2015

Lab 1 – Strome InFusion Description

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Strome InFusion

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1 INTRODUCTION

The Monarch family is a wide and diverse entity. Many features, many heads, and many mouths. And going in many different directions. One of those directions, 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.

However, if a Monarch is not alumni, faculty, or staff then that means they are a student. As a given, students are poor, meaning all business ventures, all innovation, would then come at a risk. To help rising Monarchs, the Strome Entrepreneurial Center was founded to assist them with starting a business, existing business ventures, and to take over businesses. To do this, the Strome

Entrepreneurial Center builds connections within the Monarch family and the community. They bring in speakers, host workshops, and guide students through the process of becoming an entrepreneur.

The Strome Entrepreneurial Center did not just spring forth from the awesomeness of the Old Dominion University campus…except that it kind of did. Back in the 1970s, a young man in northern New York dreaded the idea of taking over the family farm. His guidance counselor recommended that he apply for a college in Virginia, one Old Dominion University. And he got denied. His father made a phone call to the admissions office and talked the university into taking his son on under a probationary status. Four years later, in 1978, Mark Strome graduated from Old Dominion University with a bachelor's degree in civil engineering. After a few years as an engineer, he decided that he did not want to do that either. Along the way however, he realized that he was good with money. He attended University of California and received a master's in economics, went to Wall Street and by the 1990s had become

a millionaire. To paraphrase Mark Strome, ODU took a chance on an unremarkable person which allowed him to do remarkable things.[3] Mark Strome is a man that took a personal risk, by being unremarkable and putting himself out there where he might be found out. But using the work ethic he developed as an only son on a farm that he learned from his father who had been an only son of a one armed farmer, he was able to innovate and succeed. This allowed him to donate $11 million dollars to the university which funds, in part, the Strome Entrepreneurial Center.

Old Dominion University, under President Broderick's leadership, has "created an entrepreneurial ecosystem that nourishes the innovative spirit of future teachers, nurses, engineers, scientists, and artists by helping them convert their passions into new enterprises."[4] Which is unsurprising stance for a state owned college, given Governor McAuliffe's stance on moving the commonwealth's economy away from a dependency on federal jobs.[5] Along with the local city council supporting Downtown Norfolk Council's Vibrant Spaces Program, which is aimed at bringing local

entrepreneurs to use local spaces at a discount, both to help them through the venture phase and to improve property usage.[6] With so much political and social pressure and the leadership of the school driving it, Old Dominion University's goal for the Strome Entrepreneurial Center, to help students of all disciplines become successful entrepreneurs, is well grounded and supported.

The Strome Entrepreneurial Center however is unable to meet these demands, due in large part to the lack of connections it is able to make between rising Monarch entrepreneurs, students interested in joining venture ventures, and outside individuals and businesses interested in helping these young ventures. Customer relationship management programs are not designed with student ventures in mind, social media lacks the administrative tools to manage users and companies, and accelerators and incubators are often too far advanced for student ventures.

To improve Strome Entrepreneurial Center's ability to make these connections, the toolkit 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.

2 STROME INFUSION PRODUCT DESCRIPTION

2.1 Key Product Features & Capabilities

Strome Entrepreneurial Center is a unique facility offering a unique problem. A tool to match their needs would be, by necessity, just as unique. It would need to be built to match their needs and in such a way as to not only be usable, but attractive, to Monarchs.

The most prolific interface of any digital toolkit would be the website. This provides an outward facing digital portal of the Strome Entrepreneurial Center, allowing them to advertise events, features, and resources available to Monarchs. The website would allow students to work on their ventures, advertise themselves to ventures, and, as a venture, see what resources the Strome Entrepreneurial Center has for them. The web application needs to be mobile responsive and to account for modern build practices.

To improve access and mobile usage, the toolkit needs to be available as a mobile application. It will have to provide the same functionality while maintaining similar

design. The added advantage a mobile application provides to a digital toolkit is adding popup notifications to the Strome Entrepreneurial Center's communication kit.

