Polytechnic University of Puerto Rico
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Software Project Management Plan

Lambda Solutions Group Presents:

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Emilio Acosta Ortiz	86144	Computer Engineering	
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Changelog

Name	Date	Changes Performed	Version
Manuel Seda	2/3/2019	Began LaTeX template	1.00
Manuel Seda	2/3/2019	Began working on Section 3	1.01
Emilio Acosta	2/4/2019	Began working on Section 4	1.02
Rafael Santiago	2/5/2019	Began working on Section 1	1.03
Raúl Viruet	2/7/2019	Began working on Section 5	1.04
Gabrielys Rivera	2/7/2019	Began working on Section 5	1.05
Michael Quiles	2/8/2019	Began working on Section 2	1.06

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1 Introduction

1.1 Project Overview

The group's objective is to develop a steganography desktop application for Linux distributions. This application will allow cybersecurity Capture the Flag competitors in steganography assignments. The project requirements will define, in general terms, the setup of the application, topics for available information concerning Software Project Management, and user activities (if any). Other official requirements are specified in the Software Requirements Specification (SRS).

1.2 Project Deliverables

The Lambda Solutions Group will develop this web-based app by following the Software Design Description (SDD). As part of this development, here's a list the following management documents and software products as deliverables:

Deliverable Item	Date	Location
Software Requirements Specification (SRS)	February 14th, 2019	Uploaded to group SharePoint
Software Design Description (SDD)	February 14th, 2019	Uploaded to group SharePoint
System Test Documentation (STD)	February 14th, 2019	Uploaded to group SharePoint
Project Prototype Presentation	?	Uploaded to group SharePoint, Physical Presentation
Software Builds	February 14th, 2019	GitHub Repository
Status Reports	Weekly during the duration of the project	Uploaded to group SharePoint
Final Presentation	?	Uploaded to group SharePoint, Physical Presentation
Project Poster	?	Uploaded to group SharePoint, Printed Poster

Table 1.1: Deliverable Items Summary

1.3 Evolution of the SPMP

Every updates or modifications to the document SPMP would be discussed with the team, as well as with the client. The procedure for the updates or modifications is to be determine at the moment of the update or modification.

1.4 Reference Materials

The following references use the IEEE citation format.

1.5 Definitions & Acronyms

Term	Definitions
SRS	Software Requirements Specification[?]
SDD	Software Design Description[?]
STD	System Test Documentation[?]
SPMP	Software Project Management Plan[?]
TBD	To Be Determined
User	Person that would be using the application.
Resident User	A user that lives in Vieques or Culebra[?]
Tourist User	A user that doesn't live in Vieques or Culebra[?]
Client	Organization or company that the application is delivered to. May also refer to a piece of computer hardware or software that accesses a service made available by a server[?].
Server	Where the application would be hosted[?].
Hosting	Store (a website or other data) on a server or other computer so that it can be accessed over the Internet[?].
Terminal	A device or program that enables you to communicate with a computer[?].
Database	A structured set of data held in a computer, especially one that is accessible in various ways[?].
GUI	Graphical User Interface
Query	A query is a request for data or information from a database table or combination of tables[?].
Web App	A web application is a computer program that utilizes web browsers and web technology to perform tasks over the Internet[?].
HTML	Hyper Text Markup Language[?]

Table 1.2: Terms & Definitions

2 Project Organization

This section shall specify the process model for the project, describe the project organizational structure, identify organizational boundaries and interfaces, and define individual responsibilities for the various project elements.

2.1 Process Model

In this section will show the different steps that will be taken to initiate, develop and finish the system. Figure **??** shows these steps.

2.2 Organizational Structure

A diagram representing the organizational structure of the project is shown below:

Lambda Solutions' Development Team is comprised of the following members:

- Rafael A Santiago Solivan
- Michael A Quiles Melendez
- Gabrielys Rivera Flores
- Raul F Viruet Roman
- Manuel Seda Batista
- Emilio Acosta Ortiz
- Oscar Navarro Estarellas

The following table shows the roles of each member of the development team:

Name	Role
Manuel Seda Batista	Project Manager
Rafael Sanstiago Solivan	Database Administrator
Michael Quiles Melendez	GUI Designer
Gabrielys Rivera Flores	GUI Developer
Raúl Viruet Román	Database Designer
Emilio Acosta Ortiz	Client Designer
Oscar Navarro Estarrelas	Client Developer

Table 2.1: LSG Members Roles

2.3 Organizational Boundaries & Interfaces

This Section describes boundaries that LSG management placed on the project members.
The project manager will be the guide of the project and he must be contacted for any further development of the system. The team will join a voice call every two days where they will have to update on any further development they are working on. There will be a weekly meeting usually on Friday where the team can discuss and communicate their progress on the assigned task. Any other information outside the reunions is encouraged to be sent via email or text message to the group room that has been created for this project. There will be a monthly meeting with the client to show them the current progress of the system and future milestones that are going to be achieved.

2.4 Project Responsibilities

Project Manager:

- Develop policies and procedures to support the achievement of the project objectives
- Define the organizational structure of the project team
- Coordinating activities across different organizational functions
- Checking project progress toward meeting its objectives
- Ensuring customer satisfaction
- Establish the project schedule

Database Administrator:

- Monitors the efficiency and effectiveness of all database resources and thus, keep the flow of work uninterrupted owing to technology.
- Continuous review and evaluation of the software, hardware, service delivery, and updates as and when required.
- Maintains a data standard and security measures through the implementation of information technology plans, policies, and standards.
- Troubleshoot the problems. It includes a quick understanding of the problem and its resolution, restoration of the data, rectify the issue and minimize the damage.
- Monitor the changes in regulations, technology, and its impact on operations and implement the new or better ones as required.
- Implements the work plan for the Department. He meets the staff to identify any problems, take measures, and resolves it

GUI Designer:

