

**LOCAL AREA NETWORKS:  
TRACKING THE PHYSICAL LAYER  
VIA A WEB DATABASE**

by  
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This project analyzes the computer networking information system at the Kenan-Flagler Business School (KFBS) at the University of North Carolina at Chapel Hill. The goal of this project is to optimize the information system in order to facilitate network troubleshooting and network provisioning. The Local Area Network at KFBS is comprised of over 100 Ethernet network switches and provides data network connectivity to over 2500 data ports and 2000 users. The purpose of a network information system is to track the various components of the system, which include items such as client IP addresses, data ports, room numbers, usernames, switch IP addresses, switch ports, telecommunication closets, MAC addresses, and computer names. The current system used to track and administer the computer data network at KFBS is incomplete and ineffective, mainly because it uses several sources to store the data. These sources include a DHCP database containing limited information such as IP addresses, usernames, and MAC addresses and several additional spreadsheets. This project proposes a single relational database management system to replace the current system. A comprehensive database is designed in Microsoft Access and a detailed discussion of the development process includes an entity relationship diagram, database schema, and data dictionary. Lastly, a password-protected Web interface is designed and implemented in Cold Fusion. This database-driven Web site provides simple, secure access to dynamic and searchable network information via the Internet.

#### Headings:

Database design

Database management

Computer Networks – Management

Local Area Networks – Management

Web databases

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## **INTRODUCTION**

### **Project Purpose & Overview**

This project analyzes the computer networking information system at the Kenan-Flagler Business School (KFBS) at the University of North Carolina at Chapel Hill. The goal of this project is to optimize the information system in order to facilitate network troubleshooting and network provisioning. The purpose of a network information system is to track the various components of the system: client IP addresses, usernames, data ports, room numbers, usernames, switch IP addresses, switch ports, telecommunication closets, mac addresses, computer names, etc. The current system used to track and administer the computer data network at the KFBS is incomplete and ineffective. This project will discuss the current system and provide recommendations for a new system, a relational database. The details of the design and implementation of the database and its accompanying Web site will be examined.

### **Background**

The typical network in this project is the local area network that encompasses the McColl Building of the KFBS at the University of North Carolina at Chapel Hill. The data network is the primary means of satisfying the information needs of the more than 2000 members of the KFBS community - faculty, staff, and students. The network is entirely TCP/IP over switched Ethernet, with switching equipment from a single vendor, Enterasys (formerly Cabletron).

The building itself was completed in 1997 and encompasses four floors, including a basement level. The McColl building was at the forefront of technology when it was completed. All of the faculty/staff offices, classrooms, and common areas were hard-wired with category 5 unshielded twisted pair (UTP) wire for data networking, supplying over 3000 data ports for the KFBS data networking needs. The building also was wired with fiber optic cable and coaxial cable to all faculty/staff offices and classrooms, but the scope of this project will focus only on data networking via UTP connections. The

building was designed with telecommunications and computer networking closets on the north and south end of each floor. This design dictated that the North side of the building was the “A” side and the South side was the “B” side. This logical separation introduced the nomenclature for the telecommunications closets on each floor as 1A, 1B, 2A, 2B, 3A, 3B, 4A and 4B.

The physical wiring in the building complies with the structured cabling interoperability standard set by the Electronic Industries Association and Telecommunications Industry Association (EIA/TIA). This standard is known as EIA/TIA 568, also referred to as “568” (Brown, 2000). At the center of “568” is the notion that any data stream may be accessed from any data port, which means that more data ports must be installed than can be used at any one time. Typically, a desktop network interface card (NIC) is patched to a data port that is hard wired to a telecommunications closet. Once in the closet, the data port is then patched thorough to a network switch port. From there, the switch in each closet is connected to a fiber or high-speed copper backbone to a switch or router in the main telecommunications closet. The closets at the KFBS contain the totality of network switching equipment in the building. Each closet has one or more chassis that then contain one or more switches. One to 48 RJ-45 interfaced switch ports are built into the switch hardware for the current switches at the KFBS.

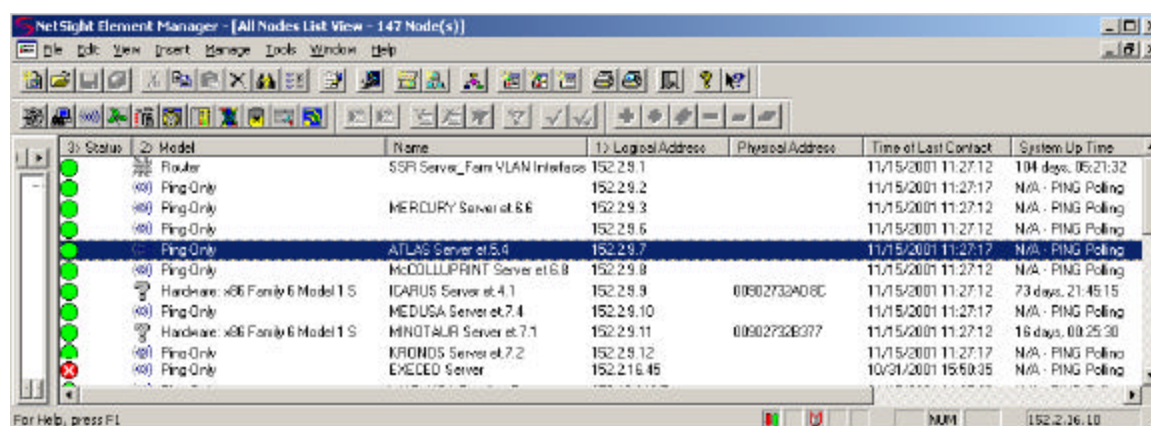
Internet Protocol (IP) addresses are both statically and dynamically assigned on the network. The IP addresses assigned to network devices are statically configured for servers, network printers, and Wireless Access Points, and are dynamically allocated to staff and faculty computers via a DHCP server at the KFBS. On the other hand, student IP addresses, used typically for notebook computers, are dynamically assigned through the University of North Carolina (UNC) main campus DHCP server. While the network is part of the larger, logically flat UNC network, the KFBS is responsible for organizing and tracking all of the network components comprising its VLAN.

### **Current System**

The current system of network organization at the KFBS is primarily through the network monitoring software NetSight Element Manager. This software was developed by Enterasys Corporation and integrates well with the Enterasys switching equipment at UNC. This software is typical to most network management software in that it does an excellent job in tracking layer two (data link layer) and

layer three (network layer) networking components. It uses the Simple Network Management Protocol (SNMP) to build a Management Information Database (MIB) that tracks all network switches in the KFBS VLAN. The NetSight Element Manager user interface typically displays the following parameters: switch status (up or down), switch model, name, logical address (IP address), time of last contact, and system uptime. Figure 1 below is a sample display from the “All Nodes List View” in NetSight Element Manager:

**Figure 1 – NetSight Element Manager screen capture**

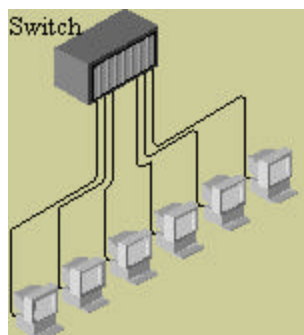


NetSight Element Manager - [All Nodes List View - 147 Node(s)]

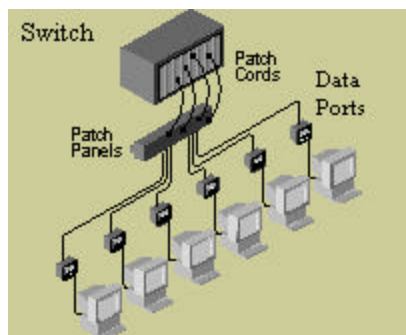
3) Status	2) Model	Name	1) Logical Address	Physical Address	Time of Last Contact	System Up Time
●	Router	SSP Server_Fam VLAN Interface	152.29.1		11/15/2001 11:27:12	104 days, 05:21:32
●	Ping Only		152.29.2		11/15/2001 11:27:17	N/A - PING Polling
●	Ping Only	MERCURY Server et 8.6	152.29.3		11/15/2001 11:27:12	N/A - PING Polling
●	Ping Only		152.29.6		11/15/2001 11:27:12	N/A - PING Polling
●	Ping Only	ATLAS Server et 5.4	152.29.7		11/15/2001 11:27:17	N/A - PING Polling
●	Ping Only	McCOLLUPRINT Server et 6.8	152.29.8		11/15/2001 11:27:12	N/A - PING Polling
●	Hardware: x86 Family 6 Model 1 S	ICARUS Server et 4.1	152.29.9	00502732A06C	11/15/2001 11:27:12	73 days, 21:45:15
●	Ping Only	MEDUSA Server et 7.4	152.29.10		11/15/2001 11:27:17	N/A - PING Polling
●	Hardware: x86 Family 6 Model 1 S	MINOTAUR Server et 7.1	152.29.11	00502732B377	11/15/2001 11:27:12	16 days, 00:25:30
●	Ping Only	KRONOS Server et 7.2	152.29.12		11/15/2001 11:27:17	N/A - PING Polling
●	Ping Only	EMECED Server	152.216.45		10/31/2001 15:50:35	N/A - PING Polling

While NetSight Element Manager and other network management applications do an excellent job of tracking the network switches (layers 2 and 3), they only touch on layer one components, or the physical layer of the network. The figures below emphasize the differences between what a typical network management software sees (figure 2) and what the reality is when it comes to the true network connection components (figure 3).

