

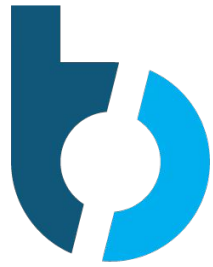
Creating The New Face of Buildertrend

SDMAY21-21

Aashray Mehta
Catherine Samatas
Hana Franck
Kyle Weinert
Mohamed Almansoori
Saoud Alkaabi

Buildertrend- *Client*

Md Maruf Ahamed - *Faculty Advisor*



BUILDERTREND

Buildertrend is a company headquartered in Omaha, Nebraska, that develops construction project management software. The software is designed to help builders, contractors, and their clients manage complex project processes.

Project Vision

Buildertrend recently discovered the need to transition application features from ASP.NET WebForms to React in order to improve stability, reliability, and to simplify the development process for future features. Transitioning to React will provide Buildertrend with the speed and efficiency needed as the company continues to grow.

Team Goal

Improve the overall experience for the engineers at Buildertrend by updating their code base to make it faster, more responsive, and scalable while maintaining the current user interface.

General Requirements

Functional Requirements

- All pages should interface with the Buildertrend API
- All pages should match the current Buildertrend UI scheme
- Features should be implemented using React

Non - functional Requirements

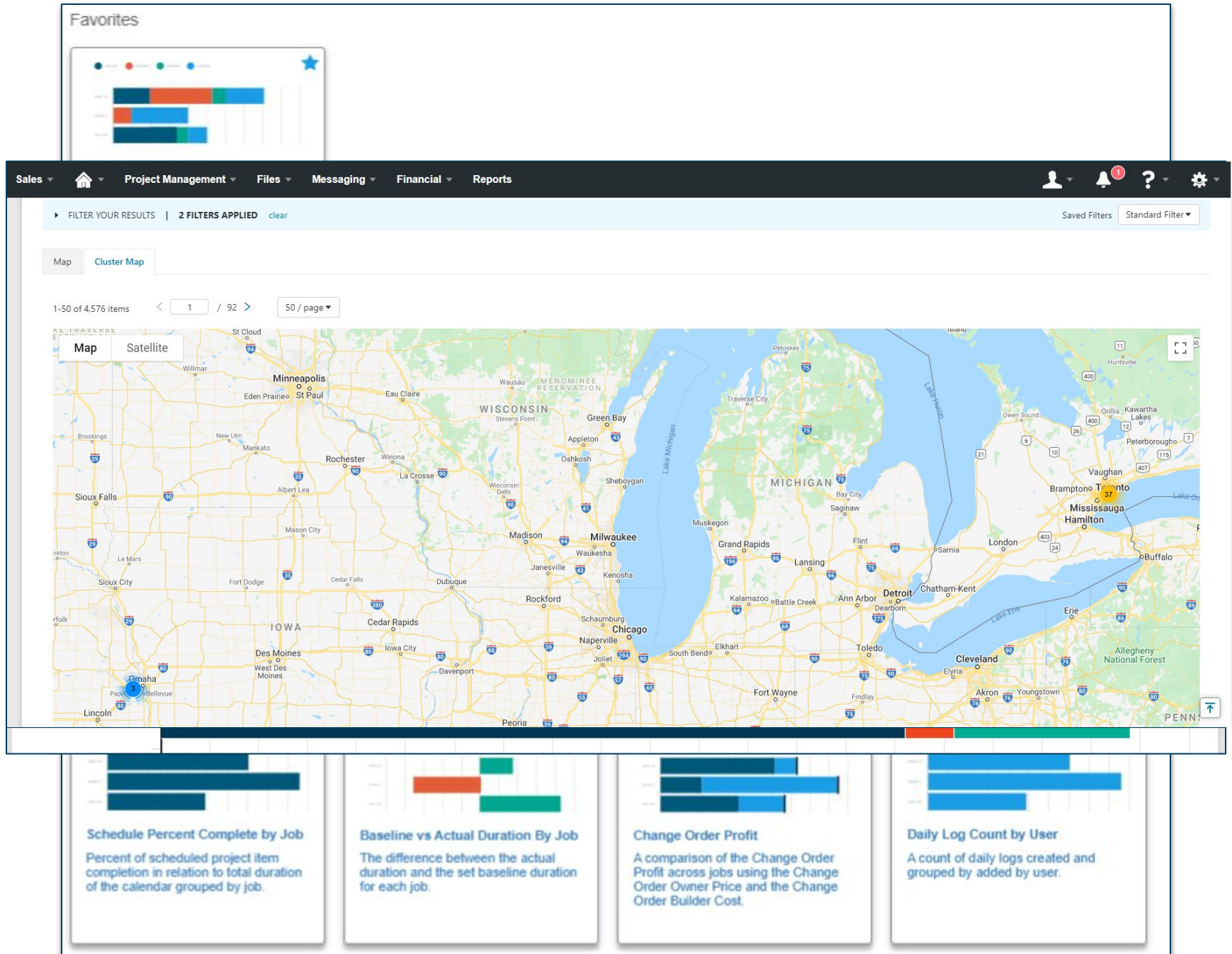
- Use Buildertrend's predefined standards
- Document all features
- Implementation should promote maintainability

