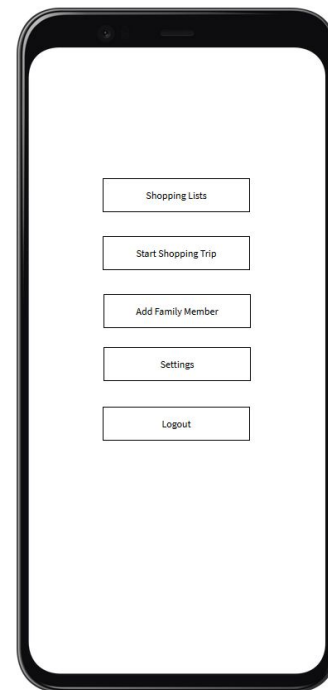# Route-Constrained Family Shopping Optimization

Colin Thurston, Elizabeth Strzelczyk, Tavion Yrjo, Colin Willenborg, Christian Baer, Erich Brandt
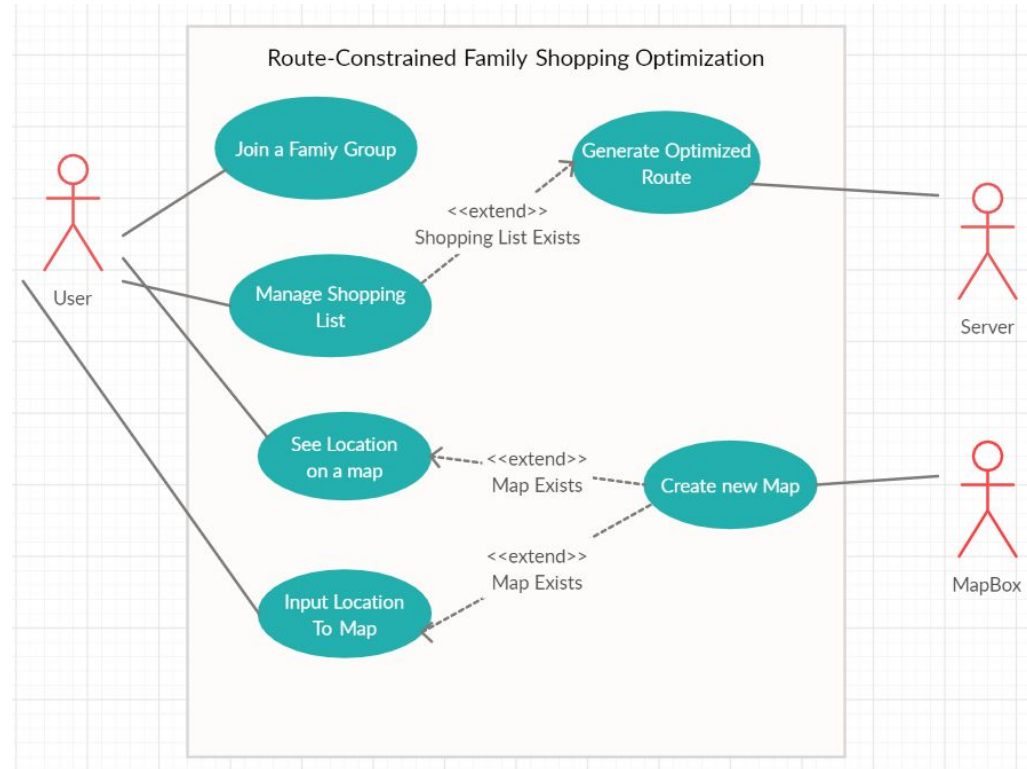
Project Vision

- Provide an optimized shopping experience for a family based on:
  - Distance
  - Price
  - Time

