Department of Computer Science & Engineering
The University of Texas at Arlington

Detailed Design Specification
CSE 4317: Senior Design II
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Team RFID
RFID Automated Student Pickup

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Revision History

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0.1	2.13.2018	AT, AH	Document creation
0.2	2.18.2018	AT, AH, KI, BK	Document updates
0.3	2.23.2018	AT, AH, KI, BK, NP	Image updates

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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.

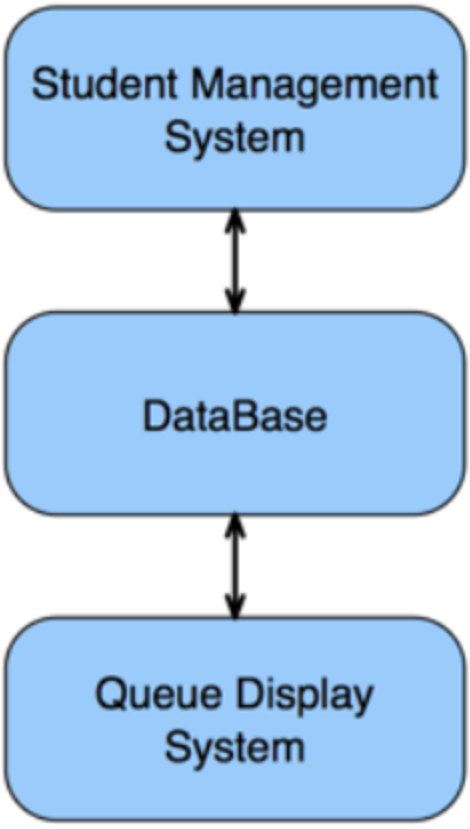

Figure 1: Overall Structure of System

3 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.

3.1 Layer Hardware

RFID integrated readers by Chafon Technology co. This system requires the hardware to begin the process of scanning tags. The two RFID readers are attached to two 8ft speaker tripods by Pyle. The RFID readers are connected in two ways. 1st: To a 9v/3A AC adapter to supply the readers power source, 2nd: A 10ft serial connection to usb for the reader to send the data back to the server for processing the RFID tags.

3.2 Layer Operating System

Windows 10

3.3 Layer Software Dependencies

Chafon Technology co. provided the base C# API for the reader, modified to render tags in a readable format.

3.4 RFID API Subsystem

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.

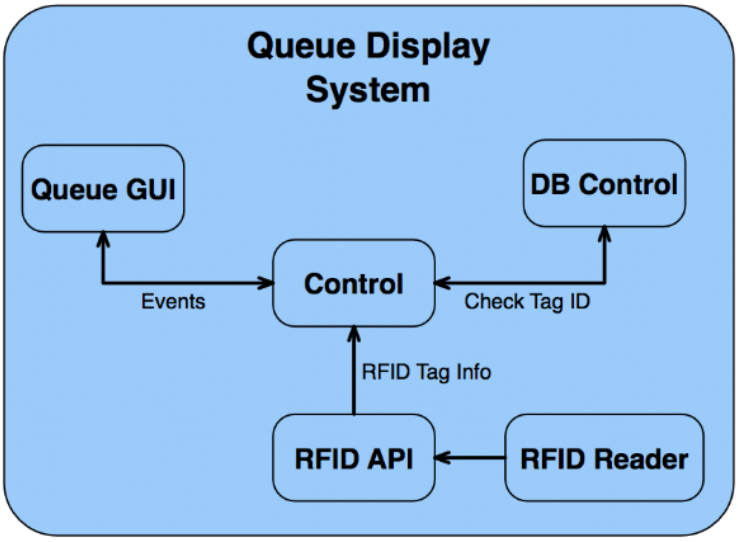

Figure 2: Queue Display Subsystems

3.4.1 Subsystem Hardware

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.

