Web-based WAN Management Facilitation Tool

By

William Woods

Submitted to
the Faculty of the Information Engineering Technology Program
In Partial Fulfillment of the Requirements
for
the Degree of Bachelor of Science
in Information Engineering Technology

University of Cincinnati
OMI College of Applied Science

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Abstract

The following report covers the accomplishments and design criteria needed to develop a Web-based tool to facilitate management of the WAN for the Telecommunications team at Chiquita Brands International, Corporate Headquarters. The purpose of this project was to centralize the vital data pertinent to management of the data portions of the wide area network at Chiquita Brands International. This will allow current and future members of the Telecommunications division of the MIS department to access vital network information in a centralized location to improve productivity and decrease network downtime occurring during periods that are vital to company production. It will allow them to access network diagrams and documentation at the click of a mouse instead of undergoing a diligent search to retrieve this information.

The material covered within this report discusses the design, materials, and effectiveness that the final project Web site provides. The results of this project prove that it provides more expedient methods of gathering and viewing information pertinent to the management of the Chiquita Brands International WAN network for the members of the Telecommunications division. This online WAN management facilitation system serves as a basic information infrastructure, although is requires further development to evolve into a company standardized telecom management tool.

Introduction

Countless problems have occurred when information is not properly managed by being stored in decentralized locations or by not being readily available for access when it is needed. In my original proposal, I planned to create a Web-based project management application for consulting firms and companies to use to manage and coordinate projects. This was to include project cost, goals, deadlines, and other resources to improve the efficiency of project management and communication. This was to be accessible to the consulting firm, the contractor, and the company contracting the work out. This system targeted Information Systems departments to ensure a more powerful method of project management. This project was originally designed to help the consulting firm keep a more accurate account of their goals and progress. It would also help the client hiring the firm to keep a close eye on exactly how much time and money was spent on each project to monitor contractor efficiency.

After a few months of research that I conducted, I concluded that this was much too broad an application to design and implement within the time span allowed for a single developer with the amount of knowledge that I possessed. The topics of investigation can be found in Appendix A. Not only was the original project too broad, but there was no doubt after I conducted my research that other programs such as Microsoft Project existed to fulfill the goals that I originally set out to accomplish. As a result I narrow the focus of the project down a specific division and team of the MIS department.

1. Statement of Problem

1.1 Definition of Problem

Keeping track of projects, vendor information, and other pertinent information within a department of a company is often mismanaged and not kept in a central location for all members of a team needing to access it expediently. Many times, various employees are on vacation or even change jobs altogether. Their information database of vendors and other project data is generally kept in their personal Rolodex, planner, or database that other members do not have accesses to. This also includes information that they have collected about projects and contacts that they have worked on or with that has become their personal property and not the property of the company. In some circumstances members of a team even withhold information and not share information needed for all members to access it easily. As a result, when this information is needed other members have to contact them. This is because of a lack of team organization and teamwork and eventually reduces productivity because individuals have to search for important information.

1.2 Definition of Need

Because key information is sometimes scattered and not readily available in critical situations it needs to be in one central location that is accessible with ease. The centralization of this data allows it to be easily accessible for any user that needs it without having to do an extensive search to find it. One way that data has been centralized as technology has increased is through Web sites. These sites can be accessed via the Internet or an Intranet. The centralization and publication of this information to Web sites makes valuable information readily available within a

matter of seconds with a mouse click. Just about every application and source of information is becoming Web-oriented.

2. Review of Literature

1. Morrison, Michael. Using Microsoft Visual Interdev. New York: Que, 1997

In this book Morrison introduces the use of Microsoft's Web developing tool, Visual Interdev. He explains the use and design of Active Server Pages and how to rapid develop them using the controls that are included in Visual Interdev.

Morrison also discusses HTLM and DHTML. He goes into depths as well about integrating SQL and Access databases into a Web project. This book is a handy tool that is targeted toward beginning users of Microsoft Visual Interdev who want to learn the tool from scratch.

