

# Global Software Controls

## External Control Flow

When The Ring Bells defined by the website with a simple feature. Firebase Database System requests submission of user data. System is multi-user, concurrently executions can occur. But, single user's control flow has been defined before. After user login to the system, the system has side-bar to navigate through web pages that can user see section. Some sections can only reachable by some user's role.

## Internal Control

- **Callbacks Between Subsystems:** All of the services uses asynchronous callbacks for inter-process communication. Every single service uses internal methods to notify the other subsystems of its own status, its needs and abilities.
- **Avoiding Deadlocks:** Callbacks must not block the caller. So only status information is updated in the callee. All other internal work within a single service must be done by other worker threads.
- **Worker Threads For Each Service:** Each service has an own thread for communication, which communicates with the service manager and other services.

## Concurrent Control

- **Callbacks Between Subsystems:** When The Ring Bells uses asynchronous callbacks for interprocess communication.
- **Multithreading:** When The Ring Bells uses threads, so that a large number of services is able to use the service manager simultaneously. The service manager also handles asynchronous events within the system.

## User Interface

User Interface has many web pages and side-bar that can user navigate through web pages. The control of next step depends on user's action and choice. In addition to this, the flow is implemented in pages. In When The Ring Bells, we have user roles. This roles can or can not be access some pages. Admin, Student, Student's Affair, Teacher have their own web pages that can do their actions defined their roles.

# Boundary Conditions

## System Start-Up

Go to website and login.

## System Shutdown

Click log-out.

## Error Conditions

### 1-Login

- E-mail and password filled can not be blank.
- E-mail must be in e-mail format.
- E-mail must be valid.
- E-mail and password can not be same.
- Password must be longer than 5 characters.

### 2- Creating Attendance

- Attendance has to have list of students and date.
- Attendance date can not be date before day that adding attendance.
- Attendance can not be created by Student.
- Attendance has to have class and list of students that taking this class.

### 3- Taking Attendance

- Every student's attendance must be filled.

### 4- Taking Class (As a Teacher)

- Class teacher position has to be empty.