

### Convert an Industry-Leading Native App to React Native

#### sdmay19-02



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Francis San Filippo

Kyle Nordstrom

Walter Seymour

#### **<u>Client: Buildertrend</u>**

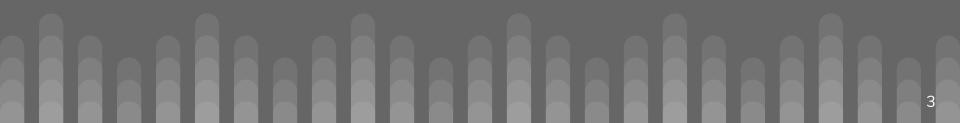
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**Faculty Advisor:** 

Mai Zheng



## Introduction



#### **About Our Client**

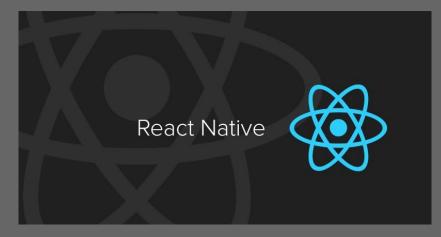


- Buildertrend provides a cloud-based construction management software
- Service includes, web and mobile applications for both Android and iOS
- **#1 Software** for home builders and remodelers

#### **Problem Statement**

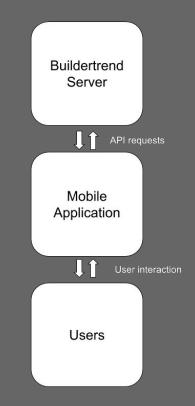


- Buildertrend currently has development teams for both iOS and Android applications
- Must develop, maintain, and test on both platforms
- React Native eliminates the need for development on two separate platforms





#### **Conceptual Sketch**





## Requirements



#### **Functional Requirements**

- Users must be able to log in and out of their existing accounts
- User must must have access to all layers of project management
- Connect to Buildertrends servers and APIs
- Replicate subsets of project management

## Non-Functional Requirements BUILDERTREND

- Consistency The application must replicate Buildertrend's current application with no major UX differences between platforms
- Usability The mobile application should be perform similar to native solutions
- Maintainability Code should be easy to understand for future developers



# System Design & Development

### BUILDERTREND

#### System Constraints

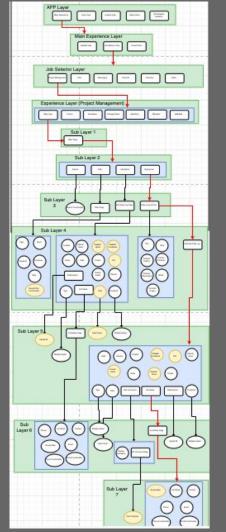
- Required use of React Native Framework
- Functionality needed to replicate Buildertrend's current app
- Integration with pre-existing technology
- Labor and time



#### **Overview of Design**

| Login View | Loading View |                 | Redux Store   |  |
|------------|--------------|-----------------|---------------|--|
|            |              | equest<br>rface |               |  |
| Main Expe  | erience      | ·               |               |  |
| NavBar V   | /iew         | Job S           | Selector View |  |
|            | Curren       | t Task          |               |  |