- Will save families:
  - Time
  - Money

- Project will use:
  - Dijkstra's & A* algorithms
  - MapBox API

Conceptual/Visual Sketch

- Users
  - Family members
  - General public
    - Spend less money

Route-Constrained Family Shopping Optimization

Requirements

Constraints
- Radius of the map of stores and locations
- The time it takes to travel to different stores
- Starting the trip from home vs. varying locations
- Start time of the trip
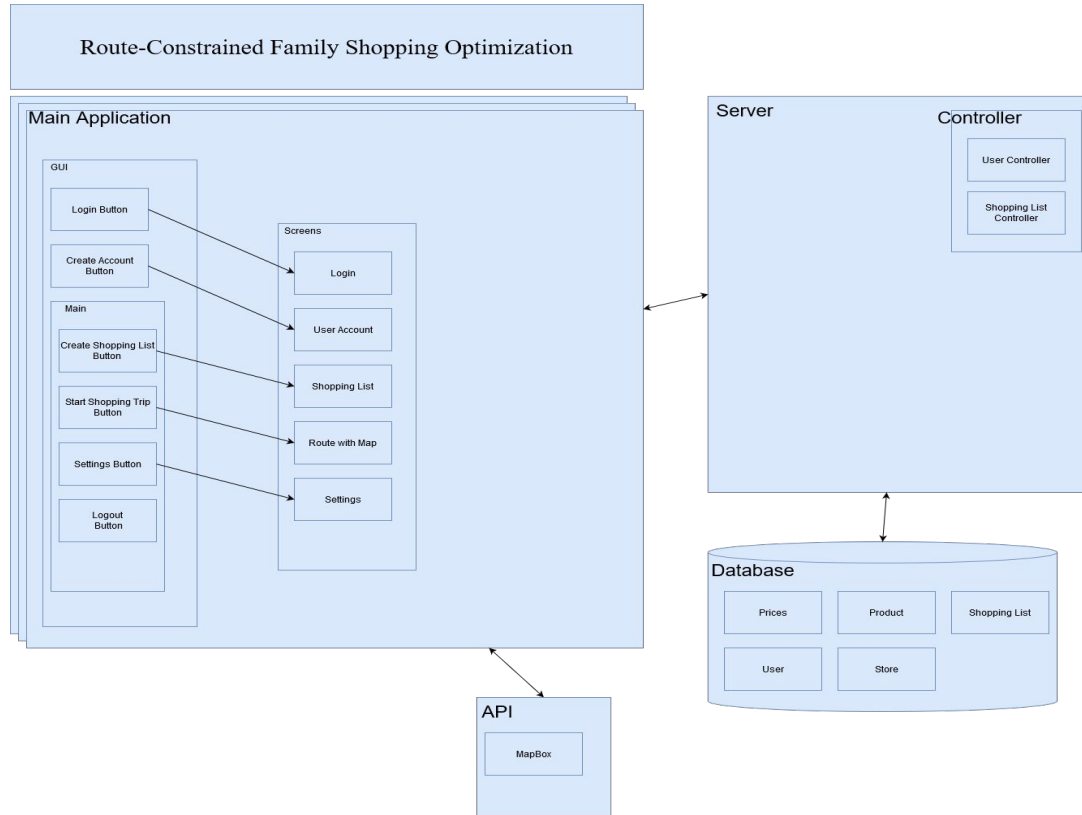
Requirements (Continued)

Functional Requirements
- Store location accuracy
- Outputting the closest store
  - desired items
    - respect to distance/time to travel
- Output fastest travel time
  - any given store
    - desired start time

Nonfunctional Requirements
- Routes must be generated in real time
- SQL Data must be in real time
- Application must be intuitive and easy to read

Conceptual Design Diagram

Project Plan - Tasks

- Identify requirements/components
- Research information
- Develop design plan
- Develop use cases
- Finalize design
- Review design
- Begin implementation
- Complete implementation
  - Testing
- Demo
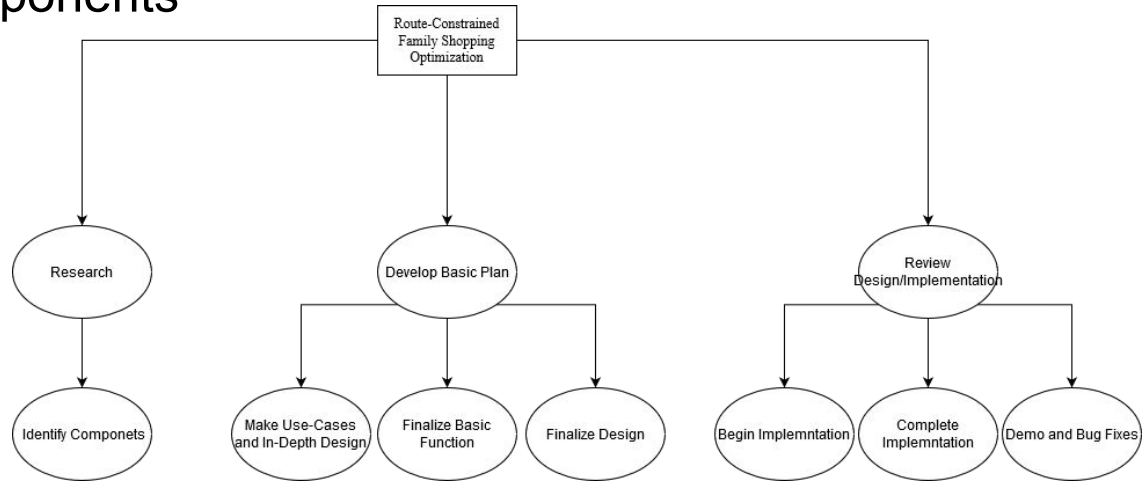
Project Plan - Risk Assessment

