Grade 13 A/L ICT · Lesson 8

8.1 Data, Information and Database Models

Syllabus 8.1. A database lets an organisation store data **once** and use it **many times**. In this part you separate **data** from **information**, **structured** from **unstructured** data, define a **database**, and compare the five **database models**: flat file, hierarchical, network, relational and object relational.

1. Data and information

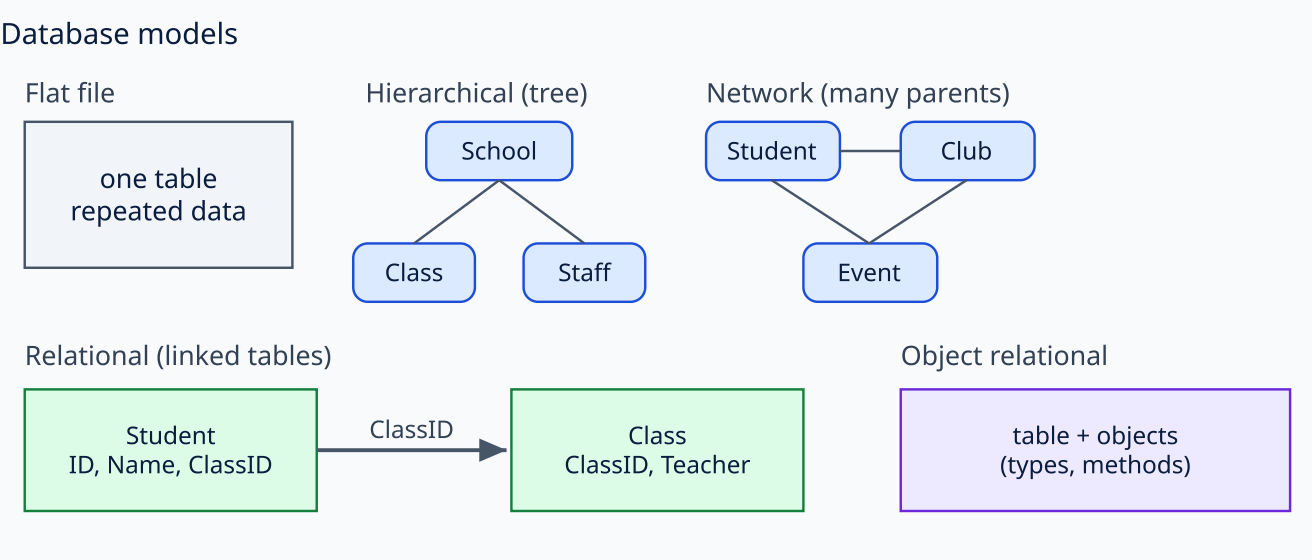
Data are raw facts such as 78, “Nimal” or 2026-03-01. **Information** is data that has been processed so it has meaning, for example “Nimal scored 78 in ICT, above the class average of 62.4”.

Structured data	Unstructured data
Fixed fields and types (rows and columns)	No fixed format
Marks table, bank transactions	Emails, photos, videos, voice notes
Easy to search with SQL	Needs special tools to search

2. What is a database?

A **database** is an organised collection of **logically related data**, stored so that many users and programs can share it. It reduces **redundancy** (repeated data), avoids **inconsistency**, and supports security, backup and fast searching.

3. Database models



The five database models

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Flat file
One table or text file; simple but data is repeated.

Hierarchical
Tree: each child has one parent (one-to-many).

Network
Graph: a record can have many parents (many-to-many).

Relational
Tables linked by keys; queried with SQL.

Object relational
Relational tables plus objects, user types and methods.

Feature	Hierarchical	Network	Relational
Structure	Tree	Graph	Tables
Relationships	1:N only	M:N	Any, through keys
Flexibility	Low	Medium	High
Query	Follow the path	Follow pointers	SQL

🧱 **Worked example: A school keeps marks in three spreadsheets. Nimal's class is stored in each one. What problems appear and which model fixes them?**
The class is stored **3 times** (redundancy). If Nimal changes class and only one file is updated, the files disagree (**inconsistency**). A **relational database** stores the class **once** in a Student table and links Marks by StudentID.

💡 Hierarchical = one parent; network = many parents; relational = tables and keys.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 many apps also use NoSQL document and vector databases for AI search, but school exams test the relational model.

Key Words

Data – Raw facts without context.

Information – Processed data with meaning.

Structured data – Data in fixed fields such as rows and columns.

Unstructured data – Data with no fixed format such as video or email.

Database – Organised collection of logically related shared data.

Redundancy – The same data stored more than once.

Inconsistency – Copies of the same data that disagree.

Flat file – Single table or file holding all data.

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Hierarchical model – Tree model where each child has one parent.

Network model – Model where a record may have many parents.

Relational model – Model of tables linked by key values.

Object relational model – Relational model extended with objects and user types.

Sample Q&A

1. Distinguish data and information.

> **Answer:** Data are raw facts; information is processed data with meaning, e.g. 78 vs “78 is above average”.

