



# **International Diploma in Computer Studies**

## **Computer Technology**

### **Session 6 Multimedia**



# Session Contents

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



# The Next Big Thing...

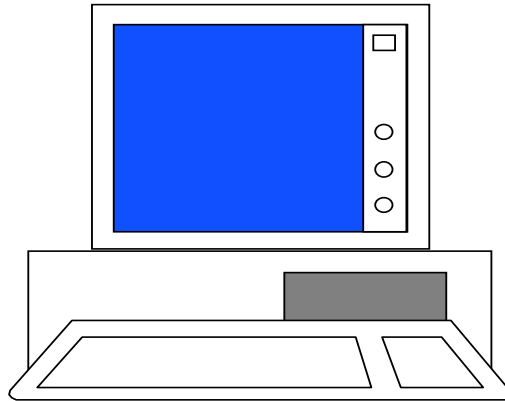
**“whole tectonic plates moving before our eyes... our seismographs tell us this is a Big One that is rearranging faster than we imagined the borders of the business world”**

**Source: Salomon Bros. report**

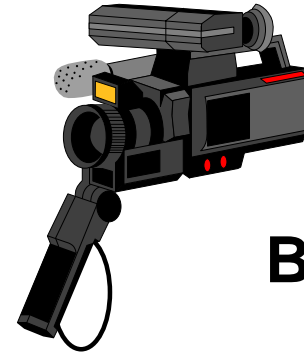


# Multimedia is a Convergence of ....

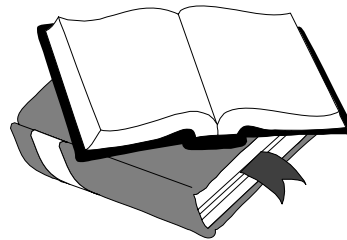
**Computing**



**Broadcasting**

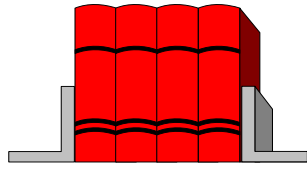


**Publishing**





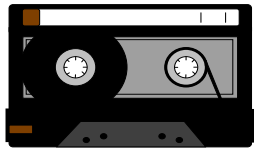
# What is Multimedia?



**Text**



**Video**



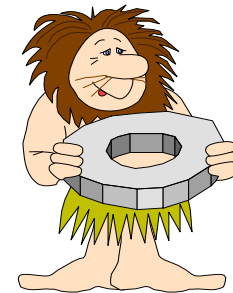
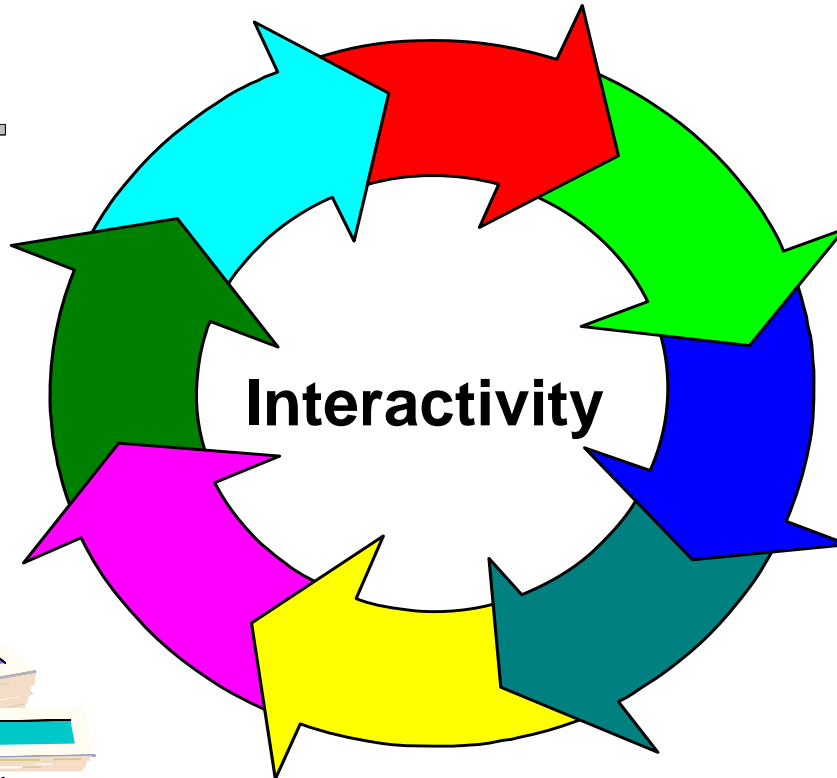
**Audio**



