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Final Report

CIS 490

Dr. Shaun-Inn Wu

May 12th, 2015



Thomas Usrey

Northrop Grumman

15120 Innovation Drive

San Diego, CA 92128

Dear Mr. Usrey:

These past 15 weeks have been a tremendously positive experience for our team, and we would like to take this opportunity to thank you for working with us.

We have succeeded at designing and developing the system that we discussed during our JAD meetings. The final prototype is in working order, allowing users to upload .CSV files that push data into a data repository. A login interface as well as reporting functionality is also included.

During the final phase we decided that it wouldn't be possible to develop a changelog system that would survive the transition from our test environment into the Northrop Grumman network. After thoughtful discussion, we allocated those resources to move our system from the MariaDB platform to a Django framework. We feel this was worth the investment as it is a more powerful platform capable of producing better reports, a major component of the system. Additionally, the Django framework aided in remedying the issue we discussed about parsing during our Prototype 2 meeting.

The completed prototype cost \$25,400 across all five phases, an increase of \$400 above our original estimation.

A USB drive will be provided to you which contains the database creation script. Using it, you can deploy the prototype into an environment of your choosing.

In Section 4 at the end of this report you can read a few of our thoughts on the finished system including potential improvements that could make the system increasingly valuable.

Thank you so much for your time and effort.

The team at Envisage.

Arturo Martinez, Jonathan Leack, Carlo Araujo, Chase Perdue, Chris Wendling, Ryan Miller

CC: Dr. Shaun-Inn Wu



May 12th, 2015

I, Thomas Usrey, have read and approve of this final report.

Name Thomas Usrey

Date _____

Signature _____

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Section 1. An Introduction to Envisage

1.1 The Team

	Arturo Martinez Team Leader	<p>Throughout his career, Arturo has always held a leadership positions due to his ability to recognize problems and create solutions to solve them. Arturo has the role of Process Engineer for his current employer and oversees a group of eight employees for which he is responsible for managing everything from time and attendance to performance reviews.</p>
	Jonathan Leack Project Manager	<p>As the only CIS major of the group, Jonathan provides a business foundation for Envisage. He currently serves as Executive Editor for a website, and has acquired over three years of IT experience. His eagerness to support team members and provide organization makes him an important link between the five other highly skilled team members.</p>
	Carlo Araujo Web Programmer	<p>Carlo is well-versed in several programming languages, including Java and C++. He brings his wealth of knowledge working in web programming to Envisage, where he will play an important role in the team's success.</p>
	Chase Perdue System Analyst	<p>Based on his skills and characteristics, Chase Perdue proudly wears the title of Systems Analyst. He tenaciously approaches projects with a sterling attention to detail and first-rate organizational process. As a fellow specialist, Chase is a welcomed addition to Envisage.</p>
	Chris Wendling Network Admin	<p>Having worked for the Department of Defense (DOD) in the past, Chris Wendling brings extensive knowledge of how both government agencies and government contractors do business. Chris also possesses years of experience in programming which will assist him in his duties as the Network Administrator. This experience will allow him to ensure Envisage presents clients with the most secure and well tested code possible in a timely manner.</p>
	Ryan Miller Database Admin	<p>Ryan Miller has accepted the role of Database Administrator and will oversee the design and implementation of this crucial piece of the development process. Ryan has a wide array of knowledge in software design and the use of multiple programming languages. He will harbor these important skills in order to assist in whatever is at hand.</p>

Contact Us: teamenvisage@googlegroups.com

1.2 Team Norms

We are Envisage, a group composed of professionals with various talents and experience. We have worked together in the past, and look to continue our success with our greatest but most rewarding challenge yet.

Communication is Our Middle Name

Envisage firmly believes that in order for a project to be successful a channel of communication must not only be open between the team and client, but between team members. The team interacts in-person at least twice per week, and has established a policy where no person is left unheard.

Quality is Important to Us

We at Envisage test our products thoroughly to find bugs and issues so that customers don't have to. We desire that everything we make is easy to use, and works right every time.

Supporting One Another

Our team members have a wide array of experience. Whether it's writing software, administrating networks, crafting IT systems, or even managing online publications, someone on our team has done it. By utilizing the strengths of each individual we are able to tackle a wide variety of problems effectively.

Going Above and Beyond

The team at Envisage strives to look for areas of improvement. We push our products to the limit to deliver something that not only meets expectations, but exceeds them.

Section 2. The Project

2.1 Project Overview

The Problem

For every cutting edge project that Northrop Grumman works on, a large amount of data is collected, tracked, and analyzed in order to manage and forecast costs. Unfortunately, there is currently no system in place to allow secure controlling of the data, change logs, or an easy-to-read format for reporting purposes.

The Solution

Envisage will craft a web service system that will serve as a central repository for all project cost data to be analyzed. Due to security concerns, this system will reside within Northrop Grumman's VPN, and will not be reachable directly to the open internet. The interface of the application will be web based. With this system, users will be able to analyze project cost data, post changes, and generate user-friendly reports.

With this solution, Northrop Grumman will be able to analyze their project data more easily with the benefit of carefully implemented security.

Project Goal

The completion of the project will include a working prototype that will meet the requirements included in the approved contract. This final prototype will be in the form of a .tar file on a USB drive. The .tar file will include an installation script that will deploy all components of the outlined prototype.

On March 12th the Final Prototype will be demonstrated during a presentation where all team members of Envisage will be present.

2.2 Project Plan

JAD Meeting 1 (February 3rd)

- Formal introduction between team and customer.
- Discuss project requirements.
- Tour customer's facility.

JAD Meeting 2 (February 17th)

- Solidify project requirements.
- Propose implementation.

- Receive feedback from customer.

Prototype Meeting 1 (March 17th)

- Showcase Prototype 1.
- Discuss Back-End System as well as Login and Upload design.
- Receive feedback from customer.

Prototype Meeting 2 (April 7th)

- Showcase Prototype 2.
- Discuss Web Portal and Parsing.
- Receive feedback from customer.

