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The Virtual Classroom and Content-Driven Web

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PROJECT PROPOSAL

The Virtual Classroom and Content-Driven Web

By Spencer J. Casey

A final project report submitted in fulfillment of the requirements for Information Networking and Telecommunications Culminating Project

Fort Hays State University

Culminating Project Advisory Committee:

Dr. Mark Bannister
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Wednesday, Jul 24, 2007

ABSTRACT

The Virtual Classroom and Content-Driven Web

By Spencer J. Casey

This proposal, prepared for my advisory committee, will describe the relevance of web-based, content-driven systems designed specifically to disseminate elementary education classroom materials and information via the web. Web-based content management systems (WCMS) are database driven, and can be dynamically updated, queried, organized, indexed, searched, and published to a website. This allows similar groups of people to share extremely relevant information over the internet by creating highly customizable and secure web applications. Specifically, these customized websites provide elementary education instructors the forum to facilitate and improve communication with parents and students through the dissemination of data in an organized and time sensitive manner. With the invention of the internet, high speed broadband, and well-designed web content management systems, society has begun to revolutionize the way we share information and how we interact with one another. Within this final paper, I will provide; 1) a brief introduction highlighting the significance of web content management systems within education, 2) detailed research of content management systems, 3) an assessment and propose a “real world” web-based project for a local elementary school, and 4) highlight the methods, project tasks, and learning outcomes.

ACKNOWLEDEMENTS

The Virtual Classroom and Content-Driven Web

By Spencer J. Casey

At this time, I would like to acknowledge the advisory committee for my Masters Degree of Liberal Studies in Information Networking and Telecommunications.

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Finally, I would like to thank Holy Family Elementary School for providing the opportunity to work on this proposal and culminating project. Furthermore, I would like to thank the administration and faculty who provided valuable input and feedback during the process of developing a web content management system.

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INTRODUCTION

The acquisition and transfer of knowledge have always been critical components in human learning. Over the last 10+ years, the internet has changed the way individuals seek information and interact with one another. This transformation is very apparent within our country's education system. Individuals within the education system now have unprecedented opportunities to network and connect with one another. In particular, this digital forum opens opportunities for students, parents, faculty, and staff to communicate and share information at unprecedented levels.

Educational institutions face challenges to create and implement internet-enabled technologies that connect students and faculty. Institutions are publishing course catalogs, student handbooks, classroom materials, class registration, and student grades online. The demand for new technologies is unprecedented and has transformed the education system.

At the same time, the development and implementation of online web applications are relatively new with a high degree of variability between products. This in itself creates unique challenges. Within higher education, primary, and secondary schools, administrations are scrambling to find innovating technologies at an affordable price. Online communication tools and learning applications are expensive and vary dramatically in capabilities. Administrators are burdened with the difficult task of identifying which product will meet their needs and budget. Furthermore, implementing and deploying web applications can be extremely difficult and time consuming. These problems can be even more difficult in smaller secondary education institutions, where

technology consultants are not on staff to address technical issues. Indirectly, the unenviable task of deciding on a course of action and/or online product often falls to school technology committee comprised of uninformed parents. These are just a few challenges facing administrators, faculty, and parents in a highly demanding and evolving area of education.

I hope this project will increase knowledge and understanding on how simple, affordable web-based content management systems can transform the education system and enhance our lives.

ASSESSMENT OF NEED

Project Overview

The primary goal of this project is to develop an affordable web-based content management system that extends the elementary classroom into a virtual realm, by providing faculty and parents the necessary online tools to organize activities, assignments, and other classroom needs interactively. This interactive tool, "the virtual classroom", will allow parents and educators to connect with one another in an organized and timely manner via the web. The information on the virtual classroom web, will parallel and compliment traditional communication methods and existing paper-based systems. The project audience and primary beneficiaries of this project will be the school administration, faculty, parents, and students of Holy Family Elementary.

Project Relevance / Challenges

Holy Family Elementary is a Catholic elementary school located in Hays, Kansas. The school has an existing website, http://www.hfehays.org. After interviewing the

administration and faculty, it became very clear that a large majority of the people within the school understand the importance of an online presence. Furthermore, the school's administration and staff have aspirations of using the web to improve communication. Currently, the school maintains a school calendar, lunch and breakfast schedules, and school newsletter online. This information is uploaded to their website on a monthly basis.

The consensus is that the current website design is appealing, but lacks functionality and relevant content. Furthermore, the current web-publishing process is cumbersome. All information flows through a very strict set of channels to a central point of control before being published to the web. Indirectly, content is often not posted in a timely manner, and the primary users, the faculty, are not the central driving force in development of the website. The challenge will be reassign ownership to allow faculty member real-time access, and to standardize information across classrooms in an effort to improve presentation, functionality, and the overall flow of data to the end user.

In conclusion, the school is in need of an affordable database-driven, content management system that will allow multiple web authors (faculty and staff) to update content on the existing website. This dynamic and interactive system will allow faculty to add, delete, or modify relevant information for their respective classrooms using a standardized forms. This sub-section of the web, dubbed "the virtual classroom", will be the centerpiece for improving online communication between faculty and parents.

Project Objectives

Below is a complete list of general and specific objectives necessary to complete the web content management system project.

1. Create an online registration system for faculty. This information will establish the primary table for faculty members by assigning a primary key value and a username and password to each faculty member. This key will provide the basis for projecting content onto the web, and the username and password will provide the basis for a security system.
    a. Develop a faculty registration form. Each faculty member will be required to register and create an online profile, including a user name and password to access secure content.
    b. Include a check and balance system to ensure registering faculty are legitimate and approved to update content on the website. In particular, hold registering members in an online queue until approved by administration and/or webmaster.