**Figure 2 - Simplified schema**

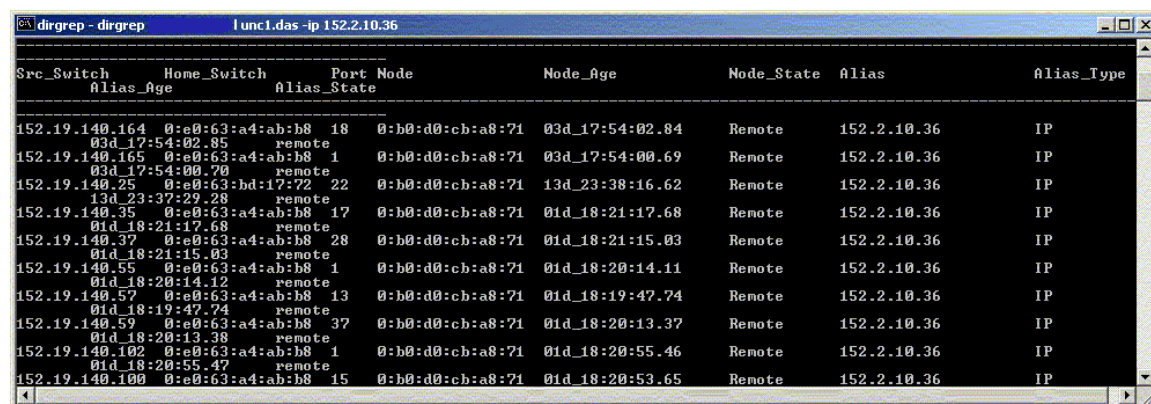


**Figure 3 – Actual schema**



NetSight will allow a user to see traffic between a client network device and a network switch, if the user knows what switch and switch port that user is connected. But to find the switch IP and port number of a client IP address bound to a NIC on the KFBS VLAN, a separate software package that polls the source allocation tables (SAT) of the switches is employed. To discover a client IP's home switch, a dirgrep utility is used. This utility polls every switch on the network in order to discover what switches have the requested IP in their SAT. The switch that has the IP as a node state of local to the IP is the switch that is actually connected to that IP address. This process involves takes approximately five minutes because each of the over 500 switches in the network are polled, and often does not return the home switch. Then a manual investigation must be made to discover the switch connection by inspecting the telecommunications closet connections. Below is a sample output of the dirgrep utility on a client IP address:

**Figure 4 – Dirgrep screen capture**



The screenshot shows a terminal window titled "dirgrep - dirgrep" with the command "l uncl.das -ip 152.2.10.36" entered. The output is a table with the following columns: Src\_Switch, Home\_Switch, Port, Node, Node\_Age, Node\_State, Alias, and Alias\_Type. The data rows show various switch configurations and their associated IP addresses and states.

Src_Switch	Home_Switch	Port	Node	Node_Age	Node_State	Alias	Alias_Type
152.19.140.164	0:e0:63:a4:ab:b8	18	0:b0:d0:cb:a8:71	03d_17:54:02.84	Remote	152.2.10.36	IP
03d_17:54:02.85	remote						
152.19.140.165	0:e0:63:a4:ab:b8	1	0:b0:d0:cb:a8:71	03d_17:54:00.69	Remote	152.2.10.36	IP
03d_17:54:00.70	remote						
152.19.140.25	0:e0:63:bd:17:72	22	0:b0:d0:cb:a8:71	13d_23:38:16.62	Remote	152.2.10.36	IP
13d_23:37:29.28	remote						
152.19.140.35	0:e0:63:a4:ab:b8	17	0:b0:d0:cb:a8:71	01d_18:21:17.68	Remote	152.2.10.36	IP
01d_18:21:17.68	remote						
152.19.140.37	0:e0:63:a4:ab:b8	28	0:b0:d0:cb:a8:71	01d_18:21:15.03	Remote	152.2.10.36	IP
01d_18:21:15.03	remote						
152.19.140.55	0:e0:63:a4:ab:b8	1	0:b0:d0:cb:a8:71	01d_18:20:14.11	Remote	152.2.10.36	IP
01d_18:20:14.12	remote						
152.19.140.57	0:e0:63:a4:ab:b8	13	0:b0:d0:cb:a8:71	01d_18:19:47.74	Remote	152.2.10.36	IP
01d_18:19:47.74	remote						
152.19.140.59	0:e0:63:a4:ab:b8	37	0:b0:d0:cb:a8:71	01d_18:20:13.37	Remote	152.2.10.36	IP
01d_18:20:13.38	remote						
152.19.140.102	0:e0:63:a4:ab:b8	1	0:b0:d0:cb:a8:71	01d_18:20:55.46	Remote	152.2.10.36	IP
01d_18:20:55.47	remote						
152.19.140.100	0:e0:63:a4:ab:b8	15	0:b0:d0:cb:a8:71	01d_18:20:53.65	Remote	152.2.10.36	IP

This sequence of events allows a technical troubleshooter to locate an IP in question, but the tools are not integrated in a single software package. Another source for physical layer information is in the DHCP database at the KFBS. This is a Microsoft Access database that has reserved IP addresses, MAC addresses, usernames, and user first and last names. In addition, there are separate Microsoft Excel spreadsheets that track the static IP allocations of servers, network printers, network switches, network UPS's and wireless access points. Once a client IP address and their switch, switch port and office location is found, the computer name assigned to that IP address is referenced on one of the spreadsheets. Another application is

then used, Microsoft Outlook, to find the phone number and email address of the client in the global contact list.

### **User Groups**

The current system has two groups of users. The first group contains the Network Administrator and the IT director. These two individuals use the network information to assist in troubleshooting and to provide input for network provisioning decisions. The Network Administrator is primarily responsible for maintaining the data while the IT director makes the decisions for longer term provisioning. The other group that uses the system is the IT technicians. They need to access the information primarily in order to troubleshoot user connectivity problems. The distinction between the two groups is that the technicians only need to view portions of the data while the Network Administrator and IT Director need to maintain the data.

### **Problems with Current System**

The current system is grossly ineffective in providing an efficient means to administer and troubleshoot the local area network. The network information is in many different places and there is no tool or procedure in place that ties all of the information together. From a troubleshooting perspective, one must go from one application to another and then possibly a spreadsheet and back to a separate database to find IP, switch and user information. If the information is not found, one must physically go to the troubled office computer and manually check the data port number patched to the client NIC. Often this data port number is concealed behind a desk or shelf, which requires an additional technician to assist in moving the object to reveal the data port number. From that point, the troubleshooter must go to the telecommunications closet and find that same data port. Then that individual must trace a sometimes 25-foot long network patch cord from the data port in question to the switch port that it is connected. The current system forces network troubleshooters to take more time to analyze problems because of the extra effort in obtaining the necessary information to make sound decisions. That effort necessarily translates into more user downtime and less than optimal network trouble ticket resolution times.



From a general administration perspective, the network information is incomplete and fails to represent the logical relationships between the data. For example, a recent manual survey of all the telecommunications closets was mandated in order to acquire data to make decisions on what chassis needed to be upgraded and what port capacity was necessary to satisfy the user networking port demands originating from each telecommunications closet. This information should be readily available for a network administrator. The current network information does not indicate how many ports and which ports are wired to each office or classroom. It also does not differentiate between the switch port capacity of each telecommunications closet and what ports are activate or inactive.

The lack of complete and accurate network information is costing the KFBS financial resources that could be spent elsewhere. For example, a manual survey of a single telecommunications closet discovered that 12 switch ports were patched through to data ports that were used in the past, but were currently unnecessary. Network Computing magazine lists a price per port of \$368 for switches in the Cabletron (now Enterasys) 6000 chassis, commonly used at the KFBS (Network Computing Interactive Buyers Guide, 1998). This translates to 12-port X 368 price-per-port, or \$4416 in costs that would be avoided in a chassis upgrade. Hypothetically, if as few as 10 ports were patched through unnecessarily in each telecommunications closet, this translates into 8 X 10 X \$368, or almost \$30,000 worth of switching equipment that appears to be in use. This false appearance of higher than actual port utilization will lead to unnecessary over provisioning or premature switch capacity upgrades.

A recent article in *Computer Telephony* emphasizes that documenting all cable connections is vital to prolonging the life of the wiring infrastructure, containing the cost of managing daily changes, and recovering in minimal time from network outages (Grigonis, 2000). Moreover, a properly designed cable information management system will assist IT staff in planning, budgeting, and daily maintenance.

Many network administration questions remain unanswered or require extensive manual investigation to be answered under the current system. A sample of these questions is as follows:

- How many data ports in the building are activate and inactive?
- How many users have more than on activate data port?
- How many and what are the data ports in a specific office or classroom?
- How many activate ports in the building are Ethernet and Fast Ethernet?

- Where are the legacy 9000 chassis in the building that need to be upgraded?
- How many and what are the spare switch ports in telecommunications closet 1A?
- In what office or classroom does data port AD-252 out of telecommunications 1A closet terminate?
- How many data ports are activate in the building for roaming (laptop) users?
- What data ports were patched through in the past, but should be inactivate?
- What telecommunications closet, switch port, and data port is connected to IP 152.2.10.6?
- What client IP, data port, and office or classroom location is connected to switch 152.19.140.204, port 6?

## **PROPOSED INFORMATION SYSTEM**

### **Proposed Solution**

The current system fails to provide an efficient, complete, and accurate means for the network administrator to characterize, maintain, and troubleshoot the local area network. The goal of the new system is to correct the shortcomings of the current system. The aforementioned and many other network administration questions may be readily answered if complete network data is stored in a single repository and the totality of network component relationships are represented.

Two alternatives were investigated that would provide a solution that would correct the information inefficiencies of the KFBS VLAN. The first was a proprietary solution that provides physical layer network management by an automatic SNMP-enabled patch cord system and a software application titled PatchView (Connolly, 2000). PatchView can add intelligence to a telecommunications closet because, via a software interface, port additions, moves, or changes can all be accomplished remotely. The electronic patch system takes the tangled mess out of a closet and replaces it with SMART patch cords that electronically signal back to the PatchView application. This allows one to track data port connections in real time without having to manually log every patch cord move in the closet. The advantages to this system are tremendous, but so is the cost. The PatchView software is \$6,995 and an electronic 24-port patch panel is \$124 (Sturdevant, 2000). Given that the KFBS has over 3000 data ports, this translates to a

need to spend at least \$124 X 3000/24, or \$15,500 for new patch panels. With the PatchView software, and excluding installation cost, this totals \$22,495. An alternate solution is to create a simple relational database.

A simple relational database management system (RDBMS) can be a single repository of information for the network. The advantages of a database are clear. A properly designed database controls redundancy of data. It follows that a single logical update can be cascaded to the same field in other tables. This eliminates duplication of effort with multiple entries, minimizes wasted storage space, and assists in preventing the data from becoming inconsistent. A database can also restrict unauthorized access and can limit actions executed in the database, depending on the user. A database also provides multiple views, based on users rights. This security feature allows users to only view portions of the database that are approved for their use by the database administrator. Complex relationships among the data can also be represented in a database. The representation of these relationships, in tandem with the SQL standard, allows for complex querying on the data. A RDMS also enforces integrity restraints on tables in the database and provides a means for backup and recovery of data (Elmasari & Navathe, 2000). Another advantage of the database solution is that there are many inexpensive off the shelf database applications that may be personalized for any environment. A database may also be viewed via the WWW, which is not an option with PatchView.

