Lab 2 – Strome InFusion Product Specification Outline

John Spaetzel

Old Dominion University

CS 411W

Janet Brunelle

November 20, 2015

Version 1.0

Table of Contents

Figures and Tables

[This Section Intentionally Left Blank]

1   Introduction

The Strome Entrepreneurial Center (SEC) at Old Dominion University exists to serve the

entrepreneurial community by enabling new ventures initiated by members of the university. The center

provides the community with regular workshops, networking events, individual advising in association

with local experts in the industry, and other innovative resources that can assist entrepreneurs.

Typically, members of the local community provide these resources. In order to pair entrepreneurs with

these local resources the Strome Entrepreneurial Center establishes relationships between resources

and student ventures that would benefit most from them.

1.1   Purpose

In order for the Strome Entrepreneurial Center to achieve their outreach goals, the center needs

to resolve several key pain points that new ventures encounter. Specifically the center needs an easier

registration, higher awareness of events, tracking of individual visits to the center, and a method for

managing available resources as well as those currently in use. The current process ventures go through

and the problems they encounter is outlined Figure 1 with the problem areas begin addressed circled.
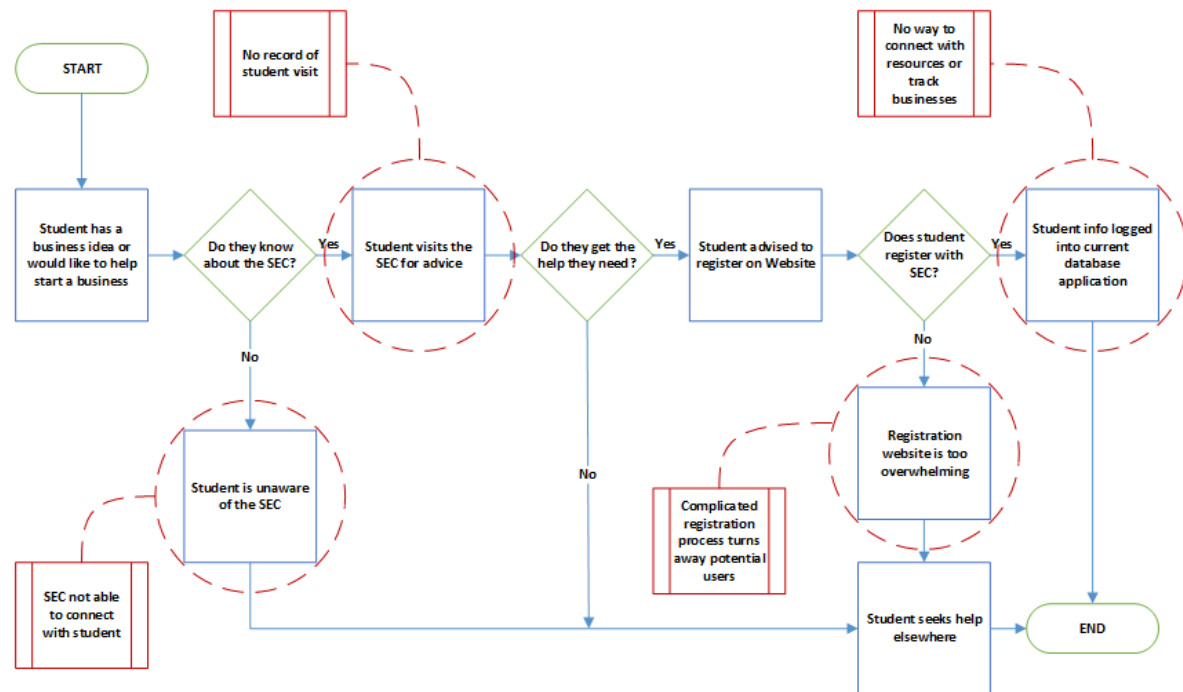
Figure 1. Current Process & Pain Points

Strome InFusion is a custom management platform for entrepreneurial centers that seeks to

meet these problems head on by addressing each point with a customized solution. The CS411 Black

team designed Strome InFusion to assist with the conversion of individuals into entrepreneurs by

helping them find and stay connected with resources. Strome InFusion targets the relationship between

the entrepreneurial center and its visitors to amplify the value of the center to its visitors.

