2007

The Internet - 5.19

World Wide Web

- Lets go surfing!
- Popular Web browsers:
 - Mozilla Firefox
 - Opera
 - Safari
 - Microsoft Internet Explorer



V1.1 © NCC Education Limited, 2007

The Internet - 5.20

Instant Messaging

- The modern version of the Telex
- Interactive
- Supports text, graphics, audio and video
- Several popular systems:
 - Microsoft Messenger
 - Yahoo
 - AOL
 - ICQ

V1.1 © NCC Education Limited, 2007

The Internet - 5.21

Peer to Peer File Sharing

- Started as a mechanism for students to share music
- Various systems developed:
 - Napster
 - WinMX
 - Bit Torrent
- Concerns over copyright infringement

V1.1 © NCC Education Limited, 2007

The Internet - 5.22

Effect on Society

- Increasing difference between Internet 'Haves' and 'Have-nots'
- Greater encouragement to use computers
- More working at home
- Virtual societies formed

V1.1 © NCC Education Limited, 2007

The Internet - 5.23

Use and Abuse

- Remember - in most cases:
 - **Anyone** can put **Anything** on a Website or in News Message
 - **No-one** monitors or approves prior to publication

Some sites are, however, moderated

V1.1 © NCC Education Limited, 2007

The Internet - 5.24

Exercise - Internet Security

- Would you trust the Internet security measures to:
 - make use of Internet banking facilities?
 - purchase items over the Internet via credit card?
- If not, why not?

V1.1 © NCC Education Limited, 2007

Models of Internet in Industry

- Advertising
- Information
- Selling

An Advertising Model

The diagram shows a 'Graphics designer' on the left and a '(Potential) Customer' on the right. Both are represented by icons of people at computers. Red arrows point from each person to a central orange oval labeled 'Website'.

An Online Information Model

The diagram shows four roles: 'Graphics designer' (top left), 'Customer' (top right), 'Database designer' (bottom left), and 'Data entry staff' (bottom right). A central orange oval labeled 'Website' is connected to the graphics designer and customer. A central orange rectangle labeled 'Database' is connected to the database designer and data entry staff. Red arrows also connect the website to the database.

A Shop-Front Model

The diagram shows five roles: 'Graphics designer' (top left), 'Customer' (top right), 'Database designer' (middle left), 'Data entry staff' (middle right), and 'Warehouse and Distribution Centre' (bottom). A central orange oval labeled 'Website' is connected to the graphics designer and customer. A central orange rectangle labeled 'Database' is connected to the database designer and data entry staff. Red arrows also connect the website to the database. A truck icon is next to the customer, and an airplane icon is next to the warehouse.

Business Use of the Internet

- As an advertising medium
- To provide up to date information on products or services via a database
- To provide a shop front to enable online purchase to be made

eCommerce or Electronic Commerce - What is it?

- Marketing, advertising and selling goods and services using an electronic medium
- Pre-dates the WWW
- Has now become synonymous with any business transaction using the Web

The Internet - 5.31

Benefits of eCommerce

<i>Method of Processing Airline ticket</i>	<i>Cost</i>
Travel Agent books using computer reservation system	US \$8
Travel Agent books direct with airline	US \$6
Customer books "Electronic ticket" direct with airline	US \$1

V1.1 © NCC Education Limited, 2007

The Internet - 5.32

Digital Goods and Services

- **Finance Sector**
 - Online banking
 - Online insurance
 - Online share trading
- **Leisure Sector**
 - Online gambling
 - Online computer gaming
 - Online travel
- **Retail Sector**
 - Online software
 - Online auctions
 - Online music and video downloads

V1.1 © NCC Education Limited, 2007

The Internet - 5.33

Problems of eCommerce

V1.1 © NCC Education Limited, 2007

The Internet - 5.34

eCommerce - the Future?