2. Mueller, John and Tom Sheldon. The Complete Reference: Microsoft Internet Information Server 4. California: McGraw Hill, 1998.

In this book, Mueller and Sheldon aim their work toward individuals that have some network experience, and who wish to gain a broader overview of how the Internet and Intranets work. It also discusses the installation and administration of IIS 4.0 from security to creating Virtual Web Servers.

This is a good reference guide for those who have a brief overview of networking and for administrators who may not be familiar with Web servers. This book offers a hands-on approach to Microsoft Internet Information Server 4 (IIS 4). This guide is designed to help busy technology professionals get IIS 4 installed quickly and respond to its many

adn....istration challenges, as well as to help those with little knowledge of networking who wish to enhance it.

3. Stroo, Eric Anne Taussig. Microsoft Visual Interdev 6.0 Programming Guide. Washington: Microsoft Press, 1998.

In the Microsoft Visual Interdev 6.0 Programming Guide, Eric Stroo and Anne Taussig focus on the VB-Scripting language to explain and give a clear understanding of code. They focus more on the code that allows a GUI to function. They also discuss and give a clear understanding of the controls that are included in the Visual Interdev and the underlying code that is associated with them.

Sections on Visual InterDev 6.0 Programming concentrate on its new Rapid Application Development (RAD) features. It also explains which Web technologies to use: pure HTML, dynamic HTML (DHTML), and/or style sheets. This publication is designed as a quick guide for users that wish to take their understanding of the VB-Scripting language to a more in-depth level.

3. Description of Solution

3.1 Introduction

In order to increase employee productivity, decrease the length of network outages, and centralize the information that the members of the Telecommunications division access daily, I have created a Web site which is used by the Telecommunications team. It is a system that stores vendor resources, technical support information, and serves as an information infrastructure of the company's wide area network equipment, circuits information, and site information. It serves as an online documentation that

houses various aspects of Chiquita's site information including network node equipment, the location of the equipment, as well as the connectivity method in which the nodes are connected. This includes online viewing of all vendor information, local exchange carries for various cities and states, network diagrams, and equipment affiliated with each business division that the Telecommunications division is responsible for in order to efficiently manage the wide area network.

3.2 User Profile

Since the purpose of this Web site is to improve the efficiency of the members of the Telecommunications team, they are the only authorized users that can login to the Web site. The only skills that the users need are basic Web browsing navigational skills. The members of the telecommunications team have already tested the site and are familiar with its navigational structure of it.

3.3 Design Protocols

The Home page consists of the Telecommunications division's roles and responsibilities within the corporation. The initial home page can be viewed by anyone with no security restrictions. My initial goal is to have the site posted to the company Intranet. On the page there is also a button that leads to the initial login prompt to authenticate authorized users to enter the site. Once the authorized user is authenticated, they have various choices to select from. These choices include:

1. Vendor Information leading to vendor contacts information and the products that they support.
2. Project Status Information leading to currently in motion and their status.

3. A list of technical references, i.e. URLs specific to the current and future network strategies in use.

4. A WAN Diagram that is used for navigation to specific circuit and equipment information for a specific site, including managed nodes, IP addresses, and circuit Ids. The major design element consists of linked site maps that allow the user to click on a specified business location and be able to access network diagrams and information for the location. There are other pages within the structure of the site that not consist of such site maps.

This site is designed for a monitor with a screen resolution of 1024 X 768. The design was set for so because 5 of the 6 members on the team use and prefer this resolution. It is also best because of the site maps that depict the WAN and other network diagrams. The default Web browser that this site is designed for is Internet Explorer 4.0 or greater, since Chiquita uses Internet Explorer 4.0.

4. Objective of the project

The objective of this project is to expand on the information as defined in the original design prototype. The final Web site, which will be presented, consists of a secured site that requires user authentication and a host of site maps which allow users of the site to easily identify various aspects of their Global WAN.