2. Provide faculty a secure portal that will allow them to maintain classroom announcements, calendar, list of assignments, student supply lists, and wish lists for needed classroom items.
    a. Develop a login and security system that will protect the secure portal. This will be accomplished by adding visual basic scripting code to each secure page, and redirecting users based on username and password.

Those who do not have access to privileged content will be redirected to an “access denied” page.

b. Develop a form-driven web interface that will allow faculty to update each segment of their web. That includes the ability to add, delete, and modify database records. All new records will be assigned a faculty member unique ID number to identify content relevant to each classroom. This primary key will be automatically assigned using session variables activated during the login validation process.

3. Provide parents a simple online interface that will allow them to select their respective child’s classroom and view the content of all sub-sections of the virtual classroom.
    a. Using SQL statements, query each classroom’s data records and batch/sort into organized sub-sections.
    b. Develop a function to allow faculty and parents the ability to print content without the website header, footer, and sidebar content.

REVIEW OF LITERATURE

CONTENT MANAGEMENT SYSTEMS

Historical Prospective

Content management systems have been in use by humans for as long as information has been relevant. Throughout history, people have managed information and have

improved the exchange of knowledge from generation to generation, (CMS Wiki, 2005). This can best be illustrated by showcasing how humankind developed writing to retain relevant information. As time and technology progressed, hand written information was collected into books and then books were archived within libraries. *Mass production of information became possible with the invention of Johannes Gutenberg's printing press in 1455*, (Drucker, 1993, p. 2). With the development of these new tools, information was available at unprecedented levels, requiring systems to organize and classify content. Libraries started to develop systems to catalog books by subject and/or author. This manual indexing system (e.g., Dewey Decimal) allowed individuals to locate specific information quickly, whether it was a single book or collection of books on a particular topic, within the library, (CMS Wiki, 2005). Society was quickly evolving and access to information was critical as humans continued the quest to share, distribute, and manage information.

Project Implications

In 1989, Tim Berners-Lee, a scientist at CERN, invented the World Wide Web, (CERN). With the invention of the Internet and the public's growing access to high-speed broadband services (ITU, 2003, p. 18, fig. 5), society now had the means and necessary tools to create, share, navigate, and browse digital content on a global level. "In the past four or five years, the penetration of broadband has changed everything." "The computer is always on and the information is always there." (Outling in Almasy, 2005) There are 10 times more broadband users today than there were in June 2000, according to Pew, (Almasy, 2005). In addition, the convergence of advances in storage, encoding, and networking technologies has produced an environment where huge

amounts of continuous media content is routinely stored and exchanged between network-enabled devices. Keeping track of (or managing) such content remains challenging due to the sheer volume of data, (Cranor, et al., 2003). Management and control of digital media (e.g., audio, video, programs, and documents) has become the next frontier for content management systems. The invention of the Internet, broadband, and the rapid development of a global network of digital media over the past decade, has resulted in an unprecedented amount of research and development dollars being poured into technology to find ways to organize and search massive amounts of data (e.g., www.googlecom, and www.loc.gov). The world continues to modernize around this electronic phenomenon and invest in technology. “One third of the capital investment in developed countries in the last thirty years has gone into equipment to handle data and information, computers, fax machines, electronic mail, closed-circuit television, and so on”, (Drucker, 1993, p. 83). As this infrastructure continues to develop, there will become an ever-increasing demand for content management systems that are designed to interrogate, customize, and produce applicable results that make sense to the individual users seeking information. "People are being much more customized in the type of content that they want to see and consume [online]," said Peter Daboll, president of comScore Media Metrix, (Almasy, 2005).

Content management systems are rapidly becoming critical gateways for customized online repositories of data (including news, sports, religion, education, etc.). In particular, content management systems are now being used extensively in education. For example, Fort Hays State University uses the Blackboard Learning System (a web-

based content management system) to provide online virtual classes to higher education students. In a press release, Blackboard highlighted its latest Blackboard Academic Suite (TM). This online content management software offers many new features to enhance teaching and learning, including multi-language support for online courses, adaptive release functionality, which enables instructors to create custom learning paths for students, and several enhancements to the Blackboard assessment engine (Blackboard, 2007). These online systems will continue to be a critical component in education and assist society in its pursuit of knowledge.

CONTENT MANAGEMENT SYSTEMS IN THE DIGITAL AGE

Defining Cyberspace

So what is cyberspace? More ecosystem than machine, cyberspace is a bioelectronic environment that is literally universal. It exists everywhere there are telephone wires, coaxial cables, fiber-optic lines, or electromagnetic waves, (Webster, 2004, p. 32). It is this electronic environment that allows people to put knowledge in, take knowledge out, and alter it. Cyberspace is the stage upon which web-based content management systems perform, and the creation, management, and control of that data within that "bioelectronic environment" defines the "digital age"'.

Static Web Content

Cyberspace is essentially made up of a millions of webs and extranets designed to disseminate information. Web authors, in the early days of the Internet, designed and structured the content of each site manually. This was known as a 'static web'. To

make a change in a static site, the web author edited the change on their computer and uploaded the new page, (Hayakawa, 2005). More specifically, static websites contained content that was very limited in functionality and was non-interactive to the end user. Individuals visiting static sites had to surf through the web's navigation structure to find relevant information and web authors had to setup "links" for each new page established, (Hayakawa, 2005). This process, for both the web author and web user, became even more cumbersome as information grew in size and volume. In some cases, the information became so overwhelming that data were misrepresented within the site, lost, and the overall structure became baffling to users.

