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The sport of triathlon (swim, bike, and run) has become exceedingly popular in recent years. Because of the difficulty and resource intensity of training for three separate disciplines, triathletes often find the volume of training information to be overwhelming. Therefore, they often rely on outside resources, such as books, websites, magazine articles, and advice from coaches/friends to guarantee their success in competition. This project centers on the development of a digital library and online database to capture the athlete's personal training needs; helping them achieve their personal triathlon racing goals.

HEADINGS:

Database—Management—Systems

Databases

Information storage and retrieval—Design

Information systems—Design

Web databases

IRONMAN TRIATHLON DIGITAL LIBRARY:
DESIGN OF AN ONLINE TRAINING RESOURCE FOR TRIATHLETES TO PLAN,
EXECUTE, AND ADVANCE IN THEIR TRAINING AND RACING GOALS

by
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Introduction

The sport of triathlon (swim, bike, and run) has quickly become one of the most popular endurance sports in recent years. Because of the difficulty and resource intensity of training for three separate disciplines, triathletes often rely on outside resources, such as books, websites, magazine articles, and advice from coaches/friends to guarantee their success in competition. The sport, while specific in the scope of its disciplines, has a wide diversity of race distance opportunities. Race durations can vary from an hour to up to seventeen hours of time. Therefore, the training needs vary greatly among groups of triathletes. Triathletes carefully select their most important races of the season as they lay out their annual race calendar. Ironman distance races (allotted seventeen hours to complete), require an exceptionally high volume of training and training support needs, and most triathletes will select only one or two Ironman races a year. In addition, the typical triathlete will not even attempt an Ironman distance race until they spend three to five years preparing their body for the ultra distance through periods of high volume training. As a result, triathletes tend to search for adequate online services available to aid them in achieving their training and racing goals. Yet, many are expensive, and offer programs too broad in scope for the serious triathlete. Ironman triathlon racing has become exceedingly popular as evidenced by ‘sold-out’ participation in the twenty-one annual qualifying races for the Ironman World Championship in Hawaii. Endurance triathletes aspire to compete on this coveted race under a full moon in Kona as the

pinnacle of their triathlon experience. For most triathletes, however, this goal begins with a successful qualifying time in one of the other twenty-one venues. As an avid Ironman triathlete myself, I was personally motivated to design a system which would target a specific audience of athletes (the Ironman triathlete), and offer them an online triathlon training resource to help them meet their specific goals for a specific Ironman race.

Background

Information Gathering

Problem description

Most triathletes are faced with a dilemma. They want to compete successfully in selected triathlons, but the demands of their intense schedule of work, home, and school activities make it difficult to plan, record, and evaluate all of their training. Detailed planning is an essential, but time consuming preparation aspect of Ironman competition. This accounts for the framework for this project. There are a myriad of online triathlon training resources available. Most of these resources provide a broad spectrum of services for the triathlete. While the services they offer are helpful in providing a general knowledge base, the competing demands of life facing most triathletes, coupled with the intense requirements of race preparation, would be ideally compensated, in part, by an online resource specifically targeted to help them with a specific Ironman race. Hence, this project focuses on the development of a triathlon training resource to target the specific needs of an Ironman triathlete preparing for a specific Ironman race.

Scope of User Group

Triathletes are the chief users of this system; athletes who participate or plan to participate in races involving the swim, bike, and run disciplines. They are divided into three categories:

- Novice: has participated in 5 or fewer triathlon races.
- Age-group: participates regularly in triathlon races; registering in their own age category (e.g. Male 30-34)
- Elite: competes successfully among the most talented athletes in triathlon; registering in elite, pro, or open categories.

Experts are the second category of users for this system. Examples of triathlon experts include: university triathlon coaches, personal coaches, swim coaches, and members of university exercise physiology departments. While there is some overlap among the two categories of users, most triathlon experts are exceptional triathletes in their own right.

Important user characteristics

Psychological characteristics

- Attitudes. Most triathletes are passionate about the sport, and have an exceptionally positive attitude about learning information related to triathlon.
- Motivation to use the system. Because of this attitude, triathletes are especially motivated to use a system that benefits their training and preparation for a race.

Knowledge and experience

- Level of education. It varies in all cases. Most users are adults, but there is no predictability on education level. However, this system will be designed with the triathlete's level of education in mind. This, at a minimum, is someone with a high school education and some computer skills.
- Reading level/native language. I assume that they can read English.
- Typing skill. Variable, but in accordance with their education level, I can predict that they have been exposed to computers, and are familiar with the functions and features of a basic keyboard.
- Level of computer literacy. Since most triathletes have, at a minimum, a high school education, we can predict that they have been exposed to basic computer skills, and that they can operate common Internet features.
- Level of experience/facility in using similar systems or computers in general. Again, based on the criterion of education level, we can predict at the very least, users can operate basic application features on a computer; i.e. open a program, select menu options, and operate browser features.
- Level of experience/expertise with entering data into an online form. Basic level of expertise. While there is no evidence to suggest that the user can automatically fill out an online form, the process is intuitive to handling paper forms.
- Particular aspects of online data entry that will be familiar. Most of the task aspects of 'clicking' links and typing data into online forms are basic, and

should be familiar to the users of this system since they possess the basic skills to operate web browser features.

Physical characteristics

- Perceptual abilities. Users have the ability to learn and perform tasks associated with features of online services.
- Motor skills. Users also have the motor skills to learn and perform those tasks.

Current Information Available

Current Internet based systems offer a myriad of tools to the triathlete. However, these systems are encumbered by a much larger focus to target an increased client base. While these sites offer support and services for a full range of distance possibilities, Ironman triathlon is a more specialized market. Let us first examine some of the other popular online triathlon training resources.

One of the industry leaders in triathlon training is Trainingbible.com (www.trainingbible.com). This site provides a comprehensive online coaching service (VirtualCoach) to create a personalized annual training plan and provide customized workouts tailored for the individual triathlete. This system is designed for individual athletes to coach themselves to peak fitness. Athletes can use it simply as a workout log, or a complete coaching tool with over 400 workouts to choose from by using detailed analysis graphs, customized Annual Training Plans, and daily workouts.

Competitionzone.com (<http://www.competitionzone.com/coaching.htm>) is another service currently available online. They provide a more personalized service for each athlete as they design programs for each athlete based on their stated needs and

goals. Their training programs are designed to maximize the available time of each athlete, and build strength and conditioning in the swim, bike, and run disciplines.

