Project Plan
Fundamenta
The Capstone Experience
Team Quicken Loans

Vishal Adusumilli
Turner Anderson
Riley Annis
Jaiwant Bhushan
Erin O’Hara

Department of Computer Science and Engineering
Michigan State University
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Functional Specifications

• Web application
• Allows collaboration among participants involved in a home build
• Indicates workflow and tasks assigned to each participant
• Ensures accountability among all parties
• Provides real time updates and brings transparency to process
• Stores build history in permanent record
Design Specifications

• Allows user login
• Creates workflow for home build
• Supports home buyer selection of home design
• Displays tasks currently assigned to each participant
• Allows users to mark tasks complete
• Displays progress of home build
Screen Mockup: User Login

Fundamenta by Quicken Loans

Username
Enter a username...

Password
Enter a password...

Role
- Home Buyer
- Builder
- Contractor

Log In or Sign Up
Screen Mockup: Build Workflow

<table>
<thead>
<tr>
<th>House Options</th>
<th>Conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Home Buyer</td>
</tr>
<tr>
<td></td>
<td>How much longer?</td>
</tr>
<tr>
<td>Exterior</td>
<td>Builder</td>
</tr>
<tr>
<td></td>
<td>I'll let the contractor answer.</td>
</tr>
<tr>
<td>Interior</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>About 1 month left.</td>
</tr>
<tr>
<td>Task 22</td>
<td>Home Buyer</td>
</tr>
<tr>
<td>Task 21</td>
<td>Great, thank you!</td>
</tr>
<tr>
<td>Task 20</td>
<td></td>
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<td>Task 19</td>
<td></td>
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<td>Task 18</td>
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<tr>
<td>Task 2</td>
<td></td>
</tr>
<tr>
<td>Task 1</td>
<td></td>
</tr>
</tbody>
</table>

Cancel
Save
Submit
“What is Blockchain...”

• Shared, continuously verified database
• Distributed with no centralized version
• Persistent, immutable, public, verifiable ledger
• Blocks contain transactions
• Integrity verified via hash of previous block
“...and Why Should I Care?”

**Proof of Work**
- Digital Currencies: Bitcoin, Ethereum, etc.
- Challenging to find, easy to verify solution
- Upon completion, a new block is created
- Enables mining and reward system

\[
\text{> hash}(x \times y) = \text{ac23dc...0}
\]
\[
\text{> x} = 5
\]
\[
\text{> #Solution: } y = 21
\]

**Smart Contracts**
- Business networks: Ethereum, Hyperledger Fabric, etc.
- Sections of executable code associated with the blockchain
- Activated with transactions, trigger side effects
Technical Specifications

• Blockchain
  ▪ Hyperledger Fabric Blockchain
  ▪ Hyperledger Composer Framework
    ○ Modeling Language, Access Control Language
    ○ Transactions and Smart Contracts

• Web app
  ▪ .NET Core 2.0 (C#)
  ▪ React

• SQL Server
System Architecture

Web App
- React JS
- .NET Core
- Service Layer
- Database Layer
- SQL Server
- SQL Database

Hyperledger
- Fabric
  - Blockchain
  - Chaincode
  - Blockchain State Storage
- Composer
  - Business Network Model
  - Transactions
  - Access Control
  - Identities
  - REST Server

REST API
Client API
System Components

• Software Platforms / Technologies
  ▪ Microsoft Azure
  ▪ Microsoft SQL Server
    ○ User Management
  ▪ Visual Studio, WebStorm, Visual Studio Code
  ▪ Visual Studio Team Services
    ○ Git Repo
    ○ Kanban Board
    ○ Continuous Deployment
Risks

• Blockchain Smart Contracts
  ▪ Description: Need smart contracts that modify the blockchain and state of home effectively
  ▪ Mitigation: Start with small simple contracts; expand existing examples
• Technology Stack Integration
  ▪ Description: Diverse technologies are being used; little experience integrating a full project environment
  ▪ Mitigation: Integrate technologies before completion of parts
• Blockchain on Azure
  ▪ Description: A RESTful API is needed to modify the blockchain after it is moved to an Azure instance
  ▪ Mitigation: Start with a simple RESTful API for basic interaction
• User Login Management
  ▪ Description: Need to develop user login for the web app and allow users to modify the blockchain with Hyperledger Composer Identities
  ▪ Mitigation: Make login management a top priority; use Composer tutorials
Questions?