The objectives of this project are defined as follows:

- Provide authentication for only authorized users.
- Allow users to access network diagrams by pointing and clicking on desired location.
- Centralize vendor and local exchange carrier contact information for technical support and new purchase purposes.
- Allow users to access wide area network node and circuit information.
- Centralized access list of site contact information for corporately supported locations.
- Provide Web sites that reference technical information pertinent to network design and technologies for research purposes and instructional purposes.

5 Design and Development

5.1 Budget

Since the main purpose of this project is to demonstrate knowledge and skills that I have acquired in the IET program, as well as in the IT workforce, the budget for the entire completion of this project was minimal. The development tools that were necessary to build this project were the same tools that were in class projects, thus requiring no additional out-of-pocket expenses. There was one additional piece of software that is used by Chiquita that was purchased by the IET Department to allow me to complete this project. The company for which I designed this project for also owns multiple licensed copies of the same tools that were needed to develop this project. If, however, this same project needed to be duplicated by an independent contractor, then these development tools would need to be purchased. A budget for single user licensed copies of each product used is listed in Appendix B. .

5.2 Timeline

Another essential aspect of this project is the schedule that I followed throughout the past year to successfully complete this project. A copy of this schedule and a list of tasks with their beginning and ending dates can be found in Appendix C of this report.

5.3 Software

The software used in the total development of this project included the following:

- Microsoft Windows NT Server 4.0
- Microsoft Windows Workstation 4.0
- Microsoft Internet Information Server
- Microsoft Visual Interdev
- Microsoft Office Suite
- Visio Enterprise 5.0

Microsoft Windows NT Server 4.0 is used as the server network operating system. The network operating system houses the Web server that the actual Web project runs on. There is a need to use a network operating system because the Web project is created on a client-server platform. In the client-server model, users run Web browsers to access information on Web servers.

Microsoft Internet Information Server (IIS) version 4.0 is used as the Web server. Microsoft IIS provides a high-speed, secure platform for publishing information on inter networks or on the Internet. IIS is designed to provide the kind of performance necessary for handling Web user's request and sending the necessary information back to the user's Web server.

For the development of this Web project, Microsoft Visual Interdev was installed on Windows NT Workstation 4. Visual Interdev can also be installed on the Windows 95 or Windows 98 operating system as well. Interdev allowed me to create HTML, Active Server pages, and provided database integration of the two.

I also used the software applications included in Microsoft Office 97 to complete this project. Portions of the information included in this project actually came from documentation that is created in Excel. Some of the documentation used is extracted

from Excel into Microsoft access to create a database. Microsoft Word is used for word processing.

Many of the network diagrams compiled in this report were created in Visio Professional version 5.0. The network diagrams included in the project were created by the members of the Chiquita Telecom team, including myself, to have a visual picture of what the network equipment and protocols in production on the network.

5.4 Hardware

There were two computers needed to create this project. The first computer is used as a server and the second is used a workstation. The server, being the most powerful version machine housed the Web server. The development tools were installed on the workstation.

6 Proof of Design

6.1 Former Method

Having being a member of the Telecommunications team, I observed the method by which information is accessed and exchanged. During this period of observation, the Senior Telecommunications Engineer left the company. I made even closer observations of how a lot of the information that this engineer possessed was not known by the other team members and that it usually had to be hunted for. Finding some of this information was time consuming and frustrating, therefore, I took on the responsibility of organizing this information myself. During this same period I also began my senior design project and decided to integrate them. After making this decision I decided to take a blind survey of the other six members of the team so that I could present this information to my

direct manager and convince him into letting me make this an on the job project as well. . A sample of the survey can be found in Appendix D.

6.2 Product Testing

After completing the design prototype, which I presented in Senior Design II, I had the project tested by the Telecommunications team members and the Director of Telecommunication. I met with each team member individually for about 20 minutes, gave each of them a presentation of the functionality and navigational structure, and also requested that they give their input on changes and additional features that need to be make. The team concluded unanimously that the Web site would definitely improve efficiency by allowing access all of the team's documentation in one centralized location from anywhere on that the company's LAN. A copy of this survey can be found in Appendix E. The members of the team found that they could access a lot of the information necessary for technical support and new project design by simply navigating through a Web site instead of locating a particular team member to find information related to a project in which they were not involved. They also saw the value of being able to easily access technical information about the current network infrastructure. This was valuable for their review, new team members/contractors that would join the group on a temporary basis, and for easing corporate presentations that required the break down of implemented network technology.