At the University of Buffalo, a design team found themselves in a real-world, less-than-ideal situation with an IT web site redesign. The team was faced with wanting to create a website that would be accessible and easy to edit or deploy mass changes without touching each file. Due to the sheer volume and size of the content, it became obvious that a simple content management system would be needed to manage the website, (Dudek, Wieczorek, 2003). This is just one example where web authors began to realize the design flaws inherit within their static websites and began to comprehend that changes were necessary to manage and ensure accuracy of large quantities of on-line data. With the evolution of the Internet, web sites are increasingly a crucial part of exchanging information. This example and many others lead people to understand that information on the web, must be accurate, accessible, tailored, and current, (Randall, 2001).

Dynamic Web Content

People seek organized information, but that is where the similarity ends. Due to the vast amounts of data and content on the web, unique systems are required to properly handle the content associated with each individual's data. As the internet-evolved web user demanded personalization and customization. In particular, web users were seeking the ability to customize content to improve their online experience. Content is data, and organized; indexed databases gave web authors the necessary tools to manage information. You can choose a product that has its own database built in, or one that provides extensive tools to work with existing database management products, (Randall, 2001). Regardless of the software or tool with which you work, customized content management systems were designed to aid web authors in generating 'dynamic' or customizable web content. These content management systems were geared around structured databases that would allow web authors or groups of web authors (content teams) to organize the site's structure, presentation, and security of media/content. Web-based content management systems are made up of database records customized to fit each online application and allow the developer(s) to categorize key attributes of data, (e.g., title, author, etc). This data can then be queried into subsets and/or sorted by the end user, creating multiple, and dynamic content-driven webpage's generated directly from a data set. In other words, it gave the end user the ability to sort, query, and organize information based on the user's individual needs and input. For instance, if all the books in the Library of Congress were categorized within a database, individuals would be able to query by author, year, title, etc. Additional queries could be preformed on that subset of data, narrowing the search results dramatically within seconds. This type of web-based content

management system is unique, highly customizable, and dynamic in the sense that the information can be ascertained directly from the online database via a webpage by the end user. Unlike its static predecessor, dynamic websites provide end users the ability to control their web environment and alter the website's content to meet their specific needs.

Interactive Systems and Applications

Web-based content management systems can also be designed to be interactive and serve as an online resource. These web content management systems focus on collaborating authors entering data into an online database via standardized forms. A good example is a system for managing a school calendar. In such a system, the faculty enters relevant events into the calendar system, which stores them in an online database. Along with the event name, the system stores attributes, including a description or memo field, the date and time of filing, the prospective audience, etc. The system then uses these attributes to determine—who should the event might affect, and which prospective pages the information should be displayed on. These interactive systems / templates are also perfect for educational applications like classroom announcements, assignments, and classroom supply and wish lists.

Content Management is expanding into all phases of life. "Over the last three years, we've seen a whole industry pop up around content management," says Naomi Miller, director of product marketing of Documentum, an 11-year-old company with roots in document management. "There are nearly 100 different vendors offering content

management services today." Miller continues by stating, "Everything is about the web now, because people want a consistent view," (Ploskina, 2001).

Research indicates content management is a booming industry. Purchase plans for content management systems are expected to increase 15% a year according to a Forrester study. An earlier study by The Yankee Group predicted a 35% growth in sales from $900 million in 2000 to $3 billion by 2004, (Elder, 2005). Online applications and content driven systems provide educational intuitions a centralized platform to enter data in a consist format, while being able to control who has access to add, modify, delete, manage, and view database records. In addition, database-driven websites with simple front-end interfaces allow inexperience users to author and manage web content for personal purposes such as interactive blogs, and discussion boards. This is a perfect system for educational instructors who have a tendency to shy away from Technology.

The World Wide Web has transformed the way people live, work, and play. People can play travel agent and book all the elements of a vacation online. They can arrange for their bills to be paid automatically while they are gone. They can put a hold on mail delivery, find directions to tourist attractions, and get a long-term weather forecast before they pack, (Almasy, 2005). With that in mind, aggressive administrators and educators are seeking to utilize the same types of technology to manage systems and create dynamic websites designed to make relevant data more accessible, personalize, and enhance your learning experience through improve communication.

Standardization and Indexing Information

As web content management systems and web searching capabilities advance, standardization of digital documents and media (indexing) has become extremely important. XML is rapidly becoming the standard method for sending information across the Internet. XML Schema, since its elevation to W3C Recommendation on the 2nd May 2001, is fast becoming the preferred means of describing structured XML data. XML Schema (W3C 2001) provides a rich set of structures, types and constraints for describing data and is therefore expected to soon become the most common method for defining and validating highly structured XML documents. An XML document's information set consists of a number of information items; the information set for any well-formed XML document will contain at least a document information item and several others. An information item is an abstract description of some part of an XML document: each information item has a set of associated named properties. By defining the document (and content within the document) high-performance, general-purpose structured text indexing and retrieval engine can search content within digital documents. Future searches, through powerful Boolean search expressions and relevance-ranked free-text queries, will allow individuals to do more extensive research and searches related directly to the content of the document. This technology is another step in improving our ability to manage content and find relevant data through “extensive searches”.

Data Accessibility versus Security

As society, moves more toward a global network of information, individuals, and organizations need to address the issue of data accessibility versus security. For

companies and educational institutions that need to share information with partners and customers via the Internet, it is crucial that they simultaneously lock down and protect vital corporate data and intellectual property, (Cohen, 2003).

Unfortunately, there is a fine line between data accessibility and security. Ninety percent (90%) of respondents to the 2002 CSI/FBI survey (Computer Security Institute) reported computer security breaches within the last twelve months, placing the total financial loss of 223 companies at more than $450 million dollars. This figure is conservative because most companies do not want to disclose information on cyberattacks, (Cohen, 2003). Not only does data security affect the corporate world, but it is a huge concern for individuals as well. Identity theft has become such a big problem that Federal Trade Commission has launched the seventh annual National Consumer Protection Week, (FTC. 2005).

