Connor, Rachel, Yumna, and Kate
Dr. Lim
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CSC 312

Project Proposal: Room Wrangler

I. **Introduction**
   A. What is the title of your project?
      1. RoomWrangler
   B. What is the goal of the project?
      1. Our primary goal is to develop a centralized system for reserving classrooms on university campuses in order to improve upon the lack of organization on many campuses.
   C. What is the motivation for this project?
      1. Right now, there is not a centralized way to reserve or check into classrooms at Davidson. We feel that a centralized system would make the process of finding a room to hold class, office hours, AT, group projects, clubs, or to study much simpler.
   D. Who are the customers/users?
      1. Center for Teaching and Learning
         a) It could be very helpful for them in organizing ET hours. Currently the schedule they have seems to be somewhat disorganized and inaccurate.
      2. Davidson students
         a) Right now, there's no way to reserve study spaces or classrooms in Chambers. Even if you are able to find a spot, you may end up getting kicked out of the room by a teacher or an ET. Thus, being able to actually see what spots are available and reserve one would be very useful.
      3. Professors
         a) It can be hard for professors to find classrooms. Often times, they have to just go around checking to see if a classroom is available, and don't really know how much time they have a room for. Having a system to help evaluate this would be incredibly useful for teachers.
   E. What development process will you be using?
      1. Agile – partially based on Scrum
II. **Novelty**
   A. Existing Software 1 – EMS (Event Management System)

1. https://support.ti.davidson.edu/hc/en-us/articles/360047714453-EMS-Event-Management-System
2. Describe the software
   a) EMS allows you to request to reserve a space for an event
      (1) Available spaces include athletic facilities, certain classrooms, Union rooms, lounges, etc.
   b) EMS shows the features of each facility or room and allows you to search by feature, building, etc.
      (1) They also show photos of the space
      (2) But they don't show how many of each feature there are (ex. How many whiteboards)
   c) EMS is not Davidson-specific. It is a software that Davidson utilizes along with many other colleges
3. Describe how we're going to do better – features they lack, etc.
   a) EMS does not support a "check-in" feature – reservation requests must be approved
   b) The approval/request system does not change for different types of reservations (i.e. informal reservations such as checking into a room)
   c) EMS only offers a few of the classrooms in academic buildings
      (1) This is suitable for major events, but not for smaller use cases such as office hours, AT hours, group project meetings, or personal use
   d) AT and office hour reservations do not show up on the calendar
   e) Overall, EMS is a good system for major events, but not for smaller-scale reservations. Additionally, EMS is hard to find and navigate

B. Existing Software 2 - LibCal
   1. https://davidson.libcal.com/reserve/library
   2. Describe the software
      a) LibCal is a Davidson-specific system for the Davidson College Library
      b) Allows user to reserve 1 of 4 rooms for up to three hours
      c) Shows a picture of the room
      d) Shows whether rooms have electricity and / or are accessible
      e) Sets limits on how long you can reserve a room and how many times in a day you can reserve a room
   3. Describe how we're going to do better – features they lack, etc.
      a) LibCal is restricted to the library; our product will be campus-wide and feature options for all study spaces across campus

b) Our product will show more helpful features of the room beyond electricity and accessibility

III. Customer Need

    A. General Questions:

        1. Who is the primary customer outside the team?

            a) Davidson students and professors

            b) Other colleges

        2. Who are the secondary stakeholders?

            a) Registrar

            b) Center for Teaching and Learning

            c) Dr. Heyer (liaison between faculty and Davidson T&I)

            d) Davidson T&I

        3. What do the stakeholders want? Why?

            a) Stakeholders might not use our software for scheduling purposes directly, but our software system could potentially make their life easier by relieving their scheduling duties. Currently they can't really see everything all together, so this could be a very powerful tool to help them organize all the schedules.

        4. What is their desired overall experience?

            a) Students and professors

                (1) Want a centralized system for reserving an academic room

                (2) Want to be able to quickly reserve a room without needing to wait on unnecessary external approvals

                (3) Want to be able to see available rooms without having to physically check if a room is occupied (knocking, opening doors, listening in)

            b) Registrar, Davidson T&I, etc.

                (1) If a student or professor wants to know if a room is available at a specific time, they could use our app instead of asking the Registrar

                (2) Davidson T&I might have interest in our app, since they coordinate software at Davidson.

                (3) The registrar could see all potential conflicts when scheduling, preventing any confusions and having to communicate back and forth with the requester.

