

Final Report

**Working with the Atlanta Day Shelter for Women and Children to meet
their technology needs**

**ECE4007: Senior Design
L01: Dr. Smith-Advisor**

**“Shelter Helpers” Team Members
Chris A. Higginbotham
John Lewis
Nikhail Singh**

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Executive Summary

There is a real need in the non-profit community for help in dealing with technology problems. The Shelter Helpers provided assistance to the Atlanta Day Shelter for Women and Children (ADSWC) during the Spring 2009 semester because of the humanitarian benefit as well as for the personal consulting experience. The ADSWC needed help developing their website, integrating donation software, and upgrading the internal networking and security issues. This project was a continuation of Fall 2008's work. Last semester's senior design group worked with the shelter to manage their network security, added a donation section to the web site, and conducted research to determine the best software to manage their incoming donations.

This semester, the Shelter Helpers built upon last semesters work by repairing many broken PC's, setting up new workstation areas to manage their volunteer and donation check-ins, and implementing the Donor Perfect software that was purchased as a result of last semester's research. In addition, the Shelter Helpers provided assistance with daily issues that came up during the semester. The total costs for this semester was a one time payment of \$5850 plus \$1600 in yearly recurring cost.

The work that is left by this group will be completed by either next semesters senior design group or by the Georgia Tech Association of Women Engineers (WECE).

1. Introduction

The Shelter Helpers continued the work started during the Fall 2008 semester. The previous team sifted through a room full of donated computers, determined which ones were working, researched the best software available for use in tracking donations and set up the passwords and badges to help with security. They also set up Active Directory on the server to help manage network passwords and enabled roaming profiles so that the staff could log onto any PC and still have their desktop information at hand.

The ADSWC has no paid IT staff with advanced technical knowledge, which makes it hard for them to fulfill their technological needs. They needed help with everything from loading new software and upgrading their website to maintaining and upgrading their network infrastructure.

1.1 Objective:

The objective this Spring 2009 semester was to further enhance the website and integrated Volgistics and the Donor Perfect software. In addition, the Shelter Helpers added further security and organization to the internal network through the use of network passwords, network printers, and organization of their network cabling.

There were over two dozen computers that were left at the shelter in unknown condition. Along with the PC's, dozens of keyboards, mice, monitors, UPS and network switches need to be evaluated for functionality. The Shelter Helpers fixed the units and discarded the rest.

1.2 Motivation:

The humanitarian aspect of this project was the primary motivator for the Shelter Helpers. In addition, the experience of acting as consultants of this organization, the ability to manage this project independently, the opportunity to interface on a one-to-one basis with the staff, and the ability to juggle many simultaneous issues were large contributing factors.

The ADSWC helps women and children by easing their burden and helping them get back on their feet. There are two training labs for women to get certified for

computers, a lab for writing resumes and looking for employment, a lab for young adults to work on their homework and play on the computers, and a similar set up for teens. [1]

1.3 Background:

There were many issues to be resolved at the shelter during the semester, but the major issues fall into three categories: website enhancements, Donor Perfect and Volgistics integration, and network organization, maintenance, and security.

Website Enhancements:

The ADSWC struggled with managing and organizing their volunteers' schedule due to their dynamic nature. Consequently, several companies have developed software designed specifically for volunteer scheduling at an affordable price. These programs are also very user friendly, allowing everyone to access and use the software despite lack of technical savvy.

Three of the most effective volunteer software scheduling packages include Volgistics, Droster, and ScheduleAnywhere. Volgistics seemed to be the best as it was specifically designed for volunteer-based organizations due to its ability to cross-match volunteer availability and preferences with the organization [3]. The program is then able to determine an optimal schedule for both parties, which is then submitted to volunteers for minor updates and changes [3]. All the information is stored on a secure website, providing easy and safe access to staff and volunteers [2]. In addition, the software is able to keep track of the number of hours worked by a volunteer as well as several other statistics [2]. Since the schedule is maintained online, there is a maintenance fee ranging from \$100 to \$600 a year, depending on the number of volunteers per day; however, there are no setup charges [2].

The majority of volunteer scheduling software provides an online user interface and allows volunteers and organizations to easily access all the necessary data [2]. By storing data on the maintained server, the exchange of information between volunteers and organizations can remain dynamic. The data storage also allows the program to calculate statistical data on the volunteers, such as total hours worked. However, due to the ease of access, the server and software have additional security measures to ensure

that the schedule is not tampered with or that any sensitive data is protected [4]. These security measures include password protection, data encryption, as well as routine server backups.