- Collaborate with product management and engineering to define and implement innovative solutions for the product direction, visuals and experience
- Execute all visual design stages from concept to final hand-off to engineering
- Conceptualize original ideas that bring simplicity and user friendliness to complex design roadblocks
- Create wireframes, storyboards, user flows, process flows and site maps to effectively communicate interaction and design ideas
- Conduct user research and evaluate user feedback

GUI Developer:

- Create Web application front end as per design comps and information architecture
- Integrate front-end application with the application business layer
- Follow best practices and standards for accessibility and cross-browser compatibility
- Collect feedback from design and technical staff on Website development needs
- Understand executing accessibility and progressive enhancement presentation
- Stick to established coding standards and group procedures individually and in teams
- Plan and estimate projects and reports hours to administration for billing

Client Designer:

- Integration of user-facing elements with server side logic
- Building reusable code and libraries for future use
- Optimization of the application for maximum speed and scalability
- Ensures the design of a logical structure for the user to interact with
- Design and implementation of all functions that interact with the server

Client Developer:

- Ensures GUI items function properly
- Builds application for optimal responsiveness
- Ensures that server transactions requested by user interactions are efficient and sane

3 Managerial Process

This section specifies management objectives and priorities to be met during the elaboration of this software project.

3.1 Management Objectives & Priorities

Lambda Solutions's philosophy is to provide software solutions that will satisfy our clients and users' needs and beyond. The project's main objective is to create a system that will benefit cybersecurity. The development team will compile the following documents, explained in section 3.4, to assist in logging their progress to themselves, the program manager and the client:

- Status Report
- Project Review
- Progress Report
- Change Requests
- Meeting Logs

To help visualize the budget allocation, the table below is provided:

Project Element	Allocation
Database Design, Development & Maintenance (Including Hardware and Staff)	35%
GUI Design & Development (Includes Staff)	15%
Back-end Design & Development (Includes Staff)	25%
System Deployment (Includes Hardware and Staff)	20%
Other Costs	5%

Table 3.1: Budget Allocation

The following table maps the flexibility of each of the project's dimensions.

Project Dimension	Fixed	Constrained	Flexible
Cost		**X**	
Schedule	**X**		
Functionality			**X**
Staff Requirements		**X**	
Technical Process			**X**
Project Deliverables	**X**		

Table 3.2: Project Dimension Flexibility Matrix

3.2 Assumptions, Dependencies & Constraints

3.2.1 Assumptions

The project's design revolves around the following assumptions:

- The system will be deployed on Linux distributions
- The schedule is accurate
- All dependencies are satisfied
- All constraints are dealt with
- Only users with a high degree of computer experience will interact with our program
- Users know how to resolve a dependency chain and compile from source
- Provided files are within the project's foreseen scope
- Keys used for decryption operations are correct
- Payload to be encoded into the input file is within the project's scope

3.2.2 Dependencies

The project's design revolves around the following dependencies:

- **A supported Linux distribution** - the software will be created using tools readily available for most Linux distributions. Other POSIX compliant Operating Systems may be able to build and run the software, but the stability and reliability of said software will be unknown
- **Python Encryption libraries** - files used as input in the decryption module of our software will be processed by functions from existing Python Encryption libraries.
- **Python qt5 bindings** - the software's GUI will be crafted using the qt5 framework.
- **Python Steganography libraries** - steganographic encoding & decoding will be programmed using python steganographic libraries

3.2.3 Constraints

The project's design revolves around the following constraints:

- **Regulatory Policies** - the project as a whole must comply with local, state and federal regulatory policies
- **Interfaces to Operating System** - this project's software will depend on many operating system elements such as the file system and random number generator.
- **Reliability Requirements** - because the project will be used as a tool for competitions, the software must perform with speed, accuracy and precision

3.3 Risk Management

The risks this project can (and will for some) incur are, but not limited to:

Risk Factor	Assessment	Risk Rating	Contingencies
Team Stability	The likelihood of team members leaving or not getting along could greatly impact the project's completion	Low	Team-building exercises, have a pool of employee candidates ready to fill any voids in the team
User Experience	Users not having the experience necessary to operate the system	Low	Have tutorials, documentation and staff readily available to help users with any difficulties operating the system
User Acceptance	Users being dissatisfied with the system when compared to the current one, causing the customer to terminate the contract	Very Low	Have a section of the software dedicated to collecting user feedback
Technology	New technologies being used in the project could cause difficulties in the project's completion	Medium	Undergo trainings and use all resources available to ensure the team's proficiency with the technologies involved in making the project
Schedule Conflicts or Workload Conflicts	Team members are full times students with full or part-time employments. University or employer workflow & scheduling conflicts can and will arise	Very High	Organized execution of the project's tasks will minimize the dangers of scheduling conflicts

Table 3.3: Risk Management Analysis

3.4 Monitoring & Controlling Mechanisms

The project manager will have bi-weekly meetings to check on the development team's progress and to guide the team's efforts. Weekly status reports must be submitted to the project manager to monitor the team's progress. Monthly project reviews will be conducted on the existing project modules and phases. Whenever the Project Manager or the client requests a change, it must be documented. Every meeting must have a log. The following table summarizes these mechanisms:

Report Type	From	To	Time Period
Status Report	Development Team	Project Manager	Weekly
Project Review	Project Manager	Development Team	Bi-weekly
Progress Report	Lambda Solutions	Client	Monthly
Change Request	Project Manager and/or Client	Development Team	Whenever Needed
Meeting Logs	Development Team & Project Manager	Lambda Solutions	Whenever a Meeting Occurs

Table 3.4: Reports

3.5 Staffing Plan

To be able to complete the project, talented and dedicated staff members are needed. These staff members should be broken down into three main development teams. These teams coincide with the number of main modules and their responsibilities should stem from the team they're on. Each team will have a team leader, and these leaders will report to a project manager. The following table will show the type of staff needed.