While, the PatchView system provides an ideal solution to integrate total network information automatically, the IT Director is not willing to pay the \$23,000 for the system at this time. On the other hand, the KFBS already has a site license for two RDBMS's, Microsoft SQL server and Microsoft Access. The PatchView system is also better suited for a network that makes frequent changes to their network data connections and inventory. The KFBS does not normally have more than a few network data port moves in a week. Given the cost and suitability criteria, the database solution is the solution of choice for the It Director, at this time. An enhanced feature of this approach is that limited database information will be viewable and searchable via the WWW. This will allow remote IT troubleshooters distributed access to the data with a user name and password. It must be noted that a database that is properly designed and well maintained can provide all of the same information as an automatic network information system, without the initial equipment cost.

### **Technology Decision**

Now that a Web-enabled database is the goal of the new system, we must choose which implementation technologies that will be used to realize this goal. This means that we must choose a database technology and a Web server application technology that integrates with our database. The database possibilities commonly employed are Oracle, Microsoft Access, Microsoft SQL Server, and mySQL. The UNC campus and the KFBS have a license for Oracle, but the scope of this project, a few thousand records, does not require the power of such a high-end database. The open-source mySQL is also a reasonable choice, but the command line interface is not easy to learn or use for whoever may maintain this database in the future. Microsoft SQL and Microsoft Access are the most obvious choices for implementation because all of the current databases at the KFBS use these applications and it is wise to remain consistent with the technologies. SQL server is much more powerful than Access, but it is also more complex to learn and administer. Given that this database will only have a few thousand records and it will not be under a heavy load, a mandate for SQL server is not warranted. This leaves Microsoft Access.

Microsoft Access has a functionality, look and feel that most users are familiar. The UNC and the KFBS have a license for this software and it is already installed on every computer in the KFBS, as part of the Office 2000 Professional suite. There are limits to Access's functionality because it was never designed to be under a high stress and heavy load environment. Microsoft states that Access, or actually the MS Jet database engine, can have up to 255 concurrent users (Microsoft, 2001). But this number drops drastically when used via an ODBC connection. In fact, Web developers at the KFBS have stated that Microsoft Access hangs with anything over 5 concurrent users via ODBC and this statement has been confirmed from other resources on the Web (Xhost, 2001). The proposed database to be designed will not be affected by these limitations in Access. The IT staff at the KFBS is fewer than 20, and the database is not at any risk to be accessed simultaneously. Only one or two users should ever access the database concurrently. The administrative interface (updates, deletes, and inserts) will be in Access, through forms, but the users of the database want the additional feature of having WWW searchable functionality. In order to port the database to the WWW, an application Web server must be chosen.

The two options currently in use at the KFBS are Microsoft Active Server Pages (ASP) and Allaire Cold Fusion. While both products are already licensed by the KFBS, Cold Fusion powers the majority of the WWW database driven solutions. ASP is only supported on IIS while Cold Fusion is supported on IIS, Netscape, Website, and Apache web servers. Both alternatives are supported on Windows NT, but Cold Fusion is additionally supported on Unix, Solaris, Linux, and HP-UX. Cold Fusion's many OS and Web Server alternatives make it a more scalable solution than ASP. The number one reason why Cold Fusion (CF) is used so ubiquitously at the KFBS is because it is far easier to code in than in ASP. While CF is not a true language, it does have built in looping and function procedures that make it easier to develop in and easier to maintain Web pages.

## **DEVELOPMENT PROCESS**

### **Information collection**

The first step in the development process was to meet with the IT director of the KFBS. The result of this meeting indicated that there needed to be a mechanism in place in order to better track network data connections in the building. After meeting with the Network Administrator, this objective was confirmed and a characterization of the data and how it needs to be used was synthesized. It essentially would be used to assist IT technicians in troubleshooting and to provide a complete picture of the switch and data port connection inventory comprising the McColl building of the KFBS. The most intensive part of the process was the man-hours involved in collecting the data for the network. Myself, along with another student were given the monumental task of collecting the data.

The data collection came along slowly and occurred in stages. The first stage was to inventory all the switching equipment in the building. This involved going into each telecommunications closet and recording each chassis model, switch IP address, and number of UTP switch ports on each switch. After that, a complete inventory of the number of data ports was recorded for each closet. From there, the switch port to data port patch cable connections were manually traced and recorded. The next step was to find where and which data port terminated in each office or classroom. Physically going to each room and referencing the telecommunications engineering drawings for the building accomplished this objective. The engineering drawings could not be used alone, as they were only valid when the building was

constructed, and did not include any addition or deletions of data ports since 1977. In addition, we had to discover every computer to data port connection in every room. A physical inspection of each room was required in order to obtain the data port number and to which closet the data port was hard wired. This is the current stage of the data collection process. The next stage will be to find the computer and user contact data for each computer or network device in the building.

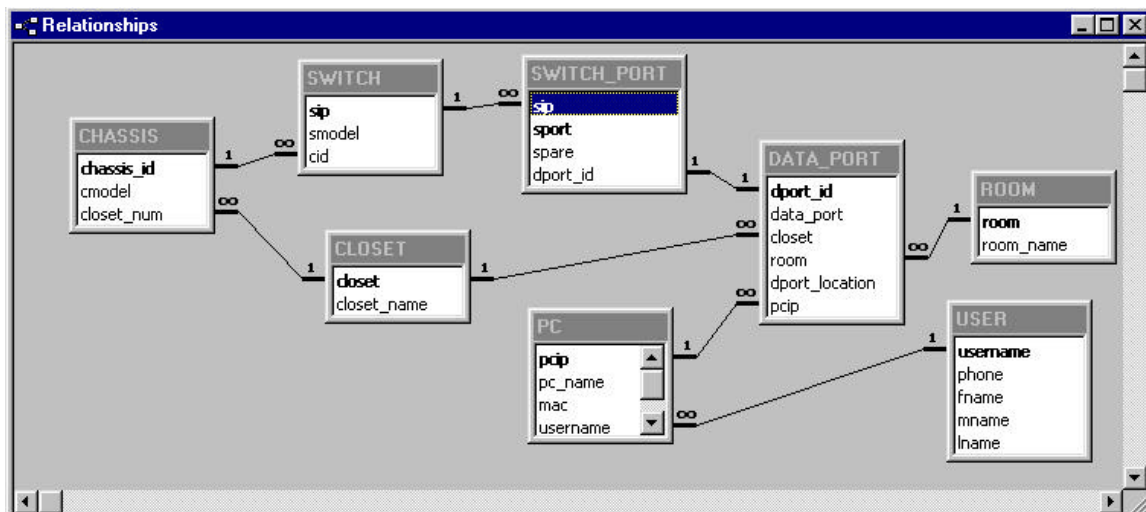
The user data inquiry will involve finding each username, first and last name, room number, and contact number for each user. This will be accomplished using an exported Excel spreadsheet from the DHCP database. A computer information inquiry will follow and involve finding the computer host name, client IP address, and MAC address. This information may be derived from the aforementioned DHCP Excel spreadsheet and from the additional spreadsheets for the statically assigned IP addresses of network printers, wireless access points, and servers. The entire data collection has consumed more than 100 man-hours and continues.

### **Database Design**

The database was designed using eight tables to encapsulate the required information in the network. The system is represented in an Entity Relationship (ER) diagram (Appendix A). This ER diagram lists the CLOSET, CHASSIS, SWITCH, SWITCH, SWITCH\_PORT, DATA\_PORT, ROOM, PC, and USER entities, and shows how the entities relate to each other. A CLOSET has many CHASSIS and contains many DATA\_PORTS. A CHASSIS can have one or more SWITCHes and a SWITCH contains one or more SWITCH\_PORTS. A SWITCH\_PORT is a weak entity because it requires the SWITCH entity in order to have any significance. A SWITCH\_PORT may be connected to one or zero DATA\_PORTS and a DATA\_PORT may be connected to one or zero SWITCH\_PORTS. A ROOM has one or more DATA\_PORTS and a DATA\_PORT while a DATA\_PORT may exist in only one room. A USER may have one or more PC's and a PC may be connected to many DATA\_PORTS, or a DATA\_PORT may be connected to one or zero PC's. The fact that a PC may be connected to many data ports over time is necessary because "roaming" users have access to any port that is active. A roaming user will have the username "roaming" and their DHCP distributed IP address will be unknown, and therefore given a dummy IP address of 0.0.0.0.

These entities were translated into tables in Access and the attributes attached to those entities were entered as fields in those tables. The relationships between each entity and the referential integrity constraints were modeled in the Access relationships window. Figure 5 is a screen shot of the aforementioned database relationships as represented in Access.

**Figure 5 – Microsoft Access entity relationships screen capture**



The tables, primary keys, foreign keys and other attributes of each table are represented in a database schema (Appendix B). For a further explanation of the database structure, a data dictionary is provided (Appendix C). The data dictionary provides a detailed explanation of the meaning of each table and attribute. It also provides the data types and possible values of each attribute.