Donor Perfect Software Implementation:

Donor Perfect Software has many different features, but the most prominent one is the centralization of all donor information. [7][6][8][9]. Donor Perfect software allows its users to organize hundreds of donors along with their contact information in one easy-to-use database application. The main technology behind the Donor Perfect software is its database [5]. Another feature of Donor Perfect software is its scalability. It varies to suit the needs of any size of organization by scaling the database and contact information for large and small organizations. The Donor Perfect software installs on a server and can be accessed by a group of computers. It organizes all of their records into an easily accessible storage container [6].

Network Management:

One important issue was network security and the proliferation of spyware and viruses throughout the network, mainly originating from the teen lab. One way to manage this problem was to separate the teen lab from the rest of the network by using a VLAN.

A Local Area Network (LAN) is a physical connection of wires used to connect host devices (PC's and Printers) together on the same broadcast domain network so that they can communicate with one another [10]. Instead of using physical wires or routers, a Virtual LAN (VLAN) uses software running on a layer 3 Switch to segregate devices into separate broadcast networks [11]. A VLAN is similar to a physical LAN in that it allows a group of host devices to be divided into distinct physical broadcast domains or cable segments and enables secure communication as though they are on the same network. Most companies use a combination of LAN and VLAN technology for securing their network communications.

Most companies rely on VLAN's for their primary means of securing their internal network by separating devices into zones of trust or discrete broadcast domains [12]. Although physical separation of networks through the use of routers and switches is the best method of separating zones of trust, this is not always possible in today's complex networks [13]. Many devices that are physically close to one another need to be on separate broadcast domains and the expense of separating the domains through routers and switches would be very costly. A VLAN deployed on a layer 3 Switch is most commonly employed in networks where the additional expense of a router and multiple switches cannot be afforded or a reduction of hardware is desired.

Although there are many switch manufacturers, Cisco Systems is the industry leader in utilizing VLAN's by implementing VLAN technology in all of their Cisco Catalyst layer 3 Series Switches. A single Cisco switch can replace two switches and a router, thus saving \$1,925 for the switch and \$1,586 for the router for a total of \$3,511 in savings [14].

2. Project Description and Goals

The main goal was to help relieve the ADSWC personnel from having computer issues. Refer to the Shelter Helpers' website

<http://www.ece.gatech.edu/academic/courses/ece4007/09spring/ece4007l01/ws1/> for more information

Below is a list of the Shelter Helpers' project goals:

Website Assistance:

- Interfaced Volgistics with the website so that volunteers could see open and available spots and schedule themselves to work.
- Upgrades: YouTube video links and Facebook links without changing the donation portion of the web.

Donation/Volunteer Assistance:

- Set up a donation Station in the rear of the building. Enter donor's info into the computer and issue thank you letter and receipts. Integrated this into the Donor Perfect Software.
- Identified and installed a bell and a camera for the donation station in the rear of the building.
- Used the current security station as a volunteer check-in area.
- Used the Access Database for verifying volunteers, etc.
- Issued guests badges with bar codes and use the barcode scanner to check them in. Checked the badges against a database list and notified the staff if there were any security alerts.

Upgrades:

- Downloaded Publisher 2007 onto the server and used it with Active Directory.
- Downloaded additional Microsoft 2003/2007 Office Software.
- Implemented the Donor Perfect Software onto the server and several PCs.

Network Maintenance:

- Installed a UPS onto the switches and the DSL circuit.
- Interfaced the UPS software with the "Poweredge" server so it will perform a controlled shutdown in case of a power loss.
- Mapped out the Ethernet cabling on the network.
- Moved all of the printers onto a print server for network printing.

Network Security:

- Implemented stronger passwords.
- Added Admin passwords.
- Checked Virus/Spyware versions on Server and PC's and installed if necessary.

Enhancements:

- Distributed Flash drives with USB extension cables where necessary.
- Repaired two teen lab computers.

Other:

- Fixed computer Latency on the shelter director's PC.
- Worked on repairing donated computers and peripherals.

To accomplish all of these goals, the Shelter Helpers spent approximately \$5850, which was donated by several outside organizations.

This includes the purchase of new workstation PC's, mice, keyboard, monitors, cable, barcode scanner, software, and miscellaneous small items.

3. Technical Specifications

There are a few technical specifications that need to be met to accomplish the above stated goals.

Computers:

The computers that needed to use the Donor Perfect software needed to have the following technical specifications:

- CPU required: 600 MHz
- Minimum memory required: 256 MB
- Minimum hard disk space required: 20 MB
- Operating system version: Windows NT/2000/ME/XP/Vista.
- Web browser versions: Internet Explorer 5.5 and higher.
- 2.0 USB capable.

Switches:

The switch that was used for the network must meet the following specifications:

- Must be a Layer-3 switch.
- Have VLAN compatibility.
- Be able to accommodate at least 24 new network ports.

UPS:

The UPS used for the network equipment must meet the following specifications:

- 1000 Watt capability.
- UL Rated.