Triathlonacademy.com (<http://www.triathlonacademy.com/online.asp>) is another familiar online service provided to triathletes. They advertise that they are the most affordable way to receive effective personal training programs and advice from a live qualified coach without canned software programs producing training programs, and every workout has is structured specifically for the athlete.

After careful inspection of these sites, a common theme is in view. They are all very worthy resources for triathletes. They offer a full range of coaching services, from self-coaching designs to fully supported programs lead by fully qualified triathlon coaches. In addition, each site offers helpful information about triathlon in terms of links to pertinent articles, newsletters, etc. The costs range from \$10 per month to as much as \$150 per month, depending on which program the athlete chooses. Each site differs in the layout, and basic differences in the features they offer, but the overall theme is the same. Trainingbible.com differs from the others slightly more in that the focus of Trainingbible.com is to produce “self-coached” athletes. Athletes who pay for this service are able to develop their own training plans using the tools provided by the site itself as opposed to paying for a coach to develop the plans for you. In all cases, however, the focus of these training resources is to develop a training program individually tailored for the athlete. Yet, while this seems like an ideal solution, I would suggest that a site which targets the specific needs of an athlete pertaining to a specific Ironman race would be an especially helpful tool based on the unique design and focus.

Now, let us examine the opinions of triathletes as they were asked about their needs and requirements.

Triathlete Needs and Requirements

Survey One

The intent of the first survey was to obtain the opinions of triathletes about online training resources. I designed the questionnaire to canvas the opinions among triathletes of all experience levels to determine if there were any common interests or desires about online training resource features. The survey (Appendix A) solicited information about the athletes' experience levels, features offered in an online resource which might be of special importance to them, and an open invitation to participate in usability testing once the system prototype was designed. I posted the survey to a University of North Carolina web server, and solicited participation by sending an email advertisement to triathlon newsgroups, selected triathlon club email lists, and personal expert contacts. The explanation of the findings are outlined below.

Findings

Several of the questions in the survey were designed to obtain some demographic information about the athletes. I wanted to validate my theories regarding participation in specific race distances, frequency of participation, cross section of talent, and then correlate that information with their individual preferences in an online system. The percentage of Ironman triathlete participants in the sample is relatively low—this is due to the significant time and resource commitment involved registering for an Ironman event. Nonetheless, the number of Ironman triathletes continues to grow, and race

participation is steadily increasing as evidenced by the sold-out registration lists in every Ironman qualifying race of the season. The tables below summarize the demographic information gathered from Survey One. There were nineteen respondents to the survey.

	Sprint	Olympic	Half Ironman	Ironman
Distance Preference	8	3	6	2

Table 1 (Preferred Triathlon Distance)

	Novice	Age Group	Elite
Race Category	10	7	2

Table 2 (Selected Race Category)

	1-5	5-10	10-15	> 15
Race Participation this season	11	4	3	1

Table 3 (Athlete Race Participation)

The next step in the survey process was to obtain respondents' opinions about online features important to them. In order to obtain helpful data, I asked the participants one objective question, and several subjective questions. The following table depicts the preferred features of triathletes surveyed.

	Training log	Digital library	Spreadsheets	Nutrition Info
Preferred Features	5	8	3	3

Table 4 (Preferred Features)

The next several questions were subjective in nature, and centered on the gathering of the individual respondent's opinions about an online resource. My initial intent was to get a feel for athlete use of online resources. Therefore, I asked them if they

routinely used a website or other online resource to assist them with their training needs, and if so, what features they found to be most helpful. In summary, most of the respondents desired a system which gave them current articles about triathlon as well as helpful training plans to assist them in the preparation of their racing goals.

Next, I attempted to gain a more specific idea about why they chose the feature most important to them, from the list I provided to them. The respondents selected the digital library as the most popular response. The general theme of their reasoning for this idea centered on the desire to continually obtain additional knowledge on the subject of triathlon. They didn't wish to be tied down to any one method or philosophy of training, but wanted to have the flexibility of obtaining multiple philosophies and ideas from an online training resource.

The next most popular feature of an online resource, according to the respondents, was the training log due to the convenience of online access to their individual training history. In addition, this seemed to be a feature that would be available to them every day, and that was especially helpful to them.

Spreadsheets and nutrition information tied for third. Electronic spreadsheets specifically designed to assist athletes with calculating their race paces for each discipline seemed to be a helpful asset to them for their training needs. The desire for nutrition information seemed to center on the generic goal of losing weight.

I then asked the participants to list any additional features they would expect from an online training resource. Most of the respondents questioned seemed to indicate the desire for specific information related to training data. For example, suggested workouts, training logs and worksheets to plan scheduled workouts and races, charts of training

history, techniques on how to allot time for each discipline in training were all ideas offered by participants. There were two who offered suggestions about the development of a nutrition section. One respondent suggested a feature to calculate the calorie consumption needed by athletes given an effort level and specific race duration. The other idea centered on the development of suggested diets for triathletes.

The next section of the survey gathered information from the experts. First, I asked for their credentials as an expert. Both of the respondents had a college degree in exercise physiology, and both are active triathlon coaches. When questioned about their ideas for an online resource, they both expressed the importance of having a feature designed to offer the athlete workout plans to meet their training needs. However, one expert cautioned against the implementation of a generic plan for everyone to follow; stating that personalized plans are important for each athlete.

Each of the responses from participants in the survey served as an excellent frame of reference in the design of this project. In summary, I would like to review the most popular components to be incorporated into the system. The digital library was the leading vote getter on the survey. Therefore, it would form the backbone of the system. Next, the training log would be designed as a premier feature within the digital library in accordance with the desires of the respondents. Finally, I decided to design and implement several spreadsheets into the digital library, so athletes could compute their desired paces for each discipline.

Project Design and Prototype Development

Based on the findings previously mentioned, it was time to design a suitable system and field a prototype. The main purpose of this system is to help endurance

triathletes get information easily and conveniently from any place and at any time. Consumers for this website have had some problems getting useful information since other web sites provide too much information to them. Therefore, the chief concern in the design of this system was to provide a simple and easy format while offering an exciting platform for all users.

Project objectives

The design specifications of this system attempt to overcome limitations in current systems and satisfy the demands of the target audience. As previously mentioned, I discovered the specific trends of current systems, and the limitations in their design. Those are: (1) current systems aim at a broad target audience of triathletes; (2) current systems provide information in an overwhelming format (too much information).

This new system tries to address these concerns. First, the new system aims at a narrowed target market, that is, Ironman triathletes, not all triathletes. Secondly, since Ironman triathletes need specific information regarding preparation for their selected Ironman race, this new system implements a database containing specific training data for the triathlete. Further, this new system provides specific information in the form of a digital library to Ironman triathletes regarding swimming, biking, running, coaching, training, travel, and local area information about a specific Ironman race. Thirdly, in this new system, information is provided for the Ironman triathlete in an easy to read and easy to navigate format.