**Web Interface:** <http://intranet.kenan-flagler.unc.edu/ports/index.cfm>

The purpose of the Web site is to provide remote access to database port information for network troubleshooters through a familiar, simple interface. In this way, the database will not be directly exposed and the information will be read-only. Although the site is read-only, the Web site is dynamic in the sense that it is searchable for a user on several criteria. A simple pull-down menu is provided that allows a user to choose their search criteria from the following options: Closet, Computer name, Client IP address, Last name, MAC address, Room, Switch IP address, and Username. The following is a screenshot of the Web site:

Figure 6 – Query Web page screen capture

For example, a user who knows a Clients IP address or a portion of the IP address will select “Client IP address” from the pull-down menu and enter an address such as 152.2.11.36 in the text box. After the “submit query” button is clicked then the following is displayed:

Figure 7 – Query result Web page screen capture

**KFBS Port Database Search Results:**

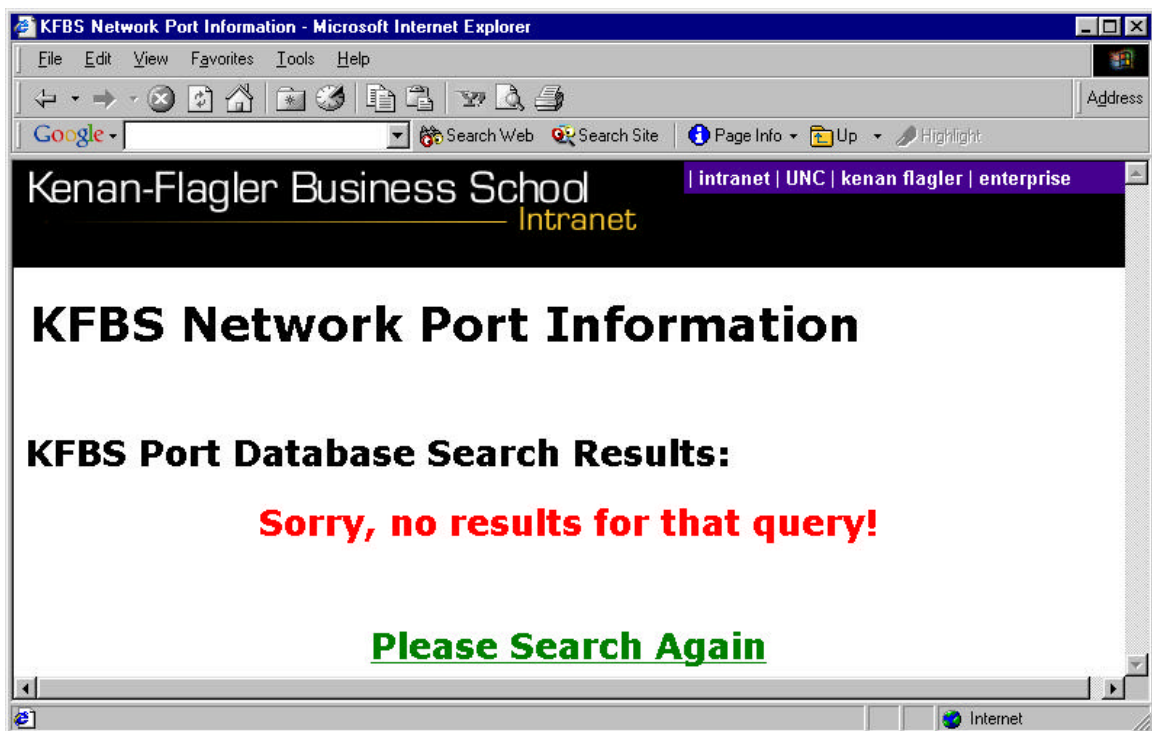
Search criteria: **Client IP: 152.2.11.36\*** [Search Again?](#)

Client IP	Computer Name	Name	Username	Room	Data Port	Closet	Switch IP, Port
152.2.11.36	TECHCENTER36	Andrew Phillips	computer_lab	1014	BD-143	1B	152.19.140.026, 30



This search scenario is particularly useful because the query is made on a string-matching basis. This means that a user does not have to know the exact Client IP address, Username, Computer name, Switch IP address, MAC address, or Last name. For example, querying only on the first letter of a last name will return all the users with the last name beginning with that letter. A user will get exact results with exact input to the form, but exact data is often not available. This feature is particularly useful for usernames and computer names that often are some version of a client's last name appended with one or two initials of their first name. If a query is not satisfied by any information in the database, a user is redirected to a Web site that indicates that no results were found. A figure indicating this page is below:

**Figure 8 – Unsuccessful query Web page**



After a failed query or one with results, a user is given the opportunity to query the database again by clicking on a link that return them to the original query page. JavaScript is employed so that a user does select from the pull-down menu and enter text in the textbox before submitting the form. Both the pull-down and textbox components of the HTML form give warning messages if it is not selected or text is not entered, respectively. The coding for the Web site is contained in the pages titled index.cfm, search.cfm, and no\_result.cfm, and may be found in Appendix D.

## **Security**

The database itself is in a restricted directory and may only be accessed by the network administrator. The NTFS permissions do not allow any other individual the right to view, modify, or delete any information from the database.

The Web interface allows read-only access to restricted information in the database. IP addresses and other network information may be used unethically if compromised. Given this possibility, the Web site itself is also secured through NTFS permissions. A single username and password will be used to authenticate KFBS troubleshooters that need to access and search network information.

## **CONCLUSION**

This project has been and continues to be a monumental undertaking. The database design has been refined a number of times in order to represent the true information needs and entity relationships in existence at KFBS. The final implementation of the database provides a single repository of information for network information at KFBS. In addition, the accompanying Web page provides an invaluable tool as an instant source of information for network troubleshooters to efficiently and effectively resolve network connectivity problems at KFBS. The database solution also provides a necessary information source for the Network Administrator and IT Director to acquire aggregate statistics on the network such as number of data ports and number of spare switch port connections in a telecommunications closet. This solution has provided many of the answers to network information questions posed in this project, but a number of design problems were encountered along the way.

Any organization interested in implementing this type of solution to their network information system can learn from the troubles encountered in this project. The foremost issue in the database design was accounting for network data ports that were active but did not have a specific computer attached at all times. Instead, these data ports had roaming users that did not have consistent IP addresses. The solution in this project was to create a single dummy IP address and dummy user to represent the majority of these ports. A similar scenario was found when faculty/staff members had additional active ports in their offices that did not have consistent IP address attached. Because a goal of this project was to attach responsibility of usernames to data ports, a schema was developed to connect the users to the active data ports by adding

a letter to the final octet of their static IP address. While this solution is not optimal, it prevents the need for creating a totally random dummy IP address, while still providing a connection back to the user. Another lesson learned is that it is wise to conduct lengthy experiments with dummy data when trying to test the functionality of the database design. The added testing time at the front-end of the project will save large amounts of time if a problem is encountered after a significant amount of data has been entered.

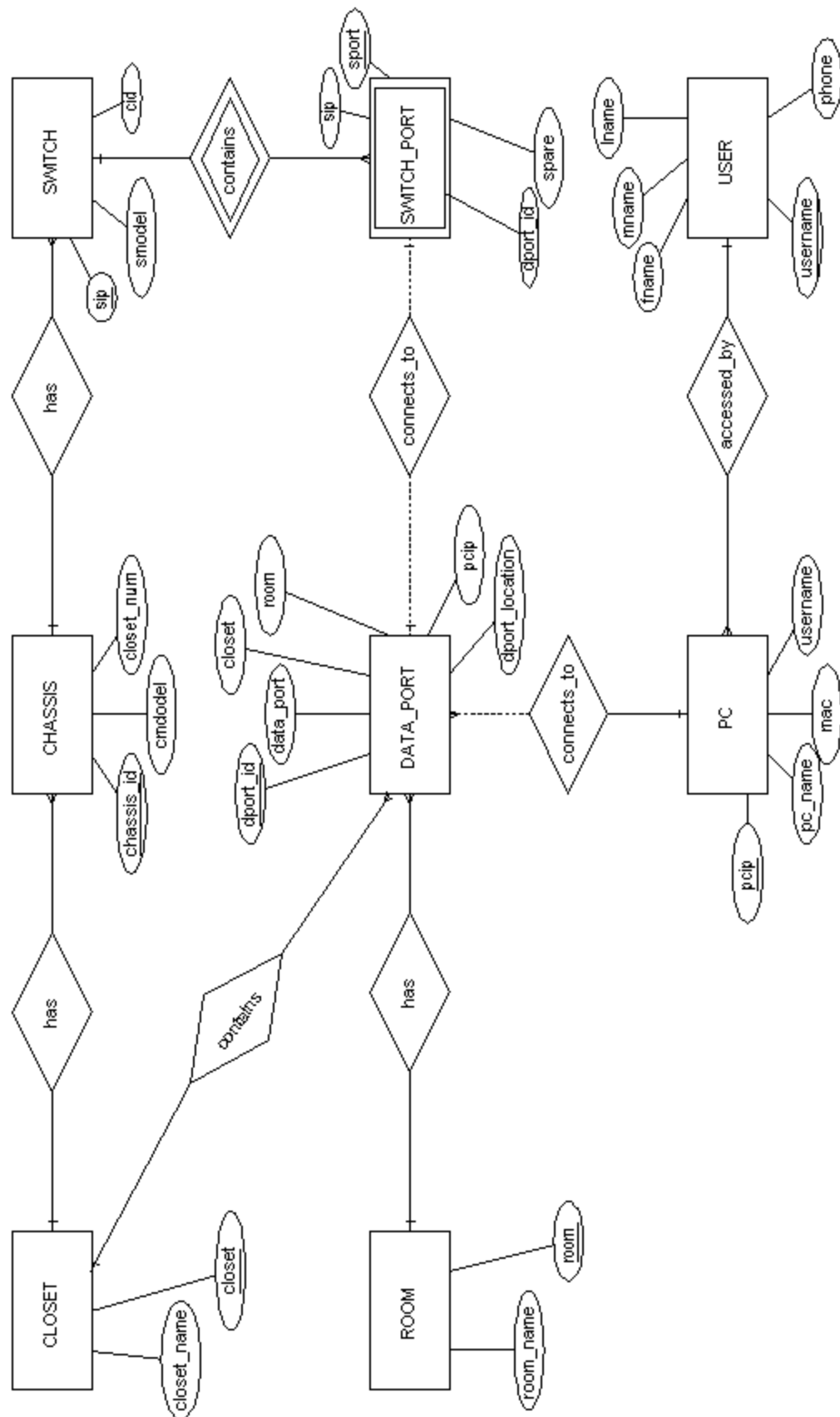
## **FUTURE**

The implementation of the new network information is poised to last well into the future. It is flexible enough to be expanded to the two other networked buildings that are part of KFBS by simply adding the buildings as entities. This solution can easily accommodate the future implementation of IPv6 by replacing the current 32 bit addresses with 128 bit hexadecimal values. Finally, the addition of serial numbers and inventory numbers can be added to the system, along with other devices that are not currently part of the database such as monitors and local printers. These additions would create a true and complete picture of the entire computer network infrastructure at KFBS, but would require the database to be ported over to a more heavy weight database application such as SQL Server.

