Final Project Design

Team 12
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Team Members

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Dravid Joseph: dravidjoseph@gmail.com (785) 764 - 6901
Evan Nichols: evanknichols@gmail.com (913) 787 - 6412
Jay Offerdahl: jaysanco@gmail.com (573) 673 - 5212
Chad Papineau: wc.papineau@gmail.com (913) 544 - 6158
Adam Thompson: theadamjthompson@gmail.com (785) 371 - 7500

Meeting Time & Contact

Lab

Time: Wednesday, 2:00pm - 2:15pm
Location: 3001 Eaton (Computer Science Design Lab)
GTA: Chinmay Ratnaparkhi (chinmay@ku.edu)

Outside Meetings

Planned meetings outside of lab will be subject to the team's availability for that week.
We will generally plan for a meeting on Monday night from 6-9PM, Tuesday morning between
10AM-12PM, and Thursday morning between 10AM-12PM. We will depend on voice
chat/emails/groupMe for communication when not meeting as a group, as well as Github’s issue
manager for dealing with code conflicts and Taiga.io for tickets.

Contact

Please see individual team member emails above.

Project Sponsor

This project is not sponsored.
Project Description

Many project managers use cluttered spreadsheets and outdated software for tracking construction jobs. The goal of MANAGR is to simplify the management process for ALL project stakeholders: the project managers, the clients, and the construction workers.

MANAGR will have three key components:

- Client facing web application: a dashboard for monitoring the progress of jobs, with views optimized for tracking expenditures and progress.
- Project Manager facing web application: a dashboard for monitoring the progress of jobs, with views optimized for tracking hours worked, equipment/tools used, raw materials purchased.
- Lightweight mobile application for construction workers: a simple time tracking application allowing workers out in the field to skip paper worksheets and enter hours worked directly into the app, which is linked to the Project Manager dashboard.

One of our team members, Evan Nichols, worked for Black & McDonald, an electrical contracting company with offices in Kansas City. Evan worked with a team of project managers, bidding out and monitoring multiple utility projects in the greater Kansas City area. Most of the projects were tracked using massive (and very fragile) Excel spreadsheets, and no formal solution was used to generate bids for projects. It was an incredibly inefficient and redundant process, one that could benefit greatly from a formal software application.

The end result of this project will be multifaceted. For project managers, we expect that they will gain insights from the valuable statistics they obtain from their business. For example, they can find out what their dominating costs are, which tools are having to be replaced most often, employee turnover, and many other workplace statistics that they may find invaluable. While it’s likely that they have all of this data already, it is unlikely that they currently have a program that aggregates all of their data into one easily accessible format.

Ordinary construction workers will find our product to be valuable as well. We envision a world in construction where paper and Excel spreadsheets cease to exist for all levels of construction work. Our product will allow workers to input their hours via a mobile application, with no need to submit a paper timesheet to their supervisor for signature later on. The project manager can batch sign hours as necessary.
# Project Milestones