As an avid triathlete, I wanted to find a way to meet the needs of serious triathletes without duplicating online services already available. However, there are some cornerstone features available on most systems that I felt were key to a successful

design, and crucial for inclusion in the objectives of the project to satisfy the demands of the target audience.

- Develop a unique and comprehensive online resource for triathletes to plan, execute, and advance in their training and racing goals.
- System must meet the personal training needs of triathletes in the swim, bike, and run disciplines.
- System must have a tracking log to document training conducted. This log must include distance, type of discipline, and time.
- Athlete should be able to view personal training statistics; for example—total training time, total last week, total last month.
- System must have a digital library of resources in each discipline to enhance the athlete’s personal knowledge base.

Project scope

- The system will target triathletes in the swim, bike, and run disciplines.
- The only project costs on this project are those incurred in system design and development.

Digital Library

Once these project details were formulated, I began the development of the digital library. Among the most notable features I wanted to capture, was a website that didn’t go too ‘deep’ in its menu structure and hierarchy. Additionally, I wanted to ensure that users were always cognizant of their place in the website. This was achieved by means

of a visible horizontal menu with glowing ‘hover buttons’ for ease in navigation. I also placed useful navigation links across the top of each main page, so that users could easily identify their current location, and formulate their next intent (Preece, Rodgers, and Sharp, 268-270, 415). Appendix E depicts the ‘state transition diagram’, and Figure 1 (below) shows a screenshot of the site.

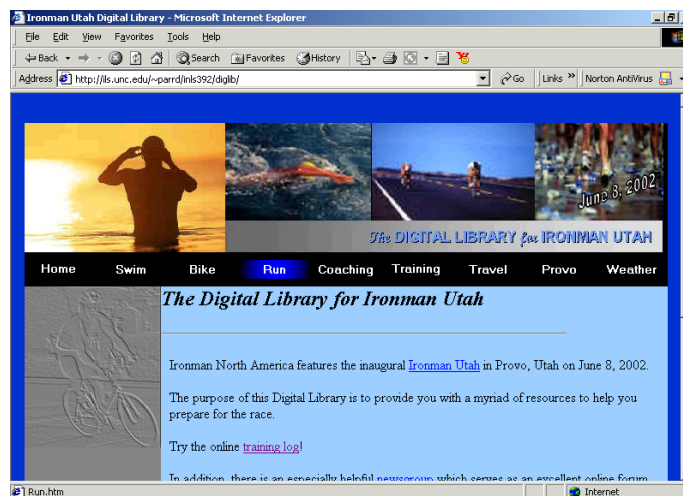


Figure 1 (Menu Design)

The overall design of the website centers on the presentation of a digital library. Specifically, this digital library is designed to prepare triathletes for an actual Ironman race. Ironman Utah was chosen as an example for the prototype. Therefore, the links in the digital library are pertinent to the preparation of each triathlete for this specific race.

Why a Digital Library?

There are several advantages to the decision to choose a digital library as the format for presentation. First and foremost, it was the most popular feature chosen by participants in the survey. In addition, a digital library offers a myriad of resources to

triathletes. Each athlete can select links from an array of pertinent articles neatly arranged into the disciplines of triathlon. Furthermore, since the system design centers on one specific Ironman race, additional features of interest are available to the athlete. For instance, local race information, weather information, and travel options are just a few of the links available. Figure 2 (below) provides an example of one of the links available to the athlete on this digital library.

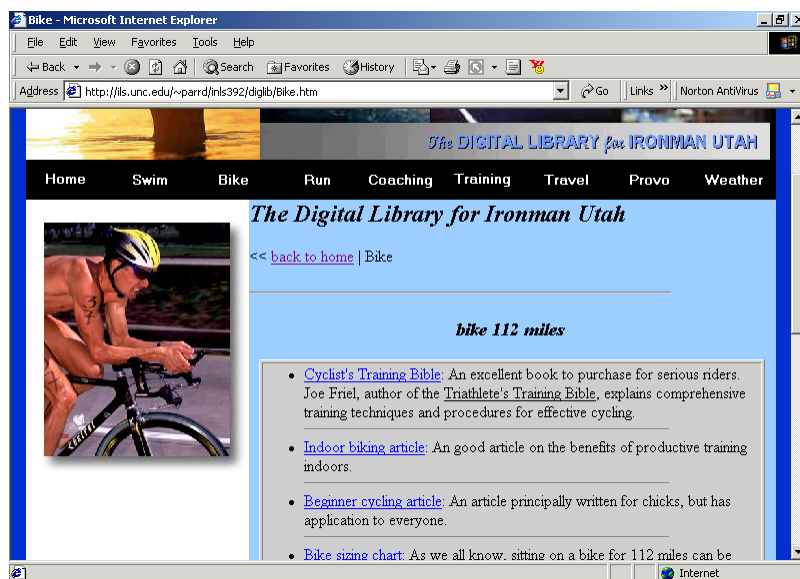


Figure 2 (Digital Library)

While many advantages are inherent to this design choice, there are some disadvantages. For example, the site maintenance is an essential consideration. The links to articles and other resources must be kept current with contemporary theories and philosophies of triathlon as well as current and accurate information about the specific race. In part, this principle can be easily implemented through the system's modular design. The website template can be applied to Ironman Florida, Ironman Hawaii, or any other Ironman race. Information about any race can be applied to the system. The next challenge is how to handle unforecasted changes such as new articles or ideas about

triathlon. This can be accomplished in two ways. Each time a template is changed to accommodate an Ironman race, the site manager will conduct a periodic review to check for currency and accuracy. Next, users send email to the site manager linking additional resources that might be useful to other digital library users.

Design Decisions

Content and Navigation

The user's perspective is a key ingredient to the implementation of design decisions; hence, the survey process. We have already discussed the justification and design of the principal format of the site—a digital library. However, I took the user views under careful consideration as I designed the secondary features of the site. For example, since this is a 'triathlon' website, I felt that it was important to divide the basic sub-topics into the disciplines associated with triathlon—swim, bike, and run. Then, based on the expressed opinions of users, I implemented the training information into two categories—coaching and training. The coaching section offers links to personalized coaching services, and the training section offers templates, spreadsheets, and example workouts as a service to athletes in preparation for this race. Finally, an additional feature I designed into the site was the information specific to the local venue. Links to weather, water temperature, travel information, and lodging arrangements are all of landmark concern to athletes as they prepare for the race. In addition, this gives the site a personal touch unique to the particular race. The State Transition Diagram (Appendix E) illustrates, in detail, the navigation architecture on the site.