## REFERENCES

- Brown, B. (2000). *EIA/TIA-568 Wiring Standard*. Retrieved November 16, 2001, from Wellington Institute of Technology Web site: [http://www.cit.ac.nz/smac/winnt/pt1\\_3.htm](http://www.cit.ac.nz/smac/winnt/pt1_3.htm)
- Network Computing Interactive Buyers Guide. (1998). Retrieved November 15, 2001, from [http://www.networkcomputing.com/ibg/ProductInfo?product\\_id=23118](http://www.networkcomputing.com/ibg/ProductInfo?product_id=23118)
- Grigonis, R. (2000). Wiring the Next Gen Office. *Computer Telephony*. Retrieved November 15, 2001 from <http://www.cconvergence.com/article/74550>
- Connolly, P. (2000). Enterprise Toolbox. *Info World*. Retrieved November 13, 2001, from <http://www.infoworld.com/articles/op/xml/00/08/21/000821opbiggs.xml>
- Sturdevant, C. (2000). Bringing Order in Datacenters. *eWEEK*. Retrieved November 15, 2001, from <http://www.zdnet.com/products/stories/reviews/0,4161,2618800,00.html>
- Elmasari, R., & Navathe, S. (2000). Fundamentals of Database Systems. Menlo Park, CA: Addison-Wesley.
- Microsoft Corporation. (2001). *Introduction to .ldb files*. Retrieved November 14, 2001, from [http://support.microsoft.com/support/kb/articles/Q208/7/78.ASP?LN=EN-C2000US&SD=gn&FR=0&qry=maximum%20users%20255&rnk=1&src=DHCS\\_MSPSS\\_gn\\_SRCH&SPR=AC](http://support.microsoft.com/support/kb/articles/Q208/7/78.ASP?LN=EN-C2000US&SD=gn&FR=0&qry=maximum%20users%20255&rnk=1&src=DHCS_MSPSS_gn_SRCH&SPR=AC)
- Xhost Corporation. (2001). *Xsupport*. Retrieved November 16, 2001, from <http://xsupport.xhost.co.uk/v2faq/policy.cfm>

**Appendix A:**  
**Entity Relationship Diagram**



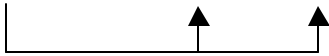
Entity Relationship (ER) Diagram

**Appendix B:**  
**Database Schema**

## DATABASE SCHEMA

### CHASSIS

		<b>FK</b>
<b>chassis_id</b>	cmodel	closet_num



### CLOSET

<u>closet</u>	closet_name



### DATA\_PORT

		<b>FK</b>	<b>FK</b>		<b>FK</b>
<u>dport_id</u>	data_port	closet	room	dport_location	pcip



### PC

			<b>FK</b>
<u>pcip</u>	pc_name	mac	username

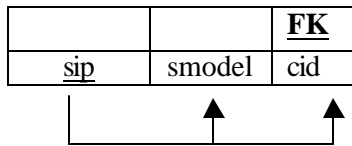
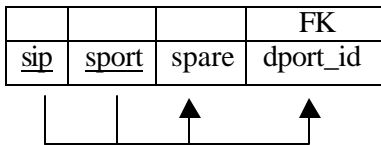
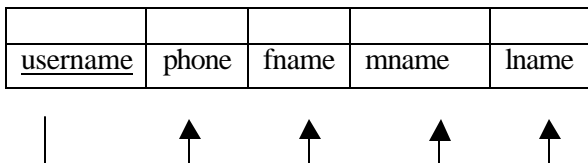


### ROOM

<u>room</u>	room_name





**DATABASE SCHEMA (CONTINUED)****SWITCH****SWITCH\_PORT****USER**

**Appendix C:**  
**Data Dictionary**

## DATA DICTIONARY

TABLE	ATTRIBUTE	MEANING	DATA TYPE	POSSIBLE VALUES
<b>CHASSIS</b>		Hardware in a telecommunications closet that may contain multiple network switches		
	<u>chassis_id</u>	Unique chassis identification number	AutoNumber	1 to 32,768
	cmodel	Model number of a specific chassis	Alphanumeric, 40 characters	Any alphanumeric
	closet_num	See definition for CLOSET.closet		
<b>CLOSET</b>		Telecommunications room number where the computer networking equipment is located		
	<u>closet</u>	Unique room number of a telecommunications closet	nnnn(a)	0001(A) to 4999(Z)
	closet_name	Familiar name of a telecommunications closet	na	1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A,4B
<b>DATA_PORT</b>		Physical data port that is hard-wired from telecommunications closet to individual rooms on each floor		
	<u>dport_id</u>	Unique data port identification number	AutoNumber	1 to 32,768
	data_port	data port prefix and data port number, separated by “-” Note: Initial Port prefix character indicates section of building that port is located & Second port prefix, D, indicates that the port is a data port	aa-nnn	AD-00 to AD-999
	closet	See definition for CLOSET.closet		
	room	See definition for ROOM.room		
	dport_location	Physical location of a data port in a room	Alphanumeric, 75 characters	Any alphanumeric
	pcip	See definition for PC.pcip		

**DATA DICTIONARY (CONTINUED)**

TABLE	ATTRIBUTE	MEANING	DATA TYPE	POSSIBLE VALUES
<b>PC</b>		Personal computer, printer, or other networked device		
	<u>pcip</u>	Unique IP address bound to NIC <u>Note:</u> Multiple spare data ports in a room without an IP address will be denoted by a single letter appended onto the users main IP address	Alphanumeric, 16 characters	0.0.0.0 through 255.255.255.255
	pc_name	The name configured to a network device	Alphanumeric, 25 characters	Any alphanumeric
	mac	Hexadecimal Ethernet address bound to NIC	Alphanumeric, 12 characters	000000000000 to ffffffff
	username	See definition for USER.username		
<b>ROOM</b>		Physical room in building		
	<u>room</u>	Unique room number in building <u>Note:</u> Room 0000 is dummy value for unknown port/room location	nnnn(a), 5 characters	0000(A-Z) to 4999(A-Z)
	room_name	Familiar name of room	Alphanumeric, 50 characters	Any alphanumeric
<b>SWITCH</b>		A hardware device that forwards packets on a computer network		
	<u>sip</u>	Unique IP address of networking switch	Alphanumeric, 15 characters	0.0.0.0 through 255.255.255.255
	smodel	Model number of a switch	Alphanumeric, 20 characters	Any alphanumeric
	cid	See definition for CHASSIS.chassis_id		

**DATA DICTIONARY (CONTINUED)**

TABLE	ATTRIBUTE	MEANING	DATA TYPE	POSSIBLE VALUES
<b>SWITCH_PORT</b>		Switch port interface on a specific switch		
	<u>sip</u>	See definition for SWITCH.sip		
	<u>sport</u>	Port number on a specific switch	nnn	1 to 999
	spare	Indicates if switch port is available or in use	Binary	True or False
	dport_id	See definition for DATA_PORT.dport_id		
<b>USER</b>		A person associated with a network device		
	<u>username</u>	Unique account name associated with a network device	Alphanumeric, 25 characters	Any alphanumeric
	phone	Contact telephone number associated with username	(nnn) nnn-nnnn	
	fname	First name of individual	Alphanumeric, 50 characters	Any alphanumeric
	mname	Optional middle name or initial of individual	Alphanumeric, 50 characters	Any alphanumeric
	lname	Last name (surname) of individual	Alphanumeric, 50 characters	Any alphanumeric

**Appendix D:**  
**Cold Fusion code**

**Cold Fusion code for Query page: index.cfm (Page 1/4)**

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<html>
<head>
    <title>KFBS Network Port Information</title>
<!-- Banner image and links code -->
<STYLE>
A.GlobalClass {color:white;text-decoration:none}
A.GlobalClass:hover {color:yellow;}
A.LocalClass {color:#ffffff;text-decoration:none}
A.LocalClass:hover {color:yellow;}
</STYLE>

<SCRIPT LANGUAGE="JavaScript">

    n = (document.layers) ? 1:0;
    ie = (document.all) ? 1:0;

    function fltshow(fltDiv) {
        if (n) {
            //document.captureEvents(Event.MOUSEOVER);
            //document.onmouseover = mouserboy;
            //function mouserboy(e,fltDiv) {
            //document.layers[fltDiv].left = e.pageX;
            //alert(e.pageX)
            //}
            //alert(document.e.pageX);
            //alert(sd.pageX);
            document.layers[fltDiv].visibility = "show";
        }
        else if (ie){
            //alert(event.x);
            document.all[fltDiv].style.visibility = "visible";
        }
    }

    function flthide(fltDiv) {
        if (n) {
            looptrip = document.layers.length;
            for (i = 0; i < looptrip; i++){
                document.layers[i].visibility = "hide";
            }
        }
        else if (ie) {
            var doc_tables = document.all.tags("DIV");
            for (i=0; i<doc_tables.length; i++){
                var s = "";
                s = doc_tables(i).id;
                r = s.search("Div");
                //alert(eval(""+s+""))
                if (r != -1){ //doc_tables(i).style.visibility = "visible";
                    document.all[s].style.visibility= "hidden" ;
                }
            }
        }
    }

    var slideimages=new Array()
    var slidelinks=new Array()
    function slideshowimages(){
        for (i=0;i<slideshowimages.arguments.length;i++){
            slideimages[i]=new Image()
            slideimages[i].src=slideshowimages.arguments[i]
        }
    }

```

**Cold Fusion code for Query page: index.cfm (Page 2/4 )**

```

}

function slideshowlinks(){
for (i=0;i<slideshowlinks.arguments.length;i++){
slidelinks[i]=slideshowlinks.arguments[i]
}

function gotoshow(){
if (!window.winslide||winslide.closed)
winslide=window.open(slidelinks[whichlink])
else
winslide.location=slidelinks[whichlink]
winslide.focus()
}

</SCRIPT>

<title>Kenan Flagler Intranet</title>

</head>

<BODY BGCOLOR="white" TOPMARGIN="0" LEFTMARGIN="0" MARGINWIDTH="0" MARGINHEIGHT="0"
TEXT="#000000">

<TABLE WIDTH="100%" BGCOLOR="black" VALIGN="TOP" CELLPADDING="3" CELLSPACING="0" BORDER="0">
<TR BGCOLOR="Black">
<TD VALIGN="top" BGCOLOR="black" WIDTH="456" HEIGHT="50" ALIGN="left" ROWSPAN="2">
<A HREF="index.html" onMouseOver="flthide();" >IMG WIDTH="450" HEIGHT="50"
SRC="/images/banner2.gif" BORDER="0" ALT="Kenan Flagler" ALIGN="left"</A>
</TD>
<TD VALIGN="top" BGCOLOR="#46008F" WIDTH="100%">
<DIV ID="GlobalMenu" ALIGN="left" STYLE="font-family:Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 10pt; color: white; visibility: visible;">
<B>
| <A ID="menu1" onMouseOver="flthide(); fltshow('menu1Div');" STYLE="color: white; text-decoration:
none; font-family: Arial" HREF="http://intranet.kenan-flagler.unc.edu/">intranet</A> | <A ID="menu2"
onMouseOver="flthide(); fltshow('menu2Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://www.unc.edu"> UNC </A> | <A ID="menu3" onMouseOver="flthide(); fltshow('menu3Div');" STYLE="color: white;
text-decoration: none; font-family: Arial" HREF="http://www.kenan-flagler.unc.edu">kenan flagler</A> | <A ID="menu4"
onMouseOver="flthide(); fltshow('menu4Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://intranet.kenan-flagler.unc.edu/ois/">enterprise</A>
</B>
</DIV>

