Lab 2 – Strome InFusion Specification Outline

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1. Introduction

The Monarch family is a large and diverse entity. One of the strategic goals for Old Dominion University, is entrepreneurship. As defined by Merriam-Webster, an entrepreneur is, "a person who starts a business and is willing to risk loss in order to make money."[1] The Wikipedia article on Entrepreneurship is a bit more extensive, "Entrepreneurship is the process of starting a business, typically a venture company offering an innovative product, process or service."[2] Innovation is important, as society and the technology industry are changing at a rapid pace. To help rising Monarch entrepreneurs, the Strome Entrepreneurial Center was founded to assist them with starting a business, existing businesses, and to take over businesses. To accomplish this, the Strome Entrepreneurial Center builds connections within the Monarch family and community. They bring in speakers, host workshops, and guide students through the process of becoming an entrepreneur.

1.1. Purpose

To improve Strome Entrepreneurial Center's ability to make these connections, Strome InFusion will need to address several points: ease of registration, tracking student ventures, distinctive connections between students, awareness of Strome Entrepreneurial Center events and activities, tracking student visits to the Strome Entrepreneurial Center, improved digital communication between students and the Strome Entrepreneurial Center, ease of digital communication between students and the Strome Entrepreneurial Center. The best toolkit for the Strome Entrepreneurial Center would address these issues while being fast, efficient, and secure. Utilizing scalable technologies to allow for usage of students that are forming their business idea or just want to work with ventures to students with existing businesses that are actively serving customers.

1.2. Scope

The prototype being developed to address Strome Entrepreneurial Center's problem will differ from the real project in terms of scale, hosting, and data used due to time constraints. See Table 1 for features that will be included and their differences in the prototype.

Features/Components	Real World Product	Prototype
Students	Actual students at ODU who wish to collaborate on a business venture	Actual student and Strome InFusion team members using virtual machines using Strome InFusion team data along with special test functionality
SEC Staff	Actual SEC staff and mentors who will provide guidance for the project.	Director Grden as well as Strome InFusion team members simulating Strome Entrepreneurial Center staff
Internal Resources	Actual students who want to utilize their skills to work on a business venture.	Strome InFusion team members connecting as a venture to test functionality
External Resources	External investors and mentors who are willing to contribute to the success of the venture.	Test data provided by Director Grden and the Strome InFusion team
Mobile Application	Mobile application will be available natively for all major mobile OS platforms	Will only be available natively for Android devices
Web Server	An independent web server hosting Strome InFusion web application	Virtually hosted server at ODU
Database Server	An independent database server hosting Strome InFusion database	Virtually hosted server at ODU

Table 1 real world model versus prototype.

The prototype web and database server will be hosted on virtual machine within the Old Dominion University's Computer Science Department. This allows the prototype to be released faster and cheaper. No time need be spent finding affordable hosting.

Users will be simulated by team members of Strome InFusion and Director Grden. Additionally, a "test user" will be generated with access to functionality for testing purposes.

This will allow the Director Grden to express concerns and desires for the digital tool and allow the team members of Strome InFusion to find and fix bugs.

The members of Strome InFusion will create a venture for the digital tool representing internal users and skills, while data will be simulated to represent outside parties, representing external users and resources. This will allow for presentation of functionality, bug and UI/UX testing. Director Grden and the Strom InFusion team will generate test data to represent the external community.

The mobile application will be developed solely for Android platforms. This will allow for prototype testing to show proof of concept and viability within the time constraints of the class. The prototype for Android will also show any UI/UX flaws for a mobile user.

The development of the prototype will allow for functionality testing, finding and fixing bugs, and UI/UX testing. All major features will be represented, even if only conceptually, so that Director Grden can determine feasibility and viability of the product. The development of the prototype also meets with the constraints of the class, allowing the members of Strome InFusion to develop the prototype within the time limit of a semester.

1.3. Definitions, Acronyms, and Abbreviations

ACID compliance: Atomicity, consistency, isolation, and durability are the properties that guarantee that a database transaction is processed reliably.

Agile (Software Development): A group of software development methods in which solutions evolve through collaboration between self-organizing, cross-functional teams. It promotes adaptive planning, evolutionary development, early delivery, continuous improvement, and encourages rapid and flexible response to change.

AngularJS: A structural framework for dynamic web applications, based off of JavaScript.

Apache Cordova: A set of device APIs that allow a mobile application developer to access native device functionality.

Application Programming Interface (API): An application programming interface is a set of routines, protocols, and tools for building software applications.

Application server: The middleware of a server centric architecture.

Backend: The server, the web application, and the database.

Company: Any business that is owned or operated outside of ODU.

Concurrency: Allowing multiple processes to go at once.

Cordova: An open source project that provides a set of device APIs that allow a mobile application to utilize native device functions from JavaScript.

CSS: Cascading style sheets, gives form to the HTML page.

Data integrity: The accuracy and consistency of data stored in the database.

Database: A structured set of data held in a computer, especially one that is accessible in various ways.

DOM: The document object model is a logical structured document applied to HTML, it represents separate and distinct browsers and interfaces to view and interact with the web application.

