Dakota State University
Beadle Scholar

Masters Theses

Fall 12-1-2003

Dynamic Solutions for a Women's Basketball Web Site

Dawn R. Gaffney
Dakota State University

Follow this and additional works at: https://scholar.dsu.edu/theses

Recommended Citation
Gaffney, Dawn R., "Dynamic Solutions for a Women's Basketball Web Site" (2003). *Masters Theses*. 32.
https://scholar.dsu.edu/theses/32

This Thesis is brought to you for free and open access by Beadle Scholar. It has been accepted for inclusion in Masters Theses by an authorized administrator of Beadle Scholar. For more information, please contact repository@dsu.edu.

DAKOTA STATE UNIVERSITY

MSIS
PROJECT APPROVAL FORM

Student Name: Dawn R. Gaffney

Expected Graduation Date: December 14th, 2003

Master's Project Title: Dynamic Solutions for a Women's Basketball Web Site

Date Project Plan Approved: December 15th, 2003

Date Project Coordinator Notified and Grade Submitted: December 15th, 2003

Approvals/Signatures:

Student: Dawn R. Gaffney Date: 12/30/03

Faculty supervisor: Jerry Dennis Date: 12/30/03

Committee member: Mer Shen Date: 1/6/04

Committee member: [illegible] Date: 12/31/03

To Ensure Certification of Completion:
Student must bring or send the original to the Graduate Programs Office.
Copies on acid free paper go to the library with the reports for binding.

Original to Graduate Programs Office
Acid-free copies with written reports to library
Copies to: Project supervisor and committee and to MSIS Coordinator

Revised 1/28/03

DYNAMIC SOLUTIONS FOR A WOMEN'S BASKETBALL WEB SITE

A Project Report
Submitted to the Graduate Faculty
of
Dakota State University

By Dawn R. Gaffney

In Partial Fulfillment of the Requirements
for the Degree of
Master of Science in Information Systems

December 2003

Madison, South Dakota

TABLE OF CONTENTS

ABSTRACT **3**

ACKNOWLEDGEMENT **4**

LIST OF TABLES **5**

LIST OF FIGURES **6**

SECTION 1: INTRODUCTION **7**

SECTION 2: STATEMENT OF THE PROBLEM **10**

SECTION 2.1: PREVIOUS ONLINE WEB SITE 10

SECTION 2.2: FUNCTIONAL WEAKNESSES 11

SECTION 2.3: LIMITATIONS AND CONSIDERATIONS 13

SECTION 2.4: CONCLUSION 13

SECTION 3: PROJECT PLANNING **15**

SECTION 3.1: OBJECTIVE 15

SECTION 3.2: SYSTEM SCOPE AND DELIVERABLES 16

SECTION 3.3: WORK PLAN 17

SECTION 3.4: CONCLUSION 21

SECTION 4: PROJECT DEVELOPMENT **22**

SECTION 4.1 DATABASE CONNECTION 22

SECTION 4.2 DATABASE MANAGEMENT 24

SECTION 4.3 SCRIPTING LANGUAGES USED 25

SECTION 4.4: SECTION CONCLUSION 27

SECTION 5: IMPLEMENTATION & DELIVERY 28

SECTION 5.1: DATABASE DESIGN 28

SECTION 5.1:1 DESIGNING THE CONCEPTUAL MODEL 28

SECTION 5.1:2 TRANSFORMING THE CONCEPTUAL MODEL TO THE LOGICAL MODEL 30

SECTION 5.1:3 CREATION OF TABLES AND ATTRIBUTES WITHIN THE DATABASE. 31

SECTION 5.2: WEB INTERFACE DESIGN AND FUNCTIONALITY 32

SECTION 5.3: CONCLUSION 42

SECTION 6: LESSONS LEARNED 43

SECTION 6.1 DATABASE DESIGN AND IMPLEMENTATION ISSUES 43

SECTION 6.2 PROGRAMMING AND INTERFACE PROBLEMS 45

SECTION 6.3 ACTUAL TIME VS. PLANNED TIME 47

SECTION 6.4 FUTURE OR ADDITIONAL WORK 49

SECTION 6.5 CONCLUSION 49

SECTION 7: CONCLUSION 50

REFERENCES 51

APPENDIX A: TABLES AND ATTRIBUTES 52

APPENDIX B: SOURCE CODE 56

ABSTRACT

The Dynamic Solutions for a Women's Basketball Web Site project involved taking a previously static web site and making it data driven and dynamic. The previous web site had over a hundred or more unorganized pages linked together. The previous web site worked well for the viewer, but was filled with functional errors and redundant processes for the web master. The Dynamic Solutions project end design - eliminated the functional errors and gave the web master more management capabilities. The following pages trace the process of creating the project from start- project planning, to finish- project implementation.

ACKNOWLEDGEMENT

I would like to take this opportunity to thank Dr. Terry Dennis, my project supervisor and my committee members, Dr. Haomin Wang and Dr. Ronghua Shan. The success of this project is due largely to their support and willingness to assist me. I would also like to thank all of the professors that I have had throughout the entire MSIS program. They have vastly improved my confidence in my abilities and have opened the door of opportunity for me. Thank you mom for your thorough job of editing and your keen eye for details. I would also like to thank my family for their love and patience and most importantly their encouragement.

LIST OF TABLES

TABLE 1: PROJECT FUNCTIONALITY AND DELIVERABLES 17

TABLE 2: WORK BREAKDOWN STRUCTURE 19

TABLE 3: TABLES AND ATTRIBUTES 55

LIST OF FIGURES

FIGURE 1: PROJECT PLANNING GANTT CHART 20

FIGURE 2: E-R DIAGRAM 30

FIGURE 3: LOGICAL MODEL 31

FIGURE 4: ROSTER PAGE 33

FIGURE 5: ATHLETE BIOGRAPHY INFORMATION 34

FIGURE 6: SCHEDULE & RESULTS 36

FIGURE 7: BOXSCORE 38

FIGURE 8: CUMULATIVE STATISTICS 39

FIGURE 9: DEFAULT PAGE 40

FIGURE 10: ADMINISTRATION PAGE 41

FIGURE 11: UPDATED GANTT CHART 48

SECTION 1: INTRODUCTION

The previous women's basketball web site was a compilation of more than one hundred unorganized web pages. The first version of this web site was created over six years ago. Since then the web site design, layout, and content have been updated on a fairly regular basis. These updates were done through FrontPage and static HTML pages. While the web site was pleasing to the eye and fairly easy to navigate it was a web master's nightmare to keep both the design and the content updated. For example, after each game had been completed, both the statistics and boxscore from the game needed to be entered onto the web site. There were four different locations where the information was manually updated: the default page, the conference statistics page, the cumulative statistics page and the individual athlete's pages. The process took anywhere from one to two hours after each game. This is one of many examples of the redundancy of work the previous web site required.

Because of the functional errors and redundant processes of the previous women's basketball web site, the programmer's vision for the new web site was to create one that was not only pleasing to the eye and exciting for the viewers, but also one that had more dynamic content. In order to complete this task, a majority of the static data from the old web site was placed into a database and then connected to the database through an ASP driven web site. The changes and updates are seamless to the average viewer, but to the web master the changes are significant. These changes have allowed the web master to avoid work duplication without also increasing the difficulty of the process. For example, the web master, who in this case, is the women's head basketball coach, has a password protected administration section. This administration section allows him to insert, update

Section 7: Conclusion: The entire project is summarized, including references and conclusions.

.

SECTION 2: STATEMENT OF THE PROBLEM

Imagine the frustration of going to work every day knowing that you were doing a number of redundant and time wasteful tasks and also knowing that you did not have the expertise to improve your situation. What options are available? Not completing the tasks is one option and reducing the number of tasks is another option. Finding outside expertise and resolutions is a third option. The women's head basketball coach, who also sidelines as the web master for the team web site, decided to go with option three. He understood the importance of an organized and content-filled web site, but did not have the time to keep the web site updated At this point, the idea for a dynamically driven web site project for the Dakota State Lady T's basketball team was conceptualized. For future reference, the women's head basketball coach will now be referred to as the web master.

Section 2.1: Previous Online Web Site

The previous Lady T's web site was a compilation of more than a hundred unorganized web pages. The web site was first created by a student, with web design knowledge and skills but no programming experience. Although the site had its limitations, it was one of the first available athletic web sites on the Dakota State campus, so at the time of its creation, it was on considered "leading edge." The web site gave basic information on the athletes, the games and the past history of the organization. Originally, there were ten or fewer web pages. After many years and many seasons, those few page numbers grew exponentially at a very fast pace.

The expectations from the viewers of the web site also grew at a very fast pace. The athletes relied on the web pages to show them current information on the schedule for the

season and on the results of the season. The families and fans of the athletes looked to the web site for timely information on the athletes and on the games plus instant reporting on the results of the games. For example, at one point the parents and fans were looking for the results of the game within hours after its conclusion. This expectation prompted the web master to look at the web site as a way of keeping the parents and fans updated and interested in the team.

The web master also looked at the web site as a way to keep statistical information updated throughout the year without revealing too much inside information to opponents for scouting purposes. However, time was a factor as the web master had only limited time available to update the content on the web site. When time was not available, the web site became outdated.

In order to cater to the identified audience, the web master organized the web site in the only manner familiar to him, which was making additions of functions to the functions originally created by the student on the first web site. This process worked for a while but quickly generated limitations and functional weaknesses.

Section 2.2: Functional Weaknesses

There were a number of functional weaknesses embedded through the Lady T's web site that hindered its ability to cater to the needs of the viewers and to the web master. The weaknesses were prevalent in the athlete information, the schedule and results section and the reporting of statistics sections.

The athlete information section not only contained static information such as the athlete's name, hometown etc. but also contained information on the career and statistical highs of the athlete. Each year at the beginning of the year the web master would create a

page for every new athlete. The layouts of all of these pages were identical, only the content changed. The athlete information would then have to be added to the roster, which contained a lot of the same information as the individual athlete's page. During the course of the season the web master had to check each athlete's statistics to see if she had broken any of her career highs. If she had broken any of her career highs, then that information had to be manually entered.

The schedule and results for each game were located in two separate locations. The first location was on the main or default page of the web site in the scoreboard section. The scoreboard section contained the final score and linked to the recap and boxscore of the last two games. It also displayed the overall record and the conference record of the team. The last item contained on the scoreboard was information on the next game such as opponent, date, time and location of the contest. The scoreboard section of the web site was continually updated during the course of the season. The schedule and results page contained much of the same information but with much greater detail. This page contained the entire schedule of the season. The opponent, date, time and location of each contest were listed. Schedule information was entered throughout the season and periodically updated as changes occurred. To further complicate the schedule, the results of each game were manually added to the schedule following the conclusion of the game. The results included the final score, overall record, conference record and linked to the boxscore and recap of the game.

Statistical information was organized on boxscore pages and on one cumulative statistics page. Each time a game was played a new boxscore page was created. The boxscore page contained the statistical information on each athlete for one particular game.