1.2   Scope

The Strome InFusion prototype website will supplement the existing Strome entrepreneurial

center website with dynamic content and content that requires user authentication. The prototype

consists of several components that work together to support a single cohesive service. The major

components of the architecture include a website, mobile application, web service, and database. The

prototype application will highlight specific features that are essential to the operations of the final

products. Individual feature differences between the real world project and the prototype are exhibited

in Table 1.

Feature	Real World Project	Prototype
Authentication	Integration with 3rd party schemes such as shibboleth	Custom authentication
Client Testing	Testing across a large variety of mobile and desktop web browsers	Mobile testing on only the devices that our team members own. Full support only for modern browsers
Customer Support	Telephone and email support for problems or questions using the application	Not simulated – Customer support is a common need for software applications.
Events	Ability to list events and add events to a calendar view for individuals and companies	Eliminated from prototype
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
Internal Resources	Students who want to utilize their skills to work on a business venture.	Strome InFusion team members connecting as a venture to test functionality
Mobile Application	Mobile application will be available natively for all major mobile OS platforms	Will only be available natively for Android devices
SEC Staff	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
Security	Audited to confirm the security of proprietary data	Not reviewed
Service	Support for scaling to multiple servers and other environments	Limited to the capabilities of a single virtual machine
Service Integrations	Integrate with existing software and services used by universities such as Microsoft Lync	Integrated with email
Students	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

Table 1. Feature comparison of full product and prototype

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: An open source project that provides a set of device APIs that allow a mobile

application to utilize native device functions from JavaScript.

Apache web server: The world's most widely used web server software.

API server: A computer that provides API data over a network.

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.

Business Canvas: A strategic management and lean startup template for developing new business

models.

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

Company resource: A resource an external company registers in Strome InFusion to assist with student

ventures.

Concurrency: Allowing multiple processes to go at once.

Cordova: See Apache Cordova.

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

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

Database: A comprehensive collection of related data organized for convenient access.

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.

Employer: A person or company that hires at least one or more employees.

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: Graphical user interface, is an interface that allows the user to interact with the application.

Horizontal Scaling: Adding more nodes to a system, such as adding a new computer to a distributed

software application.

HTML: Hypertext Markup Language, a standardized system for tagging text files to achieve font, color,

graphic, and hyperlink effects.

InFusion: An alternative name for Strome InFusion.

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: A Unix-like and mostly POSIX-compliant computer operating system assembled under the model

of free and open-source software development and distribution.

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.

MySQL: An open-source relational database management system.

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

phone).

Nginx: A web server with a strong focus on high concurrency, performance and low memory usage.

ODU: Acronym for Old Dominion University.

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 computer's basic functions (i.e. launching applications

and handling peripherals).

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

Push Notification: The delivery of information from a software application to a computing device

without a specific request from the client.

Python: A widely used general-purpose, high-level 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.

SDK: Software Development Kit, a set 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.

Small Business: A business that has less than 500 employees.

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.

Stakeholder: A person who will be affected by the outcome of Strome Infusions development..

Toolkit: A set of software tools.

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

User experience: The overall experience of a person using a product.

User skill: A skill a user registers in Strome InFusion to assist with ventures.

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.

Virtual Machine or VM: An operating system OS or application environment that is installed on software

which imitates dedicated hardware.

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.

Web Server Gateway Interface (WSGI): Specification for simple and universal interface between web

servers and web applications for the Python programming language.

1.4   References

Council, J. (2014, April 4). *Alumnus Mark Strome's $11M gift to ODU is not simple charity*. Retrieved from
Inside Business: The Hampton Roads Business Journal: http://insidebiz.com/news/alumnus-
mark-stromes-11m-gift-odu-not-simple-charity

Nancy Grden Appointed First Director of Strome Entrepreneurial Center. (2014, November). Retrieved
from News @ ODU: http://www.odu.edu/news/2014/11/entrepreneurial_cent

Spaetzel, J. (2015). *Lab 1 - Strome InFusion Description.* Norfolk.