2.2 Major Components

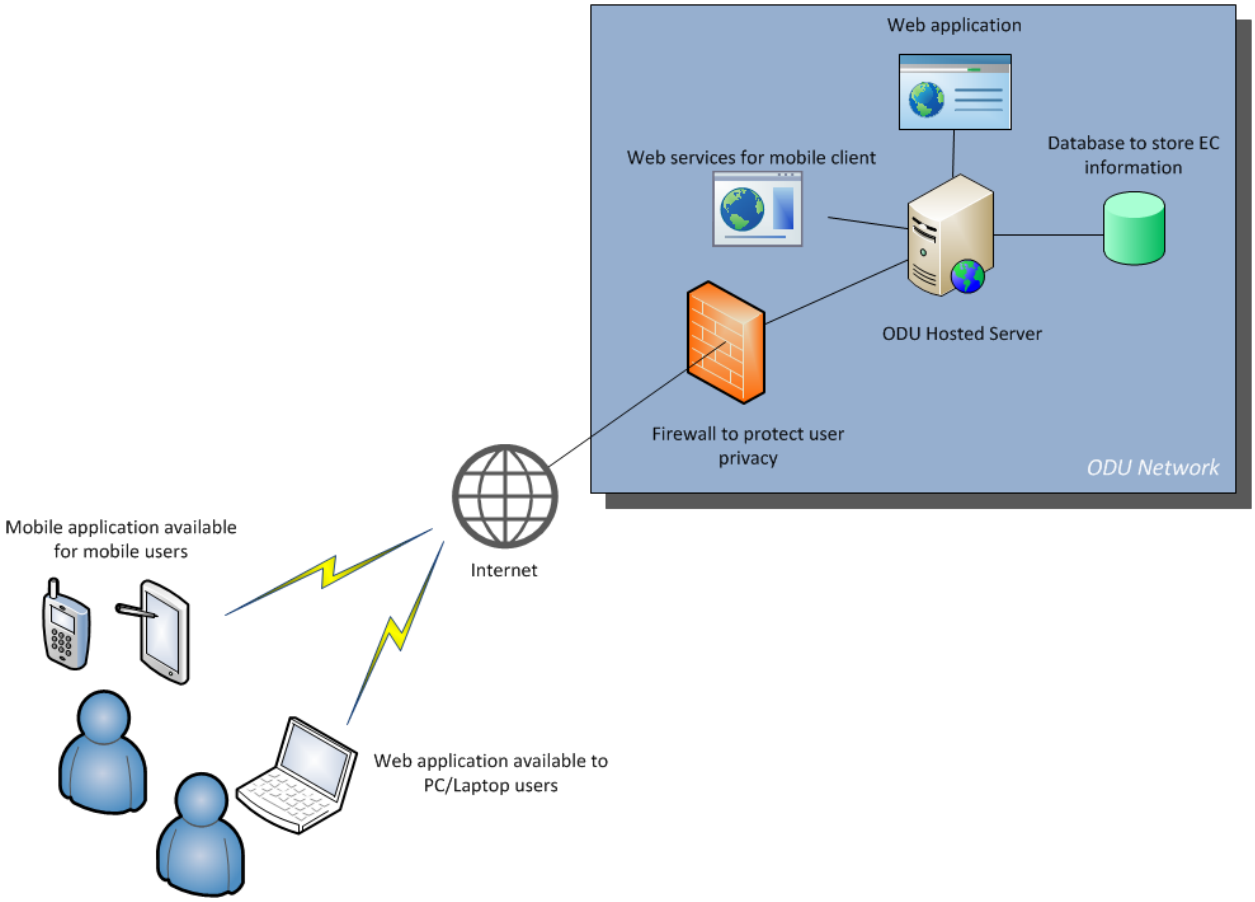

Figure 1. Major component diagram.

The server for Strome InFusion is an Ubuntu server to host the database and site API (see *Figure 1* as ODU hosted server). Ubuntu provides an open source server operating

system that offers customizability and scalability. The platform is also compatible with all technologies chosen for this product, which is why the Ubuntu was chosen over other Linux distributions.