**Graphics**



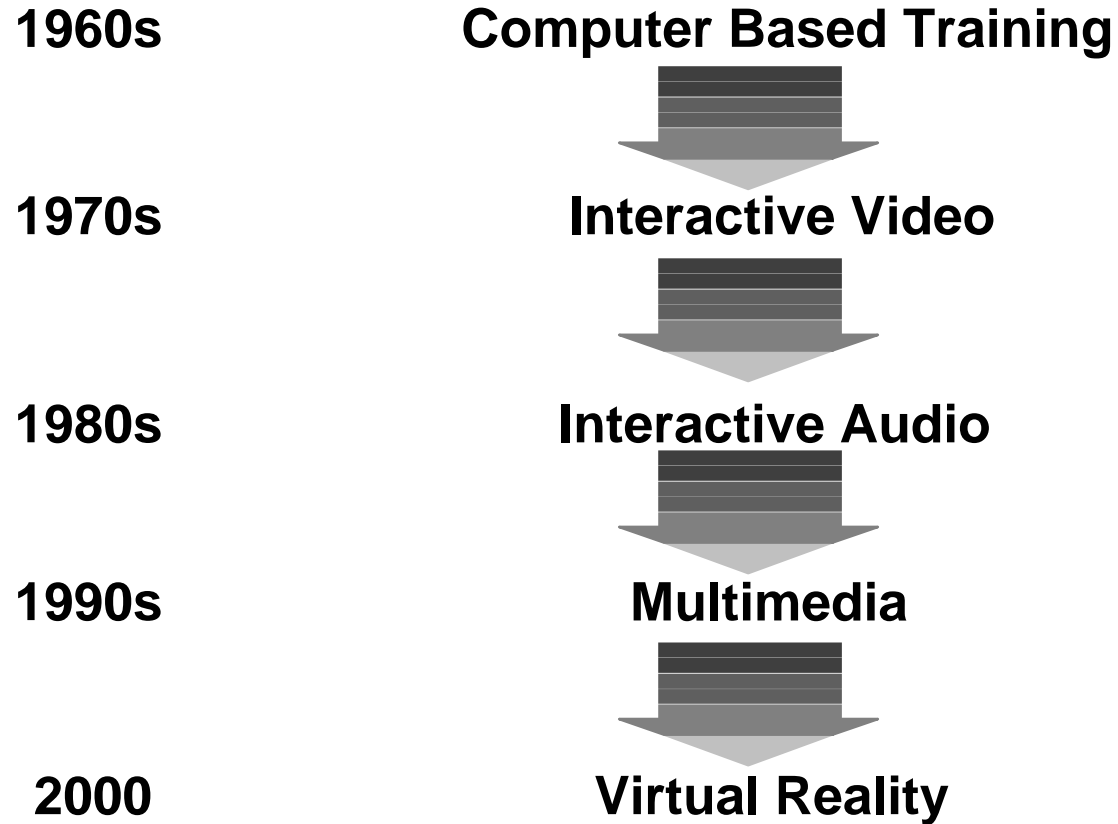
**Still pictures**



**Animation**



# Developments in Multimedia



# Multimedia Platform

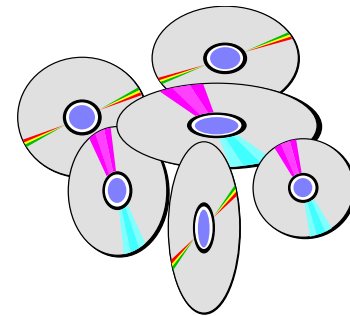
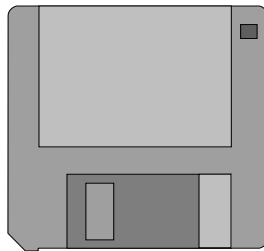
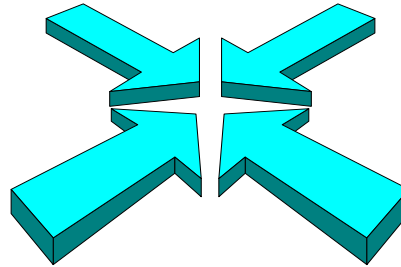
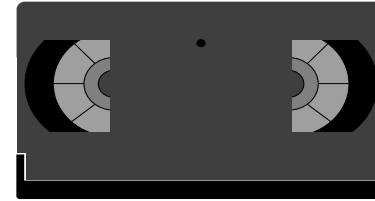
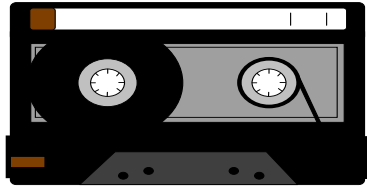
## Exercise:

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



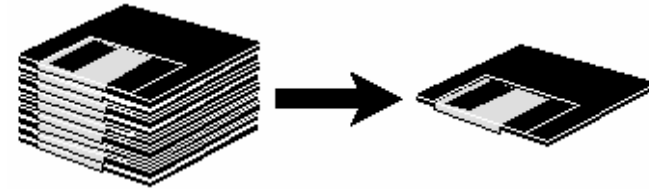


# Storage Media



# Compression

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





# Exercise - Compression

**What is meant by:**

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



# Storage Media Progression

**Magnetic Tape**



**Floppy Disk**



**CD-ROM**



**DVD-ROM**



**HD-DVD + BluRay**



# The Multimedia Business

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

**Source: Newsweek**



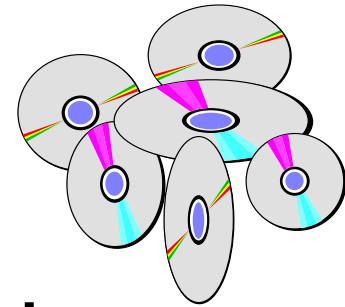
# Business Benefits

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

# Multimedia Cost Elements



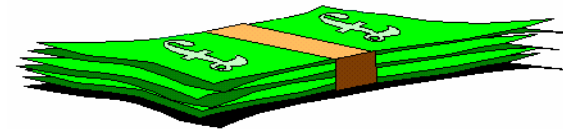
**Design and development**



**Pressing**



**Delivery platform**



**Royalties**



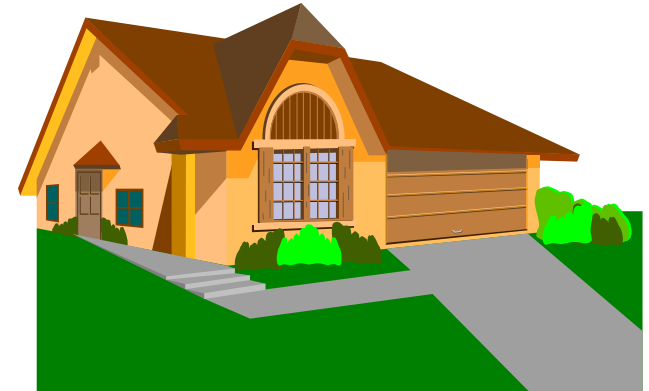
# Three Main Sectors for Multimedia



**Business**



**Education**



**Home**



# Multimedia in Business and Industry



- Training
- Kiosks
- The Internet

## Sectors

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



# Quote

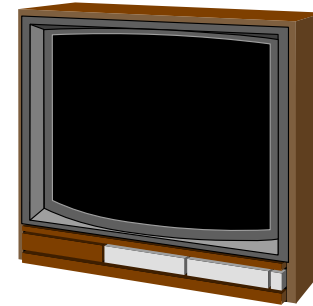
**“ Technological literacy must become the standard in our country. Preparing children for a lifetime of computer use is just as essential today as teaching them the basics of reading, writing and arithmetic.”**