Technical Decisions

The presentation of the website serves as the chief conduit of information. In other words, how will this data be presented to the user?

Hypertext Markup Language (HTML) was the intuitive choice for the development of the digital library due to its standard authoring features used to create documents for the World Wide Web.

I chose MySQL as the The Database Management System for the athlete training log. MySQL is the world's most popular Open Source Database, designed for speed, power and precision in mission critical, heavy load use. The MySQL database server embodies an ingenious software architecture that maximizes speed and customizability. Today MySQL is the most popular open source database server in the world with more than 2 million installations powering websites, datawarehouses, business applications, logging systems and more. Customers such as Yahoo! Finance, MP3.com, Motorola, NASA, Silicon Graphics, and Texas Instruments use the MySQL server in mission-critical applications. (<http://mysql.com/>)

PHP was selected as the scripting language for the athlete training log database. PHP, or "PHP: Hypertext Preprocessor," is a widely-used Open Source general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. Its syntax draws upon C, Java, and Perl, and is fairly easy to learn. The chief objective of the language is to allow web developers to write dynamically generated web pages quickly (www.php.net). Therefore, it was ideally suited for use in this project.

Database Design

The development of the athlete training log was a landmark achievement on this project. As previously discussed, many of the leading online training resources already offer a comprehensive training log as a part of their coaching services. However, this database significantly enhances the theme of the digital library by extending the purview into an interactive resource, rather than one that the user just reads. Triathletes can ultimately prepare for their single most important race of the season by means of one online training resource. The digital library provides them with training information, travel information, coaching information, and ultimately, a quality resource for them to document their training.

Therefore, the athlete training log database is an ideal feature to supplement the digital library. Due to the skills and level of computer literacy of the target audience, I limited task analysis research to the development of the training log in order to predict user difficulties when operating the system. The details of the task analysis are outlined in Appendix B, but a general description of the task characteristics is listed in Figure 3 (below):

The frequency or timing of the task—Users complete the task as required to record their training in the database

- How frequently do users perform the task? After each workout.
- What are the time constraints on the task? None.

The complexity and difficulty of the task—the difficulty of the task is based on the user's ability to read the directions and enter data into an online form. The task, in general, is very straight forward for the novice computer user.

The relationship of the task to other user tasks. The use of the system, of course, is optional. However, it is for the benefit of the user. Therefore, it is viewed as an important tool to assist the user with the documentation of their training. Therefore, as the creators of the information, the user enters data that only they know.

The physical environment of task performance. The user enters information into the web database through the personal computer they have selected to operate the system.

The social and cultural environment of the task. Users are in the privacy of their selected location. They are triathletes fluent in English; but will come from a myriad of ethnic and cultural backgrounds.

Planning for learning

- What training will be provided? How is the task learned? The training for the use of system will need to be provided within the system and its documentation. No training will be available otherwise.

Figure 3 (General Description of Task Characteristics)

One of my chief concerns was to ensure ease in the actual use of the training log in order to meet the standards outlined in the Usability Specifications (Appendix C).

Many of the training logs currently offered online are encumbered by too much information. The systems require several minutes for the athlete to compile and record each of their workouts. With this in mind, my intent was to make the log simple and easy to use. So, for example, one of the use case scenarios I focused on was the task of actually logging on to the training log without supplemental instructions. This process of analyzing the use case scenarios helped me develop an online training log comprised of self explanatory links and forms by which each athlete could document and compile personal training data. I eliminated several of the options offered by other online

systems, such as complex scales depicting perceived rates of exertion, weather data, and options for the athlete to rate his or her workout. Based on my experience and discussions with other triathletes, most athletes do not wish to log a lot of data. It is time consuming, and there are only a few things the athlete is especially concerned about. By focusing on a simple matrix of duration, distance and workout descriptions, I was able to facilitate the objective of making the system easier to use without compromising functionality.

The database entity relationship diagram (Figure 4 below) illustrates how each athlete can document his or her training. The athlete can choose from an array of personally designed workouts and log their training activities every day. What makes it so personal? In the digital library, there is a coaching section. This system is designed so that a coaching staff can operate and maintain the inventory of workouts in the database. Therefore, this system has the potential of implementing electronic interaction between a coach and an athlete. A coach can design a personal workout plan for the athlete, and post the workouts to the database. When the athlete completes each workout, he or she can record the workouts in the training log. This is accomplished by means of a simple system of web forms and hyperlinks.

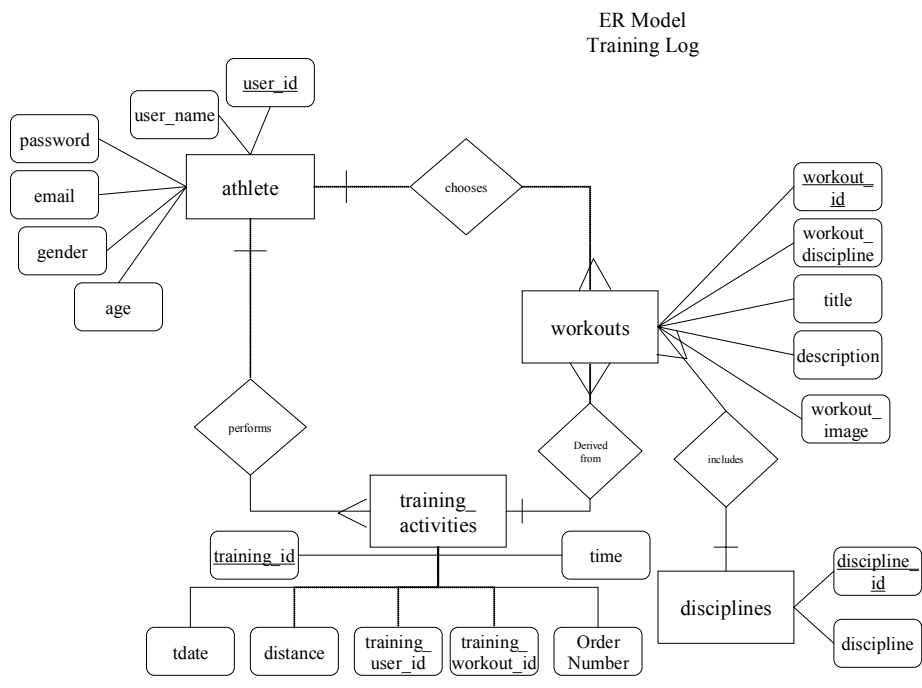


Figure 4 (ER Diagram)

The database tables are depicted in the database schema diagram (Figure 5 below). For a description of each, refer to Appendix D (Data Dictionary).