The UPS used for the ADSWC SERV2 server must meet the following specifications:

- 1500 Watt capability.
- UL Rated.

Cabling:

Data Cabling:

- CAT-5e standard, 4 pair wire at least 200' in length.

Camera Cabling:

- Coaxial 50 Ω cabling at least 250 ft. in length to reach the back of the building.

Doorbell Cabling:

- 18 AWG, two wire, low voltage cabling at least 250 ft.

Barcode Scanner:

- PDF417 compatible.
- 2010 GS1 Sunrise compliant.
- USB capable.
- RoHS compliant.

4. Design Approach and Details

4.1 Design Approach:

The Shelter Helpers acted as consultants to the ADSWC and determined which of the shelter's needs were the most important and which ones could be accomplished within a one semester time frame. The ADSWC staff has indicated that these decisions needed to be based on the Shelter Helpers' experience and what was best for the shelters network.

To effectively address all of the shelter's needs, the Shelter Helpers divided up the important tasks to give each team member an equal share. Chris Higginbotham repaired the computer hardware and performed maintenance and feature upgrades to the network. John Lewis implemented Donor Perfect software, set up the barcode scanner to work with the security badges and existing Access Database, and setup the DVR security system. Nikhail Singh upgraded the website and implemented the Volgistics volunteer software. Refer to the Shelter Helpers' website to see all the modifications.

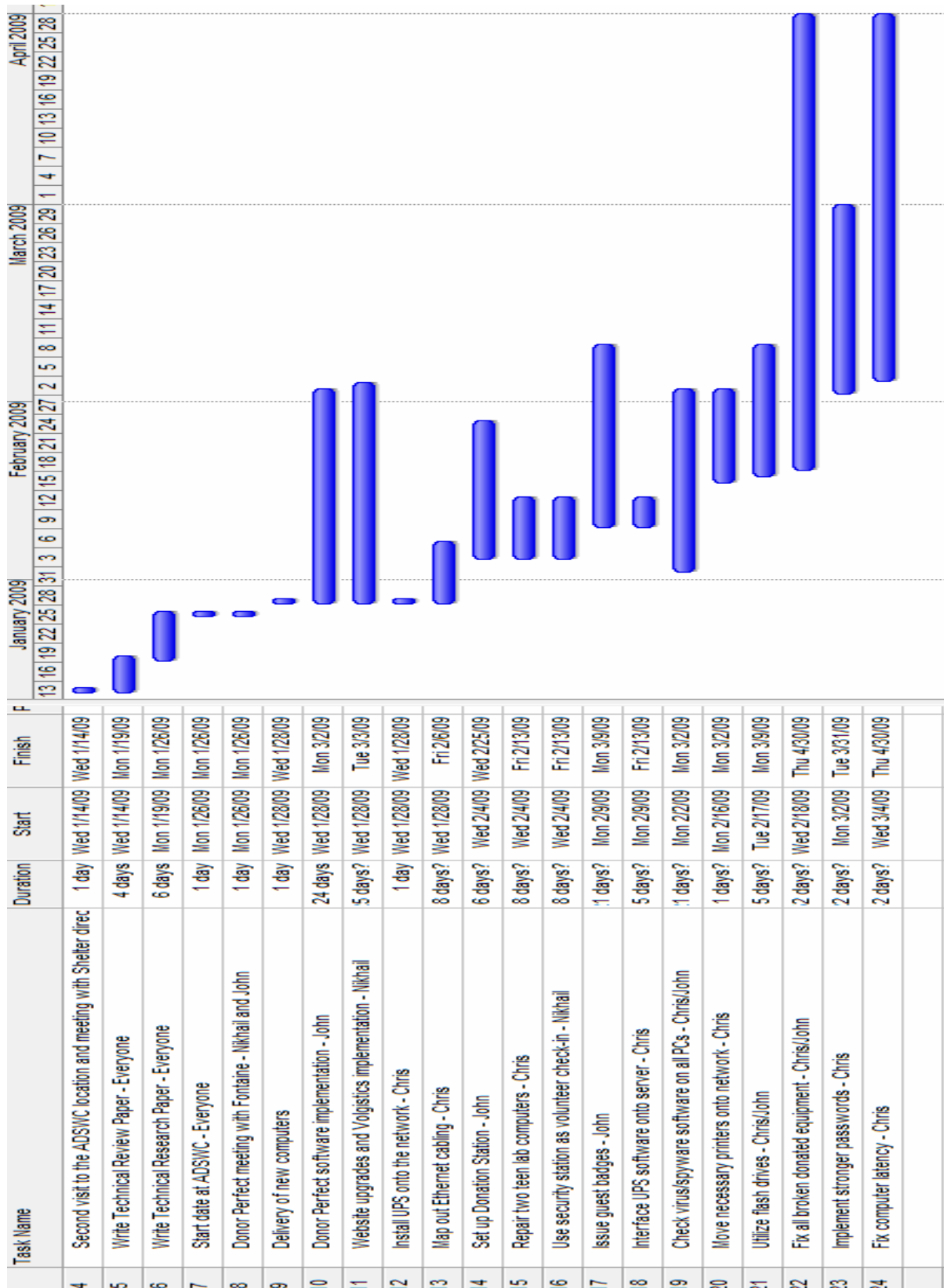
4.2 Codes and Standards:

- Microsoft Windows XP requirements
- Layer-3 switching capabilities on switch.
- The donation receipts must conform to 501C Federal guidelines.
- The barcode scanner must be 2010 GS1 Sunrise compliant.
- Online software must be compatible with several Internet browsers.

4.3 Constraints, Alternatives and Tradeoffs:

Budgetary constraints exist due to the nature of the non-profit organization. Since the shelter is not a profit-driven and revenue-generating organization, the money brought in for technological needs is smaller than in other industry-related businesses. The total budget for this semester was \$5850. Normally, an experienced IT person will cost between \$50-\$75/hour. Due to the lack of money, a tradeoff was made, which allowed the Shelter Helper team members to volunteer their time instead of requiring the shelter to hire outside help. In addition, there was no money in the budget to purchase the four new computers needed for the shelter so Delta Computers donated the computers.

5. Schedule, Tasks and Milestones



6. Project Demonstration

The project demonstrations occurred at the ADSWC at different periods of time during the semester. Some of the demonstrations were performed after the successful completion of a project such as the installation of the new PC's, volunteer check-in station, and donation station. Demonstration of individually accomplished projects during the semester were accomplished by showing the shelter director and necessary staff members how to use the new features such as the PC workstations and check-in areas. Please refer the Shelter Helpers' website for documentation on specific user guides.

The final demonstration encompassing the final proposal was held at the ADSWC on Tuesday, April 21st and was attended by the shelter director, Nancy Yarnell, ADSWC staff, the advisor, Dr. Smith, and by most of the shelter board members.

The following outlines how some of the final projects were demonstrated.

- Website upgrades will be demonstrated to the audience by accessing the website and walking them through a volunteer check-in and scheduling process.
- VLAN utilization will be demonstrated by logging into the switch and showing the audience the technical aspects of the VLAN.
- Donor Perfect implementation will be demonstrated by showing the audience how donors are stored in the database
- The Donation station will be demonstrated by walking through a mock donation by entering the donator's information and printing out a receipt.
- The Ethernet mapping can be easily shown to the audience through a handout that documents the organization of the cabling.

7. Marketing and Costs Analysis

Costs Analysis

Item	Quantity	Cost	Extended Cost
Barcode Scanner and Holder	1	\$167.00	\$167.00
Mice	10	\$5.00	\$50.00
Keyboards	4	\$25.00	\$100.00
Donor Perfect Software	1	\$4695.00	4695.00
Donor Perfect Import Module	1	\$595.00	\$595.00
Coax Cabling for security cameras	1000'	\$0.140/foot	\$140.00
Cat-5 Cabling	1000'	\$0.116/foot	\$116.00
Volgistics Software	1	\$130.00/month	\$1560.00/year
Cameras and security DVR	1	\$1000.00	\$1000.00
			\$6863.00
			+ \$1560/year
Total:			in recurring costs

Costs stated above were for purchasing all of the equipment in new condition. The ADSWC had some donated equipment, such as extra flat screen monitors which kept the expenses down. In addition, there were 283 hours of student labor, which was donated as part of this senior project which kept the ADSWC from paying out an additional \$5660-\$14,150. The labor cost breaks down to three Georgia Tech students each working 4 hours on both Monday and Wednesday from the end of January to the end of April for a total of 283 hours (27 days) at an hourly rate of \$20-\$50/hour.

8. Summary

The Atlanta Day Shelter for Women and Children has staff members and volunteers accomplishing a variety of tasks to help indigent women and children.

The Shelter Helpers met with the shelter director, Nancy Yarnell, several times during meetings and had personal contact with her at least twice a week during the Spring 2009 semester. Nancy passed onto the Shelter Helpers all of the necessary issues at the shelter at the beginning of the semester. In addition, Nancy and the staff informed the Shelter Helpers every week of on-going or new issues that arose. The Shelter Helpers also met with their senior design advisor, Dr. Smith, several times and have laid out the groundwork from which to start based on the information given to them by Nancy. Dr. Smith has been helpful in getting everything needed in relation to equipment to meet the ADSWC's needs.

After this semester, there will be additional daily work that needs to be completed. Some of these items include sifting through newly donated equipment to determine working status, maintenance of the network, upgrades to existing software, and distribution of network passwords to new and existing staff members.

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