**Source: Bill Clinton, President, United States of America**

# Multimedia in the Home



**Armchair**



**Desktop**



# 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



# Summary

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



# **International Diploma in Computer Studies**

**Computer Technology**

**Session 7**

**Software Engineering**



# Session Contents

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



# 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**



# History of Software Engineering - 1

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



# History of Software Engineering - 2

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



# Basic Software Development Processes

- **Design**
- **Construction**
- **Testing**
- **Maintenance**



# 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**



# 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**



# Testing - 1

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



# 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



# Testing - 3

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



# 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**



# Categories of Software Maintenance

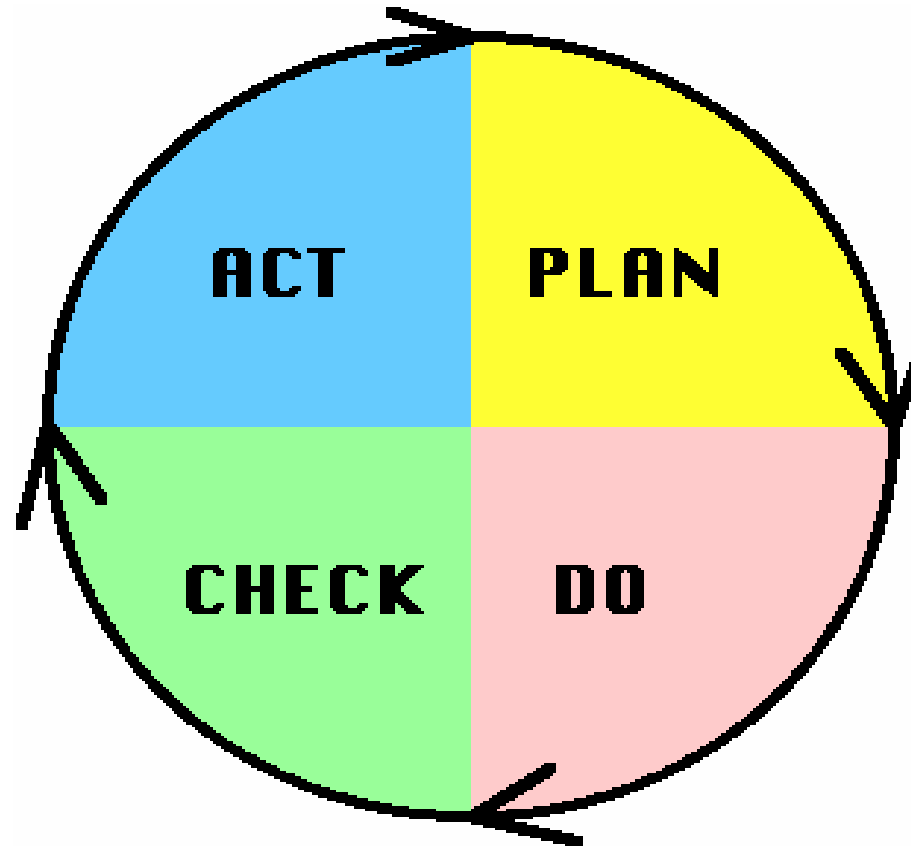
- **Corrective**
  - reactive modification to correct discovered problems
- **Adaptive**
  - modification to keep it usable in a changed or changing environment
- **Perfective**
  - improve performance or maintainability
- **Preventive**
  - modification to detect and correct latent faults