<table>
<thead>
<tr>
<th>First Semester</th>
<th>Milestone</th>
<th>Completion Date</th>
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<tr>
<td>1.</td>
<td>Weekly status report</td>
<td>Fridays, Weekly</td>
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<td>2.</td>
<td><strong>Meeting #1 with Professor Johnson</strong></td>
<td>Sept. 30</td>
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<td>3.</td>
<td>Initial project description</td>
<td>Oct. 3</td>
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<td>4.</td>
<td><strong>Meeting #2 with Professor Johnson</strong></td>
<td>Oct. 21</td>
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<td>5.</td>
<td>Project proposal</td>
<td>Oct. 24</td>
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<td>6.</td>
<td>Project proposal video</td>
<td>Nov. 4</td>
</tr>
<tr>
<td>7.</td>
<td>Preliminary design plans</td>
<td>Nov. 17</td>
</tr>
<tr>
<td>8.</td>
<td>Setup, configure, test database server/software</td>
<td>Nov. 21</td>
</tr>
<tr>
<td>9.</td>
<td>Preliminary design for database API</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Front end wireframes designed</td>
<td>Dec. 2</td>
</tr>
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<td>11.</td>
<td><strong>Meeting #3 with Professor Johnson</strong></td>
<td>Dec. 2</td>
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<tr>
<td>12.</td>
<td>End of Semester</td>
<td>Dec. 16</td>
</tr>
<tr>
<td></td>
<td><strong>Second Semester</strong></td>
<td></td>
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<tr>
<td>13.</td>
<td>Create app skeleton and configure registration</td>
<td>Jan. 31</td>
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<td>14.</td>
<td><strong>Meeting #1 with Professor Johnson</strong></td>
<td>Feb. 1</td>
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<td>15.</td>
<td>Final Project Design Plan</td>
<td>Feb. 6</td>
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<tr>
<td>16.</td>
<td>Database setup and API routes</td>
<td>Feb. 20</td>
</tr>
<tr>
<td>17.</td>
<td><strong>Meeting #2 with Professor Johnson</strong></td>
<td>Feb. 22</td>
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<tr>
<td>18.</td>
<td>Base site wireframe coded</td>
<td>Mar. 7</td>
</tr>
<tr>
<td>19.</td>
<td>Client portal wireframe coded</td>
<td>Mar. 9</td>
</tr>
<tr>
<td>20.</td>
<td>Contractor portal wireframe coded</td>
<td>Mar. 13</td>
</tr>
<tr>
<td>21.</td>
<td><strong>Meeting #3 with Professor Johnson</strong></td>
<td>Mar. 15</td>
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<tr>
<td>22.</td>
<td>Styling</td>
<td>Apr. 11</td>
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<td>23.</td>
<td>Final Unit Testing</td>
<td>Apr. 11</td>
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<tr>
<td>24.</td>
<td><strong>Meeting #4 with Professor Johnson</strong></td>
<td>Apr. 12</td>
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<tr>
<td>25.</td>
<td>Documentation, Adjustments, Video</td>
<td>Apr. 25</td>
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<td>26.</td>
<td>Present Final Project Video</td>
<td>Apr. 26</td>
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<td>27.</td>
<td>End of Semester</td>
<td>May 5</td>
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Gantt Chart

We have made our Gantt chart using a plugin for Google Drive and have placed it at the following Google Drive link:

https://drive.google.com/open?id=0BwJ79XULZiJINEZmbjEzYi14S1k

Please note, to view the above link, you must select “Gantter for Google Drive” from the connected apps bar to be able to view a dynamic version of the file.
Project Budget

Hardware, software, and/or computing resources
  - We don’t project usage beyond the free tier, but we would like the option to expand when necessary
  - We would like to get paid support from Amazon if possible.
- Domain Name Cost: $12 from Google Domains.

Estimated cost
- $30-100, depending on whether we need more storage from AWS.

Vendor
- No vendor software needed. As stated below in the Intellectual Property Issues section (IP Issues), we will be using software which has been made available by a public license, or is considered “open-source”. Please see IP Issues below for a more in-depth discussion.

Special Training
- No special training needed.

Time Constraints
- Amazon Web Services: ASAP
- Domain Name: ASAP
Work Plan

Leadership

While all team members are responsible for meeting milestones and ensuring the completion of a successful project, we are dedicating two team leaders to help guide the project along. Jay Offerdahl will function as the front-end leader and point of contact for the project. He will be responsible for ensuring all deliverables are sent in a timely fashion, communicate with Dr. Johnson and the TAs as needed, and ensure that the front-end is in a functional state by the end of the project. Ben Davidson will function as the back-end leader and operations manager for the project. He will be responsible for ensuring all local development environments are functioning correctly, configuring group workflow, and ensure that the back end is in a functional state by the end of the project.

Back-end Design

All team members will be responsible for the user back-end design process of this project. Determining what data to store, how to store it, and what relationships will exist among the data will be a critical step in the development of our project. This phase is complete.

User Interface Design

All team members will be responsible for the user interface design process of this project. We will dedicate significant time in the beginning of the development phase (especially before the front-end development) in order to achieve a functionally sound project that is also easy to use and understand. This phase is in progress.

Back-End Development

We will be implementing our database with the PostgreSQL tool in order to store all data and information related to our project. This will require significant effort to set up as well as connect with the front-end of the application. We will dedicate three people to this task:

- Adam Thompson
- Ben Davidson
- Dravid Joseph

Front-End Development

Since the app is facing both contractors and clients, we'll need to style and design both of these portals. Besides the views on the application, we also plan to build a desktop web application as well as a iOS application. We want MANAGR to have a fresh, intuitive, clean feeling, whether that's on a phone or computer. For these two parts of the front-end, we will dedicate three people:
• iOS Mobile Application
  ○ Evan Nichols
  ○ Chad Papineau
• Desktop Web Application
  ○ Jay Offerdahl
  ○ Chad Papineau
Github

We will use Github for version control. A repository for the project can be found using the following link: https://www.github.com/JayOfferdahl/managr.