1.5   Overview

This product specification reviews the hardware, software, external interfaces, and functionality

of the Strome InFusion prototype. The remaining sections of this document include detailed technical

descriptions of the hardware, software, interfaces, features, and methodology used to create and

maintain each of the features of the application.

2   General Description

The following sections will describe the prototype in detail. The prototype's architecture is

described in section 2.1. The prototype's functionality will be described in 2.2. The user experience for

the website and mobile application will be described in 2.3.

2.1   Prototype Architecture

The web application is hosted on an Ubuntu Linux server. The website is a single page web

application built using AngularJS (JavaScript based web application framework). The web application

makes RESTful HTTP requests to a web service to load user specific information and other dynamic

content. Because the application is built as a single page AngularJS application, it will also be able to be

packaged using Cordova to provide a native mobile user experience. The server includes the server

software WSGI to serve those HTTP requests for both web pages and RESTful data. Flask, a python micro

framework, is used on the server to assist in servicing the HTTP requests. The web service interfaces

with the PostgreSQL database which stores a structured copy of all of the content generated by users.

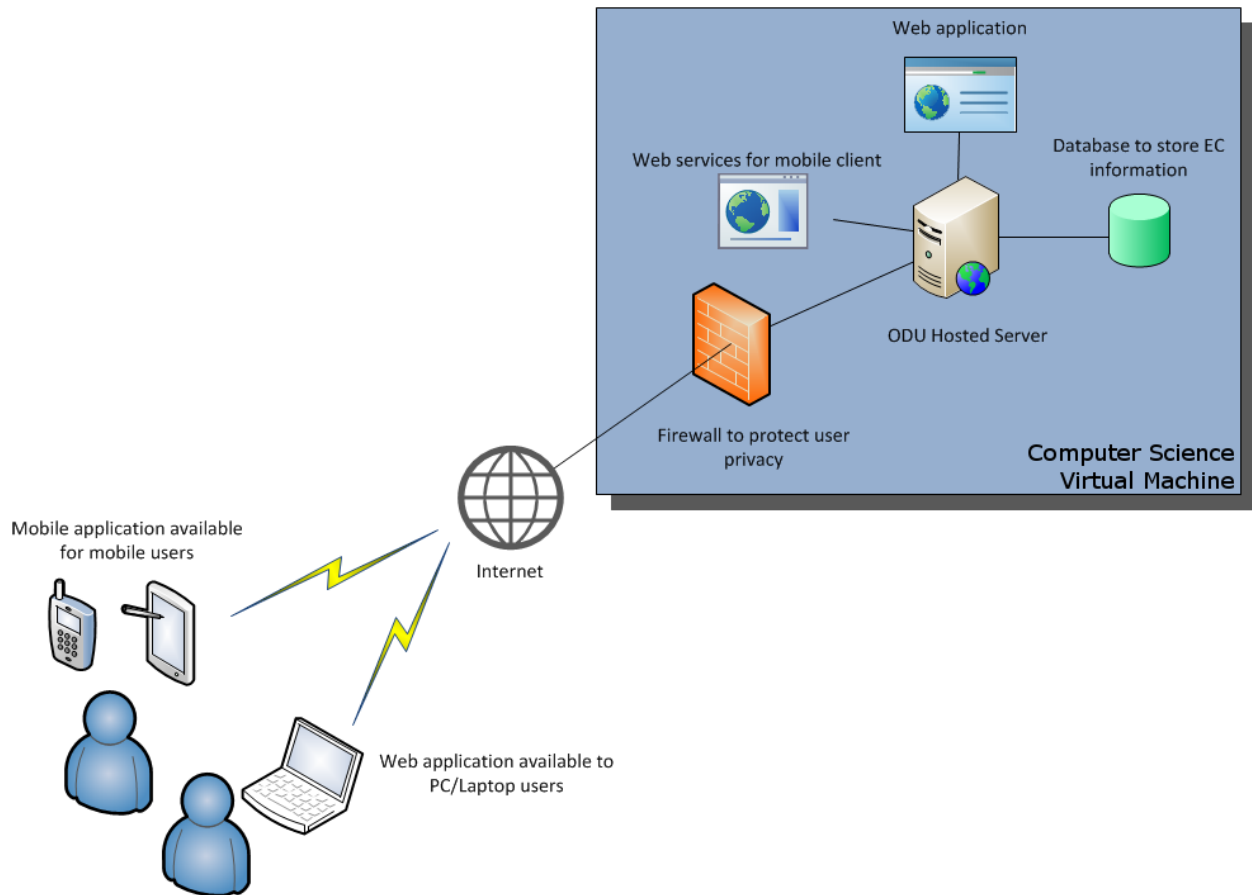See Figure 2, which is a map of how these parts are related.