Identity thieves open new accounts in other peoples' names and rack up debts on existing accounts, using consumers' Social Security numbers, bank account information, addresses, or phone numbers. Identity theft victims may spend years—and large sums of money—restoring their credit histories and their good names. Some consumers have been denied jobs or insurance, or been arrested for crimes they did not commit. A recent survey indicates that the dollar volume of the crime was $52.6 billion in 2004—much of that cost was accrued by businesses, (FTC, 2005).

Future web content management systems will have to be designed with two key elements in mind: security and easy-to-use interface. Future network administrations will be charged with the task of being “gatekeepers” of data and controlling access, the “gateway,” to their respective information networks, (Rifken, 2001).

IMPACT ON SOCIETY

Web-based content management systems allow people to think of new ways to interact with others, re-organize workflows, and streamline their business and personal life to improve efficiency and productivity. Organizations are looking at work in new ways and are re-engineering processes so they can be made more productive. Work has to be studied and restructured for optimum contribution and achievement. (Drucker, 1993) As a result, organizations are now thinking of innovative ways to utilize the Internet and content management to improve day-to-day functions like processing, billing, communication, etc. Not only are people re-engineering processes, they are restructuring departments and teams within organizations (regardless of physical location) to improves work flow and processes, (Drucker, 1993). Content management systems are affecting all aspects of social, political, educational, and economic structures. Generations of young people are now engaging in online social activities, e-commerce, and "simulated worlds", (Rifkin 2001, pg. 12). This new electronic world is penetrating every aspect of our lives and connecting and networking people in profound ways. Content management systems are a critical component within these “simulated worlds” because they are what organize the data and provide a rich, personalized, and interactive web-based experience. Some example of WCMS in action are health maintenance organizations (HMO) now developing, "exclusive portal(s) of access to

medical services." These secure portals allow customers and HMO's to interact with one another, including nursing care options, prescriptions, and medical services, (Rifkin 2001, pg. 181). In this example, web-based content management systems are expanding the capabilities and advancing society in new and exciting ways. As in the past, society will continue to look for ways to press forward and use technology to assist and improve its ability to manage and organize data. Content management systems are a hot topic presently, and will have major implications for society into the future.

CONCLUSIONS

Web Content Management Systems are penetrating all aspects of society and will continue to grow in the foreseeable future. With the proliferation of dynamic websites, it is obvious that society will continue to seek and share knowledge at unprecedented levels in the digital age, and specialized web content management systems will be relied upon to categorize and parse data in organized and meaningful blocks of information. Just as in the early days of managing information, the acquisition of relevant and timely knowledge is critical. As this explosion of information unfolds, one key element will be making data accessible, but at the same time providing the necessary security to protect personal and sensitive data/information. With that in mind, online applications, and technology-based systems will continue to be adapted to assist humankind in its endeavor of transfer system. These systems will be designed to enrich our lives and advance society into the 21st century and beyond.

METHODOLOGY

This sub-section of the proposal, discusses the conceptual and theoretical framework of the project. In particular, it identifies how to accomplish the objectives set forth in this proposal. The following key areas will be discussed: user participation, server platform and coding, security and session variables, data manipulation, data collection, training, and project timeline.

User Participation

In the early stages, it is necessary to evaluate the current web and identify strengths and weakness. This will include meeting with the administration and faculty in an effort to map out a strategic plan. This will consist of one-on-one meetings and small group discussion. The primary goal is to develop a standardized system that will work across all classrooms, but provide maximum flexibility within those set parameters to allow individual creativity. User participation will be critical in providing initial input and feedback for the overall project.

Server Platform and Coding

The http://www.hfehays.org website is located on a Windows 2003 IIS 6.0 Web Server. Coding for the project will be in Visual Basic scripting language on Active Server Pages (ASP). Open Database Connectivity (ODBC) will be established with an Access 2003 database, and multiple tables and SQL statements will be utilized to display and sort data. A basic HTML editor and script language will be used to develop online data entry forms, and generate dynamic page content that will integrate into the existing website template.

Security & Session Variables

Once ODBC is established at the time of login, the username and password of the individual faculty member will be checked versus the original registration table. If the login is successful, the user's information will be stored as a session variable. Any time an authorized user attempts to access a new page, query data, add, delete, or modify data sets their login ID will be checked versus Session ID. Furthermore, visual basic script will be placed at the top of each secure page to ensure that users have appropriate authorization to manipulate information. If an unknown user attempts to access the portal, he/she will be redirected to login in the online system.

Example 1 (ASP Visual Basic Security Code):

```
<%
'Check if user is logged in
if Session("Username1") = "" then
        'If not, go to login page
        Response.Redirect("login.htm")
else
end if
%>
```

Data Manipulation

An authorized faculty member can add records to the main table via the web content management system interface. When a new record is added to the main data table, the faculty user ID is automatically coded to the record using a session variable being held in virtual memory. This is critical. By coding each individual classroom announcement, calendar item, assignment, supply and/or wish list item, the faculty member can retrieve and edit or delete records associated with his/her respective profile. Furthermore, the faculty user ID can be queried to display content for each classroom / faculty member.

Data Collection and Feedback

Once the web author has developed the initial online application, an analysis of web traffic patterns will be critical during the “live” rollout phase. A server-side analytic program will be used to identify traffic patterns and help identify coding problems or potential linking errors. This data will be monitored throughout the testing phase, and debugging will be required to fix any known issues. In addition, administrative and faculty feedback will be another tool to aid in troubleshooting issues during testing.