This data was first entered into an Excel spreadsheet and calculated using the formula's available. From there it was manually entered onto the web site. Included on these pages were a number of fields, such as field goal percent, that had to be manually calculated. The cumulative and conference statistics were also first entered and calculated in an Excel spreadsheet and then entered onto the web site. Once the statistical information had been added to the web site a link had to be created to the scoreboard on the main page and to the results on the schedule and results page.

Section 2.3: Limitations and Considerations

The problems presented by the redundancy and limitations of the previous web site caused the web master to seek a better solution. The web master had proficient knowledge of FrontPage, Excel and Access but did not have programming or SQL experience and did not have an interest in learning either technology. He needed a solution that would decrease the overlapping redundancy of work and yet at the same time not increase the complexity. Thus the idea for a dynamically driven web site came about.

Before the project started, the project programmer was made aware of the limitations and considerations of the project. These limitations and considerations were kept in mind by the project programmer throughout the entire project.

Section 2.4: Conclusion

In Section 2, a detailed description of the history and functional problems of the previous Lady T's web site was completed. The situation of the web master was explained. With the need for a new web site and the reasons for the creation of the project established, the project programmer took the next step and explained the project plan in Section 3. This

explanation includes the problems of the past web site up to the planning of the new web site.

SECTION 3: PROJECT PLANNING

What exactly is project planning? The popularity of project planning has significantly increased over the last decade. Project managers have found that due to a greater use of project planning, more and more projects are successful. This success is due in part to the organization the project plan brings to a project. The project plan for the development of a dynamic women's basketball web site included an objective, a project scope, a work plan and a Gantt Chart.

Section 3.1: Objective

The objective of the project describes the vision and the goals that the project programmer had for the project before its development. The objective of the project was to create a graphically pleasing, dynamically generated and functionally sound web site for the women's basketball team that eliminated the redundancy of both data and maintenance work.

In the project plan, the statistics portion of the web site was to be embedded in the entire web site. On the default page there was to be an area for game results, news releases and headlines, and future contests to be posted. Each game's boxscore was to be dynamically generated on the schedule and results page. A link to the cumulative and conference statistics was also to be generated on this page. The roster page was to keep a running total of the high's in each statistical category for the athlete and then display this information on the individual athlete page.

In the project plan, there were also a number of other vital statistics that needed to be maintained. The first primary area that needed to contain dynamic content and be maintained was the statistical information for the coaching staff but not for the public.

Consequently, a new administrative section was added to the current site for the purpose of data entry and manipulation. The coaching staff needed full access to all statistical information such as game statistics, cumulative statistics, conference statistics and grades. Grades are used to evaluate the performance of each athlete during one game. Grades are based on statistical data. One of the key components of this section was the management of statistical data. Coaches will have the ability to enter, update and delete all dynamic content found in the web site. All access will be through a browser interface.

The second primary area which was to contain dynamic content was the record book for current athletes and alumni. The previous web site contained a record book that was static and incomplete. One objective of this project was to keep records on the running total of the top ten all time statistics for each category. The alumni information was to be kept along with and displayed within the record book.

The personnel information section was the third primary area that was to contain dynamic content. Each member of the coaching staff had a contact and biography page. Each athlete also had a page that listed a number of attributes as well as her current statistical information.

In addition to many updates and renovations to the dynamic content of the web site, a complete redesign of the entire web site was done. A number of new graphics, logos, colors etc. were to be developed.

Section 3.2: System Scope and Deliverables

The system scope and deliverables of the project plan describe in greater detail the objectives of the project. The objectives of the project outline what the project is expected

to do. The deliverables of the project list exactly what the project was to complete. To view the deliverables of the project see Table 1.

Functionality
Statistical Information
Enter Game Information (admin page)
Edit Game Information (admin page)
Enter Opponent Information (admin page)
Edit Opponent Information (admin page)
Enter Game Statistics (admin page)
Edit Game Statistics (admin page)
Enter Grade Statistics (admin page)
Edit Grade Statistics (admin page)
Search Grade Statistics (admin page)
Display game box score (cover, schedule)
Display cumulative statistics (schedule page)
Display conference statistics (schedule page)
Update scoreboard (cover page)
Update final game results (after each game)
Display and Update individual athlete's highs (roster page)
Display Game Grades for each athlete (admin page)
Record Book Information
Enter Records
Edit Records
Display Records
Personnel Information
Enter individual athletic profile
Edit individual athletic profile
Enter alumni profile
Edit alumni profile
Enter coaching staff information
Edit coaching staff information
Display athletic profile
Display alumni profile
Display coaching staff profile

Table 1: Project functionality and deliverables

Section 3.3: Work Plan

Table 2. is a work breakdown structure (WBS) for the development of the web site. There were five primary areas in the WBS: planning, analysis, design, implementation and maintenance.

1. Planning

1.1. Preliminaries

1.1.1. Discuss project need with Head Coach

1.1.2. Define Project

1.1.3. Find Supervisor

1.1.4. Project Proposal Approval

1.2. Develop Project Plan

1.2.1. Problem Statement

1.2.2. Objectives

1.2.3. Scope

1.2.4. WBS

1.2.5. Gantt Chart

1.3. Submit Project Plan

1.3.1. Confirm Project Committee

1.3.2. Submit Plan

2. Analysis

2.1. Analysis Strategy

2.1.1. Prepare Analysis Strategy

2.2. Analyze Current System

2.2.1. Gather Information on current web site

2.3. Analyze Similar Systems

2.3.1. Gather Information on other women's basketball web sites

2.4. Evaluate suggested System

2.4.1. Selection of Entities

2.4.2. Database Design

2.4.3. Website Organizational Structure

2.4.4. Evaluate Functions

3. Design

3.1. Logical Design

3.1.1. General Description

3.1.2. ER & EER Diagram

3.1.3. Designing Relational Schema and Constraints

3.1.4. Normalizing/Evaluating Dependencies

3.2. Physical Design

3.2.1. User Interface for Entry of Data into System

3.2.2. User Interface for Manipulation of Data

3.2.3. Complete Web Site Design
4. Implementation 4.1. Implementation Architecture 4.1.1. Configuring Server 4.1.1.1. Creation of Database 4.1.1.2. Creating Schemas/Users 4.2. Tables Implementation 4.2.1. Creating Tables 4.2.2. Creating Primary/Foreign Keys 4.3. Implementing Security 4.3.1. Password Management 4.4. Establish Data Transfer 4.4.1. Create Web Based Database Information Entry 4.4.2. Create Web Based Database Search Utility 4.4.3. Create Web Based Data Retrieval 4.4.4. Dynamic Web Page Connection 4.5. Implementing Backups 4.5.1. Online Backups 4.5.2. Exports
5. Project Close 5.1. Problems encountered 5.1.1. Reasons for problems 5.1.2. Problem resolution 5.2. Actual time required versus planned time required Lessons learned (if any)

Table 2: Work Breakdown Structure

Dynamic Solutions for Women's Basketball Web site

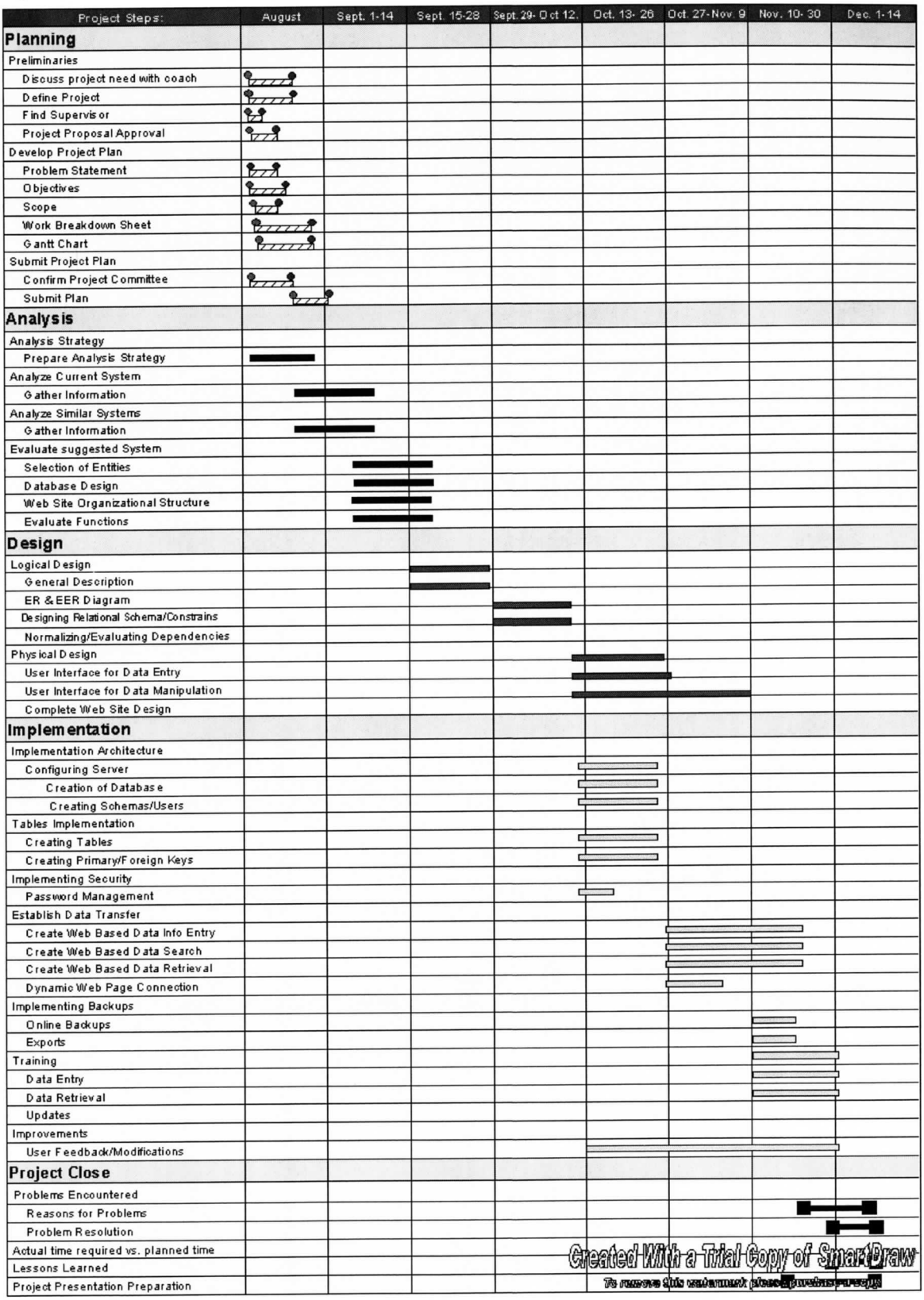


Figure 1: Project planning Gantt Chart

Section 3.4: Conclusion

Project planning involves a great deal of organization and forethought into the development of the details of a project. Through the planning process each detail is described, scrutinized and analyzed. If a project plan is well thought out the likelihood that the project will be successful greatly increases. In Section 3, the project plan and the vision of the project before its development was described. In Section 4, the Project Development will be described.