Role	**Team**	**Experience & Education Required**
Project Manager	N/A	Master's Degree in Computer Science or equivalent, at least 5 years of previous experience
GUI Designer	GUI Development	Graphic Design, some programming experience in languages such as JavaScript required
GUI Developer	GUI Development	Experience in JavaScript, HTML, 2 years previous work experience or Bachelor's Degree in Computer Science or equivalent
Database Administrator	Database Development & Maintenance	MySQL experience, Computer Science Bachelor's Degree or equivalent
Database Designer	Database Development & Maintenance	MySQL certification, Computer Science Bachelor's Degree or equivalent
Client Designer	Client Development	Master's Degree in Computer Science or equivalent, 2 years previous work experience
Client Developer	Client Development	Bachelor's Degree in Computer Science or equivalent, experience in languages such as C++, C# or Java

Table 3.5: Staff Roles, Teams and Requirements

4 Technical Process

This section of the SPMP shall specify the technical methods, tools and techniques to be used on the project. In addition, the plan for software documentation shall be specified and also describes the plans for project support functions such as quality assurance, configuration management, verification and validation may be specified.

4.1 Methods, Tools & Techniques

This section details the computer systems, the development methodologies, the structure of the equipment, the programming languages, the tools, the techniques and the methods that will be used to specify, design, build, test, integrate, document, deliver, modify and maintain project standards.

4.1.1 Methods

- **Testing Methods**
  - White-Box Testing: Each software unit will be tested individually to produce the desired results.
  - Black-Box Testing: The software will be tested after completion to test its overall functionality.
- **Development Methods**
  - Programming Style: Developers will be using the indent style and naming conventions.
  - Programming Languages: For our web page, the developers must be fluent in HTML, Java and SQL.

4.1.2 Tools

- **Documentation Tools**
  - Microsoft Word: Software used for the creation of every required document as well as for simultaneous collaboration of the team members.
  - Microsoft Power Point: Software used for creation of the required presentations.
  - Google Drive: Cloud Storage for saving all required documents.
  - LaTeX: software used for the final creation of each required document, as well as for the simultaneous collaboration of team members.
- **Development Tools**
  - MySQL Workbench: Software used for the database creation and management of data.
  - Eclipse IDE: Software used to create the website's GUI.
  - Notepad++ : Software used for general purpose languages.
  - Computers: Computers: equipment that will be used by team members to complete all tasks. This equipment, when connected to the Internet, will also be used to test the page in a web browser.

4.1.3 Techniques

- Smooth transition: this method will ensure that each phase is completely completed, reviewed, tested and approved by the client before making major changes.
- Commitment of the administrator: this technique will leave a positive impact that will ensure a functional service.
- Quality of the service: the quality of the service is an important strategy to execute a functional and reliable system that the user can feel safe and comfortable to use.

4.2 Software Documentation

The software documentation to be made is composed of the following IEEE (Institute of Electrical and Electronics Engineers, 1963) Standards:

Document	Description	Format
SPMP	Software Project Management Plan: Document management refers to the planning of the project, its main stages and its organization.	IEEE 1058-1998
SDD	Software Design Description: Document describing the product design.	IEEE1016-1998
SRS	Software Requirement Specifications: Document defining the requirements and details requested by the client.	IEEE830-1998
STD	Software Test Documentation: Document defining each test and the tester.	IEEE829-1998

Table 4.1: Software Documentation

Other documentation:

- Presentations: The team needs to offer two different presentations with the purpose of describing the system in a detailed manner.
- Personal Log: Each team member must possess a personal log file in which they will write what was discussed in each meeting as well as their work done in each objective of the product.
- Team Log File: Each team meeting and decisions will be noted in the team logbook. The materials used and the objectives that were discussed will be written in the logbook as well.

4.3 Project Support Functions

4.3.1 Configuration Management

The purpose of the software configuration management is to organize, control, plan and coordinate every part of the software suite to be developed. This will be done in parallel to the development process of the software.

- Software versions will increment 0.1 each time someone performs a change on a document.
- Individual testing for each unit will be conducted as the development process progresses.

- The project shall be stored and updated by all members.
- Milestones, identified by 1.0 version increments, for each software unit will be established. The following changes count as milestones: Initial functional web page, fixes, optimizations and requests & final fixes and adjustments.
- Individual testing for each unit will be conducted as the development process progresses.

4.3.2 Verification & Validation

The activities to be performed in this function are designed to verify the software and make sure that it meets the stated system specifications in the SRS document. This will be done through intense testing detailed in the STD document.

4.3.3 Quality Assurance

Testing by the client will be conducted for this function of the project. The purpose of this testing is to make sure that the client is satisfied with the developed Software and meets the system requirements stated in the SRS document.

5 Work Packages, Schedule & Budget

In this section, there will be a description of work packages, alongside with a schedule on how the project should be developed and description of the dependencies and requirements between elements in the project.

5.1 Work Packages

Employee allocation
Describes which group of people performs which task, and also specifies the amount of employees allocated to a particular task.

