WPI Recreation Center Database Manage and Service System

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Abstract

In this project, our group member managed to build a manage and serve system for WPI recreation center to offer better experience for the managers and the visitors. As a popular spot the WPI community members frequently visit, the equipment and rooms in the gym need a clearer manage system to screen the status, and an easier way for clients to navigate. We used the MySQL embedded in XAMPP to build the RMDBS backend and use Dreamware to build the websites available for visitors and mangers as the front end to realize the functions. To better distribute the authority and let our users make the most of the platform, we separated the users into mangers and visitors, and designed the unique login pages for them to register, check and update the related information.

Key words
Campus Recreation Center Database, Mange and serve system, manager and visitor interface

Overview

The project aims to build a data base application which can be used to offer a better service for WPI recreation center members and the mangers to manage equipment and rooms. WPI recreation center is a popular spot with a high volume of visiting members, having the equipment satisfying most visitors requirement for fitness and physical rehabilitation. However, visitors of WPI gym often find it hard to acquire the information of equipment. The only remote access to the gym information now is the website, (https://www.wpi.edu/student-experience/sports-recreation/sports-recreation-center), which cannot be updated in time, causing much inconvenience. Moreover, a number of have the problem of rust and loss of parts, making them out of service. Currently, there is no platform for visitors to know the completeness of the devices they want to use, or check the last time of sanitizing of the gym equipment before they physically visit the place. The primary motivation of our group member working on this project is to solve the inconvenience brought by the insufficient data management.

In addition, the managers of the recreation center are still using the paper based work style to deal with the high volume data. For instance, the front desk managers take record of guest visitors only by register their name and phone number on the notebook. But according to the policy of WPI's recreation center, each member is allowed to bring their guests only to times per year, the current data management system is in lack of backtracking for the record of invited guests and their affiliated members. Also, the inefficient reporting of equipment maintenance caused the devices can be out of work for weeks long. The equipment managers eager to have a platform to record and manipulate the status of facilities. Based on that thought, we decided to build a database management system which could be used for managers, visitors, workers and guests to utilize and maintain the gym efficiently.

The database application function we want to tackle is as below:

Users	Functions
Members	1. Check the gym open time for a specific date 2. Check the availability of equipment and rooms in recent time 3. Check the completeness and last sanitized time of equipment 4. Request to book or cancel room for a specific time 5. The predicted crowdedness 6. schedule or cancel appointment with trainer 7. Check the training record and comment
Gym room manager	1. Check the gym open time for a specific date 2. Approve or reject the room book request 3. Register guest information and visit time
Gym equipment manager	1. Register and update information of equipment (e.g. Equipment id, Function) 2. Record the completeness and maintenance requirement of equipment 3. Register each equipment maintenance and sanitize 4. Check the regular sanitize time and record
Trainer	1. Accept or reject training appointment with visitors 2. Record each time of training and leave comments

Our product will play an important role for the WPI recreation center, because it makes the members access to the gym information before they visit practically, and schedule the time for activities in advance. Also it let the managers get rid of the current inefficient paper-based manual registration, making it easier to keep track of equipment and room booking record. This application offers a platform to record the training

history and professional comment for both trainers and trainees. In a summary, our product would exclude the previous chaos situation in the WPI recreation center.

Background Material

- **Datasets**

1. Recreation center activity and room dataset

url: https://www.wpi.edu/sites/default/files/2020/02/21/MembershipHandbook.pdf
This hand book provided the floor distributions and room locations of WPI recreation center, which we can take use of to fulfil our entities with room information.

2. Members, trainers and managers

Names: randomly generated by python package(names) https://pypi.org/project/names/
DOB, ID number, phone number: randomly generate using python package (random)

3. Equipment

ID randomly generated by package(random)
Names and function are taken from common fitness equipment website: https://www.fitandme.com/guide-gym-equipment-names-how-to-use/

- **Frontend**

4. Website design

url: https://websitesetup.org/dreamweaver-tutorial/
We use Dreamware to design out website as the interface for clients to query information and manipulate the records and appointments. This tutorial provides the teaching of operation of Dreamware, realizing the requirement for our website interface.

5. Front-Backend connection

url: https://www.youtube.com/watch?v=3B-CnezwEeo&list=PL4cUxeGkcC9gksOX3Kd9KPo-O68ncT05o&index=2
We will use Xampp to connect our front end interface and Backend database to practice the manipulation in the website into our RMDBS. This tutorial teaches the operation of Xampp that would be useful to use for connecting the two ends.