For the web server, Nginx was chosen. It has high concurrency, which is necessary as it will be handling calls from both web users and mobile users, through load balancing. Nginx also offers the ability to act as a reverse proxy server, which offers scalability and integration.

An open source, object-relational, SQL based database was chosen for storage and ordering of the datasets. PostgreSQL (see *Figure 1* as database to store EC (entrepreneurial center) information) was chosen for reliability, data integrity, and the fact that it integrates well with other technologies chosen for this product. ACID compliance allows for not only data integrity, but ensures user experience.

The Flask API (see *Figure 1* as web application and services) offers a good backend platform as RESTful framework. Flask will host the generated AngularJS web application, by taking user requests, from either the web or mobile application, and then either generating the webpage or retrieving data from the database and returning it in a JSON format. The use of Flask also offers built in authentication, for data security.

To supplement Nginx and Flask, uWSGI is also being implemented. It offers both WSGI protocols and an application server. The WSGI protocols make communication with Nginx simpler and the application server will host Flask.

The website environment will use AngularJS (see *Figure 1* as web services and application) to supplement the HTML & CSS to create a dynamic web application. AngularJS web applications translate well into the MVC build practice, for ease of build. This JavaScript framework provides a better manipulation of DOM and also integrates well with the Flask API to provide better user experience.

The mobile application will be developed with Apache Cordova (see *Figure 1* as web services and application). Cordova packages web applications with SDKs to allow for use as a native application. This allows for concurrent native development of a mobile application for multiple devices across multiple mobile operating systems. With AngularJS's ease of use with MVC build, the GUI for mobile applications will also provide similar user experience as to that of the web application.

3 IDENTIFICATION OF CASE STUDY

Strome InFusion is being developed to assist the Strome Entrepreneurial Center with helping students, alumni, faculty, and staff become entrepreneurs and with existing business ventures. The success of Strome InFusion can be measured by the metrics of the application: user experience (both amongst the center staff and entrepreneur user group) and number of users and ventures. The success of the product can be measured by its success at Old Dominion University and by its adoption as a platform at collegiate entrepreneurial centers.