Report List

Report
Details

Lead Map

Cluster Map



Constraints & Technology

Constraints

Testing Constraints

- The team did not have access to real users of the Buildertrend software
- User testing was done by the team and through demonstrations with the client during the biweekly meeting and milestone meetings
- Can only access older version of the software missing over 6 months of updates

Technical Constraints

- Required to create React components
- Required to use Buildertrend's predefined templates if possible
- Required to use Buildertrend's current API, and could not request API changes
- Required to use Storybook to visualize the features
- Required to use Google Maps Api
- Implementation must follow Buildertrend standards

Additional Constraints

Team Meeting Constraints

- Team members are located in different time zones
- Adds constraints to partnered and in-person work

Schedule Constraints

- The project had to be completed within two semesters excluding university breaks

Technology

Development Tools

- Typescript
- React
- Highchart-react
- Google Map Api
- Storybook
- Team Foundation Server
- Git
- Amazon Workspace
- Atlassian Confluence
- Communication Tools:
 - Microsoft Teams
 - Microsoft Outlook
 - GroupMe

Project Risks

Risks and Risk Mitigation

R1 - Knowledge of the code language used

- Keep open communication
- Set time aside to learn the code base

R2 - Early completion

- Get more tasks

R3 - Loss of code

- pushed to repository frequently

R4 - Minor requirement change

- check on requirements throughout the process
- Fast action if it changes

R5 - Major requirement change

- check on requirements throughout the process
- Fast action if it changes

R6 - The functionality of ASP.NET incompatible with functionalities of React

- Research alternative solutions
- present them to Buildertrend.

Risk Chart

ID	Probability of Occurrence	Risk Impact	Risk Map
Knowledge of the code language used	Occasional	Major	High
Early completion	Expected	Negligible	Low
Loss of code	Unlikely	Major	Medium
Minor requirement change	Expected	Minor	Medium
Major requirement change	Possible	Fatel	Medium
The functionality of ASP.NET incompatible with functionalities of React	Unlikely	Minor	Medium

Risks Encountered

ID	Probability of Occurrence	Risk Impact	Risk Map
Knowledge of the code language used	Occasional	Major	High
Major requirement change	Possible	Fatel	Medium