Encryption: Encoding information in a way that is not readable except by authorized entities.

Entrepreneur: A person who organizes and operates a business or businesses, taking on greater than normal financial risks in order to do so.

Firewall: Software that prevents hackers from gaining access to systems with sensitive data.

Flask: A python web application framework.

Frontend: The HTML, CSS, and JavaScript of a web page.

GUI: The graphical user interface, is an interface that allows the user to interact with the application.

Horizontal Scaling: Expanding a system's capacity by adding servers to a cluster on the fly.

HTML: Hypertext Markup Language, a standardized system for tagging text files to achieve font, colour, graphic, and hyperlink effects.

JavaScript: An object-oriented computer programming language commonly used to create interactive effects within web browsers.

JSON: JavaScript Object Notation is a minimal, readable format of structured data.

Linux: An open sourced operating system based off of UNIX.

Linux distributions: Operating systems based off of the Linux kernel.

Load balancing: The distribution of processes across multiple available systems to improve performance.

Mobile application: An application developed to be operated and interacted within a mobile operating system.

MVC: Model view controller is an architectural pattern for building applications.

Native application: An application that has access to system functionality (i.e. the camera on a cell phone).

Nginx: A web server.

Object-relational database: Is a database that uses an object-oriented model: objects, classes, and inheritance are directly supported in the database schema and in the query language.

Object-Relationship Mapper (ORM): A programming technique for converting data between incompatible type systems in object-oriented programming languages.

Open source: Software where the source code is freely available.

Operating system: The software that supports a systems basic functions (i.e. launching applications and handling peripherals).

PostgreSQL: An open sourced, object-relational database system.

Python: An object oriented programming language.

Representational State Transfer (REST): Software architectural style of the World Wide Web.

RESTful framework: Representational state transfer is an architectural style framework for the development of web services.

Reverse proxy server: A server that can retrieve resources from one or more servers.

SEC: Acronym for Strome Entrepreneurial Center.

SI: Acronym for Strome Infusion.

SDKs: Software development kits are sets of software development tools that allow the creation of applications for a certain piece of software.

Server: A computer system that manages access to a central resource or service.

SQL: Structured Query Language is used to communicate with relational databases.

SQLAlchemy: A Python SQL toolkit and Object Relational Mapper that gives application developers the full power and flexibility of SQL.

Toolkit: A set of software tools.

Ubuntu: An open source operating system based off of Linux.

UI/UX user interface/user experience: The interface through which a user operates the digital product and the overall experience of the user.

User experience: The overall experience of the user.

uWSGI: Deploys the application server and implements WSGI protocols.

Venture: A student run business enterprise with a dedicated profile within Strome InFusion.

Vertical Scaling: Adding resources to a single node in a system, typically involving the addition of CPUs or memory to a single computer.

Web application: Client-server software application in which the client or GUI runs in a web browser.

Web application framework: A framework for software that supports web applications, services, and resources.

Web server: Systems that deliver web pages.

WSGI protocols: The web server gateway interface, it is a specification on how a web server communicates with web applications.

1.4. References

1 - Entrepreneur [Def 1]. (n.d.) in *Merriam Webster Online*, Retrieved September 16, 2015, from http://www.merriam-webster.com/dictionary/entrepreneur

2 - Entrepreneurship [Def 2]. (n.d.) in *Wikipedia*, Retrieved September 16, 2015, from https://en.wikipedia.org/wiki/Entrepreneurship

1.5. Overview

This document contains an explanation of Strome Infusion’s prototype architecture, functionality, and interfaces. The following section contains information requirements regarding the software that comprise the prototype. Key features and functional requirements are explained.

2. General Description

The following sections will describe the prototype in detail. The prototype's architecture will be described in §2.1. The prototypes functionality will be described in §2.2. User interfaces for the website and mobile app will be described in §2.3.

2.1. Prototype Architecture

The prototype will consist of a virtual machine to host an Nginx web server and PostgreSQL database, along with Android OS installed smartphones and web enabled computers. The structure of the prototype will be the same as that of the real world product. Figure 1 depicts the architecture of the prototype.