Final Presentation (May 12th)

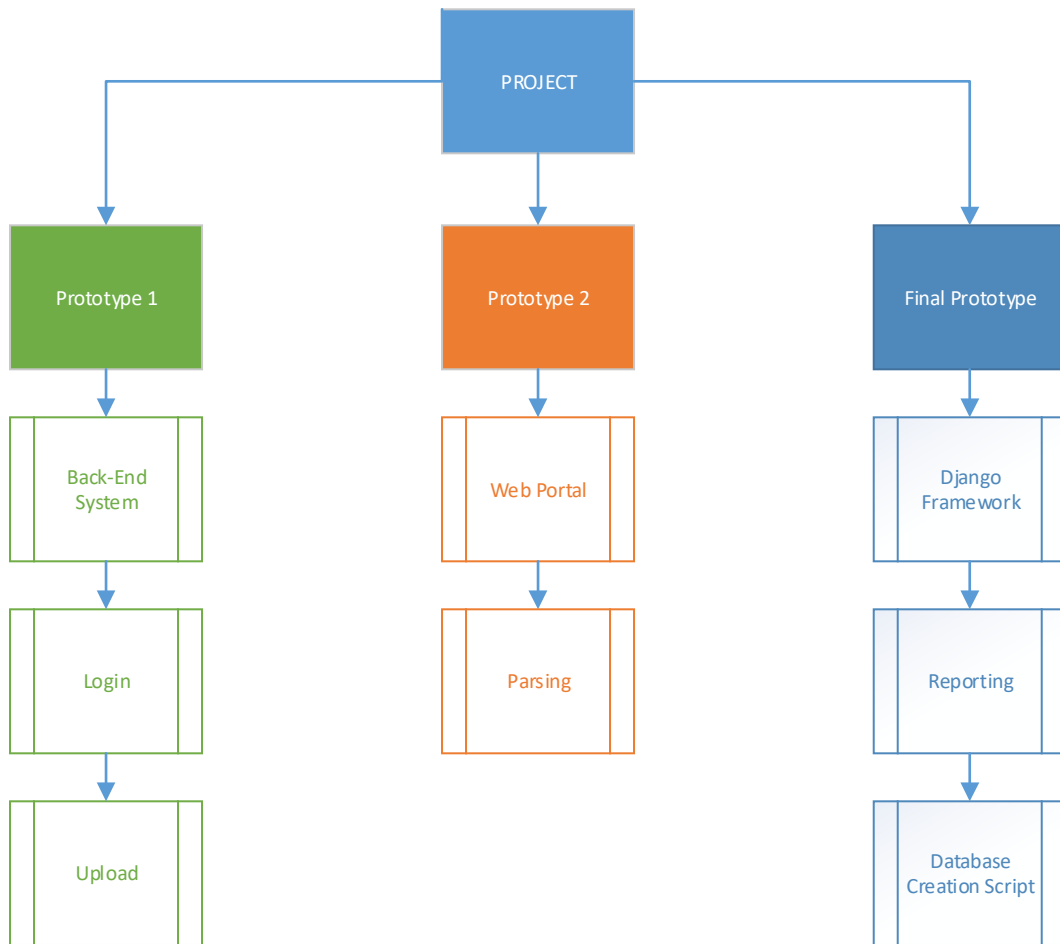
- Showcase Final Prototype.
- Deliver Final Prototype and Final Report to customer.

2.3 Project Measures of Success

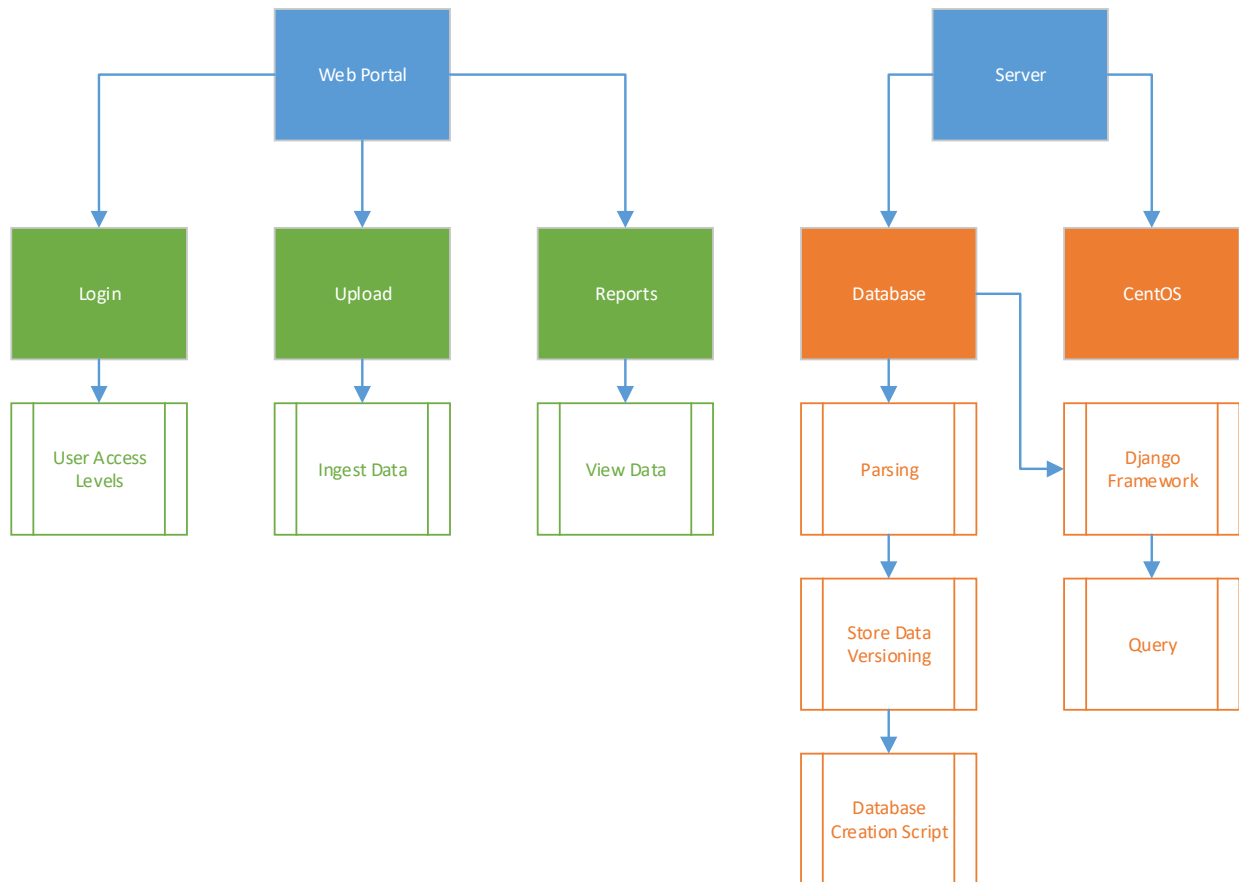
Envisage achieved the following on course to satisfying the requirements of the project:

- **System Design [COMPLETE]** – A back-end system will be put together as a test environment for development of the prototype.
- **Web Portal [COMPLETE]** – A website will be crafted that serves as the interface for users who seek to view, upload, and/or edit reports.
- **Login [COMPLETE]** – The Web Portal will authenticate users before they can access the Web Portal.
- **Upload [COMPLETE]** – The Web Portal will provide upload functionality allowing users to ingest data from .CSV files into the database repository.
- **Parsing [COMPLETE]** – Scripts will be written that parse data as a prelude to reporting.
- **Reporting [COMPLETE]** – The Web Portal will allow users to execute several different pre-configured SQL queries that filter and sort data in a meaningful way.
- **Database Creation Script [COMPLETE]** – The Final Prototype will be compiled in a comprehensive manner.

