Grade 12 A/L ICT · Lesson 7

7.6 Requirement Analysis and Analysis Tools: DFD, LDS and BSO

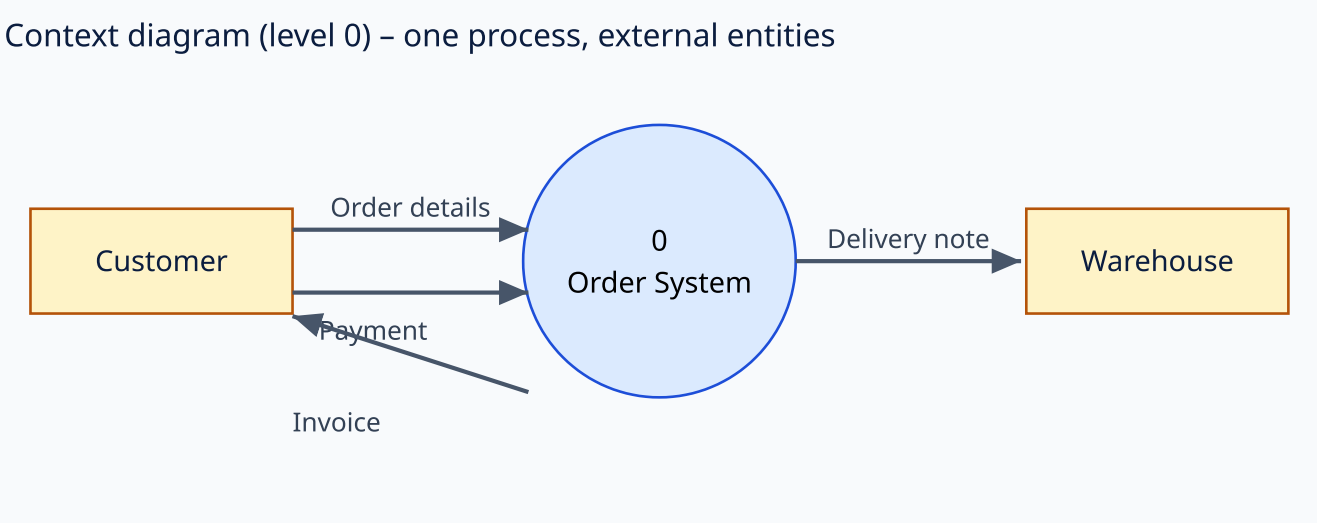
Syllabus 7.6. To understand the current system, analysts gather **functional** and **non-functional requirements** (IEEE style "The system shall…") and use analysis tools: **business activity model**, **data flow diagrams** (context and level 1), **elementary process descriptions**, **document flow diagrams** and the **logical data structure**. Finally they propose and select **business system options (BSO)**.

1. Requirements

Type	Meaning	IEEE-style example
Functional	What the system must do	The system shall issue a receipt for each payment.
Non-functional	How well it must do it (quality)	The system shall respond within 2 seconds for 50 users.

2. Data flow diagrams

DFD symbols: **external entity** (source/sink, square), **process** (rounded box, numbered), **data store** (open box, D1), **data flow** (named arrow). The **context diagram** (level 0) shows the whole system as one process; **level 1** splits it into main processes; processes that cannot be split further are **elementary processes**, each written up as an **EPD**.



Context diagram of an order system

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🧱 **Worked example: Level 1 of the order system has processes 1 Record order, 2 Check stock, 3 Take payment, 4 Issue invoice. Is it balanced with the context diagram?**
Context inputs = {Order details, Payment}, outputs = {Delivery note, Invoice}. Level 1 external inputs = {Order details, Payment}, outputs = {Delivery note, Invoice}. They match, so the DFD is **balanced**. Level 1 has **4 processes**.

