

Lab 1 – Strome Infusion Product Description

Shawn Casey

Old Dominion University

CS411

Janet Brunelle

October 25, 2015

Version 2

Table of Contents

1	INTRODUCTION	3
2	STROME INFUSION PRODUCT DESCRIPTION	4
2.1	Key Product Features and Capabilities	4
2.2	Major Components (Hardware and Software)	5
3	IDENTIFICATION OF CASE STUDY	8
4	STROME INFUSION PRODUCT PROTOTYPE DESCRIPTION	9
4.1	Prototype Architecture	9
4.2	Prototype Features and Capabilities	11
	GLOSSARY	14
	REFERENCE	19

Figures

Figure 1: Current Process & Pain Points	7
Figure 2: Hardware and Software Diagram	10

Tables

Table 1: Comparison of Real World Product versus Prototype	11
--	----

1 INTRODUCTION

The Strome Entrepreneurial Center (SEC) at Old Dominion University (ODU) exists to provide the tools and training to help students create or manage their business *ventures*. Mark Strome is an ODU alumni who graduated in the class of 1978 “and went on to found a multimillion dollar California investment management firm” (Council, 2014, para. 2). His donation of \$11 million is what financed the SEC and varying aspects of *entrepreneurship* throughout ODU’s colleges, providing breeding grounds for other entrepreneurs to rise up from ODU just as he did.

Mark Strome’s desire for his investment is not to have it be a charitable donation, which he sees as enabling dependency, but to create a means to nurture entrepreneurship (his goal is that of teaching a man to fish so that he never goes hungry). SEC uses its resources to connect ODU students looking to start their own ventures with the proper tools, training, or *investors* to allow them to become successful.

The current process for registering students interested in the SEC’s activities are overwhelming and not very effective, according to Nancy Grden, director of SEC. According to Director Grden the SEC is unable to keep records of students’ visits, registration is complex, and the current system does not provide a way to connect entrepreneurs with the resources needed to succeed.

Strome InFusion is an application that targets entrepreneurial centers to address these shortcomings in the current market. Developed by CS411 Team Black, Strome InFusion simplifies registrations allowing SEC to keep track of visitors while providing tools and resources to both

entrepreneurs and *businesses* or *external partners* willing to invest in ODU students. Using web-based and mobile-based software, Strome InFusion is a versatile and mobile tool to help SEC reach its goals of empowering and enabling entrepreneuring students at ODU. The application can be used by ODU students, the SEC's business partners, and the SEC to track progress through the entire entrepreneurship process. Since Strome InFusion is available as both a web application and mobile application, it is easy to keep students and *mentors* organized and connected.

2 STROME INFUSION PRODUCT DESCRIPTION

Strome InFusion is an application developed for entrepreneurial centers in general and SEC in particular. It is designed to have a simple registration process to allow SEC to track visitors and keep them informed of events associated with SEC. Once registered, users will have a plethora of tools available to assist in creating a new venture, finding mentors and investors, tracking development, scheduling, making connections, and communicating with all involved within that venture.

2.1 Key Product Features and Capabilities

Strome InFusion is a multi-platform application providing flexibility and ease of access for both entrepreneurs and mentors. For the web application, a simple user registration process allows students and partners to begin using Strome InFusion immediately to start their venture journey. Registration is available for students with a valid ODU email. Partner registration will also be verified to ensure those involved are legitimately able to contribute. Once a partner has been authenticated, they will have access to the full site where they will be able to work on

ventures, or a work-in-process business started by an ODU student, assigned to them. At this point, Strome InFusion becomes a powerful planning tool to assist the user in the development of a venture.

Strome InFusion also has a mobile element. The mobile application will integrate with the web application seamlessly to allow access to Strome InFusion on the go. Strome InFusion is not a web application optimized for mobile devices. Instead, it is a downloadable application to be used on most smartphones and tablets.

Strome InFusion is designed to streamline the registration process so users can connect quickly, while providing the tools necessary to either manage ventures or become involved in ventures, depending on who the user is. For ODU students and alumni Strome InFusion allows students with business ideas to develop those ideas into successful businesses with the help of mentors. Students can search a *job board* to find people with specific skillsets they may need in the development of their venture or a particular resource needed. For partners and businesses outside of ODU, Strome InFusion provides a place for partners to find ventures and become involved or post available assets on the job board. Once connected, students and partners can schedule, plan, and work together to achieve their final goals.