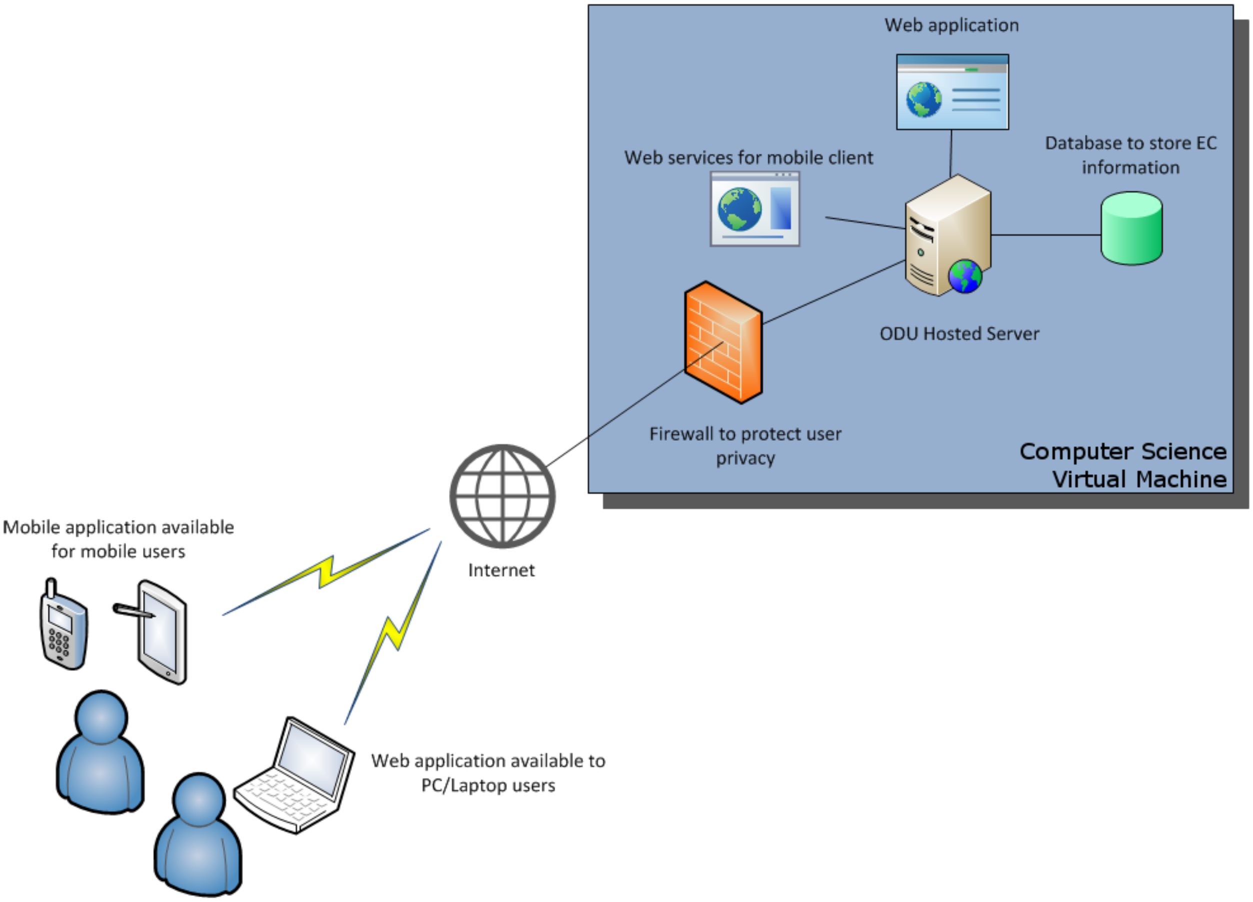

Web application
Web services for mobile client
Database to store EC information
ODU Hosted Server
Firewall to protect user privacy
Computer Science Virtual Machine
Internet
Mobile application available for mobile users
Web application available to PC/Laptop users

Figure 1. Major component diagram.

The PostgreSQL database developed for the prototype will be the same as the final product. The only difference will be scale of data that it uses. The prototype will have only data generated by Director Grden and the members of Strome InFusion.

Features developed for the website will be identical in both the prototype and the real world product. Guest, registered user, and venture will be generated based on the members of the Strome InFusion team. Strome Entrepreneurial Center staff will be generated by the Strome InFusion team and Director Grden. All other data will be simulated. User usage can be found in Figure 2.

The mobile application data will mirror the website. However, usage will not be universal. For the prototype, only Android OS platforms will be addressed. Development of the real world product mobile application will have to be addressed in terms of which mobile platforms it will be developed for. User usage can be found in Figure 2.