2.4 Product Breakdown Structure



2.5 Work Breakdown Structure



2.6 Requirements Matrix

Requirements Key:
Web Portal Functional Requirements
Database Functional Requirements
Web Portal User Interface Requirements

Requirements	Description	Number	Met	Task ID
Login	The End-User is able to enter a username and password on the web portal login area.	Req-1	Yes	31
Authenticate	The system will not authenticate the End-User.	Req-2	Yes	31
Edit Prevention	The System will prevent the End-User from modifying any existing data in the system.	Req-3	No (See Section 2.6)	N/A
Browser Support	The System will support the Internet Explorer (Version 10) browser platform.	Req-4	Yes	43
Upload Control	The System will allow one Microsoft Excel file to be uploaded at a time.	Req-5	Yes	67
Compatibility	The System will be compatible with Microsoft Excel versions 2010 or higher.	Req-6	Yes	36
Visualization	The End-User will be able to visualize comparisons between data entities.	Req-7	Yes	70
Comparisons	The End-User will be able to define comparisons.	Req-8	Yes	70
Version Number	The System will associate a version number with each contract uploaded from the web portal.	Req-9	No (See Section 2.6)	N/A
Version Control	The System will record any modifications to a contract as a new version number.	Req-10	No (See Section 2.6)	N/A
Activity Log	The System will make an activity log entry each time an End-User updates the system.	Req-11	No (See Section 2.6)	N/A
Activity Data	The System's activity log will contain a time stamp, user identifier, type of action user performed, data values before change, and data values after change.	Req-12	No (See Section 2.6)	N/A
Report Charts	The System will display data formalized into charts and graphs in a format provided Northrop Grumman.	Req-13	Yes	70

Upload Check	The System will notify the End-User if they attempt to upload a Microsoft Excel file in an improper format, and cancel the whole upload process.	Req-14	Yes	67
Primary Keys	The System will create primary keys from the data given in columns A-D.	Req-15	Yes	35
M/E	Column Labeled "M/E" will accept data formatted as a non-empty string, with character length range 1-7.	Req-16	Yes	35
HWCI	Column Labeled "HWCI" will accept data formatted as a non-empty string, with character length range 1-20.	Req-17	Yes	35
HWCI 2	Column Labeled "HWCI" will optionally accept data formatted as a non-empty string, with character length range 0-100.	Req-18	Yes	35
Type	Column Labeled "Type" will accept data formatted as a single non-empty character, either 'l' or 'm'.	Req-19	Yes	35
Type 2	Column Labeled "Type2" will optionally accept data formatted as a non-empty string, with character length range 0-10.	Req-20	Yes	35
Network	Column Labeled "Network" will accept data formatted as a non-empty string, with character length range 1-20.	Req-21	Yes	35
Complete %	Column Labeled "% Complete" will optionally accept data formatted as a number with no (currently) defined minimum and maximum.	Req-22	Yes	35
EAC	Column Labeled "EAC" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-23	Yes	35
Quantity	Column Labeled "Quantity" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-24	Yes	35
Per Unit Cost	Column Labeled "Per Unit Cost" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-25	Yes	35
HWCI Cost	Column Labeled "% of Total HWCI Cost" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-26	Yes	35
Budget	Column Labeled "Budget" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-27	Yes	35
ITD Actuals	Column Labeled "ITD Actuals" will accept data formatted as a number with no (currently) defined minimum and maximum.	Req-28	Yes	35
Subs Only	Column Labeled "% Subs Only" will optionally accept data formatted as a number with no (currently) defined minimum and maximum.	Req-29	Yes	35
Including All	Column Labeled "% Including All" will optionally accept data formatted as a number with no (currently) defined minimum and maximum.	Req-30	Yes	35
LOE Per Unit	Column Labeled "LOE Allocation Per Unit" will optionally accept data formatted as a number with no (currently) defined minimum and maximum.	Req-31	Yes	35
EAC Per Unit	Column Labeled "Total EAC Per Unit" will optionally accept data formatted as a number with no (currently) defined minimum and maximum.	Req-32	Yes	35
Data Range	Number Values will (unless otherwise specified) range from 0-1,000,000,000,000.	Req-33	Yes	35
Percents	Percent values shall not exceed 100% when calculated.	Req-34	Yes	35

Safe Precision	Data precision will satisfy the following conditions:	Req-35	Yes	35
	Numbers will range from 0-8 digits following the decimal.			
	Valid data will never be rounded by the system			
Data Error	Any data that fails validation, the System will display an error message.	Req-36	Yes	35
Login Screen	The Login Screen contains the following items:	Req-37	Yes	31
	A textbox labeled, "Username: ".			
	A textbox labeled, "Password: ".			
	A button labeled, "Login".			
	A button labeled, "Exit".			
Team Lead Home	The Team Lead home screen contains the following items:	Req-38	Yes	43
	A file path textbox.			
	A button labeled, "Browse".			
	A button labeled, "Upload".			
	A button labeled, "Logout".			
Report Options	Four dropdowns that contains the following elements:	Req-40	Yes	43
	Module			
	Date			
	Version			
	Value Change Threshold			
	N/A			
Threshold Select	Upon selection, User must select "Show values Above threshold" or "Show values below threshold"	Req-41	Yes	70
Selection Broadening	Has function of not including one of the four dropdowns in the search by selecting N/A.	Req-42	Yes	70

2.7 Statement of Requirements

During Phase 5: Final Prototype Envisage decided that a changelog and user access levels would not transition properly from the test environment to Northrop Grumman's network. Therefore, requirements related to this functionality weren't met during development.

