Software Requirements Specification

for

Class Rank & Sort System (CRSS)

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Revision History

Name	Date	Reason for changes	Version
CRSS	Sep. 21, 2019	Initial draft	0.1

1. Introduction

1.1 Purpose

This document presents the software requirements specification for Class Rank & Sort System (CRSS) (vision 0.1). It includes the whole system and subsystem's purpose, features, interfaces, functions, and constraints on operations with corresponding reactions of the system.

1.2 Document Conventions

This document follows the IEEE standard: IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications. IEEE Computer Society, 1998. Higher-level requirements are assumed to be inherited by detailed requirements. CRSS is the short for Class Rank & Sort System in the following content.

1.3 Intended Audience and Reading Suggestions

This document is intended for developers, project managers, marketing staff, users, testers, and documentation writers of CRSS.
Chapter 2: Overall description, describes the overview of the product, including product perspective, functions, constraints, and assumptions.
Chapter 3: External Interface Requirements, describes the logical characteristics of each interface between the software product and the users/ hardware/ other software components.
Chapter 4: System Features, describes organizing the functional requirements for the product by system features, the major services provided by the product.
Chapter 5: Other Nonfunctional Requirements, describe the product's requirements on performance, safety, security, quality, business.
We recommend the readers to read the chapter 2 first, chapter 3 & 4 is mainly for developers and testers, users should also read chapter 5.

1.4 Product Scope

CRSS is for assisting the various stakeholders with the ranking, sorting, scheduling and attendance documentation needs for the summer camp. It aims to effectively engage attendees in the classes offered to allow attendees or what we will refer to as "campers" to rank classes and enroll campers in their highest ranked classes (as long as there is availability).

This system is designed to support camp director and instructors and manage the class rankings and class schedules, also supports campers to submit their class ranking preference, checking their enrollment status. We build a database between campers, instructors, and camp director.

1.5 References

IEEE. IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications. IEEE Computer Society, 1998.

2. Overall Description

2.1 Product Perspective

Class Rank & Sort System (CRSS) is designed to help campers to rank classes and directors and instructors enroll campers in their highest ranked classes. It consists of various functions, such as ranking, sorting, scheduling and attendance documentation needs.

2.2 Product Functions

CRSS is designed for camp directors, instructors, and campers. There are distinctive functions for these three types of users.

Campers:
- User login: User login the system before any operation.
- Rank classes: Campers select and rank classes then submit the ranked classes.
- Check and print the class schedule: Camper checks his/her class schedule and he/she can print it.

Instructors:
- User login: User login the system before any operation.
- View and print class report: The instructors view and print the enrollment report of their classes, including class lists, campers and campers' schedules.
- View camper's schedule: The instructors view a camper's schedule by either enter a camper's name or select a camper in campers list.
- Assign late attendees classes: The instructors add late camp attendees to their classes.

Directors:
- User login: User login the system before any operation.
- Run the ranking process: The camp director run the ranking process to place campers in the classes based on their rankings.
- Set enrollment cap: The camp director sets the enrollment cap after discussing with the instructor.
- See class enrollment overview: The camp administrator sees the enrollment overview to analyze class and student needs.
- Reassign class: The camp administrator reassign the class of a camper.

2.3 User Classes and Characteristics

- Campers can use CRSS to submit their class rankings and check their schedules.
- Instructors can use CRSS to check their class reports, camper's schedule, and add campers to their class.
- Directors can use CRSS to run ranking process, arrange classes, and add or delete campers from a class.

2.4 Operating Environment

Operating system
- Windows
- Mac OS X
- Linux

Software
- Firefox
- Internet Explorer
- Safari
- Google Chrome
- Opera

2.5 Design and Implementation Constraints

The responsive front-end framework of CRSS is built using HTML 5. The server runs on Linux operating system, and works closely with the SQL database management system MySQL.

2.6 User Documentation

2.7 Assumptions and Dependencies

The client should follow the HTML 5 standard (see https://html.spec.whatwg.org) so that it can be accessed by most of the browsers.

3. External Interface Requirements

3.1 User Interfaces

3.1.1 Overview

The user interface should be user-friendly. Visual consistency needs to be ensured among all of the visual elements in the user interface. In order to be compatible with both desktop computer and mobile devices, responsive layout technique should be leveraged.
The user interface should be designed by keeping accessibility in mind, so that users with disabilities can easily access the system. All of the visual elements should be assigned with semantics. Alternative text should always be provided for images.