Design

Design Decisions

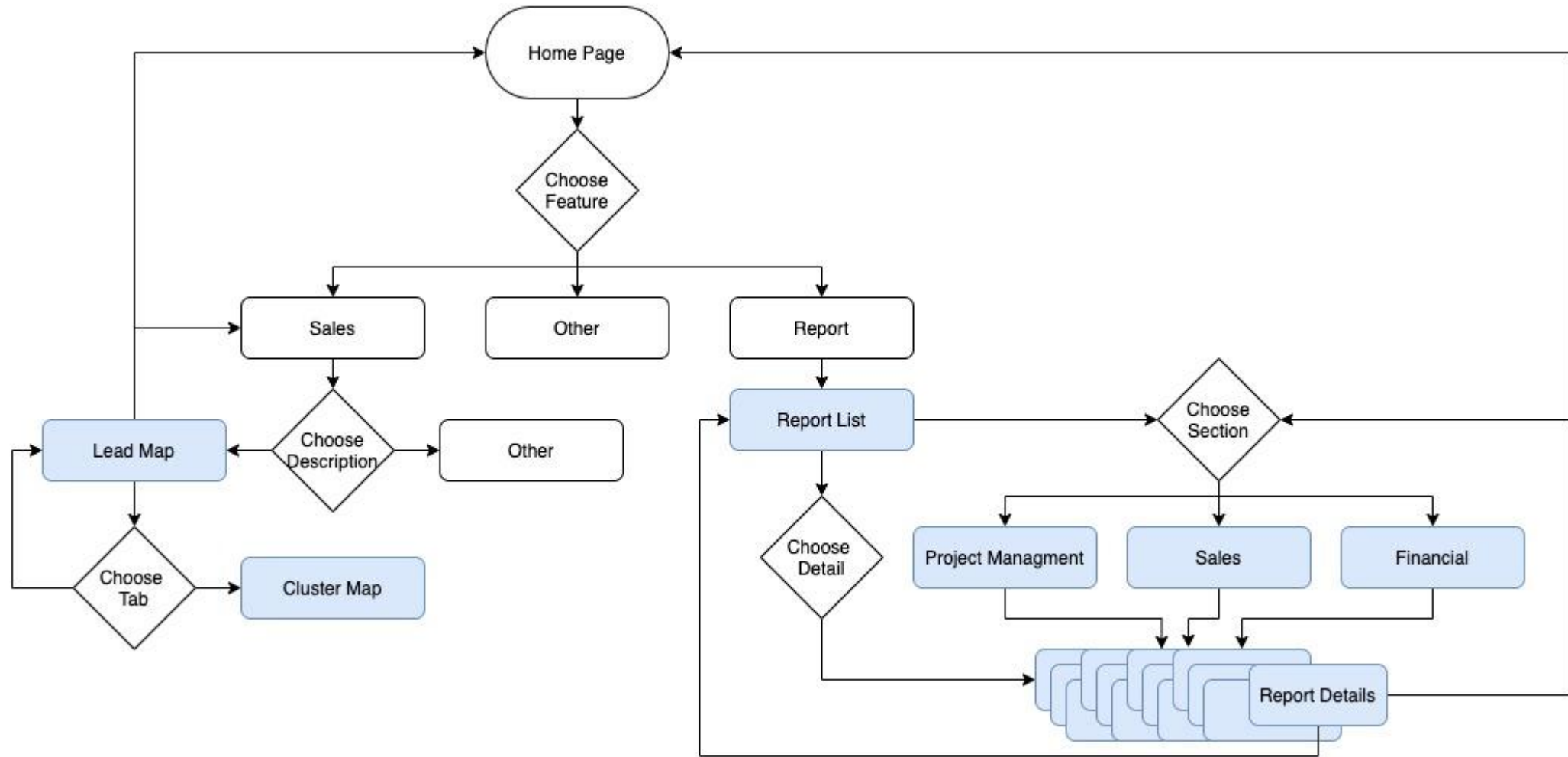
Design Choices

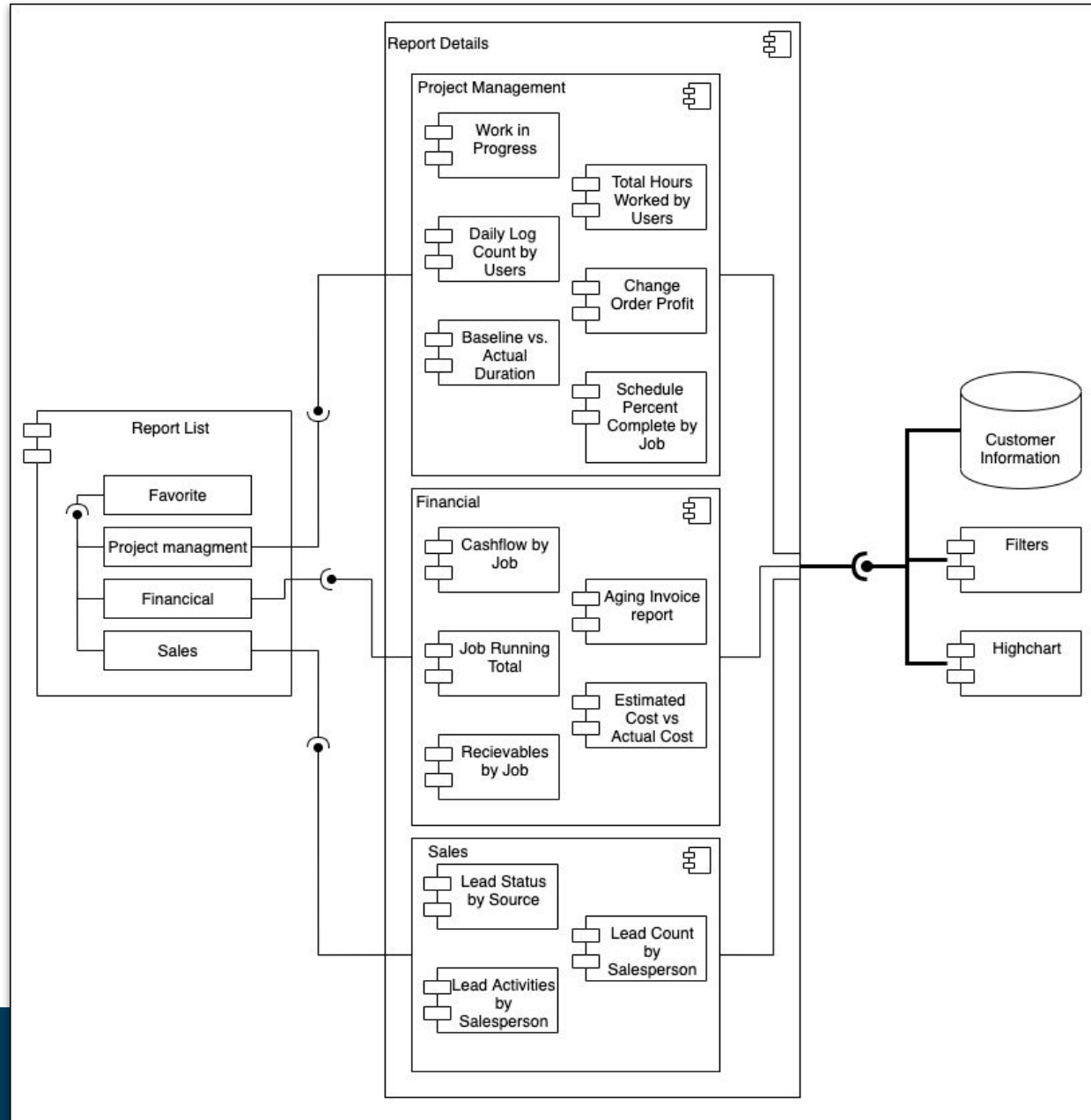
- Object-Oriented Design
- Focus on Modularity
- Abstractions