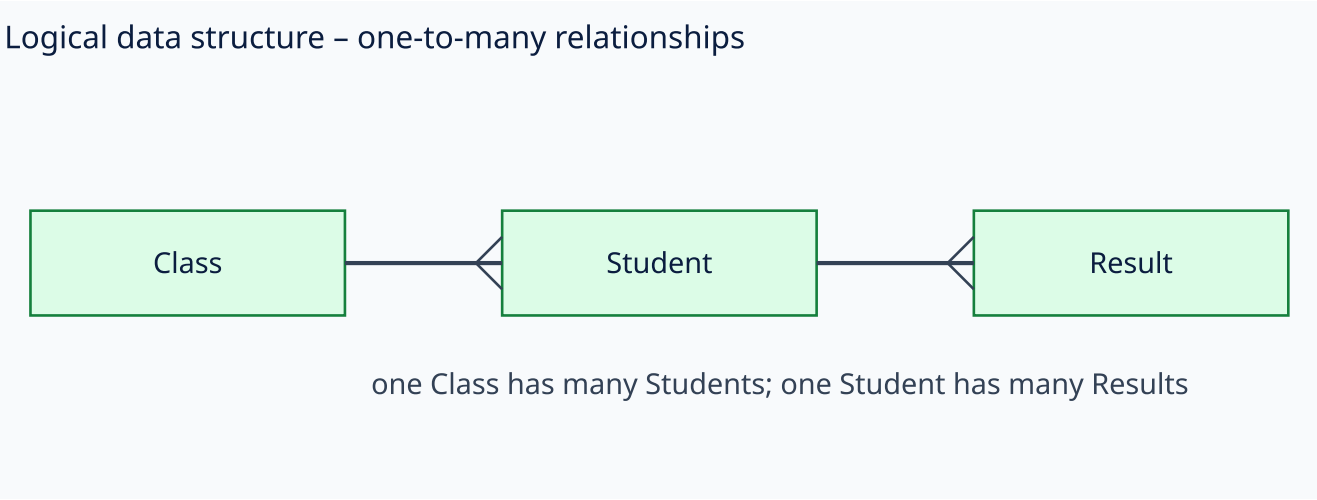
3. Other tools

Business activity model
Shows business activities and events, without technology.

Document flow diagram
Shows how paper/electronic documents move between people.

Logical data structure
Entities and their relationships (e.g. one-to-many).

BSO
2–3 options (minimum, medium, full) with costs; users choose one.



Logical data structure

Elementary process description

```
PROCESS 1 Record order
  READ order details from Customer
  IF customer exists THEN
     WRITE order to D1 Orders
  ELSE
     REJECT order
  ENDIF
END PROCESS
```

💡 A DFD shows data movement, not timing or decisions – no loops or IF arrows.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* In 2026 analysts often generate first-draft DFDs and user stories with AI tools, then check them with users.

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Key Words

Functional requirement – What the system must do.

Non-functional requirement – Quality such as speed, security, usability.

Data flow diagram – Diagram of data moving between processes, stores and entities.

Context diagram – Level 0 DFD showing the system as one process.

External entity – Source or receiver of data outside the system.

Data store – Place where data is held in a DFD.

Elementary process – Lowest-level process not split further.

Elementary process description – Short logic description of an elementary process.

Document flow diagram – Shows movement of documents between people.

Logical data structure – Entities and relationships of stored data.

Business activity model – Model of business activities and events.

Business system options – Alternative scopes proposed for the new system.

Sample Q&A

1. Why is requirement analysis needed?

> **Answer:** To capture exactly what users need before design, avoiding costly changes later.

2. Functional vs non-functional?

> **Answer:** Functional: what it does; non-functional: how well (speed, security).

3. Name the four DFD symbols.

> **Answer:** External entity, process, data store, data flow.

4. What is a context diagram?

> **Answer:** A level 0 DFD with the whole system as one process and its external entities.

5. What is DFD balancing?

> **Answer:** Inputs and outputs of a parent process equal those of its child diagram.

6. Why propose BSOs?

> **Answer:** To let management choose scope and cost of the new system.

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MCQ

1. “The system shall print a receipt” is a

A. data store
B. functional requirement
C. non-functional requirement
D. test case
E. external entity

2. “Response within 2 seconds” is a

A. functional requirement
B. process
C. data flow
D. BSO
E. non-functional requirement

3. A level 0 DFD is called a

A. EPD
B. document flow diagram
C. Gantt chart
D. context diagram
E. LDS

4. In a DFD, a Customer outside the system is a

A. elementary process
B. process
C. external entity
D. data dictionary
E. data store

5. Level 1 in the example has

A. 4 processes
B. 1 process
C. 3 processes
D. 6 processes
E. 0 processes

6. A DFD is balanced when

A. there are no data stores
B. all flows are unnamed
C. parent and child have the same external inputs and outputs
D. every process has a loop
E. it has exactly 7 processes