2.8 Schedule of Tasks

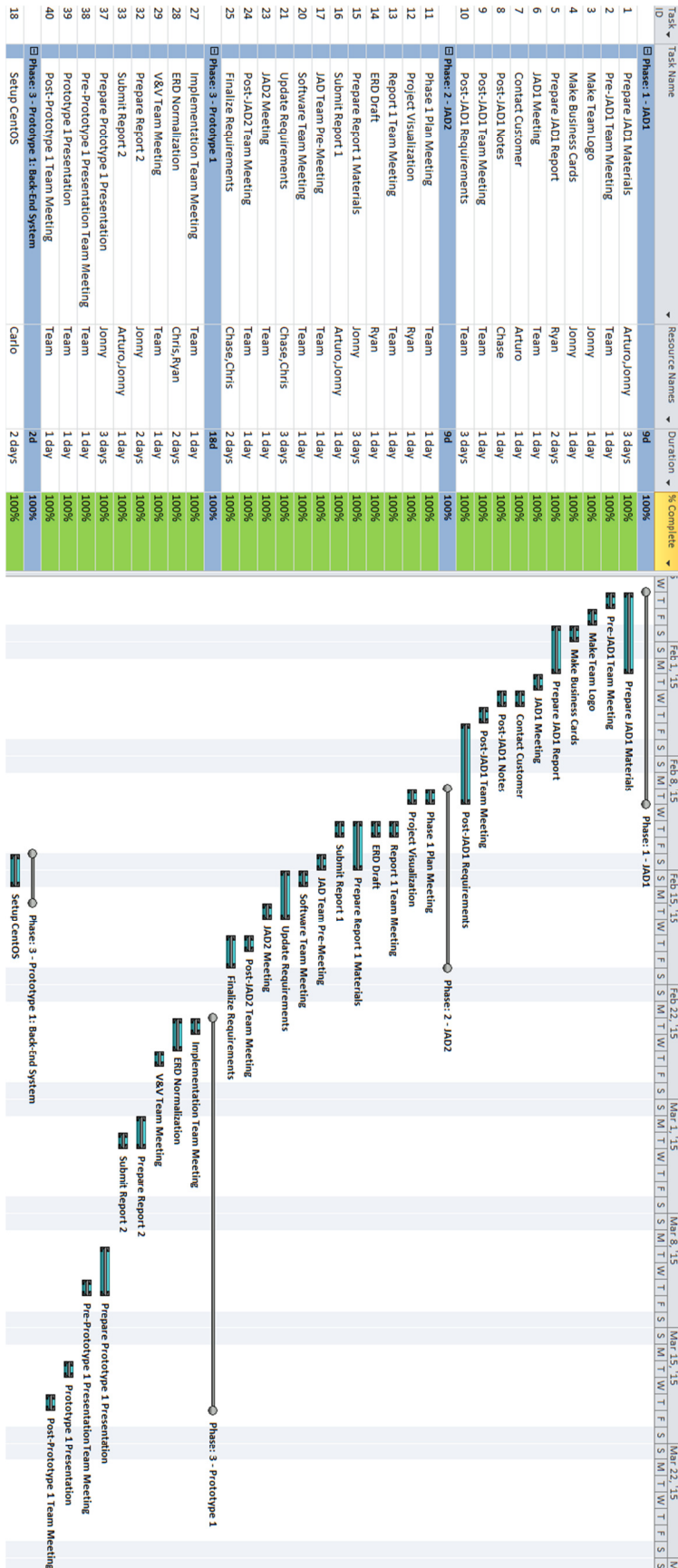
Task ID	Description	Resource(s)	Duration	% Complete
1	Prepare JAD1 Materials	Arturo, Jonny	12 hours	100%
2	Pre-JAD1 Team Meeting	Team	6 hours	100%
3	Make Team Logo	Jonny	2 hours	100%
4	Make Business Cards	Jonny	2 hours	100%
5	Prepare JAD1 Report	Ryan	8 hours	100%
6	JAD1 Meeting	Team	6 hours	100%
7	Contact Customer	Arturo	1 hour	100%
8	Post-JAD1 Notes	Chase	2 hours	100%
9	Post-JAD1 Team Meeting	Team	6 hours	100%
10	Post-JAD1 Requirements	Team	4 hours	100%
11	Phase 1 Plan Meeting	Team	6 hours	100%
12	Project Visualization	Ryan	4 hours	100%
13	Report 1 Team Meeting	Team	6 hours	100%
14	ERD Draft	Ryan	4 hours	100%
15	Prepare Report 1 Materials	Jonny	12 hours	100%
16	Submit Report 1	Arturo, Jonny	1 hour	100%
17	JAD Team Pre-Meeting	Team	6 hours	100%
18	Setup CentOS	Carlo	8 hours	100%
19	Setup Network Packages	Carlo	8 hours	100%
20	Software Team Meeting	Team	6 hours	100%
21	Update Requirements	Chase, Chris	10 hours	100%
22	Setup/Unlock Router	Carlo	4 hours	100%
23	JAD2 Meeting	Team	6 hours	100%
24	Post-JAD2 Team Meeting	Team	6 hours	100%
25	Finalize Requirements	Chase, Chris	6 hours	100%
26	Web Portal Modeling	Jonny	4 hours	100%
27	Implementation Team Meeting	Team	6 hours	100%
28	ERD Normalization	Chris, Ryan	6 hours	100%
29	V&V Team Meeting	Team	6 hours	100%

30	Perform V&V for Back-End System	Arturo, Jonny	4 hours	100%
31	Create Login Screen	Carlo, Chase	10 hours	100%
32	Prepare Report 2	Jonny	8 hours	100%
33	Submit Report 2	Arturo, Jonny	1 hour	100%
34	Database Team Meeting	Team	6 hours	100%
35	Database Table Creation Script	Chris, Ryan	13 hours	100%
36	Create Upload Screen	Carlo	10 hours	100%
37	Prepare Prototype 1 Presentation	Jonny	8 hours	100%
38	Pre-Prototype 1 Presentation Team Meeting	Team	6 hours	100%
39	Prototype 1 Presentation	Team	6 hours	100%
40	Post-Prototype 1 Team Meeting	Team	6 hours	100%
41	Database Attributes Creation	Ryan	10 hours	100%
42	Create Parser Function for Excel WB	Carlo, Chris	8 hours	100%
43	Improve Web Portal UI	Chase	6 hours	100%
44	Web Portal Team Meeting	Team	6 hours	100%
45	Prepare Report 3	Jonny	8 hours	100%
46	Submit Report 3	Arturo, Jonny	1 hour	100%
47	Post-Report 3 Team Meeting	Team	6 hours	100%
48	Create Test Cases for Web Portal	Arturo	2 hours	100%
49	Load Stress Test for Web Portal	Arturo	2 hours	100%
50	Perform V&V for Web Portal	Arturo, Jonny	4 hours	100%
51	Design Prototype Reporting Interface	Jonny	4 hours	100%
52	Create Team Leader View for Web Portal	Chris, Ryan	8 hours	100%
53	Create Function to Select WB to Load into DB	Ryan, Carlo	8 hours	100%
54	Write Post	Chris, Chase, Ryan	18 hours	100%
55	User Control Team Meeting	Team	6 hours	100%
56	Create Function to Extract and Select DB Data	Ryan, Carlo	8 hours	100%
57	Prepare Prototype 2 Presentation	Jonny	8 hours	100%
58	Pre-Prototype 2 Presentation Team Meeting	Team	6 hours	100%
59	Prototype 2 Presentation	Team	6 hours	100%
60	Post-Prototype 2 Team Meeting	Team	6 hours	100%
61	Create Query Scripts to Sort Data Being Extracted	Ryan, Carlo	8 hours	100%
62	Test POST	Chris, Chase	2 hours	100%