3.1.2 Sample GUI prototype

Login screen. Users need to select their role. Other functions are not available until the user login.

CRSS

Camper

Submit ranking

Ranking form	Class offered
❶ Class 2	Class 1
❷ Class 5	Class 2
❸	Class 3
❹	Class 4
❺	Class 5
⊕	Class 6
	Class 7

Submit

Submit ranking. The camper can drag offered classes to his own list and rank them.

CRSS

Camper

Class schedule

🖨 Print

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	**Class 1** Room 1 Instructor A Special instructions		**Class 3** Room 3 Instructor D Special instructions				
Afternoon	**Class 2** Room 2 Instructor B Instructor C Special instructions			**Class 4** Room 4 Instructor E Instructor F Special instructions			

Class schedule. Campers can view and print their class schedules once classes are assigned to them.

CRSS Instructor

Campers

Camper 1

Camper 2

Camper 3

Camper 4

Camper 5

Camper 6

Class schedule for Camper 3

Print

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Morning	**Class 1** Room 1 Instructor A Special instructions		**Class 3** Room 3 Instructor D Special instructions				
Afternoon	**Class 2** Room 2 Instructor B Instructor C Special instructions			**Class 4** Room 4 Instructor E Instructor F Special instructions			

Camper's schedule. Instructors choose from the camper list to see their class schedule.

CRSS Instructor

Class report

Print

	Location	Instructor(s)	Special instructions	Caps
Class 1	Room 1	Instructor A	Special instructions	50
Class 2	Room 2	Instructor B Instructor C	Special instructions	40
Class 3	Room 3	Instructor D	Special instructions	30
Class 4	Room 4	Instructor E Instructor F	Special instructions	40
Class 5	Room 5	Instructor G	Special instructions	50

Class report. Instructors can view and print a list of current classes.
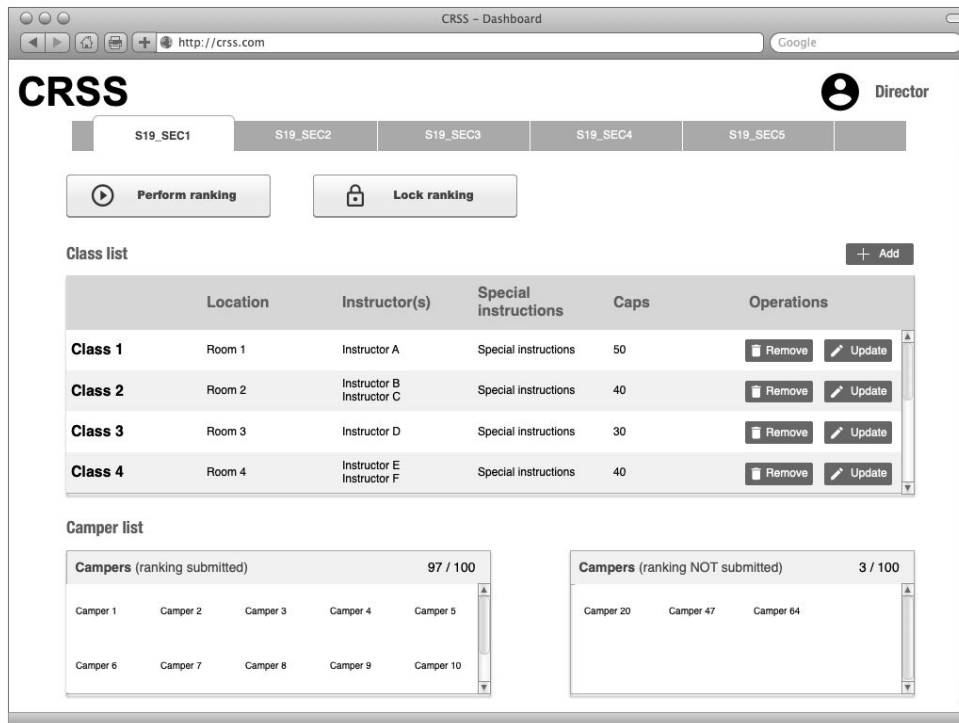
Director dashboard. Directors can have an overview of current classes and campers. Actions of performing ranking and locking ranking can be initiated from this page.

3.2 Hardware Interfaces

The client is able to operate on personal computers (including desktops and laptops) and modern mobile devices (including tablets and smartphones) with Internet connection. The client is responsible for handling all of the control interactions and sending instructions to the server, while no data is stored in the client.