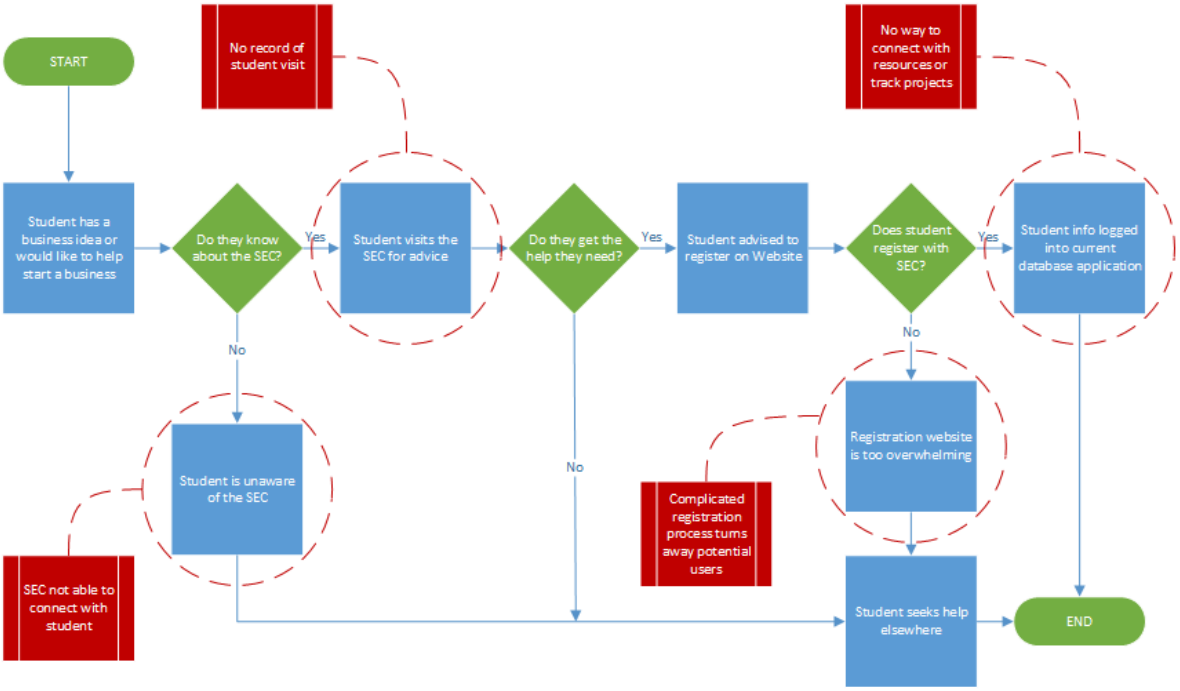

Figure 2. Work flow diagram.

There are four major points where the Strome Entrepreneurial Center is failing to make the necessary connections. The center: is unable to accurately record and make connections with rising Monarchs that visit the center, unable to directly connect students that have the desire and skills to work with ventures with those ventures that would need the students, and the existing system is overly complicated in its registration process.

Strome InFusion would through its ease of access and use allow students that visit to maintain that connection and allow the center to maintain the connection through the student's use of the product. The product would also allow the users, both as student ventures and as individual users, to make connections with one another. The center itself could connect student ventures and students, as well as connecting ventures with outside resources such as mentors, investors, and goods and services. The registration process for Strome InFusion is streamlined to allow for quick access by visiting students and the creation of accounts by the center staff to increase use by outside visitors.

4 STROME INFUSION PRODUCT PROTOTYPE DESCRIPTION

The goal for the Strome InFusion prototype is to prove that an efficient system of organized and monitored networking of Monarch entrepreneurs will provide not only more connections, but sustained connections. Metrics and surveys of user experience will be collected and reviewed by the director of the Strome Entrepreneurial Center.

The main function of Strome InFusion is to allow for efficient and easy connections between Monarch ventures and the skills and resources that they need. This will allow Monarch ventures to develop quickly and provide the Strome Entrepreneurial Center data on who is interested in entrepreneurial endeavors and who lacks assistance.

To accomplish that function, two datasets need be developed. The first is a list of skills possessed by Monarchs and those in the community willing to assist Monarch ventures, while the second is a list of resources that companies and individuals in the community are willing to contribute to assist Monarchs with their ventures. These are the groups that the Strome Entrepreneurial Center needs to connect and why they need to connect them.

The third function is profile of Monarch ventures, where the ventures can upload their business plans, marketing strategies, and a list of resources and skills that the venture is utilizing. This allows the Strome Entrepreneurial Center to assist these ventures in their development. It provides direct and organized access by the

center staff to assist the Monarchs that are involved with the center.

Features/Components	Real World Product	Prototype
Students	Actual students at ODU who wish to collaborate on a business venture	Actual student and 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. Feature comparison between real world prototype and the prototype

4.1 Prototype Architecture

The prototype of the Strome Entrepreneurial Center toolkit is being developed to share the same functionality as the real world product. A comparison between the developed prototype and the real world product can be found on table 1. The biggest difference is that the servers for the web application and the database will be hosted on Old Dominion University Computer Science department's virtual machines. Other differences include test and simulation data, though as much as possible, real world data will be provided (such individual team members of Strome InFusion and the creation of a Strome InFusion venture) and that the only supported mobile devices for the prototype are those running an Android OS.

The Strome InFusion web application and database are being hosted on virtual machines within the Old Dominion University Computer Science department versus private hosting or within the Old Dominion University ITS department. Testing of the web application and the mobile applications will be done by Director Grden and the team members of Strome InFusion on their privately owned machines or Old Dominion University systems.

The Strome InFusion database will be a virtual instance stored on the virtual machine. It will host the schema and the operations to update the tables. Flask will retrieve information and translate it between JSON, for the web application, and SQL, for the database.