### Layered Architecture







| APP Lawr   |   |   |
|--|---|---|
| APP Layer<br>Attente Lerine Antine Mattine Matter  |   | Select Job 🗸                            |
| Main Experience Layer<br>textures anterior texture | APP Layer   | Home                                    |
|  |   |   |
| Job Belector Layer                                 | Main Experience Login View Loading View Redux Store API Request Interface | Project Management                      |
| Experience Layer (Project Management)              |   |   |
| Terrie Stor Hanne Hoppins Miller More Aller        |   |   |
| Sub Layer 1  |   | Daily Logs To-Do's Schedules Change Ord |
| Sub Layer 2  |   |   |
| ter te Atle Beye                                   |   |   |
| Sub Layer  | Main Experience Layer   | Selections Warranty Job Info            |
| Sub Layer  |   |   |
| Sub Layer 4  | NavBar View Job Selector View Current Task                                | Files                                   |
|  | Inavbal view Jou Selector view Culterin rask                              |   |
|  |   |   |
|  |   | Photos Documents Videos                 |
|  |   | Photos Documents videos                 |
| Sub Layer 5  |   | Messaging                               |
|  |   | Wessaying                               |
|  | Job Selector Layer  |   |
|  |   |   |
|  | Project Management Files Messaging Financial Directory Sales              | Comments Messages                       |
| Bib  |   |   |
|  |   | Financial                               |
|  |   |   |
| Side Layer   |   | 🖩 📰 Ş 🚃 🖸                               |
|  |   | Budget Bills/POs Owner Invoi Bids       |
|  |   |   |

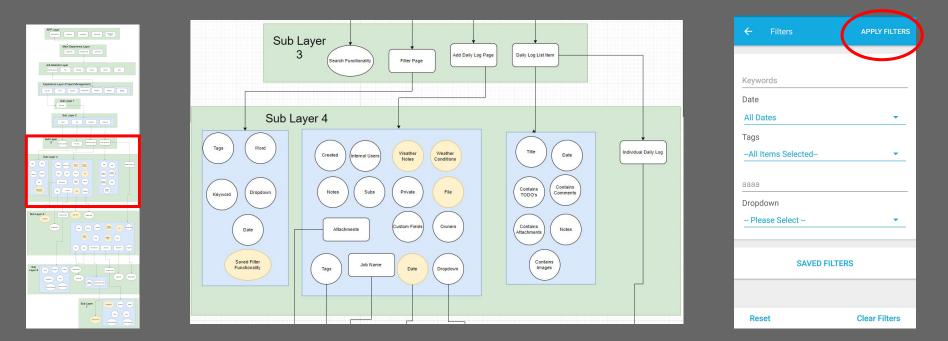
Overview

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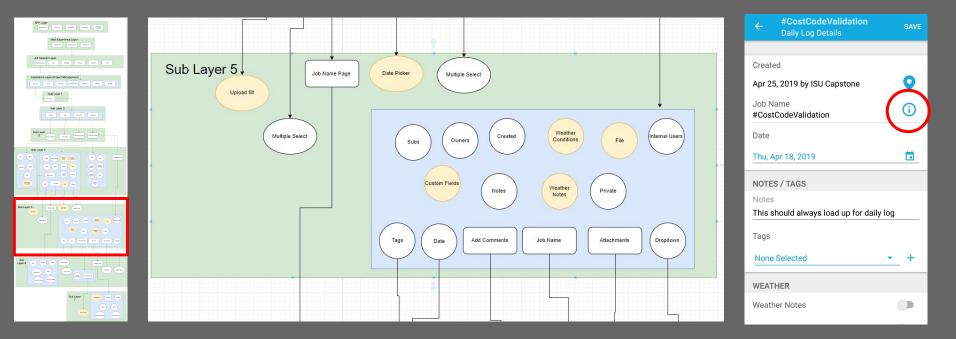


|                       | Experience Layer (Project Management)                                   |  |
|-----------------------|---|--|
| Main Department Layer |   | Search   |
|                       | Daily Logs To-Do's Schedules Change Orders Selections Warranty Job Info | #CostCodeValidation<br><b>12-10-2019 by ISU Capstone</b><br>This is a super test |
|                       | Sub Layer 1   | #CostCodeValidation<br><b>8-17-2019 by ISU Capstone</b><br>Heck no               |
|                       | Sub Layer 2   | #CostCodeValidation<br><b>4-27-2019 by ISU Capstone</b><br>this is a test        |
|                       | Search Filter Add Button Display List                                   | #CostCodeValidation<br><b>4-25-2019 by ISU Capstone</b><br>Ih                    |
|                       |   | #CostCodeValidation<br>4-18-2019 by ISU Capstone                                 |