# Related Disciplines

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

# The Shewhart (Deming) Cycle



Source: The Balanced Scorecard Institute



# 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



# Usability and Ergonomics

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



# The Future of Software Engineering - 1

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



# The Future of Software Engineering - 2

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



# Summary

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



# **International Diploma in Computer Studies**

## **Computer Technology**

### **Session 8**

## **Database Systems**



# Session Contents

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



# 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**



# DBMS - 1

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

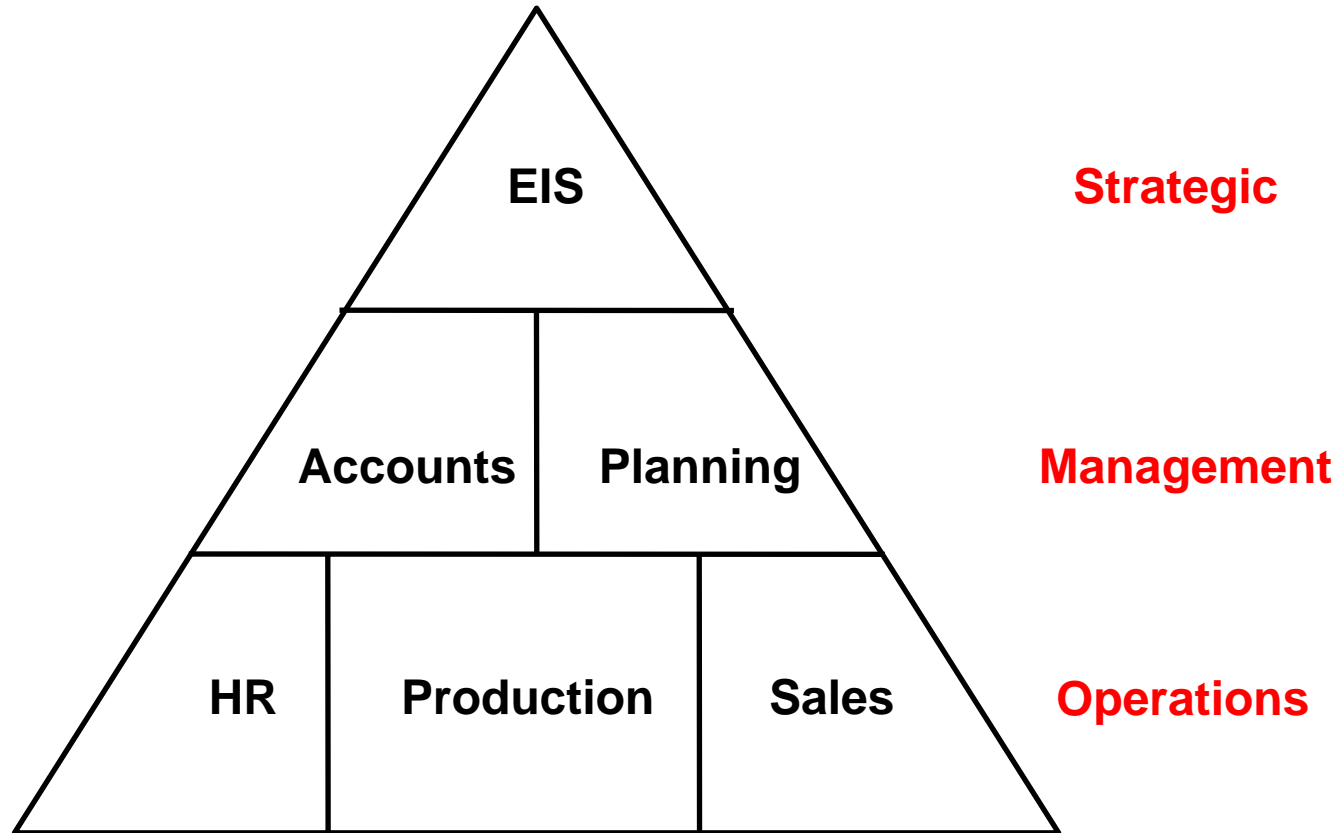


# DBMS - 2

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



# Business Information Usage





# Business Benefits of a DBMS

- **Space**
- **Speed**
- **Manageability**
- **Integrity**



# Technical Benefits of a DBMS

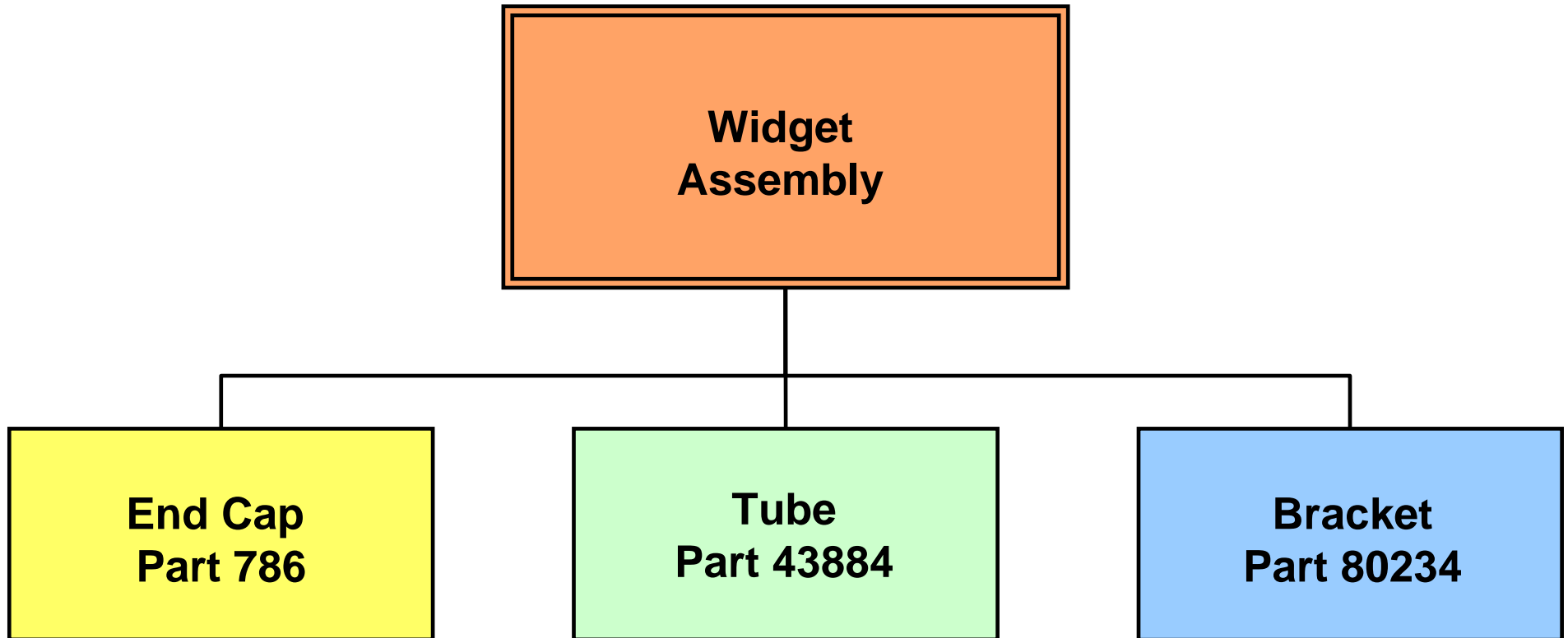
- **Data and application independence**
- **Uniform data management**
- **Application integration**
- **Can make effective use of current IT infrastructure**
- **Provides consistent support for innovation and change**