V1.1 © NCC Education Limited, 2007

The Internet - 5.35

Current Trends

- **Micro businesses**
- **Person to person finance**
- **Reverse auctions**

V1.1 © NCC Education Limited, 2007


The Internet - 5.36

Internet Security Issues

- **Hacking**
- **Viruses**
- **Unauthorised surfing**


V1.1 © NCC Education Limited, 2007

The Internet - 5.37




Security Countermeasures

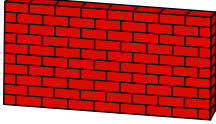
Organisational and procedural security



Physical security




Firewalls



Logical security

V1.1 © NCC Education Limited, 2007

The Internet - 5.38




Summary

- What is the Internet
- History of the Internet
- Underpinning technology
- Facilities available on the internet
- Effects on society and industry
- Electronic commerce and security

V1.1 © NCC Education Limited, 2007

Multimedia - 6.1



International Diploma in Computer Studies


Computer Technology

**Session 6
Multimedia**

V1.1

© NCC Education Limited, 2007

Multimedia - 6.2



Session Contents

- **What is Multimedia?**
- **Multimedia Technologies**
- **Application of Multimedia**
 - in business
 - in education
 - in the home
- **Future Directions of Multimedia**

V1.1

© NCC Education Limited, 2007

Multimedia - 6.3



The Next Big Thing...


“whole tectonic plates moving before our eyes... our seismographs tell us this is a Big One that is rearranging faster than we imagined the borders of the business world”

Source: Salomon Bros. report

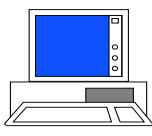
V1.1

© NCC Education Limited, 2007


Multimedia - 6.4




Multimedia is a Convergence of ...



Computing



Broadcasting




Publishing


V1.1

© NCC Education Limited, 2007


Multimedia - 6.5



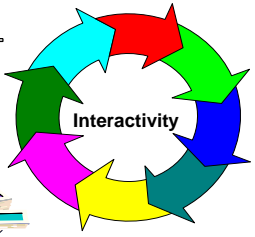
What is Multimedia?




Text



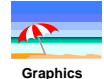
Video




Interactivity




Audio



Graphics



Still pictures




Animation

V1.1

© NCC Education Limited, 2007

Multimedia - 6.6



Developments in Multimedia

1960s	Computer Based Training
1970s	Interactive Video
1980s	Interactive Audio
1990s	Multimedia
2000	Virtual Reality

V1.1


© NCC Education Limited, 2007

Multimedia - 6.7

Multimedia Platform

Exercise:

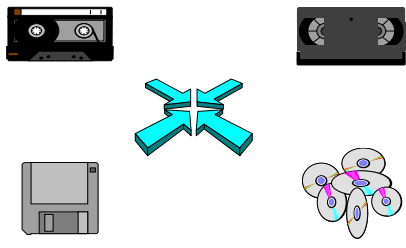
Using information on available multimedia titles, discuss and define a generic minimum hardware and software platform for running most modern titles



V1.1 © NCC Education Limited, 2007

Multimedia - 6.8

Storage Media

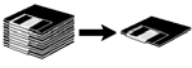


V1.1 © NCC Education Limited, 2007

Multimedia - 6.9

Compression

- Compression ratio
- Image quality
- Compression/decompression speed



V1.1 © NCC Education Limited, 2007

Multimedia - 6.10

Exercise - Compression

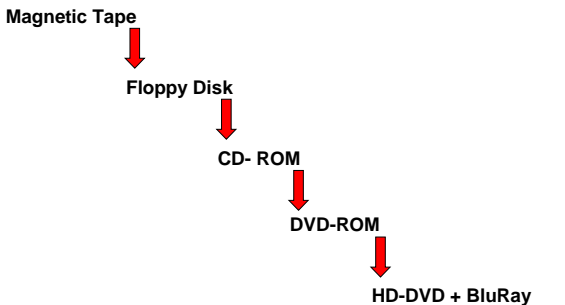
What is meant by:

- Compression ratio?
- Image quality?
- Compression/decompression speed?

V1.1 © NCC Education Limited, 2007

Multimedia - 6.11

Storage Media Progression



```
graph TD; A[Magnetic Tape] --> B[Floppy Disk]; B --> C[CD-ROM]; C --> D[DVD-ROM]; D --> E[HD-DVD + BluRay]
```

V1.1 © NCC Education Limited, 2007

Multimedia - 6.12


The Multimedia Business

- “New technology that will change the way you shop, play and learn”
- “A zillion dollar industry”

Source: Newsweek

V1.1 © NCC Education Limited, 2007

Multimedia - 6.13




Business Benefits


- Powerful presentation medium
- Retention
- Consistency
- Personalised
- Convenience
- Persistency
- Safety
- Motivation

