Department of Computer Science & Engineering
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Architectural Design Specification
CSE 4316: Senior Design I
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Team 2
RFID Automated Student Pickup

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Revision History

Revision	Date	Author(s)	Description
1.0	11.03.2017	BK, AH, KI, NP, AT	document creation
1.1	12.10.2017	BK, AH, KI, NP, AT	document revision

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1 INTRODUCTION

The project will be able to automate student pickup from school. Parents or guardians need to have a tag that will be read by RFID reader. From the RFID reader the school staffs shall be able to get the name and other information of the students. This shall expedite the process of student pickup as now parents are using a piece of paper to pick up their kids. Initial versions of the system will use a wire tether for data transfer between the RFID and processing unit. The majority of processing will be accomplished by RFID and processor.

2 System Overview

The overall structure of the software system contains three layers: Student Management System, DataBase, and Queue Display System. The Student Management System is user end system which is related to administrative functionality that includes adding, removing and editing student and staff information in the system. The GUI allows the admin to add student and remove student. The DataBase System is responsible for storing the information. It also allows the user to make queries. The Queue Display System displays the information of the system and also handles the RFID listener. This is a user end system and also includes hardware. The Queue Display System and Database System communicate with each other to keep real time records of the student pickup.

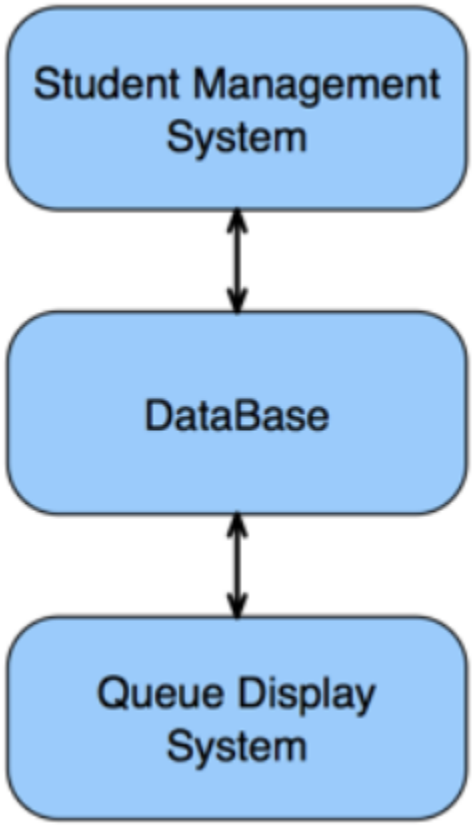

Figure 1: Overall Structure of System

2.1 Student Management System Layer Description

The Student Management System includes a control system, database control, and GUI. Control. This System directly talks with the Database System in order to store all the information about the students.

2.2 Database Layer Description

This System contains the tables to store the text and image of the system. Database System directly talks with Student Management System and Queue Display System.

2.3 Queue Display System Layer Description

This System contains control system, dbcontrol, GUI and RFID API. The RFID API helps to maintain communication between the Queue Display System and the RFID reader. The GUI displays the list of the students as their parents approach the school.

3 Subsystem Definitions & Data Flow

Will update this section later.