6. PHP

url: https://www.php.net/manual/en/intro-whatis.php
We are using PHP as the scripting language for web development, this tutorial contains the majority of functions of PHP.

7. CSS

url: https://www.w3schools.com/css/
CSS is another scripting language we will use to build our website, we are going to refer the website for css operation and skills.

8. Dashboard JS API

url: https://help.tableau.com/current/api/js_api/en-us/JavaScriptAPI/js_api.htm
We try to apply JS code or url for dashborad both to put the dashborad on our web page. We will figure out which one is better.

9. Python SQL API

url: https://www.python-course.eu/sql_python.php
This is the tuition for python SQL API. We query significant updates on our database. This is preparation for email auto sending.

- **Backend**

10. Reference Book

Ramakrishnan, R., & Gehrke, J. (2000). Database management systems. McGraw Hill.

We refer to our reference book for most of the backend schema design and function realization.

11. MySQL

url: https://dev.mysql.com/doc/refman/8.0/en/tutorial.html

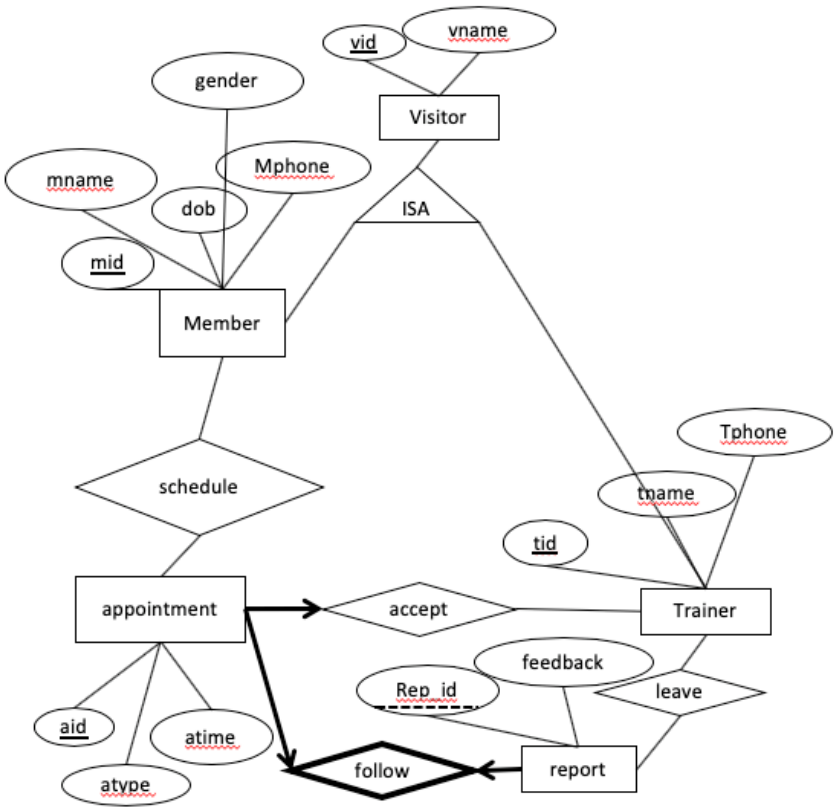
For the functions that we are not familiar with, we search the Oracle SQL tutorial to help us build the backend.