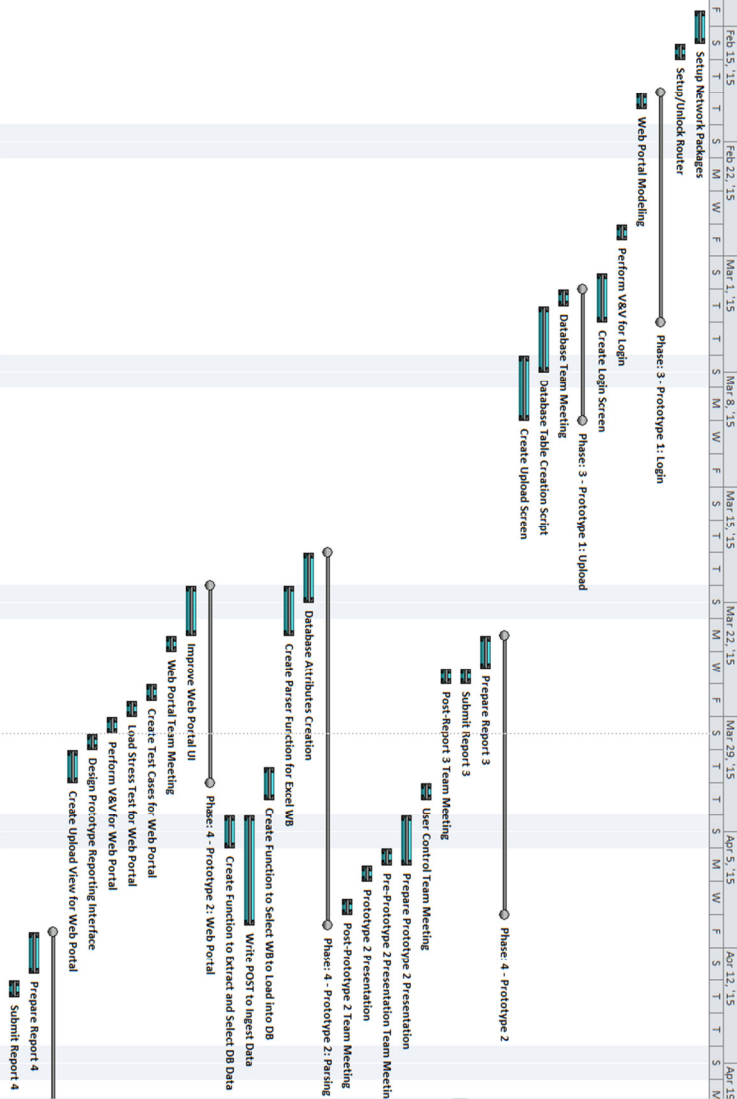
63	Prepare Report 4	Jonny	8 hours	100%
64	Submit Report 4	Arturo, Jonny	1 hour	100%
65	Django Team Meeting	Team	6 hours	100%
66	Install Django Framework	Ryan, Chris	6 hours	100%
67	Update System for Django Framework	Ryan, Chris	16 hours	100%
68	New Framework Team Meeting	Team	6 hours	100%
69	Test Django	Carlo, Chase	5 hours	100%
70	Implement Advanced Reporting	Ryan, Chase	16 hours	100%
71	Create Test Cases for Reporting	Arturo	3 hours	100%
72	Load Stress Test for Reporting	Arturo	4 hours	100%
73	Reporting V&V Team Meeting	Team	4 hours	100%
74	Perform V&V for Reporting and User Control	Arturo, Jonny	4 hours	100%
75	Post-Reporting Team Meeting	Team	6 hours	100%
76	Compile Database Creation Script	Chris, Carlo	3 hours	100%
77	Compile Parser Code	Ryan	2 hours	100%
78	Compile Web Portal Code	Chase	2 hours	100%
79	Compile Final Prototype Package	Chris, Ryan, Carlo	3 hours	100%
80	Final Report Team Meeting	Team	6 hours	100%
81	Prepare Final Report	Jonny	10 hours	100%
82	Prepare Final Prototype Presentation	Jonny	11 hours	100%
83	Pre-Final Prototype Presentation Team Meeting	Team	6 hours	100%
84	Submit Final Report	Arturo, Jonny	1 hour	100%
85	Final Prototype Presentation	Team	6 hours	100%
86	Deliver Final Prototype to Customer	Team	1 hour	100%

2.9 GANTT Chart

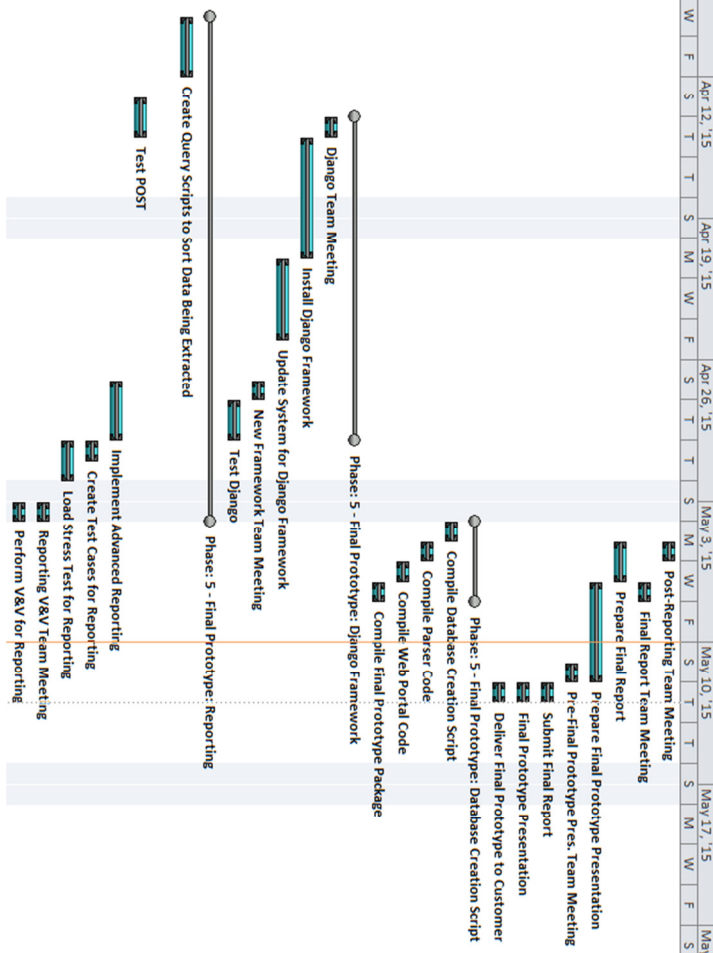
See following three pages.