    B. User Requirements

        1. Write at least 5 SMART user stories based on the stakeholder's needs and wants

a) As a student, I want to search for available rooms with certain features so that I can quickly check into an open room with the features I need.
b) As a student, I want to see all the reservations made for a specific room today so that I know how long I can stay in the room.
c) As a student, I want to see a list of my current and upcoming reservations so that I don't forget which room I reserved.
d) As a professor, I want to quickly find a room with the technology I need to share my screen with a student
e) As an AT who usually holds sessions outside, I want to make a last-minute room reservation so that I can meet inside when the weather is bad

C. Acceptance Tests
1. Write at least 5 acceptance tests for the user stories using the template
   a) **Given** the user is on the Search page **when** the user searches for "All Rooms" **then** all rooms should display in the correct format with the correct information
   b) **Given** the user is on the Search page **when** the user performs a search for rooms with certain filter criteria **then** only the rooms that match the filter criteria should display in the correct format with the correct information
   c) **Given** the user has searched for rooms **and** at least one room is displayed in the search results **when** the user selects a room **then** the "Room Details" page should display in the correct format with the correct information
   d) **Given** the user is on the "Room Details" page for a specific room **when** the user selects the "View Calendar" option **then** the "Calendar" layout should display for the given room with the most up-to-date information about all reservations
   e) **Given** the user is on the "Room Details" page for a specific room **when** the user selects the "Reserve" option **then** the "Reserve a Room" page/section should be displayed
   f) **Given** the user is on the "Reserve a Room" page **when** the user selects a day and time for the reservation **and** confirms the reservation **then** the reservation should be reported to the database

IV. **Project Goals**
   A. Customer Problems and Benefits
   1. What customer problem have you chosen to address?
      a) Customers struggle to find and reserve a room to host class, office hours, AT, group projects, clubs, or to study.
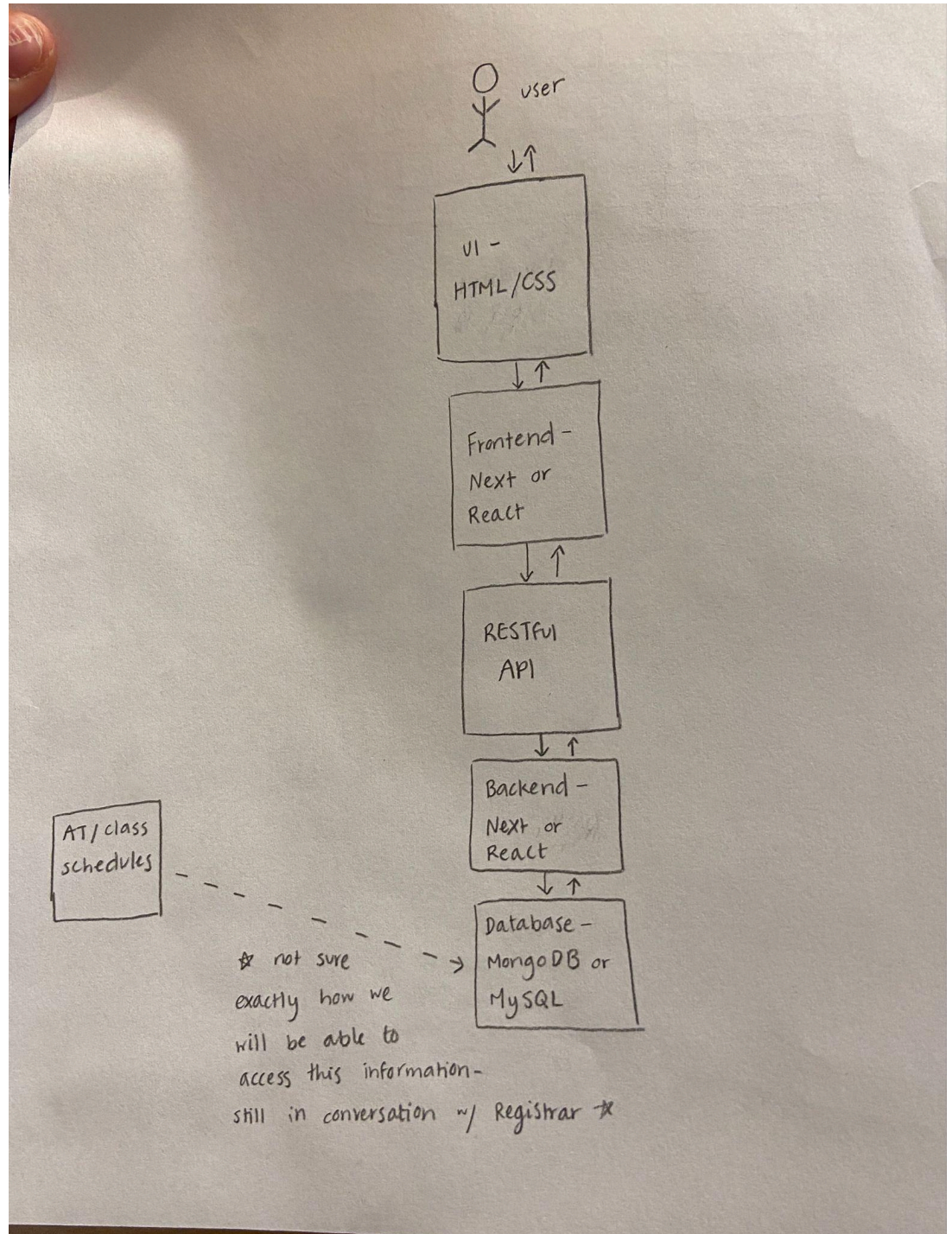
2. In implementation-free terms, what user benefit will the system provide?
   a) This system will provide an easy to use and centralized room reservation system. RoomWrangler will help users choose the right room by showing room features, and allow for instantaneous reservations so that informal reservations don't have to be approved unless necessary.
3. How will the benefit support the customer's desired overall experience?
   a) The system will centralize room reservations across campus, ensuring that the users do not have to switch between platforms in order to look at or reserve various rooms.
   b) By showing room features, our system will support customers in choosing the space best suited for their needs
   c) Instantaneous reservations allow users to make plans on the fly and adjust plans as needed – very important for college students