Figure 2. Major Component Diagram

      Users can work with the application through either the website or downloadable mobile

application. A mobile application is used to provide functionality that would not be available with a

website. A full sitemap of the functionality available to administrators and application users can be seen

on the Strome InFusion Site-Map in Figure 3. In the sitemap below, the relationships and links between

pages are shown using arrows to indicate the potential directions the user can travel as they work with
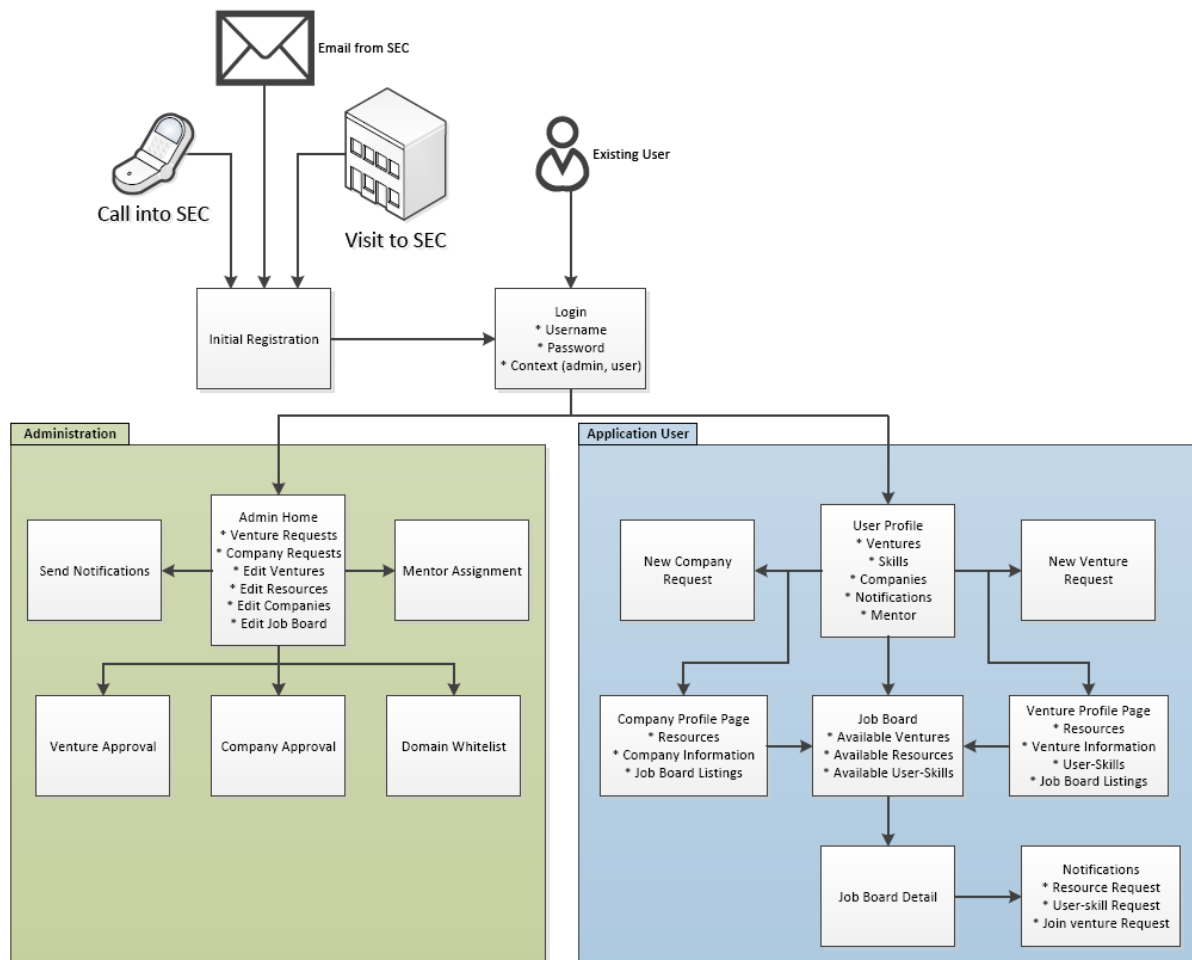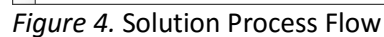
the Strome InFusion prototype application.