SECTION 4: PROJECT DEVELOPMENT

The previous sections of this report focused on the need for the project and on the planning of the project. This section contains a summary of what was actually done. Throughout the development of this project, a number of technology applications were used. These applications include:

1. Database Software- MS Access, MS SQL Server
2. Web Interface Design- MS FrontPage and HTML
3. Graphical Design- Adobe PhotoShop and Macromedia Fireworks MX
4. Web Programming- Active Server Pages (ASP), JavaScript
5. Data Access- ODBC and DSN
6. Database Management- Structured Query Language (SQL).

There were two servers used to house this project, both located on the campus of Dakota State University. The main interface and web site is located on the www.departments.dsu.edu server, a Microsoft Internet Information Server. The database resides on a MS SQL Server named LUNA. Each of these technologies was utilized by examining how the database connection was established, how the database was developed and the scripting languages used.

Section 4.1 Database Connection

Open DataBase Connectivity (ODBC), Active Data Objects (ADO), and Data Source Name (DSN) were all used in the database connection process. ODBC is a standard for accessing data. It was primarily designed to allow programmers a common set of routines to access the data stored in a databases regardless of the different types of

databases in which the data was stored. ("Francis") One of the main purposes of ODBC is to provide interface transparency so that the programmer can access an Oracle database in the same way that it accessed a SQL database. ADO is a set of objects that allow programmers to program their data access logic from scripting languages. DSN is a way to establish a connection string without typing it explicitly. There were two separate instances in which database connections were established. ("Francis")

First, a connection was made to the SQL server from the project programmer's computer through MS Access. This process involved first setting up a DSN connection from the project programmer's computer to the SQL server. Once this was completed, the project programmer was able to export tables and also create linked tables in MS Access through ODBC. Three steps were involved in this process:

1. Establishing a DSN connection from the project programmer's computer to the SQL server.
2. Exporting table information to SQL server through ODBC and the DSN.
3. Creating linked table information through the ODBC. These linked tables allowed for manipulation and configuration of data housed on the SQL server before any of the web pages were created.

The second connection made to the SQL server was from the IIS server www.departments.dsu.edu through ASP. This connection established the dynamic link from the data housed on the SQL server to the ASP pages created to manipulate that data. Four steps were involved in this process:

1. Creating a database connection object using ADO- e.g.: Set Conn = Server.CreateObject("ADODB.Connection")

2. Creating and opening a DSN-e.g.: theDSN="driver=SQL Server;server=luna;uid=wna;pwd=d@yfn3y" Conn.open theDSN
3. Executing a server connection SQL string to retrieve, insert, edit or delete data- e.g.: Set objrec= Conn.execute("SELECT * FROM GameInformation, Opponent WHERE GameInformation.OpponentID = Opponent.OpponentID ORDER BY Date desc")

There are a number of different web pages within the Dynamic Solutions for a Women's Basketball Web Site that use this connection. In order to ensure ease of use, a separate data connection web page was created which contains the database connection object and the DSN. Each page that needed the connection string was linked to it through an include statement. This allowed for any future modification to easily be made to one connection instead of to the connections on several different web pages.

Section 4.2 Database Management

One of the key issues of this project was the management of the data within the database. As the database developer, the project programmer could plan for and create a database but the data in that database would soon be rendered useless if the means for management were ineffective. There were two primary goals to the database management system created in this project. First, there was a need for the integrity and relevance of the data to be constantly maintained. Second, the complicated back-end details of the database needed to be converted to a user-friendly front-end application. In order to meet and maintain these goals an extensive administration section was created. Some of the primary functions of the administration section included:

1. Security: The main administration page can only be viewed by a registered login id. Each page connected to the administration pages checks login validation.
2. Input: Data can be input into the database through a process of selecting the correct path to the data. Form verifications have been set up on all input pages to ensure that the correct type of data is placed in the database.
3. Edit: Edits can be made to all data. Once these edits have been made they are then distributed throughout the database. Form verifications have also been set up on each of these edit pages.
4. Delete: Data can be deleted from each of the tables. There are three steps involved in deleting data. First, the data is selected, second the deletion command is confirmed and validated and third the actual deletion takes place.

The administration section is crucial to the management of the database. The web master does not have knowledge of SQL, DSN or many of the other advanced technologies that could otherwise be used to connect to the data. The administration section allows the web master to manage the data without needing advanced technical knowledge

Section 4.3 Scripting Languages Used

There were three primary scripting languages used to complete the project: ASP, Structure Query Language (SQL) and JavaScript. The first two languages were used extensively to connect to the database and to display the dynamic content to the browser. JavaScript was primarily used as a graphical interface enhancer on such items as applets and mouseovers.

The first programming language, ASP or Active Server Pages is a Microsoft programming tool. It allows programmers to write code that dynamically generates HTML.

The HTML does not exist until a web browser requests one of the ASP pages. It is at that time that the ASP code is processed by the web server, generates the HTML and then passes the information to the user's browser. ("Buser") ASP must be executed on a server that supports it, but ASP web pages can be viewed from any computer with any modern browser.

In order for the ASP pages to interact with the data on the SQL Server, the second programming language, SQL was utilized. SQL is a high-level query language that has commands that contain standard English words. The standard query language for relational database is SQL. Basic SQL consists of approximately 30 commands that enable users to create database structures and manipulate and view data. There are two categories for SQL commands: Data Definition Language (DDL) commands and Data Manipulation Language (DML) commands. DDL commands are used to create new database objects such as user accounts and tables. DML commands are used to insert, update, delete and view database data. This project strictly utilized DML commands ("Hoffer").

The third programming language used in this project was JavaScript. By definition JavaScript has a similar function as ASP in that it brings HTML to life and makes web pages more dynamic. There are two primary differences between JavaScript and ASP. First, it is a client side scripting language that means that everything is run on the client's machine, not on the server. Second it is not connected to a database. ("Gosselin") JavaScript was primarily used on the graphical design and interface of the web site. It was used for such things as image manipulation and mouseovers. The JavaScript in this web site was created through the Macromedia Fireworks MX application. This application provides a graphical user interface for the creation of JavaScript. For example, in this

application there were a number of steps taken to create the graphics and layers of a button mouseover. Once these graphics and layers have been created and the application knows what to do with them, it will generate the JavaScript. There are no instances in this project in which the JavaScript was created manually.

Section 4.4: Section Conclusion

At the conclusion of Section 4: Project Development, a more definitive outline and shape of the dynamic web site has taken form. The discussion of the project development summarizes the technologies utilized in this project. In Section 5: Implementation and Delivery, the theories, ideas and plans listed in the previous Sections will be put into action. This action takes the project issues to a new level and creates a picture of the actual dynamically driven web site created for this project.

SECTION 5: IMPLEMENTATION & DELIVERY

Project design is the step in the progression from planning to implementation. Project design takes all of the planning and development into the creation of the database and the web interface. This section is broken down into two primary components: database design and web interface design and functionality. The database design section details the conceptual model, the logical model, the tables and attributes found in the database for this project and then addresses some of the database design and implementation issues discovered during the process. The web interface design and functionality section will explain the individual pages that contain the dynamic content of this project. This section is also broken down into administration content and data display content.

Section 5.1: Database Design

Designing an organized, reliable and functional database to drive the content of the new web site took a lot of time and planning. In order for the correct content to be displayed, it first had to be organized and then inserted into the database. The entire process was organized into three primary steps: designing the conceptual model, transforming the conceptual model to the logical model then creation of the tables and attributes within the database.

Section 5.1:1 Designing the Conceptual Model

Conceptual data modeling analyzes the overall data requirements of the project and presents a global view of the data. At this point in the development only high-level categories of data and major relationships are included. The conceptual model contains a diagram called an entity-relationship diagram or E-R diagram. [Morrison] The E-R

diagram graphically represents the entities in the business environment and the relationships among those entities and attributes. The E-R diagram for the database is based on the following business rules:

1. Personnel are grouped into three categories: athlete, coach, alumni.
2. Alumni are listed in one to many records in the record book.
3. The web master inputs, edits and deletes personnel, records, game, opponent and statistics information.
4. Each athlete participates in zero to many games.
5. Each game contains one opponent.
6. Opponents can be in one to many games.
7. Each game produces one to many statistics.
8. Statistics contain zero to many games.
9. Statistics are broken into two categories: grades and season statistics.

The business rules then lend themselves to the E-R diagram. See Figure 1.

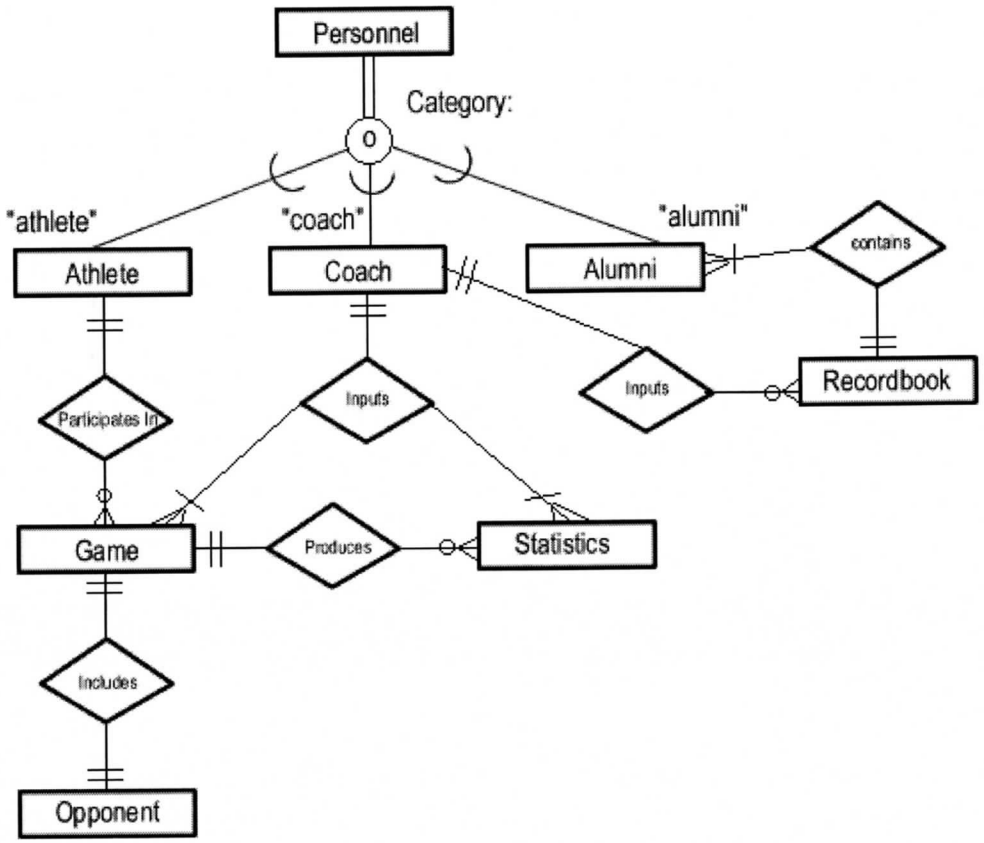


Figure 2: E-R diagram

Section 5.1:2 Transforming the Conceptual Model to the Logical Model

The logical model is another view of the database that allows the creator an overall view of the design and content of the database. The logical model takes the conceptual model one step further and includes the attributes of the various entities. Many times the logical model can be used to visualize exactly how the different tables in the database are going to interact. The simplified logical model, Figure 2, is from MS Access. It shows the different tables, their attributes and the relationships among all of the tables. Notice that there are a few tables that do not have direct relationships with any other table.