V1.1 © NCC Education Limited, 2007

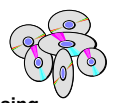
Multimedia - 6.14




Multimedia Cost Elements



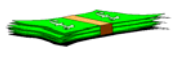
Design and development



Pressing




Delivery platform




Royalties

V1.1 © NCC Education Limited, 2007


Multimedia - 6.15




Three Main Sectors for Multimedia



Business




Education




Home

V1.1 © NCC Education Limited, 2007

Multimedia - 6.16



Multimedia in Business and Industry




- Training
- Kiosks
- The Internet

Sectors

- Finance
- Manufacturing
- Retail
- Utilities
- Government
- Services

V1.1 © NCC Education Limited, 2007

Multimedia - 6.17




Quote

“ Technological literacy must become the standard in our country. Preparing children for a lifetime of computer use is just as essential today as teaching them the basics of reading, writing and arithmetic.”


Source: Bill Clinton, President, United States of America

V1.1 © NCC Education Limited, 2007


Multimedia - 6.18



Multimedia in the Home




Armchair



Desktop

V1.1 © NCC Education Limited, 2007

Multimedia - 6.19




Future Services to the Home

- TV networks
- Classified advertisements
- Financial services
- News and information services
- Libraries and databanks
- TV archives (Video On Demand)
- Interactive shopping channels
- Long distance phone services
- Record companies
- Interactive games
- Movie collections
- TV and video collections

V1.1 © NCC Education Limited, 2007

Multimedia - 6.20




Summary

- What is multimedia
- Multimedia technologies
- Application of multimedia
 - in business
 - in education
 - in the home
- Future directions of multimedia

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.1




International Diploma in Computer Studies

Computer Technology
Session 7
Software Engineering

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.2




Session Contents

- What is Software Engineering?
- A History of Software Engineering
- Technologies and Practices
- Related Disciplines
- The Future of Software Engineering

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.3




Software Engineering

- The process of creating computer software in a controlled and disciplined manner adhering to recognised standards and procedures using formal methods and tools

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.4




History of Software Engineering - 1

- Low level machine code
- Compilers and interpreters
- Software life cycle concept

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.5




History of Software Engineering - 2

- Rapid Application Development (RAD)
- Computer Aided Software Engineering (CASE)
- Object Orientated Programming (OOP)

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.6




Basic Software Development Processes

- Design
- Construction
- Testing
- Maintenance

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.7




Design

- **Two main activities associated with the software design process:**
 - **Architectural design** - where the top-level structure and organisation of the system is described and various components are identified
 - **Implementation design** - where each individual component is sufficiently described to allow for its coding

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.8




Construction

Tools that may be employed in the construction process include:

- compilers
- version control systems
- debuggers
- code generators
- specialised editors
- tools for path and coverage analysis
- test scaffolding
- documentation tools

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.9




Testing - 1

- **Classified by purpose:**
 - correctness testing
 - performance testing
 - reliability testing
 - security testing

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.10




Testing - 2

- **Classified by life-cycle phase:**
 - requirements phase testing
 - design phase testing
 - program phase testing
 - evaluating test results
 - installation phase testing
 - acceptance testing
 - maintenance testing

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.11




Testing - 3

- **Classified by scope:**
 - unit testing
 - component testing
 - integration testing
 - system testing

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.12



Maintenance

- **Software maintenance is required for the following reasons:**
 - Correct errors
 - Correct requirements and design flaws
 - Improve the design
 - Make enhancements
 - Interface with other systems
 - Convert to use other hardware
 - Migrate legacy systems
 - Retire systems

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.13

Categories of Software Maintenance

- **Corrective**
 - reactive modification to correct discovered problems
- **Adaptive**
 - modification to keep it usable in a changed or changing environment
- **Perfective**
 - improve performance or maintainability
- **Preventive**
 - modification to detect and correct latent faults

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.14

Related Disciplines

- **Business analysis**
- **Systems analysis**
- **Project management**
- **Quality management**

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.15

The Shewhart (Deming) Cycle

Source: The Balanced Scorecard Institute

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.16

Key Phases

- **Plan**
 - design or revise business process components to improve results
- **Do**
 - implement the plan and measure its performance
- **Check**
 - assess the measurements and report the results to decision makers
- **Act**
 - decide on changes needed to improve the process

