DES329: System Analysis and Design

Midterm Mock Exam

curated by The Peanuts

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Conditions: Closed Book

Directions:

1. This exam contains 13 pages (including this one). If yours has fewer, you may have discovered a scope creep into the wrong exam packet.
2. Write your name clearly at the top.
3. Show your work and reasoning. Partial credit is real — this isn't a black-hole process.
4. You may not use any books, notes, or external reference materials. You may not use your neighbor's data store or any unauthorized external entity.
5. For written questions involving diagrams, label every arrow clearly. An unlabeled data flow is a gray hole waiting to happen.

For solution, ***click here****.*

Part I: Multiple Choice

*Choose the **best** answer for each question. Each question is worth 2 points.*

1. Which of the following correctly lists the five main components of an information system?

a) Hardware, Software, Data, Processes, Networks

b) Hardware, Software, Data, Processes, People

c) Hardware, Software, Data, Users, Internet

d) Hardware, Firmware, Data, Processes, People

2. Which statement about a context diagram is correct?

a) A context diagram shows multiple numbered processes and data stores.

b) A context diagram shows the entire system as a single process (Process 0) with no internal data stores.

c) A context diagram may use double-headed arrows to simplify bidirectional data flows.

d) A context diagram must be drawn across multiple pages if the system is large.

3. When "balancing" DFDs between a parent process and its child diagram, which condition must be satisfied?

a) The child diagram must contain more data stores than the parent.

b) All data flows entering and leaving the child diagram must exactly match the data flows of the parent process.

c) The child diagram must have the same number of processes as external entities.

d) The child diagram may introduce new external entities that were not in the parent.

4. **According to DFD rules, which of the following connections is NOT allowed?**

a) A process to a data store

b) An external entity to a process

c) A data store to a process

d) An external entity directly to a data store

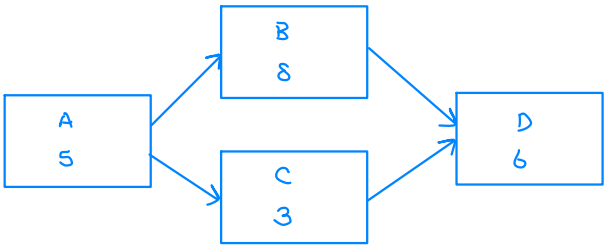
5. **A project has four tasks with the following durations and dependencies: Task A (5 days, no predecessor), Task B (8 days, depends on A), Task C (3 days, depends on A), Task D (6 days, depends on B and C). What is the critical path and total project duration?**

a) A → C → D, 14 days

b) A → B → D, 19 days

c) A → B, 13 days

d) A → C, 8 days



6. **A systems analyst needs to gather requirements from 500 front-line employees spread across 10 regional offices. Which requirements-gathering method is most appropriate for reaching such a large, geographically dispersed group efficiently?**

a) Individual interviews with every employee

b) Structured walk-throughs

c) Questionnaires and surveys

d) Joint Application Development (JAD) sessions

7. **Task X has an earliest finish of Day 20 and a latest finish of Day 28. What is the slack time of Task X, and what does this imply?**

a) 8 days; Task X is on the critical path.

b) 8 days; Task X can be delayed up to 8 days without delaying the project.

c) 28 days; Task X must start on Day 1.

d) 20 days; the project will finish on Day 20.

8. **Which of the following best distinguishes Joint Application Development (JAD) from Rapid Application Development (RAD)?**

a) JAD produces a complete working information system; RAD produces only requirements documents.

b) RAD relies solely on individual interviews; JAD uses group prototyping sessions.

c) JAD brings users in as active participants to define requirements; RAD represents a complete four-phase methodology whose end product is a working system.

d) JAD and RAD are identical methodologies with different names.