After compiling the results from the second survey, I presented them along with the Web project to the Director of Telecommunications. He also favored the Web site because he was not able to access information about his network without having to hunt his team members down to get a simple piece of information. Although he would not

need to access the site on a regular basis, he was convinced that this would definitely increase the efficiency of his team members, thus improving network management.

6.3 Sample Survey

Before beginning the project, I recognized a great need for centralizing the network documentation and creating a platform that would be easy to access. This need was in reference to the current method in which we were using manage network information. In addition, I submitted a brief survey to my team members to get their opinion. A sample of this survey can be found in Appendix D.

6.4 Pre-Development Survey Results

After observing and assessing the need for a centralized source for accessing network information, I surveyed the other team members. The first part of the survey addressed the current method on accessing and sharing information pertinent to daily job functions. Figure 6.4.1 shows a chart of the results.

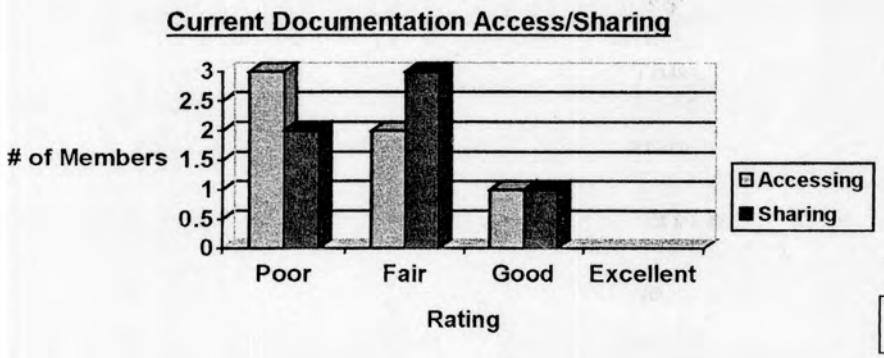

Figure 6.4.1

Of the six members surveyed, three felt that the current method for accessing documentation was poor, two felt that it was fair, and only one rated it as good. Of the six members, two that information was shared among each team member poorly, three

stated fairly, and only one felt that information was shared well. There were no ratings of excellent. One thing that was unanimous and is illustrated in Figure 6.4.2 was that everyone felt very strongly about the centralization of information.

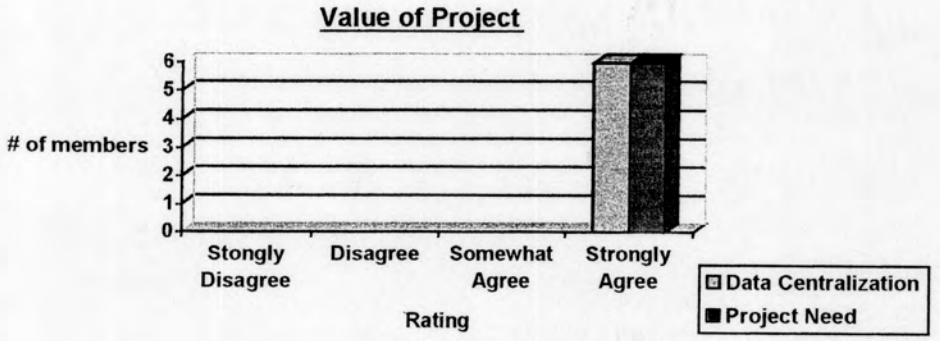

Figure 6.4.2

The last part of the second survey included the team members' thoughts on their increased productivity and on resolving network outages. The results are as follows in Figure 6.4.3.