Figure 3. Application Site Map

Users are expected to go through specific steps as they start using the application in order to register their ventures and learn more about resources provided by the Strome Entrepreneurial Center. The Solution Flow Diagram in Figure 4 below demonstrates this user flow.

Figure 4. Solution Process Flow

2.2   Prototype Functional Descriptions

The Strome InFusion prototype application will share views between the mobile and web

application. These views include a landing page, registration, login, job board, administration pages, and

profiles for companies, ventures, and users. The application is also capable of notifying users of actions

performed by other users of the application through a notification system. Figure 5 demonstrates the
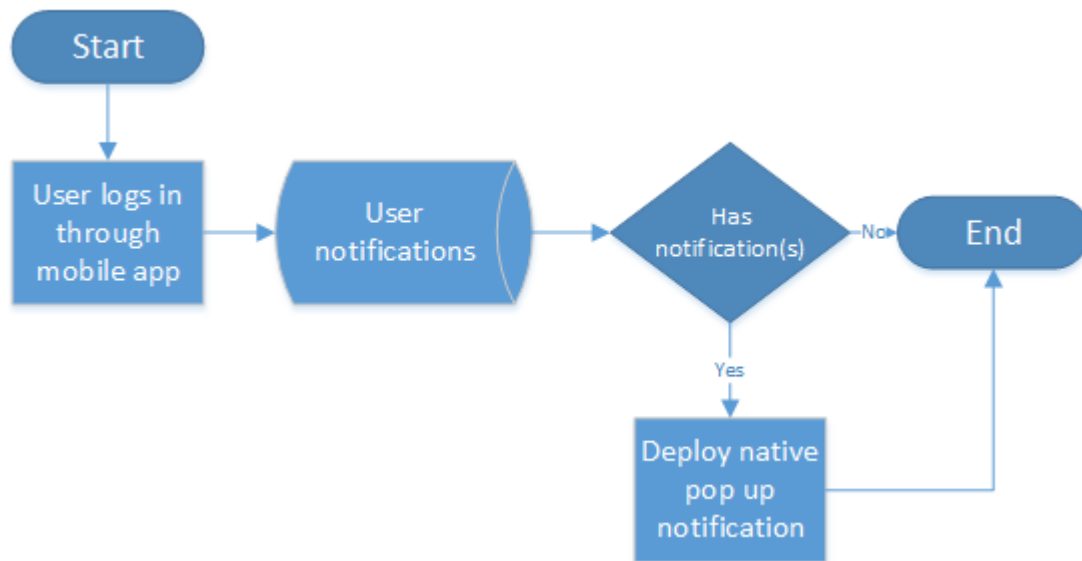
process used to notify users.