2.2 Major Components (Hardware and Software)

Strome InFusion is developed as an application that can be fairly self-sufficient. The hardware requirements are fairly minimal. The ODU physical *servers* are to host all aspects of Strome InFusion including all associated databases. Software requirements include server hosting, web application software, mobile application software, and databases.

Server hosting will be handled by *Ubuntu Server*. Ubuntu Server is an open-source server with amazing flexibility and scalability. It is compatible with all major hardware so future upgrades to the current servers will not affect Strome InFusion. Ubuntu Server also provides speed and simplicity, allowing Strome InFusion to work quickly and smoothly for users.

The web application itself will be hosted on *nginx*. Nginx will serve as both a web server and a *reverse proxy* server for Strome InFusion. Pairing nginx with *uWSGI* protocol, allows Strome InFusion to operate smoothly with as little *latency* as possible. uWSGI implements the Web Server Gateway Interface, connecting the application and the server. uWSGI allows nginx to *multithread* without being slowed by multiple *Python interpreters*.

To actually run the *back-end* of the web application and interact with the database, *flask* will be used. Flask will also handle all the *front-end API* requests, authentication, and hosting of the *AngularJS* pages. AngularJS will allow for the front-end application to work as an application, not a collection of pages written in *HTML*. Using flask and AngularJS will allow the web application to multitask efficiently.

With that framework in place, Strome InFusion will also be available as a mobile application. Using *Apache Cordova* along with AngularJS, all of the functionality of the web application is stored on the mobile device and Cordova's API will allow it to function as a mobile application. In doing so, the application will be usable across many platforms with few or no changes.

All data associated with user accounts will be stored in a database powered by *PostgreSQL*. Postgres provides the framework to create a relational database while providing

extra concepts to enhance the database system. Interfacing all this software together, Strome InFusion will meet the SEC's needs in an entrepreneurial management system.

Figure 1 shows the current software available to entrepreneurial centers. There are several pain points where SEC fails to connect with students. Strome InFusion is designed to assist SEC in overcoming these pain points with a customized platform to replace the current system. With Strome InFusion in place, when a student visits SEC, they can quickly register for an account on their phone. Once registered, SEC can stay in contact with that student and help them get connected to external resources to help them with their ventures.