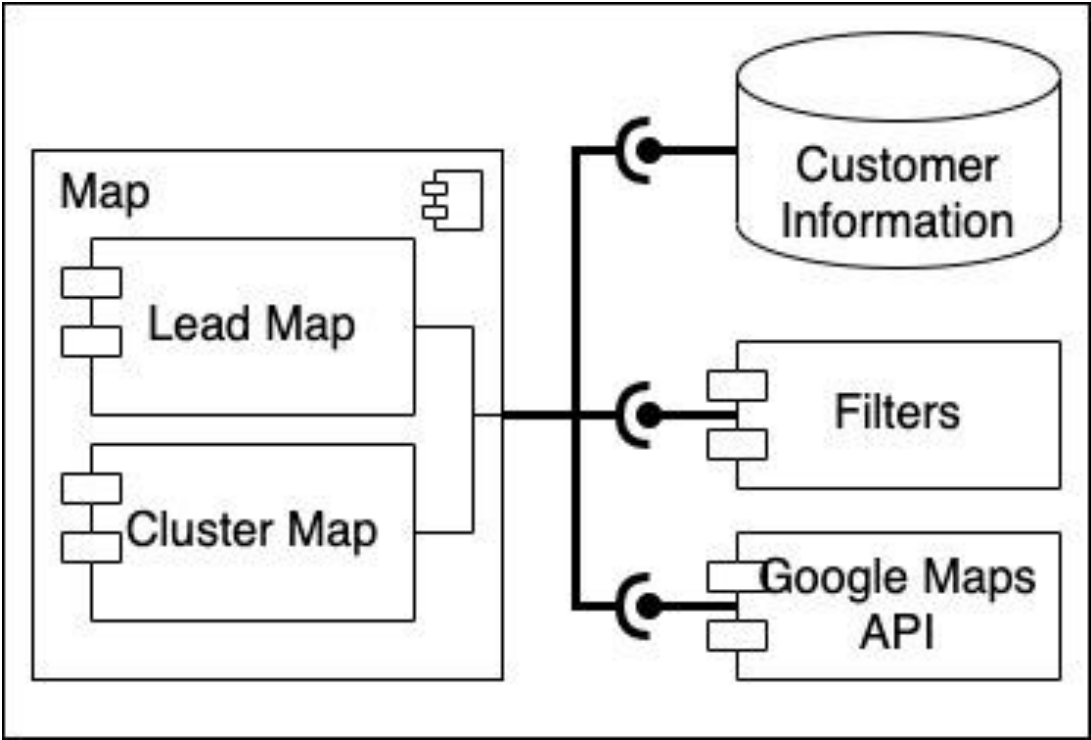
Agile Development Process

Standards

- ISO/IEC/IEEE 12207 - Systems and Software Engineering - Software Lifecycle Processes
- IEEE/ISO/IEC 16085 - Systems and software engineering - Life cycle processes - Risk management
- Buildertrend Standards