Approaches

- Backend

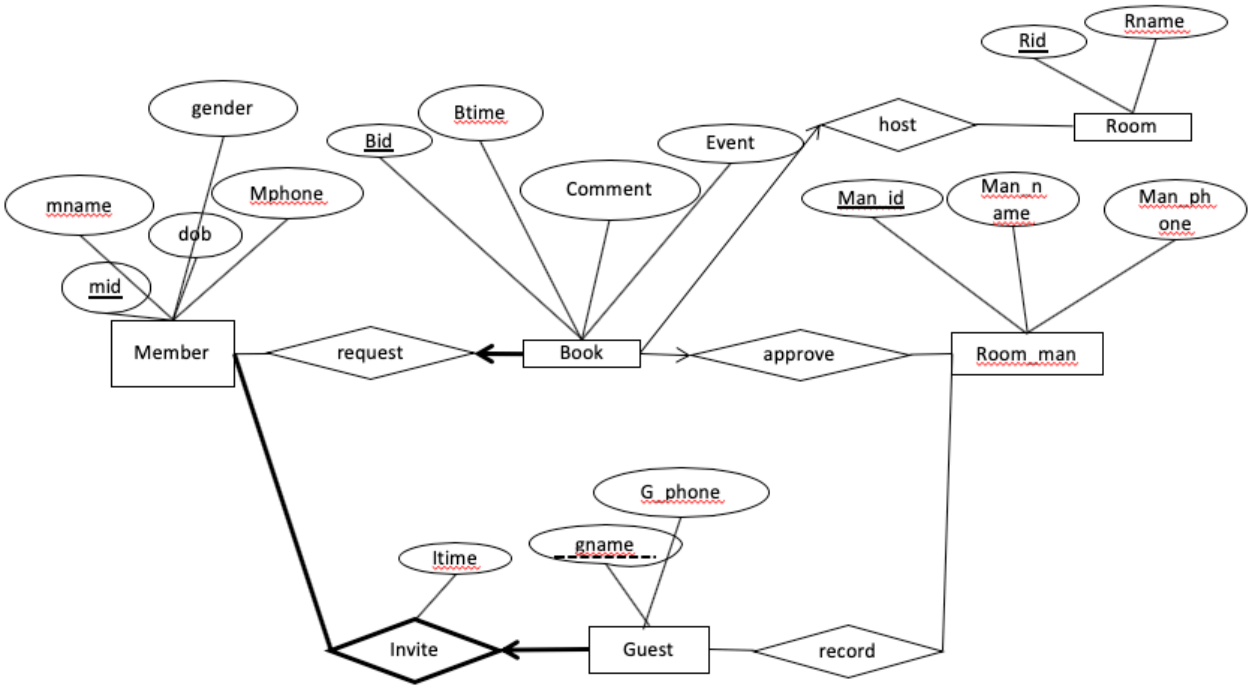
We designed our backend with a database manage system using MySQL, adding the entities correlated to the users and relational schemas to link the entities together.

1. Trainers and members



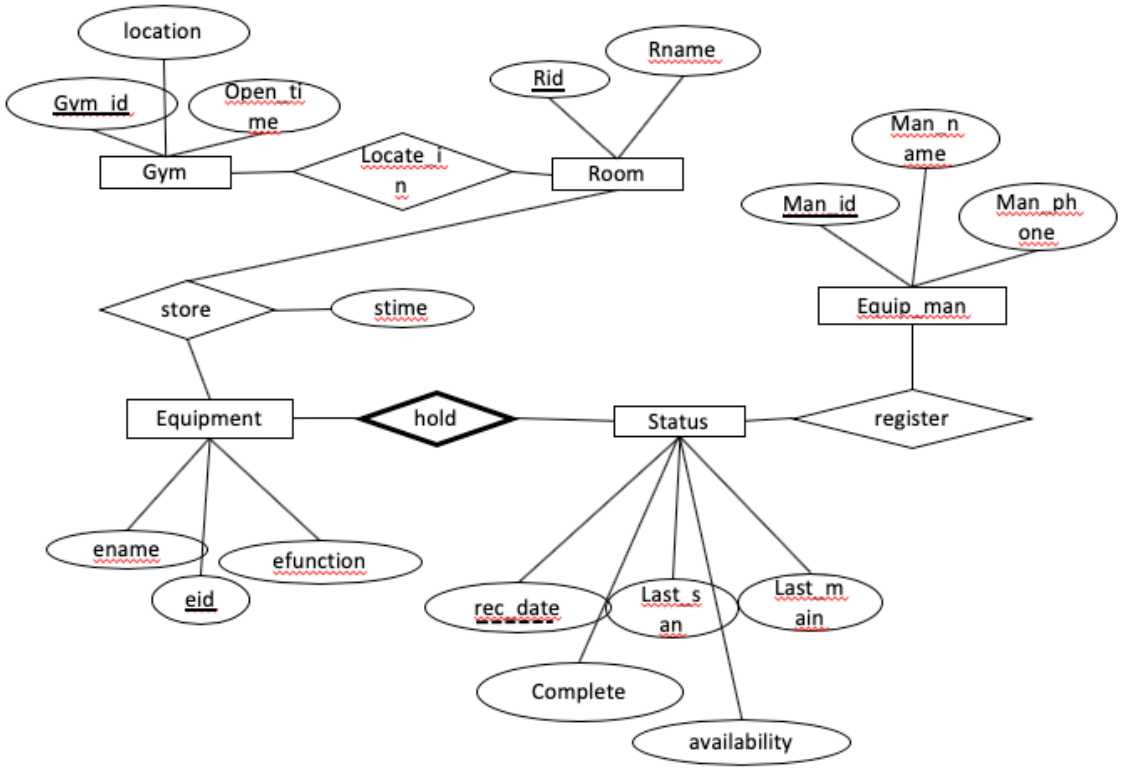
- Visitors are people visiting the recreation center, including member, and trainer.
- Trainers are licensed fitness instructors. Members can schedule appointment with trainers. Each appointment has an appointment id, training type and time. Trainers can accept or reject the appointment. After each training, the trainer needs to make a report including the feedback to trainee.