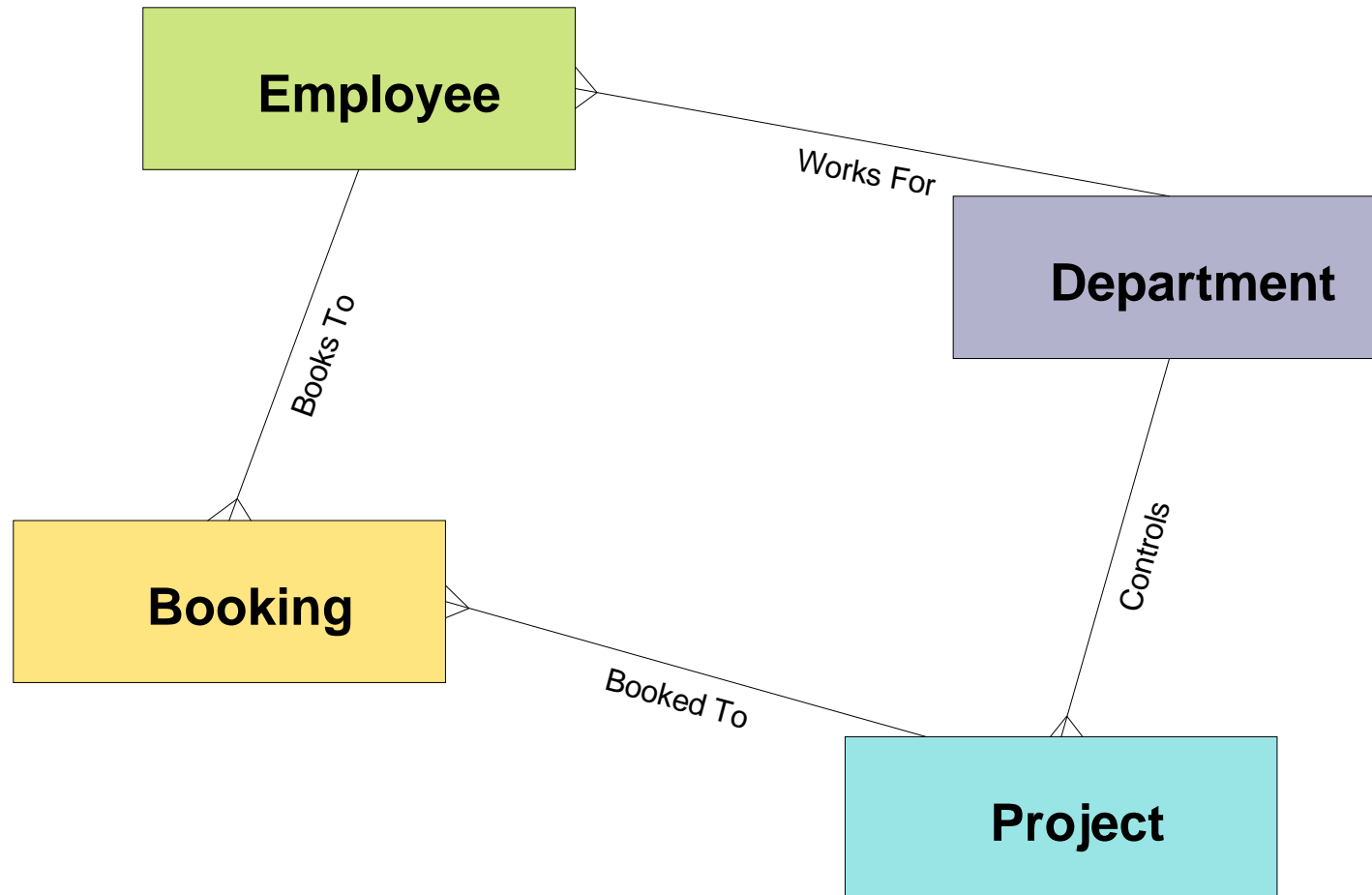
# Data Models

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

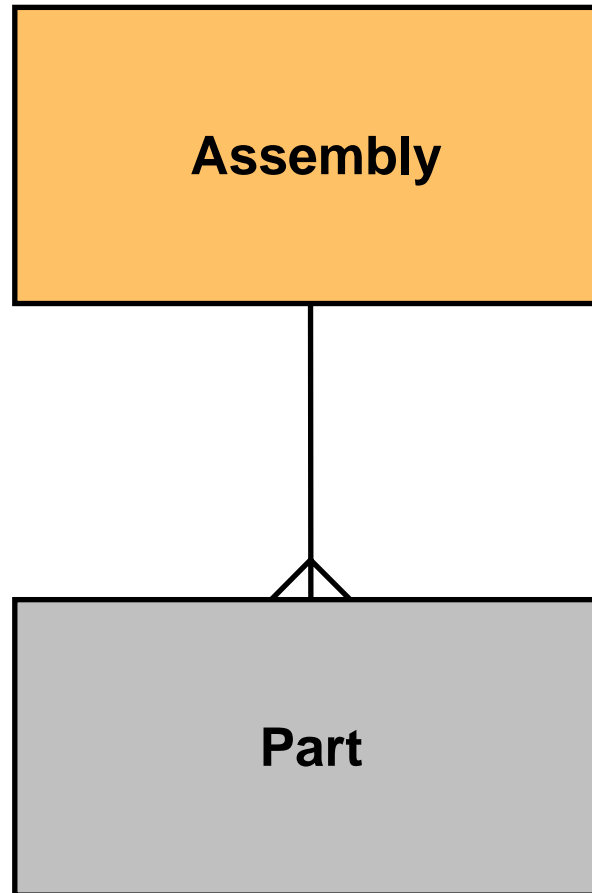
# Hierarchical



# Network

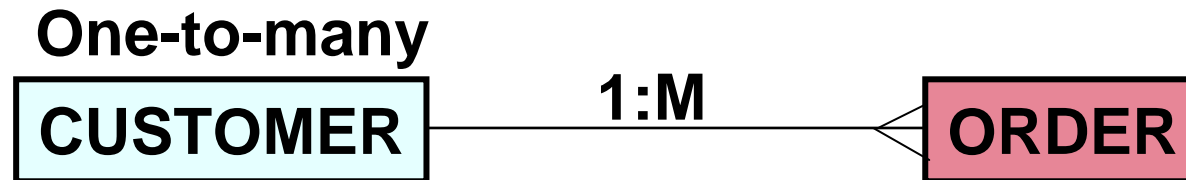
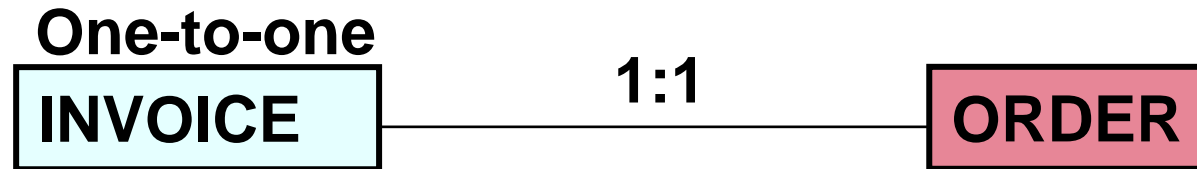