Training

Once the database is online and the application is functioning, it is critical to train the faculty on how to utilize the online application. Specifically, each faculty member will need to learn how to add, delete, and modify entries. This training process will also serve as an opportunity to promote the idea to the key benefactors, the faculty, who will in turn utilize the system to assist their partners in education, the parents.

Project Timeline

To meet the objectives set forth for this project, it is necessary to provide a detailed schedule of activities, including a timeline and project priorities. In this particular case, the timeline will be modified to accommodate the school’s spring schedule and summer break.

Project Priorities	**Timeline**
Begin Review of Literature:	Dec 23, 2006 – Jan 3, 2007
Meet w/ HFE Faculty / Administration	Jan. 8, 2007

Review of Literature Completion:	Feb 1, 2007
Develop Project Proposal	Feb 1 – Mar 1, 2007
Develop Database Tables & Queries	Mar 1, 2007
Develop Web Applications	Mar 30, 2007
Test Web Applications	Apr 13, 2007
"Live" Application Testing	Apr 16, 2007
Debug Web Applications	As Needed
Faculty and Administration Feedback	Apr 27, 2007
Modify Coding based on Feedback	May 4, 2007
Begin Developing Final Report:	July 1, 2007
Finish Final Report:	July 18, 2007
Present Project to Committee:	July 23-27, 2007

PROJECT

I began working on this project several months early in an effort to accommodate Holy Family's schedule. The goal was to develop a fully functional version of the "virtual classroom" before school was dismissed for spring break. This would allow us ample time to make adjustments, and complete the project before the end of the school year.

- Phase I – Complete an extensive literature review on content management systems, and evaluate the strengths and weakness of the current HFE website. Then meet with the administration and faculty to discuss developing an online system, dubbed the "virtual classroom".
- Phase II – Develop the initial website, including the database tables, SQL queries, security parameters, and web forms, (see Fig. 1: Virtual Classroom Flow Chart).

- Develop the registration form and registration validation page (Appendix 1: Registration Coding). This segment of the web allowed faculty members to register via a web form, and create a username, password, and online profile. The initial coding on the validation page established a connection string to the online database and inserted content from the online form into the results table, (mySQL= "INSERT INTO Results"). An ASP mailer was included in the coding to notify the webmaster when an individual attempted to register. All registrants are denied access to secure online content, using a hidden field, until approval is granted by the webmaster. This step prevents unauthorized access to the online system. Additional code was added to the bottom of the registration validation page that would verify that the individual's data had been added to the database results table, and would then redirect the user to a "success" or "failed" registration page based on the findings of the IF statement.
- The next step was to create faculty login and login validation pages, (Appendix 2: Login Validation). A simple HTML form was created to ask the user for his/her respective username and password. When the user submits the information, it is directed to the login validation page which contains a connection string to the online database and extensive IF statement. The login username and password checks to make sure the user is authorized to access exclusive content by comparing the form result to the information within the online database. In addition, the code also assigns several session variables to authorized users. The session

variables (Session("username1") = rs("USERNAME1")) are used to populate the content within the secure pages based on SQL statements. Users who fail to enter the correct username and/or password, or are not registered at all, are redirected to a one of three “failed login” pages.

- The third step was to develop a secure portal, customized for each authorized faculty member, (Appendix 3: Secure Portal Page). At the top of each secure page, an IF statement was added to check to see if the individual requesting access to the page had properly logged into the web, and the username session variable was present and accurate. If the username was not recognized, the web user would be redirected to the login page. If the user was authorized, the secure.asp page would load and subsequent SQL queries would be automatically populated based on the active username session variable. Indirectly, faculty members are able to see all content within the tables that are directly related to their respective usernames.
- The fourth step was to develop three additional pages, where faculty members could add, delete, and modify data for each sub-section of the virtual classroom. The “add.asp” page is a HTML form where data is inserted into a specific table. When a new record is added, four hidden fields are populated automatically. The username, password, and class session variable (based on the faculty member’s profile) are automatically added to the data table for a new records and in each sub-section. This is critical. By coding each new record by faculty member’s username and

password, they are then able to access records specific to them at a later date when attempting to modify and/or delete data. In addition, by coding each new record by classroom, parents are able to query data for all sub-sections of a specific class on the virtual classroom webpage. Finally, the fourth hidden field is assigning an IDx value to each new record. This is a unique numerical value sequentially added to each new record automatically. If a record is to be modified or deleted, this unique number is queried.

Once a record is added, the faculty member is returned to the secure portal and the record is immediately visible. The faculty member is able to select the “modify” or “delete” hyperlinks to change or remove specific records at any time. This process is completed with an *update* or *delete* SQL statement referencing the record’s unique IDx value.

- The final step was to develop a dynamic web page where parents could view classroom specific content, (i.e. the virtual classroom). A simple HTML form was developed where parents could select their child’s classroom and/or instructor. When parents used the “submit” button, the classroom variable from the HTML form was placed into a session variable and the user was directed to the dynamic classroom page that projects content based on the session variable, (ex: KA – Cindy Washburn). This session variable is also used when parents want to print the online content (without header, footer, and sidebar). The session variable changes when the parent returns to the classroom form and

selects another class/instructor.

- Phase III – Once the “virtual classroom” was in beta format, testing was required. This included training a small group of teachers and working with them on sample data. During this exercise, problem areas were documented and corrected based on faculty feedback. In addition, site traffic was monitored with an analytic program to identify any 404 errors or coding problems.

- Phase IV – The “virtual classroom” was introduced to the public in mid April. The remaining faculty members were registered and given training. Parents and faculty members provided feedback. The roll out was very well received and very few problems were encountered.