2. Give two examples of unstructured data.

> **Answer:** Photos and emails (also videos, voice notes).

3. Define a database.

> **Answer:** An organised collection of logically related data shared by many users.

4. Why is a database better than separate files?

> **Answer:** Less redundancy, consistent data, sharing, security and easy searching.

5. How does the network model differ from the hierarchical model?

> **Answer:** Hierarchical allows one parent per record; network allows many parents (M:N).

6. What does the object relational model add?

> **Answer:** Objects, user-defined types and methods on top of relational tables.

MCQ

1. Raw facts without meaning are

A. knowledge
B. a report
C. data
D. a query
E. information

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2. “Average ICT mark is 62.4” is an example of

A. raw data
B. a field name
C. a primary key
D. unstructured data
E. information

3. Which is unstructured data?

A. a recorded video lesson
B. a marks table
C. a bank transaction table
D. a timetable grid
E. an invoice row

4. Storing the same class name in three files causes

A. compression
B. encryption
C. normalisation
D. redundancy
E. indexing

5. A model where each child record has exactly one parent is

A. network
B. flat file
C. hierarchical
D. relational
E. object relational

6. A model where a record can have many parents is

A. flat file
B. network
C. tree
D. sequential
E. hierarchical

7. Tables linked by key values form the

A. relational model
B. flat file
C. network model
D. hierarchical model
E. spreadsheet model

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8. Adding user-defined types and methods to tables gives the

A. flat file model
B. hierarchical model
C. object relational model
D. network model
E. file system

9. Which term means: “Raw facts without context”?

A. Structured data
B. Redundancy
C. Relational model
D. Flat file
E. Data

10. Which term means: “Processed data with meaning”?

A. Inconsistency
B. Information
C. Unstructured data
D. Object relational model
E. Hierarchical model

11. Which term means: “Data in fixed fields such as rows and columns”?

A. Flat file
B. Database
C. Network model
D. Data
E. Structured data

12. Which term means: “Data with no fixed format such as video or email”?

A. Relational model
B. Hierarchical model
C. Information
D. Unstructured data
E. Redundancy

13. Which term means: “Organised collection of logically related shared data”?

A. Object relational model
B. Structured data
C. Inconsistency
D. Database
E. Network model

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14. Which term means: “The same data stored more than once”?

A. Redundancy
B. Unstructured data
C. Relational model
D. Data
E. Flat file

15. Which term means: “Copies of the same data that disagree”?

A. Inconsistency
B. Database
C. Information
D. Object relational model
E. Hierarchical model

16. Which term means: “Single table or file holding all data”?

A. Data
B. Structured data
C. Redundancy
D. Network model
E. Flat file

17. Which term means: “Tree model where each child has one parent”?

A. Relational model
B. Hierarchical model
C. Unstructured data
D. Information
E. Inconsistency

18. Which term means: “Model where a record may have many parents”?

A. Database
B. Structured data
C. Network model
D. Flat file
E. Object relational model

19. Which term means: “Model of tables linked by key values”?

A. Hierarchical model
B. Relational model
C. Redundancy
D. Data
E. Unstructured data

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20. Which term means: “Relational model extended with objects and user types”?

A. Inconsistency
B. Network model
C. Information
D. Object relational model
E. Database

Structured Questions

1. Distinguish data and information with a school example. *(3 marks)*

> Data raw marks; information processed; example average or rank.

2. Compare structured and unstructured data (two points each). *(3 marks)*

> Fixed fields vs no format; table vs video; easy SQL search vs special tools.

3. List three advantages of a database over separate files. *(3 marks)*

> Less redundancy; consistency; sharing and security.

4. Describe the hierarchical and network models with a diagram. *(3 marks)*

> Tree one parent; graph many parents; diagram.

5. Why is the relational model the most widely used? *(3 marks)*

> Simple tables; flexible relationships through keys; SQL standard.

Summary

- Data are raw facts; information has meaning.
- Structured data fits rows and columns.
- A database stores related data once and shares it.
- Hierarchical: one parent; network: many parents.
- Relational tables are linked by keys and queried with SQL.

MCQ answer key – 8.1

1. **C** – Data.
2. **E** – Processed data.
3. **A** – No fixed fields.
4. **D** – Repeated data.
5. **C** – Tree.
6. **B** – Graph.
7. **A** – Relational.

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8. **C** – Object relational.
9. **E** – Data – Raw facts without context.
10. **B** – Information – Processed data with meaning.
11. **E** – Structured data – Data in fixed fields such as rows and columns.
12. **D** – Unstructured data – Data with no fixed format such as video or email.
13. **D** – Database – Organised collection of logically related shared data.
14. **A** – Redundancy – The same data stored more than once.
15. **A** – Inconsistency – Copies of the same data that disagree.
16. **E** – Flat file – Single table or file holding all data.
17. **B** – Hierarchical model – Tree model where each child has one parent.
18. **C** – Network model – Model where a record may have many parents.
19. **B** – Relational model – Model of tables linked by key values.
20. **D** – Object relational model – Relational model extended with objects and user types.

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