# Relationship



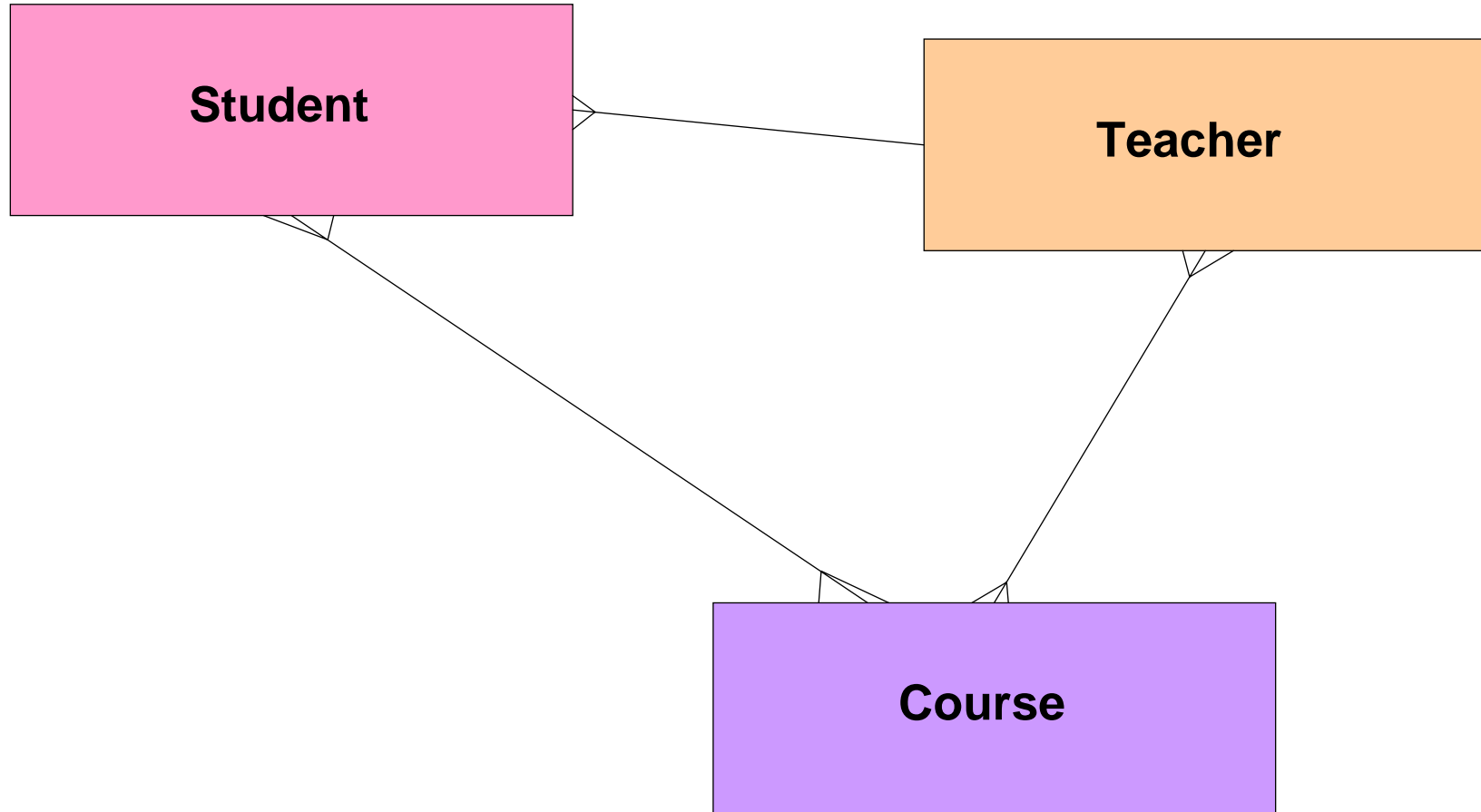


# Entity Relationships





# A Typical Set of Complex Relationships





# 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

Customer

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

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

Order-line

Product

Number	Description	Length	Head Size	Head Type
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**



# 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



# Data Mining

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



# Database-Oriented Applications

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



# Summary

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



# **International Diploma in Computer Studies**

## **Computer Technology**

### **Session 9**

## **Mobile Computing and Communications**



# Session Contents

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



# 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**



# Business Applications

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



# Business Benefits

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



# Mobile Network Concerns

- **Security**



- **Bandwidth**



- **Cost**





# Mobile Hardware Technology - 1

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





# 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





# 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





# 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





# 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





# 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



# Docking Station

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



Source: Kensington Technology Group



# Mobile Data Services

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



# The Future of Mobile Computing

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



# Summary

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