B. Measure of Success
   1. Who outside the team have you tested the idea on?
      a) CTL and Dr. Lim seemed to like the idea
      b) Talked to fellow students who shared grievances about current room reservation system
   2. How will you know whether the customer got their desired benefits?
      a) Meetings / email correspondence with customers
      b) Survey for customer satisfaction
   3. What are your customer-centric measures of success?
      a) We will do usability testing on students outside of our project to make sure our software is easy to learn and easy to use. We will also monitor their experience to see if using our software eliminates the problem we intend to address.

V. **System Description**
   A. Block Diagram:

user

UI –
HTML/CSS

Frontend –
Next or
React

RESTful
API

Backend –
Next or
React

AT / class
schedules

Database –
MongoDB or
MySQL

☆ not sure
exactly how we
will be able to
access this information –
still in conversation w/ Registrar ☆

1.

B. System Introduction / Main Elements
1. RoomWrangler will be able to send information about reservations to our database, and will query for information about rooms and reservations from our database. We will also need to sync with the Academic Calendar / AT and office hours meetings.
2. We don't know exactly how this information is stored currently, so we'll

have to discuss this with the registrar. Ideally, we could input data about AT/class schedules directly into our database and display those calendars that way in RoomWrangler. If not, we might be able to pull the necessary information from these schedules and input them into RoomWrangler directly.

VI. Solution Approach

A. Briefly describe how the system will work.
   1. User logs in > User searches for a room based on building and features > System returns results > User selects a room from the results > System displays "Room Details" page layout > User can choose "View Calendar" or "Reserve".
      a) View Calendar > System displays calender of reservations made in that room (similar to any calendar app)
      b) Reserve > User fills out information about reservation > Information is uploaded to the database and application is updated
B. What technologies (platform, tools, libraries, programming languages) will you use and why?
   1. React for application development since it is full-stack and we have some familiarity with other javascript frameworks
   2. MySQL for database management, since Yumna and Kate are familiar with MySQL
      a) Will likely use DBeaver platform
C. How will you test and measure the adequacy of your test strategy?
   1. Unit testing with a testing framework such as Jest
   2. End-to-end testing of the experience
   3. A developer will review all PRs before merge by taking a screen recording of the experience and carefully documenting changes made
   4. Regression testing at the end of each sprint
   5. Usability testing at the end of each sprint by having students outside of the group use the product