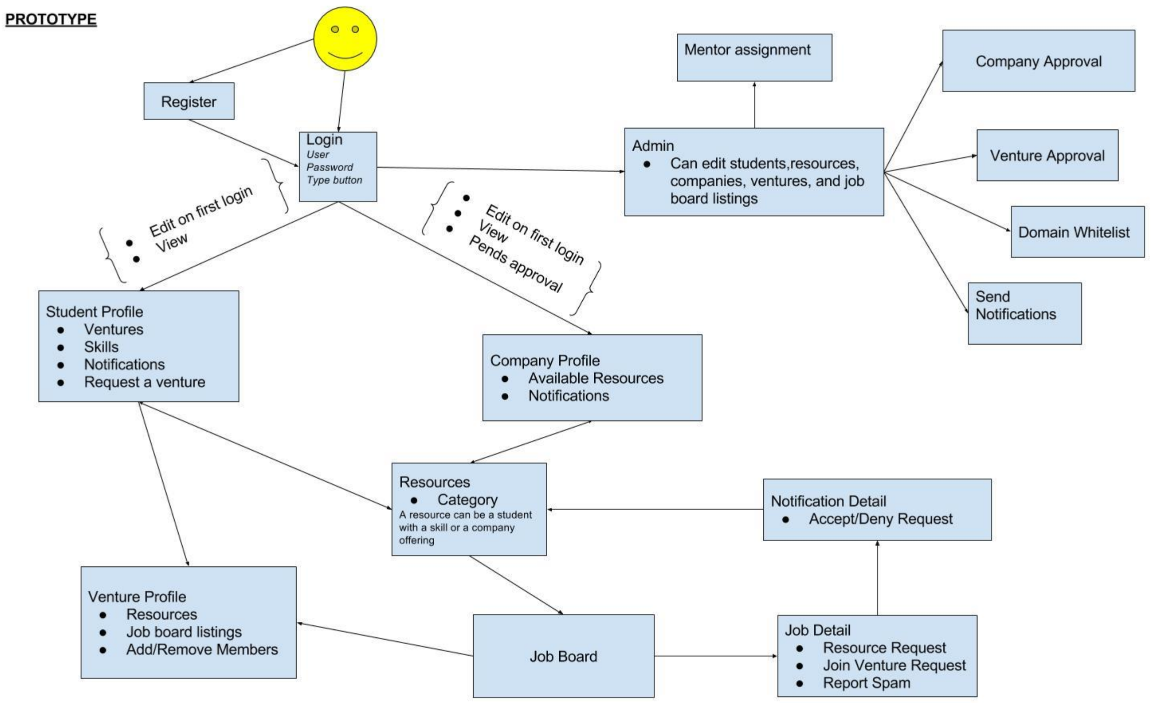


Figure 2. GUI sitemap

The prototype infrastructure will be composed of a single Ubuntu server virtual machine. This machine will run all database, web server, and proprietary Strome InFusion software. The virtual server will satisfy the requirements of the prototype and match the requirements of the real world product.