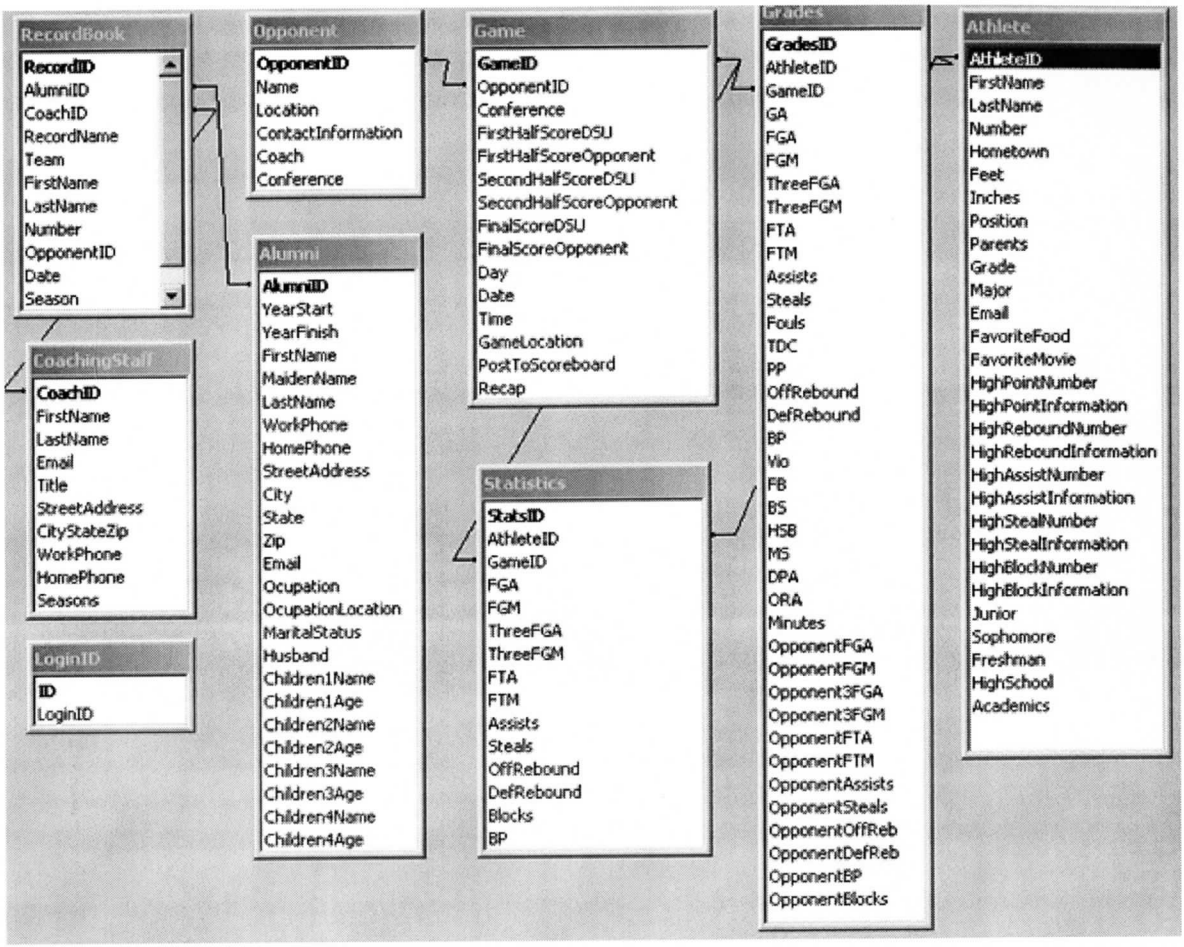


Figure 3: Logical Model

Section 5.1:3 Creation of Tables and Attributes Within the Database.

The logical design of the database produces the tables and the attributes of the entities. In the project, the logical design was created in MS Access and then exported to the SQL table through a DSN. There are 9 tables in this project: Record Book. Alumni, Athletes, Coaching Staff, Game, Grades, Login, Opponent and Statistics. See Table 3 in Appendix A for a complete breakdown of the tables, their attributes and their primary and foreign keys.

Section 5.2: Web Interface Design and Functionality

Once the database had been implemented and the data entered into the system the connection from the database to the web site was made. All of the dynamic web pages that were created were done so through the use of FrontPage and ASP. In order to create the organization of the web site all of the ASP pages were created first using a very simple graphical layout and design. Once the functionality goals were reached a new graphical design was distributed throughout these pages. The web interface consists of two primary functions: data display and administration. A breakdown of each of these functions and an explanation of exactly what they do will follow.

The first areas of data display that were created were the athlete information and the athlete roster pages which fall under the personnel category. These pages both contain the same content only the athlete information page more specifically explains the history of the athlete. The athlete roster page displays the name, number, height, position, year and hometown of each athlete. The athlete's names are all hyperlinks connecting to a page that will display a complete history of the athlete that was chosen. The previous web site had a separate page for each athlete. The dynamic web site has only one page for all of the athletes. The athlete information displayed on the data is selected through the athlete's unique AthleteID. Only the information for that AthleteID is displayed on the page. See Figure 4 and Figure 5 for screenshots of these two pages.