<DIV ID="menu1Div" STYLE=" visibility: hidden; position: absolute; left: 463; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu1Div');" ONMOUSEOVER="fltshow('menu1Div');"
ONBLUR="flthide('menu1Div');" >
<DIV ALIGN="left">
<B>
_____  

<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/index.html">Intranet &nbsp; Home</A><BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/itr/Help/Tips___Tricks/Email/Request_Help/request_help.html">Submit &nbsp; Request &nbsp; to &nbsp; Helpdesk</A>
<BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-flagler.unc.edu/itr/">ITR</A><BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/Webdev/index.cfm">KFBS &nbsp; WebDev</A><BR>
<A CLASS="GlobalClass"
HREF="mailto:intranetfeedback@bschool.unc.edu">Questions &nbsp; &nbsp; Comments &nbsp; about &nbsp; this &nbsp; site</A>
<BR>
</B>
</DIV>
</DIV>

```





**Cold Fusion code for Query page: index.cfm (Page 4/4)**

```

<table border="0" cellpadding="0" cellspacing="10">
  <tr>
    <td align="center">
      <select name="select_query">
        <option value="0" selected>-- Choose a query field--</option>
        <option value="1">Closet</option>
        <option value="2">Computer name</option>
        <option value="3">Client IP address</option>
        <option value="4">Last Name</option>
        <option value="5">MAC address</option>
        <option value="6">Room</option>
        <option value="7">Switch IP address</option>
        <option value="8">Username</option>
      </select>
    </td>
    <td align="center">
      <input type="text" name="search" size=30<table align="center" cellspacing="0" cellpadding="0" border="0">
    </td>
  </tr>
  <tr>
    <td align="center">
      &nbsp;
    </td>
    <td align="center"><input type="submit" name="submit" value="Submit Query"></td>
  </tr>
</table>
</form>
</body>
</html>

```

**Cold Fusion code for Search Web page: search.cfm (Page 1/9)**

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<html>
<head>
    <title>KFBS Network Port Information</title>
<!-- Banner image and links code -->
<STYLE>
A.GlobalClass {color:white;text-decoration:none}
A.GlobalClass:hover {color:yellow;}
A.LocalClass {color:#ffffff;text-decoration:none}
A.LocalClass:hover {color:yellow;}
</STYLE>

<SCRIPT LANGUAGE="JavaScript">

    n = (document.layers) ? 1:0;
    ie = (document.all) ? 1:0;

        function fltshow(fltDiv) {
            if (n) {
                //document.captureEvents(Event.MOUSEOVER);
                //document.onmouseover = mouserboy;
                //function mouserboy(e,fltDiv) {
                //document.layers[fltDiv].left = e.pageX;
                //alert(e.pageX)
                //}
                //alert(document.e.pageX);
                //alert(sd.pageX);
                document.layers[fltDiv].visibility = "show";
            }
            else if (ie){
                //alert(event.x);
                document.all[fltDiv].style.visibility = "visible";
            }
        }

    function flthide(fltDiv) {
        if (n) {
            looptrip = document.layers.length;
            for (i = 0; i < looptrip; i++){
                document.layers[i].visibility = "hide";
            }
        }
        else if (ie) {
            var doc_tables = document.all.tags("DIV");
            for (i=0; i<doc_tables.length; i++){
                var s = "";
                s = doc_tables(i).id;
                r = s.search("Div");
                //alert(eval("'+s+'"))
                if (r != -1){ //doc_tables(i).style.visibility = "visible";
                    document.all[s].style.visibility = "hidden" ;
                }
            }
        }
    }

var slideimages=new Array()
var slidelinks=new Array()
function slideshowimages(){
for (i=0;i<slideshowimages.arguments.length;i++){
slideimages[i]=new Image()
slideimages[i].src=slideshowimages.arguments[i]
}
}

```

**Cold Fusion code for Search Web page: search.cfm (Page 2/9)**

```

}

function slideshowlinks(){
for (i=0;i<slideshowlinks.arguments.length;i++)
slidelinks[i]=slideshowlinks.arguments[i]
}

function gotoshow(){
if (!window.winslide||winslide.closed)
winslide=window.open(slidelinks[whichlink])
else
winslide.location=slidelinks[whichlink]
winslide.focus()
}

</SCRIPT>

<title>Kenan Flagler Intranet</title>
</head>

<BODY BGCOLOR="white" TOPMARGIN="0" LEFTMARGIN="0" MARGINWIDTH="0" MARGINHEIGHT="0"
TEXT="#000000">

<TABLE WIDTH="100%" BGCOLOR="black" VALIGN="TOP" CELLPADDING="3" CELLSPACING="0" BORDER="0">
<TR BGCOLOR="Black">
<TD VALIGN="top" BGCOLOR="black" WIDTH="456" HEIGHT="50" ALIGN="left" ROWSPAN="2">
<A HREF="index.html" onMouseOver="flthide();" ><IMG WIDTH="450" HEIGHT="50"
SRC="/images/banner2.gif" BORDER="0" ALT="Kenan Flagler" ALIGN="left"></A>
</TD>
<TD VALIGN="top" BGCOLOR="#46008F" WIDTH="100%">
<DIV ID="GlobalMenu" ALIGN="left" STYLE="font-family:Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 10pt; color: white; visibility: visible;">
<B>
| <A ID="menu1" onMouseOver="flthide(); fltshow('menu1Div');" STYLE="color: white; text-decoration:
none; font-family: Arial" HREF="http://intranet.kenan-flagler.unc.edu/">intranet</A> | <A ID="menu2"
onMouseOver="flthide(); fltshow('menu2Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://www.unc.edu"> UNC </A> | <A ID="menu3" onMouseOver="flthide(); fltshow('menu3Div');" STYLE="color: white;
text-decoration: none; font-family: Arial" HREF="http://www.kenan-flagler.unc.edu">kenan flagler</A> | <A ID="menu4"
onMouseOver="flthide(); fltshow('menu4Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://intranet.kenan-flagler.unc.edu/ois/">enterprise</A>
</B>
</DIV>

<DIV ID="menu1Div" STYLE=" visibility: hidden; position: absolute; left: 463; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu1Div');" ONMOUSEOVER="fltshow('menu1Div');"
ONBLUR="flthide('menu1Div');">
<DIV ALIGN="left">
<B>
<BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/index.html">Intranet&nbsp;Home</A><BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/itr/Help/Tips___Tricks/Email/Request_Help/request_help.html">Submit&nbsp;Request&nbsp;to&nbsp;Helpdesk</A>
<BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-flagler.unc.edu/itr/">ITR</A><BR>
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/Webdev/index.cfm">KFBS&nbsp;WebDev</A><BR>
<A CLASS="GlobalClass"
HREF="mailto:intranetfeedback@bschool.un.c.edu">Questions&nbsp;&nbsp;Comments&nbsp;about&nbsp;this&nbsp;site</A>
<BR>
</B>
</DIV>
</DIV>

```

**Cold Fusion code for Search Web page: search.cfm (Page 3/9)**

```

<DIV ID="menu2Div" STYLE="visibility: hidden; position: absolute; left: 530; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu2Div');" ONMOUSEOVER="fltshow('menu2Div');"
ONBLUR="flthide('menu2Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://www.unc.edu/">UNC&nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="https://www-
s2.ais.unc.edu/servlet/SISBrowserServlet">UNC&nbsp;Online&nbsp;Registration</A><BR>
    <A CLASS="GlobalClass" HREF="http://help.unc.edu/">ATN</A><BR>
</B></DIV>
</DIV>

<DIV ID="menu3Div" STYLE="visibility: hidden; position: absolute; left: 567; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu3Div');" ONMOUSEOVER="fltshow('menu3Div');"
ONBLUR="flthide('menu3Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://www.kenan-
flagler.unc.edu">Kenan&nbsp;Flagler&nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="index.html">Intranet&nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="http://www.kenan-
flagler.unc.edu/news/index.html">Kenan&nbsp;Flagler&nbsp;News&nbsp;and&nbsp;Events</A><BR>
</B></DIV>
</DIV>

<DIV ID="menu4Div" STYLE="visibility: hidden; position: absolute; left: 660; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu4Div');" ONMOUSEOVER="fltshow('menu4Div');"
ONBLUR="flthide('menu4Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://intranet.kenan-flagler.unc.edu/ois/">enterprise</A><BR>
</B></DIV>
</DIV>

</TD>
</TR>
<TR BGCOLOR="Black">
<TD VALIGN="top" BGCOLOR="black" WIDTH="100%" HEIGHT="100%">
    <A HREF="index.html" onMouseOver="flthide();" ><IMG SRC="/images/spacer.gif" WIDTH="300"
HEIGHT="45" BORDER="0" ALIGN="right" ALT=""></A>
    </TD>
</TR>
</table>
</head>

<h1>&nbsp;KFBS Network Port Information</h1>
<br>
<br>
<body>

    <h2>&nbsp;KFBS Port Database Search Results:</h2>

    <!-- Conditional search queries Begin Here --->
    <!-- If selection is closet execute this code --->
    <cfif #form.select_query# eq 1>
    <cfquery name="closet" datasource="WDports" dbtype="ODBC">
    SELECT CLOSET.closet_name, DATA_PORT.data_port, SWITCH.sip, SWITCH_PORT.sport, PC.pcip, ROOM.room,
    USER.username, USER.fname, USER.lname
    FROM [USER] INNER JOIN (SWITCH INNER JOIN (ROOM INNER JOIN (PC INNER JOIN ((CLOSET INNER JOIN
    DATA_PORT ON CLOSET.closet = DATA_PORT.closet) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id =
    SWITCH_PORT.dport_id) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room = DATA_PORT.room) ON SWITCH.sip =
    SWITCH_PORT.sip) ON USER.username = PC.username
    WHERE (((CLOSET.closet_name)=#search#))
    ORDER BY data_port
    </cfquery>
    <!-- Unsuccessful query! -->
    <cfif closet.RecordCount eq 0>