The server needs to process the requests from clients and respond to them. All of the data are stored and managed by the server. In order to handle concurrent client requests, the server should be deployed on a high performance computer or computer cluster with high speed Internet connection.

3.3 Software Interfaces

The client should follow the HTML 5 standard (see https://html.spec.whatwg.org) so that it can be accessed by most of the browsers on both personal computers and mobile devices.

The server runs on Linux operating system, and works closely with the SQL database management system MySQL. The data that need to be processed and stored in the system include textual, time and ordinal data.

3.4 Communication Interfaces

The client will be accessed by web browsers. HTTP is used as the communication protocol between the server and the client. Any data exchange happening in an identity authentication process need to be encrypted. Email service will be used to send the system-generated username and password to the users.

4. System Features

4.1 User login

Name	User Login
ID	CRSS_001
Description	User login the system before any operation
Actors	Campers, instructors and camp directors
Organizational Benefits	Limit the system access only to users.
Frequency of Use	Each user can login as many times as they want
Triggers	User clicks the login button.
Preconditions	User account information is in the system.
Postconditions	User login into the system.
Main Course	1. System shows login page. 2. User enters the username. 3. User enters the password. 4. User selects the user type. 5. User clicks login button (see AC1, EX1) 6. System redirects to dashboard page.
Alternate Courses	AC1 User decides not to login now 1. Return to main course step 1.
Exceptions	EX1 User enters wrong username or password 1. System pops wrong username, password or user type notification 2. System redirects to main course step 1.

4.2 Campers rank classes

Name	Campers rank classes
ID	CRSS_002
Description	Campers select and rank classes then submit the ranked classes.
Actors	Campers
Organizational Benefits	Collect necessary data for further operations.
Frequency of Use	At least one for each camper, can be updated any time before the camp registration closes.
Triggers	Camper clicks the rank class button.
Preconditions	Camper has loginned the system. A list of classes offered is ready. Time is before the camp registration closes.
Postconditions	A form of ranked classes with timestamp is uploaded.
Main Course	1. System shows a list of classes offered but the camper has not selected in the form of floating bricks on the right and a list of selected ranked classes on the left (see AC1). 2. Camper drags class bricks from the right list to the left list, and a ranking number will appear next to the selected class brick counting from top as 1 to bottom. 3. Camper sorts the selected classes by dragging the class bricks in the left list or deletes the selected classes by dragging the class bricks from the left list to the right list. 4. Camper clicks the "submit" button to submit (see EX1) 5. System uploads the ranked classes with the current timestamp then pops out a successful submit notification (see EX2). 6. System redirects to main course step 1.
Alternate Courses	AC1 The camper has not submitted any courses. 1. System shows an empty list of ranked classes on the left. 2. Continue with main course step 2.
Exceptions	EX1 The total number of selected classes is less than 5 1. The submit button is not clickable. 2. Camper continues main course step 2. EX2 System fails to upload camper's ranked classes list. 1. System pops out a fail notification. 2. System redirects to main step 2.

4.3 Campers check and print the class schedule

Name	Campers check and print the class schedule
ID	CRSS_003
Description	Camper checks his/her class schedule and he/she can print it.
Actors	Campers
Organizational Benefits	Campers can check their class schedules and print their schedules if they want.
Frequency of Use	At least once for each camper. Can be as many times as they want.
Triggers	Camper clicks the class schedule button.
Preconditions	User logins as a camper. Camp directors have done use case 4.7
Postconditions	None
Main Course	1. System shows the class schedule for the camper (see EX1). 2. Camper decides to print and click "print" button (see AC1). 3. System prints the class schedule and continues with main course step 1.
Alternate Courses	AC1 Camper doesn't want to print the schedule now 1. System continues with main course step 1.
Exceptions	EX1 The camper has no decided class schedule 1. System shows no class schedule 2. System shows contact information of camp directors.