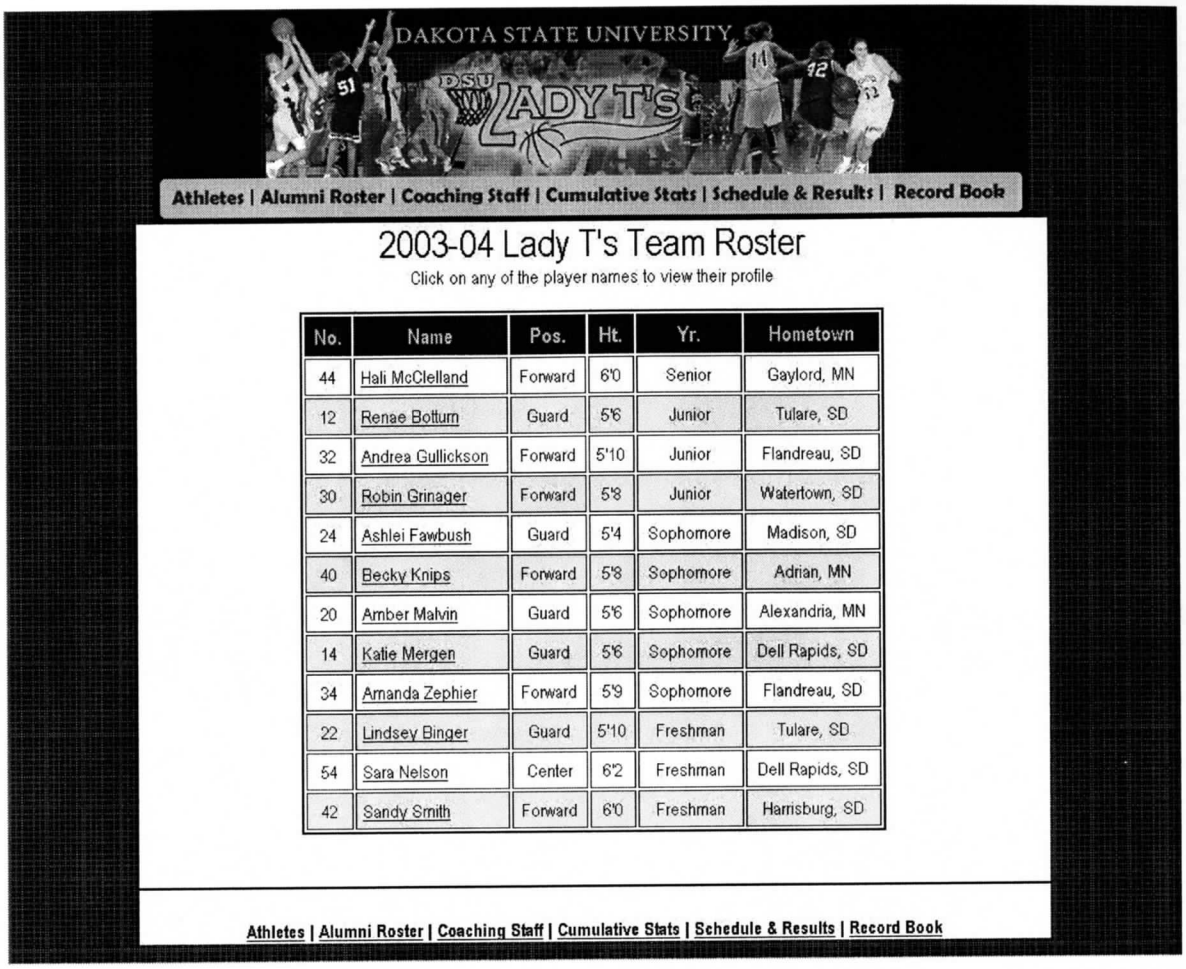


Figure 4: Roster Page

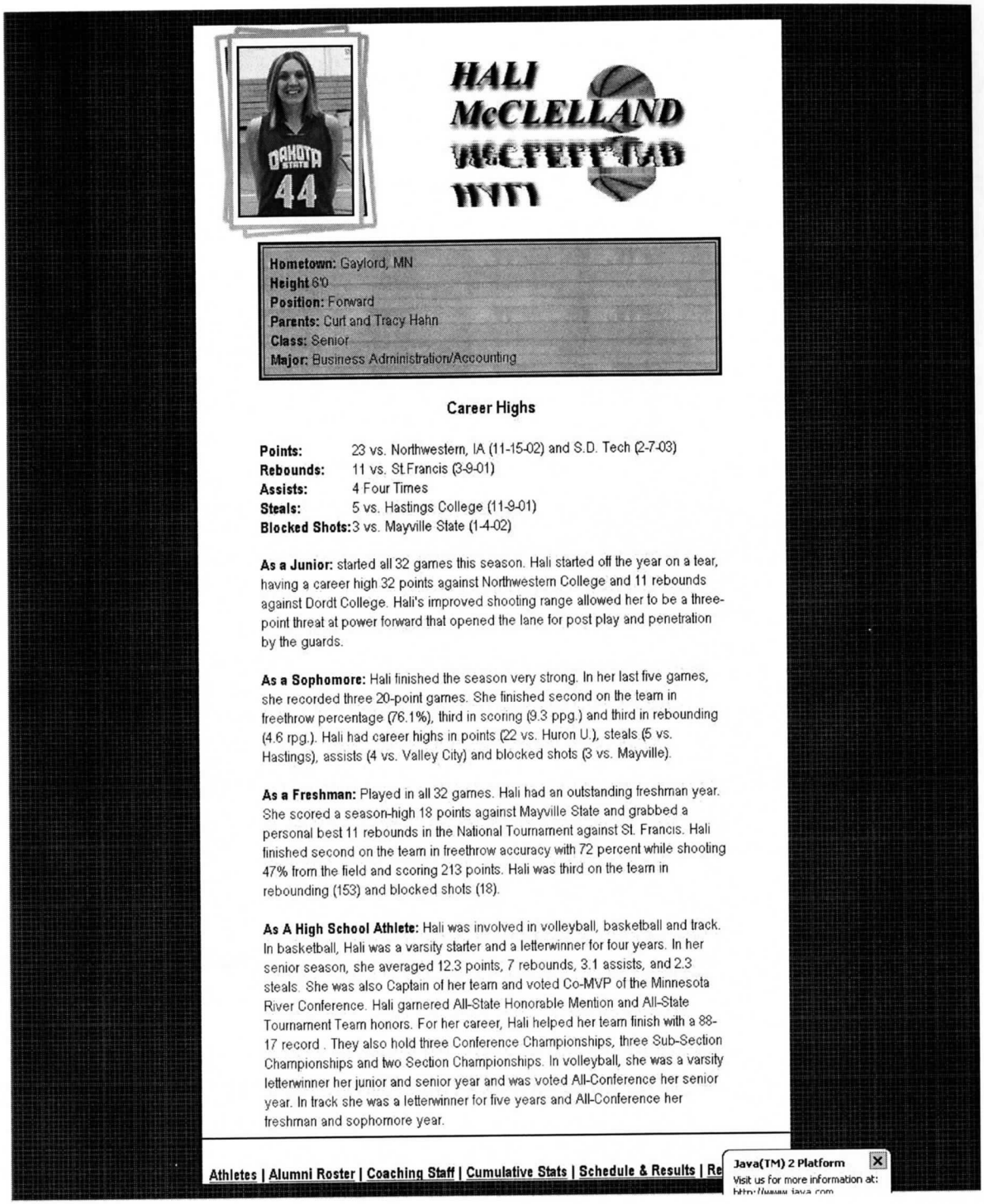


Figure 5: Athlete Biography Information

The coaching staff and alumni pages were the next two areas of data display created and also fall into the personnel category. This information will only be updated at the beginning of the year or at the end of the year. Each coach and alumni are listed and then linked to a biography page that contains data pulled from the database. The alumni are also referenced in the record book section of the web site. Any time the alumni are found in the record book, their name is linked to their biography page.

The record book section was originally going to be connected to the athlete information page and dynamically updated any time that an athlete broke a record. The complications of this function outreached the capabilities of the project programmer so had to be eliminated from the plan. The record book does link to the alumni information section.

The schedule and results section of the data display were the next items on the creation list. The schedule and results page displays the game and opponent information for each game. This information includes game day, date, opponent, time and location. The schedule is dynamically updated each time the final score of the game is entered into the database. Once the final score has been updated, the page will replace the location information with the results of the game and add a link to the boxscore and a link to the recap page for the game. The overall record and the conference record information are also displayed on this page and are dynamically updated once the final score of the game has been entered into the database. Figure 6 is a screenshot of the information displayed on the schedule & results web page.

2003-04 Schedule & Results

Click on any of the boxscore links to review the statistics for the game.

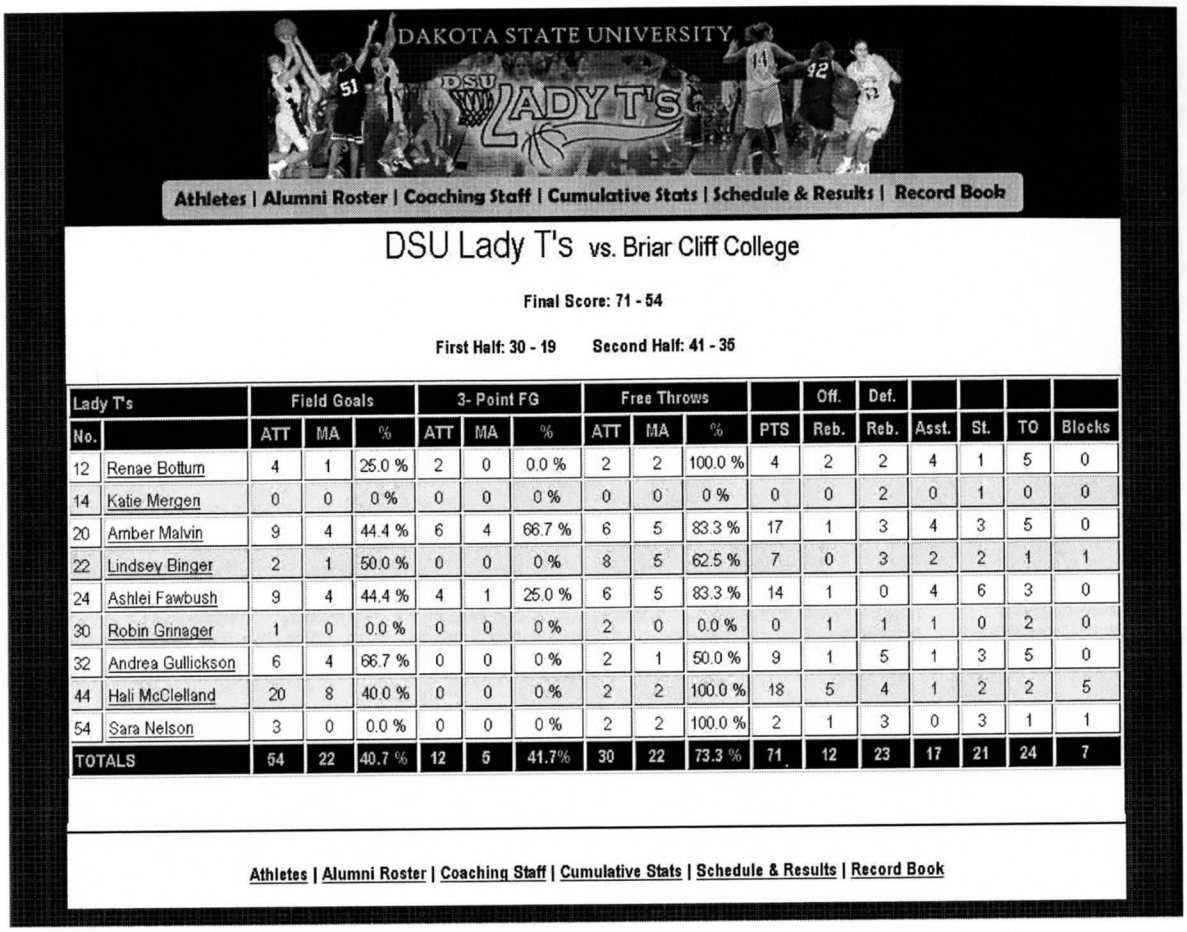
Overall Record: 5-6 Conference Record: 0-0

Day	Date	Opponent	Time	Location/Results	Recap
Friday	10/11/2003	Alumni Game	6:00 PM	**95-70** Boxscore	
Monday	11/3/2003	Briar Cliff College	6:00 PM	**W 71-54** Boxscore	Recap
Saturday	11/8/2003	Northwestern College (IA)	3:00 PM	**W 60-53** Boxscore	Recap
Thursday	11/13/2003	Dordt College	7:30 PM	**W 74-46** Boxscore	Recap
Friday	11/14/2003	Mt. Marty College	5:30 PM	**L 71-96** Boxscore	Recap
Tuesday	11/18/2003	Dakota Wesleyan University	6:00 PM	**L 62-91** Boxscore	Recap
Friday	11/21/2003	Martin Luther College	8:00 PM	**W 66-56** Boxscore	Recap
Saturday	11/22/2003	UW- Superior	1:00 PM	**W 64-56** Boxscore	Recap
Friday	11/28/2003	Northwestern College (MN)	7:30 PM	**L 51-52** Boxscore	Recap
Saturday	11/29/2003	U. of Minnesota Morris	7:00 PM	**L 52-55** Boxscore	Recap
Friday	12/5/2003	University of Mary	5:30 PM	**L 50-98** Boxscore	Recap
Saturday	12/6/2003	Jamestown College	3:00 PM	**L 65-68** Boxscore	Recap
Friday	12/12/2003	Minot State University	5:30 PM	Madison, SD	
Saturday	12/13/2003	Dickinson State University	3:00 PM	Madison, SD	
Tuesday	12/30/2003	University of Sioux Falls	7:30 PM	Madison, SD	
Friday	1/2/2004	Valley City State University	5:30 PM	Valley City, ND	
Saturday	1/3/2004	Mayville State University	3:00 PM	Mayville, ND	
Friday	1/10/2004	South Dakota Tech	5:30 PM	Madison, SD	
Saturday	1/11/2004	Black Hills State University	3:00 PM	Madison, SD	
Thursday	1/15/2004	Si-Tanka Huron	5:30 PM	Madison, SD	
Friday	1/23/2004	Dickinson State University	5:30 PM	Dickinson, ND	
Saturday	1/24/2004	Minot State University	3:00 PM	Minot, ND	
Friday	1/30/2004	Valley City State University	5:30 PM	Madison, SD	
Saturday	1/31/2004	Mayville State University	3:00 PM	Madison, SD	
Friday	2/6/2004	South Dakota Tech	5:30 PM	Rapid City, SD	
Saturday	2/7/2004	Black Hills State University	3:00 PM	Spearfish, SD	
Thursday	2/12/2004	Si-Tanka Huron	5:30 PM	Huron, SD	
Friday	2/20/2004	Jamestown College	5:30 PM	Madison, SD	
Saturday	2/21/2004	University of Mary	3:00 PM	Madison, SD	

Athletes | Alumni Roster | Coaching Staff | Cumulative Stats | Schedule & Results | Record Book