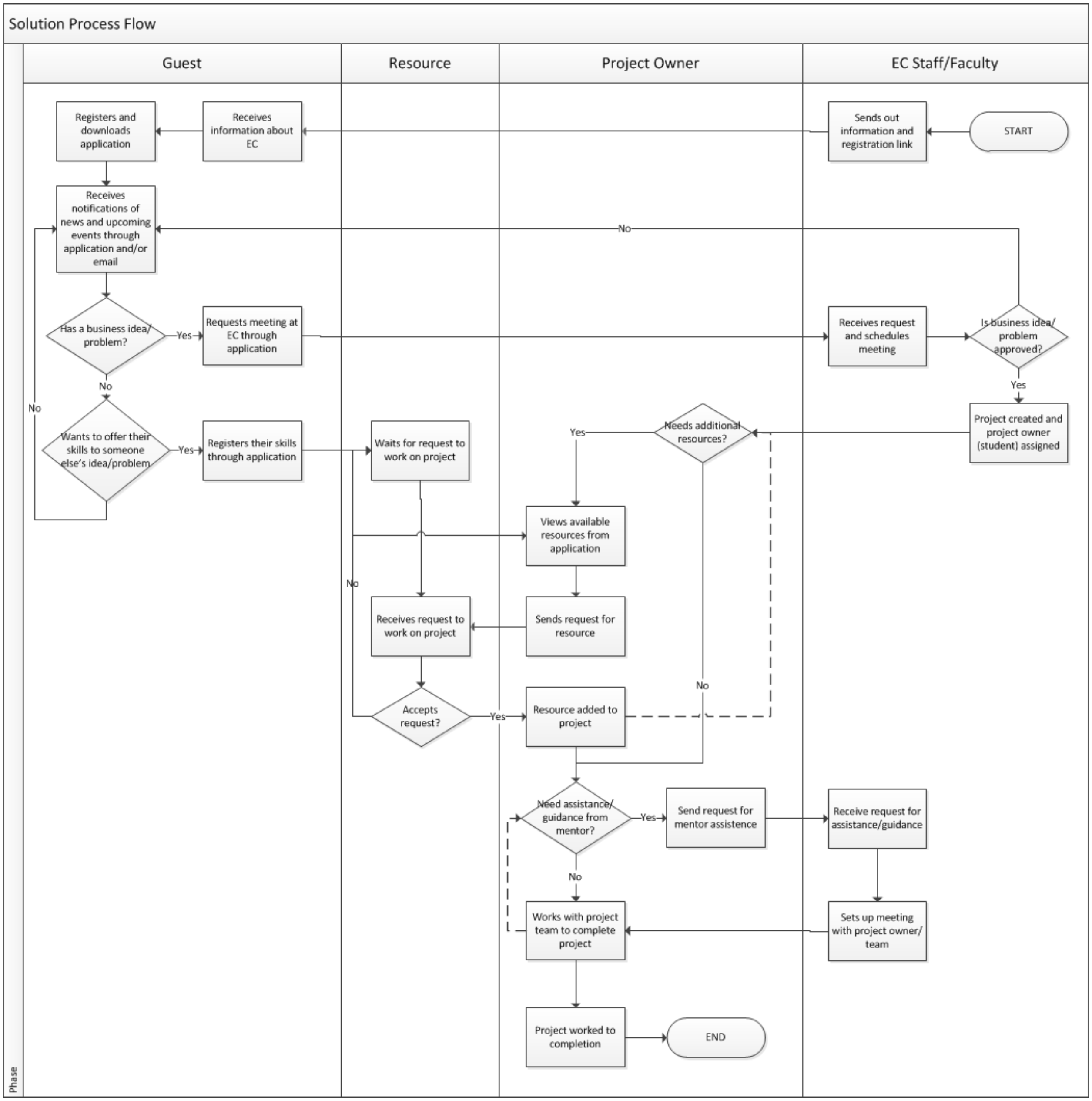

Solution Process Flow
Guest
Resource
Project Owner
EC Staff/Faculty
Phase
START
Sends out information and registration link
Receives information about EC
Registers and downloads application
Receives notifications of news and upcoming events through application and/or email
No
Has a business idea/ problem?
Yes
Requests meeting at EC through application
Receives request and schedules meeting
Is business idea/ problem approved?
Yes
No
Project created and project owner (student) assigned
No
Wants to offer their skills to someone else's idea/problem
Yes
Registers their skills through application
Waits for request to work on project
Needs additional resources?
Yes
Views available resources from application
No
Sends request for resource
Receives request to work on project
No
Accepts request?
Yes
Resource added to project
Need assistance/ guidance from mentor?
Yes
Send request for mentor assistence
Receive request for assistance/guidance
No
Works with project team to complete project
Sets up meeting with project owner/ team
Project worked to completion
END

Figure 3. Solution flow.

2.2. Prototype Functional Descriptions

The web and mobile application for Strome InFusion will consist of the following screens: landing page, registration, login, user profile, venture profile, company profile, job board, and moderator page. Login authentication as well as username and password recovery, with data collected from the Login page, will be handled by the Nginx server.

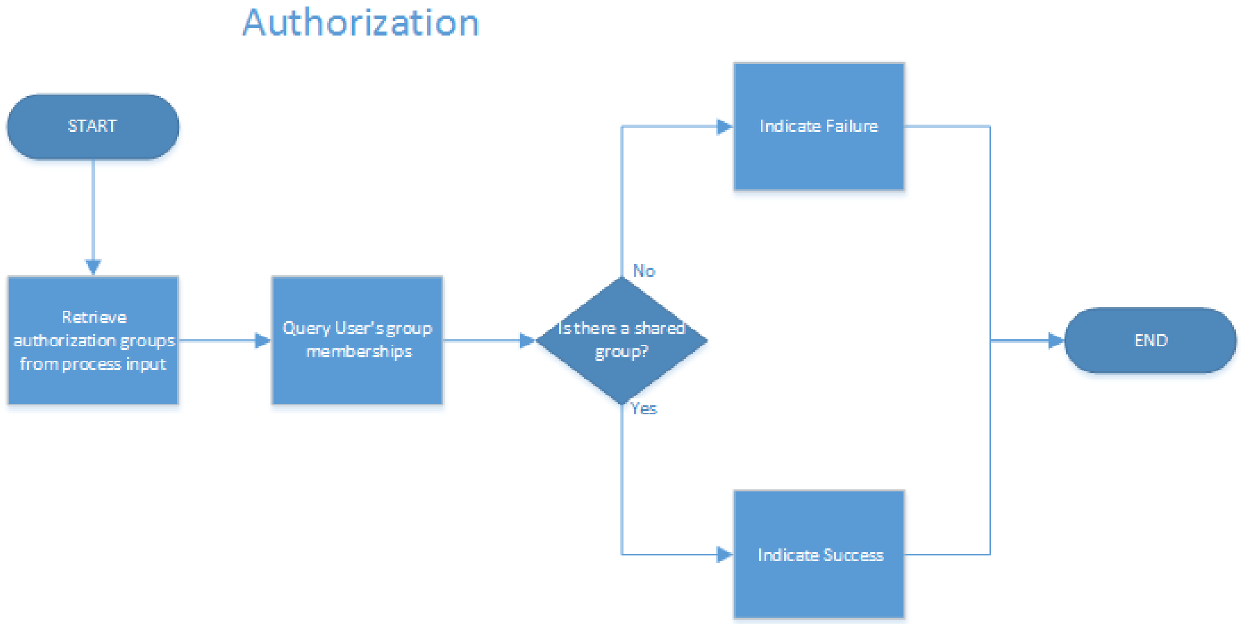


Figure 4. User registration.

Users who register a new account will have their data passed to the administrator page for approval. Once approved, a user, who logins with the correct credentials through the Flask API, will be directed to their profile. A user can edit their profile, add skills, request a meeting with the Strome Entrepreneurial Center staff, apply for a venture, or apply for an outside company.