Implementation

Implementation Timeline

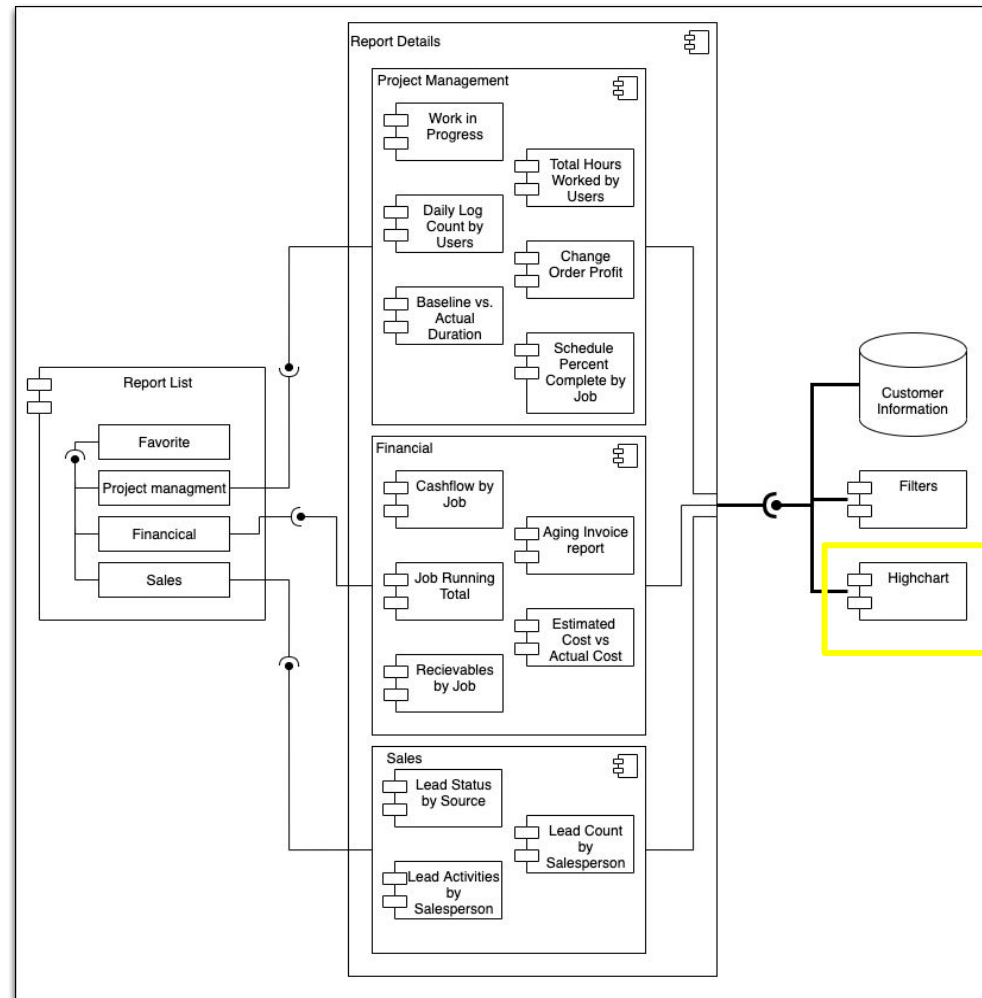
Fall Semester 2020

- Created the design
- Spent time learning BT's code base
- Learned new coding languages
- Began work on report list and report details
- Began acceptance testing