Athlete

user_id	user_name	password	email	gender	age
---------	-----------	----------	-------	--------	-----

Training Activities

training_id	tdate	distance	training_user_id	training_workout_id	ordernumber	time
-------------	-------	----------	------------------	---------------------	-------------	------

Workouts

workout_id	workout_discipline	title	description	workout_image
------------	--------------------	-------	-------------	---------------

Disciplines

discipline_id	discipline
---------------	------------

Figure 5 (Database Schema)

As described briefly above, a coaching staff can design and implement quality workouts for the users to select. The actual recruiting and selection methods for a coaching staff would be at the discretion of the system operators. Athletes can then select individual workouts from an inventory designed by a qualified coach. Selected coaches can independently manage the workout side of the database while athletes can create and manage their own individual account and training log. Athletes can then view their training totals by month and week (Figure 5 below). Security and privacy are enforced by means of the user name and password system. Only the athlete can access their own account through a user name and password which they choose. Likewise, only the coaches can manage the workouts table by means of an administrator account.

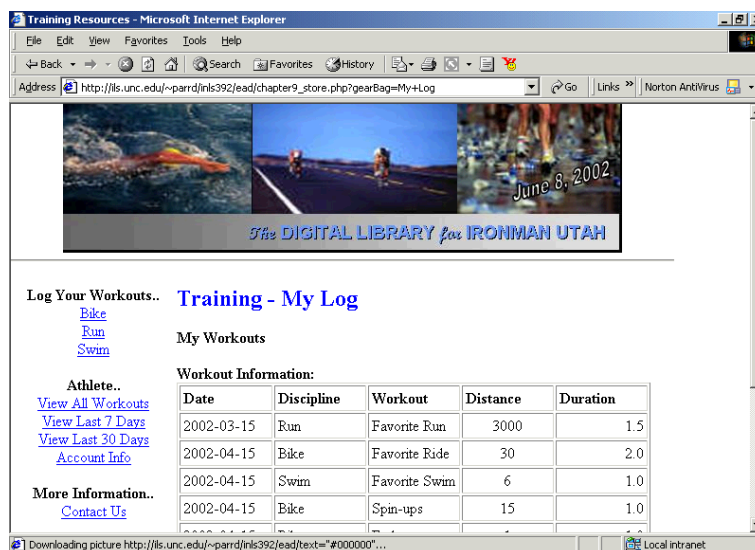


Figure 6 (Training Log)

The task analysis for the development of the athlete training log prototype is outlined in appendix B. Since the training log database is a premier component of the digital library, the source code is listed in appendix F. Both of these references were especially important in the design process.

User Evaluation

Once the prototype was developed, it was important to obtain feedback from users before a full scale usability test could be conducted. Therefore, a second survey was developed (appendix G), and sent to participants who volunteered their assistance on the initial survey. Table 5 (below) lists the results of the respondents to each objective question in the survey. Overall, the six respondents were satisfied with the design features of this system.

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
I found that the system uses words, phrases, and concepts familiar to me, and presents information in a natural and logical order.	2	4			
The objects, actions and options are clearly visible, and I don't have to remember information from one part of the site to the other.	4	1	1		
Each page contains relevant information about each topic, and ties in with the overall theme of the system.	5	1			
Each document (page) is short, and contains only one topic.	3	3			
It is easy to determine my current position in the site structure, and convenient to return to the home page.	2	4			
The system is intuitive and can be used for the most common tasks without documentation.	3	3			
The idea of a site dedicated	2	2	1	1	

	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
to the preparation of one particular race is especially helpful.					
I would select this digital library as my principal information source in my preparation for this race.	1	3	2		
I would adopt this digital library as one of several sites I visit regularly.	1	5			

Table 5 (Survey Two Results)

The remaining portion of the survey centered on users' overall satisfaction with the site as well as recommendations for improvements. In general, the subjective feedback from users who evaluated the prototype was positive. Users found the navigation to be simple, and their overall experience on the site to be enjoyable. They offered some constructive criticism as well. One triathlete responded that he or she would like to see additional links along the left margin of each page. While he or she wasn't specific about what types of links should be considered for inclusion, from a design perspective, the idea is worthy of careful consideration. Perhaps additional menu links, such as options for a text only version, etc. would be helpful in the implementation of this recommendation. In addition, another triathlete asked that the home page provide a more detailed description of the purpose of the digital library and how to use it.

Next Steps

Based on the progress made thus far, the next step will be to make minor revisions to the site, and then conduct a full scale usability test. The proposed usability test plan is located in Appendix H. Triathletes will evaluate the revised prototype in a controlled

setting. Compliance with the standards outlined in Appendix C (Usability Specifications) will also be evaluated at this time. Results of the usability test plan will serve as empirical evidence for product release.

The deployment of the product requires several additional tasks: developing a marketing plan, a site maintenance plan, and a plan for continued evaluation. This site is ideally suited for employment by an official organization, such as Ironman North America, since they host the largest series of qualifying races for the Ironman World Championships in Kona, Hawaii. Official sponsors and product vendors would serve as leading contenders for venture capital. The site maintenance and continued evaluation would be a relatively simple process due to the simple design of the site. The overhead to maintain this site is minimal. While ideally suited for employment in an official organization, it could easily be implemented and maintained by one or two entrepreneurs. This is due to the simple design and scope of product.

Conclusion

This project set out to help endurance triathletes get information easily and conveniently from any place and at any time. I intended to design a system which would provide a simple and easy format while offering an exciting platform for all users. Based upon the input from the initial user survey, I opted to implement an online digital library as the project backbone to facilitate this purpose, and achieved this successfully.

Next, the design specifications of this system attempted to overcome limitations in current systems and satisfy the demands of the target audience. This system attacks those shortcomings by offering a unique triathlon training resource which targets a

specific audience (Ironman triathletes). Furthermore, this system provides an even narrower scope by means of its design for a specific Ironman race. The navigation features and friendly design offer each Ironman trainee a pleasurable experience while they visit this website. Demand satisfaction is further achieved through the implementation of a simple athlete training log as a principal supplement to the digital library. Athletes and coaches can collaborate on a suitable training plan, and athletes can document their training using the training log database. Next, athletes can use the skillfully designed spreadsheets as tools to assist them with their training in each triathlon discipline. Both the training log database and the spreadsheets serve as features that distinguish the site from others, and are intended to satisfy expressed needs of the target user group. While formal tests of the training log to meet the standards of Appendix C (Usability Specifications) will be conducted in the usability test plan phase, I conducted informal tests to validate that the system can meet or exceed expectations.