Task	Task Name	Resource Name	Duration	% Complete
19	Setup Network Packages	Carlo	2 days	100%
22	Setup/Unlock Router	Carlo	1 day	100%
Phase: 3 - Prototype 1: Login				
26	Web Portal Modeling	Jonny	1 day	100%
30	Perform V&V for Login	Arturo,Jonny	1 day	100%
31	Create Login Screen	Carlo,Chase	3 days	100%
Phase: 3 - Prototype 1: Upload				
34	Database Team Meeting	Team	1 day	100%
35	Database Table Creation Script	Chris,Ryan	4 days	100%
36	Create Upload Screen	Carlo	3 days	100%
Phase: 4 - Prototype 2				
45	Prepare Report 3	Jonny	2 days	100%
46	Submit Report 3	Arturo,Jonny	1 day	100%
47	Post-Report 3 Team Meeting	Team	1 day	100%
55	User Control Team Meeting	Jonny	1 day	100%
57	Prepare Prototype 2 Presentation	Jonny	2 days	100%
58	Pre-Prototype 2 Presentation Team Meeting	Team	1 day	100%
59	Prototype 2 Presentation	Team	1 day	100%
60	Post-Prototype 2 Team Meeting	Team	1 day	100%
Phase: 4 - Prototype 2: Parsing				
41	Database Attributes Creation	Ryan	3 days	100%
42	Create Parser Function for Excel WB	Carlo,Chris	2 days	100%
53	Create Function to Select WB to Load into DB	Ryan,Carlo	2 days	100%
54	Write POST to Ingest Data	Chris,Chase,Ryan	5 days	100%
56	Create Function to Extract and Select DB Data	Ryan,Carlo	2 days	100%
Phase: 4 - Prototype 2: Web Portal				
43	Improve Web Portal UI	Chase	8d	100%
44	Web Portal Team Meeting	Team	2 days	100%
48	Create Test Cases for Web Portal	Arturo	1 day	100%
49	Load Stress Test for Web Portal	Arturo	1 day	100%
50	Perform V&V for Web Portal	Arturo,Jonny	1 day	100%
51	Design Prototype Reporting Interface	Jonny	1 day	100%
52	Create Upload View for Web Portal	Chris,Ryan	2 days	100%
Phase: 5 - Final Prototype				
63	Prepare Report 4	Jonny	2 days	100%
64	Submit Report 4	Arturo,Jonny	1 day	100%

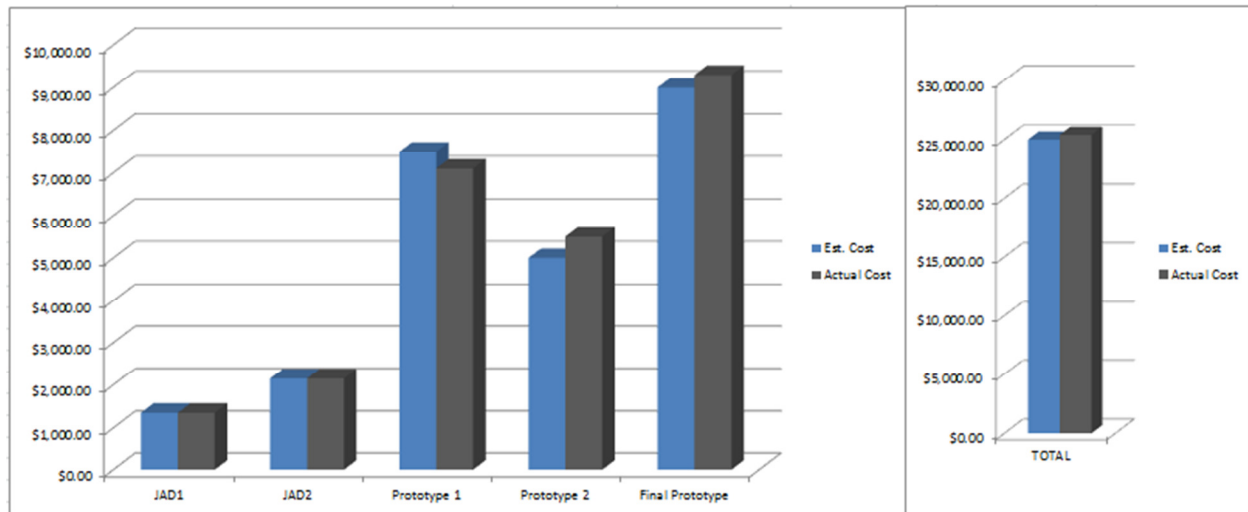


Task	Task Name	Resource Names	Duration	% Complete
75	Post-Reporting Team Meeting	Team	1 day	100%
80	Final Report Team Meeting	Team	1 day	100%
81	Prepare Final Report	Jonny	2 days	100%
82	Prepare Final Prototype Presentation	Jonny	3 days	100%
83	Pre-Final Prototype Pres. Team Meeting	Team	1 day	100%
84	Submit Final Report	Arturo,Jonny	1 day	100%
85	Final Prototype Presentation	Team	1 day	100%
86	Deliver Final Prototype to Customer	Team	1 day	100%
76	Phase: 5 - Final Prototype: Database Creation Script		4d	100%
76	Compile Database Creation Script	Chris,Carlo	1 day	100%
77	Compile Parser Code	Ryan	1 day	100%
78	Compile Web Portal Code	Chase	1 day	100%
79	Compile Final Prototype Package	Chris,Ryan,Carlo	1 day	100%
79	Phase: 5 - Final Prototype: Django Framework		12d	100%
65	Django Team Meeting	Team	1 day	100%
66	Install Django Framework	Ryan,Chris	4 days	100%
67	Update System for Django Framework	Ryan,Chris	4 days	100%
68	New Framework Team Meeting	Team	1 day	100%
69	Test Django	Carlo,Chris	2 days	100%
61	Phase: 5 - Final Prototype: Reporting		18d	100%
61	Create Query Scripts to Sort Data Being Extracted	Ryan,Carlo	3 days	100%
62	Test POST	Chris,Chase	2 days	100%
70	Implement Advanced Reporting	Ryan,Chase	3 days	100%
71	Create Test Cases for Reporting	Arturo	1 day	100%
72	Load Stress Test for Reporting	Arturo	2 days	100%
73	Reporting V&V Team Meeting	Team	1 day	100%
74	Perform V&V for Reporting	Arturo,Jonny	1 day	100%