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.17

Usability and Ergonomics

- **Software design features that affect usability include:**
 - screen layout
 - screen content
 - colour scheme
 - font style and size
 - error handling
 - communication
 - navigation

V1.1 © NCC Education Limited, 2007


Software Engineering - 7.18

The Future of Software Engineering - 1

- **Software Reuse**
- **Collaborative Software Engineering**
- **Rapid Applications Development (RAD)**
- **Prototyping**
- **Process Performance Models**
- **Generative Programming**

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.19




The Future of Software Engineering - 2

- Meta-programming and Reflection
- Aspect-Oriented Software Development
- Adaptive and Reflective Middleware
- Model-Driven Architecture
- Object-Oriented Frameworks

V1.1 © NCC Education Limited, 2007

Software Engineering - 7.20




Summary

- What is Software Engineering?
- A History of Software Engineering
- Technologies and Practices
- Related Disciplines
- The Future of Software Engineering

V1.1 © NCC Education Limited, 2007

Database Systems - 8.1




International Diploma in Computer Studies

Computer Technology

**Session 8
Database Systems**

V1.1 © NCC Education Limited, 2007

Database Systems - 8.2




Session Contents

- Database Concepts
- Data Modelling
- Database Integrity
- Potential Database Applications

V1.1 © NCC Education Limited, 2007

Database Systems - 8.3




Basic Principles

- A database is a collection of related data
- A database may not necessarily require the use of a computer
- A database may consist of many files or tables where the data is linked to one another

V1.1 © NCC Education Limited, 2007

Database Systems - 8.4




DBMS - 1

- A DataBase Management System (DBMS) is a collection of computer programs designed to enable the efficient manipulation of data

V1.1 © NCC Education Limited, 2007

Database Systems - 8.5




DBMS - 2

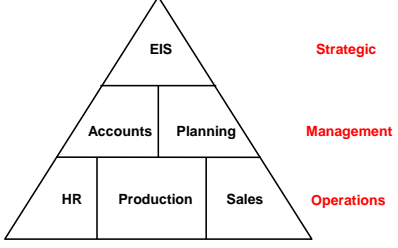
- The two primary goals of a DBMS are to provide a mechanism for:
 - data sharing
 - multiple views of data

V1.1 © NCC Education Limited, 2007

Database Systems - 8.6



Business Information Usage



Strategic

Management

Operations

V1.1 © NCC Education Limited, 2007

Database Systems - 8.7

Business Benefits of a DBMS

- Space
- Speed
- Manageability
- Integrity

V1.1 © NCC Education Limited, 2007

Database Systems - 8.8

Technical Benefits of a DBMS

- Data and application independence
- Uniform data management
- Application integration
- Can make effective use of current IT infrastructure
- Provides consistent support for innovation and change

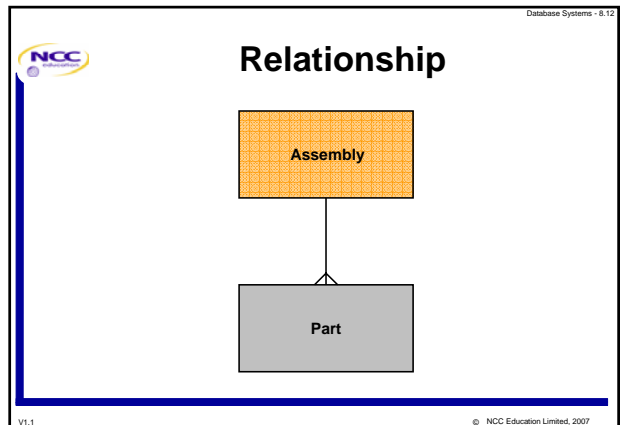
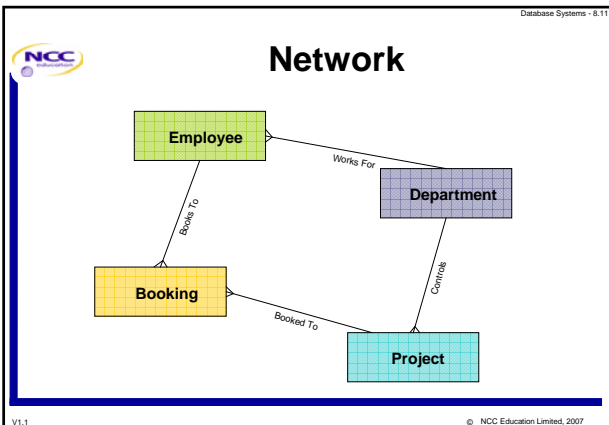
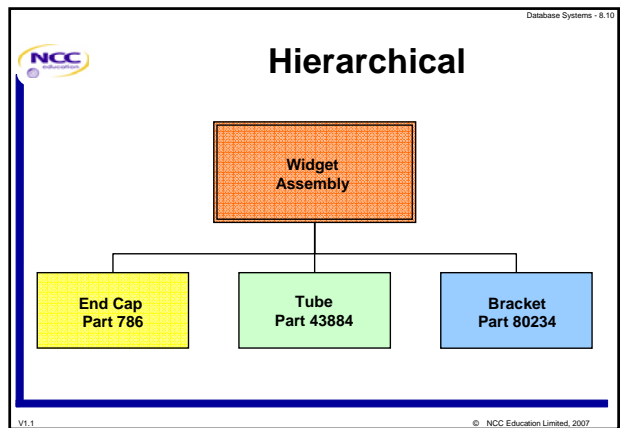
V1.1 © NCC Education Limited, 2007