PROJECT OUTCOMES AND MEASUREMENTS

After evaluation and feedback, the Holy Family elementary school administrators and faculty were very pleased with the web-based content management system, dubbed the “virtual classroom”. With that in mind, the project was successful in terms of the original measurement goals. However, from a personal prospective, I believe that the group was excited about moving in any positive direction. I do not intend to downplay the success of the project. However, in hindsight an external team of web developers should have conducted a more technical evaluation of the web content management system. Indirectly, I felt it was important to conduct a self-evaluation of the project.

The system did improve overall communication between the parents and faculty members. It also allowed the faculty to quickly update the web and eliminated the bottleneck that existed prior to development. Classroom communication did improve. However, it does have one major shortcoming. It failed to meet the needs of the administrative offices. The online application should also include an administrative section that would allow for global calendar additions and announcements. This was an obvious omission.

School-wide programs, announcements, and other critical items should be appended to all virtual classroom pages saving repetition, and unnecessary key strokes. In addition, a master calendar should be designed for the school, using similar technology. In my opinion, the existing system should be modified to improve the overall design of the content management system and integrate these ideas.

LEARNING OUTCOMES

This project presented many “learning opportunities” on varying levels. The project was challenging and time consuming. In particular, the development included advanced web techniques, script, and database-enabled applications. Much of what I learned in my coursework was applied to this project. In addition, a certain level of additional research and background information was necessary to accommodate the web server’s settings and programming languages. The project proposal taught me how to approach a problem, complete research, develop a logical proposal, and execute the plan in an effort to accomplish a goal.

In conclusion, this project provided an excellent forum to display my web development skills and prove to peers and my advisory committee that I am worthy of a Masters Degree of Liberal Studies in Information Networking and Telecommunications from Fort Hays State University.

GLOSSARY OF TECHNICAL TERMS

Blog: A weblog (usually shortened to blog, but occasionally spelled web log) is a web-based publication consisting primarily of periodic articles (normally in reverse chronological order).

Content Management Systems: Database driven systems that can be dynamically updated, queried, organized, indexed, searched, and published to a website.

Discussion Board: An Internet forum is a web application which provides for discussion, often in conjunction with online communities. Older forums date back to around 1996, following the newsgroups and bulletin board systems which were widespread in the 1980s and 1990s.

End User: The person who uses a product or service.

Extranet: Two or more intranets with network connectivity. Generally, and as with intranets, an extranet will be based on Internet Protocols. The underlying network technology does not really matter. For instance it may be that organizations use the Internet for carrying data but restrict access to resources from the general public via firewalls. A virtual private network could be set up over the Internet to achieve the same result.

Knowledge worker: A term coined by Peter Drucker in 1959 to describe one who works primarily with information or one who develops and uses knowledge in the workplace.

Networks: In electronics, a digital network is a coupled network of digital components, such as logic gates, that implement a logic system. Digital networks consist of inputs, which can take binary states, components to process these signals, and outputs.

Web: A computer programming system called "literate programming." The idea that one can create software as works of literature, by embedding bits of code inside descriptive text, rather than the reverse, as is common practice in most programming languages.

Web Content Management System: A type of Content management system targeted at managing websites.

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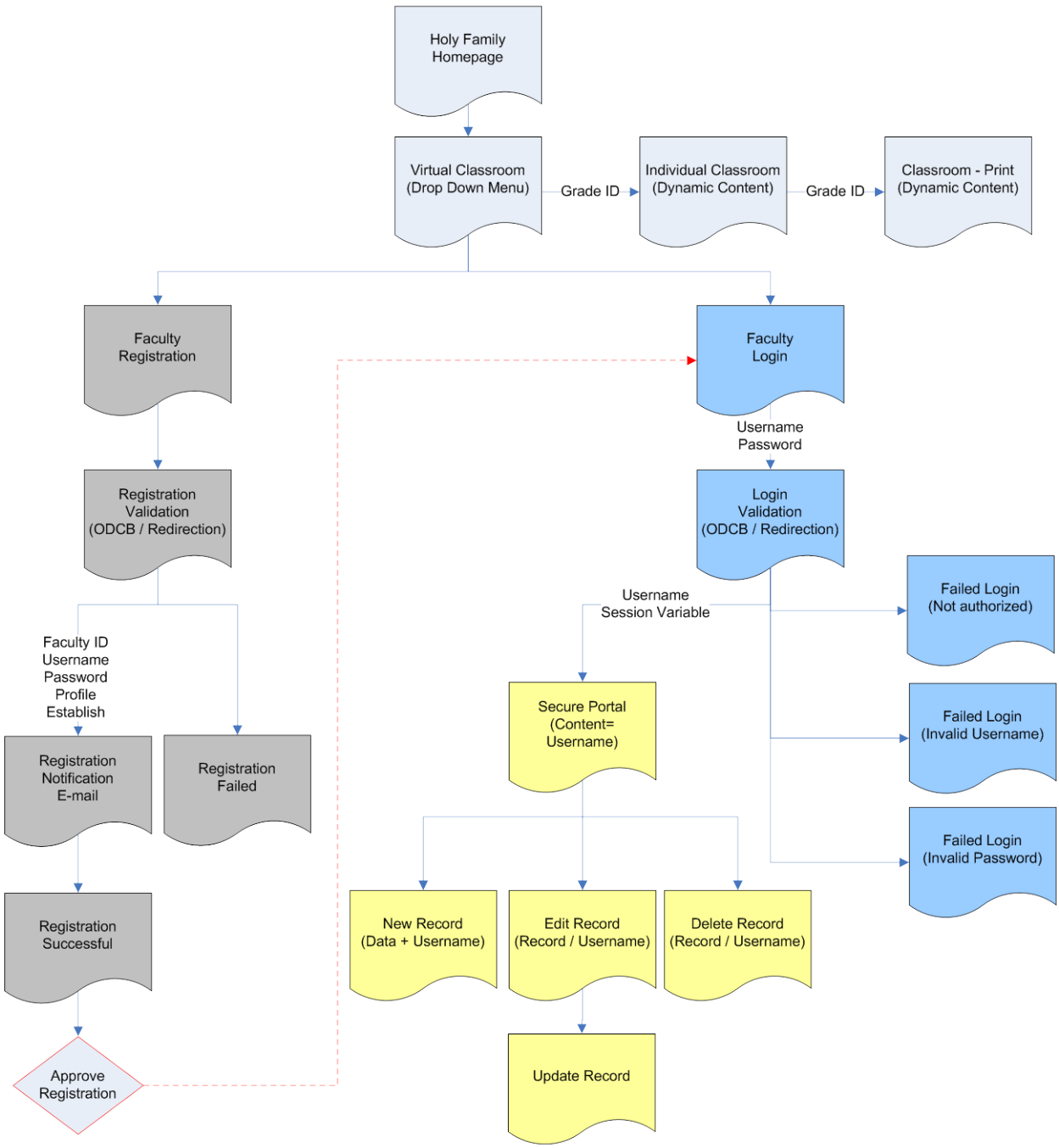
APPENDIX