Figure 6: Schedule & Results

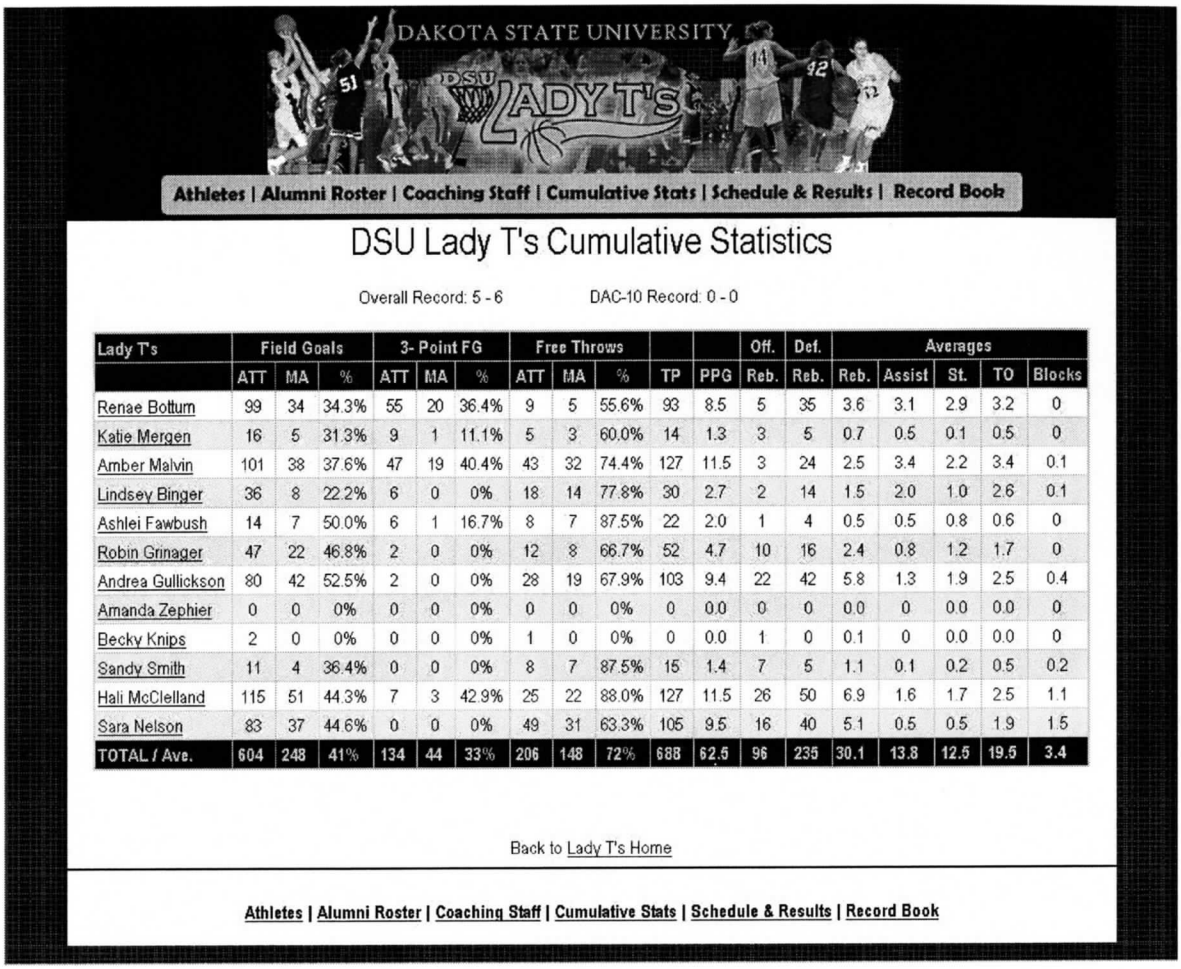
Once the schedule and results page had been created and links to the boxscore had been developed the boxscore sections were developed. The boxscore page contains statistical data from the selected game results. This page contains information from the GameInformation, OpponentInformation, AtheteInformation and StatsInformation tables and combines them to reveal all statistical data from the contest. The final game results and all of the stats from each athlete are contained on this page. There are also a number of calculated fields such as field goal percent and free-throw percent available on the page. The previous web site had a different boxscore page for each game. The dynamic web site has only one page that displays the boxscore information based on the unique GameID that was chosen by the viewer. The page also links to each of the athlete's individual pages. Figure 7 represents the boxscore web page.



Lady T's		Field Goals			3- Point FG			Free Throws				Off.	Def.				
No.		ATT	MA	%	ATT	MA	%	ATT	MA	%	PTS	Reb.	Reb.	Asst.	St.	TO	Blocks
12	Renae Bottum	4	1	25.0 %	2	0	0.0 %	2	2	100.0 %	4	2	2	4	1	5	0
14	Katie Mergen	0	0	0 %	0	0	0 %	0	0	0 %	0	0	2	0	1	0	0
20	Amber Malvin	9	4	44.4 %	6	4	66.7 %	6	5	83.3 %	17	1	3	4	3	5	0
22	Lindsey Binger	2	1	50.0 %	0	0	0 %	8	5	62.5 %	7	0	3	2	2	1	1
24	Ashlei Fawbush	9	4	44.4 %	4	1	25.0 %	6	5	83.3 %	14	1	0	4	6	3	0
30	Robin Grinager	1	0	0.0 %	0	0	0 %	2	0	0.0 %	0	1	1	1	0	2	0
32	Andrea Gullickson	6	4	66.7 %	0	0	0 %	2	1	50.0 %	9	1	5	1	3	5	0
44	Hali McClelland	20	8	40.0 %	0	0	0 %	2	2	100.0 %	18	5	4	1	2	2	5
54	Sara Nelson	3	0	0.0 %	0	0	0 %	2	2	100.0 %	2	1	3	0	3	1	1
TOTALS		54	22	40.7 %	12	5	41.7%	30	22	73.3 %	71	12	23	17	21	24	7

Figure 7: Boxscore

After the statistical information for each game was available, the cumulative statistics page was created. The cumulative statistics page displays the overall and the conference record. It also displays the cumulative statistics for each athlete based on the number of games that have been played. The statistics available are not only the information found in the database but there are also a number of calculated fields such as average points per game and average assists per game. See Figure 8.



Lady T's	Field Goals			3- Point FG			Free Throws					Off.	Def.	Averages				
	ATT	MA	%	ATT	MA	%	ATT	MA	%	TP	PPG	Reb.	Reb.	Reb.	Assist	St.	TO	Blocks
Renae Bottum	99	34	34.3%	55	20	36.4%	9	5	55.6%	93	8.5	5	35	3.6	3.1	2.9	3.2	0
Katie Mergen	16	5	31.3%	9	1	11.1%	5	3	60.0%	14	1.3	3	5	0.7	0.5	0.1	0.5	0
Amber Malvin	101	38	37.6%	47	19	40.4%	43	32	74.4%	127	11.5	3	24	2.5	3.4	2.2	3.4	0.1
Lindsey Binger	36	8	22.2%	6	0	0%	18	14	77.8%	30	2.7	2	14	1.5	2.0	1.0	2.6	0.1
Ashlei Fawbush	14	7	50.0%	6	1	16.7%	8	7	87.5%	22	2.0	1	4	0.5	0.5	0.8	0.6	0
Robin Grinager	47	22	46.8%	2	0	0%	12	8	66.7%	52	4.7	10	16	2.4	0.8	1.2	1.7	0
Andrea Gullickson	80	42	52.5%	2	0	0%	28	19	67.9%	103	9.4	22	42	5.8	1.3	1.9	2.5	0.4
Amanda Zephier	0	0	0%	0	0	0%	0	0	0%	0	0.0	0	0	0.0	0	0.0	0.0	0
Becky Knips	2	0	0%	0	0	0%	1	0	0%	0	0.0	1	0	0.1	0	0.0	0.0	0
Sandy Smith	11	4	36.4%	0	0	0%	8	7	87.5%	15	1.4	7	5	1.1	0.1	0.2	0.5	0.2
Hali McClelland	115	51	44.3%	7	3	42.9%	25	22	88.0%	127	11.5	26	50	6.9	1.6	1.7	2.5	1.1
Sara Nelson	83	37	44.6%	0	0	0%	49	31	63.3%	105	9.5	16	40	5.1	0.5	0.5	1.9	1.5
TOTAL / Ave.	604	248	41%	134	44	33%	206	148	72%	688	62.5	96	235	30.1	13.8	12.5	19.5	3.4

Figure 8: Cumulative Statistics

The last data display web page created was the default page. The default page contains links to all of the data display pages plus has a dynamic section of its own called the scoreboard. The scoreboard section of the default page lists information from the last two contests and for the next contest. The final score and links to the boxscore and recap page are listed for the last two contests. The opponent, day, date, time, location and days remaining to the next game are listed for the next contest. The scoreboard section also displays the overall and the conference record. See Figure 9.

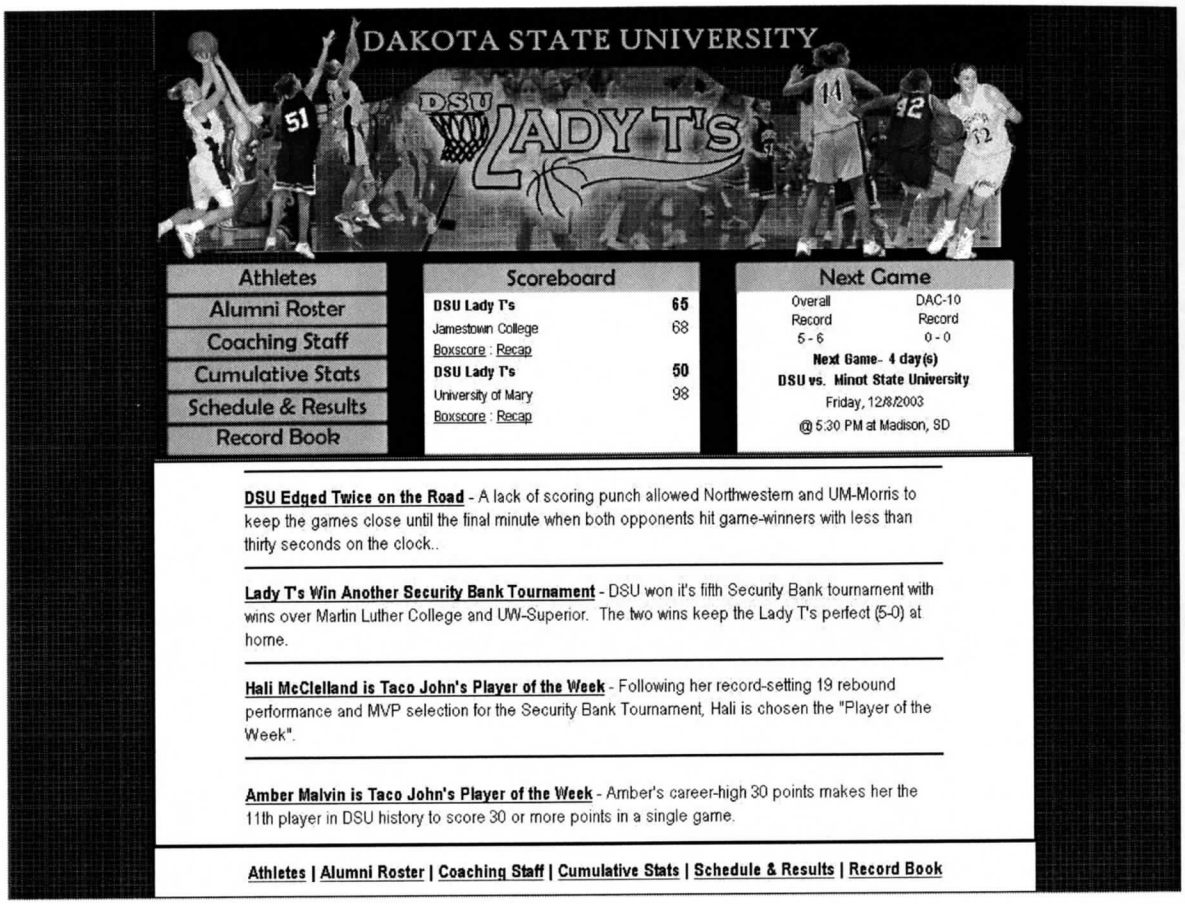


Figure 9: Default Page

The next section to display dynamic data information is the administrative section. The administration section is a fully developed, secure, browser based management tool. The primary purpose of this section is to give the web master the management tools necessary to insert, update and delete data from the database. The secondary purpose of this section is to give the web master the ability to sort the statistical information in a more in-depth manner. Figure 10 displays each function available to the web master.