9. **During a SWOT analysis, a company discovers that a new government regulation will force it to rebuild a core module of its system within six months. How should this factor be classified?**

a) Internal Strength

b) Internal Weakness

c) External Opportunity

d) External Threat

10. A process in a DFD receives only a customer's date of birth as input but is expected to output a final grade. What type of DFD error does this represent?

a) Gray hole

b) Black hole

c) Spontaneous generation

d) Balancing error

e) Makro

Part II: Written Questions

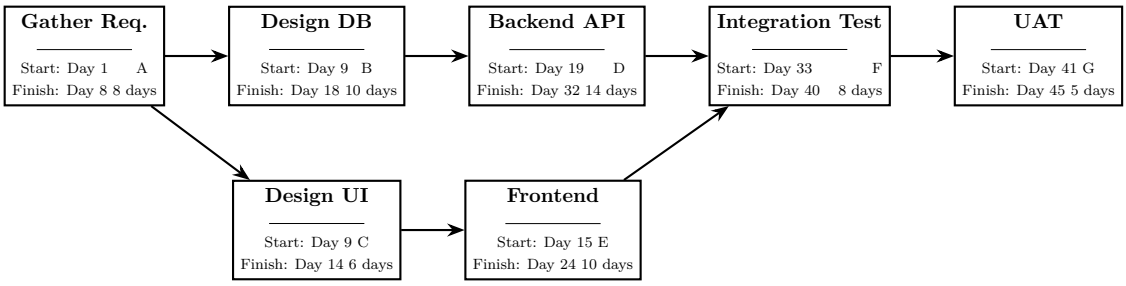
*Answer **all** questions. Show your reasoning where applicable. For diagram questions, label every element clearly. Consistency between diagrams will be checked.*

Question 1

Saichon is a project manager overseeing the development of a new **Hospital Patient Registration System**. She has identified the following tasks, durations, and dependencies:

Task	Name	Duration (days)	Depends On
A	Gather Requirements	8	—
B	Design Database Schema	10	A
C	Design UI Mockups	6	A
D	Develop Backend API	14	B
E	Develop Frontend	10	C
F	Integration & System Test	8	D, E
G	User Acceptance Testing	5	F

The following PERT/CPM network diagram represents the task structure above. Study the diagram carefully before answering.



(a) List **all possible paths** through the network from Task A to Task G and calculate the total duration of each path.

A → B → D → F → G

∴ 8 + 10 + 14 + 8 + 5 = 45 days

A → C → E → F → G

∴ 8 + 6 + 10 + 8 + 5 = 37 days

(b) Identify the **critical path**. State clearly which tasks are on it and what the **total project duration** is.

The critical path is A → B → D → F → G

Total project duration is 45 days

(c) Calculate the **slack time** for Task E and explain what this value means in practical project management terms.

Slack time = Latest finish - Earliest finish

= 32 - 24

= 8 days #

Task E can be delayed by upto 8 days beyond its earliest finish w/o pushing back the project completion date

(d) Saichon discovers that the backend developer is sick and Task D will be delayed by **5 days**. Explain the impact on the overall project completion date and state what the project manager should do.

Task D is on the critical path, so any delay propagates directly to the end of the project.

The overall project is delayed by 5 days (45 days → 50 days)

PM should:

- Notify management and update the project timeline
- Explore whether additional resources (another dev) can be assigned to Task D to recover lost time