2. Invite guest and room booking



- According to WPI's office, each visitor is allowed to bring one guest 2 times per year. The guest visit is recorded by the room manager.
- Every room have its room id and name. Visitors can book the room during the available time. Each book needs to be approved/rejected by a room manager. Visitors are responsible to name the event and comment on the reason for room booking.

3. Equipment management



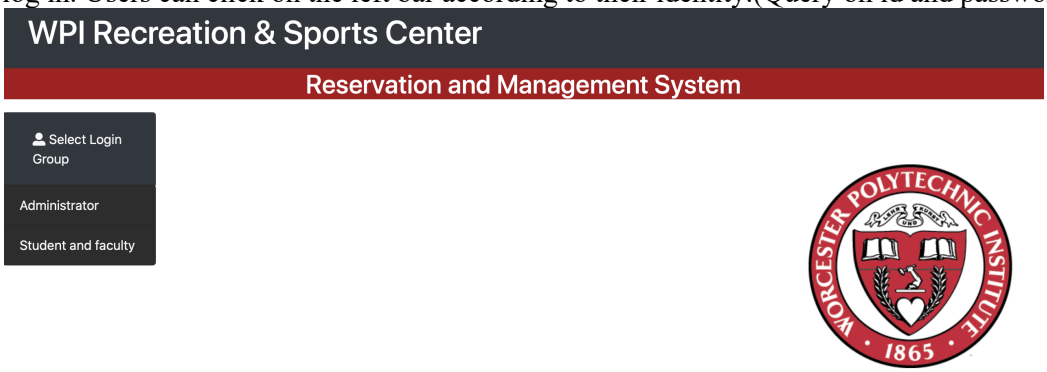
- We divided the recreation center into several gym according to their main function and location(e.g. pool, weight training, ball games). Each gym has the unique gym id and open time.
- Equipment are stored in rooms (including open area). Each equipment has the unique id. The name and main functions are also the attributes of equipment.
- Equipment having the status recorded by the recording manager. The status provide the information of record date, completeness, availability, last sanitized date, last maintenance date.

Relation Schemas	Meaning and Additional Information
Visitor(vid: string, vname: string) Primary Key: vid Candidate Key: None Foreign Key: None	Register the id and name of visitors
Member(mid: string, mname: string, DOB: date, gender: string, mphone#: string) Primary Key: mid Candidate Key: None Foreign Key: mid	Register the information of the members
Invite_guest(mid: string, gname: string, gphone#: string, v_date: date, man_id: string) Primary key: mid, gname Candidate Key: None Foreign Key: mid, man_id	Register the information of the guest and the corresponding member
Trainer(tid: string, tname: string, tphone#: string, strengths: string) Primary key: tid Candidate Key: None Foreign Key: tid	Register the information of the trainers
Appointment(aid: string, mid: string, tid: string, atype: string, atime: timestamp) Primary Key: aid Candidate Key: None Foreign Key: mid, tid	Register the training appointment
Leave_report(rep_id: string, feedback: string, aid: string, tid: string) Primary Key: aid, rep_id Candidate Key: None Foreign Key: aid, tid	Record the training record for each appointment
Room_man(man_id: string, man_name: string, man_phone#:string) Primary Key: man_id Candidate Key: None Foreign Key: None	Store the information of room manager
Equip_man(man_id: string, man_name: string, man_phone#: string) Primary Key: man_id Candidate Key: None Foreign Key: None	Store the information of equipment manager
Gym(gym_id: string, location: string, open_time: timestamp, close_time: timestamp) Primary Key: gym_id	Record the basic information of a gym area