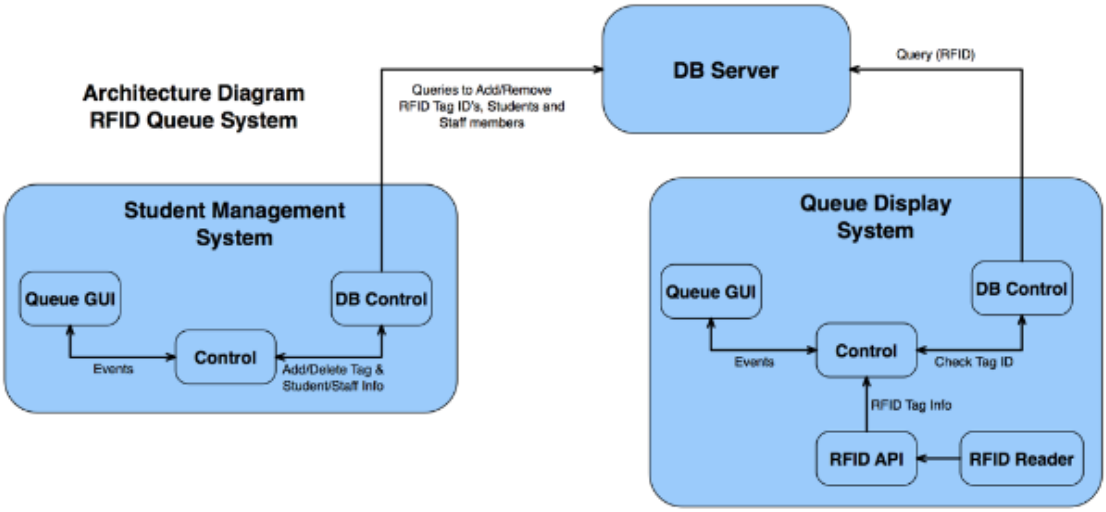

Figure 2: Data Flow Diagram

4 Student Management Subsystems

This subsystem communicates and controls database and Graphical user interface. This is needed for setting up the initial database for all the users, admin, students, etc.

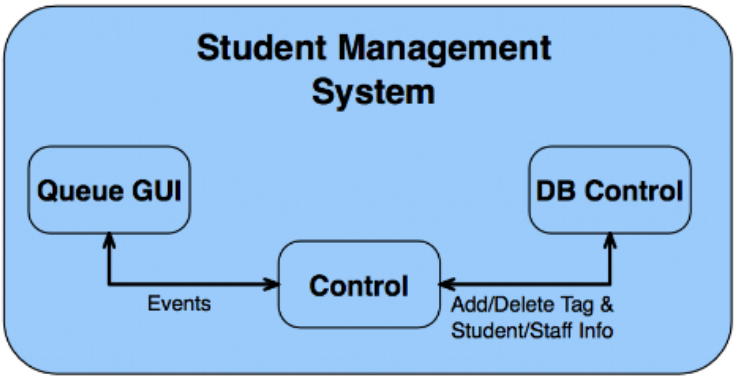

Figure 3: Student Management Subsystems

4.1 Queue GUI Subsystem

This subsystem will talk with the control subsystem and displays the list of the names of students in the GUI.

4.1.1 Assumptions

The GUI has to be running at the same time and the database must have the data of the students who are assigned a RFID tag.

4.1.2 Responsibilities

This subsystem accepts mouse and keyboard inputs from the user and update the list accordingly.

4.1.3 Subsystem Interfaces

This system has two, two-way interfaces. The first is directly connected to the computer recieving keyboard and mouse input and relaying to the screen. The second passes and receives from Control.

Table 2: Student Management Queue GUI Subsystem interfaces

ID	Description	Inputs	Outputs
#01	GUI Interaction	User Input	Events
#02	Events Return	GUI Data	Screen Data

4.2 Control Subsystem

This subsystem communicates with the database subsystem and the queue display subsystem and vice versa. It also reformats the data.

4.2.1 Assumptions

There has to be working input systems to get the user input and a database and GUI to handle the events.

4.2.2 Responsibilities

This subsystem handles the callback functions. It should act as a control unit between the GUI and the database. It also checks for the safe use for security.

4.2.3 Subsystem Interfaces

This system has two, two-way interfaces. The first is connected to the Queue GUI recieving GUI events and returning data to the GUI. The second passes and receives from DB Control.

Table 3: Student Management Control Subsystem Interfaces

ID	Description	Inputs	Outputs
#03	Control GUI	Events	Database Query
#04	Control Database	Database Response	QUI Data

4.3 DB Control Subsystem

This subsystem handles all the data related to students needing to be dismissed by staff. This is the subsystem that handles forwarding and receiving information from the database.

4.3.1 Assumptions

All the data has been set up in the database and it should be receiving good data from the control sub system.

4.3.2 Responsibilities

This subsystem will return all the data requested by the Control subsystem querying the DB.

4.3.3 Subsystem Interfaces

This system has two, two-way interfaces. The first is connected to the database, sending queries and receiving responses. The second passes and receives from Control.

Table 4: Student Management DB Control Subsystem interfaces

ID	Description	Inputs	Outputs
#05	Send Query	Database Query	Query
#06	Receive Results	Response	Database Response

5 Queue Display Subsystems

This subsystem will make various queries to the database as RFID tags become ready and display all the associated data to the Queue GUI.