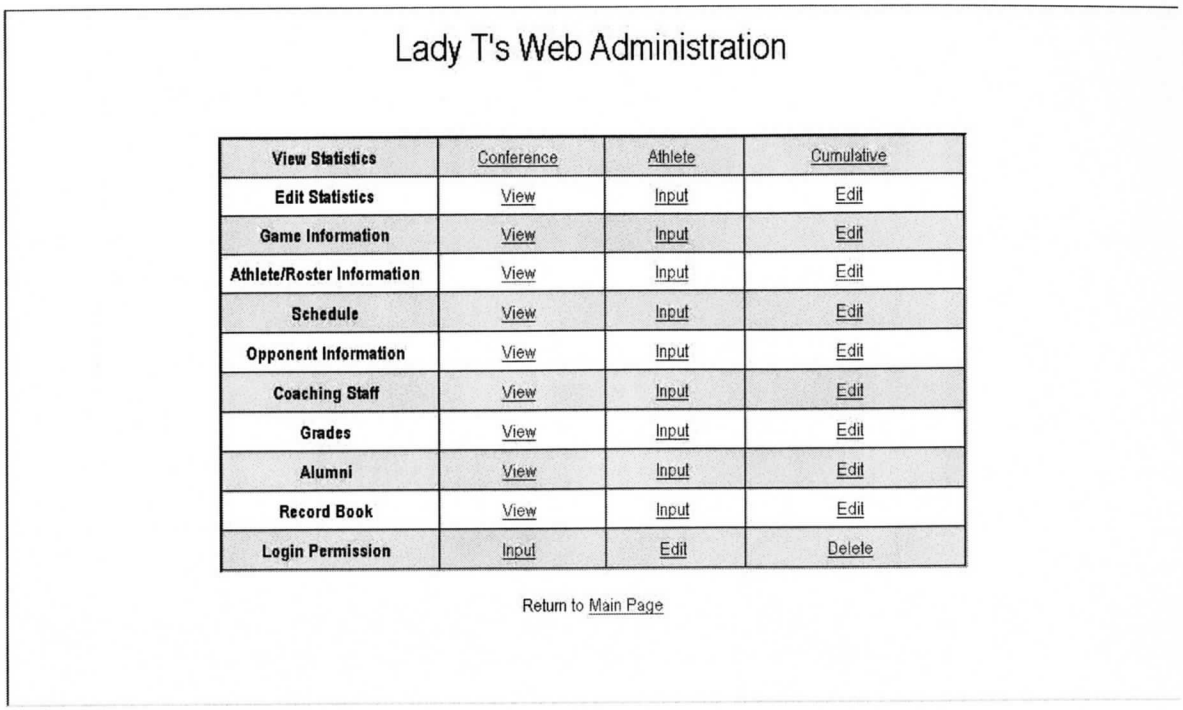


Figure 10: Administration Page

The management tools in the administration section connect to the statistics, game , athlete, schedule, opponent , coaching staff, grades, alumni , record book, and login information. In essence, the management tools allow the web master to manage the information in every table in the database. The default administrative page contains links for the web master to view, input information, edit or delete the data in every table. In order to do this, three separate pages were created for each table. The insert pages have a FrontPage form connected through ASP to the database. Once the form has been filled out and submitted the new record is added to the table. The edit pages also have a FrontPage form connected through an ASP database. The form pulls the selected record from the database; the web master updates the information and then submits the changes. The changes are then updated on the database. The deletion page is one single page that has a confirmation page linked to it. The deletion page allows the web master to select the information he wants to delete. The confirmation page double checks to make sure that the

correct data is going to be deleted and confirms the deletion a second time with the web master. Every form in the web site contains validation script to ensure the integrity of the data entered into the database.

The web master in the project wanted the capabilities of having specific searches set up for him on the statistical data in the database. Four display pages were created for this purpose. The first display page searches the database for all data relating only to conference games. This data is separated from the non-conference data. The second display page shows the statistical data based on each athlete. In this page the web master can see how the athlete has performed in each game and then view their cumulative statistics on the season. The third and fourth display pages are similar in nature in that they choose the statistics for only the last three or the last five games of the season. These pages cumulate the statistics based on the number of games chosen. The four display pages are used by the web master to search for trends and to share with the athlete her strengths and weaknesses.

The security of the administration section is extremely crucial to the success of this project. The web master needs to have complete confidence in the fact that no one will be able to manage the data in the database unless he has given them access. The web master also wants to make sure that the searches set up for him are not revealed to opponents for scouting information.

Section 5.3: Conclusion

The primary purpose of Section 5: Implementation & Design was to describe the new and improved dynamic web site solution created for the Dakota State Lady T's. This web site contains database technology with programming technology to enhance the Internet experience for the athletes, fans, coaching staff and the web master.

SECTION 6: LESSONS LEARNED

In Sections 1-5 , the Dynamic Solutions for the Women's basketball Web Site project has been described, including the events and details included in every aspect of the project. What these sections do not describe is the frustrations, late nights, frantic pace and excitement of a problem solved that can be involved in the successful completion of any project, even a well organized one. Section 6 is dedicated to taking a look back at the highs and lows of the entire process.

Section 6.1 Database Design and Implementation Issues

The finished database design looks organized, functional and well thought out. However, this design did not come on the first try. It took many designs, implementations, errors and testing in order to get the design to this point. Most of the issues that arose during the creation of the tables seemed minor to the design, but proved to be very disruptive to the successful display of the dynamic content on the web site. A few of the major issues will be reviewed.

The first major issue that arose started with the design of the table and finished with access problems on SQL. Connecting to the SQL through ODBC proved to be very useful and allowed the project programmer direct access to the tables and to the data. The first few tables that were exported worked perfectly. The table was exported to the database on the SQL and then the data entry process began. Unfortunately there were a few times when the project programmer needed to change the design of a table because it was not handling the information as it was expected to handle it. Changing the design of a table and deleting tables were not permitted through the level of security permissions on the project programmer's account. All attempts to edit the design of a table or delete a table through

ODBC were met with error messages. The first few times that this happened, the original table on the project programmer's personal computer was changed and then exported again to the SQL, with a different name. By the time the project programmer had gone through this process a few times, there was an SQL database full of tables that were useless. This problem was solved when the process was changed so that the data was entered into the database before it was exported into SQL.

The second issue that caused a few complications similarly dealt with security permissions on the project programmer's SQL account. The SQL server administrator created a database for the project programmer and used her DSUNT login ID and password as the administrator of the account. He then created a user on the account that had the privileges to insert, edit and delete files but not create or delete tables. The project programmer did not want to include her DSUNT login information in the connection string so was forced to use the login information for the user account with less access privileges. The interesting side affect to this issue is that any reference in the SQL statement to a table in the project programmer's database had to be preceded by her login id. For example, here is a SELECT statement from one of the ASP pages: SELECT * FROM gaffneyd.AthleteInformation, gaffneyd.StatsInformation WHERE gaffneyd.AthleteInformation.AthleteID = gaffneyd.StatsInformation.AthleteID. This issue is not a current concern but will be more of an issue in the future. Right now the database connecting to this site is all based on the project programmer's personal login id. If she would ever decide to leave the campus, which would remove her user id , there is also a chance that her account on the SQL server would also be deleted. One solution to this would be to contact computing services and have them keep the user id active.

The third problem that appeared during the design and implementation of the database had to do with the selection of attribute names and the need for attributes that were not planned. For example, in the first design of the GameInformation table there were two fields 3FGA and 3FGM. These fields worked well in the basic SQL select string but once the select string became more complicated and used the SUM method, SQL could not read the number 3 in the field name. It would only give back error messages. The attributes' names were then changed to ThreeFGA and ThreeFGM.

An example of issues occurring that were not thought of in the design came about during the reporting of game statistics to the web site. Each game in the Game table had a GameID and an OpponentID. This allowed for the data from each game to be separate. The games were then referenced by the OpponentID. The problem did not show up until conference game information was organized. In the conference season there are two games with each opponent in the conference. There needed to be a quick and easy way for the web master to find the correct game. To resolve this issue a field named Recap was added to the GameInformation table. Each game has a different recap name. The first time the Lady T's play Jamestown the recap is Jamestown1, the second time the team plays Jamestown the recap name is Jamestown2. The recap name is also used to name the file containing the recap information from that particular game.

Section 6.2 Programming and Interface Problems

The beauty of Internet programming languages is that they can take data that seems to the naked eye to be uninteresting and static and create a fully interactive Internet experience. ASP, HTML and SQL query statements were used extensively on the new web site to create the dynamic links and content. Combine this ability with a graphically

pleasing web site design and the opportunities for the web site capabilities are endless. Unfortunately this process can also be filled with complications and frustrations. During programming development for this project there were a few issues that arose to hinder its steady progression. Two of the core problems included project programmer error and inexperience.

Project programmer errors can include any number of events from very basic to very devastating. There are a few simple errors that come to mind. First, there were times when the project programmer did not always look for the simple solution and would spend hours pouring over line after line of code looking for a syntax error or a logic error. In the end, the simple solution was that the project programmer had forgotten to add the database connection including the page or had mistakenly named her page default.htm instead of default.asp. Once these minor problems were corrected the page as expected.

Another simple error had to do with the functionality of the code. In the event of increased scope or functionality of the code, one should always comment out the code that is working or save a copy of the simple, yet functional code. Several times during the course of this project the project programmer would have a page working as intended and then would change her mind and decide to add more functions. As the complexity of the code increased so did the chances that the project programmer would get to a point of no return and have the code so twisted she would have to start from scratch. If the programmer had kept a copy of the simpler code she would have started from that point instead of starting over. This lesson was learned very quickly.

The most severe setbacks and problems in this project occurred primarily because of the project programmer's lack of project experience. At the onset of this project, the web

master and project programmer sat down and discussed the dynamics of and opportunities available to this web site project. Numerous items and descriptions seemed available which would result in the web site being more dynamic. Walking away from this discussion, the project programmer felt she could leap tall buildings with a single bound. However, after the project programmer actually designed and created the web site, she realized that this was the first large project of this type that she had ever done. The project programmer's project advisor and committee provided great leadership and guided her through the functions that she could complete and then helped her plan for the items that she would be able to complete in the future. After implementing the project, the project programmer can honestly say that her knowledge of programming, database design and project management have tripled since the onset of this project.

