

# Case study

International Baccalaureate · IB Diploma · Computer Science · SL

## Scope and prerequisites

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This handout teaches how to prepare for and answer questions on the **case study**, for the course first assessed in 2027. All of it is SL and HL content.

Each year the IB publishes a case study some months before the examinations, and some examination questions are based on it. Your teacher will give you the current case study and tell you which paper it is examined in; this handout teaches the method, using a short fictional case written for practice.

Prerequisites: Themes A and B. A case study can draw on any part of the course.

## What the case study is

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### ■ A scenario published in advance

A case study is a few pages about one real-world use of computing: a hospital, a farm, a transport network or a game studio, for example. It usually describes:

- the **organisation** and the problem it wants to solve;
- the **technology** it uses or plans to use;
- the **stakeholders** : the people and groups affected, such as users, staff, managers and the public;
- the **challenges** it faces, technical, social and ethical;
- a list of **additional terminology** : terms that are outside the course but that you are expected to research.

The questions then test whether you can **apply** your course knowledge and your research to that scenario. A correct definition that never mentions the scenario usually earns little.

### ■ How to study it

You have months, not hours. Work through the case in stages and keep everything in one notebook or document.

| Step | What you do                                                                                          | What you produce        |
|------|------------------------------------------------------------------------------------------------------|-------------------------|
| 1    | Read the case twice; underline every technical term                                                  | a marked copy           |
| 2    | Look up each term; write a definition in your own words and <b>how it is used in the case</b>        | a case glossary         |
| 3    | Link each part of the case to the course themes                                                      | a topic map             |
| 4    | List the stakeholders and what each one wants                                                        | a stakeholder table     |
| 5    | For each challenge, research how it could be solved, with advantages, disadvantages and alternatives | a challenge sheet       |
| 6    | Write answers to practice questions, then check every claim against the case text                    | marked practice answers |

Step 2 is the one most students rush. “Edge computing: processing data near where it is collected” is a definition; adding “in the case, each locker checks QR codes itself, so it works when the 4G link is down” makes it **case knowledge**.

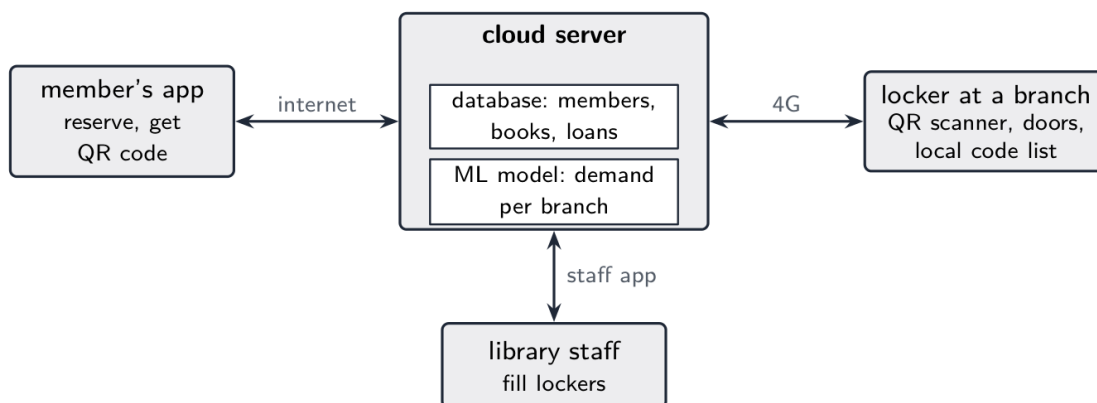
## A practice case: smart library lockers

### ■ The scenario

*This case is fictional and written for practice.*

A city library has eight branches. Many members work long hours and cannot visit while the branches are open. The library plans to install **smart lockers** outside each branch so that members can collect reserved books at any time.

A member reserves a book in the library’s app. When staff have placed the book in a locker, the app shows a **QR code**. At the locker, the member scans the code and one door opens. Each locker connects to the library’s **cloud server** over a 4G mobile network. The server holds a database of members, books and loans. A **machine learning** model on the server predicts how many reservations each branch will receive, so that staff can move stock in advance.



*The smart-locker system: app, cloud server, lockers and staff*

The library's challenges are:

1. Lockers must keep working when the 4G connection fails.
2. Reading history is personal data, but it would improve the predictions.
3. The model must not give poorer service to branches in poorer areas.
4. A QR code must not be usable by anyone except the member it was issued to.

## ■ Stakeholders

| Stakeholder      | What they want                       | A possible conflict                |
|------------------|--------------------------------------|------------------------------------|
| members          | easy, private collection at any hour | privacy against better predictions |
| library staff    | fewer wasted trips; clear tasks      | new work filling lockers           |
| library managers | more loans at a fair cost            | cost of lockers and 4G             |
| local council    | a fair service in every area         | prediction bias between branches   |

## ■ Linking the case to the course

| Case feature                         | Course theme                      | Terms to use                                  |
|--------------------------------------|-----------------------------------|-----------------------------------------------|
| locker, scanner, doors               | A1 computer fundamentals          | sensor, actuator, microcontroller             |
| 4G link, app, cloud server           | A2 networks                       | protocol, latency, encryption                 |
| members, books, loans                | A3 databases                      | primary key, relational database, transaction |
| demand prediction                    | A4 machine learning               | training data, bias, supervised learning      |
| QR codes, codes stored on the locker | B1, B2 algorithms and programming | validation, hashing, data structure           |

A topic map like this shows you where questions can come from, and which terms an examiner expects to see.