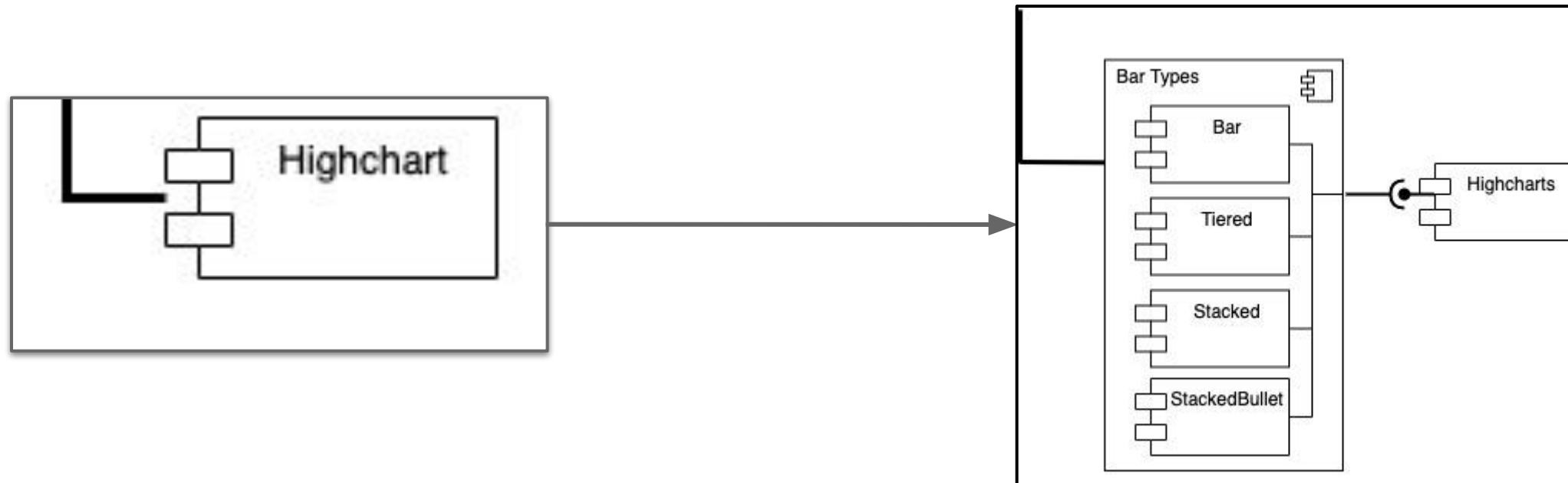
Spring Semester 2021

- Reset the design plan
- Continued to work on the reporting features
- Implemented Lead and Cluster map
- Finished acceptance testing

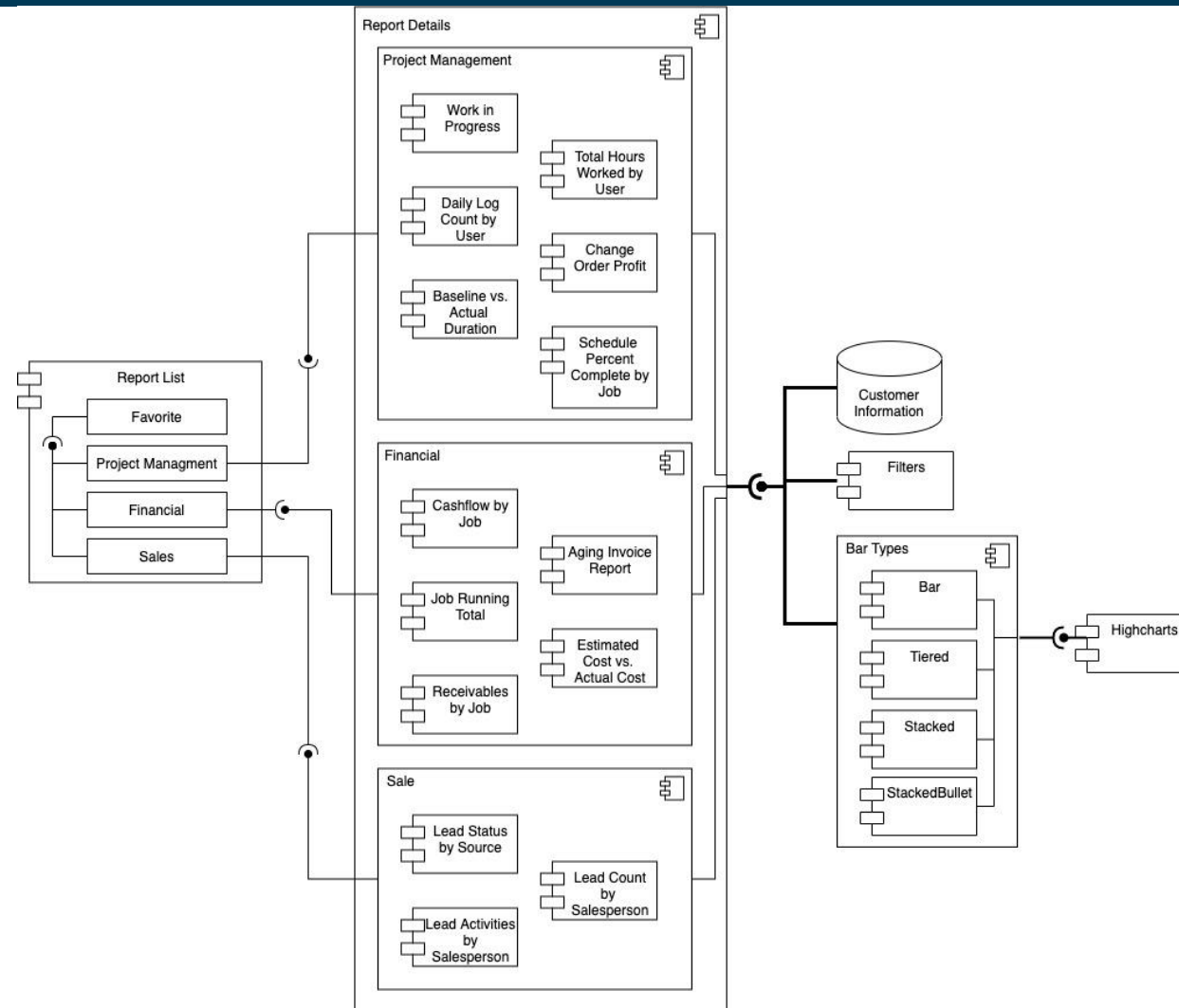
Design Changes During Implementation



Design Changes During Implementation



Design Changes During Implementation



Testing

Acceptance Testing - Report List

- When a star button is clicked, the star button turns yellow and adds the card to the favorites section
- When view all of a certain types (sales, financial, project management, etc.) is clicked, the page repopulates with all tiles of the selected type