VII. Project Management

A. What development process will you use (Scrum, XP, Scrum+XP, etc.)?
   1. We plan to primarily follow the Scrum development process, with either 1 or 2-week sprints
B. What are the reasons behind your choice?
   1. Scrum is widely approved of across the computer science industry
   2. Sprints will keep us on track
C. Describe your (brief) goals for each iteration (Proposal-Report 1, Report 1 - Report 2, and Report 2 - Final)
   1. Proposal through Report 1

a) Database setup
   (1) Determine entity-model relationships for our database
   (2) Connect our database to the frontend
b) Set up skeleton of web app
   (1) Create various
c) Create "search for available room" functionality
   (1) Support filtering by room features, floor, building – in the frontend, and in the backend
   (2) Support filtering by windows of time that the room is available
      (a) Now
      (b) Specify multiple time slots
d) Reserve a room functionality
   (1) Personal use
      (a) Ability to select a room from search results
      (b) Ability to specify the length of reservation or the end time of reservation
   (2) Ability to specify Type of reservation – possible options include Personal, Club, AT, Office Hours, Group Project
   (3) Ability to reserve a room for future use – might restrict this to be only for AT, Office Hours, and Club meetings
      (a) Communicate with stakeholders to see if they want to keep the reservation system for AT hours through the registrar – if so, we might not allow AT room reservations
e) Data importing
   (1) Add information about all classrooms in ONE academic building
2. Report 1 through Report 2
   a) Database maintenance
      (1) Determine how to handle expired reservations – delete? Save as a history of reservations?
      (2) Support room usage analytics
   b) Reserve functionality
      (1) Determine if we want to support "Repeat reservation" (weekly, or on custom days)
   c) Ability to see "My Reservations" for a specific organization/group that made a reservation
      (1) e.g. search for "CSC 221 AT" and see:
          Chambers 1060   M <hours> W <hours>

        d) Calendar layout
            (1) Ability to show/hide name of person reserving the room on the calendar
            (2) Sync with the Academic Calendar
            (3) Major events, classes, and AT/Office Hours should appear on the calendar
        e) Ability to see "My Reservations"
            (1) Room, Day(s), Time, Type
    3. Report 2 through Final:
        a) Room Information layout
            (1) Add the ability to see images of the rooms when clicking on a room.
            (2) Potentially have a panorama view of the rooms to see everything in greater detail.
        b) Reservation functionality
            (1) Add "Warnings" when you try to reserve a room with a time slot that conflicts with an existing reservation
        c) Data importing
            (1) Add information about all academic buildings
        d) Publish application

VIII. Team Management

  A. Roles
    1. What are the planned roles for the team members? What are the reasons for your decision?
        a) Connor – Developer
        b) Kate – Developer
        c) Rachel – Product owner, Developer
        d) Yumna – Scrum master, Developer

Explanation:
Connor and Kate have the most experience with software development hard skills, so we want their jobs to be heavily focused on that area. It then makes sense to have Rachel and Yumna handle the other roles and focus on guiding the team.

  B. Scheduling
    1. How often will the team meet?
        a) Twice a week
    2. How will you meet as a team? Zoom? In-person?
        a) We will determine ahead of time (either in class or by means of our group chat) what mode of meeting works best for that week

          b) We will try to meet in person as often as possible and use Zoom as an alternative

          c) We will communicate as needed through our group chat

C. Team Background

Everyone is familiar with basic software such as VSCode and GitHub.

    1. Connor

          a) Experience with Java and C, strong object oriented programming fundamentals.

          b) Basic understanding of HTML/CSS and ReactJS

          c) Experience with Python for machine learning

    2. Kate

          a) Experience with frontend development, using HTML/CSS and LWCs, but this translates over to other JS frameworks. Other tools include Figma.

          b) Experience with backend development, primarily using Express.js and Flask

          c) Experience with database management using MySQL and SQLite

    3. Rachel

          a) Experience with Java and Python programming; Learning C

    4. Yumna

          a) Experience with database management using MySQL, SQLite and DBeaver

          b) Experience with frontend development, using HTML, CSS and JS. Other tools include Figma.

IX. Constraints and Risks

A. Social, ethical, policy, and legal constraints:

    1. Some rooms require approval from the registrar, so we would have to discuss with the registrar whether there should be a mechanism for them to approve those rooms through our app, e.g. having a fixed user role for the registrar office.

    2. We might not be able to support scheduling certain event types, such as classes, AT hours, and major events through our app. We are planning to meet with the Registrar to figure out what permissions our app can have. At the very least, we expect to be able to display information about the class schedule, since this information is publicly available to all Davidson students.

B. Access to resources:

    1. We will have to get access to class schedules as well as AT session schedules. Depending on what form these schedules exist in (spreadsheet,

database, etc.), we will need to make them compatible with our system or upload them directly.

2. Next.js and Tailwind are all free
3. Prisma is free to users
4. MongoDB Atlas has free features that should be enough for our project
5. Deploying on Vercel will be free with the "Hobby plan"