4.4 View and print class report

Name	View and print class report
ID	CRSS_004
Description	The instructors view and print the enrollment report of their classes, including class lists, campers and campers' schedules.
Actors	Instructors
Organizational Benefits	The instructors can know the enrollment status of their classes from the report, so that they can design their courses better based on the information such as enrollment numbers.
Frequency of Use	The enrollment report is available to the instructors when the camp registration closes, and they can view the report as many times as they need.
Triggers	Instructors select an option to view or print the enrollment report.
Preconditions	Classes are being offered by instructors. Campers are being placed into the classes.
Postconditions	Instructors view the enrollment report of their classes. Instructors are able to print the report.
Main Course	1. System prompts user to select the enrollment report of one section to view. (see AC1) 2. User confirms to view the enrollment report of a section. (see EX2) 3. User confirms to print the enrollment report of a section. (see EX1) 4. System redirects user to the page where the user can select other classes.
Alternate Courses	AC1 System decide the user have the instructor privilege. If not, pump a window with "instructor privilege needed", return to the login page.
Exceptions	EX1. The printer has problems. 1. System notifies user that what's wrong with the printer. 2. System prompts user to try again or quit printing. EX2. System fails on showing the report of the section that the user selects. 1. System notifies user that an error has occurred. 2. Return user to main course step 1.

4.5 View camper's schedule

Name	View camper's schedule
ID	CRSS_005
Description	The instructors view a camper's schedule by either enter a camper's name or select a camper in campers list.
Actors	Instructors
Organizational Benefits	The instructors can know campers' schedules.
Frequency of Use	The campers' schedule is available to the instructors when the camp registration closes, and they can view the report as many times as they need.
Triggers	Instructors select an option to view a camper's schedule, so that they can know their campers better.
Preconditions	Classes are being offered by instructors. Campers are being placed into the classes. Instructors know the camper's name they want to see.
Postconditions	1. Instructors can see a camper's schedule.
Main Course	1. System prompts user to select the camper's schedule to view. (see AC1) 2. User enters camper's name in the search bar. (see EX1) 3. User confirms to list all campers' names and select a camper. (see EX2) 4. System redirects user to the page of a camper's schedule.
Alternate Courses	AC1 System decide the user have the instructor privilege. If not, pump a window with "instructor privilege needed", return to the login page.

Exceptions	EX1. The instructor enters a name which doesn't exist.
	    1. System notifies user that the camper doesn't exist.
	    2. System prompts user to search again or qui.
	EX2. System fails on showing the report of the section that the user selects.
	    1. System notifies user that an error has occurred.
	    2. Return user to main course step 1.

4.6 Assign late attendees classes

Name	Assign late attendees classes
ID	CRSS_006
Description	The instructors add late camp attendees to their classes.
Actors	Instructors
Organizational Benefits	Late camp attendees can still have chances to participate in the camps.
Frequency of Use	Only if a late camp attendee ask to change it, not so frequent.
Triggers	The instructor click on the class edit page.
Preconditions	The camper didn't select classes before the deadline. The user logged in as instructor.
Postconditions	The user adds the campers to classes when the classes are not full. The user is informed by the system that the campers can't be added to the classes when the classes are full.
Main Course	1. In the main page, the user clicks class overview (see AC1). 2. The user clicks on the edit button of a class that the user teaches. 3. The page directs to a page showing the list of enrollment of that class. 4. The user clicks on add in the top of this list and input the camper's id. (see AC2, EX1) 5. Refresh show the list again.
Alternate Courses	AC1 System decide the user have the instructor privilege. If not, pump a window with "instructor privilege needed", return to the login page. AC2 System decide whether the class is full. If it is full, pump a window "please change the class cap". Return to class overview page.
Exceptions	EX1. System fails on changing the enrollment list. 1. System notifies user that an error has occurred. 2. System redirects user to the class overview page.

4.7 Run the ranking process

Name	Run the ranking process.
ID	CRSS_007
Description	The camp director run the ranking process to place campers in the classes based on their rankings.
Actors	Camp director
Organizational Benefits	Enroll campers in their highest ranked classes so that the summer camp will be more engaging to campers.
Frequency of Use	The ranking process will only be run once when the camp registration closes.
Triggers	The camp director selects an option to run the ranking process.
Preconditions	The camp registration is closed. Ranking forms have been collected.
Postconditions	1. Campers who submitted ranking forms are assigned to classes based on their rank preferences and timing of their submission (the time of submission of a class is the last time when its rank has been changed). 2. Campers will not be assigned more than 2 classes every day. 3. 3. Campers will not have 2 classes in the same time slot (both morning or afternoon). 4. Classes will not be assigned campers more than the limit of slots. 5. Campers are able to see their class schedules..
Main Course	1. System prompts user to confirm running the ranking process while showing the number of campers who have not yet submitted the ranking form (see AC1, AC2). 2. User confirms to run the ranking process now (see EX1). 3. System run the ranking process (see EX2). 4. System ask the user whether they want to lock the rank. 5. System redirects user to the page where they initiated this process.
Alternate Courses	AC1 System decide the user have the director privilege. Return to the main course step 2. AC2 System decide the registration deadline has passed and the ranking process has not been run. 1. If not, pump a window with hint, return to main course step 1..
Exceptions	EX1. User decides not to run the ranking process now.