What wasn't achieved? The site does not have a nutrition section. Based on the input from the original survey, the findings didn't seem to warrant this feature. However, in retrospect, I should have carefully considered this as an option for inclusion. After personally competing in an Ironman race since the completion of the prototype, and informally coordinating with numerous Ironman triathletes on a myriad of training topics, nutrition has quickly become a leading contender for further research. Triathletes have often failed to complete an Ironman race due their failure to implement properly standards of fundamentally sound nutrition. Hence, the goals of this project would have been better achieved if I had implemented a nutrition section within the digital library.

Lessons Learned

As the development of this project got underway, many challenges were encountered. Research such as this requires several levels of approval from university officials. This process takes time to achieve. The review board document alone took several weeks to coordinate due to several different revisions required by officials at each level of the approval process. In retrospect, I should have begun the Institutional Review Board (IRB) process well in advance of the semester to preclude delays in conducting the actual research and project development.

Secondly, the development of the athlete training log was a significant undertaking. One of my personal goals in this project was to demonstrate proficiency and quality research in many of the skills and subject matter presented throughout the course of the Information Science program at UNC. While I received an introduction to the features of web database design and development, I still felt that this was a skill I wanted to have before graduating. Therefore, while the process was slower than I would have expected, I felt that the lessons learned in web database development were invaluable. The design, coding, and interface considerations are especially important lessons to take with me.

Closing Comments

Overall, this was an exceptionally worthwhile project in terms of providing an additional source for triathletes to plan and conduct their training and preparation for a specific Ironman triathlon. Additionally, it was an overwhelming accomplishment for me personally in that I was able to develop and refine the skills that I learned throughout the course of this graduate program.

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Appendix A (Survey 1)

Questionnaire

Thank you for taking the time to fill out this questionnaire. Your input is very helpful in the design of an online triathlon training resource.

nature

Instructions: This questionnaire is divided into two parts. Section I is for all triathletes, and the Section II is for experts. Some questions are multiple choice, and some ask for a narrative. On the narrative questions, please type your answers in the text box provided. Once you complete the questions, click the SUBMIT button at the bottom of the form, and your results will be sent electronically.

Section I: All Triathletes

1. What is your favorite triathlon race?
 - a. sprint distance
 - b. international distance
 - c. half ironman distance
 - d. ironman distance

2. How would you describe your ability level as a triathlete?
 - a. novice (has participated in 5 or fewer triathlon races)
 - b. age-group (participates regularly in triathlon races; registering in your own age category (e.g. Female 30-34))
 - c. elite (competes successfully among the most talented athletes in triathlon; registering in the 'elite' or 'professional' categories.)

3. How many races do you plan to participate in this season?
 - a. 1-5
 - b. 5-10
 - c. 10-15
 - d. greater than 15

4. Have you used a website or other online resource to assist you with your training needs? If so, what features were most helpful? What features were least helpful?

5. What is the most important feature you would value on an online training resource?
 - a. a training log for you to track your workouts
 - b. a digital library with links to helpful articles
 - c. simple spreadsheets to calculate your training paces
 - d. nutrition information

6. Why did you choose this as the most important feature?
7. Please list some additional features you would expect or wish from an online training resource.
8. Briefly describe how you would like to view your workouts on an online resource? (e.g. in a table, via email, etc)
9. Are you interested in participating in a 'usability' test once the system has been designed?
 - a. yes
 - b. no

If yes, please fill out the following information, and we will contact you by email:
FIRST NAME (ONLINE TEXT BOX)
LAST NAME (ONLINE TEXT BOX)
EMAIL ADDRESS (ONLINE TEXT BOX)
DATE (ONLINE TEXT BOX)

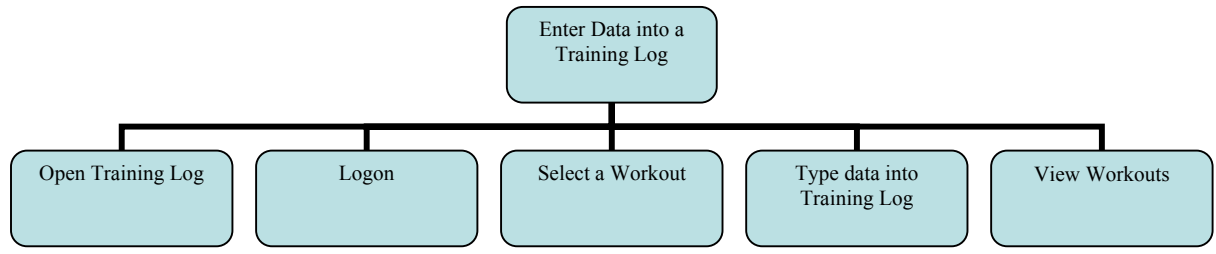
Section II: Experts. Examples of triathlon experts include, but are not limited to: triathlon coaches, personal trainers, swim coaches, cycling coaches, running coaches, exercise physiologists.

1. Please describe the scope of your expert experience.
2. As an expert, please describe what design features are essential to you on an online triathlon training resource? For example, if you were to use an online triathlon training resource to assist you in your dealings with athletes, what features are most important to you (training log, workout plans, digital library)? Explain.
3. As an expert, is there any particular feature of an online resource you would avoid using in your dealings with athletes? Why (what is it you don't like about it)?
4. Is there anything you'd like to add, not covered in this questionnaire, that might be helpful in the design of an online training resource?

Once again, thank you for taking the time to fill out this questionnaire. Your input is very helpful in the design of an online triathlon training resource.

Appendix B (Task Analysis)

Task Analysis Hierarchical Analysis, Use Cases, Scenarios



Essential Use Case: Open Training Log
(athlete sits at a personal computer, and must open the training log in order to enter their information).

User intention	System responsibility
Begin interaction with system	
	Offer Link to training log
Open training Log	
	Offer menu choices to log on

Scenario: Open Training Log difficulty

Dave is the World’s Greatest Triathlete. However, he is a somewhat ‘challenged’ when it pertains to computer skills. He wants to prepare a comprehensive training log in preparation for his race. He sits down to enter his training data into an online form. However, he is having difficulty finding the training log link.

Essential Use Case: Logon Difficulty
(athletes and coaches must log on before they can enter data.)