Note: This is a private repository. We have added both Dr. Johnson and Chinmay as collaborators so they have full access.
Final Project Design

Project Components
2. Client Web Application.

Proposed Technology Stack
- Frontend: React/React Native
  - Have this running on AWS Elastic Beanstalk (AWS EC2 host)
  - React is Facebook’s Javascript library for building user interfaces. It is
    ■ Declarative
    ■ Component-based
    ■ Fits well with the Client/Project Management Dashboards -- they will share many of the same views but with different display data.
- Backend: PostgreSQL server running on AWS.
  - PostgreSQL server running on AWS RDS host
- Middleware: Node.js or Django connected to PostgreSQL server
  - Have this server running on AWS EC2 host.
  - Define our own API calls to return the data we need for each of the views in the PM, Client and Groundsmen applications.
Software Overview

MANAGR at its very core will be a project management application. There will be two distinct sets of users, the clients/project managers, and the groundsmen. The clients/project managers will exclusively use the web application, and the groundsmen will exclusively use the mobile application.

User accounts will be created after a user enters their name, email address, and other information (which may be optional) such as username, password, company, age, etc. Users will then login to this account after verifying their email address with their credentials. Users will also be asked if they're going to be a client or contractor. While this setting can be reversed, it will help with initial setup as client users won't need to see tiles about labor or supplies since these are contractor tiles. Obviously contractors may implement sub-contractors, so the contractor user is a superset of the client user. Please note, since we have two types of users, there will be two forms to create an account. Groundsmen will have to create an account so they can login to the mobile application in order to log their work (see groundsmen requirements below).

Upon entering the application, clients and project managers will be presented with a dashboard which will change based on their open projects. One of the larger components of this application is that the dashboard will be customizable. This means that users will be able to change where tiles are located, as well as which tiles are displayed. This will allow for a customized user experience which doesn’t feel hard coded or static. Once logged in, users will
obviously be able to access their account settings page where they can modify their existing account data.

The mobile/web applications will also contain functions to reset account passwords and retrieve usernames. These functions will be present on the login pages and will be displayed with higher priority after three failed login attempts in the same session.

Aside from the user-facing application, the website will consist of a few static pages displaying information about the product, MANAGR, as well as information about the team and how to get in contact with us. This will take minimal effort to implement since it’s essentially just a limited description of the functionality of the software and about the team members.

Below is one of the initial mockups we have made for MANAGR:
User Requirements

As previously stated, MANAGR will have three key components: the client dashboard, the project manager dashboard, and the groundsmen mobile application. These sections are described in depth below.

Client Dashboard

- **Project Bids**
  - I want to be able to create a request for bid, where prospective contractors may create potential projects for me to consider.
    - I should be able to accept/decline these project bids.
      - Declining a project bid removes it from the client dashboard, and the project manager who created it is sent a notification saying it was declined.
      - Accepting a project bid creates a project object which is controlled by the project manager and viewed by the client.
      - Accepting a project bid declines all other pending project bids for the specified project.
    - Note: There is no legal binding action associated with accepting a project bid on this tool. Accepting a bid only shows intent, and all negotiations will be done ‘out of band’. The result of these negotiations will be reflected in the application by way of the client and manager editing the project.
  - I should be able to modify existing bid requests.
    - All bids created prior to the modification will be invalid, and a notification will be sent to the project managers to update them. Prospective contractors may alter their bids in order to reflect the changes and then resubmit for consideration by the client.
  - I should be able to delete existing bid requests.
    - All bids relative to this request would be invalid, and a notification will be sent to the project managers telling them the project has been canceled.
      - A reason for cancellation may be included in the notification.

- **View Project Details:**
  - I want to see a progress timeline view (read: Gantt Chart) that displays progress on project in terms of milestones achieved.
    - This view/document is created and maintained by the project manager.
    - The project manager can add/remove additional milestones with the approval of the client.
  - I want to see daily, weekly and monthly expenditure views.
    - I want these views to be displayed to me in the forms of graphs and charts, which I can filter by expense type.
      - For example, a monthly view of labor costs, or equipment costs, etc.
    - I should be able to view past month's/week's/day's expenditure views by selecting previous/next in the view.
Project Proposal
MANAGR - Team 12