- Missing requirements

- Unavailable/false information

- Client does not like design

- Use cases do not reflect end user

- Incorrect component diagram

- Missing information in design document

- Databases cannot be accessed

- Testing reveals problems

Project Plan - Risk Mitigation

- Meet with client
  - Requirements
  - Components
- Compare research
  - Multiple credible sources
- Meet with team
  - Implementation issues
- Design review
  - Add missed details
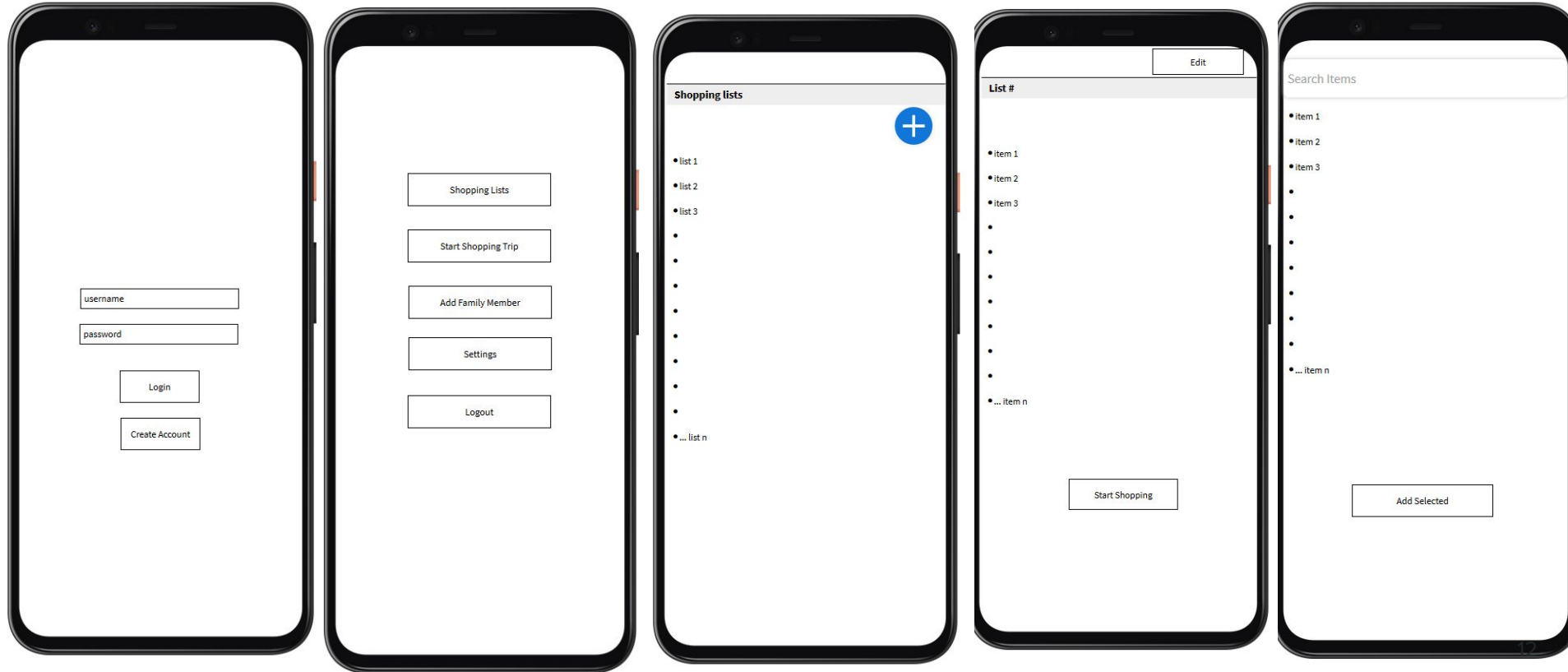- Maintenance
  - Bug fixes