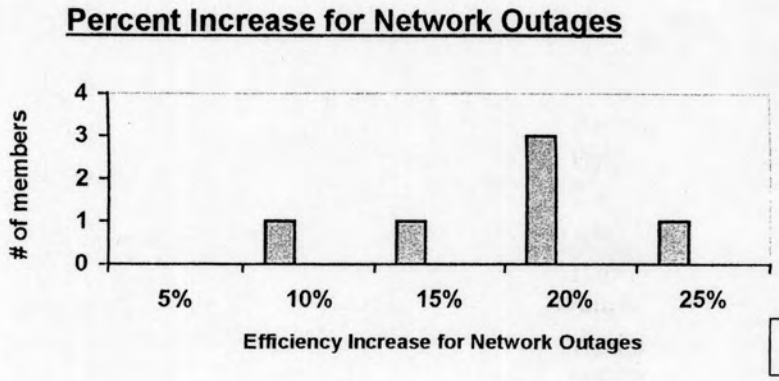

Figure 6.4.3

All team members felt that this project would increase their ability to resolve network outages quickly and decrease network downtime. Four stated that their productivity in resolving network outages would increase at least 20%.

6.5 Prototype Testing Survey

After testing the prototype, the members of the Telecom team were surveyed again. The results of the testing of the prototype let the entire Telecommunications team to a unanimous decision. They agreed that the Web project was a much more efficient method of accessing their network documentation and would provide better network management. Figure 6.5.1 below shows the results of the survey.

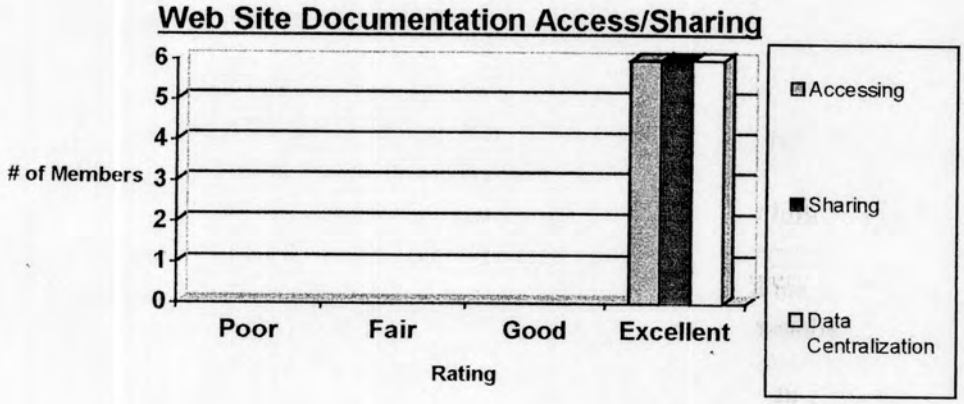

Figure 6.5.1

Conclusions and Recommendations

7.1 Review of Objectives

The purpose of this project is to meet or exceed the objectives that were defined in the initial planning stages. The objectives of this project were:

- Provide authentication for only authorized users.
- Allow users to access network diagrams by pointing and clicking on desired location.
- Centralize vendor and local exchange carrier contact information for technical support and new purchase purposes.
- Allow users to access wide area network node and circuit information.

- Centralized access list of site contact information for corporately supported locations.
- Provide Web sites that reference technical information pertinent to network design and technologies for research purposes and instructional purposes.

My project met all of the above objectives. These features can be viewed by accessing the Web site. They will also be demonstrated during the final Senior Design presentation. I consider this project to be successful. The feedback that I received from my colleagues both verbally, and by their surveys supports this. The Director of Telecommunications for Chiquita Brands International saw this project as a major stepping-stone toward increasing the efficiency of his workers and the management of Chiquita's Global Wide Area Network.

7.2 Further testing

In order for this project to go into its final development states there is work that needs to be done. First of all, instead having an initial login page, all of the authentication would need to be done using their Web Server to make this a secured site. This authentication would not come in the form of a script such as I wrote, but it would come in the form of Chiquita authenticating it on their platform using the security standards as are set forth by LAN administrators at the company.