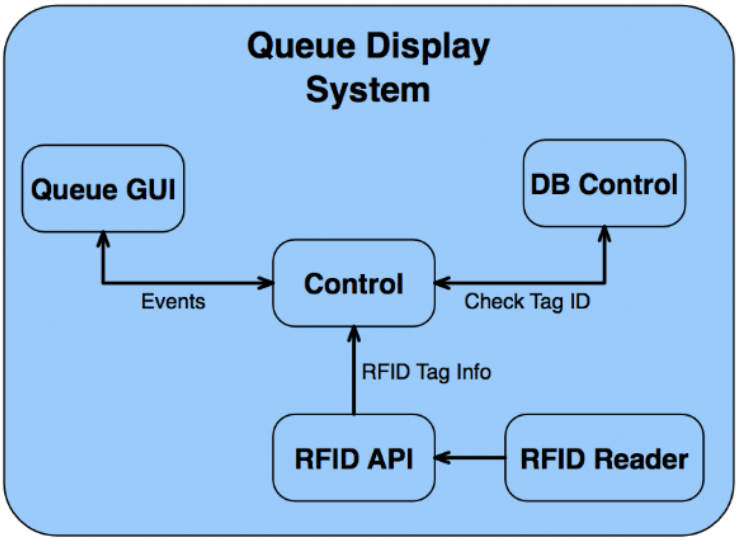

Figure 4: Queue Display Subsystems

5.1 RFID API Subsystem

The RFID API subsystem will communicate with the RFID Reader and take RFID tag ID to the control subsystem.

5.1.1 Assumptions

RFID tags have already been set up by the Student Management subsystem.

5.1.2 Responsibilities

This subsystem will identify the RFID tag that is scanned from the RFID Reader, utilizing the RFID API it will send the data to the Control model.

5.1.3 Subsystem Interfaces

This system has a single one-way interface, it parses the RFID tag from the reader into a format that the Control system can use.

Table 5: Queue Display RFID API Subsystem interfaces

ID	Description	Inputs	Outputs
#07	RFID API	RFID Tag	RFID Tag Info

5.2 Queue GUI Subsystem

This subsystem handles all the data being displayed for the users to be able to successfully give the advanced notice for the staff to be able to dismiss the students.

5.2.1 Assumptions

The GUI has to be running at the same time and the database must have the data of the students who are assigned a RFID tag.

5.2.2 Responsibilities

This subsystem will handle events and triggers given by the control subsystem to be able to display all the relevant data of the student being picked up by the parent.

5.2.3 Subsystem Interfaces

This subsystem will be a two way with regards to the control subsystem, it will send events to update the visualized data.

Table 6: Queue Display Queue GUI Subsystem interfaces

ID	Description	Inputs	Outputs
#08	Update Roster	User Input	Events
#09	Visualize Tag	GUI Data	Screen Data

5.3 Control Subsystem

This subsystem communicates with the database subsystem and the queue display subsystem and vice versa. It also reformats the data.

5.3.1 Assumptions

There has to be working input systems to get the user input and a database and GUI to handle the events.

5.3.2 Responsibilities

This subsystem handles the callback functions. It should act as a control unit between the GUI and the database. It also checks for the safe use for security.

5.3.3 Subsystem Interfaces

This system has three, two-way interfaces. The first is connected to the Queue GUI recieving GUI events and returning data to the GUI. The second passes and receives from DB Control. The Third takes data from the reader and pushes to the DB control, while the return is formatted to display in the GUI.

Table 7: Queue Display Control Subsystem interfaces

ID	Description	Inputs	Outputs
#10	Control GUI	Events	Database Query
#11	Control Database	Database Response	QUI Data
#12	Readin Data	RDIF API Tag	Database Query

5.4 DB Control Subsystem

This subsystem handles all the data related to students needing to be dismissed by staff. This is the subsystem that handles forwarding and receiving information from the database.

5.4.1 Assumptions

All the data has been set up in the database and it should be receiving good data from the control sub system.

5.4.2 Responsibilities

This subsystem will return all the data requested by the Control subsystem querying the DB.

5.4.3 Subsystem Interfaces

This system has two, two-way interfaces. The first is connected to the database, sending queries and receiving responses. The second passes and receives from Control.

Table 8: Queue Display DB Control Subsystem interfaces

ID	Description	Inputs	Outputs
#13	Send Query	Database Query	Query
#14	Receive Results	Response	Database Response