# Resident's Intranet

By

David Menifee and Mario Davison

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
College of Applied Science

March 2001

# Resident's Intranet

## Signature / Acceptance

By

David Menifee and Mario Davison

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



David Menifee Mario Davison — 03-28-01
Author: David Menifee and Mario Davison — Date

[signature] — 3/28/01
Faculty Project Advisor — Date

[signature] — 3/28/01
Department Head — Date

# Acknowledgements/Dedication

The project would not have been completed without the personal and professional support of family, friends and colleagues. In preparing this project, we have been thankful for the research assistance, insight and expertise of Ronald A. Cherry, Steven D. Taylor and the IET Faculty.

# Table of Contents

# List of Illustrations

# Abstract

After decades of research, a global electronic system of receiving and analyzing data has changed the way businesses interact with each other. Society has evolved from the Industrial Age to the Information Age. The evolution of the Information Age started with the advent of the Internet. All aspects of business transactions, marketing, and electronic cash (E commerce) must adhere, and conform to the new status quo or face competitive elimination. Apartment owners such as Cincinnati Metro Housing Authority (CMHA), and Metro Prop Reality, use manual systems for business transactions. With the utilization of current technologies (i.e.GUI interfaces, databases, routers, switches, MS Exchange, IIS 4.0, Cluster Server technologies), apartment owners can simplify resident support, thus resulting in a profit for the apartment owner, and customer satisfaction.

## 1. Statement of the Problem

Metro Prop Realty, Cincinnati Metropolitan Housing Authority (CMHA), and countless other large-scale apartment owners use a manual system to process rental information, and maintenance calls. This manual system has caused many condominium and large apartment complex owners to lose customers and suffer a depreciation in their properties. The current manual systems used by existing apartment owners are inefficient.

Currently, condominium and large apartment complex residents can only voice their concerns by phone, or in person. This type of communication can be inconvenient and time consuming. Information Technology has lead to many innovations to help assist in trouble reporting, and increased sales volume.

Approximately 70% of all low-income people live in urbanized setting, and lack adequate Internet connectivity. Current large apartment complexes such, as the Huntington, Metro Prop Realty, and CMHA housing do not have the physical infrastructure to accommodate a network system. Therefore, low-income people who do own a computer, must either choose a cable modem solution or rely on a slow 56k connection which often does not work.

Currently 90% of all ISP customers reside in suburban areas. A study conducted by Sharon Thompson (Information Week Magazine), showed that minorities spend 5 billion dollars a year. The study also showed that minorities spend 70% of their time watching TV, or seeking some form of entertainment. ISP's have not taken advantage of the minority dollar, which constitutes a huge consumer base. If this segment of the population is marketed to strategically, a great deal of wealth can be generated for ISPs.

As a result of the manual trouble reporting, and the customer maintaining the system, the following business problems have been identified for landlords.

- Landlords have a bad attribution rate of keeping customers.
- Current ISP companies, who compete for suburban customers, have not capitalized on the low-income dollar, consequently losing a potential 2 billion dollars in yearly revenue.
- Landlord apartment information is not automated.
- Current apartment facilities lack the infrastructure to accommodate a network installation.

## 2. Review of Literature

According to John Chambers, CEO of Cisco System, "the need to provide Internet connectivity to American communities should be the number one task of the ISP companies." Bill Gates stated, "if America fails to educate its low-income community in the science of Information Technology, then America will be producing a prison generation, and become less competitive with foreign countries." IT companies have resorted to using HP-Visas to attract computer science professionals. "We are witnessing the wholesale disappearance of work accessible to the urban poor," concludes Milton J. Little, Jr., executive vice president and chief operating officer of the National Urban League. His view was confirmed in 1996 by Harvard sociologist William Julius Wilson in *When Work Disappears: The World of the New Urban Poor*. There will be a need to educate low-income people in computer science, and math. The next illustration shows the percent of individuals who own a computer based on income.

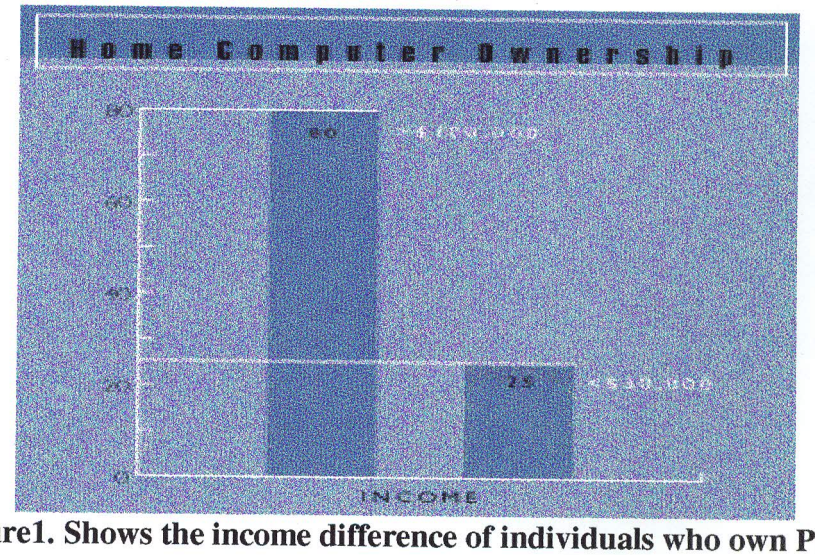


**Figure1. Shows the income difference of individuals who own PC's.**

The problem is even worse than the numbers suggest, says Karen Coyle, an IT manager for the University of California and activist with Computer Professionals for

Social Responsibility. Coyle says that many home computers counted in these surveys go unused because people don't have enough support or training. In short, the catalyst for learning in the Information Age is the Internet. The Internet has started a new revolution in retrieving, and processing raw data.

**3. Description of the Solution**

The scope of the Resident's Intranet system is two NT 4.0 servers running Microsoft Cluster Server Phase1, IIS 4.0, Exchange Server 5.5, Citrix Terminal Server, and Citrix Meta frame 1.8. The proposed system will process customer maintenance orders with an on-line Web based system. In addition, the system is capable of offering residents free applications, such Office 2000, and free email hosting (ex. bjohnson@apartment.com).

The proposed system will provide fault tolerance for the Resident's Intranet web page and the Email Exchange Server using Microsoft Cluster Server Phase 1 (MSCS). MSCS is software that allows two or more nodes (computers) to connect together in such a way that they behave like a single computer. The two-node cluster is generally described as a high-availability solution for use in those situations where a standalone server is simply not reliable or powerful enough to meet the 24 * 7 requirements of an organization such as a bank. MSCS in theory provides some 99.9X percent of system and resource uptime. The high-availability in a two-node configuration is realized via running instances of critical applications on both Cluster Servers. When one node becomes unavailable or its responsiveness slows (usually due to an outage), the surviving node automatically starts up its copy of that particular application and prepares to take over the workload and user connections from the failed node. This process can take tens of seconds to several minutes, depending upon the type of application and its network resources. In short, the Resident's Intranet system will be remotely managed, so MSCS software will be needed to automatically move the Resident's Intranet web site and email server from the failing node without user intervention. The following picture shows the Cluster Server creating an alias for the web site, which is node-1.

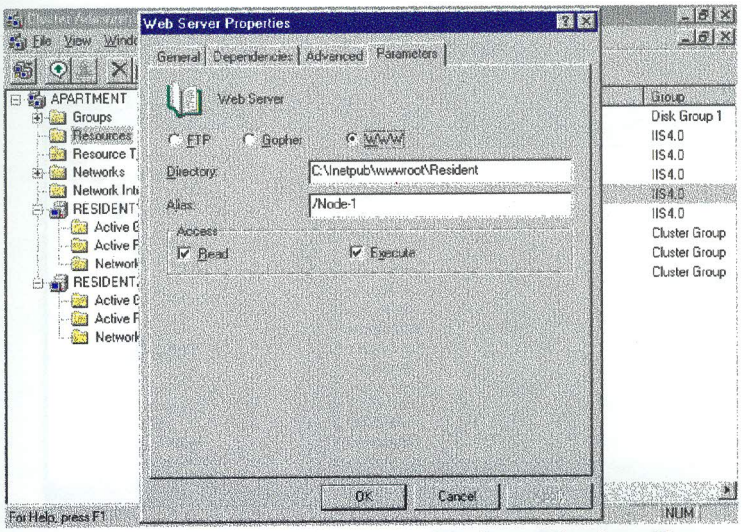


**Figure2. Cluster Server creates the web site alias.**

IIS 4.0 will host and provide security for the Resident's Intranet web site. IIS 4.0 provides administrators with the ability to manage the Web server or individual Web sites remotely from any Web browser that supports frames and JavaScript. IIS will be integrated with our Cluster Server to provide custom failover capabilities. With the failover capabilities, we can host two separate web sites on two separate servers, and provide failover support for both web sites. If one server fails, the other takes over. This provides customers with a reliable means of ensuring web site "uptime" in the event of a hardware failure. In addition to the failover feature, when any entity on a network attempts to access a secured resource, it must present the right credential to the controller of that resource in order to gain access. Presentation of credentials can be a very subtle process, completely hidden from the user and requiring no user interaction. Or it can be a totally interactive process where the network user must indicate a valid username, password, and (in the case of NT-based networks) the network domain to present the credentials to. The next illustration shows IIS 4.0 hosting the alias, which is node-1.