3.4.2 Subsystem Operating System

Windows 10

3.4.3 Subsystem Software Dependencies

C# Chafon RFID API

3.4.4 Subsystem Data Structures

HTTP message once the tag id has been read is broadcast to local host. Checking the Database if the tag matches the DB will retrieve the associated data to the queue gui

3.5 Queue GUI Subsystem

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

3.5.1 Subsystem Hardware

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.

3.5.2 Subsystem Operating System

Windows 10

3.5.3 Subsystem Software Dependencies

C# Chafon RFID API

3.5.4 Subsystem Data Structures

HTTP message once the tag id has been read is broadcast to local host. Checking the Database if the tag matches the DB will retrieve the associated data to the queue gui

3.6 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.

3.6.1 Subsystem Operating System

Windows 10

3.6.2 Subsystem Software Dependencies

C# Chafon RFID API

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.

4.1 Layer Operating System

Windows 10

4.2 Layer Software Dependencies

Python pyqt4 module

4.3 Queue GUI subsystem

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

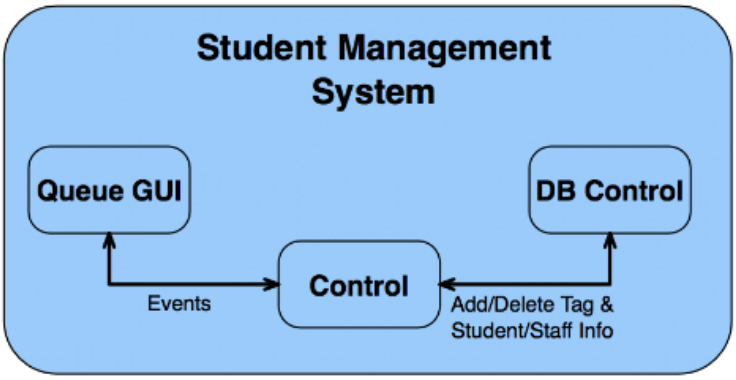

Figure 3: Student Management Subsystem

4.3.1 Subsystem Programming Languages

Python subsystem programming language

4.4 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. 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.

4.4.1 Subsystem Programming Languages

Mysql subsystem programming language

5 Database server Subsystems

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.

5.1 Layer Operating System

Windows 10

5.2 Layer Software Dependencies

Mysql

5.3 DB server 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.

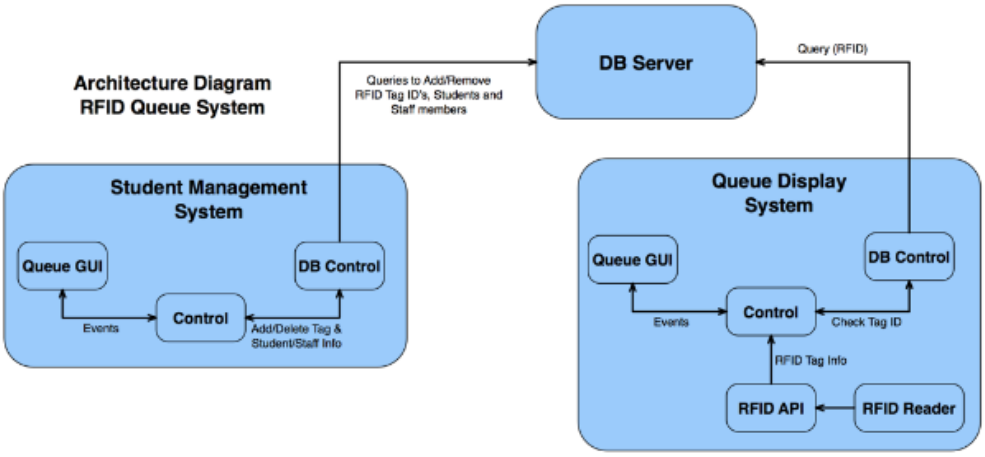

Figure 4: DB server high level

5.3.1 Subsystem Operating System

Windows 10

6 Appendix A