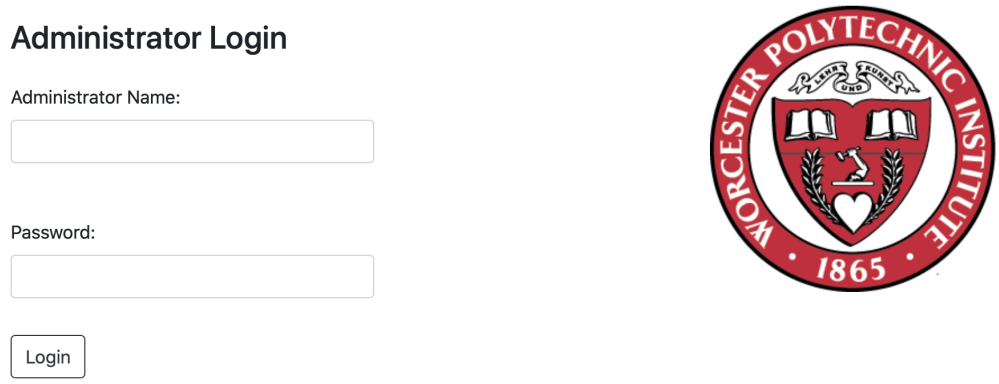
Candidate Key: None Foreign Key: None	
Room(Rid: string, Rname: string, gym_id: string) Primary Key: Rid Candidate Key: None Foreign Key: gym_id	Record the information of rooms in a gym
Equipment(eid: string, ename: string, efunction: string, stime: date, Rid: string) Primary Key: Eid Candidate Key: None Foreign Key: Rid	Record the information of Equipment
Equip_status(eid: string, rec_date: date, completeness: string, availability: string, last_san: date, last_main: date, man_id: string) Primary Key: Eid, rec_date Candidate Key: None Foreign Key: Eid, man_id	Store the information of the status of equipment
Book(bid: string, btime: timestamp, comment: string, event: string, vid: string, man_id: string) Primary Key: Bid Candidate key: None Foreign Key: vid, man_id	Store the information of Room booking

- Frontend

We designed an user interface to allow regular members(students and faculty)/administrator(managers) to log in. Users can click on the left bar according to their identity.(Query on id and password)



Manager login interface



Managers can add the equipment/room information(insert)

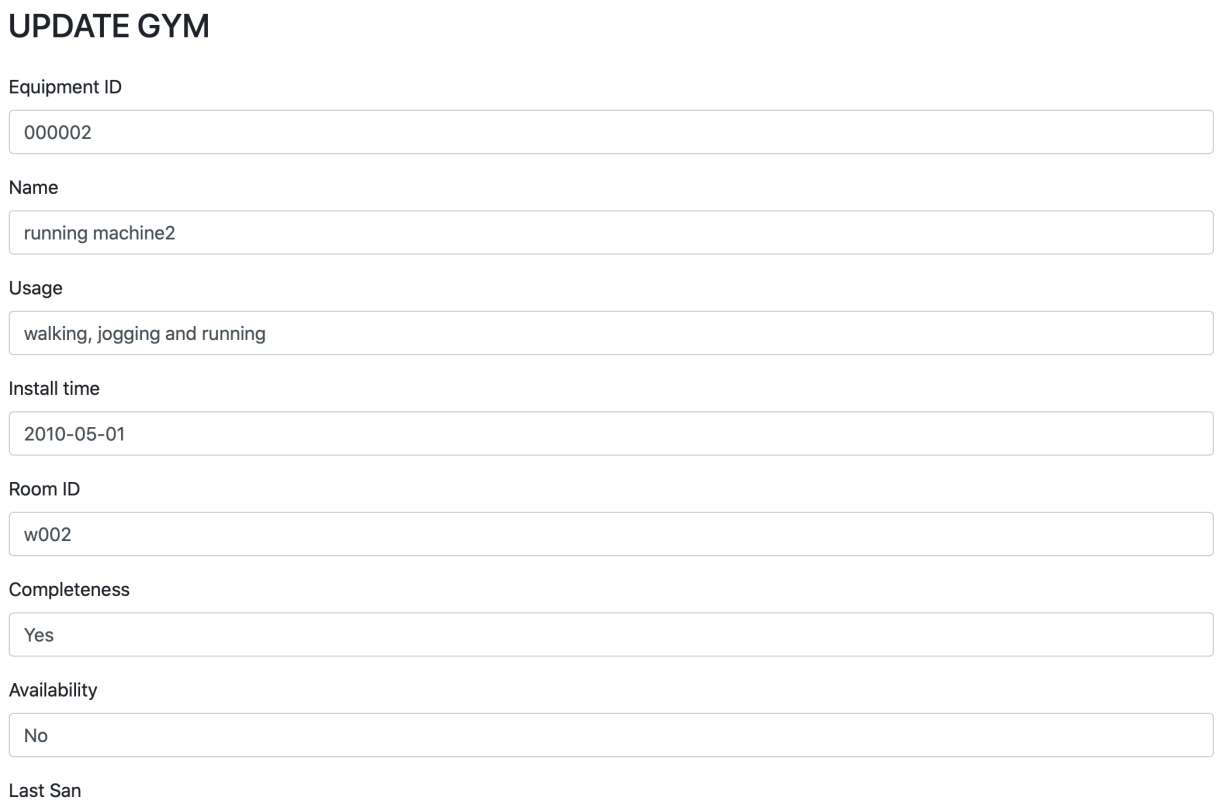
Check the current equipment list(query all the equipment)