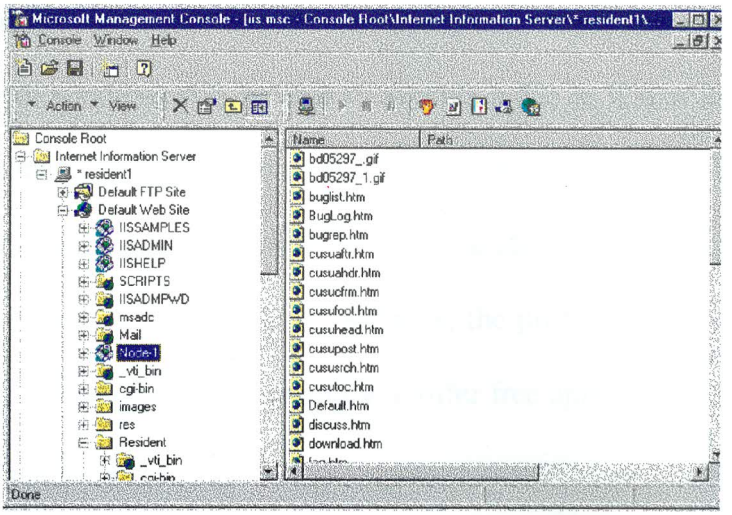


**Figure3. IIS 4.0 hosting Cluster Server alias.**

The Resident's Intranet Email Exchange Server will make extensive use of email because it is reliable, and flexible. Hosting resident mailboxes using Microsoft Exchange Server is reliable, because it supports the Microsoft Cluster Server technology, providing single-node fail-over support in the event of software or hardware failure. In addition to being reliable, it gives the administrators flexibility to create virtual organizations by creating multiple address containers within the Global Address List and preventing users from viewing any container other than their own. This allows multiple organizations to be hosted securely on a single server.

Citrix Terminal Server and Metaframe 1.8 give the residents the capability of running any application on any device with any connection, wireless to Web. Citrix is the pioneer and market leader in application server computing, a model that centralizes the execution and administration of applications on a server, and allows multiple users to access them over a network. Citrix technology delivers a comprehensive application server solution that comprises application servers and supporting services. Citrix enables creation of an Internet portal through which users can subscribe to and receive

applications based on organizational policies. Citrix will benefit the Resident's Intranet system, because the residents will be able to execute a file as if it is installed on their machine. For example, a resident would not have to install Word 2000 in order to use it. Instead the user would just open the ICA client and click the Word 2000 icon. After that step, the Citrix Server will handle the security, the profile and the application. In short, Citrix Server will give us the capability to offer free applications to the residents, which save the residents at least $300.

### 3.1 User Profile

It is assumed that the users of the Resident's system are not completely computer literate, especially those a part of the older generation base. Statistically, older people are more likely to be computer illiterate. It is therefore assumed that the typical user of the Resident's Intranet system will be a young adult between the age of 25 and 35 or an adolescent between the age of 12 and 19.

A good analysis cannot be done if one does not examine the notion of population deferentially based on income, status, race, and education. It is assumed that most of the residents will reside in large apartment complexes. The residence system will accommodate the user community by providing them with a complete online service that meets customer complaint, and rental application requirements. Users in suburban areas will consist of a plethora of ethnic groups who constitute the middle class base. Usually these users will live in large town house communities, or condominiums. The residence system will cater to this customer base, by providing them with adequate bandwidth for work, and a user-friendly web hosting system. Resident's Intranet will also prove to be cost effective for residents.

### 3.2 Design Protocols

The Resident's Intranet site was designed to be user friendly. The Intranet site has clear hyperlinks such as home, what's new, bugs, frequently asked questions, suggestions, download, discussion, and search. The illustration below is the site diagram.

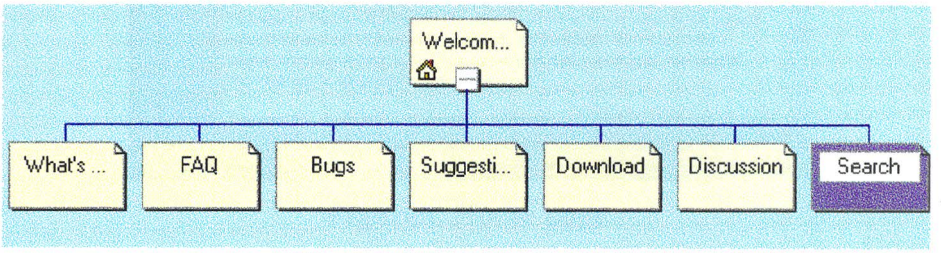


**Figure4. Site Diagram**

The home page has a white background and a light cloudy blue border, which is easy for the eyes to view. The light blue border gives the impression of a cloud that reminds the users that they are communicating over the TCP/IP Internet, which exemplifies a cloud. Once a hyperlink is clicked it turns from blue to red to let the user know that the link has just been visited. At the bottom of every page we have the administrator's email address that the user can click to submit questions in email format. If the questions need to be answered immediately, we have a 24 * 7 contact number, where the administrator can be contacted. The next exhibit shows the home page.

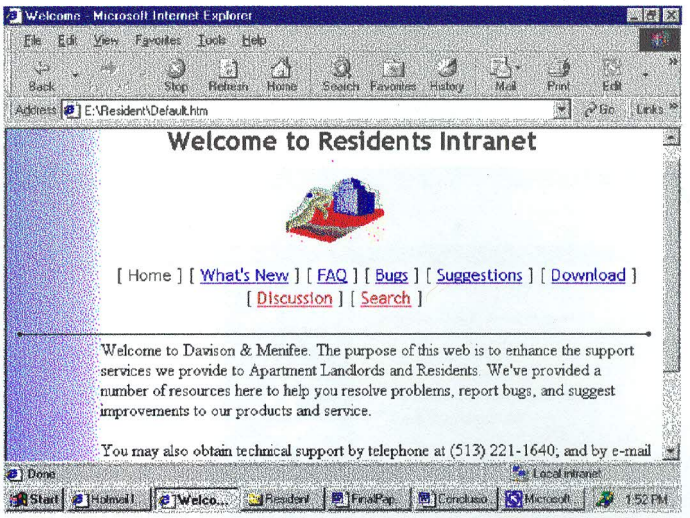


**Figure5. Home page**

The what's new web page displays an up-to-date listing of enhancements to our Resident's Intranet support system. We have also place notices there regarding product updates, scheduled releases, or problems and work-arounds that may affect residents. When bugs reported by our landlords or residents are resolved, we'll notify our users with an estimate of when the fix will be shipped. Our bugs web page is for residents experiencing problems with a software product. This page asks the user what version of software they are using, operating system, description of problem, their name, phone number and email address. The results are submitted to a bugs html page that can be viewed only by the landlord or administrator. The page prompts the administrator or landlord for their username and password, which is stored in NT Server user manager for domains. The faqs page contains answers to common questions handled by the administrator, along with some tips and tricks that might be useful. Examples of these common questions are "Where can I find software drivers?" where we direct the user to http://www.download.com/. The search page contains a search engine where the user can search our whole Intranet site for information. The download page contains links to files that we made available for HTTP download. The files we have included so far are

WinZip, the ICA 32bit client, and set of file format descriptions. The illustration below, demonstrates our download page.