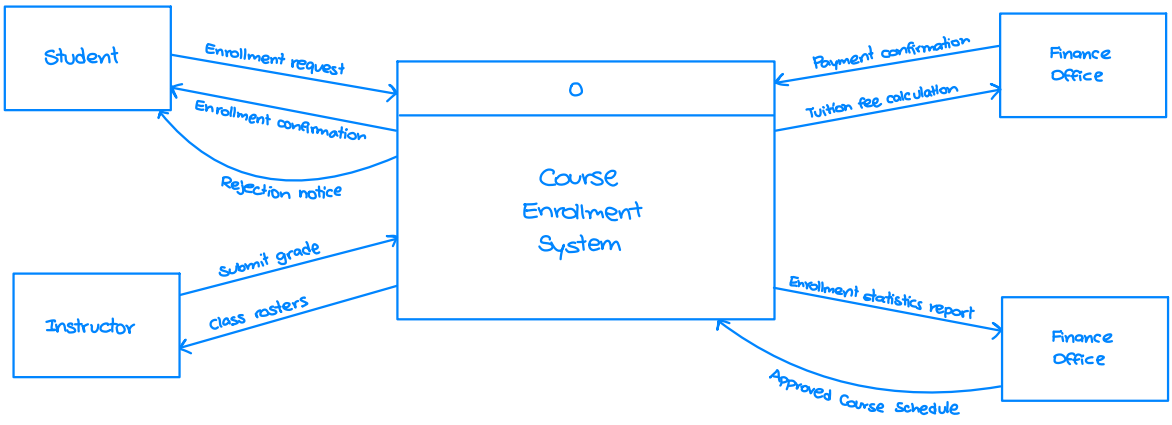
Question 2

A university is building a new **Course Enrollment System**. After conducting interviews and document reviews, the systems analyst identified the following information:

- **Students** submit enrollment requests to the system and receive enrollment confirmations or rejection notices.
- The system sends **class rosters** to **Instructors**, who can submit grade updates back to the system.
- The **Finance Office** receives tuition fee calculations from the system and sends payment confirmations back.
- The system sends **enrollment statistics reports** to the **Registrar's Office**.
- The **Registrar's Office** also provides approved course schedules to the system.

In the space below, draw a **Context Diagram** for the Course Enrollment System. Your diagram must:

- Represent the entire system as a single process labeled `COURSE ENROLLMENT SYSTEM`.
- Show all external entities identified in the scenario.
- Label every data flow with a clear, descriptive name.
- Use single-headed arrows only (no double-headed arrows).
- Fit entirely on this page.



Question 3

Using **your Context Diagram from Question 2** as the starting point, draw a **Level 0 (Diagram 0) DFD** for the Course Enrollment System.

The system has been decomposed into the following **four major processes**:

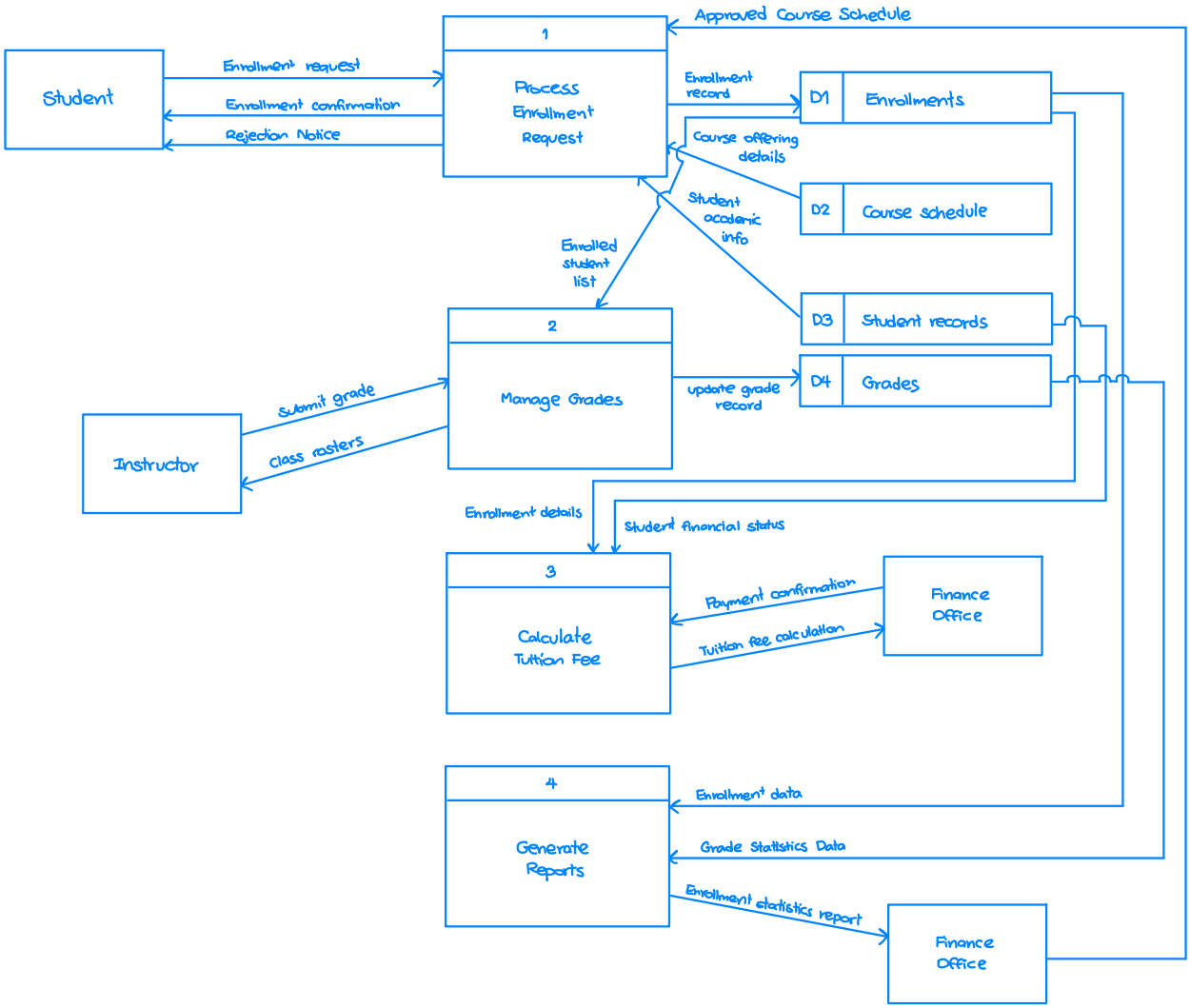
Process No.	Process Name
1	PROCESS ENROLLMENT REQUEST
2	MANAGE GRADES
3	CALCULATE TUITION FEES
4	GENERATE REPORTS

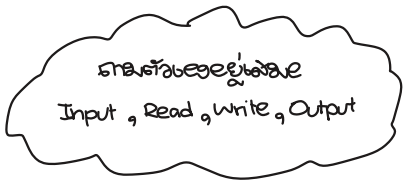
Additionally, identify and include appropriate **data stores**. Suggested data stores (you may add or adjust as needed):

- `D1 | ENROLLMENTS`
- `D2 | COURSE SCHEDULE`
- `D3 | STUDENT RECORDS`
- `D4 | GRADES`

Important balancing requirement: The external data flows entering and leaving your Level 0 DFD **must exactly match** those in your Context Diagram from Question 2.

Draw your Level 0 DFD in the space below. Use Gane and Sarson notation


Approved Course Schedule
1
Process Enrollment Request
Student
Enrollment request
Enrollment confirmation
Rejection Notice
Enrollment record
D1
Enrollments
Course offering details
D2
Course schedule
Student academic info
D3
Student records
Enrolled student list
2
Manage Grades
D4
Grades
update grade record
Instructor
submit grade
class rosters
Enrollment details
Student financial status
3
Calculate Tuition Fee
Payment confirmation
Tuition fee calculation
Finance Office
4
Generate Reports
Enrollment data
Grade Statistics Data
Enrollment statistics report
Finance Office


รายชื่อนักศึกษา
Input , Read , Write , Output

Question 4

Nidnoi is a systems analyst assigned to develop a new **Human Resources (HR) Management System** for a large manufacturing company with 2,000 employees across 8 factory sites. The system must replace an aging legacy payroll system and add new features for leave management, performance tracking, and recruitment.

Nidnoi needs to choose the most appropriate requirements-gathering methods.

(a) Nidnoi decides to conduct **interviews** with senior HR managers and department heads.

(i) Explain **why** interviews are a suitable method for gathering requirements from senior-level stakeholders in this scenario.