## Answering case-study questions

### ■ Command terms

Every question starts with a **command term** that tells you what kind of answer is wanted. Learn the IB's meaning of each.

| Command term | What it asks                                     | Shape of a good answer                     |
|--------------|--------------------------------------------------|--------------------------------------------|
| outline      | a brief account                                  | two or three linked points                 |
| describe     | a detailed account                               | the features, in order                     |
| explain      | a detailed account <b>with reasons or causes</b> | point → because → so, linked to the case   |
| discuss      | a balanced review of arguments                   | points for and against, then a conclusion  |
| evaluate     | weigh strengths and limitations                  | both sides, then a judgement with a reason |

### ■ Worked example: an explain question

Explain why each locker should store a list of valid codes locally. (4 marks)

1. **Point.** If the 4G link fails, the locker cannot ask the server whether a code is valid.
2. **Because.** Mobile coverage outside a building can drop, and the case says lockers must keep working when it does (challenge 1).
3. **So.** With a local list, received while the link was up, the locker can check the code itself and open the door; members are not turned away.
4. **Link.** When the link returns, the locker sends its log of openings to the server, so the loan records in the database are brought up to date.

Each step adds one idea **and** ties it to the case. An answer that says only “so it works offline” makes one point.

### ■ Worked example: a discuss question

Discuss whether the library should use members’ reading histories to improve its demand predictions. (6 marks)

*For.* Reading history shows which kinds of book each branch’s members borrow, so the model could predict reservations more accurately; staff would move the right books in advance, and members would wait less.

*Against.* Reading history is personal and sensitive: it can reveal a member’s health, beliefs or politics. If the database were breached, or the data used for another purpose, members would be harmed, and some might stop borrowing certain books.

*A middle way.* The model needs totals per branch, not individuals. The library could keep counts per branch and per subject, with no member IDs (**anonymised** data), and delete individual histories after the loan ends.

*Conclusion.* The library should use **branch-level, anonymised** data only, because it gives most of the accuracy benefit without the privacy risk, and it should tell members what is collected and why.

A discuss answer is marked on balance and on the conclusion. A conclusion that only repeats one side, or one that states no reason, loses marks.

### ■ Common weaknesses

- **Generic answers.** “Encryption keeps data safe” could be written about any system; say **what** is encrypted in the case and **from whom**.
- **Definitions without use.** Defining a term earns little unless the question asks for a definition.
- **One-sided discussions.** Give arguments on both sides before you judge.
- **New facts.** Do not invent details that the case does not give; if you must assume something, say so.

## Practice

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1. State **two** stakeholders in the smart-locker case and what each one wants from the system.
2. Identify the course theme that each of these belongs to: (a) the QR scanner; (b) the 4G link; (c) the table of loans.
3. Outline why a QR code shown in the app should change for each reservation.
4. Explain how training the demand model mainly on data from busy central branches could lead to unfair service.
5. Explain **one** advantage and **one** disadvantage of storing the database on a cloud server rather than on a server in the library.
6. Discuss whether the lockers should also accept a member's library card instead of a QR code.

### Answers.

1. Any two, e.g. members: easy collection at any hour, with privacy; staff: clear tasks and fewer wasted trips; managers: more loans at a fair cost; the council: a fair service in every area.
2. (a) A1 computer fundamentals (an input device, a sensor); (b) A2 networks; (c) A3 databases.
3. A code used once and then made invalid cannot be reused if someone photographs or copies it, so only the member with the current code can open that door.
4. The model learns patterns from the data it is given; with few examples from quieter branches, its predictions for them are poorer, so the right books are moved there less often and those members wait longer. Fix: balance the training data and check accuracy for each branch.
5. Advantage: the cloud provider handles backups, uptime and scaling, so the library needs no server room or staff to run one. Disadvantage: the system depends on internet access, and personal data is stored by a third party, so the contract must cover security and where the data is kept.
6. For: a card is familiar and works without a phone. Against: a lost or stolen card would open any locker reserved by that member, unless a PIN is added. Conclusion with a reason, e.g. accept the card **with a PIN**, so members without smartphones are not excluded and a lost card alone is not enough.

## Exam tips

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- Learn the case **before** the exam: glossary, topic map, stakeholders, and an answer plan for each challenge.
- Every answer should name something from the case: a stakeholder, a device, a challenge.

- Read the command term first: “explain” needs reasons; “discuss” and “evaluate” need both sides and a conclusion.
- Use the course terms the examiner expects (latency, primary key, bias, encryption), each tied to the scenario.
- Do not add facts the case does not state; mark any assumption you need.