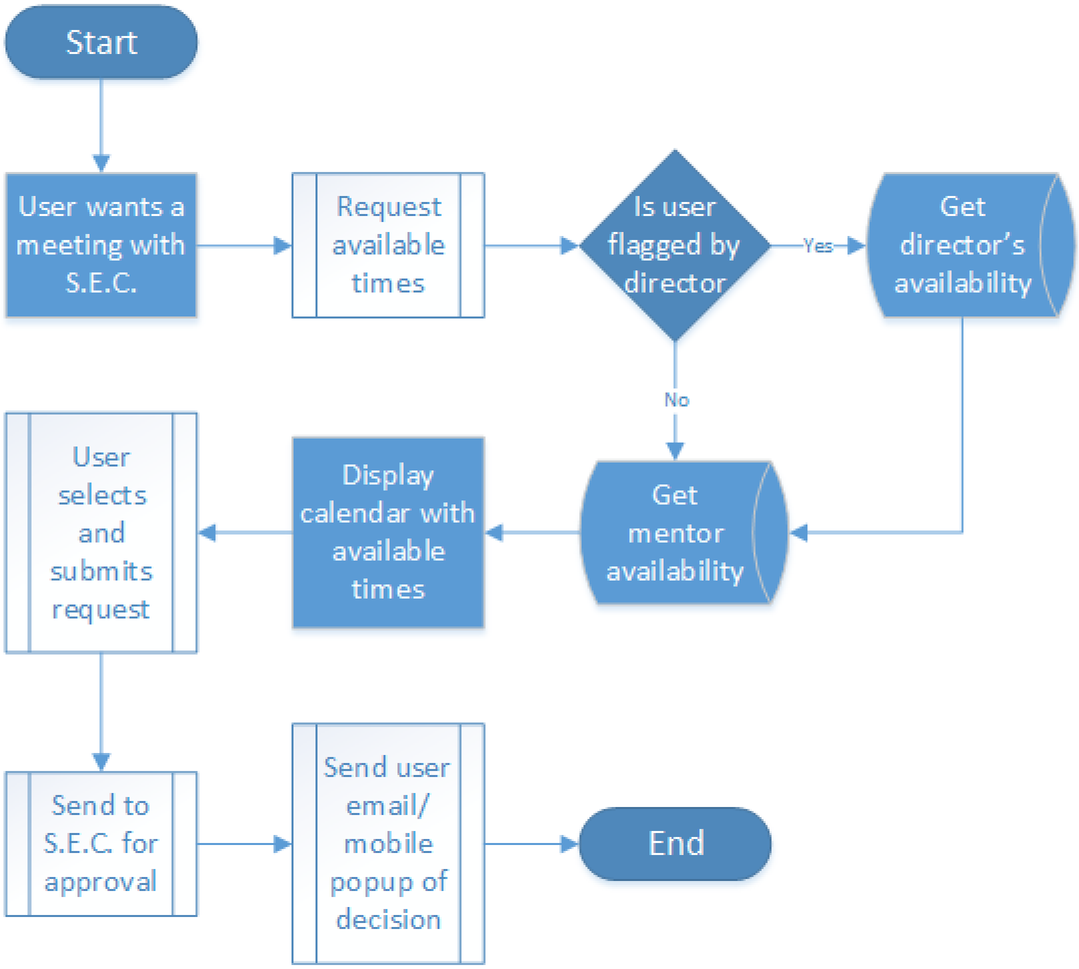

Start
User wants a meeting with S.E.C.
Request available times
Is user flagged by director
Yes
Get director's availability
No
Get mentor availability
Display calendar with available times
User selects and submits request
Send to S.E.C. for approval
Send user email/ mobile popup of decision
End

Figure 5. Meeting request.

A user who has been approved for a venture can then move to the venture profile page from their profile page. From there they can update their venture profile, editing their summary, vision, business canvas, pitch deck, marketing strategy, number of customers, revenue stream, and taxed employees. Ventures can also request skills, resources, and a meeting with the Strome Entrepreneurial Center staff.