The web and mobile application front end will be written in HTML, CSS, and AngularJS. The back end will be uWSGI to handle API calls to Flask. These calls will populate tables in the database, as well as populating the web or mobile application.

4.2 Prototype Features and Capabilities

The primary feature of Strome InFusion prototype is its ability to demonstrate connections between a Monarch venture and those in the Monarch family and community that are contributing to the venture. The web and mobile interface will allow Strome Entrepreneurial Center staff to directly assist with building meaningful connections and to monitor these connections. This will allow for more efficient use of time for all users and more access to the ventures to assist them.

Another major feature of the Strome InFusion prototype is the way in which it allows Monarchs to connect. The job board feature of the prototype will allow ventures to post their needs and users to post their available skill sets. Allowing both ventures and users to advertise themselves and to search for those that are available to meet their needs and desires. Users can search on their own time and are not dependent on Strome Entrepreneurial Center staff to assist them in filling out the necessary roles within the ventures.

Another component that will be demonstrated by the Strome InFusion prototype is the ability for companies and individuals in the Monarch community to post their available resources for ventures to use. The Strome Entrepreneurial Center staff will also be able to view those connections between a Monarch venture and the outside resources that it is using, and to create connections where needed.

A necessary feature that will be demonstrated by the prototype of Strome InFusion will be internal messaging, notification, and system emails. To assist in making those connections of ventures and users, the ability to internally communicate and know you have communications is important. This also allows ventures to contact the Strome Entrepreneurial Center for assistance. System emails will notify users of unread emails, either by number of unread or having had unread emails for some arbitrary time, as set in the user's settings.

The Strome InFusion mobile application prototype will be able to demonstrate further communication through pop up

notifications. This feature will also be adjustable through the user's settings, but will be used to notify them of communications, requests, and Strome Entrepreneurial Center messages.

The database schema will have tables for individual users, Monarch ventures, outside entities (companies and individuals offering up their skills and resources), and a list of skills and resources. These tables will provide data that can searched and aggregated as necessary by the job board and by the Strome Entrepreneurial Center staff.

These features will be tested by existing Monarch ventures within the Strome Entrepreneurial Center, as well as the Strome InFusion team and the Strome Entrepreneurial Center staff.

4.3 Prototype Developmental Challenges

There are a few challenges that the Strome InFusion team will have to account for when building the prototype. One of the largest is the inability to test scaling capabilities. The end goal is for a product that can be

redeployed as a platform and will have sustaining capabilities to match the growth of the center using it. The use of an Ubuntu server, PostgreSQL, Nginx, uWSGI, and Flask with AngularJS will address scaling growths, as these technologies are inherently scalable.

Another challenge the prototype is facing, would be the scope of the mobile application testing. The Strome InFusion prototype will be built on Apache Cordova, which allows for the building of iOS applications with SDK packaging. The access of on hand hardware limits the ability to deploy and fully test an iOS application, while all team members possess at least one Android device apiece.

As a platform, the Strome InFusion prototype faces the challenge of having been developed for the Strome Entrepreneurial Center specifically, with the centers needs and desires being the focus. A lack of available data on the needs of collegiate entrepreneurial centers at large is a hurdle. The product was developed to address issues as broadly as possible, with highly a focus on future

integration. The use of open source technologies and frameworks provides not only a wealth of documentation, but products that are inherently designed to be implemented with a plethora of technological applications.

The last two challenges faced, are addressed by the Strome InFusion team, as it affects development of the prototype, not a limitation on the prototype itself. Which are: time frame and knowledge. While two separate challenges, they are compounding. The use of documentation, online resources, and Old Dominion University faculty and peers will address these challenges.

GLOSSARY

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

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.

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.

Concurrency: Allowing multiple processes to go at once.

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.

Flask: Is a 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.

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 design is the framework for building web 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.

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.

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.

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.

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.

uWSGI: Deploys the application server and implements WSGI protocols.

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.

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