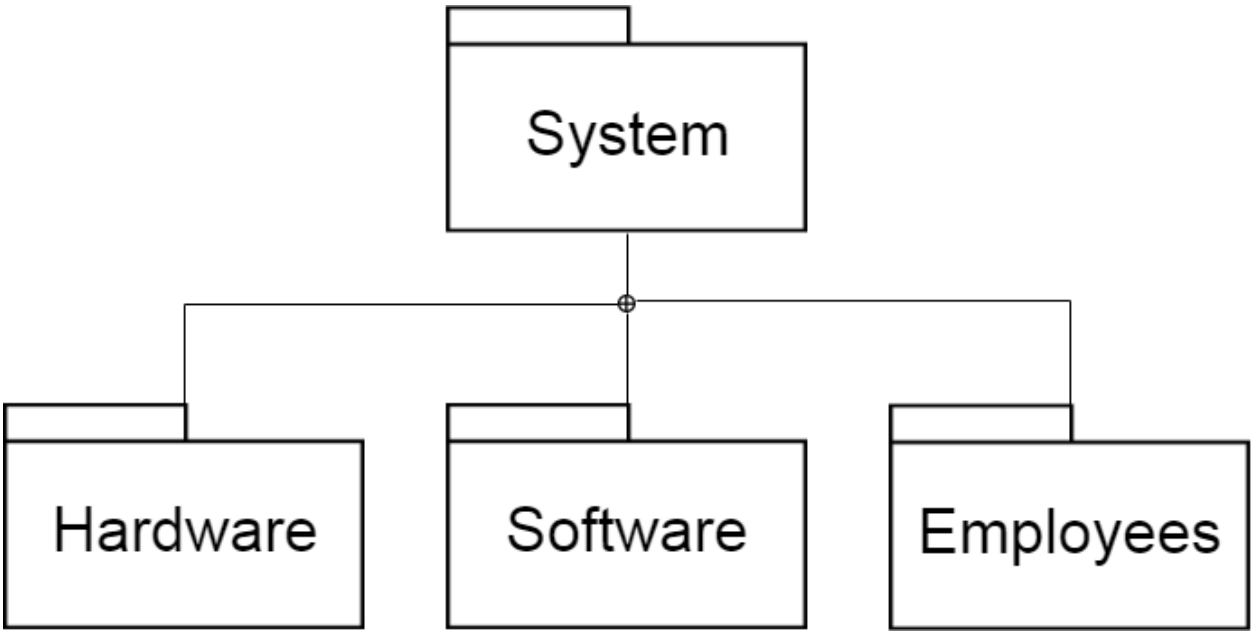

Figure 5.1: Package Diagram - System Top View

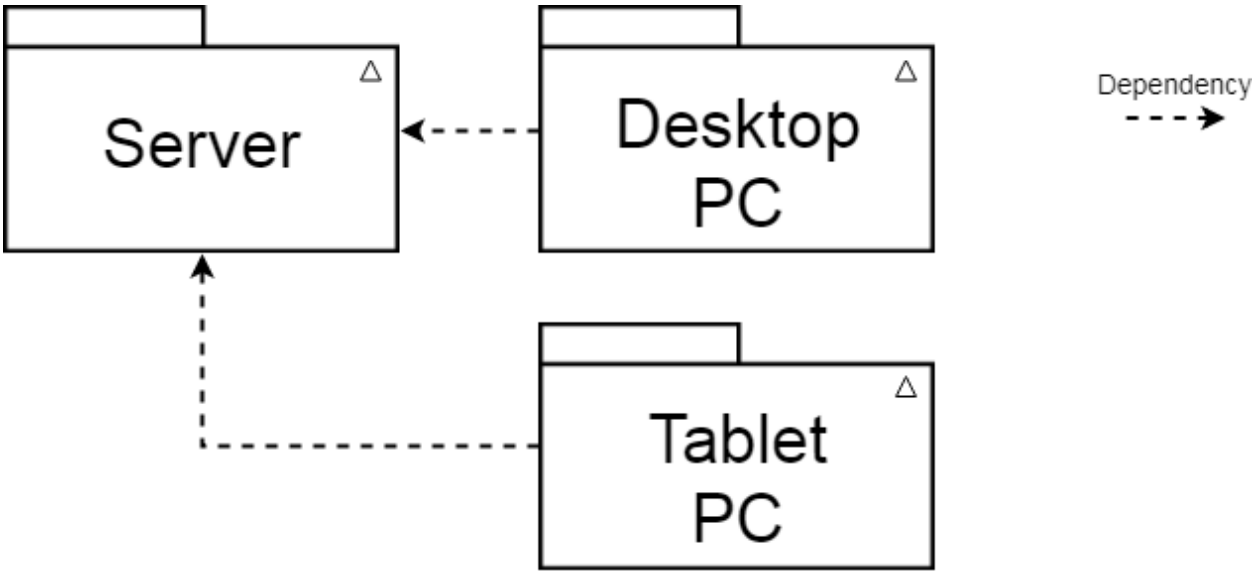

Figure 5.2: System Dependencies

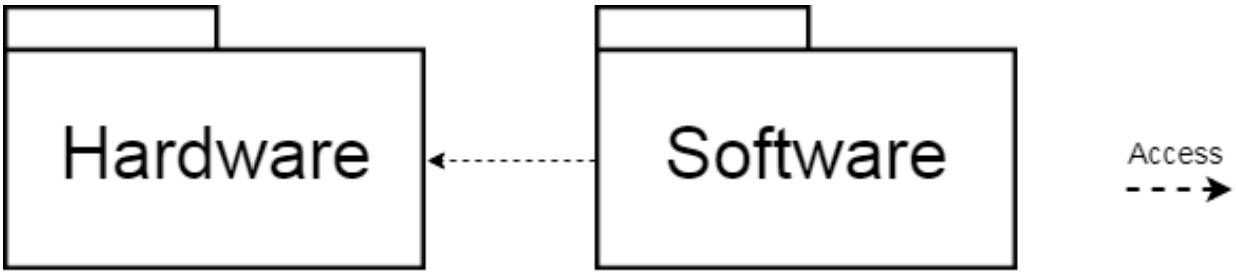

Figure 5.3: Dependencies between packages

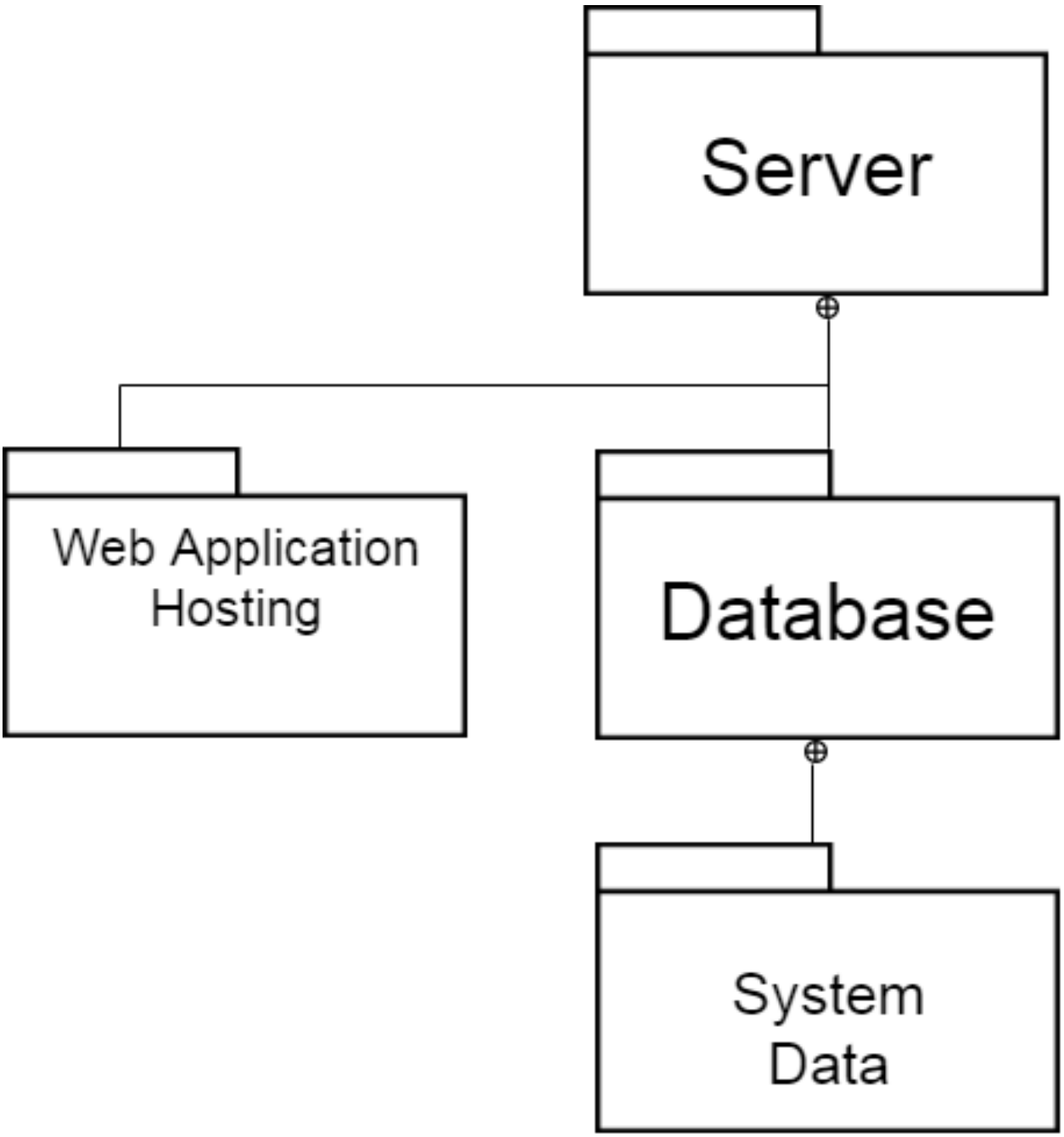

Figure 5.4: Package Diagram - Server

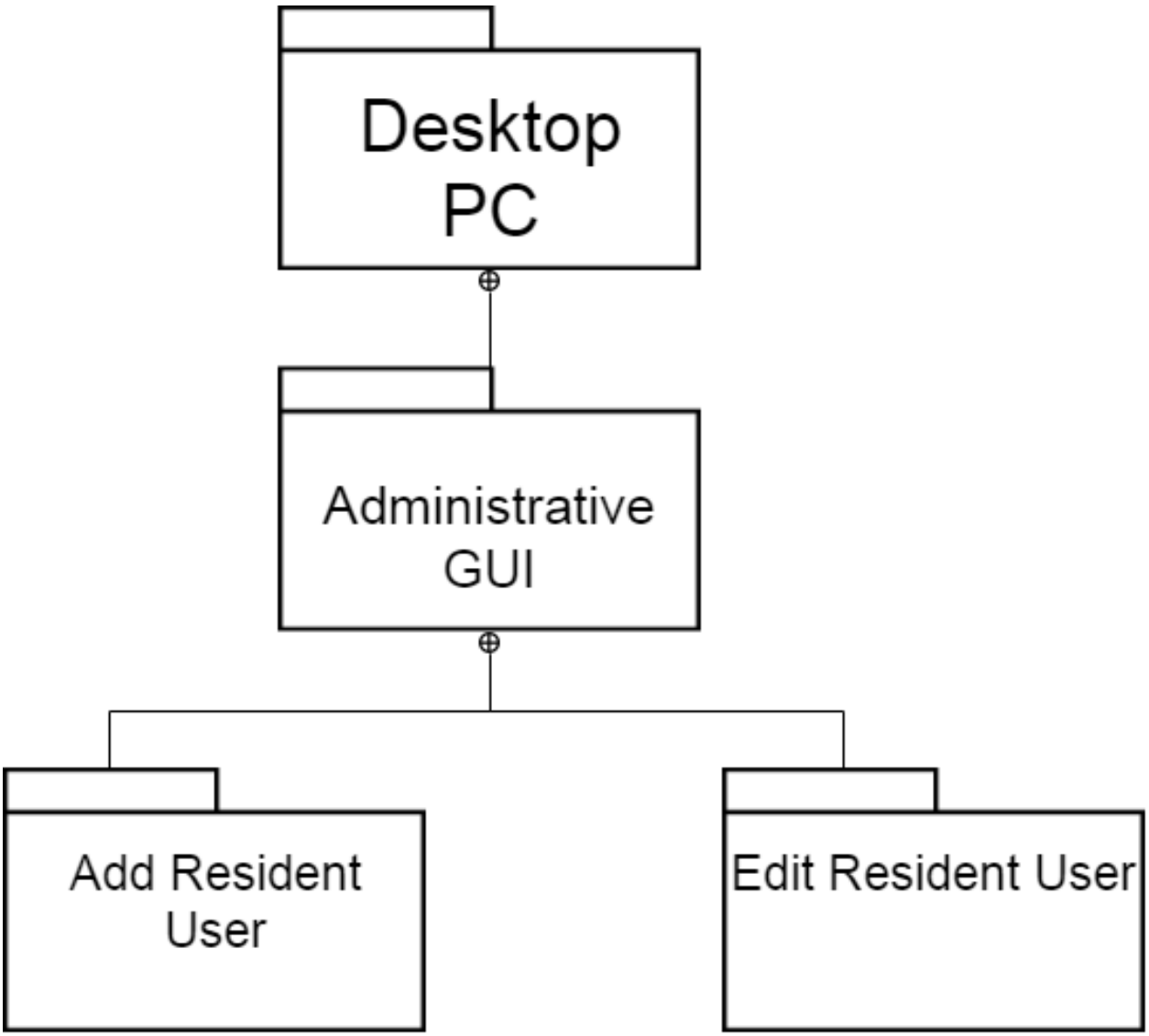

Figure 5.5: Package Diagram - Desktop PC Component