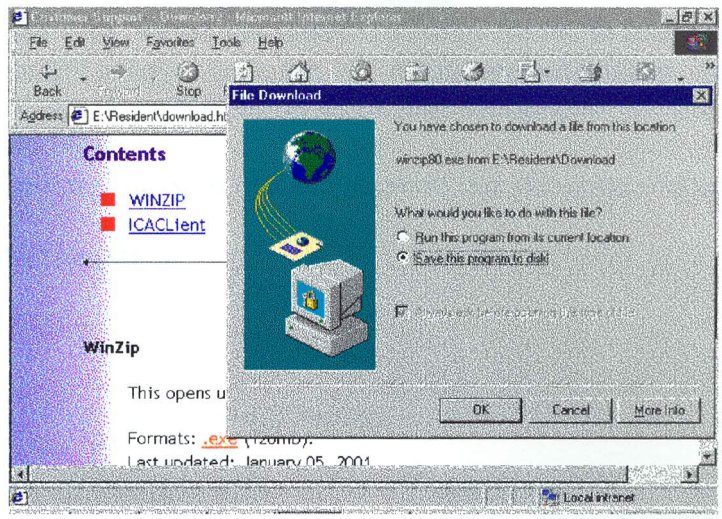


**Figure6. Download Page**

The discussion page contains a discussion group where residents can post articles about problems they encounter, or tips and tricks that other users might want to know about. Administrators and Landlords will be tuned in to this discussion as well, and will reply to questions posted there. The next exhibit is the discussion's web page.

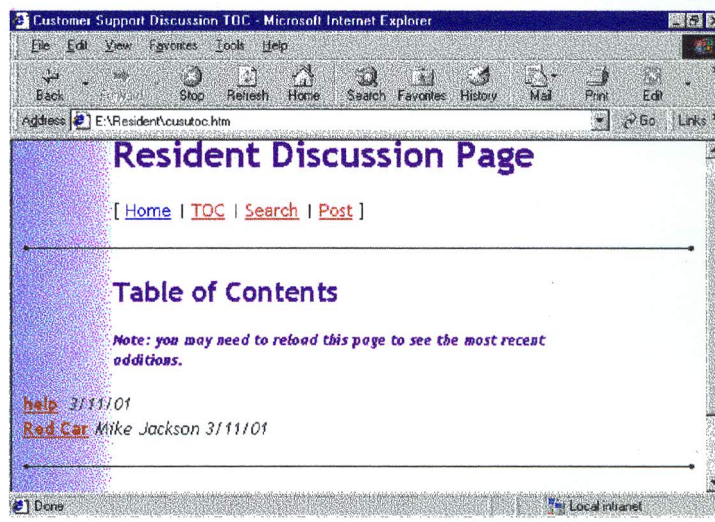


**Figure7. Discussion Page**

## 4. Objective of the project ("Deliverables")

- Create a website, so residents can submit complaints or comments.
- Provide free email addresses to every resident
- Ensure that the Web Server and Email Exchange Server is fault tolerant.
- Developed an ISP solution utilizing, NT 4.0 Enterprise Edition, Exchange Server 5.5, IIS 4.0, Citrix Terminal Server 4.0, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase 1.
- Develop a theoretical design that can improve our pre-approved solution.

## 5. Design and Development

### 5.1 Budget

| | |
|---|---|
| • Two IBM Netfinity 5600 NT 4.0 Servers. 1 GB RAM, 20 GB hard drive, DLT tape backup, Pentium 900. | $20,0000 |
| • Cisco Catalysts 35000 switches | $900 will be determined by customer needs |
| • Cisco Catalysts 5000 switches | $4000, will be determined by customer needs |
| • Cisco 2621 router | $1300 |
| • Cisco 3600 router | $4000 |
| • CAT 5 cabling | $90 dollars a drop, will be determined by customer needs |
| • T-1 circuits | $700 a month |
| • T-3 circuits | $3000 a month to Oarnet POP |
| • MS-software, and licensing | $10,000 |

## 4. Objective of the project ("Deliverables")

- Create a website, so residents can submit complaints or comments.
- Provide free email addresses to every resident
- Ensure that the Web Server and Email Exchange Server is fault tolerant.
- Developed an ISP solution utilizing, NT 4.0 Enterprise Edition, Exchange Server 5.5, IIS 4.0, Citrix Terminal Server 4.0, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase 1.
- Develop a theoretical design that can improve our pre-approved solution.

## 5. Design and Development

### 5.1 Budget

| | |
|---|---|
| • Two IBM Netfinity 5600 NT 4.0 Servers. 1 GB RAM, 20 GB hard drive, DLT tape backup, Pentium 900. | $20,0000 |
| • Cisco Catalysts 35000 switches | $900 will be determined by customer needs |
| • Cisco Catalysts 5000 switches | $4000, will be determined by customer needs |
| • Cisco 2621 router | $1300 |
| • Cisco 3600 router | $4000 |
| • CAT 5 cabling | $90 dollars a drop, will be determined by customer needs |
| • T-1 circuits | $700 a month |
| • T-3 circuits | $3000 a month to Oarnet POP |
| • MS-software, and licensing | $10,000 |

**5.2 Timeline (task and schedule)**

| Senior Design I | April | June | |
|---|---|---|---|
| Subject | Start Date | Ending Date | Time Allowed |
| Researched topic | 04/01/00 | 04/31/00 | 29 days |
| Proposal | 05/03/00 | 06/03/00 | 30 days |
| Discuss and approved project with Mr. Steven Taylor, Director of Information Technology, MCSE, CCNA | 04/09/00 | 04/11/00 | 2 days |
| Oral presentation | 05/24/00 | 06/05/00 | 11 days |
| Senior Design II | June | August | |
| Project Feasibility | 05/24/00 | 08/01/00 | 66 days |
| Read Citrix Exam Cram | 08/25/00 | 10/30/00 | 65 days |
| Installed NT 4.0 Enterprise Edition | 05/29/00 | 05/29/00 | 3 hours |
| Installed Exchange Server 5.5 | 06/10/00 | 06/10/00 | 3 hours |
| Read Exchange 5.5 Exam Cram | 05/01/00 | 08/01/00 | 90 days |
| Configured Exchange Server | 06/15/00 | 07/10/00 | 25 days |
| Read IIS 4.0 Exam Cram | 05/01/00 | 08/01/00 | 90 days |
| Read Cluster Book | 06/01/00 | 07/20/00 | 50 days |
| Installed and Configured Microsoft Cluster Server Phase 1 | 07/12/00 | 07/28/00 | 16 days |
| Prototype Complete! | 07/01/00 | 08/25/00 | 53 days |
| Senior Design III | October | March | |
| Started implementing Citrix at Blue Chip | 10/29/00 | 11/25/00 | 26 days |

| | | | |
|---|---|---|---|
| Broadcasting. (Installed Terminal Server 4.0 and Metaframe 1.8 on one Server. | | | |
| Installed and configured the ICA Client on 15 machines. | 11/15/00 | 11/19/00 | 4 days |
| Tested Citrix | 11/20/00 | 11/25/00 | 5 days |
| Finished Setting up Citrix | 10/29/00 | 11/25/00 | 26 days |
| Designed, and tested Resident's Intranet web site. | 11/01/00 | 11/27/00 | 26 days |
| Installed and Configuring IIS 4.0 | 11/30/00 | 11/30/00 | 5 hours |
| Talk with Mr. Ron Cherry, Sr. Network Support Specialist, about ISP development, and installation parameters. | 12/05/00 | 12/05/00 | 1 day |
| Decided to add a 2600 router and 3500xl switch to the project | 12/06/00 | 02/06/01 | 60 days |
| Surveyed apartment residents at Four Towers complex | 01/15/01 | 01/16/01 | 1 days |
| Tested final project | 02/10/01 | 02/20/01 | 10 days |
| Prepared for final presentation | 03/01/01 | 03/12/01 | 11 days |
| Completed final paper | 02/01/01 | 03/09/01 | 38 days |

**5.3 Software**

The implementation of the Resident's Intranet System has exposed us to Microsoft Exchange Server 5.5, Internet Information Server 4.0, Citrix Terminal Server, Citrix Metaframe 1.8, NT Server 4.0 Enterprise Edition, Microsoft Cluster Server Phase 1, and

FrontPage 2000. All of the software requires licenses, so the software was used for senior design purposes only. The main software tool used to create the website was Microsoft FrontPage 2000. Microsoft FrontPage is fast and an effective way to create a professional Intranet site. Since FrontPage generates the code automatically, it was very easy to create the Resident's Intranet web site. The FrontPage web page generator helped us quickly organize our Intranet site, ensuring that all hyperlinks were connected. In short, Microsoft FrontPage was the main software tool used to meet the deliverable deadline for the Resident's Intranet web site. The free software helped us meet the deliverable deadline. In short, we used the used the specified software, because it was donated by the IET Faculty.