User intention	System responsibility
	Skillfully articulate logon procedure
Logon	

Scenario: athlete ignores the directions

Triathlete Toni isn't especially motivated to read directions. After selecting the training log link, she attempts to skip immediately to the task of filling out the online form. However, the system allows her to return to the logon screen by posting an error message and link to the previous menu.

Scenario: coach inputs the wrong password

Dave Scott inadvertently inputs the wrong password. However, the system allows him to return to the logon screen by posting an error message and link to the previous menu.

Essential Use Case: Select a Workout
(athlete sits at a personal computer, and intends to select a workout.)

User intention	System responsibility
	Display a list of possible workouts
Choose a workout	
	Display the training log form

Scenario: athlete chooses a workout

Ironman World Champion Dave Scott is about to train for his most important race of the season. He needs to select his prescribed workouts on the athlete training log. Therefore, he selects the appropriate workout, and the system displays the training log form.

Essential Use Case: Post a Workout
(coach sits at a personal computer, and intends to post a workout.)

User intention	System responsibility
	Display a workout entry form
Post a workout	
	Store the workout information

Scenario: Coach posts a workout

A coach has designed a personal training plan for an elite athlete. He needs to post the workouts he has developed to the training log database. Therefore, he opens the online form, fills in the appropriate workout information, and the system stores the information to the training log database.

Essential Use Case: Type data into training log

User intention	System responsibility
Log training already conducted	
	Display selected form and data fields: Duration, Distance, Date
Type appropriate data into data fields	
	Save data to database

Scenario: Enter information/problem with format

Novice triathlete Anne decides to document her personal training. However, as she begins to enter information, she isn't sure what format to use for dates and duration of training.

Essential Use Case: View Workouts

User intention	System responsibility
User has completed a form, and wishes to view their workouts.	
	System offers user options of viewing workouts from last seven days, last thirty days, or 'all' workouts.
User clicks link to view selected choice	
	Displays user selection

Scenario: View all workouts

Triathlete Tim is approaching the end of his training cycle, and wants to view all of the training he has conducted in preparation for the race. He selects the appropriate link to view all of the training recorded in his training log.

Appendix C (Usability Specifications)

Usability Specifications

Usability attribute	Measuring instrument	Value to be measured	*Current level (if known)	#Planned target level
Initial Performance	Open training log	Length of time to successfully begin operating system	N/A	30 Seconds
Initial performance	“select workout” task per Benchmark 1	Number of errors on first trial	30 seconds (current systems)	15 seconds
Initial performance	“Add workout information” task per Benchmark 2	Length of time to successfully add workout information	1 minute (current systems)	30 seconds
Initial performance	“View Workouts” task per Benchmark 3	Length of time to complete Benchmark Task 3	1 minute (manually)	5 seconds

Benchmark Task 1 (select workout) Given a ‘bike’ workout comprised of prescribed standards, athlete selects desired workout in order to record their personal training.

Benchmark Task 2 (Add Workout Information) Given a selected workout, athlete adds their duration, distance, and date to their training log.

Benchmark Task 3 (View Workouts) Given a list of possible queries (week, month, all), view selected workout information.

*Current Level—figures are based on tests I completed on other online systems or manual systems. I used a manual system example for the “View Workouts” task to illustrate how cumbersome manual systems can be for retrieving data.

#Planned Target Level—figures are based on a desired level of performance for the new system.

Appendix D (Data Dictionary)

- age char(2)—athlete’s age.
- description text—workout description in workouts table. This will explain to the athlete exactly what the workout entails.
- discipline varchar(10)—swim, bike, or run.
- discipline_id int(11)—primary key; unique identifier of discipline.
- distance number—actual distance conducted (miles for bike and run); (yards/meters for swim)
- email varchar(50)—athlete’s email address.
- gender char(1)—athlete’s gender.
- orderNumber varchar(10)—borrowed from store template to make php work. It is a randomly generated number.
- password varchar(16)—password of the user.
- tdate date—date of training.
- time varchar(5)—conducted workout time (in number and tenths—eg. 1.5 hours)
- title varchar(20)—workout title (e.g. “Long Distance Run”)
- training_id int(11)—unique identifier primary key.
- training_user_id int(11)—unique identifier
- training_workout_id int(11)—unique identifier
- user_id int(11)—primary key; unique identifier of athlete.
- user_name varchar(10)—The user name of the athlete.
- weight number(3)—athlete’s weight.
- workout_discipline int(11)—unique identifier/foreign key to discipline_id.
- workout_id int(11)—unique identifier to describe the type of training activity performed.
- workout_image varchar(50)—URL for image to be posted on workouts page; generated by php.

Appendix E (State Transition Diagram)

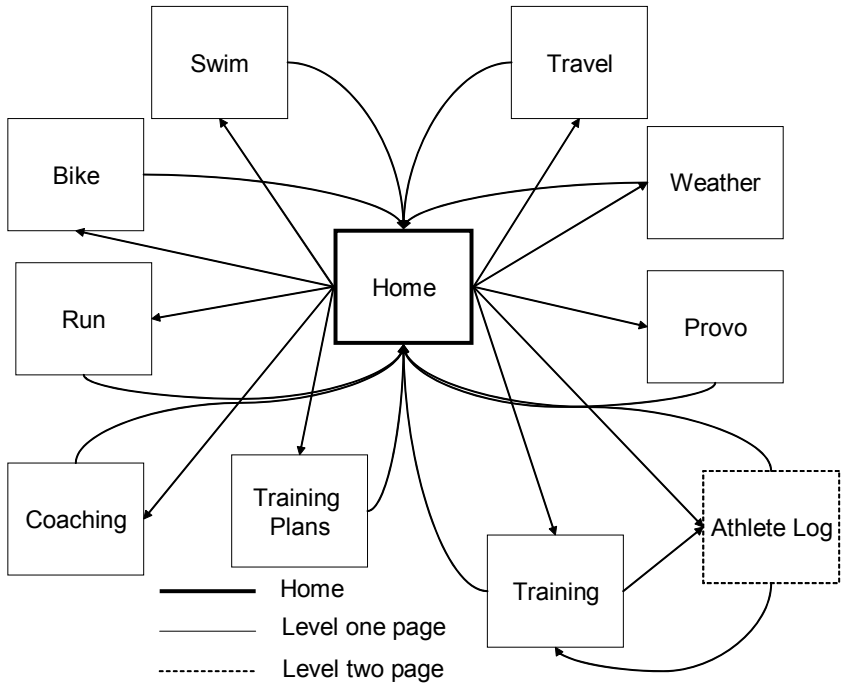


Figure 7 (State Transition Diagram)

The state transition diagram is designed to depict the overall navigation schema of the Ironman Digital Library. Each page is easily navigated to and from the home page. In addition, the navigation bar at the top of the of each page provides easily identifiable menu options by means of glowing ‘mouseover’ buttons.