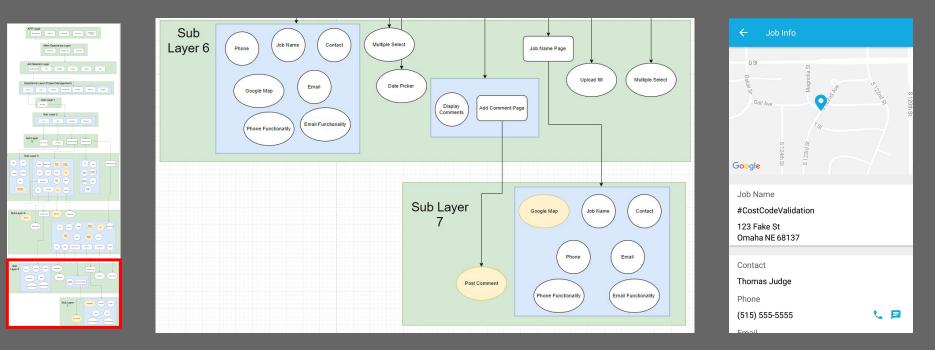






Overview





Overview



## Implementation

## Hardware & Software Platforms Buildertrend

- Hardware: Smart Phones & Macbooks
- Android Studio/XCode: Simulation
- TypeScript
- Jest and React Test Renderer
- Redux

- Gitlab
- TSLint
- Yarn
- Charles
- React Native



#### **Our Approach**

- Break it into three steps:
  - Initial Prototype
  - Structured Prototype
  - Final Prototype



### Initial Prototype

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|                   |         |           |                   |         |           | JobInfo           |                   | OwnerInfo |



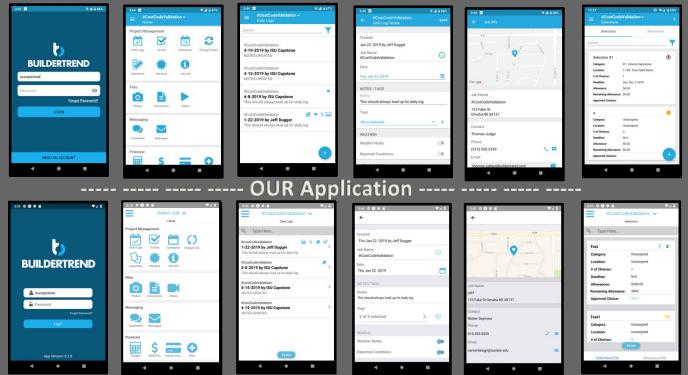
### Structured Prototype

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|          | Project<br>Home      |             |         | Home      |          |                         |         |               |                 |
|          |                      |             | Project | Manage    | ment     |                         |         |               |                 |
|          |                      |             | •       | Job Info  |          |                         |         |               |                 |
|          |                      |             | \$5     | Change (  | Orders   |                         |         | <b>builde</b> | ertrend®        |
|          |                      |             |         | Daily Log | IS       |                         |         |               |                 |
|          |                      |             |         | Schedule  | es       |                         |         |               |                 |
| A        |                      | يلسلم       |         |           |          |                         | Us      | ername        |                 |
| Job Info | Change Or Daily Logs | Schedules   |         |           |          | edules                  | Pa      | ssword        |                 |
|          | enange enn           | Contraction |         |           |          |                         |         | Fo            | orgot Password? |
|          |                      |             |         |           |          |                         |         | Login         |                 |
|          |                      |             |         |           |          |                         |         |               |                 |
|          |                      |             |         |           |          |                         |         |               |                 |
|          |                      |             |         |           |          | - 11                    |         |               |                 |
|          |                      |             |         |           |          |                         |         | App Version:  | 7.0.0           |



#### **Final Prototype**

#### ----- Buildertrend's CURRENT Application -----





### Final Prototype

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| Well May 1, 201              |                                 |                             |
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|                              | ( C V                           |                             |