Senior managers possess knowledge & context that can't be capture through structured forms

Interview
- Ask follow-up question
- Adapt conversation based on responses

Senior stakeholders also rarely have time for lengthy forms ดังนั้น Interview = high quality

(ii) State **one advantage** and **one disadvantage** of interviews compared to questionnaires.

Can probe and clarify ambiguous answers in real time

Costly & time-consuming

(b) For gathering requirements from **factory floor employees** who operate the current payroll system daily, Nidnoi considers using a **questionnaire**.

(i) Explain why a questionnaire is more appropriate than individual interviews for this group.

There are 2,000 employees.

Conducting individual interviews with each employee would เกิน expensive & time-consuming

A questionnaire can reach all employees simultaneously & allow them to respond at a convenient time

(ii) Name **one limitation** of questionnaires that Nidnoi should be aware of and suggest how to mitigate it.

Questionnaire typically suffer from low response rates and may yield incomplete or superficial answers, since there's no way to probe unclear response

Mitigation: Nidnoi can increase response rate by keeping the questionnaire short, and more.

(c) Nidnoi also visits the factory sites and watches employees use the current system without interrupting their work.

(i) Name this requirements-gathering technique and explain what unique insight it provides that interviews and questionnaires cannot.

Observation !

Observation reveals unstated and informal requirements, unofficial procedures that employees follow in practice but would never volunteer in an interview or write down in a questionnaire (b/c they take them for granted or maybe think not worth mentioning)

Question 5

A startup is building a brand-new **Food Delivery Mobile Application**. No legacy system exists. The founding team includes three developers and a business owner, and they want the first working prototype ready in six weeks.

(a) From the team-based requirements engineering methods — **JAD**, **RAD**, and **Agile** — recommend the **single most appropriate method** for this startup scenario.

Recommended method: Agile

(b) Write a structured discussion that:

- Explains **why** you chose this method (relate to the scenario's constraints).
- Compares your chosen method with **one alternative** method, explaining why the alternative is less suitable.
- States **one disadvantage** of your chosen method that the team should be aware of.

This is a small team with a tight 6 weeks deadline, and no-legacy system to reverse engineer. Agile developed is designed precisely for this context: it builds the system incrementally, start with a minimal working prototype and refining through short sprints based on continuous feedback from the business owner.

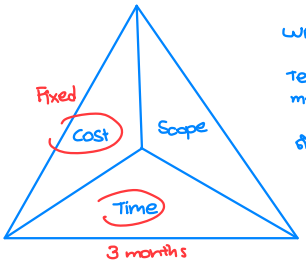
Compared with RAD:
RAD is plausible alternative because it also emphasises speed and user involvement. However, RAD is best suited to situations where a reasonably complete set of requirements can be defined before heavy construction begins.

Disadvantage:
Agile provides little formal documentation and lacks rigid structural milestones, which make it difficult to predict the final cost, feature set, and completion date with precision.

Question 6

The IT director of a hospital tells the project team: *"We need the new patient management system fully deployed in three months. Our budget is fixed. We cannot hire additional staff."*

(a) Using the concept of the **Project Triangle** (Cost, Scope, Time), explain what trade-off the project team must most likely make to meet the director's constraints.



With both time and cost locked, team can adjust is scope.

Team must reduce scope, delivering a smaller, priority set of features within 3 months, more functionality later.

[illegible] → low quality, unstable system, missing the deadline 🤦

(b) Identify which **type of feasibility** is most at risk in this scenario (Operational, Technical, Economic, or Schedule), and briefly justify your answer.

Schedule feasibility ("Can we do this in time?")

The director has imposed a firm three-month deadline while refusing to add resources. A patient management system is typically a large, complex undertaking; three months is an extremely tight window. Without the ability to increase staff or budget, the team cannot "crash" critical-path tasks by assigning extra people to them. The project therefore faces a very high risk of not being completable within the required timeframe, making schedule feasibility the primary concern.