Equipment ID	Name	Usage	Install time	Room ID
000001	running machine1	walking, jogging and running	2010-05-01	w002
000002	running machine2	walking, jogging and running	2010-05-01	w002
000003	running machine3	walking, jogging and running	2010-05-01	w002
000004	running machine4	walking, jogging and running	2010-05-01	w002
000005	rower1	rowing	2010-05-03	w004
000006	rower2	rowing	2010-05-01	w004
000007	elliptical machine1	running	2010-05-01	w002
000008	elliptical machine2	running	2010-05-01	w002
000009	elliptical machine3	running	2010-05-01	w002

Check the status of the equipment(query on equipment id)

Equipment ID	Name	Usage	Install time	Room ID	completeness	Availibility	Last San	Last Maintainance	Manager By	Update	Delete
000002	running machine2	walking, jogging and running	2010-05-01	w002	Yes	No	2020-05-03	2020-02-03	415230033		

Managers can update the gym information, which is the fitness area inside the recreation center (update gym table)



Managers(front desk) can add the guest information as the record into the database (insert)

Managers can search/check and delete the guest's visiting record. (query on guest's name)

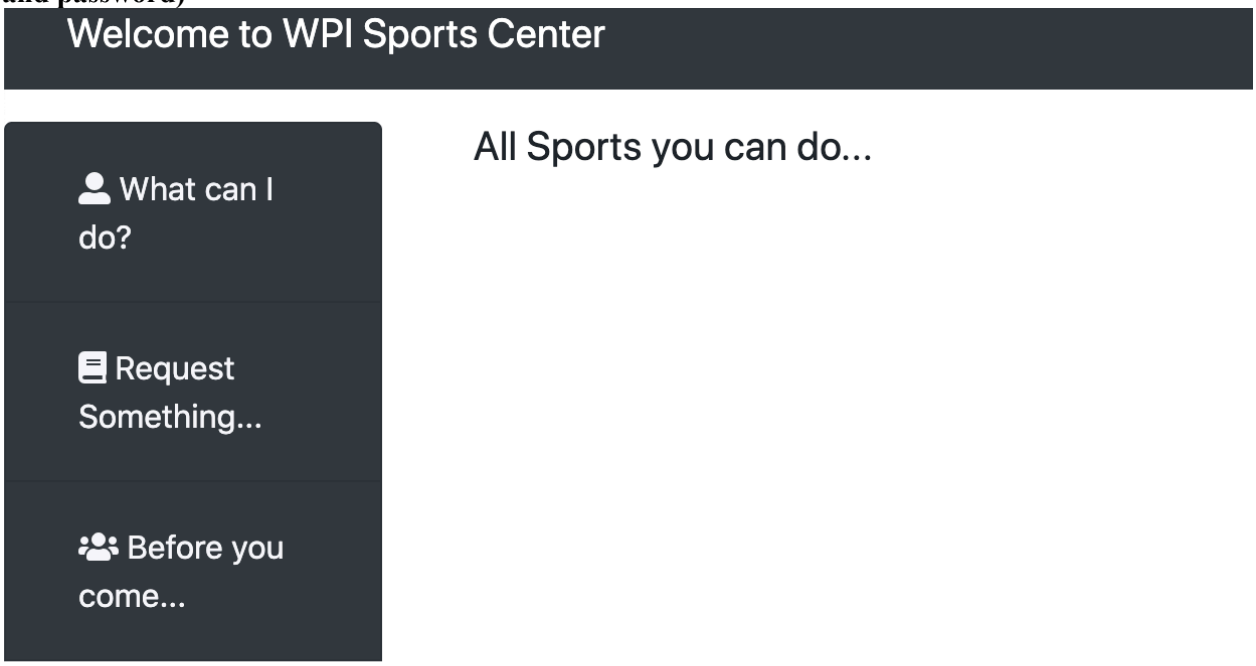
SEARCH GUEST

tai zhou

MEMBER ID	GUEST NAME	VISIT DATE	GUEST PHONE NUMBER	MANAGER ID

mid	gname	v_date	gphone	man_id	Delete
917169278	Tai Zhou	2020-09-01	131	337137134	
917169278	Tai Zhou1	2020-09-03	131	337137134	

Regular members login to the interface and it shows the function list they can acquire(query on id and password)



If a student want to reserve a room, he or she can use the following interface. (query and insert)

gym_Id	gym_name	location	rid	Reserve
1004	weight areas1	third floor	w002	

Please Fill the blanks for details

Start Time