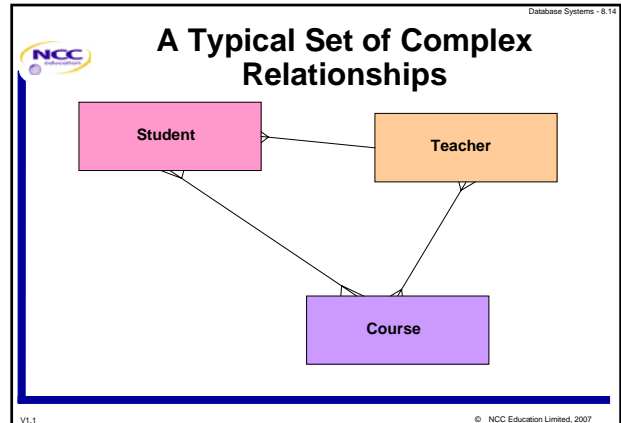
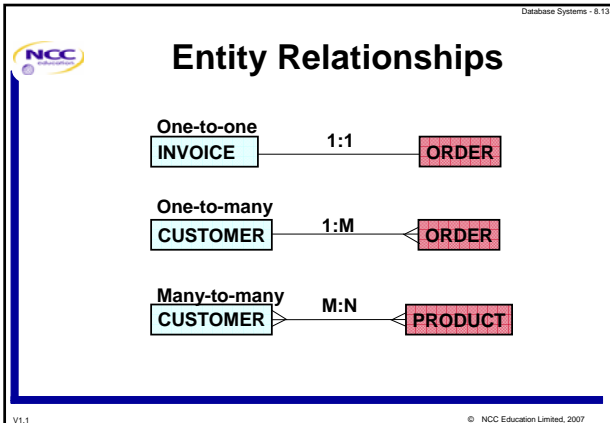
Database Systems - 8.9

Data Models

- There are basically three main types of data models in common usage:
 - Hierarchical
 - Network
 - Relational

V1.1 © NCC Education Limited, 2007





Relational Data Model - A Relation

Number	Description	Length	Head Size	Head Type	Product
2145	Bolt	75mm	16mm	Hex	
2147	Bolt	50mm	15mm	Square	
2150	Screw	25mm	5mm	Round	
2263	Washer	1mm	12mm	Round	
2719	Nut	5mm	12mm	Hex	

Relational Data Model - Links between Relations

Customer Number	Name	Address
12345	J Smith	High Street
15790	F Brown	Town Lane

Order Number	Customer Number	Date
04123	12345	23/4/1998
04199	15790	2/6/1998
04245	15790	9/9/1999
04271	12345	19/11/1999

Order Number	Product Number	Quantity
04123	2145	2000
04123	2263	2000
04199	2147	3000
04199	2150	6000
04245	2150	2500
04145	2263	1000
04271	2145	4000
04271	2263	5000
04271	2719	4500