- I should be able to click on an expense and see any associated notes that have been added to it.
  - I want to be able to generate an expenditure report that I can use internally within my company.
    - I want this report to be generated as a PDF or a Printable HTML page.
    - Expenses should be itemized.
    - Expenses groups may also be displayed in charts or graphs (optional).
- Manage Project Files:
  - I want to be able upload, store and view all documents and files related to my project in a central location. These files can include:
    - Work Contracts
    - Leases
    - Legal Documents
    - Receipts and Expenditure Reports
  - I want to be able to upload files to a project easily from my computer, similar to how you can upload files to Google Drive or Dropbox.
  - I want to be able to associate specific files with specific tasks/milestones

**Project Manager Dashboard**

- Create a Project:
  - I want to be able to create a new project
    - I should be able to see daily/weekly/monthly expenses individually and by type.
  - I want to be able to input expenses related to the project
    - These expenses should update the project in real time.
  - I want the information related to a certain project expenditure to be displayed to me in an easy-to-understand, human-readable format, for example:
    - “You’ll need X men at Y hours per week over a period of W weeks at a total cost of P dollars to you and a profit margin of R percent. This expenditure accounts for G percent of your total project bid.”
  - I want to be able to create project milestones
    - This will be part of a Gantt chart associated with the project showing the collection of milestones over time.
    - Will be similar to other Gantt charts (item description, start date/end date, completion %, etc.)
  - I want to be able to apply for a project by submitting this project as a bid for the client’s bid request.
Projects can exist without a client. (For example, the client is the contractor)

View and Manage a Project:
  - I want to be able to see the same views the client does in terms of project progress and overall expenditures, with the additional total profit/profit margin displayed to me.
  - I want to see how on track I am to completing the job. I want the program to inform me if we are running behind, on schedule, or ahead of schedule.
    - This comes as notifications from milestones in the gantt chart.
  - I want to be able to organize and upload files, receipts and proofs of purchase as my bidded expenditures become real expenditures.
  - Should I (the project manager) make use of a subcontractor for this project, I will have the option to import expenses from the subcontractor’s project (if they use the tool) or manually enter the expenses incurred by the subcontractor in my project how I see fit.
  - My changes should be atomic. They should only be visible by the client after I have explicitly committed the set of changes.
    - Changes should automatically be detected and saved to a non-client facing copy of the project (diff).
    - Email reminders should be sent if changes are made and not committed within certain time periods (set by user in account settings).
  - I want to be able to see/modify expenses shown to the client as well as expenses hidden from the client.
    - Client accessible expenses are different from hidden expenses in the fact that they may have a markup attached.
      - This allows contractors to keep their profits secret from the client.

Groundsmen Mobile Application
  - I want to be able to clock in on a specific project by using my user ID and password and a project ID given to me by my project manager.
    - If I have already logged into the application, I will be able to login with just a PIN number.
  - I want to be able to clock-out of a specific project using a similar format as above.
  - I want my hours worked to be automatically submitted to the Project Management Application (pending approval by the project manager).
  - I want to see my total hours worked on a certain project.
Ethical and Intellectual Property Issues

Ethical Issues

The information that this software will handle is inherently private to the parties involved with its creation and dissemination. Furthermore, certain parties are limited to certain subsets of this data. The design and implementation of MANAGR shall incorporate security measures to assure proper access control within the parties involved in a project. This implies that administrators and developers should not have full access to this data. This not only addresses the concerns a potential user of MANAGR might have about storing their confidential information on our servers, but it limits our liability if a bad actor attempted to access or leak client information. In order to achieve this goal, we must keep security in mind during the entire development process. This may include, but is not limited to hardening servers and software, and encrypting client data.

IP Issues

As the developers of MANAGR, it is our responsibility to avoid copying the intellectual property of others when designing and implementing this software. We will do our duty to discover and avoid any possible infringements during our design and implementation of MANAGR. However, we will not ‘poison the well’ by thoroughly inspecting all potential prior art. It is our duty to assure that all software integrated but not created by us is properly used within the terms of its respective license. Our goal is to have plausible deniability in the case that we are accused of infringement, meaning we will create our software without referencing the design, object code or source code of any software that we have not licensed. If we happen to create the same solution that someone else has, it will be by pure coincidence and not malintent.
Change Log

- Lab Time and GTA updated to reflect current status.
- Updated project milestones for second semester to accurately reflect the expectations of Dr. Johnson as well as to more realistically portray the nature of the development process.
- Updated resources and budget to Google Domains.
- Included a “Leadership” section in the work plan to more accurately delineate the division of responsibilities in the project.
- Update Gantt Chart to reflect 1st semester progress as well as updated goals for the second semester.