#### **Best Practices**

- Ticket tracking
- Code Reviews
- Code formatting standards

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|---------------|------------|---------|----|
| Discussion 54 | Commits 25 | Changes | 23 |



# Testing



#### Test Plan

- Continuous Integration (automated testing)
  - Unit testing (component based)
  - Functional testing (component interactions)
  - Integration Testing
    - Connection to servers
- Manual testing



#### Software Used

- Jest
  - Testing framework for Typescript
  - Snapshot testing for regression testing
- React Test Renderer
  - Provides a testing environment



# Project & Risk Management

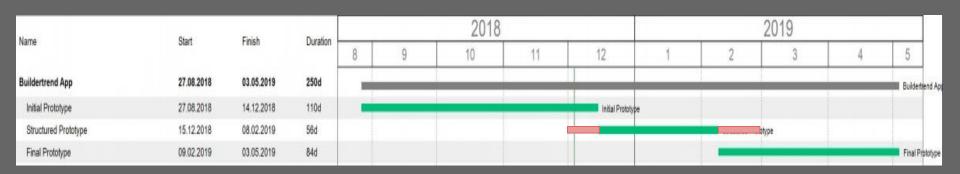
### **Task Responsibilities**



- Frank Backend Service
  Coordinator
  - Login/Logout
  - Integration with BT backend
- Victor Project Designer
  - Architecture Implementation
  - React Navigation
  - Redux Store
- Kyle Communications Lead
  - Ambassador for Client
  - Arranges meetings

- Mich UI Developer
  - Implements UI Components
  - UI Styling
- Lucas UI Developer
  - Implements UI components
  - UI Styling
- Walter UI Developer
  - Implements UI Components
  - UI Styling





- Three prototypes (mentioned earlier)
- Our Prototypes began to blend together
- Structured Prototype took longer than expected

#### **Risks & Mitigation**



- Relying on captured HTTP requests (Anticipated)
  - Mitigated using Charles and confirmed with our client
- Lacking Understanding of React Native Framework (Anticipated)
  - Took time to learn and read documentation
- Large UI changes on an actively developed application (Actual)
  - Discussed new expectations with Buildertrend

#### Lessons Learned



- Meet consistently with all affiliated members of the project
  - Keeps all members up to date
  - Keeps the project on correct track
- Separate platforms are essential for organization
  - Slack/Gitlab for code
  - Groupme for project management
  - Google Applications for important documents



## Conclusion

#### Future Work



- Final code handoff and final meeting this week
- Buildertrend has all of our contact information and we are willing to help clear up any confusion
- Full-time developers at Buildertrend will be taking our existing project and investigate the pros and cons of React Native as a replacement plan



#### **Closing Remarks**

- We are really grateful to have had such an amazing team, client, and advisor!
- Thank you to lowa State for connecting us with a company in the industry!
- Thank you all for coming out to help support the senior design program at ISU!



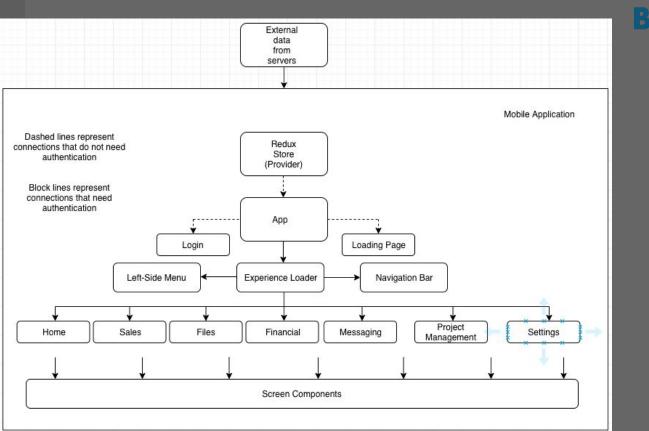
## Thank You!