Figure 5. User Notifications

        Users of the website have the capability to register or login to an account. There are three

primary roles with different abilities; users can have one or more of these roles, which determine their

capabilities on the site. The center's staff approves a user's rolls in order to grant them access to specific

components of the system. Prior to a role being approved, the user can see an immediate preview of the

resources affiliated with members of the center. Figure 6 demonstrates the user authorization flow for

registered users.
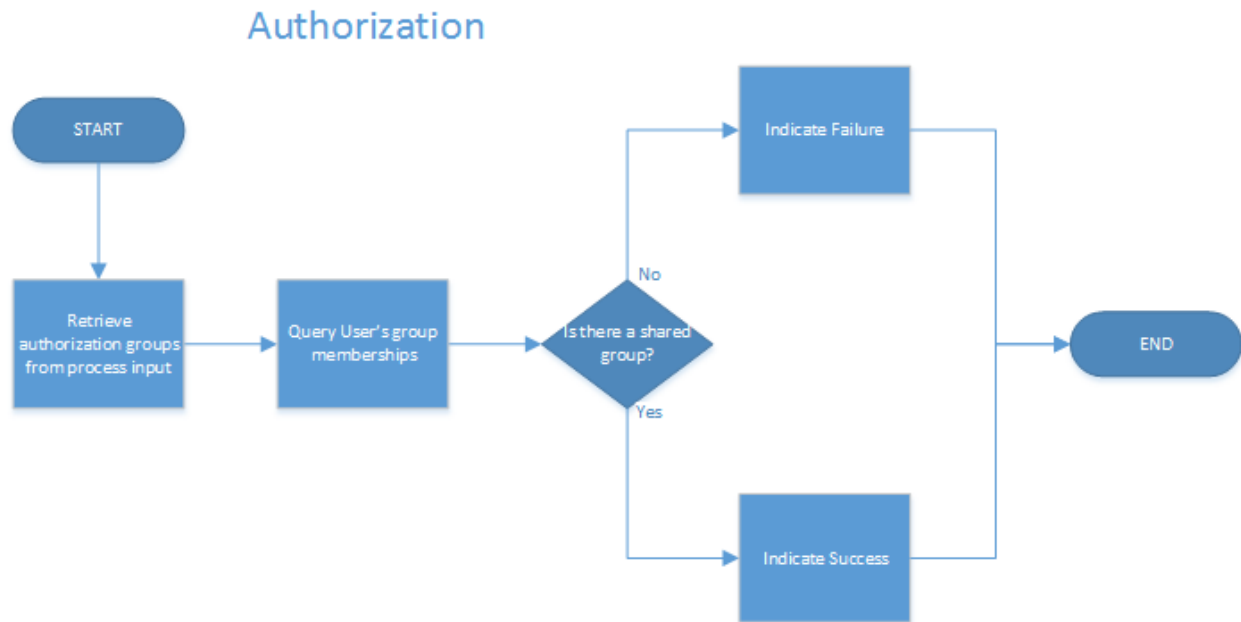
Authorization

Figure 6. User Authorization

Students are able to create a new venture, offer their skills to an existing venture, or request

meetings with SEC mentors. Once the SEC staff approve a student's new venture they can also then

request specific resources, and update information about their venture. If a request does not target a

specific individual who is offering a resource then it is placed onto the job board, which lists all open

requests and offers. External companies frequently work with the Strome Entrepreneurial center to

provide their resources to new student ventures. An external company will have the ability to post

about their resources to indicate how they can help student ventures. An external company can also

maintain a listing of its own profile with information to provide supplemental information to students