```



**Cold Fusion code for Search Web page: search.cfm (Page 5/9)**

```

</tr>
<cfoutput query="computer_name">
<tr>
    <td>#pc_name#</td>
    <td>#fname# #lname#</td>
    <td>#username#</td>
    <td>#pcip#</td>
    <td>#room#</td>
    <td>#data_port#</td>
    <td>#closet_name#</td>
    <td>#sip#, #sport#</td>
    <td></td>
</tr>
</cfoutput>
</table>
</cfif>
<!-- If selection is client IP, execute this code! --->
<cfif #form.select_query# eq 3>
<cfquery name="client_ip" datasource="WDports" dbtype="ODBC">
SELECT PC.pcip, PC.pc_name, USER.lname, USER.fname, USER.username, DATA_PORT.room, DATA_PORT.data_port,
CLOSET.closet_name, SWITCH.sip, SWITCH_PORT.sport
FROM [USER] INNER JOIN (SWITCH INNER JOIN ((ROOM INNER JOIN (PC INNER JOIN (CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room =
DATA_PORT.room) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id = SWITCH_PORT.dport_id) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((PC.pcip) Like '#search#%'))
ORDER BY PC.pcip
</cfquery>
<!-- Unsuccessful query! -->
<cfif client_ip.RecordCount eq 0>
    <cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
    <td align="left">
        <h3>&nbsp;  Search criteria: <font face="" color="green">Client IP:
<cfoutput>#search#</cfoutput></font></h3>
    </td>
    <td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccff">
    <td><b><font size="+1">Client IP</font></b></td>
    <td><b><font size="+1">Computer Name</font></b></td>
    <td><b><font size="+1">Name</font></b></td>
    <td><b><font size="+1">Username</font></b></td>
    <td><b><font size="+1">Room</font></b></td>
    <td><b><font size="+1">Data Port</font></b></td>
    <td><b><font size="+1">Closet</font></b></td>
    <td><b><font size="+1">Switch IP, Port</font></b></td>
</tr>
<cfoutput query="client_ip">
<tr>
    <td>#pcip#</td>
    <td>#pc_name#</td>
    <td>#fname# #lname#</td>
    <td>#username#</td>
    <td>#room#</td>
    <td>#data_port#</td>
    <td>#closet_name#</td>
    <td>#sip#, #sport#</td>
    <td></td>
</tr>
</cfoutput>
</table>
</cfif>
<!-- If selection is Last Name, execute this code! --->

```

**Cold Fusion code for Search Web page: search.cfm (Page 6/9)**

```

<cfif #form.select_query# eq 4>
<cfquery name="last_name" datasource="WDports" dbtype="ODBC">
SELECT USER.lname, USER.fname, PC.pc_name, USER.username, PC.pcip, ROOM.room, DATA_PORT.data_port,
CLOSET.closet_name, SWITCH.sip, SWITCH_PORT.sport
FROM [USER] INNER JOIN (SWITCH INNER JOIN ((ROOM INNER JOIN (PC INNER JOIN (CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room =
DATA_PORT.room) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id = SWITCH_PORT.dport_id) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((USER.lname) Like '#search#%'))
ORDER BY lname, fname
</cfquery>
<!-- Unsuccessful query! -->
<cfif last_name.RecordCount eq 0>
<cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
<td align="left">
<h3>&nbsp;&nbsp; Search criteria: <font face="" color="green">Last Name:
<cfoutput>#search#</cfoutput></font></h3>
</td>
<td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccf">
<td><b><font size="+1">Name</font></b></td>
<td><b><font size="+1">Computer Name</font></b></td>
<td><b><font size="+1">Username</font></b></td>
<td><b><font size="+1">Client IP</font></b></td>
<td><b><font size="+1">Room</font></b></td>
<td><b><font size="+1">Data Port</font></b></td>
<td><b><font size="+1">Closet</font></b></td>
<td><b><font size="+1">Switch IP, Port</font></b></td>
</tr>
<cfoutput query="last_name">
<tr>
<td>#lname#, #fname#</td>
<td>#pc_name#</td>
<td>#username#</td>
<td>#pcip#</td>
<td>#room#</td>
<td>#data_port#</td>
<td>#closet_name#</td>
<td>#sip#, #sport#</td>
</tr>
</cfoutput>
</table>
</cfif>
<!-- If selection is MAC address, execute this code! --->
<cfif #form.select_query# eq 5>
<cfquery name="select_mac" datasource="WDports" dbtype="ODBC">
SELECT PC.mac, USER.lname, USER.fname, PC.pc_name, USER.username, PC.pcip, ROOM.room, DATA_PORT.data_port,
CLOSET.closet_name, SWITCH.sip, SWITCH_PORT.sport
FROM [USER] INNER JOIN (SWITCH INNER JOIN ((ROOM INNER JOIN (PC INNER JOIN (CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room =
DATA_PORT.room) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id = SWITCH_PORT.dport_id) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((PC.mac) Like '#search#%'))
ORDER BY mac
</cfquery>
<!-- Unsuccessful query! -->
<cfif select_mac.RecordCount eq 0>
<cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
<td align="left">

```



**Cold Fusion code for Search Web page: search.cfm (Page 7/9)**

```

        <h3>&nbsp;Search criteria: <font face="" color="green">MAC address:
<cfoutput>#search#</cfoutput></font></h3>
        </td>
        <td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccf">
        <td><b><font size="+1">MAC address</font></b></td>
        <td><b><font size="+1">Name</font></b></td>
        <td><b><font size="+1">omputer Name</font></b></td>
        <td><b><font size="+1">Username</font></b></td>
        <td><b><font size="+1">Client IP</font></b></td>
        <td><b><font size="+1">Room</font></b></td>
        <td><b><font size="+1">Data Port</font></b></td>
        <td><b><font size="+1">Closet</font></b></td>
        <td><b><font size="+1">Switch IP, Port</font></b></td>
</tr>
<cfoutput query="select_mac">
<tr>
        <td>#mac#</td>
        <td>#fname# #lname#</td>
        <td>#pc_name#</td>
        <td>#username#</td>
        <td>#pcip#</td>
        <td>#room#</td>
        <td>#data_port#</td>
        <td>#closet_name#</td>
        <td>#sip#, #sport#</td>
</tr>
</cfoutput>
</table>
</cfif>
<!-- If selection is Room, execute this code! --->
<cfif #form.select_query# eq 6>
<cfquery name="room_number" datasource="WDports" dbtype="ODBC">
SELECT ROOM.room, USER.lname, USER.fname, DATA_PORT.data_port, PC.pc_name, USER.username, PC.pcip,
DATA_PORT.data_port, CLOSET.closet_name, SWITCH.sip, SWITCH_PORT.sport
FROM [USER] INNER JOIN (SWITCH INNER JOIN (ROOM INNER JOIN (PC INNER JOIN ((CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id =
SWITCH_PORT.dport_id) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room = DATA_PORT.room) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((ROOM.room) LIKE '#search#%'))
ORDER BY ROOM.room
</cfquery>
<!-- Unsuccessful query! -->
<cfif room_number.RecordCount eq 0>
        <cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
        <td align="left">
                <h3>&nbsp;Search criteria: <font face="" color="green">Room number:
<cfoutput>#search#</cfoutput></font></h3>
                </td>
                <td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccf">
        <td><b><font size="+1">Room</font></b></td>
        <td><b><font size="+1">Name</font></b></td>
        <td><b><font size="+1">Computer Name</font></b></td>
        <td><b><font size="+1">Username</font></b></td>
        <td><b><font size="+1">Client IP</font></b></td>
        <td><b><font size="+1">Data Port</font></b></td>
        <td><b><font size="+1">Closet</font></b></td>
        <td><b><font size="+1">Switch IP, Port</font></b></td>

```

**Cold Fusion code for Search Web page: search.cfm (Page 8/9)**

```

</tr>
<cfoutput query="room_number">
<tr>
    <td>#room#</td>
    <td>#lname#, #fname#</td>
    <td>#pc_name#</td>
    <td>#username#</td>
    <td>#pcip#</td>
    <td>#data_port#</td>
    <td>#closet_name#</td>
    <td>#sip#, #sport#</td>
</tr>
</cfoutput>
</table>
</cfif>
<!-- If selection is Switch IP address, execute this code! --->
<cfif #form.select_query# eq 7>
<cfquery name="switch_ip" datasource="WDports" dbtype="ODBC">
SELECT SWITCH.sip, SWITCH_PORT.sport, ROOM.room, USER.lname, USER.fname, DATA_PORT.data_port, PC.pc_name,
USER.username, PC.pcip, CLOSET.closet_name
FROM [USER] INNER JOIN (SWITCH INNER JOIN (ROOM INNER JOIN (PC INNER JOIN ((CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id =
SWITCH_PORT.dport_id) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room = DATA_PORT.room) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((SWITCH.sip) Like '#search#%'))
ORDER BY SWITCH.sip, SWITCH_PORT.sport
</cfquery>
<!-- Unsuccessful query! -->
<cfif switch_ip.RecordCount eq 0>
    <cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
    <td align="left">
        <h3>&nbsp;Search criteria: <font face="" color="green">Switch IP address:
<cfoutput>#search#</cfoutput></font></h3>
    </td>
    <td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccf">
    <td><b><font size="+1">Switch IP</font></b></td>
    <td><b><font size="+1">Switch Port</font></b></td>
    <td><b><font size="+1">Room</font></b></td>
    <td><b><font size="+1">Name</font></b></td>
    <td><b><font size="+1">Computer Name</font></b></td>
    <td><b><font size="+1">Username</font></b></td>
    <td><b><font size="+1">Client IP</font></b></td>
    <td><b><font size="+1">Data Port</font></b></td>
    <td><b><font size="+1">Closet</font></b></td>
</tr>
<cfoutput query="switch_ip">
<tr>
    <td>#sip#</td>
    <td>#sport#</td>
    <td>#room#</td>
    <td>#lname# #fname#</td>
    <td>#pc_name#</td>
    <td>#username#</td>
    <td>#pcip#</td>
    <td>#data_port#</td>
    <td>#closet_name#</td>
</tr>
</cfoutput>
</table>
</cfif>