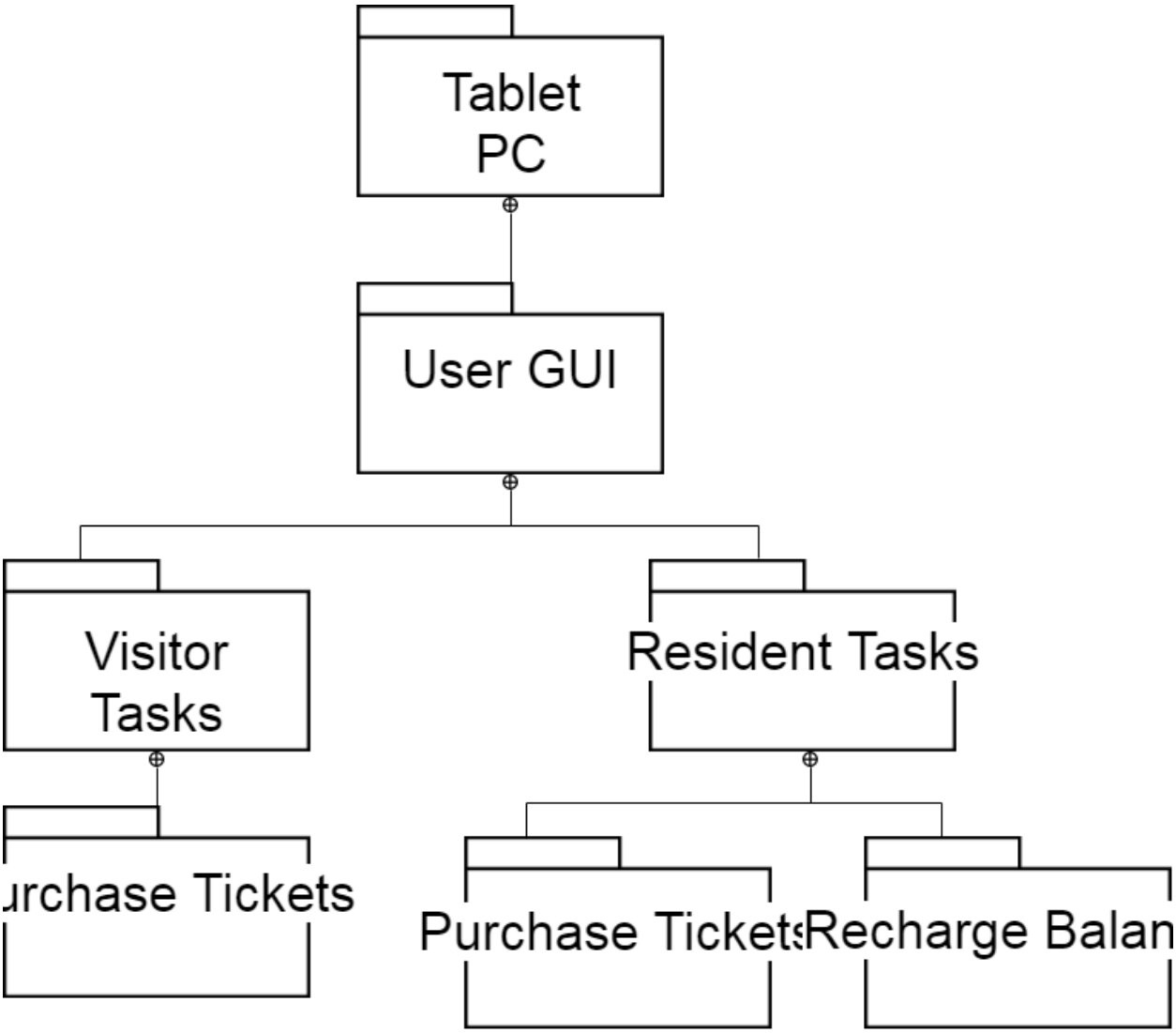

Figure 5.6: Package Diagram - Tablet PC Component

Group	Task	Number of Employees
A	Install Vieques terminals and configure them with the system	3
B	Install Ceiba terminals and configure them with the system	3
C	Install Culebra terminals and configure them with the system	3
O	Install terminals and server equipment in customer service main office, and configure these devices.	5
T	Train Customer service office (OA) employees how to use the system to add new Resident users to the system and modify existing users. Personnel will also perform customer service training. Train clerks for Vieques, Culebra and Ceiba (KV, KC, KF) on how to operate and troubleshoot their respective terminals.	4
KV	Vieques customer service clerk, in charge of trooubleshooting and provide customer assistance if required.	6