Figure 1: Virtual Classroom Flow Chart



Appendix 1: Registration Coding

Registration Validate

```
<%
	Function ParseBody(strText)
		strText = Replace(strText, Chr(13), "<br>")
		ParseBody = strText
	End Function

	' Variable declaration:
	'  myConnString = Connection string to database.
	'  myConnection = The database connection object.
	'  mySQL = The query string to be used.
	'=====================================================
	Dim myConnString
	Dim myConnection
	Dim mySQL
	'=====================================================
	' Set up connection string.
	 myConnString = Application("Registration_ConnectionString")
	'=====================================================
	' When you are using custom ASP to set up a connection to  a database, you use a Connection to connect to the
database.
	'=====================================================
	 Set myConnection = Server.CreateObject("ADODB.Connection")
	'=====================================================
	' After the connection has been created, open it so that  information can be written to the database. To do
	' that, use the Open method and pass it the connection string that you defined earlier.
	'=====================================================
	myConnection.Open myConnString
	'=====================================================
	' SQL string that queries the database.
	mySQL= "INSERT INTO Results"
   mySQL= mySQL &
"(FName1,LName1,Address1,City1,St1,Zip1,Telephone1,Email1,School1,Address2,City2,St2,Zip2,Telephone2,Email2,Grade1,Per
mission1,Username1,Password1,Label_Personal,Label_School,Access1)"
mySQL= mySQL & "VALUES ('" & Request.Form("FName1") & "'"
mySQL= mySQL & ",'" & Request.Form("LName1") & "'"
mySQL= mySQL & ",'" & Request.Form("Address1") & "'"
mySQL= mySQL & ",'" & Request.Form("City1") & "'"
mySQL= mySQL & ",'" & Request.Form("St1") & "'"
mySQL= mySQL & ",'" & Request.Form("Zip1") & "'"
mySQL= mySQL & ",'" & Request.Form("Telephone1") & "'"
 mySQL= mySQL & ",'" & Request.Form("Email1") & "'"
 mySQL= mySQL & ",'" & Request.Form("School1") & "'"
mySQL= mySQL & ",'" & Request.Form("Address2") & "'"
mySQL= mySQL & ",'" & Request.Form("City2") & "'"
mySQL= mySQL & ",'" & Request.Form("St2") & "'"
mySQL= mySQL & ",'" & Request.Form("Zip2") & "'"
mySQL= mySQL & ",'" & Request.Form("Telephone2") & "'"
mySQL= mySQL & ",'" & Request.Form("Email2") & "'"
mySQL= mySQL & ",'" & Request.Form("Grade1") & "'"
mySQL= mySQL & ",'" & Request.Form("Permission1") & "'"
mySQL= mySQL & ",'" & Request.Form("Username1") & "'"
mySQL= mySQL & ",'" & Request.Form("Password1") & "'"
mySQL= mySQL & ",'" & Request.Form("Label_Personal") & "'"
mySQL= mySQL & ",'" & Request.Form("Label_School") & "'"
mySQL= mySQL & ",'" & Request.Form("Access1") & "')"
	'=====================================================
	' Execute the connection with the SQL string. This runs the SQL string against the database and inputs the information.
	'=====================================================
	myConnection.Execute mySQL
	'=== Close the connection.
	myConnection.Close
	'=== Set the connection equal to Nothing.
	Set myConnection = Nothing
%>
```