yyyy-mm-dd hh-mm-ss

End Time

yyyy-mm-dd hh-mm-ss

Please explain what for:

At most 100 chars

Member ID

Name

Email

Submit

Event Next Week

Room are not availiable while events

Event_Name	From	To	Room
Swimming race	2020-05-12 09:00:00	2020-05-12 12:00:00	a001

A student can search the trainer list for training class appointment. (query and insert)

Search trainer

Enter trainer name or skill you are looking for

Trainer name	Strength
Linda Huff	fat reduce
Jim Renz	limp power training
Raymond Gilmore	core power training

trainer ID	trainer Name	Contact info	Strength	Reserve
154519055	Linda Huff	6529168904	fat reduce	

Trainers can accept/reject the appointment using this interface(query, insert, delete)

Trainer ID	Member ID	Trainer Name	Member Name	Start Time	End Time	Email	Approve	Decline
154519055	917169278	Linda Huff	Tai Zhou	2020-05-05 00:00:00	2020-05-05 08:00:00	tzhou4@wpi.edu		
561810342	917169278	Jim Renz	Tai Zhou	2020-05-05 00:00:00	2020-05-05 08:00:00	clouderdna@gmail.com		

The ongoing request will show as pending in the backend, the approved one will show as 'approved', the rejected one will be deleted

+ Options

	tid	mid	mname	tname	s_time	e_time	email	status
Edit Copy Delete	154519055	917169278	Tai Zhou	Linda Huff	2020-05-05 00:00:00	2020-05-05 08:00:00	tzhou4@wpi.edu	pending
Edit Copy Delete	561810342	917169278	Tai Zhou	Jim Renz	2020-05-05 00:00:00	2020-05-05 08:00:00	clouderdna@gmail.com	pending

+ Options

	tid	mid	mname	tname	s_time	e_time	email	status
Edit Copy Delete	154519055	917169278	Tai Zhou	Linda Huff	2020-05-05 00:00:00	2020-05-05 08:00:00	tzhou4@wpi.edu	approved
Edit Copy Delete	561810342	917169278	Tai Zhou	Jim Renz	2020-05-05 00:00:00	2020-05-05 08:00:00	clouderdna@gmail.com	pending

