**System Definition**

The **Computer Lab Management System (CLMS)** is an administrator-focused web application designed to track and manage the usage of computer systems within a lab environment. Built with a **React.js** front-end and a **Firebase** back-end, the system's core function is to provide the lab administrator with a real-time, centralized dashboard to monitor system availability, manage system status, and log usage. The system is designed to provide the administrator with a clear overview of the lab, ensuring efficient resource management without requiring individual student logins.

Understood. Based on your clarification that the system only has an **admin login** and no user login, here is the updated documentation for your **Computer Lab Management System**. This version focuses on the administrator's role and a simplified workflow.

### Problem Statement

In a computer lab setting where there is no user login system, the administrator faces several key challenges:

* **Lack of Real-time Visibility:** The administrator has no automated way to see which computers are in use and which are available at any given moment. This leads to manual checks and inefficient resource allocation.
* **Manual System Tracking:** When students use a computer, the administrator must manually update a record (e.g., on a paper sheet or a spreadsheet) to track who is using which machine. This is time-consuming and prone to human error.
* **Inefficient Management:** Without a centralized system, it's difficult for an administrator to quickly identify and update the status of a faulty or non-functional computer, leading to confusion for students.
* **No Usage Log:** There is no automated record of which computer was used at what time, making it impossible to review past usage data or investigate issues.

The **CLMS** solves these problems by providing the administrator with a single, intuitive interface to manage all lab systems efficiently, saving time and improving overall lab operations.

### Data Flow Diagram (DFD)

The DFDs have been simplified to reflect the single admin entity.

#### Level 0: Context Diagram

The external entity is now only the **Administrator**, who provides login credentials and requests to update system status. The system provides an overview of the lab and usage reports back to the administrator.

#### C:\Users\admin\Desktop\leval-0 dnd.png Level 1: Detailed DFD

This diagram shows the internal processes: **Admin Authentication**, **Lab Status Management**, and **Usage Logging**. The processes interact with data stores for the **Admin Database**, the **Lab Status** of each system, and the **Usage Logs**.

### C:\Users\admin\Desktop\leval-1dnd.png System Workflow

The workflow for the CLMS is now streamlined for the administrator only.

1. **Admin Login:** The administrator navigates to the website and logs in using their credentials, which are authenticated against Firebase Auth.
2. **Dashboard View:** Upon successful login, the administrator is presented with a dashboard showing a real-time, visual map of the computer lab. Each computer is displayed with its current status: **Available**, **In Use**, or **Under Maintenance**.
3. **Manual Status Update:** When a student occupies a computer, the administrator manually clicks on that computer on the dashboard. The system then prompts the admin to enter the user's details (e.g., name or student ID) and a start time. The system's status is then updated to **"In Use."**
4. **Session Management:** When a student leaves, the administrator clicks on the computer again. The system records the end time, calculates the total session duration, updates the computer's status back to **"Available,"** and logs the full session details in the usage history.
5. **Maintenance and Management:** The administrator can also click on a computer and change its status to **"Under Maintenance,"** indicating it is not available for use. This can be reversed when the issue is fixed.
6. **View Reports:** The administrator can view past usage logs, which include details on which computer was used, by whom, and for what duration. This data can be used to generate reports for analysis.

**Working Project (Demonstration)**

For your internal exam, be prepared to demonstrate the following:

* **Admin Login:** Show the login process and how the dashboard appears after a successful login.
* **Real-time Status Updates:** Demonstrate how the dashboard's visual representation of the lab updates as you manually change a computer's status from **"Available"** to **"In Use"** and then back to **"Available."**
* **Usage Logging:** After a "session" is over, show the log entry in your database (e.g., within the Firebase console) that includes the start time, end time, and user details.
* **System Maintenance:** Demonstrate changing a computer's status to **"Under Maintenance"** and explain how this prevents it from being marked as available for a new user.
* **Firebase Integration:** Explain how you're using Firebase Authentication for the admin login and the Firebase Realtime Database to manage and update the lab status in real-time.