System Design - Decomposition

- Routing algorithms

- Data storage

- UI

- Web scraping

- Server hosting

System Design - Component Diagram
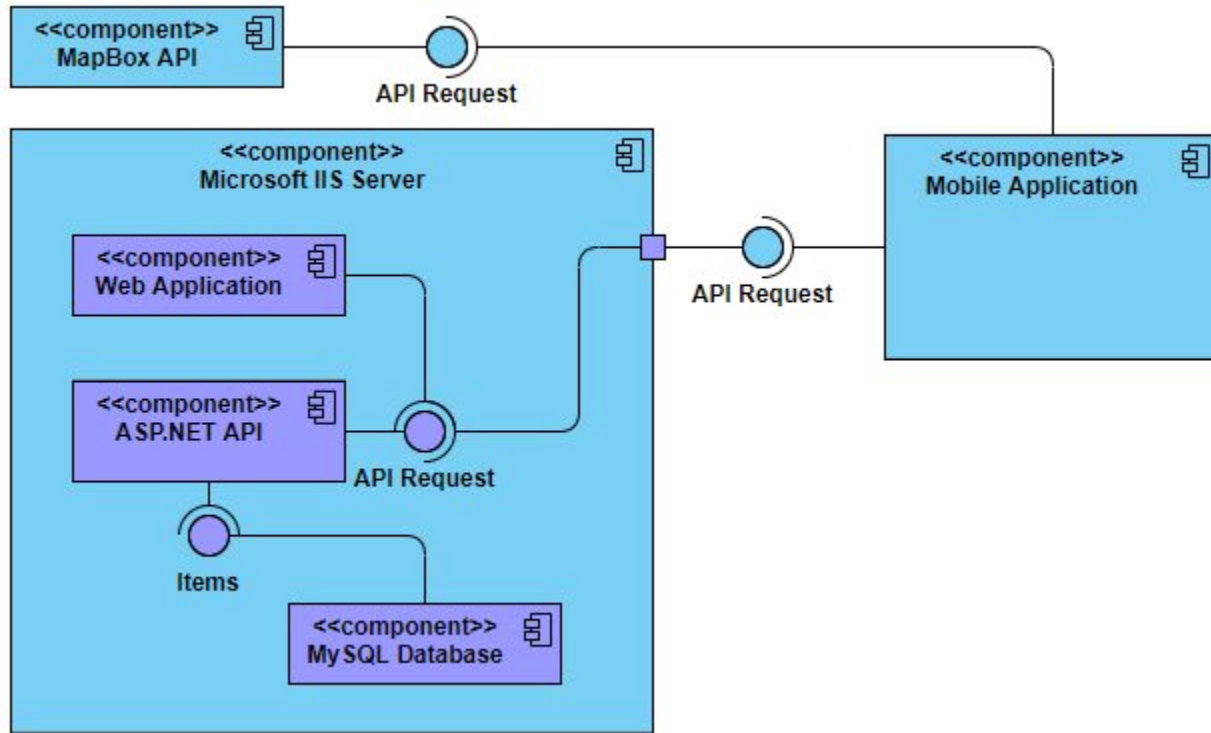
System Design - UI Design

System Design - Technologies

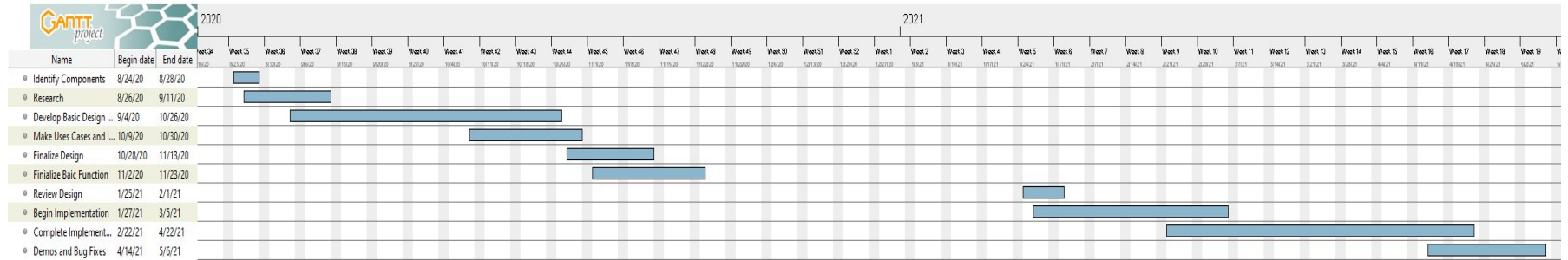# Project Plan - Schedule/Milestones

Quantifying Progress

- Completing scenarios

- Establishing foundations for each of our components

- Accepting updates to design

- Detailing components

Project Plan - Schedule/Milestones

Milestones

- Completion of design document

- Completing all six scenarios

- Completion of web and mobile application

- Completion of MYSQL database, tables, and views

- Creation of IIS server

- Completion of ASP.NET web API

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Project Plan - Schedule/Milestones

