

"Lab 6: GUI II: Events, Dialogs and MVC"

Make every button work, show errors in dialogs, and split Model, View and Controller

Lab 6 of 9

Branch: week9-gui-events-mvc

About 2 to 3 hours

Guide: LMS Guide, Step 6

Objective

Bring the window to life with **event listeners**, show exceptions as **dialogs**, and apply **MVC**: the window talks only to a `LibraryController`, and the model never prints.

Before you start

- Lab 5 merged. Lecture 9 notes read.
- Remember Week 5: your exceptions are about to earn their keep.

Git: start and submit

```
git checkout main
git pull origin main
git checkout -b week9-gui-events-mvc
```

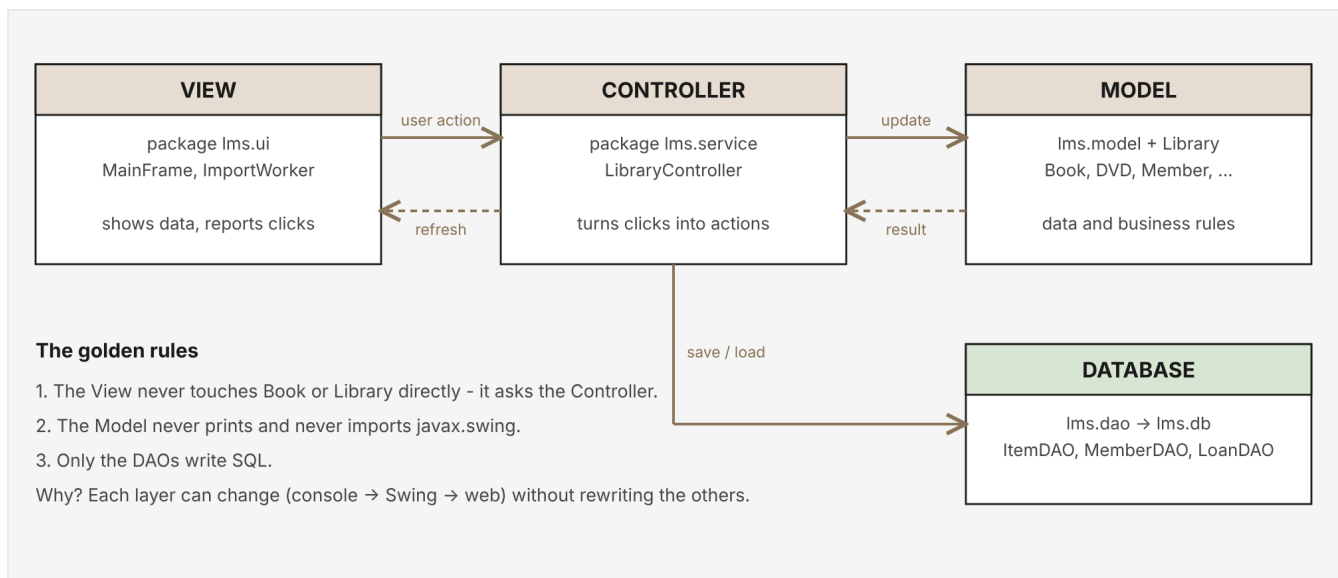
Commit small and often (see the *Git Support Guide*). When you finish:

```
git push -u origin week9-gui-events-mvc
```

Open a Pull Request titled **Week 9: GUI II (Events, Dialogs & MVC)**, fill in the template, and request a review from your lecturer.

Design first (10 minutes)

Draw an MVC diagram for *your* classes (`docs/mvc-week9.png`):



Question to answer in your PR: *name one thing MainFrame is no longer allowed to do, and why.*

Tasks

Task 1: remove printing from the model

Delete every `System.out.println` from `LibraryItem.loan / returnItem` and from `Library.addItem` overloads. The model reports through return values and exceptions only.

Task 2: LibraryController in lms.service

- Constructor takes the `Library`.
- `addItem(String type, String id, String title, String detail)`: rejects duplicate ids with `IllegalArgumentException`; builds a `Book`, `DVD` or `Magazine` (parse a whole number for DVD minutes / magazine issue; turn `NumberFormatException` into `IllegalArgumentException("Duration must be a whole number")`).
- `borrow(itemId, memberId)` and `giveBack(itemId)` that delegate to the library and declare `throws ItemNotAvailableException`.
- `getItems()` and `getMembers()`.
- Add `Library.hasItem(String id)`.

Task 3: change MainFrame to use only the controller

Constructor takes a `LibraryController`. Add a **member picker** (`JComboBox<String>` with text like `M001 - Nadeesha Perera`) next to the buttons.

Task 4: listeners

```
addButton.addActionListener(e -> onAdd());
borrowButton.addActionListener(e -> onBorrow());
returnButton.addActionListener(e -> onReturn());
```

- **onAdd**: call the controller; on success clear the fields, refresh the table, set the status; catch `IllegalArgumentException` and show a `JOptionPane` warning.