2.10 Cost Tracking Chart

Phase	Est. Hours	Real Hours	Bill Rate	Est. Cost	Actual Cost
JAD1	27	27	\$50.00	\$1,350.00	\$1,350.00
JAD2	43	43	\$50.00	\$2,150.00	\$2,150.00
Prototype 1	150	142	\$50.00	\$7,500.00	\$7,100.00
Prototype 2	100	110	\$50.00	\$5,000.00	\$5,500.00
Final Prototype	180	186	\$50.00	\$9,000.00	\$9,300.00
TOTAL	500	508	\$50.00	\$25,000.00	\$25,400.00



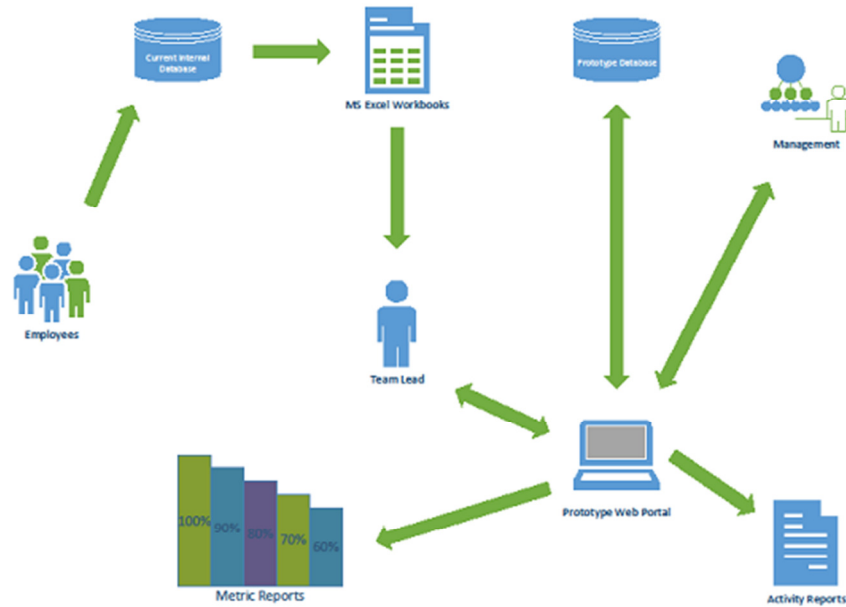
2.11 Statement of Costs

The cost to complete Phase 5: Final Prototype was \$9,300. This was an increase of \$300, or six hours, over the original projection. This additional expenditure was due to the decision to change to a Django framework.

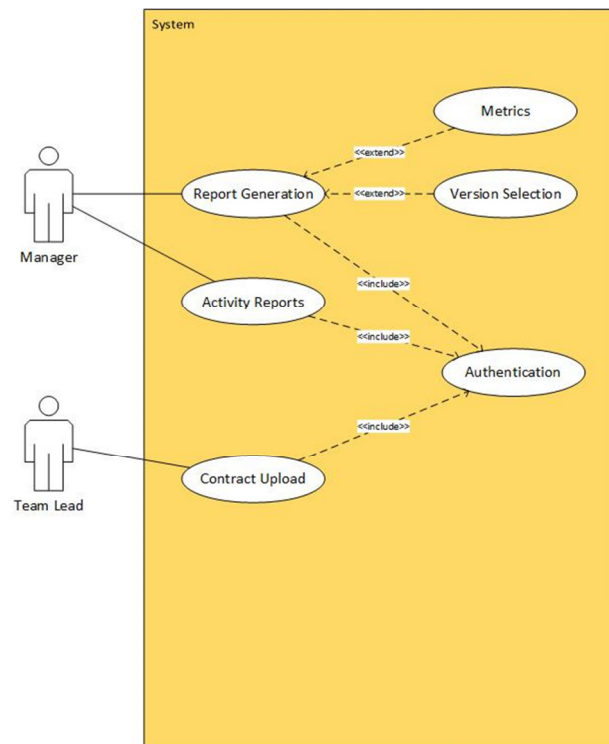
The cost to complete the project was \$25,400. This was \$400 above our initial projection. Although Phase 3: Prototype 1 came under budget, both subsequent Phases, Phase 4: Prototype 2 and Phase 5: Final Prototype, were slightly over budget.

