**Timetable Management Application**

**Overview**

The **Timetable Management Application** is a Java Swing-based desktop application that allows users to manage class schedules by assigning teachers, subjects, and time slots efficiently. The system ensures that no overlapping occurs and enforces constraints such as teacher-specific subject assignments.

**Features**

**1. Add Time Slots**

* Assigns a teacher, subject, and time slot for a particular day.
* Prevents assigning a time slot to multiple teachers.
* Enforces subject-teacher mapping.

**2. Delete Time Slots**

* Allows users to remove an assigned slot from the timetable.
* Ensures that the deleted slot can be reassigned if needed.

**3. View Teacher’s Schedule**

* Displays all assigned time slots for a selected teacher.
* Helps in tracking a teacher's availability.

**4. Subject Selection Based on Teacher**

* Each teacher is allowed to teach only two specific subjects.
* The subject dropdown updates dynamically based on the selected teacher.

**5. Time Slot Management**

* Predefined time slots are available for selection.
* Ensures no two teachers are assigned the same time slot on the same day.

**Technology Stack**

* **Language:** Java
* **GUI:** Swing (JFrame, JPanel, JTable, JComboBox, JButton, JScrollPane, etc.)
* **Data Structures:** Java Collections (List, HashMap)

**User Interface Components**

**Main UI Components:**

* **JFrame:** Main application window.
* **JPanel:** Holds input controls.
* **JComboBox:** Drop-down menus for selecting class, teacher, subject, day, and time slot.
* **JTable:** Displays the assigned timetable entries.
* **JButton:** Actions for adding, deleting, and filtering slots.
* **JOptionPane:** Displays messages and alerts.

**Subject-Teacher Mapping**

| **Teacher** | **Subjects** |
| --- | --- |
| John | Physics, Chemistry |
| Mary | Maths, English |
| Harshada | Biology, Computer Science |

**Predefined Time Slots**

| **Slot Number** | **Time Range** |
| --- | --- |
| 1 | 8:00 AM - 8:50 AM |
| 2 | 8:50 AM - 9:40 AM |
| 3 | 9:40 AM - 10:30 AM |
| 4 | 10:30 AM - 11:20 AM |
| 5 | 12:00 PM - 1:00 PM (Lunch) |
| 6 | 1:00 PM - 1:50 PM |
| 7 | 1:50 PM - 2:40 PM |

**Functionalities**

**1. Adding a Time Slot**

1. Select a **Class (Class 11 / Class 12)**.
2. Choose a **Teacher** from the dropdown.
3. Based on the selected teacher, the **Subject** dropdown updates.
4. Select a **Day** and a **Time Slot**.
5. Click **Add Slot**.
6. The system checks for conflicts before adding the slot.

**2. Deleting a Time Slot**

1. Select a row from the timetable table.
2. Click **Delete Slot**.
3. The entry is removed from the schedule.

**3. Viewing a Teacher’s Schedule**

1. Select a **Teacher** from the dropdown.
2. Click **Show Time Slots**.
3. A message box appears displaying the assigned slots for the teacher.

**Constraints & Validations**

* **No duplicate time slot assignment**: If a slot is already assigned to a teacher on a specific day, it cannot be reassigned.
* **Only two subjects per teacher**: Subject selection is limited based on the assigned subjects for each teacher.
* **Time slot validation**: Users cannot leave the time slot field empty.

**Conclusion**

The **Timetable Management Application** ensures efficient scheduling and prevents conflicts while assigning time slots to teachers. It dynamically updates subject selections and maintains an intuitive user interface for easy management.