| Name	Begin date	End date
Identify Components	8/24/20	8/28/20
Research	8/26/20	9/11/20
Develop Basic Design ...	9/4/20	10/26/20
Make Uses Cases and I...	10/9/20	10/30/20
Finalize Design	10/28/20	11/13/20
Finalize Baic Function	11/2/20	11/23/20
Review Design	1/25/21	2/1/21
Begin Implementation	1/27/21	3/5/21
Complete Implement...	2/22/21	4/22/21
Demos and Bug Fixes	4/14/21	5/6/21

Testing Plan

- Unit Testing

  - Test specific aspects and quickly identify problems

  - Give small test sets to our algorithms and database

- Acceptance Testing

  - Project will be demoed to our client, teammates and faculty advisors

  - Use client/teammate/faculty feedback to make improvements

  - Rinse and repeat

Testing Plan (Continued)

- Interface Testing
  - Algorithms and database
    - Test algorithms
      - Interaction with database
  - Algorithms and user interface
  - Database and user interface
  - Algorithms, database, and user interface

Prototype - Mobile Device

- Phone layout
  - Preliminary
- Database
- Phone app
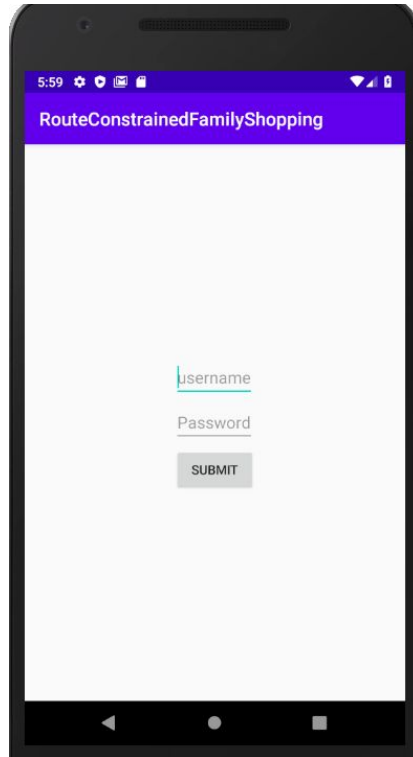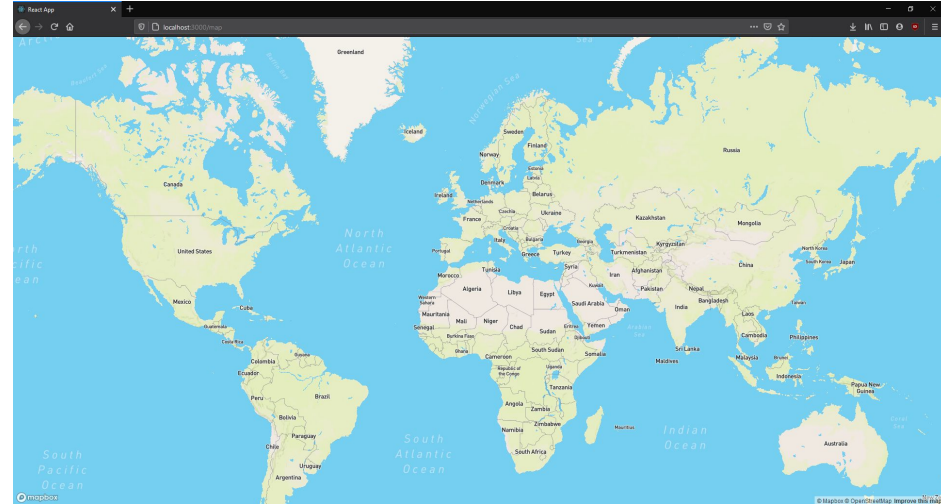
Prototype - Web Application

Conclusion - Project Status

Where Are We Now?

- Project Design completed
- Final version of Design Document completed

Next Semester's Plans

- Ensure functionality of scenarios
- Implement simplest scenario
  - Add more complexity

Contributions

- All worked on design document and presentation
- Tavion Yrjo - Meeting Scribe, Backend Engineer
- Colin Willenborg - Frontend Engineer
- Erich Brandt - Web Developer
- Elizabeth Strzelczyk - Web Developer
- Christian Baer - Backend Engineer, Data Analyst
- Colin Thurston - Trello, Tester, Algorithm Developer