Section 3. Visualizing the Project

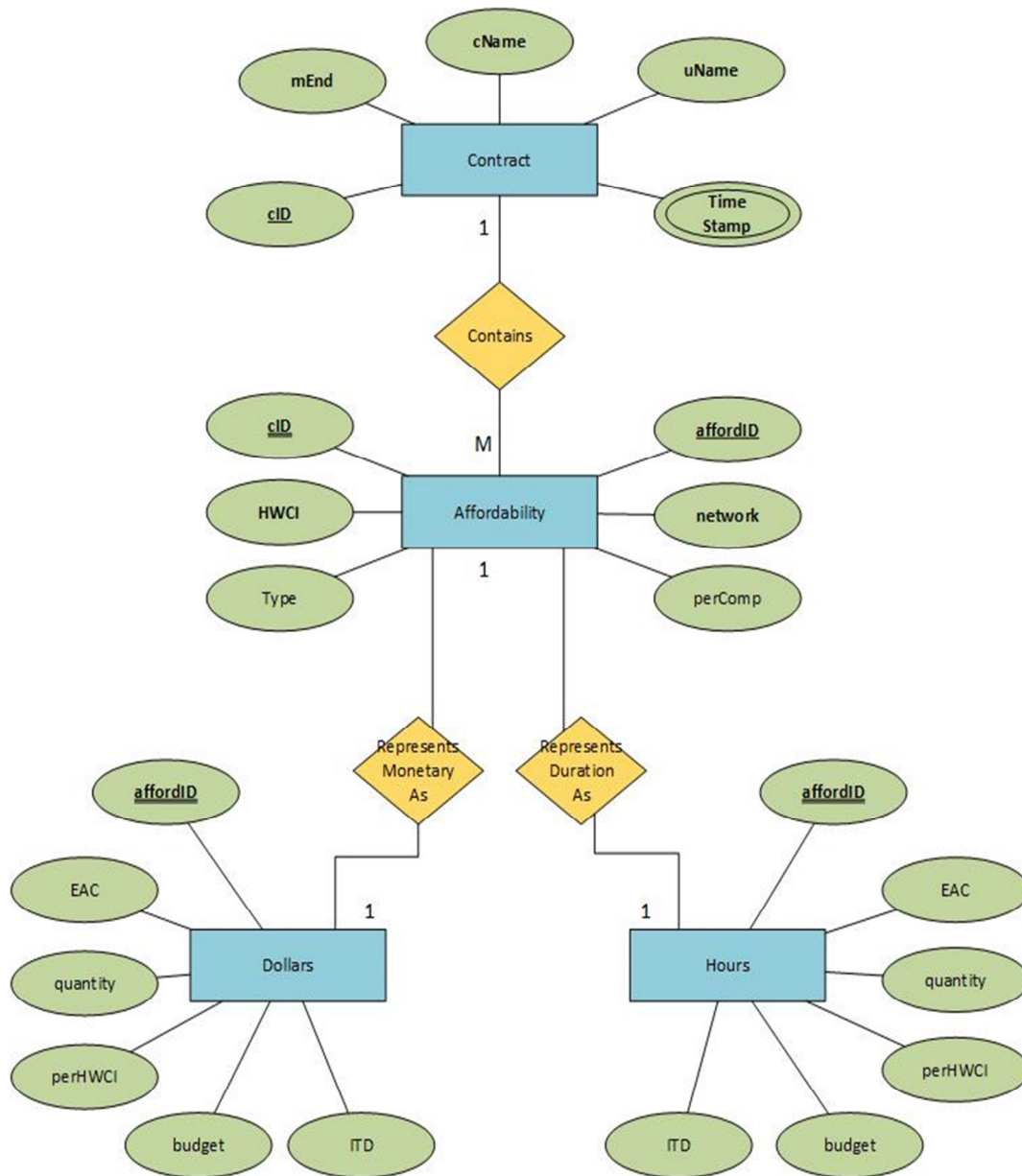
3.1 System Workflow



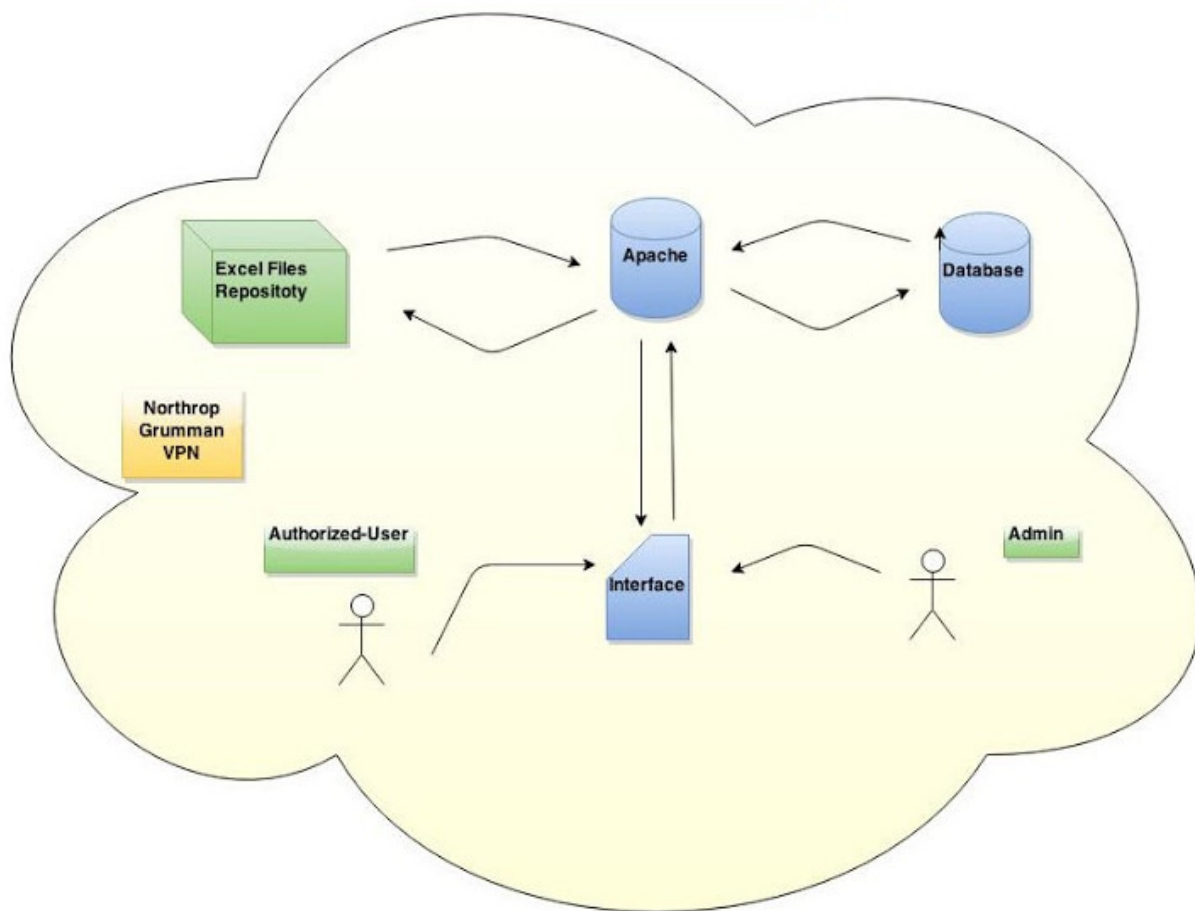
3.2 UML Diagram



3.3 Entity Relationship Diagram (ERD)



3.4 Application Programming Interface (API)



Section 4. Post Development Synopsis

4.1 Future Improvements

Given the limited duration of the project, Envisage wasn't able to fully realize its vision for the system. Below are some areas that could be improved with the system.

Reporting

The Final Prototype contains a basic form of reporting. It is recommended that more queries are implemented to allow for more meaningful report types.

Interface

The current Web Portal is rudimentary and it is recommended that improvements are made to ensure that it meets the expectations of users.

Changelog

During development the team learned that due to the discrepancy of the test environment versus that of the Northrop Grumman network, a changelog would not translate over to the live environment. Therefore, the team decided to eliminate it from the scope of the project during Phase 5: Final Prototype.

User Authentication

Similar to changelog, Envisage's test environment didn't allow the team to implement network-oriented functionalities of the system. While login functionality was developed, it will require future development time to allow for Northrop Grumman's authentication to be integrated into the system.