Section 6.3 Actual Time vs. Planned Time

A very large lessoned learned, and one that the project programmer should bold, underline and highlight is that you should always attempt to stick to your planned schedule. In Section 3: Project Planning, there is a Gantt chart that was created in the planning portion of the project. This planning takes into account all of the tasks that need to be completed with plenty of time to complete each one. Unfortunately, it is impossible to include in the Gantt real world events such as implementation of a new course management tool at work. This implementation doubled the project programmer's workload and decreased the amount of time available to work on the project. The project programmer eventually found herself sitting at her computer at midnight working at a frantic pace to complete the project, write the final project paper and present her project in time for graduation.

Figure 3 is a Gantt chart that was created on the day in which the project programmer was actually able to start working on the project. A comparison of the original and the updated Gantt charts reveals the importance and peace of mind that come with staying on task and on time.

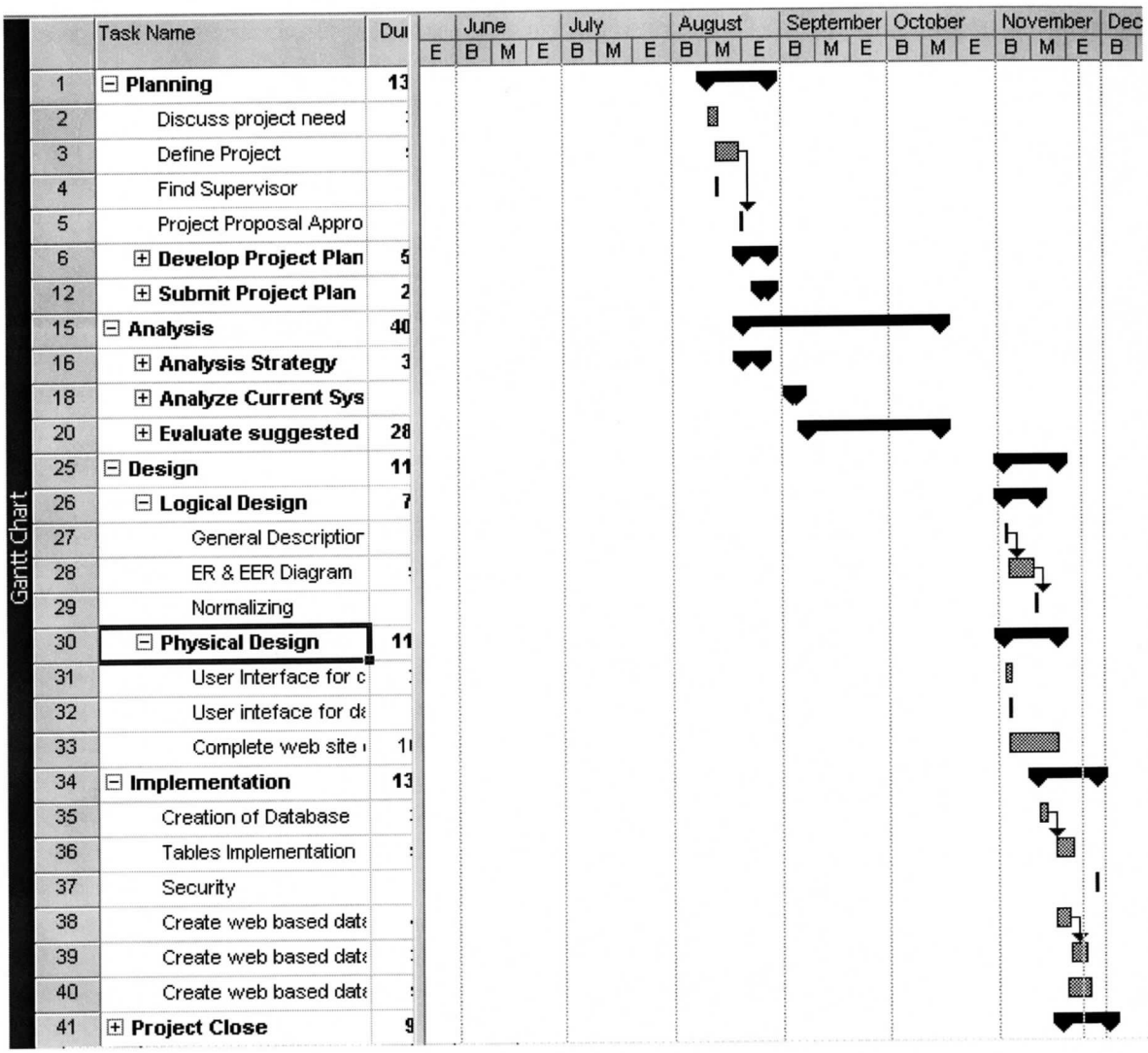


Figure 11: Updated Gantt Chart

Section 6.4 Future or Additional Work

The Dynamic Solutions for a Women's Basketball Web Site project was the project programmer's first venture into a project of this nature. There is always going to be room for improvements and modifications. Now that the web site is up and running it is important to first train the web master on the intricate details of the web site and then make any modifications necessary as the year and the season progress. Although this web site will constantly have additions and modification, the dynamic foundation has been created.

Section 6.5 Conclusion

The purpose of Section 6 was not to downplay the success of the project or somehow imply that the problems of the project outweighed its success. This section attempted to show that although the project was successful, it still had areas of weakness. In order to prevent these same areas of weakness from occurring in the future, it is important to recognize, solve, and document them sooner rather than later. Lessons learned are not truly learned if they are repeated in future projects.

SECTION 7: CONCLUSION

As the web master of the Lady T's Basketball Team web site, the head coach had days of great frustration related to the functional capacity and redundancy of the web site. By supporting the project programmer through initiation and completion of this project, the web master is now benefiting from the decrease in redundancy and workload required to maintain the web site that has resulted in an increase in the amount of time available to him for other projects. Ultimately, the primary goal of this project was to create a graphically pleasing, dynamically generated and functionally sound web site for the Lady T's Basketball Team. The project programmer met this objective through project management and through the support of the web master, her project supervisor, her committee members, her professors and her family.

REFERENCES

Buser, David, et al. Beginning Active Server Pages 3.0. Birmingham: Wrox P Ltd. , 2002.

Fancis, Brian, Alex Homer, and Dave Sussman. Professional Active Server Pages 3.0. Birmingham: Wrox P Ltd. , 1999.

Gosselin, Don. JavaScript. 2nd ed. Boston: Course Technology, 2002.

Hoffer, Jeffrey A., Fred R. McFadden, and Mary B. Prescott. Modern Database Management. 6th ed. Upper Saddle River, New Jersey 07458: Prentice Hall, 2002.

Morrison, Joline, and Mike Morrison. Enhanced Guide to Oracle 8i. Boston: Course Technology, 2002.

APPENDIX A: TABLES AND ATTRIBUTES

RecordBookInformation		
Field Name	**Data Type**	**Key**
RecordID	AutoNumber	Primary Key
OpponentID	Number	Foreign Key
AlumniID	Number	Foreign Key
CoachID	Number	Foreign Key
RecordName	Text	
Team	Text	
RecordHolder	Text	
Number	Text	
Date	Date/Time	
Season	Text	
RecordInformation	Text	
CoachingStaffInformation		
Field Name	**Data Type**	**Key**
CoachID	AutoNumber	Primary Key
FirstName	Text	
LastName	Text	
Email	Text	
Title	Text	
StreetAddress	Text	
CityStateZip	Text	
WorkPhone	Number	
HomePhone	Number	
Seasons	Text	
AlumniInformation		
Field Name	**Data Type**	**Key**
AlumniID	AutoNumber	Primary Key
YearStart	Number	
YearFinish	Number	
FirstName	Text	
LastName	Text	
WorkPhone	Text	
HomePhone	Text	
StreetAddress	Text	
City	Text	
State	Text	
Zip	Text	
Email	Text	
Occupation	Memo	
OcupationLocation	Text	

MaritalStatus	Text	
Husband	Text	
AthleteInformation		
Field Name	**Data Type**	**Key**
AthleteID	AutoNumber	Primary Key
FirstName	Text	
LastName	Text	
Number	Text	
Hometown	Text	
Height	Text	
Position	Text	
Parents	Text	
Class	Text	
Major	Text	
Email	Text	
FavoriteFood	Text	
FavoriteMovie	Text	
HighPointNumber	Number	
HighPointInformation	Text	
HighReboundNumber	Number	
HighReboundInformation	Text	
HighAssistNumber	Number	
HighAssistInformation	Text	
HighStealNumber	Number	
HighStealInformation	Text	
HighBlockNumber	Number	
HighBlockInformation	Text	
Junior	Memo	
Sophomore	Memo	
Freshman	Memo	
HighSchool	Memo	
Academics	Memo	
GameInformation		
Field Name	**Data Type**	**Key**
GameID	Autonumber	Primary Key
OpponentID	Number	Foreign Key
Conference	Yes/No	
FirstHalfScoreDSU	Number	
FirstHalfScoreOpponent	Number	
SecondHalfScoreDSU	Number	
SecondHalfScoreOpponent	Number	
FinalScoreDSU	Number	
FinalScoreOpponent	Number	
Day	Text	

Date	Date/Time	
Time	Date/Time	
GameLocation	Text	
PostToScoreboard	Yes/No	
Recap	Text	
GradeInformation		
Field Name	**Data Type**	**Key**
GradeID	AutoNumber	Primary Key
AthleteID	Number	Foreign Key
GameID	Number	Foreign Key
FGA	Number	
FGM	Number	
ThreeFGA	Number	
ThreeFGM	Number	
FTA	Number	
FTM	Number	
Assists	Number	
Steals	Number	
Fouls	Number	
TDC	Number	
PP	Number	
OffRebound	Number	
DefRebound	Number	
BP	Number	
Vio	Number	
FB	Number	
BS	Number	
HSB	Number	
MS	Number	
DPA	Number	
ORA	Number	
Minutes	Number	
Login		
Field Name	**Data Type**	**Key**
ID	AutoNumber	Primary Key
LoginID	Text	
Opponent		
Field Name	**Data Type**	**Key**
OpponentID	AutoNumber	Primary Key
Name	Text	
Location	Text	
ContactInformation	Text	
Coach	Text	

Conference	Yes/No	
StatsInformation		
Field Name	**Data Type**	**Key**
StatsID	AutoNumber	Primary Key
AthleteID	Number	Foreign Key
GameID	Number	Foreign Key
FGA		
FGM		
ThreeFGA		
ThreeFGM		
FTA		
FTM		
Assists		
Steals		
OffRebound		
DefRebound		
Blocks		
BP		

Table 3: Tables and Attributes

APPENDIX B: SOURCE CODE

Due to proprietary necessity, the source code for this project has been omitted as suggested by the project committee.