```

**Cold Fusion code for Search Web page: search.cfm (Page 9/9)**

```

<!-- If selection is Username, execute this code!      --->
<cfif #form.select_query# eq 8>
<cfquery name="user_name" datasource="WDports" dbtype="ODBC">
SELECT USER.username, USER.lname, USER.fname, PC.pc_name, PC.pcip, DATA_PORT.room, DATA_PORT.data_port,
CLOSET.closet_name, SWITCH.sip, SWITCH_PORT.sport
FROM [USER] INNER JOIN (SWITCH INNER JOIN (ROOM INNER JOIN (PC INNER JOIN ((CLOSET INNER JOIN
DATA_PORT ON CLOSET.closet = DATA_PORT.closet) INNER JOIN SWITCH_PORT ON DATA_PORT.dport_id =
SWITCH_PORT.dport_id) ON PC.pcip = DATA_PORT.pcip) ON ROOM.room = DATA_PORT.room) ON SWITCH.sip =
SWITCH_PORT.sip) ON USER.username = PC.username
WHERE (((USER.username) Like '#search#%'))

ORDER BY SWITCH.sip, SWITCH_PORT.sport
</cfquery>
<!-- Unsuccessful query! -->
<cfif user_name.RecordCount eq 0>
    <cflocation url="no_result.cfm">
</cfif>
<table width="100%" border="0">
<tr>
    <td align="left">
        <h3>&nbsp;  Search criteria: <font face="" color="green">Username:
<cfoutput>#search#</cfoutput></font></h3>
    </td>
    <td align="center"><h3><a href="index.cfm"><font face="" color="Red">Search Again?</font></a></h3></td>
</tr>
</table>
<table width="100%" border="1">
<tr bgcolor="#99ccf">
    <td><b><font size="+1">Username</font></b></td>
    <td><b><font size="+1">Name</font></b></td>
    <td><b><font size="+1">Computer Name</font></b></td>
    <td><b><font size="+1">Client IP</font></b></td>
    <td><b><font size="+1">Room</font></b></td>
    <td><b><font size="+1">Data Port</font></b></td>
    <td><b><font size="+1">Closet</font></b></td>
    <td><b><font size="+1">Switch IP, Port</font></b></td>
</tr>
<cfoutput query="user_name">
<tr>
    <td>#username#</td>
    <td>#fname# #lname#</td>
    <td>#pc_name#</td>
    <td>#pcip#</td>
    <td>#room#</td>
    <td>#data_port#</td>
    <td>#closet_name#</td>
    <td>#sip#, #sport#</td>
</tr>
</cfoutput>
</table>
</cfif>
</body>
</html>

```

**Cold Fusion code for Query with no results Web page: no\_results.cfm (Page 1/3)**

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">

<html>
<head>
    <title>KFBS Network Port Information</title>
    <!-- Banner image and links code -->
    <STYLE>
    A.GlobalClass {color:white;text-decoration:none}
    A.GlobalClass:hover {color:yellow;}
    A.LocalClass {color:#ffffff;text-decoration:none}
    A.LocalClass:hover {color:yellow;}
    </STYLE>

    <SCRIPT LANGUAGE="JavaScript">

        n = (document.layers) ? 1:0;
        ie = (document.all) ? 1:0;

        function fltshow(fltDiv) {
            if (n) {
                //document.captureEvents(Event.MOUSEOVER);
                //document.onmouseover = mouserboy;
                //function mouserboy(e,fltDiv ) {
                //document.layers[fltDiv].left = e.pageX;
                //alert(e.pageX)
                //}
                //alert(document.e.pageX);
                //alert(sd.pageX);
                document.layers[fltDiv].visibility = "show";
            }
            else if (ie){
                //alert(event.x);
                document.all[fltDiv].style.visibility = "visible";
            }
        }

        function flthide(fltDiv) {
            if (n) {
                looptrip = document.layers.length;
                for (i = 0; i < looptrip; i++){
                    document.layers[i].visibility = "hide";
                }
            }
            else if (ie) {
                var doc_tables = document.all.tags("DIV");
                for (i=0; i<doc_tables.length; i++){
                    var s = "";
                    s = doc_tables(i).id;
                    r = s.search("Div");
                    //alert(eval(""+s+""))
                    if (r != -1){ //doc_tables(i).style.visibility = "visible";
                        document.all[s].style.visibility="hidden" ;
                    }
                }
            }
        }

        var slideimages=new Array()
        var slidelinks=new Array()
        function slideshowimages(){
            for (i=0;i<slideshowimages.arguments.length;i++){
                slideimages[i]=new Image()
                slideimages[i].src=slideshowimages.arguments[i]
            }
        }
    </SCRIPT>

```

**Cold Fusion code for Query with no results Web page: no\_results.cfm (Page 2/3)**

```
function slideshowlinks(){
for (i=0;i<slideshowlinks.arguments.length;i++)
slidelinks[i]=slideshowlinks.arguments[i]
}
```

```
function gotoshow(){
if (!window.winslide||winslide.closed)
winslide=window.open(slidelinks[whichlink])
else
winslide.location=slidelinks[whichlink]
winslide.focus()
}
```

```
</SCRIPT>
```

```
<title>Kenan Flagler Intranet</title>
```

```
</head>
```

```
<BODY BGCOLOR="white" TOPMARGIN="0" LEFTMARGIN="0" MARGINWIDTH="0" MARGINHEIGHT="0"
TEXT="#000000">
```

```
<TABLE WIDTH="100%" BGCOLOR="black" VALIGN="TOP" CELLPADDING="3" CELLSPACING="0" BORDER="0">
<TR BGCOLOR="Black">
```

```
<TD VALIGN="top" BGCOLOR="black" WIDTH="456" HEIGHT="50" ALIGN="left" ROWSPAN="2">
```

```
<A HREF="index.html" onMouseOver="flthide();" ><IMG WIDTH="450" HEIGHT="50"
```

```
SRC="/images/banner2.gif" BORDER="0" ALT="Kenan Flagler" ALIGN="left"></A>
```

```
</TD>
```

```
<TD VALIGN="top" BGCOLOR="#46008F" WIDTH="100%">
```

```
<DIV ID="GlobalMenu" ALIGN="left" STYLE="font-family:Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 10pt; color: white; visibility: visible;">
```

```
<B>
```

```
| <A ID="menu1" onMouseOver="flthide();fltshow('menu1Div');" STYLE="color: white; text-decoration:
none; font-family: Arial" HREF="http://intranet.kenan-flagler.unc.edu/">intranet</A> | <A ID="menu2"
onMouseOver="flthide();fltshow('menu2Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://www.unc.edu"> UNC </A> | <A ID="menu3" onMouseOver="flthide(); fltshow('menu3Div');" STYLE="color: white;
text-decoration: none; font-family: Arial" HREF="http://www.kenan-flagler.unc.edu">kenan flagler</A> | <A ID="menu4"
onMouseOver="flthide();fltshow('menu4Div');" STYLE="color: white; text-decoration: none; font-family: Arial"
HREF="http://intranet.kenan-flagler.unc.edu/ois/">enterprise</A>
```

```
</B>
```

```
</DIV>
```

```
<DIV ID="menu1Div" STYLE=" visibility: hidden; position: absolute; left: 463; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu1Div');" ONMOUSEOVER="fltshow('menu1Div');"
ONBLUR="flthide('menu1Div');" >
```

```
<DIV ALIGN="left">
```

```
<B>
```

```
<BR>
```

```
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/index.html">Intranet&nbsp;Home</A><BR>
```

```
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/itr/Help/Tips___Tricks/Email/Request_Help/request_help.html">Submit&nbsp;Request&nbsp;to&nbsp;Helpdesk</A>
<BR>
```

```
<A CLASS="GlobalClass" HREF="http://intranet.kenan-flagler.unc.edu/itr/">ITR</A><BR>
```

```
<A CLASS="GlobalClass" HREF="http://intranet.kenan-
flagler.unc.edu/Webdev/index.cfm">KFBS&nbsp;WebDev</A><BR>
```

```
<A CLASS="GlobalClass"
```

```
HREF="mailto:intranetfeedback@bschool.unc.edu">Questions&nbsp;&nbsp;Comments&nbsp;about&nbsp;this&nbsp;site</A>
<BR>
```

```
</B>
```

```
</DIV>
```

```
</DIV>
```

```
<DIV ID="menu2Div" STYLE="visibility: hidden; position: absolute; left: 530; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
```

**Cold Fusion code for Query with no results Web page: no\_results.cfm (Page 1/3)**

```

color: #46008F;" ONMOUSEOUT="flthide('menu2Div');" ONMOUSEOVER="fltshow('menu2Div');"
ONBLUR="flthide('menu2Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://www.unc.edu/">UNC&nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="https://www-
s2.ais.unc.edu/servlet/SISBrowserServlet">UNC&nbsp;Online&nbsp;Registration</A><BR>
    <A CLASS="GlobalClass" HREF="http://help.unc.edu/">ATN</A><BR>
</B></DIV>
</DIV>

<DIV ID="menu3Div" STYLE="visibility: hidden; position: absolute; left: 567; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu3Div');" ONMOUSEOVER="fltshow('menu3Div');"
ONBLUR="flthide('menu3Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://www.kenan-
flagler.unc.edu">Kenan&nbsp;Flagler&nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="index.html">Intranet &nbsp;Home</A><BR>
    <A CLASS="GlobalClass" HREF="http://www.kenan-
flagler.unc.edu/news/index.html">Kenan&nbsp;Flagler&nbsp;News&nbsp;and&nbsp;Events</A><BR>
</B></DIV>
</DIV>

<DIV ID="menu4Div" STYLE="visibility: hidden; position: absolute; left: 660; top: 20; font-family: Arial,
Helvetica, Geneva, Swiss, SunSans-Regular; font-style: bold; font-size: 8pt; color: white; background-color: #46008F; layer-background-
color: #46008F;" ONMOUSEOUT="flthide('menu4Div');" ONMOUSEOVER="fltshow('menu4Div');"
ONBLUR="flthide('menu4Div');"
<DIV ALIGN="left"><B>
    <BR>
    <A CLASS="GlobalClass" HREF="http://intranet.kenan-flagler.unc.edu/ois/">enterprise</A><BR>
</B></DIV>
</DIV>

</TD>
</TR>
<TR BGCOLOR="Black">
<TD VALIGN="top" BGCOLOR="black" WIDTH="100%" HEIGHT="100%" >
    <A HREF="index.html" onMouseOver="flthide();" ><IMG SRC="/images/spacer.gif" WIDTH="300"
HEIGHT="45" BORDER="0" ALIGN="right" ALT=""></A>
</TD>
</TR>
</table>

</head>

<h1>&nbsp;KFBS Network Port Information</h1>
<br>
<br>
<body>

<h2>&nbsp;KFBS Port Database Search Results:</h2>

<h2 align="center"><font face="" color="red">Sorry, no results for that query!</font></h2>
<br>
<br>
<h2 align="center"><a href="index.cfm"><font face="" color="green">Please Search Again</font></a></h2>

```