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Database Design and Development

Topic 1:
Introduction to the Module

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Introduction to the Module Topic 1 - 1.2

Scope and Coverage

This topic will cover:

- Introduction to the module
- Review of key material from level 4 databases module
- Common uses of databases
- Types of databases
- Overview of database development

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Introduction to the Module Topic 1 - 1.3

Learning Outcomes

By the end of this topic students will be able to:

- Understand which topics will be covered in the module
- Recognise key material from the Level 4 Databases module
- Outline common uses of databases and different types of databases
- Give an overview of database development

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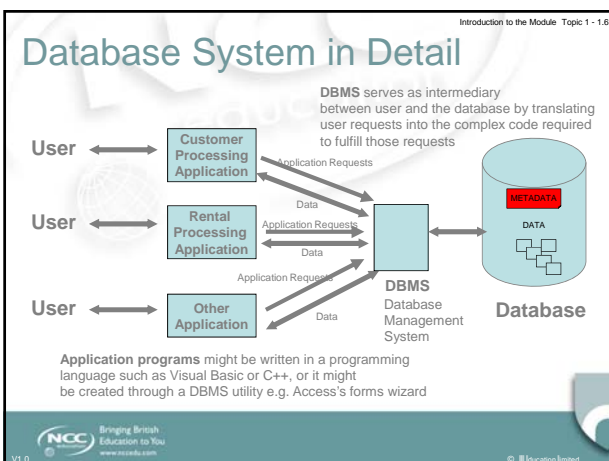
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Overview of the Module

1	Introduction to the Module
	Key concepts in databases and database development
2	Enhancing Design 1
3	Enhancing Design 2
4	Data Retrieval 1
5	Data Retrieval 2
6	Physical Design 1
7	Physical Design 2
8	Physical Design 3
9	Physical Design 4
10	Distributed Databases
11	Data Warehouses
12	Summary

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- Introduction to the Module Topic 1 - 1.5
- ## Pedagogic Approach
- Lectures...
 - Workshops...
 - Self-study...
 - Tutorials...
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Common Types of Database Systems

- Transaction processing systems
- Management Information Systems
- Data Warehouses
- Distributed Daabases

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Common Uses of Database Systems

- Purchasing from supermarkets
- Using a credit card
- Booking a holiday
- Using a library
- Taking out insurance
- Using the Internet

What others can you think of?

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Activity: Entity Relationship Modeling

- Give a definition of the following:
 - Entity
 - Attribute
 - Relationship

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Activity: Draw an ER model

- Draw an ER model for the following scenario:
- A student record system contains data about the students at a college, the modules they are taking and the course they are enrolled on. Each course can have many modules; a student will take many modules. A student will be enrolled on one course only.

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ER Solution

```
graph TD; STUDENT[STUDENT] --- |"1 to 0..*"| STUDENT_MODULE[STUDENT MODULE]; COURSE[COURSE] --- |"1 to 0..*"| MODULE[MODULE]; STUDENT_MODULE --- |"0..* to 1"| MODULE;
```

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Activity - Metadata


- What is metadata?
- What are data types?
- Define metadata for an entity in:
 - Student record system
 - Car hire system
 - Holiday booking system

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Key Concepts of Relational Model

- Relations and tables
- Attribute
- Domain
- Tuples and rows
- Primary Key
- Foreign Key


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Database Design and Development

- Development involves the whole life cycle of the project to elicit the user requirements and produce the database, applications and the supporting hardware and software.
- Design focuses on producing the actual database once the requirements have been gathered


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Requirements Gathering

- Part of Systems Analysis
- Understanding what it is that the users want...
- A whole topic in itself!

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Database Design


- “The process of creating a design that will support the enterprise’s mission statement and mission objectives for the required database system.”
Connolly and Begg

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Phases of Database Design


- Conceptual database design
- Logical database design
- Physical database design

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Database Design and our Topics

1	Introduction to the Module
	Key concepts in databases and database development
2	Enhancing Design 1 CONCEPTUAL AND LOGICAL
3	Enhancing Design 2 CONCEPTUAL AND LOGICAL
4	Data Retrieval 1
5	Data Retrieval 2
6	Physical Design 1 PHYSICAL
7	Physical Design 2 PHYSICAL
8	Physical Design 3 PHYSICAL
9	Physical Design 4 PHYSICAL
10	Distributed Databases
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Conceptual Database Design

- “The process of constructing a model of the data used in an enterprise, independent of all physical considerations.”


Connolly and Begg

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Activity - Why do Conceptual Design?

- What is the purpose of doing design that doesn't take account of the eventual implementation, ignores the data model, ignores the software that will be used?


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Logical Database Design

- “The process of constructing a model of the data used in an enterprise based on a specific data model, but independent of a particular DBMS and other physical considerations.”


Connolly and Begg

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Difference between Conceptual and Logical Design

- Conceptual design is independent of data model and target DBMS
- Logical model takes account of data model (but not DBMS)
- Thus in logical design we know we are dealing with, for example, a relational model


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Logical Model Uses...

- Normalisation
- Ensures that relations derived from the data model do not display data redundancy, which can cause update anomalies.

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Physical Database Design

- “The process of producing a description of the implementation of the database on secondary storage; it describes the base relations, file organisations, and indexes used to achieve efficient access to the data, and any associated integrity constraints and security measures.”

Connolly and Begg

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Additional Aspects of Development

- DBMS selection
- Application design
- Transaction design
- User interface issues
- Implementation
- Data conversion
- Testing


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Learning Outcomes - Revisted

By the end of this unit students will be able to:


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- Outline common uses of databases and different types of databases
- Give an overview of database development

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