Appendix 1: Registration Coding

ASP Mailer

```
<% Set Mail = Server.CreateObject("Persits.MailSender")
Mail.Host = "smtp.emailsrvr.com" ' Specify a valid SMTP server
Mail.Username = "form@caseydesigns.com"
Mail.Password = "form"
Mail.From = Request.Form ("EMAIL1") ' Specify sender's address
Mail.FromName = Request.Form ("FNAME1")&" "&Request.Form ("LNAME1")' Specify sender's name
Mail.AddAddress "scasey@caseydesigns.com", "Spencer Casey"
Mail.Subject = "Holy Family Elementary - Intranet Request"
Mail.Body = Chr(13) & Chr(10) & "PERSONAL CONTACT INFORMATION" & Chr(13) & Chr(10)& Chr(13) & Chr(10) & "Full Name:
" &Request.Form ("FNAME1")& " "&Request.Form ("LNAME1")& Chr(13) & Chr(10) & "Address:  " &Request.Form ("ADDRESS1")&
Chr(13) & Chr(10) & "City/State/Zip:  " &Request.Form ("CITY1")&", "&Request.Form ("ST1")&"  "&Request.Form ("ZIP1")& Chr(13)
& Chr(10) & "E-mail:  " &Request.Form ("EMAIL1")& Chr(13) & Chr(10) & "Telephone No:  " &Request.Form ("TELEPHONE1")&
Chr(13) & Chr(10) & Chr(13) & Chr(10) & "SCHOOL CONTACT INFORMATION" & Chr(13) & Chr(10)& Chr(13) & Chr(10) & "Full
Name:  " &Request.Form ("FNAME1")& " "&Request.Form ("LNAME1")& Chr(13) & Chr(10) & "School Name:  " &Request.Form
("School1")& Chr(13) & Chr(10)& "School Address:  " &Request.Form ("ADDRESS2")& Chr(13) & Chr(10) & "City/State/Zip:  "
&Request.Form ("CITY2")&", "&Request.Form ("ST2")&"  "&Request.Form ("ZIP2")& Chr(13) & Chr(10) & "School E-mail:  "
&Request.Form ("EMAIL1")& Chr(13) & Chr(10) & "School Telephone No:  " &Request.Form ("TELEPHONE1")& Chr(13) & Chr(10)
& Chr(13) & Chr(10)& "GRADE LEVEL" & Chr(13) & Chr(10)& Chr(13) & Chr(10) & "Grade:  " &Request.Form ("Grade1")& Chr(13)
& Chr(10) & Chr(13) & Chr(10) &"INTRANET SETTINGS" & Chr(13) & Chr(10)& Chr(13) & Chr(10) & "Display Personal Information:
" &Request.Form ("PERMISSION1")& Chr(13) & Chr(10) & "Username:  " &Request.Form ("UserName1")& Chr(13) & Chr(10) &
"Password:  " &Request.Form ("Password1")
On Error Resume Next
Mail.Send
If Err <> 0 Then
   Response.Write "Error encountered: " & Err.Description
End If
%>
```

Appendix 1: Registration Coding

Registration Redirection

```
<%
	'Declare username
	USERNAME1 = Request.Form("USERNAME1")

	'Build connection with database
	set conn = server.CreateObject ("ADODB.Connection")
	conn.Open "Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" & server.MapPath ("fpdb/Registration.mdb")
	set rs = server.CreateObject ("ADODB.Recordset")
	'Open record with entered username
	rs.Open "SELECT * FROM Results where USERNAME1='"& Username1 &"'", conn, 1
	'If there is no record with the entered username, close connection
	'and go back to login with QueryString
	If rs.recordcount = 0 then
		Session("Username1") = Request.Form("Username1")
		Session("password1") = rs("password1")
		Session("FullName") = rs("FNAME1")& " " &rs("LNAME1")
		Session("Grade1") = rs("Grade1")
		rs.close
		conn.close
		set rs=nothing
		set conn=nothing
		Response.Redirect("Registration_Success.asp")
	else
		Session("Username1") = rs("USERNAME1")
		Session("password1") = rs("password1")
		Session("FullName") = rs("FNAME1")& " " &rs("LNAME1")
		Session("Grade1") = rs("Grade1")
rs.Close
		conn.Close
		set rs=nothing
		set conn=nothing
		Response.Redirect("Registration_Fail.asp")
	end if

%>
</font></b>
</body>
</html>
```

Appendix 2: Login Validation

ODBC Connection and Login Validation

```
<%
	'Save the entered username and password
	Username1 = Request.Form("Username1")
	Password1 = Request.Form("Password1")

	'Build connection with database
	set conn = server.CreateObject ("ADODB.Connection")
	conn.Open "Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" & server.MapPath ("../fpdb/Registration.mdb")
	set rs = server.CreateObject ("ADODB.Recordset")
	'Open record with entered username
	rs.Open "SELECT * FROM Results where username1='"& Username1 &"'", conn, 1

	'If there is no record with the entered username, close connection
	'and go back to login with QueryString
	If rs.recordcount = 0 then
		rs.close
		conn.close
		set rs=nothing
		set conn=nothing
		Response.Redirect("failed1.asp")
	end if
  'If entered username is found but fees is set to no, close connection
	'and return to login with QueryString
	If rs("ACCESS1") = "No" then
		rs.close
		conn.close
		set rs=nothing
		set conn=nothing
		Response.Redirect("failed3.asp")
	end if
	'If entered password is right, close connection and open mainpage
	if rs("password1") = Password1 then
		Session("username1") = rs("USERNAME1")
		Session("password1") = rs("password1")
		Session("fullname") = rs("FNAME1")& " " & rs("LNAME1")
		Session("Grade1") = rs ("Grade1")
    rs.Close
		conn.Close
		set rs=nothing
		set conn=nothing
		Response.Redirect("secure.asp")
	'If entered password is wrong, close connection
	'and return to login with QueryString
	else
		rs.Close
		conn.Close
		set rs=nothing
		set conn=nothing
		Response.Redirect("failed2.asp")
	end if
%>
```

Appendix 3: Secure Portal Page

Security Code (Top of Page)

```
<%
'Check if user is logged in
if Session("Username1") = "" then
        'If not, go to login page
        Response.Redirect("login.htm")
else
end if
%>
```

SQL Statements - User Specific Data

```
SQL="SELECT * FROM Announcement WHERE USERNAME1 = '::USERNAME1::' ORDER BY DATE1 ASC"

SQL="SELECT * FROM Calendar WHERE USERNAME1 = '::USERNAME1::' Order by Date1"

SQL="SELECT * FROM Homework WHERE USERNAME1 = '::USERNAME1::' Order by Date1"

SQL="SELECT * FROM Supply WHERE USERNAME1 = '::USERNAME1::'"

SQL="SELECT * FROM Wish WHERE USERNAME1 = '::USERNAME1::'"
```