Acceptance Testing - Report Details

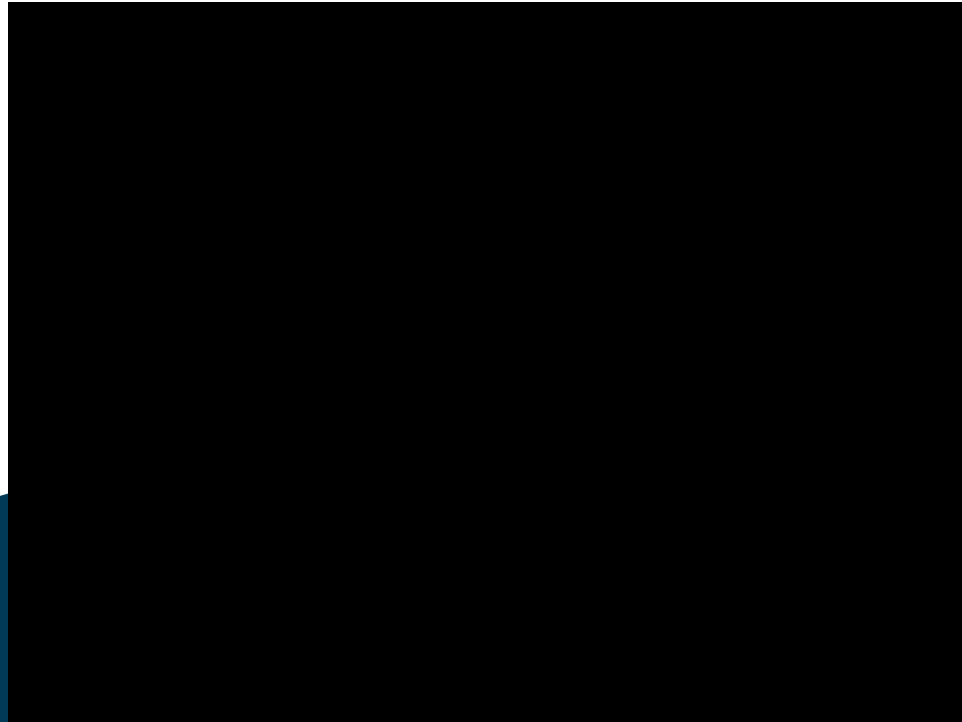
- When a report card is selected, the user is directed to the matching report details page
- A filter and highchart is displayed on each report details page
- The user can update the chart data by using a filter
- The available filters match the filters in the old implementation
- The highchart data reflects the current data stored in the database

Acceptance Testing - Lead and Cluster Map

- When hovering over a row the corresponding map pin should bounce
- When the view button is selected the map should scope down to the corresponding pin's location
- When the new lead button is clicked the user should be able to create a new lead
- The available filters match the filters in the old implementation
- When the filter is used in the lead map the pins reflect the updated data
- When the cluster tab is pressed a cluster map with the equivalent pins appears
- When the filter is used in the cluster map also reflects the updated data