who might seek their assistance. Figure 7 gives an overview of how the job board is used to create new
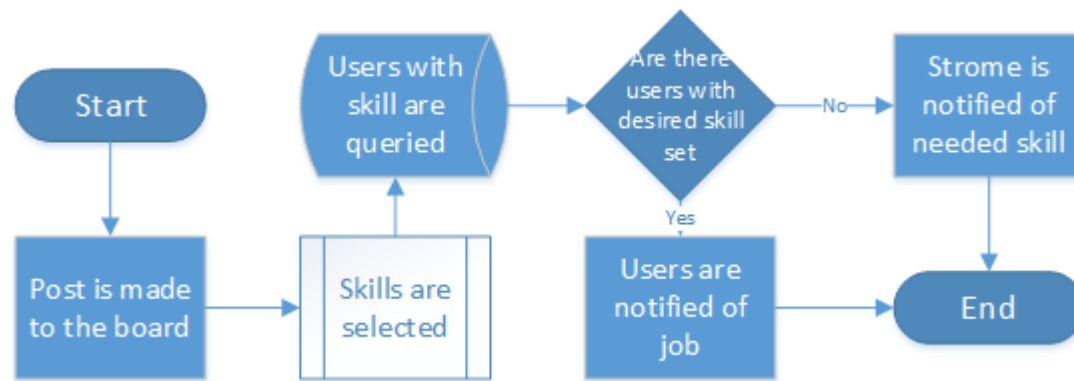
posts and inform relevant users about posts.

Figure 7. Job Board

The entrepreneurial center staff role is specifically for employees of the Strome Entrepreneurial center and has administrative capabilities. Staff members can send notifications to members. They are also granted the ability to approve or deny new signups, and maintain current lists of external mentors. Staff can manage key words associated with the search for resources provided by both students and companies. Staff are able to approve and provide additional information about meetings between students and the center's team of mentors. An overall administrator role allows the center to send general system notifications to all users. The administrator is empowered to add, delete, enable or disable user accounts, companies, change signup requirements of roles, and has all of the other abilities of staff members. Figure 8 demonstrates ways that a user can be approved either automatically or directly by an administrator.
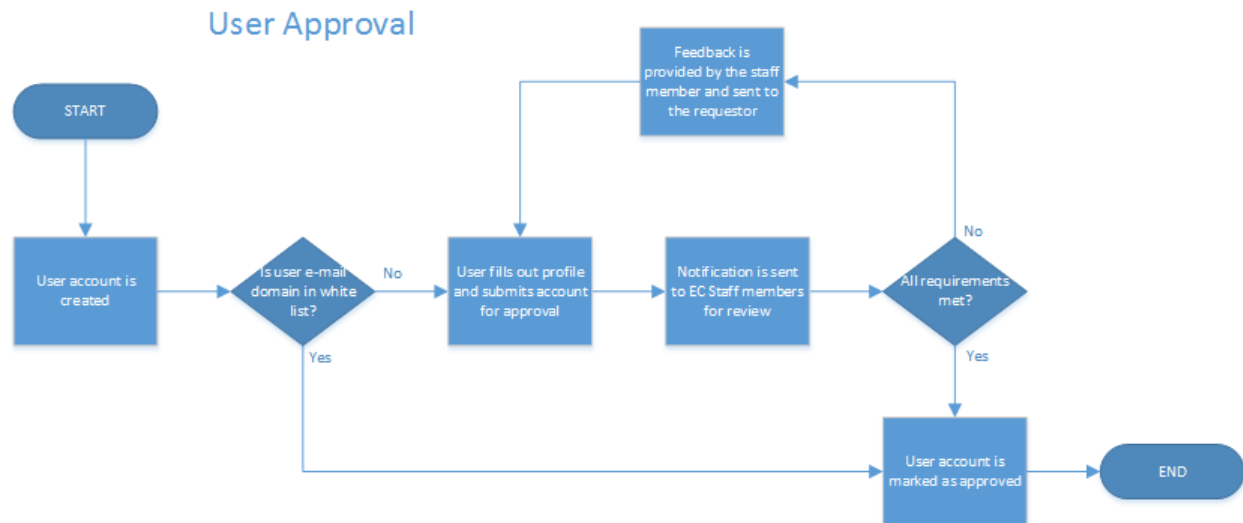
Figure 8. User Approval