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7. Entities and one-to-many links are shown in an

A. LDS
B. EPD
C. Gantt chart
D. document flow only
E. context diagram

8. A process that is not split further is

A. an external entity
B. a data store
C. a BSO
D. a context diagram
E. an elementary process

9. Which term means: “What the system must do”?

A. Data store
B. Business activity model
C. Data flow diagram
D. Functional requirement
E. Elementary process description

10. Which term means: “Quality such as speed, security, usability”?

A. Elementary process
B. Document flow diagram
C. Context diagram
D. Business system options
E. Non-functional requirement

11. Which term means: “Diagram of data moving between processes, stores and entities”?

A. Logical data structure
B. Data flow diagram
C. Elementary process description
D. External entity
E. Functional requirement

12. Which term means: “Level 0 DFD showing the system as one process”?

A. Context diagram
B. Non-functional requirement
C. Document flow diagram
D. Data store
E. Business activity model

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13. Which term means: “Source or receiver of data outside the system”?

A. Logical data structure
B. External entity
C. Business system options
D. Elementary process
E. Data flow diagram

14. Which term means: “Place where data is held in a DFD”?

A. Context diagram
B. Functional requirement
C. Data store
D. Business activity model
E. Elementary process description

15. Which term means: “Lowest-level process not split further”?

A. Document flow diagram
B. Business system options
C. Non-functional requirement
D. Elementary process
E. External entity

16. Which term means: “Short logic description of an elementary process”?

A. Elementary process description
B. Data store
C. Functional requirement
D. Logical data structure
E. Data flow diagram

17. Which term means: “Shows movement of documents between people”?

A. Elementary process
B. Non-functional requirement
C. Document flow diagram
D. Context diagram
E. Business activity model

18. Which term means: “Entities and relationships of stored data”?

A. External entity
B. Logical data structure
C. Data flow diagram
D. Elementary process description
E. Business system options

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19. Which term means: “Model of business activities and events”?

A. Functional requirement
B. Data store
C. Document flow diagram
D. Business activity model
E. Context diagram

20. Which term means: “Alternative scopes proposed for the new system”?

A. Elementary process
B. Non-functional requirement
C. Logical data structure
D. External entity
E. Business system options

Structured Questions

1. Define functional and non-functional requirements with IEEE-style examples. *(2 marks)*

> Functional “shall issue receipt”; non-functional “shall respond in 2 s”.

2. Name and draw the four DFD symbols. *(4 marks)*

> Entity square; process rounded; store open box; flow named arrow.

3. Explain context and level 1 DFDs. *(2 marks)*

> Context: one process + entities; level 1: main processes, stores, flows.

4. Check balancing for the order system. *(3 marks)*

> Context in {Order details, Payment}, out {Invoice, Delivery note}; level 1 same; balanced.

5. What are BSOs and how is one chosen? *(2 marks)*

> 2–3 options of different scope/cost; management selects after comparing benefits.

Summary

- Functional = what; non-functional = how well.
- DFD: entity, process, store, flow.
- Context → level 1 → elementary processes + EPDs.
- LDS shows entities and relationships.
- BSOs give options; one is selected.

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MCQ answer key – 7.6

1. **B** – What it does.
2. **E** – Quality.
3. **D** – Context.
4. **C** – Entity.
5. **A** – Count.
6. **C** – Same flows.
7. **A** – LDS.
8. **E** – Elementary.
9. **D** – Functional requirement – What the system must do.
10. **E** – Non-functional requirement – Quality such as speed, security, usability.
11. **B** – Data flow diagram – Diagram of data moving between processes, stores and entities.
12. **A** – Context diagram – Level 0 DFD showing the system as one process.
13. **B** – External entity – Source or receiver of data outside the system.
14. **C** – Data store – Place where data is held in a DFD.
15. **D** – Elementary process – Lowest-level process not split further.
16. **A** – Elementary process description – Short logic description of an elementary process.
17. **C** – Document flow diagram – Shows movement of documents between people.
18. **B** – Logical data structure – Entities and relationships of stored data.
19. **D** – Business activity model – Model of business activities and events.
20. **E** – Business system options – Alternative scopes proposed for the new system.

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