Furthermore, in order for this project to go into full production, there would have to be an individual on the Telecommunications team that would be dedicated to keeping the site updated with all of the latest files and projects. This is because most of the members on the Telecommunications team have no knowledge of Web development. Their expertise is in network connectivity, not applications development. Since this site

is developed exclusively for the Telecom team at corporate headquarters, additions have to be made in order to integrate the other members of the telecom team that are in tropical locations.

References

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7. Stroo, Eric Anne Taussig. Microsoft Visual Interdev 6.0 Programming Guide. Washington: Washington: Microsoft Press, 1998.

Notes

This project and its content contains information that is to be specifically used for the purpose of its intents. The two purposes that this document, the Web project, and any content affiliated with it are to serve as follows:

1. Completion and Evaluation for Senior Design requirements set forth to comply with graduation standards from the University of Cincinnati's College of Applied Sciences Information Engineering Technology program.

2. Use by the Telecommunications Team at Chiquita Brands International's Corporate Headquarters for purposes of network management and/or any job function affiliated therewith.

This document and or the Web site that it pertains to are not to be duplicated or viewed by or for anyone else that does not pertain to the two above criteria.

Appendices

Appendix. A Topics of Investigation

In Senior Design I originally planned to create a project management system that consulting firms, consultants, and the contracting company could use to monitor the status of project. This was to be accessible to the consulting firm, the contractor, and the company contracting the work out. This system was to be targeted toward Information Systems departments so that it will ensure a more powerful method of project management. After investigating the following questions, I found that the project would not be feasible.

1. What problems have occurred in the past concerning the record keeping methods?
2. How do consulting firms currently keep track of their employees' time spent on projects?
3. How do consultants currently present this information to their employers and their clients?
4. How do often do they present this information?
5. How does the perspective contractor and client keep track of their project budgets?
6. How are project deadlines and important dates tracked?
7. What other tools are available to track this kind of information?

Appendix. B Software Budget

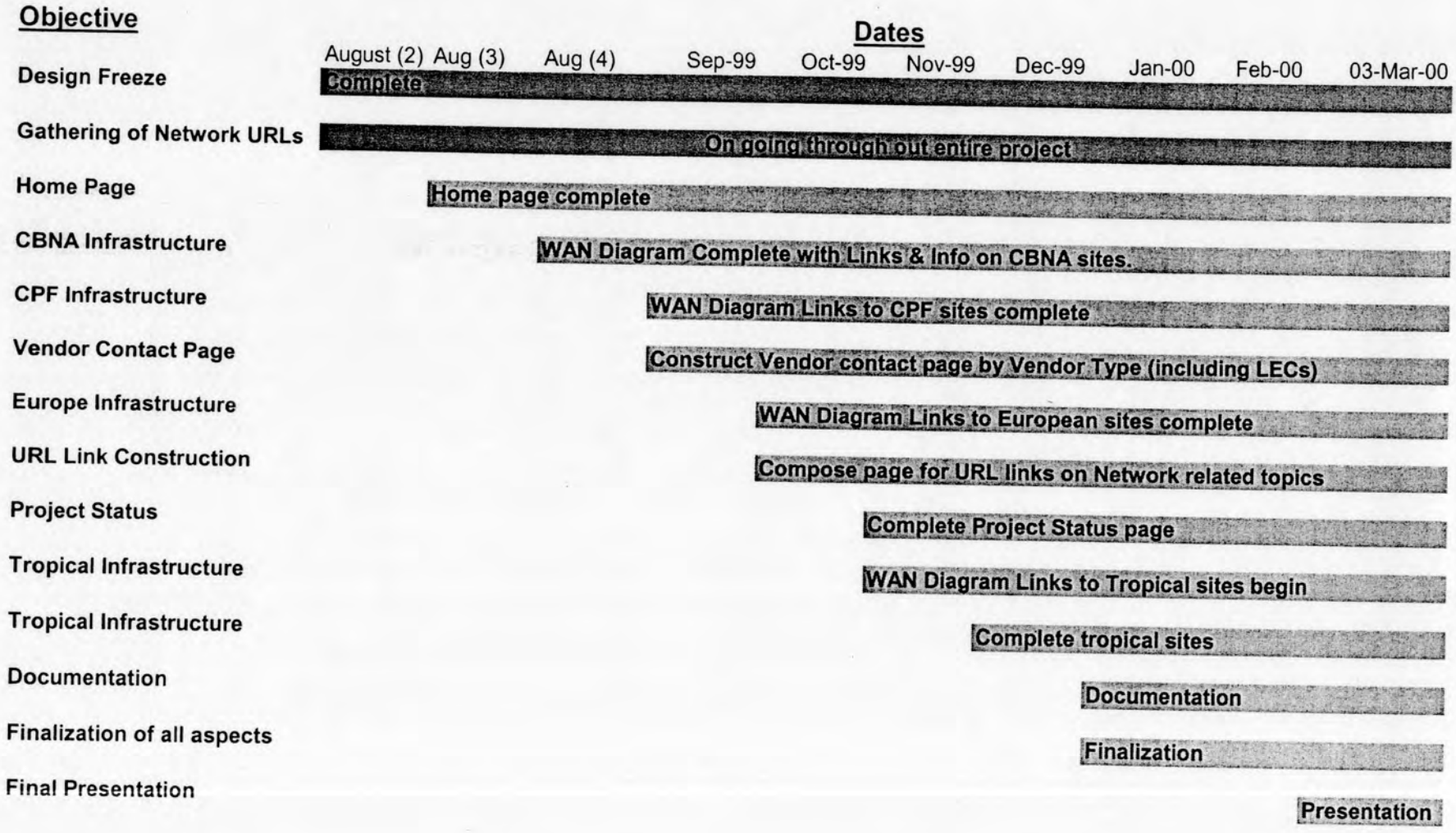
The following is a list of the software applications used to develop this project. Since most of these applications were used as a part of the Information Engineering Technology curriculum, the IET depart had them already installed on the PCs in the IET lab. This budget is provided to show the cost affiliated with this project had the IET department not owned licensed copies of them.