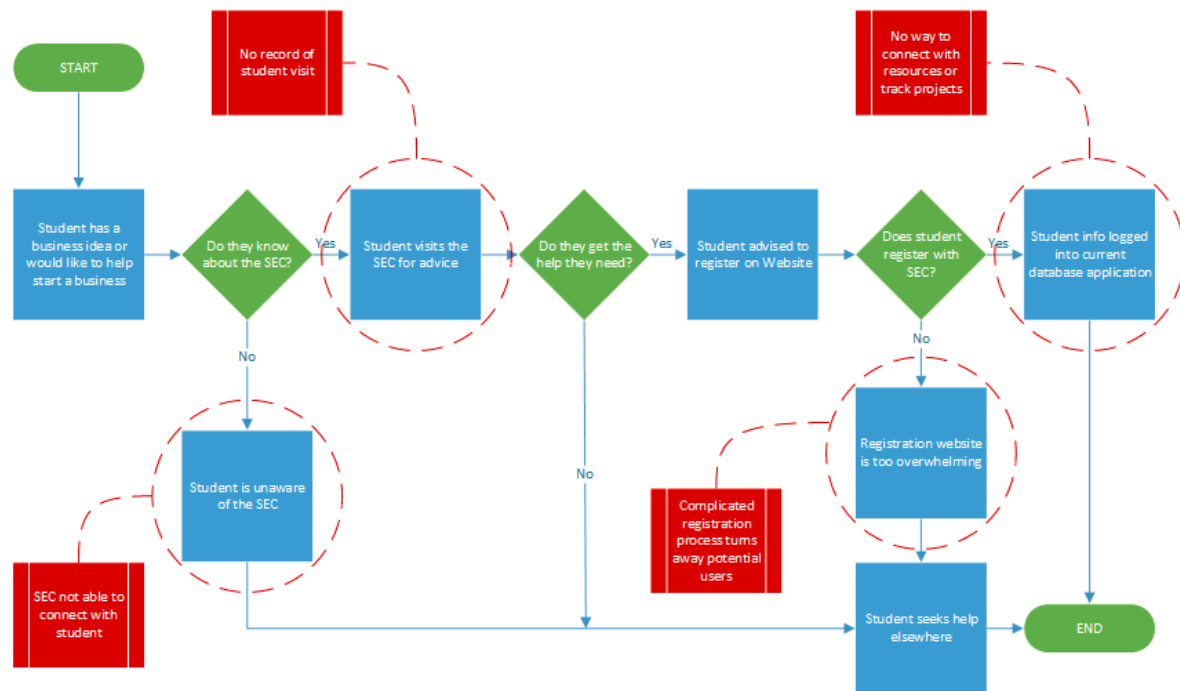


Figure 1: Current Process & Pain Points

3 IDENTIFICATION OF CASE STUDY

Strome InFusion is designed for the Strome Entrepreneurial Center at Old Dominion. The SEC will use Strome InFusion for potential venture students with partners from the community or businesses who can offer the student mentorship, training, investing, skillsets or any combination thereof. The target users for Strome InFusion will be the staff at the SEC, students and alumni of ODU, and outside partners and businesses. The staff of SEC will use Strome InFusion to track traffic through the SEC, connect students to partners, send information about upcoming events at SEC to either group, manage accounts of both groups, and process registration applications. Students and alumni will use Strome InFusion to create venture projects and manage those projects. Outside partners and businesses will use Strome InFusion to find possible ventures to assist in, post skillsets and offerings for students to search, and manage relationships with ventures those partners or businesses are already assisting.

With the framework and architecture built already, shifting to other entrepreneurial centers will require very small changes to the original design to be usable in the open market. The main changes would include hosting changes, labeling changes.

4 STROME INFUSION PRODUCT PROTOTYPE DESCRIPTION

The Strome InFusion prototype will serve as a functioning version of the real world product. The major components that will be functional are a website with simple registration, a mobile application, a web application, and a database. The mobile application will have the same functionality as the web application. Figure 2 shows how each part of the system makes up the whole of Strome InFusion. Users connect via multiple different devices to ODU's servers to access all elements of Strome InFusion.

4.1 Prototype Architecture

The architecture to develop the prototype will be stored on a virtual machine on ODU's servers. Like the actual product, Ubuntu Servers will host the application with nginx and uWSGI handling server and application communication. The front-end and back-end will be developed using flask and AngularJS. The web application prototype will only be functional on modern browsers. The mobile application will be developed using Apache Cordova and AngularJS to link the web application with the mobile version, but is limited to Android OS for the prototype. The database supporting the application will still be developed with PostgreSQL. Figure 2 shows how this model translates from the ODU servers to the end users.

