COMSATS UNIVERSITY ISLAMABAD, ABBOTTABAD

Software Design and Architecture

Assignment - 01

Submitted by:

Laiba Binta Tahir FA21-BSE-019

Arfah Ali FA21-BSE-080

Submitted to:

Mam Neeli khan

High-Level S/w Architecture for Hostel Management System

Major Elements:

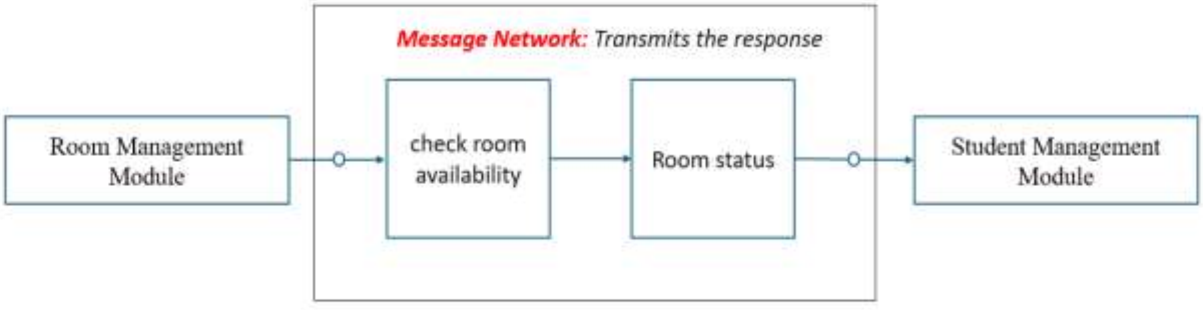
1. User Interface Module: This module manages communication between users, such as administrators, staff, and students. It offers interfaces for completing tasks including making reservations, checking in and out, paying fees, and filing grievances.
2. Student Management Module: Maintains student data, including preferences, room assignment, and registration information. It also manages room change requests and offers account management features for students.
3. Room Management Module: This module manages the hostel facilities' inventory, scheduling of maintenance, and room distribution.
4. Staff Management Module: Oversees payroll, roles, responsibilities, and shifts for employees.
5. Billing and Finance Module: Manages the invoicing, billing, collection of fees, and financial reporting for the administration of the dorms and students.
6. Complaints and Maintenance Module: Enables students to file maintenance requests or complaints, and it makes it easier for maintenance personnel to follow up and take care of these issues.
7. Reporting and Analytics Module: Offers administrators insights with functions which includes revenue analysis, occupancy rates, and student feedback analysis.

Connectors:

1. User Interface Module to Student Management Module:
    - Type: Two-initiator connector
    - Justification: This connector allows communication on two sides between student management module and user interface. Requests would be initiated by the user interface like registration details submission or room availability queriries. Whereas updats and actions would be triggered by student management module (SMM) as a

response to UI requests such as confirmation of room assignments or updations of student information.

2. Student Management Module to Room Management Module:
    - Type: One-initiator connector
    - Justification: In this connector request initiates from student management module. It sends requests to the room management module. Students can request for room changes, can check room availability through the UI by triggering the actions in the room management module (RMM). Whereas RMM doesn’t pledge requests to the SMM as it responds to the student-initiated actions.
3. Room Management Module to Staff Management Module:
    - Type: One-initiator connector
    - Justification: In this conector room management module initiates contact with the staff management module. This permits the room management module to inform staff regarding the maintenance schedule, allocation of tasks to staff members and request support for solving issues. But staff management module responds only to the
    - maintenance schedules, request assistance for resolving issues, or allocate tasks to staff members. However, the staff management module doesn't initiate requests to the

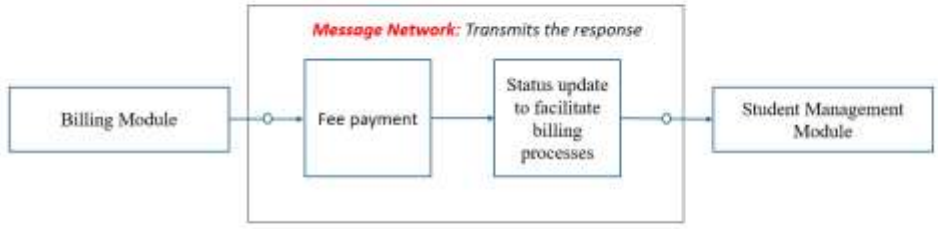

Message Network: Transmits the response
Room Management Module
check room availability
Room status
Student Management Module

Student Management Module: *updating the user interface based on the room availability status.*

to room-related events rathe4r than room management module.