Software Package	***Single User Cost***
Microsoft Windows NT Server 4.0	**599.99.**
Microsoft Windows Workstation 4.0	**281.99**
Microsoft IIS 4.0	**289.99**
Microsoft Visual Interdev	**483.99**
Microsoft Office Professional	**329.95**
Visio Enterprise 5.0	**387.95**
Total Software Cost	**2373.86**

Appendix. C Project Time Line

Following Page

Telecommuncations Network Management Web Site Timeline



Appendix D. Pre-Project Survey

Accessing Network Information/Documentation

1. **How would you rate our current method of accessing information such as contacts names, numbers, addresses, equipment information for technical support purposes during network outages.**

   1.Poor 2. Fair 3. Good 4. Excellent

2. **How would you rate the method in which the information is shared willingly or unwillingly.**

   1.Poor 2. Fair 3. Good 4. Excellent

3. **How strongly do you agree that this information is needs to be centralized for all members to access.**

   1.Strongly Disagree 2. Somewhat disagree 3.Somewhat Agree 4. Strongly Agree

4. **Do you think that this would be a valuable project for someone to began to work on during spare time.**

   1.Strongly Disagree 2. Somewhat disagree 3.Somewhat Agree 4. Strongly Agree

5. **If this project was thoroughly completed, what percentage of time do you think that it would increase your overall productivity in resolving network outages.**

   1. 5% 2. 10% 3. 15% 4. 20% 5. 25%

Appendix E. Post Prototype Survey

Web Project Evaluation Survey

1. **How would you rate the ease of use of this Web site versus the current method of accessing documentation.**

   1.Poor 2. Fair 3. Good 4. Excellent

2. **What impact do you feel this site will have on the sharing of information/documentation?**

   1.Poor 2. Fair 3. Good 4. Excellent

3. **How well would you rate the centralization of data found in this Web site versus the current method.**

   1.Poor 2. Fair 3. Good 4. Excellent

4. **List any changes or additions that you would like to see in the site.**