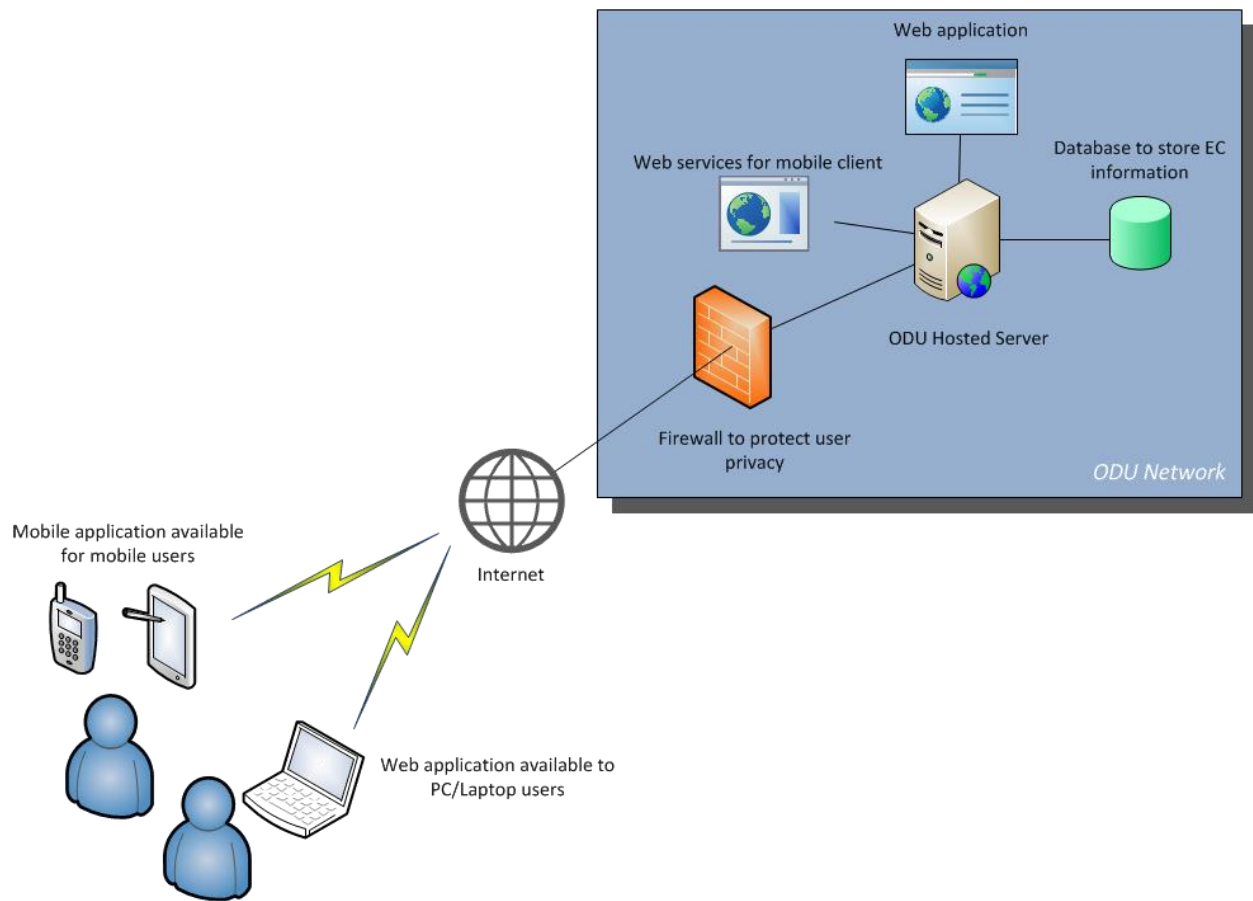


Figure 2: Hardware and Software Diagram

[This space intentionally left blank]

4.2 Prototype Features and Capabilities

Table 1: Comparison of Real World Product versus Prototype

Feature	Real World Product	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

Visitors to Strome InFusion website will be able to register for an account. An SEC staff member will review the user's request and determine what level of access that user has, be it a student looking to start a venture, a student looking to offer services and be of assistance to other ventures, or an outside company offering resources to any venture that may need it. While the visitor is awaiting approval from SEC, they can preview most of the site. Without approval, they will not be able to post to job boards, send or receive notifications, join other ventures, or add company resources (for company users). Students can start immediately working on their venture. They can request meetings with SEC

staff, view the job board, add members to their venture, create and modify their profile, and edit their venture details.

Once approved, full functionality is available to a user. Students can post to the job boards and contact other Strome InFusion members. Companies will be able to set up company profiles, add resources, request to join ventures, approve venture join requests, and post to the job boards.

SEC staff will have a different level of access. Staff members can create and remove test users to experience the full functionality of Strome InFusion for training purposes. Staff members are granted administrative access and can add, remove, or modify profiles and job board postings for any reason. Staff members can approve or deny registration requests and maintain a list of mentors. Staff members can contact any user to schedule meetings or provide information about upcoming events at SEC. Staff members can also change user roles.

4.3 Prototype Development Challenges

With most development projects, challenges will arise. Strome InFusion has its own set of specific challenges to overcome. Time constraints are the limiting factor for this project. By using the Scrum development model, some of these time constraints can be mitigated. Lacking the required devices, it will be difficult to test on multiple platforms. Since the architect is cross-platform compatible, the need to test on multiple platforms shall be eliminated. Regardless, testing will still be fairly limited to what is available to Team Black members. Scaling capabilities also cannot be tested. The Strome InFusion prototype will not be able to push limits of the actual amounts of users that will be able to access the system at the same time. The prototype will also be unable to be tested in terms of total information stored and accessed on the database. While

Strome InFusion has long term aims of being used in the open market for any entrepreneurial center, the current prototype is only aimed as a singular release for the SEC.

A minor challenge stems from the different frameworks in use for Strome InFusion and multiple programming languages involved. Resources and support are available for those frameworks and languages so there will be little issue with implementation of said frameworks into Strome InFusion.

GLOSSARY

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.

REFERENCE

Council, Jared. (2014) Alumnus Mark Strome's \$11M gift to ODU is not simple charity. *Inside*

Business, The Hampton Roads Business Journal. September 19, 2015. Retrieved from

<http://insidebiz.com/news/alumnus-mark-stromes-11m-gift-odu-not-simple-charity>