Number	Description	Length	Head Size	Head Type	Product
2145	Bolt	75mm	16mm	Hex	
2147	Bolt	50mm	15mm	Square	
2150	Screw	25mm	5mm	Round	
2263	Washer	1mm	12mm	Round	
2719	Nut	5mm	12mm	Hex	


Transactions and Integrity - 1

- One of the key features of any DBMS is it should maintain the consistency of a database while changes are being made

Transactions and Integrity - 2

- Atomicity
- Consistency
- Isolation
- Durability

Database Systems - 8.19




Making Data Useful

- DBMS have a variety of tools to make effective use of the data stored in a database including:
 - a query language
 - a form designer
 - a report generator
 - analysis and charting features

V1.1 © NCC Education Limited, 2007

Database Systems - 8.20




Data Mining

- Typical Data Mining capabilities include:
 - data classification
 - cluster analysis
 - regression analysis
 - feature extraction

V1.1 © NCC Education Limited, 2007

Database Systems - 8.21




Database-Oriented Applications

- Enterprise Resource Planning (ERP) Systems
- Customer Relationship Management (CRM) Systems
- Financial and Management Information Systems

V1.1 © NCC Education Limited, 2007

Database Systems - 8.22




Summary

- Database Concepts
- Data Modelling
- Database Integrity
- Potential Database Applications

V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.1



International Diploma in Computer Studies


Computer Technology

Session 9
**Mobile Computing and
Communications**

V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.2




Session Contents

- The principles of mobile computing and communications
- Types of technologies
- Potential future developments in mobile data communications

V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.3




Principles of Mobile Computing

- The use of technology to allow users the freedom to work from anywhere at anytime
- Requires a sophisticated and comprehensive communications infrastructure
- Use of highly portable equipment

V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.4




Business Applications

- Paging
- Short Message Service (SMS)
- Mobile email
- Picture messaging
- Web browsing
- Mobile video
- Global Positioning System (GPS)
- Video on demand

V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.5




Business Benefits

- Increases flexibility and versatility
- Employees' time can be used more effectively
- More efficient use of data
- Can speed up various business processes




V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.6



Mobile Network Concerns

- Security 
- Bandwidth 
- Cost 

V1.1

© NCC Education Limited, 2007

Mobile Computing and Communications - 9.7

NCC Mobile Hardware Technology - 1

- Laptop PCs
 - about the size of a briefcase
 - portable
 - ‘clamshell’ design
 - fairly heavy at between 10 and 14 kgs




V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.8

NCC Mobile Hardware Technology - 2

- Notebook PCs
 - ‘clamshell’ design
 - same area as a sheet of A4 paper
 - highly portable weighing less than 3 kgs
 - less than 1 inch thick
 - extremely popular




V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.9

NCC Mobile Hardware Technology - 3

- Sub Notebooks (UMPCs)
 - ultra mobile pc
 - about the size of a typical paperback book
 - weighs less than 2 kgs
 - may have touch sensitive screen




V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.10

NCC Mobile Hardware Technology - 4

- Tablet PCs
 - same size as a Notebook or Sub Notebook PC
 - uses a stylus instead of a mouse
 - supports hand writing recognition
 - virtual onscreen keyboard




V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.11

NCC Mobile Hardware Technology - 5

- Personal Digital Assistants (PDAs)
 - also known as a handheld PC
 - fits in shirt or jacket pocket
 - uses a stylus instead of a mouse
 - supports hand writing recognition
 - virtual onscreen keyboard
 - weighs just 133 grams



V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.12

NCC Mobile Hardware Technology - 6

- Smartphones
 - similar to a PDA but based on mobile phone technology
 - features a tiny keyboard or phone keypad
 - can support stylus
 - various designs




V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.13

Docking Station

- Designed to enable a portable device to be used as a desktop PC



Source: Kensington Technology Group

V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.14

Mobile Data Services

- Wireless Application Protocol (WAP)
- General Packet Radio Service (GPRS)
- 3rd Generation (3G)
- Satellite

V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.15

The Future of Mobile Computing

- Worldwide Interoperability for Microwave Access (WiMax)
- Ultra Wide Band (UWB)

V1.1 © NCC Education Limited, 2007

Mobile Computing and Communications - 9.16

Summary

- The principles of mobile computing and communications
- Types of technologies
- Potential future developments in mobile data communications

V1.1 © NCC Education Limited, 2007