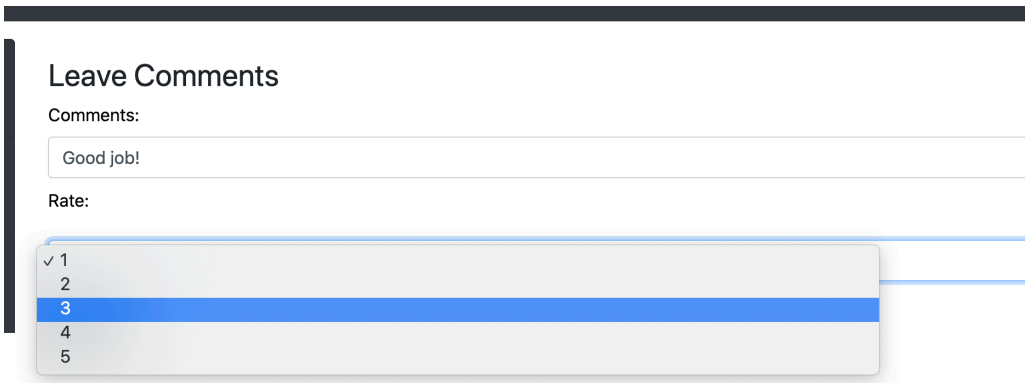
Check all *With selected:* Edit Copy Delete Export

Trainees should leave the comments on each training appointment(query and insert)

Your feedback is important for us to improve our community. All your personal information will not be record.

Please make your comments be fair enough.

Trainer Name	Skill at	Rate	write comments
Linda Huff	fat reduce	3.75	
Jim Renz	limp power training	4.00	
Raymond Gilmore	core power training	4.00	



Problems

1. Data Source

Address: At the beginning of the project, we planned to visit the WPI recreation center practically to register the data that will be used to fill out the database. But with the outbreak of COVID-19, the recreation center closed thus we decided to use randomly generated data with the real room floor location, as well as the open access dataset of other recreation center.

2. Frontend and backend connection.

Address: We applied Apache Xampp to connect the frontend and backend. This System allow us to manually edit database through backend and use SQL query. Also we can through frontend webpage to add tuples or update data manually.

3. Key constraint violation when edit database through fronted if the user do not know the database schema.

Address: We applied key word option card in PHP script to constraint key value violation

Validation

1. how much of it is now running?

It's 100% running now.

2. what core functionalities/accomplishments of your product do provide?

Training appointment, Room management and reservation, Equipment management and status update

3. which part of it is not working yet?

None.

4. what experiments and /or sample data sets have you run to test your product?

We ran the experiments by testing every page manually.

5. how will you know that your product works at the end?

We will invite the works and the student members/ trainers to try our product after the recreation center reopens.

Lessons Learned

1. Describe your experience what you have learned so far?

- Product design:

A user focused Database Management System need to consider every aspect of potential users, instead of narrowing the scope towards one role

- Back end:

Designing a database product requires us considering every detail and combining different functions in a reasonable way.

- Front end:

Since this project is facing to user without database knowledge, we have tried to make our frontend easy to use and avoid confusing key value constraint as much as possible.

2. What skills you are practicing or new tools and techniques you are working with, that you did not know before?

- Design a database backend from scratch
- Adjust the key value constraint to make all entities have the proper relations.
- Design and create the webpage as an user interface
- Connect the webpage and database

Conclusions

- List out all the functions/capabilities in the task table that have been completed.

We have achieved the main functions that we planned at the beginning of the project starts, shown in the following task table

Functions	Information	Status
Gym availability	Open time	Done
Equipment management	Equipment id, type, location, maintenance, etc.	Done
Equipment availability	Available or not, location, etc.	Done
Room schedule management	Room number, schedule, contact person information, last sanitized time, etc.	Done
Room availability	Available or not, ready to book or not, available time, etc.	Done
Visitor management	Visitor name, id number, related student id, etc.	Done
Room Reservation	Members book room for events	Done
Training appointment	Members request training class schedule with trainers	Done

- List what you have NOT managed to accomplish (if any) that your group was planning to finish them by the end of the semester.

1. Crowdedness prediction
   We planned to create the function that predict the crowdedness at the specific time windows. Because we cannot find the real-time data that visitors visiting the recreation center, we decided to cancel this function.
2. Email notification
   We planned to add the email notification function to our database, thus the users can be informed via email if there is new request or the status has been changed. However, due to the lack of time and the limited data resources, we decided to postpone it to the future work.

Future work

It is necessary to invite the members and managers of WPI recreation center to test our product and collect their feedback to improve the design and interface of the system. Adding the functions that is more user-friendly such as the email notification and crowdedness to our product is also crucial for the future development.