## Questions?

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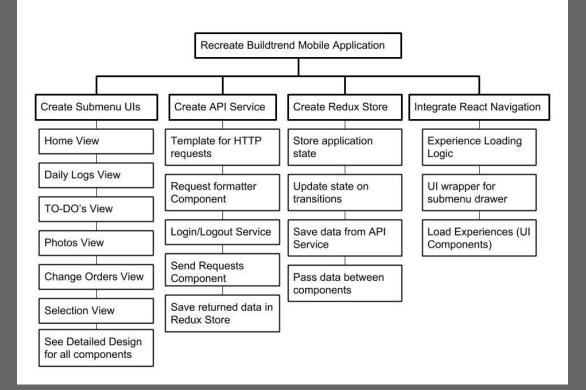
#### **Conceptual Sketch**



BUILDERTREND

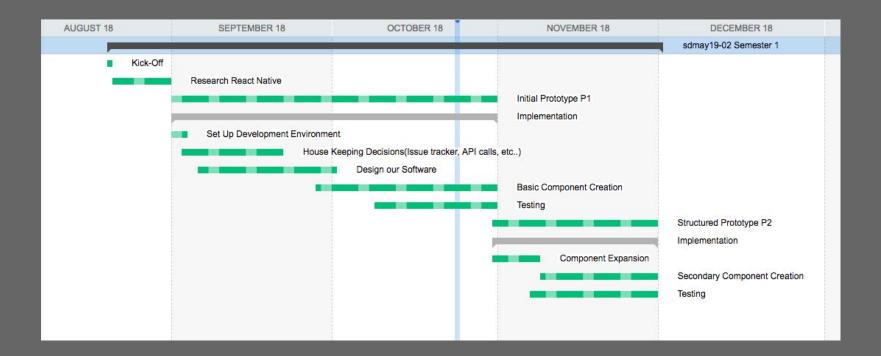
### **Functional Decomposition**





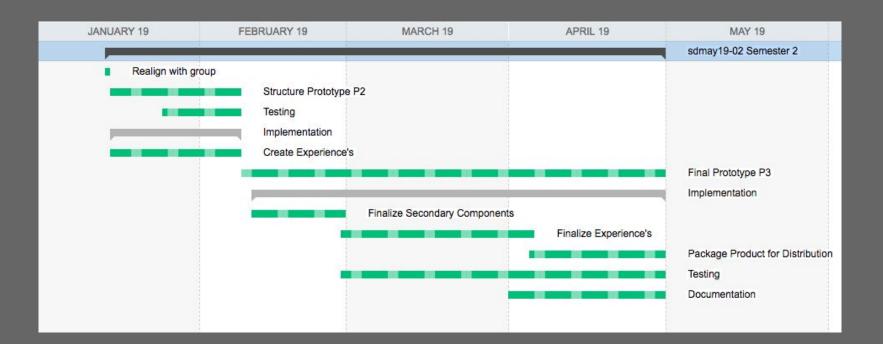
#### **Gantt Chart Semester 1**





#### **Gantt Chart Semester 2**





### **Detailed Design**



| in Vi | iew Loading Vi        | iew Redux                        |                          | equest<br>rface      |                  |
|-------|-----------------------|----------------------------------|--------------------------|----------------------|------------------|
| Mair  | n Experience          |                                  |                          |                      |                  |
| lavE  | Bar View Job Sele     | ector View                       |                          |                      |                  |
|       | Current Task          |                                  |                          |                      | 1                |
|       |                       |                                  | [[]                      | Schedules            | Photos           |
|       | Home View             | Daily Logs View                  | TO-DOs View              | View                 | View             |
|       | Change Orders<br>View | Selections<br>View               | Warranty View            | Job Info View        | Messages<br>View |
|       | Documents View        | Videos View                      | Comments View            | Comments View        | Budget View      |
|       | Bill/POs View         | Bill/POs View Owner Payment View |                          | Contacts View        | Subs View        |
|       | Internal Users        | Directory View                   | Lead Opportunity<br>View | Lead Activities View |                  |