2.3   Extended Interfaces

The interface for accessing Strome InFusion is designed as a responsive website, which can be accessed from either mobile or desktop devices. Regardless of which interface is used to access the website they will all be served using via the Python based API using a uWSGI server. Figure 9 exhibits a mockup of how the Strome InFusion prototype might look on a desktop computer.
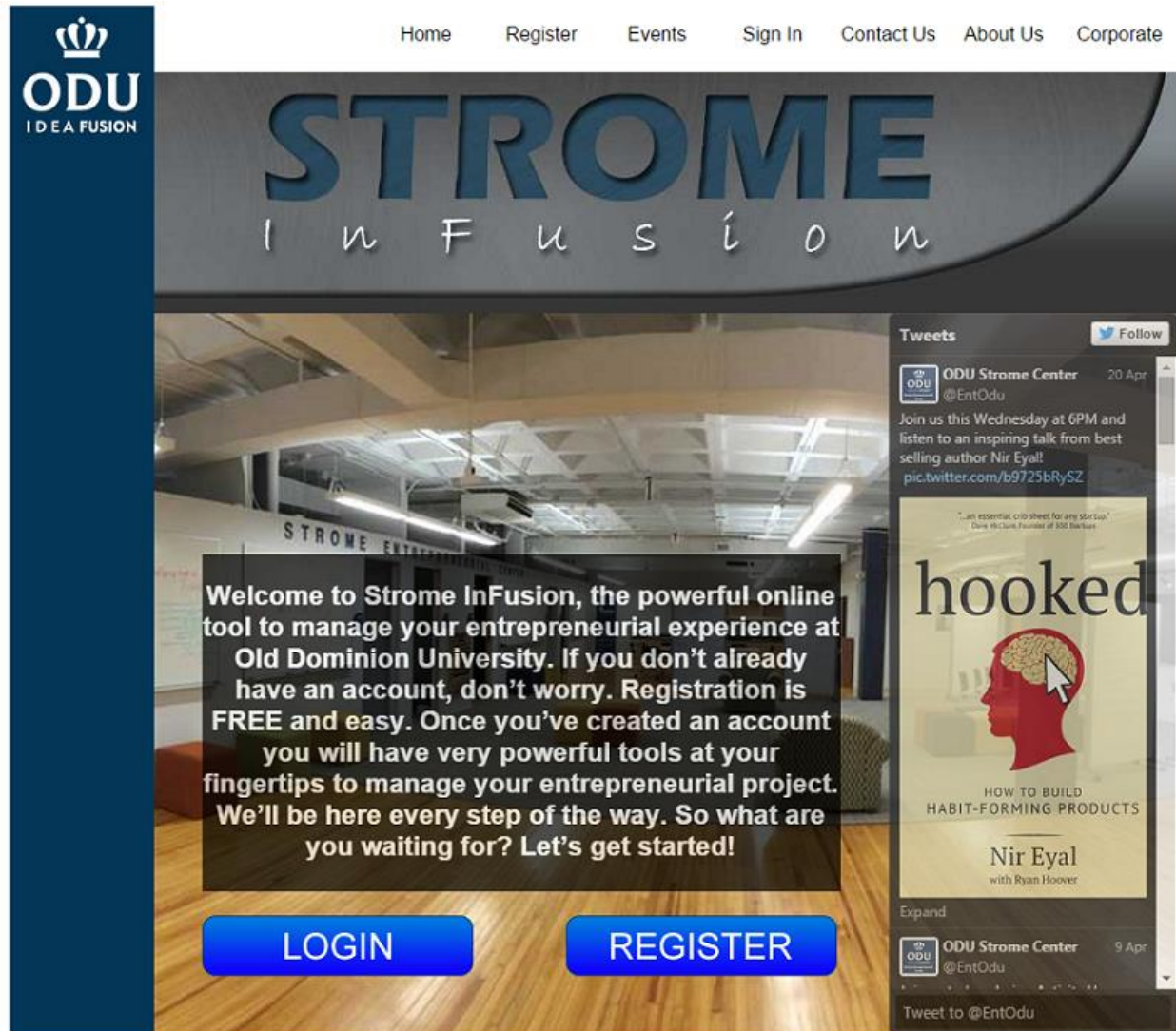
Figure 9. Landing Page Mockup