- **onBorrow / onReturn:** need a selected table row (if none, show an information dialog). Catch `ItemNotAvailableException` and `MemberNotFoundException` and show the message. Refresh the table afterwards. The `Status` column should read `On loan: <member name>` (use `item.getBorrower()`).

Task 5: wire up `GuiMain`

`new MainFrame(new LibraryController(library))` on the EDT.

Task 6: evidence

Capture three screenshots into `docs/`: a successful borrow, an *already on loan* dialog, and a bad-input dialog.

Expected output

A successful borrow, then a refusal:

The screenshot displays the 'Library Management System' interface. On the left, there is a 'New item' form with fields for 'Type' (set to 'Book'), 'ID', 'Title', and 'Detail', and an 'Add Item' button. The main area contains a table with the following data:

ID	Title	Type	Detail	Status
B001	Clean Code	Book	Robert C. Mart...	On loan: Nade...
B002	Refactoring	Book	Martin Fowler	Available
D001	Introduction to Algorithms	DVD	120 min	Available
G001	Software Weekly	Magazine	Issue 42	Available

At the bottom left, a status bar indicates 'B001 borrowed by M001'. At the bottom right, there is a 'Member:' dropdown menu showing 'M001 - Nadeesha Perera', and two buttons labeled 'Borrow' and 'Return'.

New item

Type: Book

ID:

Title:

Detail:

Add Item

ID	Title	Type	Detail	Status
B001	Clean Code	Book	Robert C. Mart...	On loan: Nade...
B002	Refactoring	Book	Martin Fowler	Available
D001	Introduction to Algorithms	DVD	120 min	Available
G001	Software Weekly	Magazine	Issue 42	Available

Clean Code is already on loan.

OK

B001 borrowed by M001

Member: M002 - Mr. Kasun Silva

Borrow

Return

And a rejected form:

New item

Type: DVD

ID: D010

Title: Operating Systems

Detail: abc

Add Item

ID	Title	Type	Detail	Status
B001	Clean Code	Book	Robert C. Mart...	On loan: Nade...
B002	Refactoring	Book	Martin Fowler	Available
D001	Introduction to Algorithms	DVD	120 min	Available
G001	Software Weekly	Magazine	Issue 42	Available

Duration must be a whole number

OK

Cannot borrow: Clean Code is already on loan.

Member: M002 - Mr. Kasun Silva

Borrow

Return

Checkpoints

Tick each before moving on. If a box stays empty, ask for help *now*; later steps build on it.

- ☐ `MainFrame` has **no** new Book , new DVD , `import lms.model.Book` for construction, and never touches `Library` directly
- ☐ The model prints nothing
- ☐ Typing `abc` as a DVD duration gives a dialog, not a crash
- ☐ Borrowing a borrowed item gives a dialog with the exception's message

- ☐ The status bar updates after each success
- ☐ Three screenshots and the MVC diagram committed

Experiments: break it on purpose

Learning happens when you predict, run, and compare. Write your **prediction** first, then paste the real compiler message or output into your PR description.

1. Click **Borrow** with no row selected. If you did not handle it, what is the exception? Handle it.
2. Register the same listener twice on one button. What happens when you click once?
3. Make `onBorrow` catch `Exception` instead of the two specific ones. What did you lose?
4. Add `import javax.swing.*;` to `Book.java`. Compiles? Explain why this is still a bad idea.

Stretch tasks (optional, no marks lost if skipped)

- Double-click a row to borrow it for the selected member (`MouseAdapter`).
- Colour *On loan* rows red with a custom `TableCellRenderer`.
- Add a *Delete item* button and the controller method behind it.

Common pitfalls

Symptom	Fix
Table does not update	You forgot <code>refreshTable()</code> after changing the model
<code>ArrayIndexOutOfBoundsException</code> splitting the member text	The combo box text must contain " - "; keep format consistent
Nothing happens on click	Listener registered on a different button variable
Dialog shows <code>lms.exception.ItemNotAvailableException: ...</code>	Use <code>getMessage()</code> not <code>toString()</code>

What to submit

- ☐ PR **Week 9: GUI II (Events, Dialogs & MVC)** from branch `week9-gui-events-mvc`
- ☐ Three screenshots, MVC diagram
- ☐ PR description: the MVC answer; what experiments 1 to 4 showed

Marking guide

Your PR is marked on four criteria. Each is scored 4 (excellent) to 1 (needs work) and weighted as shown.

Criterion (weight)	4	3	2	1
Works (40%)	All tasks run, expected output matches	Minor differences	Partly works	Does not compile or run
OOP design (30%)	Concepts of this week used correctly and deliberately	Mostly correct	Concepts present but misused	Concepts missing
Code quality (15%)	Clear names, small methods, no dead code, comments explain <i>why</i>	Mostly clean	Messy in places	Hard to read
Git and PR (15%)	Exact branch/PR name, small clear commits, full PR description, UML in docs/	One slip	Several slips	One giant commit or direct to <code>main</code>

Check Before you open the PR, read your own diff on GitHub as if you were the reviewer. Most deductions are things you would have spotted yourself.