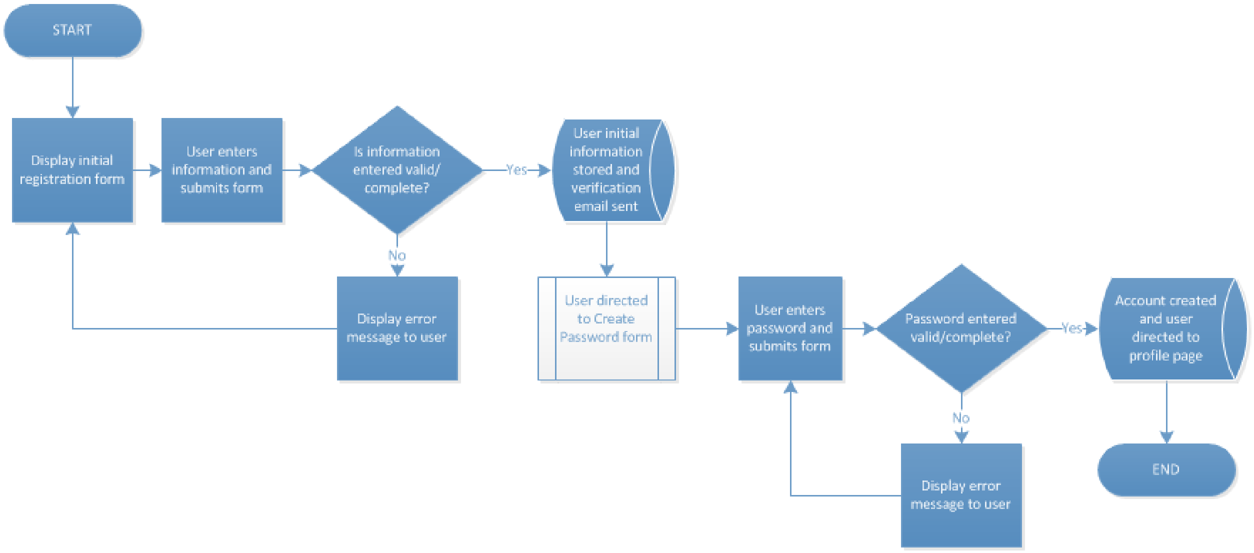

START
Display initial registration form
User enters information and submits form
Is information entered valid/ complete?
Yes
User initial information stored and verification email sent
No
Display error message to user
User directed to Create Password form
User enters password and submits form
Password entered valid/complete?
Yes
Account created and user directed to profile page
No
Display error message to user
END

Figure 6. User to venture or company authentication.

A user who has been approved for a company can move to the company profile page from their user profile page. From there they can edit their company profile and apply for new resources. Companies that are approved for mentoring, a specific resource, can then move to venture pages that Strome Entrepreneurial Center staff have approved them to mentor. From there they can check the venture progress and contact users in the venture about changes they should make.

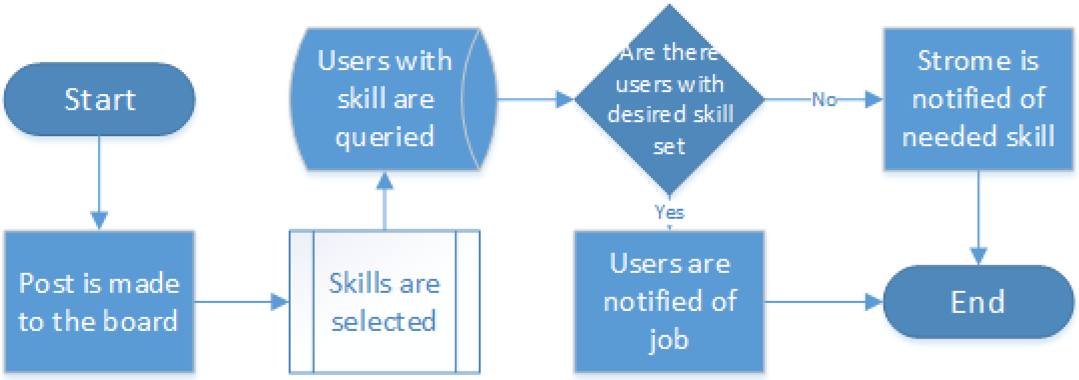

Start
Post is made to the board
Skills are selected
Users with skill are queried
Are there users with desired skill set
No
Strome is notified of needed skill
Yes
Users are notified of job
End

Figure 7. Job board page.

Users with skills and ventures with skill requests can move to the job board page. Here, users will see ventures with skill requests while ventures can see users with skills. They can send requests to one another to make requests for connections, allowing users to join ventures. This will allow users to connect based off similar needs and shared vision.