**5.4 Hardware**

We used two Pentium II machines and two hubs to create the test-bed for the senior design project. The Pentium II machines were 233MHZ, with 64MB of RAM. In addition, each machine had two network interface cards to connect the servers to an Internal and External network. The hubs were two four-port NETGEAR hubs. One of the hubs's connected the two machines to Road Runner's external network and the other hub connected the two machines for Internal communication only. The Internal network used an IP address that began with 192.168, which is non routable, while the External network used an IP address of 65.27, which is routable. We needed two networks, because Microsoft Cluster Server requires static IP addresses, which meant we could not use Road Runner because they assign their IP addresses automatically using DHCP(Dynamic Host Configuration Protocol- service enables automatic assignment of

TCP/IP addresses). In short, we used the used the specified hardware, because it was donated by the IET Faculty.

The hardware installed at the customer sight will be determined by the specific customer needs. Our system can be marketed to apartment complex owners such as CMHA, Metro Prop Realty, or to individual customers, such as Key Bank, Madeira School District, or a startup business needing Internet connectivity. Our ISP network schema will have a Cisco 3600 router; with T-3 inverse multiplexed via the TCP/IP cloud to customer sites, and an OC-3 to a commercial ISP i.e. Oarnet, or UUNET.

## 6. Proof of Design

The installation, and the theoretical design of an ISP are the key deliverables of the Resident's Intranet Senior Design Project.

The Installation consisted of installing NT Server 4.0 Enterprise Edition, Exchange Server 5.5, IIS 4.0, Citrix Terminal Server, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase1. In addition, the installation also consisted of installing a Cisco 2621 router at Raymond Walters College, and a 3500XL frame switch.

We were able to automate the way that residents can submit complaints using our Web Site. On the homepage, there is a hyperlink that takes the residents to our suggestion page. Once the user hits our suggestion page, we explain to the resident that the purpose of the form is to give users a voice to recommend ways that the Resident's Intranet can be improved or just general comments. Once a user enters a category, subject and a complaint or comment, the user must click on the submit button so that their comments are processed. The results then go to an html page that can only be viewed by the apartment landlord or administrator. This page is secured using IIS 4.0 NT Challenged Response, which prompt the landlord for the username, password, and as shown below.

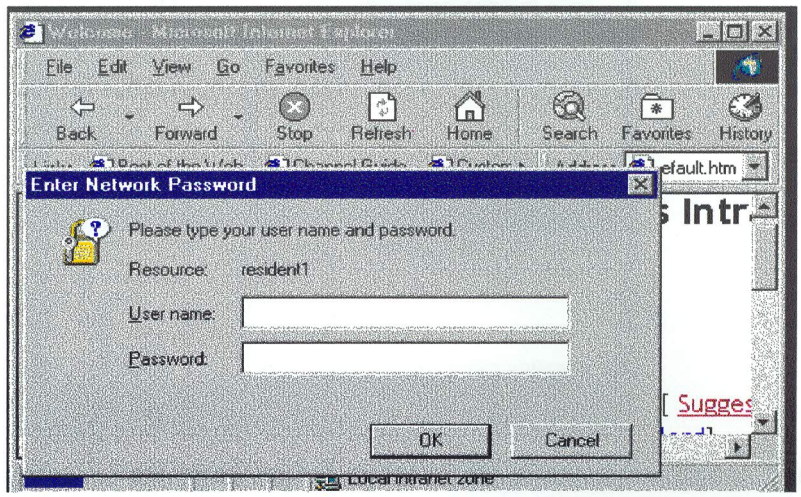


**Figure8. IIS 4.0 Security**

Exchange Server 5.5 has helped the Resident's Intranet System accomplish the second deliverable, which is to provide free email hosting for residents. Residents will now have their own email address at apartment.com. In addition to being reliable, it now gives the administrators flexibility to create virtual organizations by creating multiple address containers within the Global Address List and preventing users from viewing any container other than their own. This allows multiple organizations to be hosted securely on a single server. As one can see from the next illustration, Exchange Server gives the administrator the ability to create multiple recipient containers, such as landlords and residents.

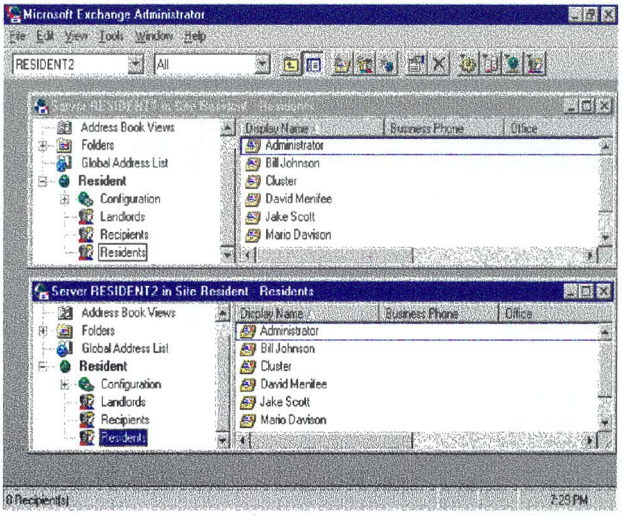


**Figure9. Resident1 and Resident 2 Replicated Exchange Servers**

We met our third deliverable deadline, which was to ensure that the Web Server and Email Exchange Server was fault tolerant by installing Microsoft Cluster Server Phase 1. With our Active/Standby cluster, the active node (Resident2) is online and operational while the inactive node (Resident1) sits in a "hot standby" mode waiting for any type of failure to occur on the primary node. Both nodes are active in respect to having formed a cluster, with essentially one being a duplicate of the other in terms of having instances of the same applications that will failover/failback residing on it. In this mode, the standby server should have been larger in memory and storage capacity because it is sized to take over the workload during failover. The standby node is only utilized in the event of a failure. To achieve this fault tolerance the standby node has IIS 4.0 and Exchange Server 5.5 up and running, just waiting for the other resources to transfer over during failover. The next figure shows the cluster server.

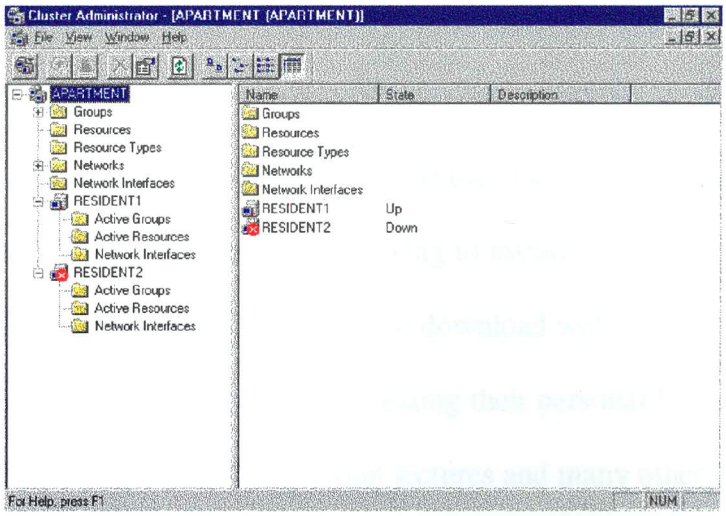


**Figure10. Resident1 detects Resident2 is down**

The fourth and most important deliverable was to developed an ISP solution utilizing NT 4.0 Enterprise Edition, Exchange Server 5.5, IIS 4.0, Citrix Terminal Server 4.0, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase 1. As it was previously stated, the software used in this project was loaned to us by the University of Cincinnati and Blue Chip Broadcasting, so as a result, we are not able to use this project again without purchasing software licenses. The utilization of this software has helped us bring all the features of the web site together. Residents can now submit a customer email address requests through our web site using the suggestions page and selecting customer support as the category. Once the administrator receives the request, the resident's mailbox will be created and then the user will be contacted and informed to view the Faqs page, which explains how to set up the assigned email account using Microsoft Outlook.