	1. System redirects user to the page where they initiated this process.

	EX2. System fails on running the ranking process.
	    1. System notifies user that an error has occurred.
	    2. System redirects user to the page where they initiated this process.

4.8 Set enrollment cap

Name	Set enrollment cap.
ID	CRSS_008
Description	The camp director sets the enrollment cap after discussing with the instructor.
Actors	Camp director
Organizational Benefits	Changing the enrollment cap can help the organization offer class with more flexible size.
Frequency of Use	Each class will need to be input the cap at least once.
Triggers	In the class overview page, the camp director click on the cap field and selects to change it.
Preconditions	The class to be changed has already in the class overview page. Size is larger than or equal to the number of current registered campers.
Postconditions	1. The user can see the changed cap in the class overview page.
Main Course	1. In the class overview page, the user click on the "edit" button (see AC1). 2. In the edit page, the user double click the cap field and input the new cap.. 3. The user click on save (see AC2) 4. System redirects user to the overview page. (see EX1).

Alternate Courses	AC1 System decide the user have the director privilege.
	        Return to the main course step 2.
	AC2 System decide whether new cap >= current enrollment cap
	        If not, pump a window with "cap should larger than the current enrollment cap, save failed", Return to the main course step 2.

Exceptions	EX1. System fails on running the ranking process. 1. System notifies user that an error has occurred. 2. System redirects user to the page where they initiated this process.

4.9 See class enrollment overview

Name	See class enrollment overview
ID	CRSS_009
Description	The camp administrator sees the enrollment overview to analyze class and student needs.
Actors	Camp administrator
Organizational Benefits	Can analyze the class enrollment condition and student needs.
Frequency of Use	The camp administrator will check that everyday.
Triggers	The camp director click on the class overview button
Preconditions	The class to be changed has already in the system. The user logged in as administrator.
Postconditions	The user can see all classes' enrollment condition.
Main Course	1. In the main page, the user click class overview (see AC1). 2. The user click on "go to block overview" 3. The page direct to a page showing the enrollment of each block.
Alternate Courses	AC1 System decide the user have the director privilege. If not, pump a window with "administrator privilege needed", return to the login page.
Exceptions	EX1. System fails on showing the class overview. 1. System notifies user that an error has occurred. 2. System redirects user to the main page.

4.10 Reassign class

Name	Reassign class
ID	CRSS_010
Description	The camp administrator reassign the class of a camper.
Actors	Camp administrator
Organizational Benefits	The camper can have more flexibility in enrolling classes.
Frequency of Use	Only if a camper ask to change it, not so frequent.
Triggers	The camp director click on the class edit page.
Preconditions	The camper has already in a class she wants to drop. The user logged in as administrator.
Postconditions	The user can see the class's enrollment list.
Main Course	1. In the main page, the user click class overview (see AC1). 2. The user click on the edit button of a class. 3. The page direct to a page showing the list of enrollment of that class. 4. The user click on remove after the camper's name, or the user click on add in the top of this list and input the camper's id. (see AC2, EX1) 5. Refresh show the list again.
Alternate Courses	AC1 System decide the user have the director privilege. If not, pump a window with "administrator privilege needed", return to the login page. AC2 System decide whether the class is full. If it is full, pump a window "please change the class cap". Return to class overview page.
Exceptions	EX1. System fails on changing the enrollment list. 1. System notifies user that an error has occurred. 2. System redirects user to the class overview page.

5. Other Nonfunctional Requirements

5.1 Performance Requirements

5.1.1 Response Time

System should be able to respond to operations of all users quickly, which means it should show different data or tables and respond to editing in time. In case of multiple users operating at the same time, system should be able to respond to all of them smoothly.

5.1.2 Processing Speed

System does not need very quick processing speed. Only need to perform rank of campers' ranked class lists in seconds.

5.2 Safety Requirements

5.2.1 Operating Environment

All operations are done in a web environment.

5.3 Security Requirements

5.3.1 User Permission Requirement

Different levels of users can only access their own level data, i.e. campers can only read/write their ranked class list and read their class schedules, instructors can read/write class schedules and lists, camp directors can read/write all data.

5.4 Software Quality Attributes

5.4.1 Architecture

The whole system is divided into backend database and frontend interface.

5.5 Business Rules