

Mandaluyong College of Science and Technology  
Bachelor of Science in Information Systems  
System Analysis and Design (PCIS222)  
2nd Semester AY 2024-2025

**Business Scenario:** MCST E-Library Laptop Borrowing System

**Scenario Overview:**

The MCST offers an E-Library System that allows students to borrow laptops for academic purposes (e.g., research, assignments, online learning). The system must manage the laptop inventory, track which student borrows a laptop, when the laptop is due for return, and ensure that laptops are available for other students after they are returned.

**Key Entities:**

**Student**

Attributes:

Library\_ID (Primary Key)

Name

Program

**Laptop**

Laptop\_ID (Primary Key)

Serial\_Number

Brand

Model

IP\_Address

Status (e.g., Available, Borrowed, Under Maintenance)

**Loan**

Attributes:

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Loan\_ID (Primary Key)

Library\_ID (Foreign Key)

Laptop\_ID (Foreign Key)

Staff\_ID (Foreign Key)

Borrow\_Date

Due\_Date

Return\_Date

Status (e.g., Borrowed, Returned, Overdue)

**Staff**

Attributes:

Staff\_ID (Primary Key)

Name

Position (e.g., Librarian, Administrative Officer IV, Information Officer II)

**Technician**

Attributes:

Staff\_ID (Primary Key)

Name

Position (e.g., Technician, IT Support)

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**Laptop\_Maintenance**

Attributes:

Maintenance\_ID (Primary Key)

Laptop\_ID (Foreign Key)

Staff\_ID (Foreign Key)

Maintenance\_Type (e.g., Software Update, Hardware Repair)

Maintenance\_Date

Status (e.g., Pending, Completed)

Maintenance\_Notes

**Relationships between Entities:**

**Student - Loan (One-to-Many)**

A Student can borrow multiple Laptops, but each Loan is linked to one Student.

A Loan record is created when a student borrows a laptop.

**Laptop - Loan (One-to-Many)**

A Laptop can be loaned to many students over time, but each Loan is linked to one Laptop.

A Laptop can have multiple loan records over time (once returned, it can be borrowed again).

**Staff - Loan (One-to-Many)**

A Staff member (typically a librarian) can process multiple Loan requests.

Each Loan is processed by one Staff member.

**Technician - Laptop\_Maintenance (One-to-Many)**

A Technician can handle multiple Laptop Maintenance requests.

Each Laptop\_Maintenance record is assigned to one Technician.

**Laptop - Laptop\_Maintenance (One-to-Many)**

A Laptop can have multiple maintenance records over time (e.g., hardware repair, software update).

Each Laptop\_Maintenance record is linked to one Laptop.

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**Explanation of the ERD:**

**Student:** Represents the students borrowing the laptops from the e-library system. Each student can make multiple loans.

**Laptop:** The laptops available in the e-library. The system tracks the status (available, borrowed, or under maintenance) and logs maintenance issues related to each laptop.

**Loan:** Represents the borrowing activity where a Student checks out a Laptop. The loan includes information Student's library ID, laptop ID, date, time-in, time-out.

**Staff:** Represents the library, and handles the borrowing process.

**Technician:** Responsible for performing laptop maintenance.

**Laptop\_Maintenance:** If a Laptop needs maintenance (e.g., hardware repair or software update), a Laptop\_Maintenance record is created. Staff are responsible for managing these maintenance tasks.

**Example Use Case:**

**Student Borrows a Laptop:**

A student goes to the e-library and requests to borrow a laptop.

The staff checks for the available laptops.

The staff asks the student for his library ID, enters it into the system along with the laptop ID, and a loan record is created.

The laptop's status is updated.

The student can now use the borrowed laptop.

If a loan is overdue, the server will send notification to the laptop, and after some time, the laptop will force-lock.

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When the student returns the laptop, the staff asks the student for his library ID, and enters it into the system.

The laptop's status, and the loan record is updated.

The laptop is returned to the shelf.

**Laptop Maintenance:**

After a laptop is used for some time, it might need maintenance (e.g., software updates or hardware repairs).

The Laptop\_Maintenance record is created, and a technician performs the required maintenance.

The laptop's status is updated to under maintenance until repairs are completed.

Once completed, the laptop becomes available again for borrowing.

**Business Flow and Operations:**

**Loan Process:**

Step 1: The student requests to borrow a laptop.

Step 2: The staff enters the library ID of the student, and the laptop ID into the system.

Step 3: The laptop is loaned to the student.

Step 4: The student returns the laptop, and the staff enters the library ID of the student into the system.

Step 5: The laptop is returned to the shelf.

**Maintenance Process:**

Step 1: A laptop needs maintenance (reported by the librarian to the technician or detected automatically).

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Step 2: A laptop maintenance request is created, and the laptop is taken out of service until repaired.

Step 3: The maintenance is completed, and the laptop is made available for borrowing again.