Group	Task	Number of Employees
KC	Culebra customer service clerk, in charge of trooubleshooting and provide customer assistance if required.	4
KF	Ceiba customer service clerk, in charge of trooubleshooting and provide customer assistance if required.	4
OA	In charge of adding new resident users to the database and enabling their acess to the system. They are also responsible of adding existen Resident user information if required.	4
SD	Software Developers (SD) are in charged of designing the system according to specifications	6
TST	System Testers, wil perform Unit Testing, Integration Testing, Sanity Testing and Interface Testing	15

Table 5.1: Employee Allocation to project realization

5.2 Dependencies

The following activity network diagram demonstrates the sequential relationships of activities for this project.

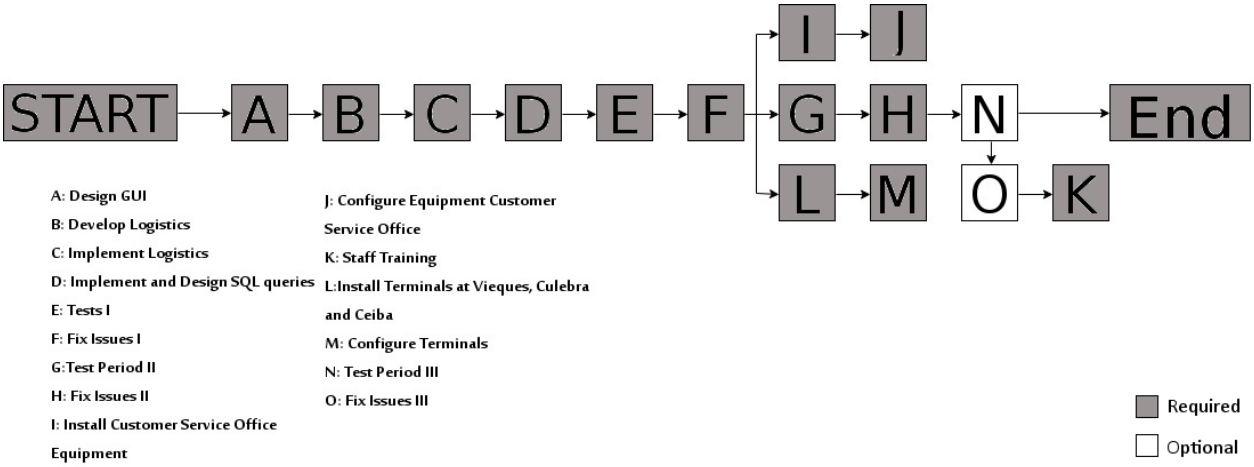

Figure 5.7: Activity Network Diagram

5.3 Resource Requirements

The following graphs represent the required investments this system will require as a function of time. Figure 5.8 considers both investments in hardware and employee resources

Month	Start Balance ($)	End Balance ($)
1	27,360.00	27,360.00
2	30,240.00	57,600.00
3	7,200.00	64,800.00

Month	Start Balance ($)	End Balance ($)
4	27,360.00	92,160.00
5	31,360.00	123,520.00
6	6,720.00	130,240.00
7	25,280.00	155,520.00
8	25,280.00	180,800.00
9	25,280.00	206,080.00
10	25,280.00	231,360.00
11	25,280.00	256,640.00
12	25,280.00	281,920.00