Demo

Demo-Lead and Cluster Map



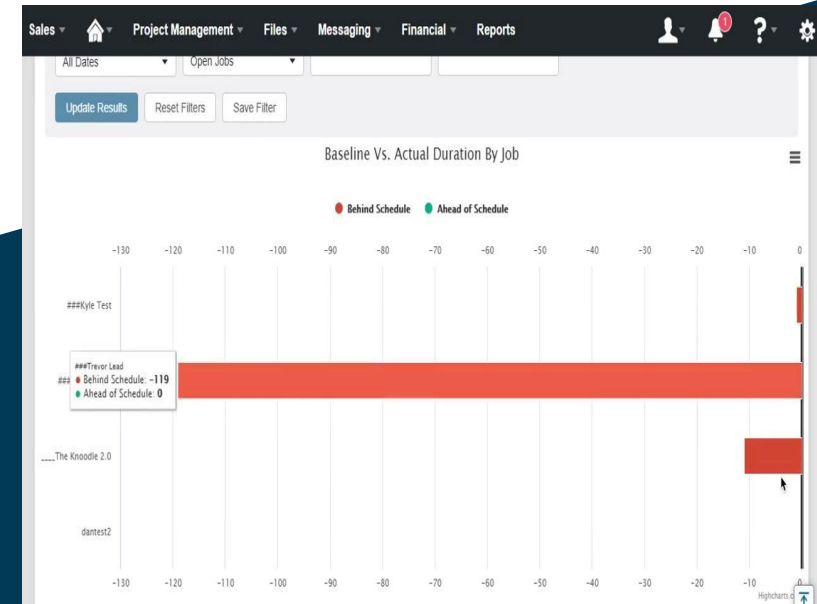
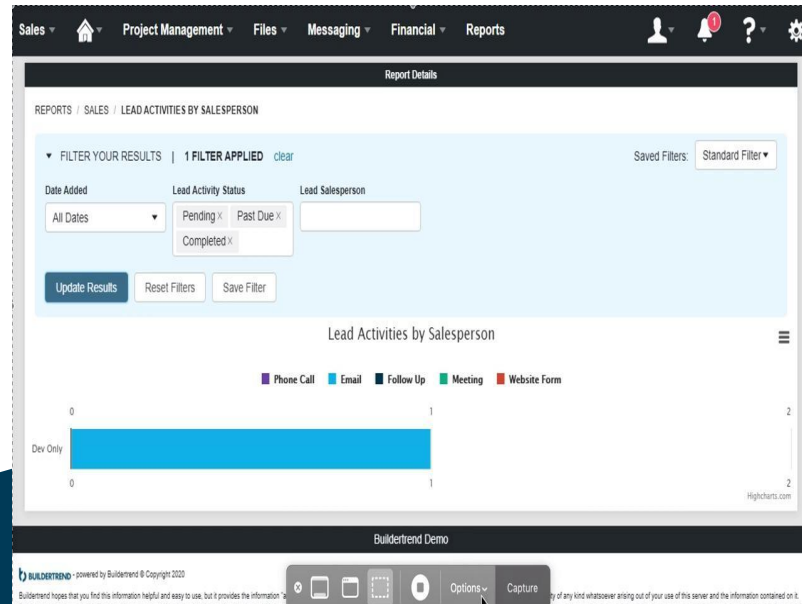
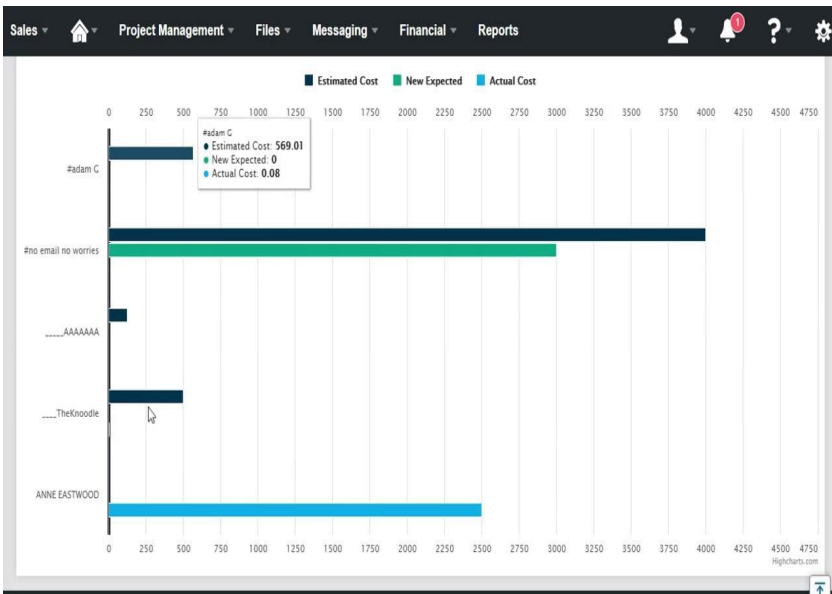
Demo - Report List

The screenshot displays a dashboard titled "Report Lists" with a blue header. Below the header, the breadcrumb "REPORTS / FINANCIAL" is visible. The main content area is titled "Financial" and contains four report cards, each with a small chart icon, a title, and a brief description:

- Estimated Cost vs. Actual Cost**: A comparison of the total estimated costs coming from your estimate with the actual costs paid from POs and Bills.
- Receivables by Job**: A comparison of the total amount you have invoiced with the amount paid against those invoices.
- Job Running Total**: View your original Contract Price in comparison with what makes up your current Job Running Total.
- Work In Progress**: Check the financial health of your jobs. Identify current cost and billing statuses, as well as ensure jobs are on track.

At the bottom of the report list, there is a link: [View All Financial Reports >](#)

Demo-Report Details



Conclusion

- We successfully implemented three features for Buildertrend
- Developed client and team communication skills
- Learned and used design thinking processes
- Expanded Hard Skills
 - React
 - Highcharts
 - Google Maps API