4. Billing and Finance Module to Student Management Module:

    - Type: Two-initiator connector
    - Justification: This connector allows both modules to initate contact when needed. In order to initiate activities in the student management module, the billing and finance module may need to verify fee payments, update student accounts, or produce invoices. Similar to this, in order to streamline billing procedures, the student management module might need to communicate with the billing and finance module in order to supply student information or status updates.


Message Network: Transmits the response
Billing Module
Fee payment
Status update to facilitate billing processes
Student Management Module

***Student Management Module**: updating the user interface based on payments.*

5. Complaints and Maintenance Module to Staff Management Module:

    - Type: One-initiator connector
    - Justification: The staff management module receives requests from the issues and maintenance module, which enables maintenance personnel to assign tasks to staff members, request more resources, and update the status of complaints. However, because it mostly handles maintenance-related events or calls made elsewhere in the system, the staff management module doesn't make requests to the complaints module.Reporting Module to Student Management Module and Billing and Finance Module:

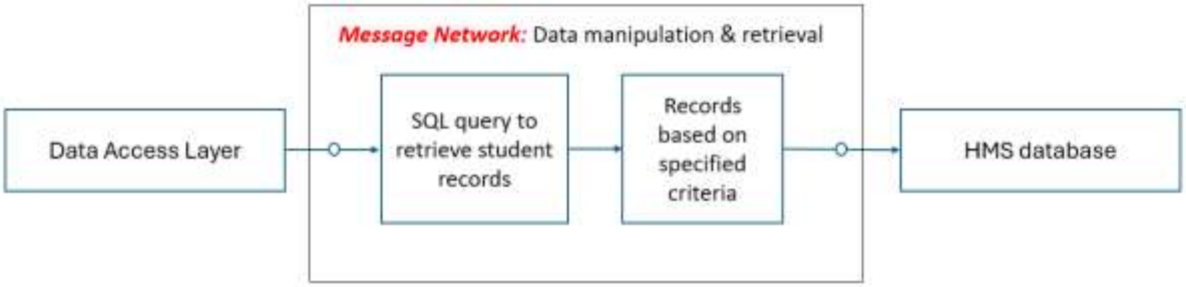
- Type: One-initiator connector
- Justification: This module pulls data from the student module and finance module to create reports. This module only retrieves the necessary information for reporting and analytics

such as student info, payment method, etc. This doesn't initiate requests to the student module.

6. Reporting Module to User Interface Module:

   - Type: One-initiator connector
   - Justification: This connector allows the reporting module to provide summarized data or visuals to the user interface for wardens to view. The reporting module initiates communication to deliver relevant data or reports to the user interface, enhancing the user experience and helping the administrators or wardens in decision-making.

7. SQL queries:
   - Type: Data access connector
   - Justification: This connector allows the DAL (Data Access Layer) to interact with databases using queries of SQL. The DAL built & executes the queries to manipulate data in DB. These queries provide a systematic way to communicate with the HMS database to perform operations like retrieving records of students, updating room status, and report generation. Thus, this connector helps in data access and manipulation within HMS.


Message Network: Data manipulation & retrieval
Data Access Layer
SQL query to retrieve student records
Records based on specified criteria
HMS database

***HMS database**: generating reports based on stored data.*

8. Request/response connector:
   - Type: synchronous connector
   - Justification: This connector guarantees synchronous communication b/w user interface and business logic layer. When a user interacts with an interface such as checking room availability or giving feedback, the user sends a request to the Business

logic layer; which processes the request and sends back the response to the UI and updates the interfaces accordingly.

9. API calls
   - Type: synchronous connector
   - Justification: This connector ensures synchronous communication b/w the Business logic layer and the Data Access Layer. When BLL wants to perform any CRUD operation on the database, it makes an API call to the Access Layer. These calls allow Business logic layer to perform operations from the database as required.

THE END