



FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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CA EXAMINATION

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OPERATING SYSTEM CA

1. Description of the Problem

The current marks complaint process at ICTU might be inefficient, leading to:

- **Multiple Students Submitting Complaints Simultaneously:** This can overwhelm administrators and cause delays.
- **Unclear Complaint Status:** Students may not know if their complaints are being addressed or when to expect a resolution.
- **Lack of Progress Tracking:** There might be no system to track complaint progress, leading to frustration and uncertainty.

2. Proposed Solution

The Marks Complaint Resolution System (MCRS) is a desktop application designed to streamline the complaint process, ensuring fairness and efficiency. It utilizes:

- **Mutual Exclusion:** Only one student can submit a complaint at a time, preventing conflicts and ensuring data integrity.
- **Bounded Waiting:** Complaints have a maximum wait time of 3 days to guarantee responsiveness.
- **Progress Updates:** Students receive notifications about the status of their complaints, fostering transparency.

3. Architectural Approach

The MCRS will leverage the following technologies for a robust and scalable solution:

- **Firebase:**
 - **Cloud Firestore:** Stores complaints securely with structured data and real-time updates.
 - **Cloud Functions:** Serverless functions manage logic like mutual exclusion, bounded waiting, and notifications using triggers.
- **Python Client Application (GUI):** Provides a user-friendly interface for students to submit complaints and view progress.

4. Key Components

- **Mutual Exclusion:**
 - Implemented using a **threading library** (Python) with a lock.
 - When a student attempts to submit a complaint, the lock is acquired.
 - If another student is already submitting, the current student waits for the lock to be released (bounded by timeout).
- **Bounded Waiting:**
 - A **Firebase Function** triggers upon complaint creation.
 - It checks the timestamp of the complaint and compares it to the current time.
 - If the waiting time exceeds 3 days, the function automatically generates a notification for the student and/or administrators.
- **Progress Updates:**
 - Firebase Cloud Functions can trigger notifications through:

- **Firestore Cloud Messaging (FCM):** Sends real-time push notifications to students' devices (if enabled).
- **Firestore Update:** Modifies a complaint field to indicate updated status, which the client app can display on refresh.

5. User Manual

Students:

1. Download and install the MCRS app.
2. Select the course for which you have a complaint.
3. Enter a detailed description of your complaint, including evidence (optional).
4. Submit the complaint.
5. You will receive a notification acknowledging the receipt of your complaint.
6. The app will notify you of updates.
7. You can access a history of your submitted complaints through email.

Screenshots/Visual Aids:

- Include screenshots or mockups illustrating the GUI for clarity (not possible due to confidentiality).

The screenshot shows a web-based form titled "Complaint Submission Form" within a window labeled "MainWindow". The form includes several input fields: "Your email", "Matricule", "Your Password", and a large text area for "Complaint Text". There are also two dropdown menus, one for "Course" and one for "Department" (which is currently set to "ICT"). A button labeled "Add Atachement" is located below the "Complaint Text" field. At the bottom of the form, there are two buttons: "Send" and "Quit".

8. Conclusion

The MCRS offers a comprehensive and secure solution for streamlining the marks complaint process at ICTU. By addressing mutual exclusion, bounded waiting, and progress tracking, this system fosters transparency, fairness, and a more efficient complaint resolution process for students and administrators. The proposed architecture leverages Firebase for both scalability and ease of implementation. By prioritizing security and continuously incorporating future advancements, the MCRS can be a valuable tool for enhancing ICTU's academic administration.