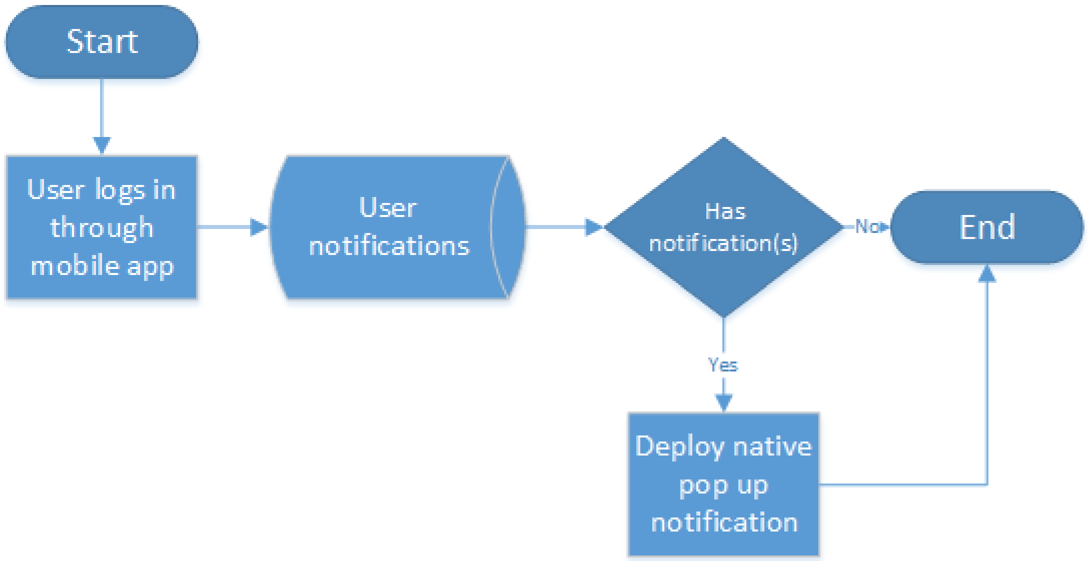
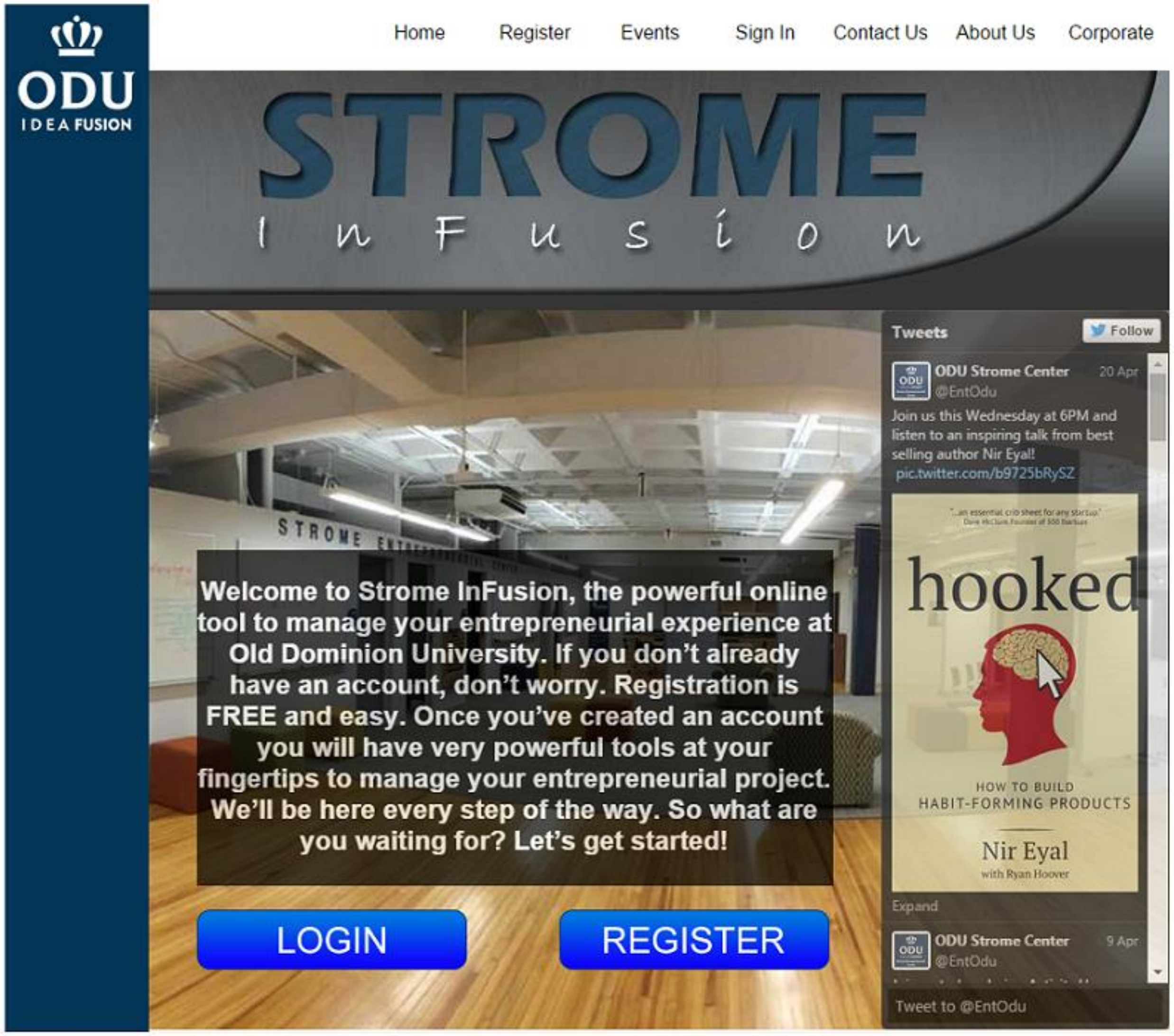

Start
User logs in through mobile app
User notifications
Has notification(s)
No
End
Yes
Deploy native pop up notification

Figure 8. Push notifications on mobile.

The mobile application will run off of the web server API through Apache Cordova, so that pages will be similar from computer browser to the mobile application. With the mobile application running natively on the mobile devices, this allows Strome InFusion to send push notifications to the users. Push notifications will be generated based off of messages to the user in the user profile.

2.3. Extended Interfaces

The GUI for Strome InFusion will be adaptive for mobile browsers, which allows for a single development for both desktop browsers, mobile browsers, and the mobile application. All interfaces will interact with uWSGI, regardless of platform or browser. Figure 9 shows a proposed mockup for the Strome InFusion landing page.



Welcome to Strome InFusion, the powerful online tool to manage your entrepreneurial experience at Old Dominion University. If you don't already have an account, don't worry. Registration is FREE and easy. Once you've created an account you will have very powerful tools at your fingertips to manage your entrepreneurial project. We'll be here every step of the way. So what are you waiting for? Let's get started!

ODU Strome Center @EntOdu 20 Apr

Join us this Wednesday at 6PM and listen to an inspiring talk from best selling author Nir Eyal! pic.twitter.com/b9725bRySZ

ODU Strome Center @EntOdu 9 Apr

Figure 9. Landing page mockup.