IIS 4.0 gave us the ability to host and secure the web site. When the residents attempt to access the web site, they are prompted to enter a username and password that will be assigned to all residents and reside in NT 4.0 Server as a user account. Forcing users to enter a password ensures that the suggestion, bugs, or discussion

page will have reliable and accurate information from current residents. It also helps us track logged in users.

Citrix Terminal Server and Metaframe give the user the option of using Office 2000 and other applications for free without having to install them. When the administrator downloads the ICA client from the download web page to the resident computer the resident then has the option of creating their personal homepage, a business web site, personal letters, PowerPoint lectures and many other Office 2000 capabilities.

Microsoft Cluster Server guarantees that the web site and email server will be up and running 99.9X of the time. If our active node fails the user will only have to wait ten seconds to several minutes before it automatically comes back online. Our Resident's Intranet System has reliability that will serve as an excellent insurance that a resident or landlord can work from home, if need be. In short, the utilization of NT 4.0 Enterprise Edition, Exchange Server 5.5, IIS 4.0, Citrix Terminal Server 4.0, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase 1 has helped us develop and improve our intranet site.

Our fifth deliverable was to provide a theoretical design to improve the pre-approve solution, which is the next illustration. This is the main ingredient of the Resident's Intranet system. This gives the system the capability to being marketed to large-scale apartment owners such as CMHA, Metro Prop Realty, or to individual customers, such as Key Bank, Madeira School District, and a startup business needing Internet connectivity. Due to the expensive price of Internetwork equipment, we were only able to learn part of our project at Raymond Walters College.

The next illustration (Figure11) is the system we would like to market to potential customers. The Cisco 2621 router is cost effective and is the industry leader in T-1, ISDN integration for large or small businesses. The Cisco 3600 router is an all-purpose router that can accommodate T-3 baseband circuits. The 3500XL switch can be managed through a GUI on the Internet, which gives us the capability to administer the switch anywhere in the U.S.A.

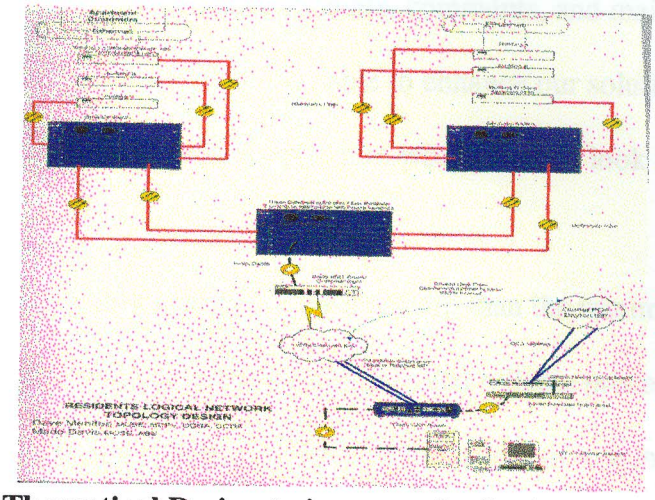


**Figure11. The Theoretical Design to improve the Resident's Intranet System.**

## 7. Conclusions and Recommendations

In conclusion, our pre-approved project was completed as of December 1, 2000. All objectives/deliverables were achieved. An effective ISP solution was developed utilizing Windows NT 4.0 Enterprise Edition, IIS 4.0, Exchange Server 5.5, Citrix Terminal Server 4.0, Citrix Metaframe 1.8, and Microsoft Cluster Server Phase 1.
An Intranet web site for apartment residents was created with Front Page with the functionality to allow residents to submit complaints, comments, and maintenance requests as well as get free mail. We were also able to enhance our solution by discussing and demonstrating what the infrastructure would need to look like to make this a project more valid.

For future reference we would recommend using more than the minimum manufacturer hardware requirements for more efficient and reliable processing. We also recommend that this solution not only be marketed to Landlords of low income housing, but all landlords who want to give their tenants a little extra added value.

# Appendix A.

Steps to Install NT Server 4.0

**The step below explain step by step the NT 4.0 Server Installation.**

1. Change the Bios boot sequence to (CD-ROM, A, C).
2. Save Bios changes and reboot the machine.
3. After a series of messages, the **Windows NT Setup** window appears and the system begins to copy files to the hard-disk drive.
4. Press <F6> when the following message appears:
   Setup is inspecting your computer's hardware configuration.
5. When the **Device Display** dialog box appears, highlight **Additional Devices** and then select **Other**.
6. When prompted, type s to load the drivers from the diskette onto your hard-disk drive, and then press <Enter>.
7. When prompted for the driver diskette, insert the SCSI driver diskette that you created in step 2 into the diskette drive, and then press <Enter>.
   Windows NT Server displays information about the drivers on the diskette.
8. Repeat steps 7 and 8 for each SCSI driver diskette you created in step 2.
9. Press <Enter> to continue.
10. When the Microsoft agreement appears, use <Page Down> to scroll through the agreement and then press <F8> to accept the agreement.
    You must accept the agreement to proceed.
11. Select the partition to install the operating system on.
12. Choose NTFS or FAT for the drive format or leave the current partition intact.
13. Specify the directory for the system files. Example (c:\winnt)
14. After setup is complete, reboot the system and follow the wizard.

# Appendix B.

## Exchange Server 5.5 Installation

**The following steps below, explain the Exchange Server Installation.**

- Verify that the Windows NT Server primary domain controller (PDC) is running.
- Ensure that messaging-aware applications are not running.
- Back up your existing installation if you are upgrading Microsoft Exchange Server, in case you need to restore your system later. You can use the Windows NT Server Backup utility to save directory and information store files to a tape drive while the server is online. For more information about performing backups and restoring data from tape backup, see *Microsoft Exchange Server Maintenance and Troubleshooting*.
- Use the Cluster Administrator program to verify that an appropriate cluster group has been created if you are installing Microsoft Exchange Server on a pair of clustered servers. The group must contain a network name, an Internet Protocol (IP) address, and a shared disk that is part of an external disk array. For more information, see "Installing Microsoft Exchange Server on Clustered Servers" later in this chapter.

**Note** Microsoft Exchange Server Setup installs the latest National Language Support (NLS) files available for Windows NT Server. To load the newest NLS files, you must restart Windows NT Server. These files load the ISO-8859 code page series, which provides improved mapping between Internet character sets and code pages.

Starting Setup

Before you can start Setup, you must log on to the Windows NT Server computer using a domain account that is in the local administrators group.

1. Insert the Microsoft Exchange Server compact disc into the CD-ROM drive.
2. Choose **Setup** from the Microsoft Exchange Server Setup page.

Choosing an Installation Type

Use the **Installation Options** dialog box to specify the type of installation (**Typical**, **Complete/Custom**, or **Minimum**) and the location of files.

| Installation Type | Components Installed |
|---|---|
| **Typical** | The Microsoft Exchange Server software and Administrator program. No connectors are installed. |
| **Complete/Custom** | As selected. You can install any and all available components, including certain connectors. |
| **Minimum** | Just the Microsoft Exchange Server software. No connectors are installed. |

**Tip** To remove items that you've previously installed, select the **Add/Remove** option and clear the check box for that item.

You can install any or all of the following components if you choose the **Complete/Custom** installation:

**Microsoft Outlook Web Access** Outlook Web Access is a Microsoft Exchange Active

Server application that enables users to access mailboxes, public folders, and the Address

Book from any Web browser.

Outlook Web Access must be installed on a computer running IIS with Active Server pages installed. This enables all available user authentication options. If Setup detects IIS during a **Typical** installation, Outlook Web Access is automatically installed. Clear the check boxes in the **Complete/Custom** installation to disable any options you don't want. Outlook Web Access and Microsoft Exchange Server do not have to be installed on the same computer. If you install Microsoft Exchange Server on a separate computer from the IIS or have multiple computers running IIS connected to another computer running Outlook Web Access, your user authentication options are limited.