Table 5.2: Montly Budget

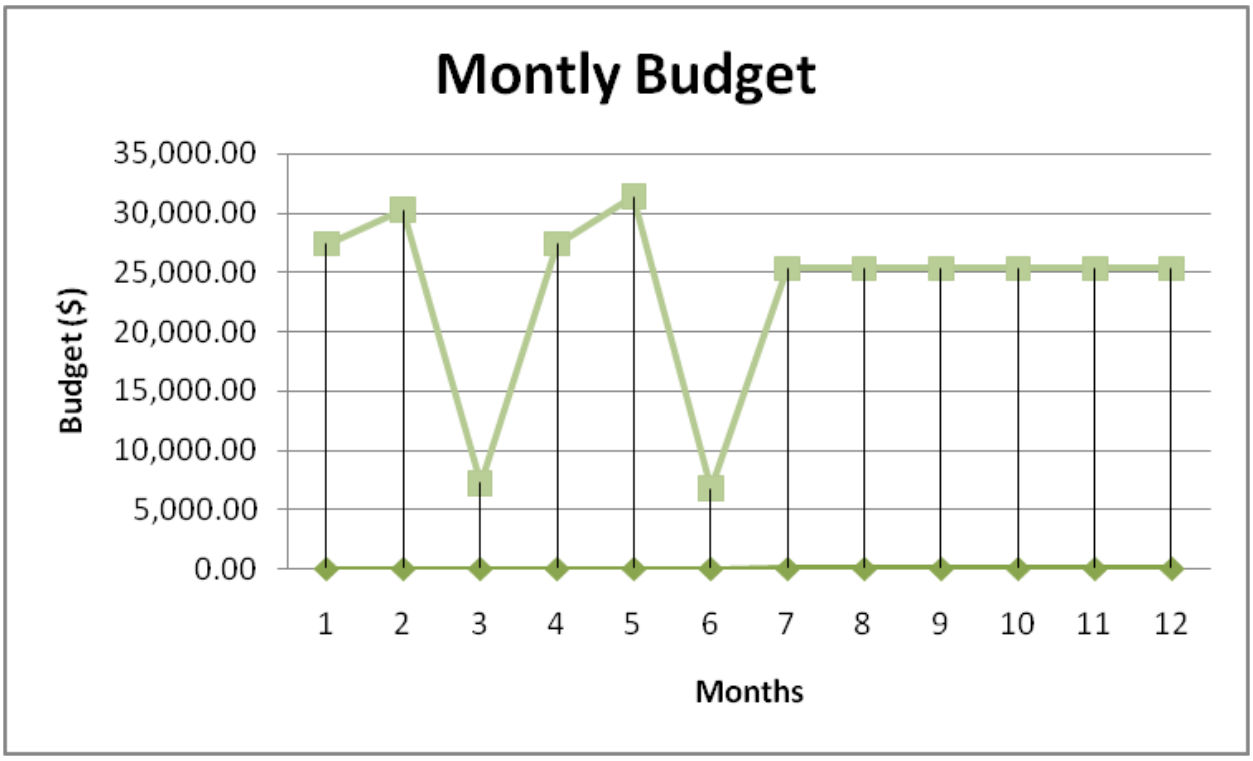

Figure 5.8: Budget Graph

5.4 Budget & Resource Allocation

Required Equipment
Describes and specifies required equipment to be purchased and installed for the initial system realization.

Equipment	Price Per Unit	Ammount Needed	Total	Description
Samsung Galaxy Book	$970.00	7	$6,790.00	Tablet Computer
Epson TM-T88VI	$270.00	7	$1,890.00	Receipt Printer
Server Hardware	$3,500.00	1	$3,500.00	Database Hardware
Origin Chronos	$2,600.00	6	$15,600.00	Office Computers
Acer Predator Z35	$625.00	6	$3,750.00	Monitors
Logitech MK550 Wireless Mouse and Keyboard Combo	$45.00	6	$270.00	Keyboard and Mouse
HP Laserjet Pro MFP M521dn	$750.00	1	$750.00	Printer
GRAND TOTAL			**$32,550.00**	

Table 5.3: Equipment Quote

Position	Staff	Salary per hour ($)	Days	Total Yearly Salary
Software Developer	6	$30.00	80	$115,200.00
Tester	15	$7.26	13	$11,325.60
Installer - Remote	9	$10.00	12	$1,080.00
Installer - Local	5	$10.00	12	$4,800.00
Training Staff	4	$12.00	10	$4800.00
Customer Service Clerk - Remote	14	$8.00	256	$229,376.00
Administrator - Clerk	4	$11.50	256	$94,208.00

Table 5.4: Yearly Staff Budget

5.5 Schedule

A detailed look of project milestones and due dates.

Milestone	Start Date	Due Date	Team	Notes
GUI	October 7, 2018	October 18, 2018	SD	Develop HTML Graphic User Interface (GUI) for both Administrative and Customer interactions.
Develop Logistic for Administrative Tasks	October 22, 2018	October 30, 2018	SD	Contruct logistic for adding Resaident users and modifying current Resident User information.
Develop Logistic for Resident User Tasks	October 31, 2018	November 9, 2018	SD	Construct logistic for purchasing tickets for Resident Users, Construct Logistic for recharging existing balance using credit Card
Develop Logistic Tasks for Visitor User Tasks	November 12, 2018	November 16, 2018	SD	Construct logistic for purchasing tickets for Visitor Users using credit Card
Implement Logisticgs developed for Resident and Visitor User Tasks	November 19, 2018	November 21, 2018	SD	Write HTML Code that will make viable the design and logistics developed by the SD team.
Design and Implement Database Queries	November 26, 2018	December 7, 2018	SD	Write SQL queries that will enable the web app developed from the HTML code to interface the Database Management System
Test Period I	January 7, 2019	January 15, 2019	TST	Perform Tests to the developed system, namely Unit Testing, Integration Testing, Sanity Testing and Interface Testing
System Readjustment Period I	January 16, 2019	February 1, 2019	SD	Correct issues and bugs found on Test period I
Test Period II	February 4, 2019	February 8, 2019	TST	Perform Tests to the developed system, namely Unit Testing, Integration Testing, Sanity Testing and Interface Testing. Focus on issues detected previously.
System Readjustment Period II	February 11, 2019	February 20, 2019	SD	Correct issues and bugs foun on Test period II
Test Period III	February 21, 2019	February 22, 2019	TST	Perform tests on elements not working properly form test period II
System Readjustment Period III	February 25, 2019	March 2, 2019	SD	Correct issues and bugs found on Test period III
System Launch		March 3, 2019		System goes online

Table 5.5: Software Development Milestones

Milestone	Start Date	Due Date	Team	Notes
Install Server Equipment	February 11, 2019	February 22, 2019	O	N/A
Install Terminals	February 11, 2019	February 22, 2019	O	N/A
Configure Server and Terminals	February 11, 2019	February 22, 2019	O	N/A
Employee Training	March 4, 2019	March 15, 2019	T	Training for employees how to use the system to add new Resident users to the system and modify existing users. Personnel will also perform customer service training.
Office Open Date	N/A	March 25, 2019	N/A	Open to the public no later than this date

Table 5.6: Customer Service Office Milestones

Milestone	Start Date	Due Date	Team	Notes
Install Terminals Vieques	February 11, 2019	February 20, 2019	A	N/A
Install Terminals Culebra	February 11, 2019	February 20, 2019	C	N/A
Install Terminals Ceiba	February 11, 2019	February 20, 2019	B	N/A
Configfure Vieques, Culebra and Ceiba Terminals	February 11, 2019	February 22, 2019	A, B, C	Configuration of these terminals may depend on the configuration status of the main server.
Employee Training	March 4, 2019	March 15, 2019	T	Training for Clerk(s) stationed at Vieques, Culebra or Ceiba ports.
Terminals Accessible to Public	N/A	April 3, 2019	N/A	N/A

Table 5.7: Vieques, Culebra and Ceiba Milestones