Outlook Web Access requires the name of a Microsoft Exchange Server computer. If Setup is installing Outlook Web Access with Microsoft Exchange Server, it uses the name of the local Microsoft Exchange Server computer. If you are installing only Outlook Web Access, a dialog box opens, prompting you to type the name of the Microsoft Exchange Server computer.

**Microsoft Mail Connector and X.400 Connector** During Setup, you can install the Microsoft Mail Connector and the X.400 Connector. For more information about these two connectors (and connectors that you can configure after installing Microsoft Exchange Server), see "Setting Up Connections to Other Sites and Systems" later in this chapter.

**Microsoft Exchange Connector for Lotus cc:Mail** Setup installs the Lotus cc:Mail address generator and one-off template, even when the connector is not selected in the Setup program. If the Microsoft Exchange Connector for Lotus cc:Mail is selected, the address generator and template are enabled; otherwise, they are disabled.

**Microsoft Server Scripting Agent** Microsoft Server Scripting Agent supports folders with customized workflow applications. For more information, see Chapter 6, "Configuring Public Folders."

**KM Server** The KM server enables users to encrypt and digitally sign messages. For more information about installing KM server, see "Advanced Security Installation" later in this chapter.

Installing Microsoft Exchange Server on Clustered Servers

Microsoft Exchange Server runs on clustered servers to provide greater reliability in the event of hardware failure.

Microsoft Cluster Server uses cluster groups to organize system resources. A cluster group is a logical collection of interdependent resources that are used by various Windows NT services. A cluster comprises an active node and a secondary node. For Microsoft Exchange Server, the active node is the primary mail server that processes and routes messages on your network. If the active node goes down, or if a critical service on the active node fails, the secondary node takes its place without interrupting mail service or dropping client connections. This is called a *failover*.

**Important** The clustered servers on which you install Microsoft Exchange Server must have identical processors and the same amount of RAM.

You install Microsoft Exchange Server first on the active node, and then on the secondary node. After Setup determines that the active node is a member of a cluster, select the cluster group that contains the necessary resources. Microsoft Exchange Server requires a group that contains a network name, an IP address, and a shared disk. Setup

adds Microsoft Exchange Server *resources* (such as the system attendant, information store, and so on) to the group you select.

When you install Microsoft Exchange Server on the secondary node, Setup detects that Microsoft Exchange Server is installed on the active node. By updating the secondary node, you enable the active node to failover to the secondary node.

After you install Microsoft Exchange Server on each node, use Cluster Administrator to define the failover rules for Microsoft Exchange Server services. The failover rules define the events or conditions that trigger a failover to the secondary node.

For more information, see the Microsoft Cluster Server documentation.

Specifying the Compact Disc Key Number

The compact disc key is part of the longer Product Identification Number (PID). It uniquely identifies your copy of Microsoft Exchange Server and enables you to receive technical support. The compact disc key number is located on the back of the Microsoft Exchange Server jewel case.

- Type the compact disc key number provided with the product.

Specifying the Organization and Site

Setup prompts you to specify the site for the new Microsoft Exchange Server computer.

If you are installing the first server in a site:

1. In the **Organization and Site** dialog box, select **Create a New Site.**
2. Type the name of the organization and site.

If you are adding a server to an existing site:

1. In the **Organization and Site** dialog box, select **Join An Existing Site.**
2. In the **Existing Server** box, type the name of a Microsoft Exchange Server computer in the site you are joining.

If you are adding a server to an existing site, Setup uses the service account for that site by default.

**Note** Do not use an administrator account as the service account. The service account should be used only to validate services.

- In the **Site Service Account** dialog box, type the service account name and password. Use the format *domain\account*.

Completing the Setup Process and Running the Performance Optimizer

During the final phase of Setup, you are notified of the rights that you have been granted to access the system. Then Setup prompts you to run the Performance Optimizer, which analyzes your hardware configuration and tunes the server for optimum performance.

**Important** The Performance Optimizer is critical to the efficient operation of Microsoft Exchange Server. If you skip this step during installation, make sure you complete it before using the server.

- Choose **Run Optimizer**. Skip this step if you want to run the Performance Optimizer later.

# Appendix C.

## Installation for Citrix Terminal Server and Metaframe

**The following steps below, explain the Terminal Server and Metaframe Installation.**

1) Obtain the IBM PC Server RAID Device Driver and Utilities Version 2.00 by contacting IBM support.
2) Install Terminal Server following the directions in the Terminal Server documentation.
3) When prompted to auto detect mass storage controllers, press **S** to detect the Atapi Version 1.2 IDE CD-ROM controller.
4) Press **S** to configure additional SCSI controllers.
5) Expand the list of additional SCSI controllers, select **Other** (located at the end of the list), and press ENTER.
6) When prompted for a driver diskette, insert the IBM PC Server RAID Adapter Device Driver/Utilities diskette and press ENTER. The device drivers on the diskette are displayed. Select the IBM PC Server RAID Adapter driver and press ENTER to continue.
7) The Server RAID Adapter **must** be installed first or the installation process will hang.

# Appendix D.

## Installing IIS on a Clustered Server

During the initial installation of Internet Information Server 4.0 (IIS) onto a Microsoft Cluster Server, you normally begin installing IIS onto the first Node of the Cluster. Then you completely install IIS onto the second Node of the Cluster when prompted, and then you complete the installation of IIS back on the first Node of the Cluster.

- Make certain that the Cluster Server Service is STOPPED and set to Manual Startup before you proceed. You can stop the Cluster Server Service through the Services Applet in Control panel. You should also set the Startup Type for the Cluster Server Service to Manual.
- Run the Windows NT Option Pack Setup.
- Once the installation of the Windows NT Option Pack is completed you should restart the node you just installed onto.
- If you have Windows NT Service Pack 4 or greater on the system then you should reapply that Service Pack at this time and restart the Node again.
- You can now re-enable clustering on this Node. In the Services Applet in Control Panel chose the Cluster Server Service and click **Start**. Then change the Startup Type back to automatic.

# Appendix E.

**Steps to Create the ICA Client for Citrix**

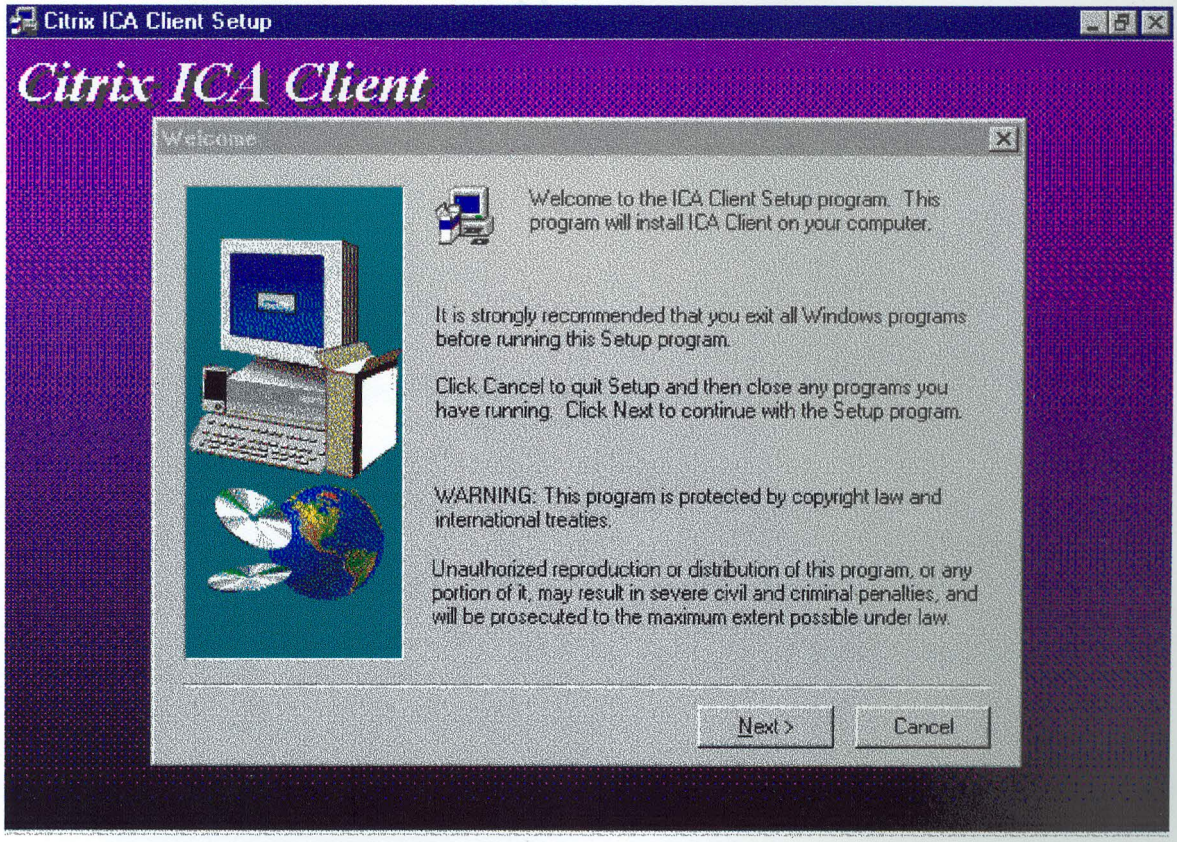


**Figure12. Setting up the ICA client for Citrix.**

On your MetaFrame server, click **Start**, select **Programs**, select **MetaFrame Tools**, and click **ICA Client Creator**. You need three diskettes for this operation:

- On the **Make Installation Disk Set** dialog box, click the desired Citrix ICA Client.
- Select the **Format Disks** check box to format the disks while creating the installation media.
- Click **OK**.
- When prompted, insert the setup disk in drive A (or other appropriate drive).
- Click **OK** to format the diskette and load the ICA Client on the diskette.

# *Appendix F.*

## Software Configuration for the 2621 Router

The Cisco IOS was written in C++ and most of the commands used to create files, directories, IP addressing on a JP-UX server, or Solaris server are used in the Cisco Internetworking Operating System (IOS). The bullets below are examples of Cisco IOS commands.

- Router# show startup-config
- Displays the router configuration stored in NVRAM.
- Router# show flash
- Displays the formatting and contents of flash.

Configuration of fast Ethernet ports on a Cisco router is done using the Interface method. To begin the process you must first go into configuration mode. Secondly You must assign the interface an IP address, and a routing protocol. The syntax for configuring an Ethernet interface is shown below.

- Router#config t
- Router (config-t)#int E 0/1
- Router (config-if)#IP address 129.137.0.0 subnet mask 255.255.240.0
- Router (config-if)rip version2
- Router# copy runn start

Before you begin to configure the ISDN BRI interface, you must first order a correctly configured ISDN BRI line from your local telecommunications service provider. The ordering process varies from provider to provider and from country to country. There are some general guidelines to follow. Ask for two channels to be called by one number. Next, request delivery of calling line identification, also known as caller ID or Automatic Number Identification (ANI).

If the router will be the device attached to the ISDN BRI line, point-to-point service and a data-only line will be required. ISDN BRI provisioning refers to the type of services provided by the ISDN BRI line. Although provisioning is performed by the

ISDN BRI service provider, it is still required that you tell the provider what you want. Some service providers assign service profile identifiers ( SPIDS) to define the services to which an ISDN device subscribes. IF the service provider requires SPIDS, your ISDN device cannot place or receive calls until it sends a valid SPID to the service provider when initializing the connection.

A SPID is usually a seven-digit telephone number plus some optional numbers, but service providers might use different numbering schemes. SPIDs have significance at the local access ISDN interfaces; remote routers are never sent the SPID.

Currently, only DMS-100 and NI-1 switch types require SPIDs. Two SPIDS are assigned for the DMS-100 switch type, one for each B channel. The AT&T 5ESS-switch type might support SPIDs, but Cisco recommends that you set up the service without SPIDs. The syntax for configuring an ISDN interface on a Cisco router is presented below.

- Router(config-if)#isdn spid1 51378934560101
- Router#copy runn start
  In order for a call to be placed across the ISDN network, there needs to be

network wide configuration information. ISDN uses directory numbers and service profile identifiers. The directory is a telephone number you will use to call. The SPID is a number the telephone company uses to identify the equipment on your ISDN connection. The configuration is shown below.

- Router# switch-type basic DMS 100
- Router(config-t)#int BRI0
- Router(config-if)#IP address 129.137.23.4 255.255.252.0
- Router(config-if)#spid1 513556758990101
- Router (config-if)#ppp authentication chap
- Router(config-if)#dialer-group 1
- Router(config-if)#dialer idle-timeout 300
- Router(config-if)#map IP 129.137.23.4 speed 64 broadcast 24569000

- Router(config-if)#dialer load-threshold 100

# Appendix G.

**Software Configuration for the 3500 Switch**

- Unpack the hardware and verify the contents matches the packaging list.
- Stack or rack-mount (with the correct rubber feet or rack hardware) the switch in a location that is no more than 100 meters form any attached 10BaseT device, where the temperature is correct for the product.
- When selecting the cable, use straight-through cables for all ports not marked with an X. The X stands for crossover cable. Category 5 cables will work for all ports except for the 100BASEFX port, which requires fiber optic media.
- Verify that the voltage of the power outlet is the same as the voltage indicated on the label and connect the power.

This is the method to set up a Cisco Catalyst 3500XL frame switch. This method demonstrates out-of-band management (A switch that is managed from a terminal directly connected to the serial port). This method has the ability to wok regardless of whether the network connectivity is available from the switch. The steps to setting up a Cisco Catalyst switch are show below.

- Turn on the switch and watch POST (power on self test) where all the port LEDs should turn Green and then off.
- Connect the devices to the switch using the correct cables.
- Connect a VT-100 terminal or emulator to the RS-232 port, using settings for 96bps, 8 data bits, 1 stop bit and no parity.
- Press S to access the System Configuration menu and change the switching mode by selecting S again. Then select the number for the switching mode desired. This step is unnecessary if fast-forward switching is desired.
- Press X to exit to the main menu and then press N to access the Network Management menu, which is where the protocol configuration is stored.
- Select I to access IP configuration, then select I again to assign an IP address. When assigning an IP address any time after the first assignment, the switch must be reset for the address to take effect. Select S and G to assign the appropriate subnet mask and default gateway.
- Select X to exit the Main Menu, select S again for the System menu, and select R to reset the witch and retain the assigned parameters.

# Appendix H
## Resident's Intranet web site code

```
<html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Welcome</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">
<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="tlb, default">
</head>

<body><p><font face="Times New
Roman">            
    

</font> </p>
</body>

</html>

<html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Customer Support -- Download</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="tlb, default">
</head>

<body>
<p><a name="top">T</a>his page contains links to files we are making available
for
HTTP download. Click on the appropriate
link under the <em>Formats</em> section of a file's description to begin
downloading.</p>
```

```
<p>A <a href="#fileformats">definition of the file formats</a> is available at
the bottom of this page. All file sizes are approximate.</p>
<hr align="center">
<h3>Contents</h3>
<ul>
  <li><a href="#item1">WINZIP</a></li>
</ul>
<hr align="center">
<p> 
</p>
<p><a name="item1"><strong>WinZip</strong></a></p>
<blockquote>
  <p>This opens up compressed files.</p>
  <p>Formats: <a href="Download/winzip80.exe">.exe</a> (120mb). <br>
Last updated: January 05, 2001.</p>
</blockquote>
<blockquote>
  <p> </p>
</blockquote>
html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Customer Support -- FAQ</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="tlb, default">
</head>

<body>
<p><a name="top">T</a>his page contains answers to common questions handled by
our support staff, along with some tips
and tricks that we have found useful and presented here as questions.</p>
<p><strong>Note</strong>: In these answers we will follow a few shorthand
conventions for describing user-interface
procedures. Key combinations will be presented like this:
<tt>Ctrl+Alt+Delete</tt>, which means that you
```

```
should press and hold down the Control key, the Alt key, and the Delete key at
the same time.
Menu selections will be presented like this: <tt>File-&gt;Open</tt>, which
means that you should open the File
menu, and then make the Open selection.</p>
<ol>
  <li><a href="#q1">How do I format my hard drive ?</a></li>
  <li><a href="www.download.com">Where can I find Software Drivers ...
?</a></li>
  <li><a href="#q3">Why doesn't printer print ?</a></li>
  <li><a href="#q4">Who is the administrator ?</a></li>
</ol>
<hr align="center">
<h3><a name="q1">How do I format my hard drive ?</a></h3>
<blockquote>
  <p>Create a boot disk then reboot your machine.  When the Window 95/98
  menu comes up, select command prompt. Type the commands below. </p>
  <p>cd a: </p>
  <p>format c: </p>
  <h5><a href="#top">Back to Top</a></h5>
</blockquote>
<hr align="center">
<h3><a name="q2">Where can I find Software?</a></h3>
<blockquote>
  <p><a href="www.download.com" target="_top">www.download.com</a> </p>
  <h5><a href="#top">Back to Top</a></h5>
</blockquote>
<hr align="center">
<h3><a name="q3">Why doesn't my printer print?</a></h3>
<blockquote>
  <p>Try reinstalling the drivers.  Go to start---Settings----printer---
add
  new printer. </p>
  <h5><a href="#top">Back to Top</a></h5>
</blockquote>
<hr align="center">
<h3><a name="q4">Who is the Administrator ?</a></h3>
<blockquote>
  <p>David

Menifee            
       
```

```
  Mario Davison </p>
  <p><a
href="mailto:DavidM@apartment.com">DavidM@apartment.com</a>   &n
bsp; 
  <a href="MarioD@apartment.com">MarioD@apartment.com  </a> 
</p>
  <h5><a href="#top">Back to Top</a></h5>
</blockquote>
 </body>

</html>

 <html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Customer Support -- Suggestions</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="tlb, default">
</head>

<body><p>Use the form on this page to tell us your ideas for enhancing our
support, or improving our
customer service, or anything else that comes to mind. To report a software
problem, please use our
<a href="bugrep.htm">Bug Report Form</a> instead.</p>
<form method="POST" action="--WEBBOT-SELF--" onSubmit="">
  <!--webbot bot="SaveResults" startspan U-File="New_Folder/Suggestions.txt"
  S-Format="TEXT/TSV" S-Label-Fields="TRUE" B-Reverse-Chronology="FALSE"
  S-Date-Format="%A, %B %d, %Y" S-Time-Format="%I:%M:%S %p"
  S-Builtin-Fields="REMOTE_NAME REMOTE_USER HTTP_USER_AGENT Date Time" --
><input TYPE="hidden" NAME="VTI-GROUP" VALUE="0"><!--webbot
  bot="SaveResults" endspan -->
  <p><strong>Category:</strong></p>
  <dl>
    <dd><select name="Category" size="1">
        <option selected>Web site</option>
```

```
        <option>Customer support</option>
        <option>Company</option>
      </select></dd>
  </dl>
  <p><strong>Subject:</strong></p>
  <dl>
    <dd><input type="text" size="57" maxlength="256" name="Subject"></dd>
  </dl>
  <p><strong>Suggestion:</strong></p>
  <dl>
    <dd><textarea name="Suggestion" rows="7" cols="55"></textarea></dd>
  </dl>
  <p><input type="submit" value="Submit Suggestion"> <input type="reset"
value="Clear Form"></p>
</form>
 </body>

</html>

html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Customer Support -- Search</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="tlb, default">
</head>

<body>
<!--webbot bot="Search" S-LINK S-FIELDS="TimeStamp,DocumentK,Weight" S-
INDEX="All" S-DSN="default" TAG="BODY" S-Text="Search for:" I-Size="20" S-
Submit="Start Search" S-Clear="Reset" b-useindexserver="0" -->
<hr align="center">
<p>
Questions or problems regarding this web site should be directed to <a
href="mailto:davisomk@email.uc.edu">administrator@resident.com</a>.<br>
Copyright © 2001Davison &amp;amp; Menifee. All rights reserved.</body>
```

```
</html>
</head>

<body>
<p>
 
</p>
<blockquote>
  <blockquote>
    <p><a name="top"> </a></p>
    <p><strong>Last update:</strong> <!--webbot bot="TimeStamp" S-
Type="REGENERATED" S-Format="%B %d, %Y" --></p>
    <h5><a href="#bottom">Go to Bottom</a></h5>
    <hr align="center">
    <p><em>
    <hr align="center">
    <dl>
      <dt><b>Category: </b></dt>
      <dd>Web site</dd>
      <dt><b>Subject: </b></dt>
      <dd> </dd>
      <dt><b>Remote Name: </b></dt>
      <dd>192.168.10.1</dd>
      <dt><b>Remote User: </b></dt>
      <dd>APARTMENTS\Administrator</dd>
      <dt><b>HTTP User Agent: </b></dt>
      <dd>Mozilla/4.0 (compatible; MSIE 4.01; Windows NT; DigExt)</dd>
    </dl>
    <h3>Suggestion</h3>
    <p> </p>
    <hr align="center">
    <dl>
      <dt><b>Category: </b></dt>
      <dd>Web site</dd>
      <dt><b>Subject: </b></dt>
      <dd> </dd>
      <dt><b>Remote Name: </b></dt>
      <dd>192.168.10.1</dd>
      <dt><b>Remote User: </b></dt>
      <dd>APARTMENTS\Administrator</dd>
      <dt><b>HTTP User Agent: </b></dt>
```

```
      <dd>Mozilla/4.0 (compatible; MSIE 4.01; Windows NT; DigExt)</dd>
    </dl>
    <h3>Suggestion</h3>
    <p> </p>
    <!--webbot bot="FormInsertHere" DESCR="The FrontPage FormInsertHere
Component indicates the point in an HTML file where you want a default,
Registration, or Discussion Component to insert new results." --></em>
    <p><a name="bottom">The End</a></p>
    <h5><a href="#top">Back to Top</a></h5>
  </blockquote>
</blockquote>
</body>

</html>

tml>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Customer Support Discussion TOC</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="none">
</head>

<body>
<!--webbot bot="Include" TAG="BODY" U-Include="cusuhead.htm" -->
<blockquote>
  <blockquote>
    <h2>Table of Contents</h2>
<h5><em>Note: you may need to reload this page to see the most recent
additions.</em></h5>
  </blockquote>
</blockquote>
<!--webbot bot="Include" TAG="BODY" U-Include="_cusudi/tocproto.htm" -->

<!--webbot bot="Include" TAG="BODY" U-Include="cusufoot.htm" -->
</body>
```

```
</html>
<html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
<title>Bug Reports from Customers</title>
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">


<meta name="Microsoft Theme" content="blends 001, default">
<meta name="Microsoft Border" content="none">
</head>

<body>
<p align="center"><b>Bug Updates</b></p>
<p> </p>
<p><strong>           &n
bsp;   
Last update: </strong><!--webbot bot="TimeStamp" S-Type="REGENERATED" S-
Format="%B %d, %Y" --></p>
<h5>            &nb
sp;      
<a href="#bottom">Go to Bottom</a></h5>
<hr align="center">
<p> </p>
<p>            &nbs
p;  
<a name="bottom">The End</a></p>
<h5>            &nb
sp;      
<a href="#top">Back to Top</a></h5>
</body>

</html>
<html>

<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta http-equiv="Content-Language" content="en-us">
```

# References


1. **http://www.techweek.com/articles/11-1-99/divide.htm**
2. **http://netec.wustl.edu/BibEc/data/Papers/fthlsecas17.html**
3. **http://www.findarticles.com/m0WUB/1998_Nov_9/53200124/p1/article.jhtml**
4. **http://www.ciof.org/policy/policy-agenda.htm**
5. **http://www.ntia.doc.gov/ntiahome/fttn99/part2.html**
6. **http://www.why-not.com/company/stats.htm**
7. **http://www.microsoft.com/ntserver**
8. **http://www.microsoft.com/netmeeting**
9. **http://www.ntia.doc.gov/ntiahome/fallingthru.html**
10. **http://www.kcoyle.net/**
11. Kurt Hudson, James Michael Stewart, Ed Tittel (1999). NT Server 4.0 EXAM CRAM
12. Kurt Hudson, James Michael Stewart, Ed Tittel (1999). Internet Information Server 4.0 EXAM CRAM
13. Kurt Hudson, James Michael Stewart, Ed Tittel (1999). Exchange Server 5.5 EXAM CRAM
14. Cisco Systems (2000). Catalyst 3500 Series XL Family Quick Software Configuration.
15. Cisco Systems (2000). Cisco Network Module Software Configuration Guide for Cisco 2600 Series and 3600 Series Routers.
16. Richard R. Lee (1999). Windows NT Microsoft Cluster Server