Appendix F (Source Code)

The source code for the athlete training log was developed on a template similar to an online store (Instant PHP 4, 2001).

```
//connect to database

<?
    $mysql_link = mysql_connect("pearl.ils.unc.edu", "parrd", "257project") or die
    ("<p>Could not connect to the database!");
    mysql_select_db("tri_web", $mysql_link) or die ("<p>Could not select the database!");
?>

//disconnect from database
//<?
    mysql_close($mysql_link);
?>

//authorize administrative user
<?
$loginPage = "./chapter9_store.php?gearBag=Login";
if (!isset($PHP_AUTH_USER) || $unauthorized)
{
    $realm = "MyPHPStore_".time();
    Header("WWW-Authenticate: Basic realm=\"\$realm\"");
    Header("Status: HTTP/1.0 401 Unauthorized");
    print "<h1>401 Unauthorized</h1>Unable to authorize you. Please <a
href=\"\$loginPage\">click here</a> to try again.";
    exit;
}
else
{
    include("./chapter8_dbconnect.php");
    $query = "select * from storeAdmin where adminUserID = '$PHP_AUTH_USER' and
adminPassword = '$PHP_AUTH_PW'";
    $mysql_result = mysql_query($query, $mysql_link);

    if(mysql_affected_rows() == 0)
    {
        header("Location: ".$loginPage."?unauthorized=1");
        exit();
    }
}
?>
```

```

    }
    else
    {
    }
    include("./chapter8_dbdisconnect.php");
}
?>

//add discipline
<?
if($submit)
{
    print("<h3>Adding Discipline...</h3>");
    printf("Discipline: <b>%s</b><br>\n", $discipline);
    include("./chapter8_dbconnect.php");
    $query = "insert into disciplines (discipline) values ('$discipline)";
    $mysql_result = mysql_query($query, $mysql_link);
    include("./chapter8_dbdisconnect.php");
}
else
{
    print("<h3>Add Discipline</h3>");
    print("<form action='./chapter8_storeAdminMenu.php'>");
    print("<table width='500' border='0' cellpadding='3'>\n");
    print("<tr><td><b>Discipline</b></td><td><input type='text' "
name="discipline"></td></tr>\n");
    print("<input type='hidden' name='nav' value='Discipline'>");
    print("<input type='hidden' name='action' value='Add'>");
    print("<tr><td colspan='2' align='right'><input type='submit' name='submit' "
value="Add"></td></tr>");
    print("</table>");
    print("</form>");
}
?>

//delete discipline

<?
if($submit)
{
    print("<h3>Deleting Discipline...</h3>");
    printf("Discipline: <b>%s</b><br>\n", $discipline);
    include("./chapter8_dbconnect.php");
    $query = "delete from disciplines where discipline = '$discipline'";
    $mysql_result = mysql_query($query, $mysql_link);
    include("./chapter8_dbdisconnect.php");
}
?>

```

```

}
else
{
    if($discipline_id)
    {
        include("./chapter8_dbconnect.php");
        $query = "select * from disciplines where discipline_id = '$discipline_id'";
        $mysql_result = mysql_query($query, $mysql_link);
        while($row = mysql_fetch_row($mysql_result))
        {
            print("<h3>Delete Discipline</h3>");
            print("<form action='./chapter8_storeAdminMenu.php'>");
            print("<table width='500' border='0' cellpadding='3'>\n");
            printf("<tr><td><b>Discipline:</b></td><td>%s</td></tr>\n", $row[1]);
            print("<input type='hidden' name='nav' value='Discipline'>");
            print("<input type='hidden' name='action' value='Delete'>");
            printf("<input type='hidden' name='discipline' value='%s'>", $row[1]);
            printf("<input type='hidden' name='discipline_id' value='%s'>",
                $discipline_id);
            print("<tr><td colspan='2' align='right'><input type='submit' name='submit'
                value='Delete'></td></tr>");
            print("</table>");
            print("</form>");
        }
        include("./chapter8_dbdisconnect.php");
    }
    else
    {
        print("<h3>Delete Discipline</h3>");
        include("./chapter8_dbconnect.php");
        $query = "select * from disciplines order by discipline";
        $mysql_result = mysql_query($query, $mysql_link);
        print("<ul>\n");
        while($row = mysql_fetch_row($mysql_result))
        {
            printf("<li><a
                href='./chapter8_storeAdminMenu.php?nav=Discipline&action=Delete&discipline_id=%s'>%s</a>", $row[0], $row[1]);
        }
        print("</ul>\n");
        include("./chapter8_dbdisconnect.php");
    }
}
?>

//edit discipline

```

```

<?
if($submit)
{
    print("<h3>Updating Discipline...</h3>");
    printf("Discipline: <b>%s</b><br>\n", $discipline);
    include("./chapter8_dbconnect.php");
    $query = "update disciplines set discipline = '$discipline' where discipline_id =
'$discipline_id'";
    $mysql_result = mysql_query($query, $mysql_link);
    include("./chapter8_dbdisconnect.php");
}
else
{
    if($discipline_id)
    {
        include("./chapter8_dbconnect.php");
        $query = "select * from disciplines
where discipline_id = '$discipline_id'";
        $mysql_result = mysql_query($query, $mysql_link);
        while($row = mysql_fetch_row($mysql_result))
        {
            print("<h3>Editing Discipline...</h3>");
            print("<form action='./chapter8_storeAdminMenu.php'>");
            print("<table width='500' border='0' cellpadding='3'>\n");
            printf("<tr><td><b>Discipline</b></td><td><input type='text' "
name="discipline" value="%s"></td></tr>\n", $row[1]);
            print("<input type='hidden' name='nav' value='Discipline'>");
            print("<input type='hidden' name='action' value='Edit'>");
            printf("<input type='hidden' name='discipline_id' value='%s'>",
$discipline_id);
            print("<tr><td colspan='2' align='right'><input type='submit' name='submit' "
value='Update'></td></tr>");
            print("</table>");
            print("</form>");
        }
        include("./chapter8_dbdisconnect.php");
    }
    else
    {
        print("<h3>Edit Discipline</h3>");
        include("./chapter8_dbconnect.php");
        $query = "select * from disciplines order by discipline";
        $mysql_result = mysql_query($query, $mysql_link);
        print("<ul>\n");
        while($row = mysql_fetch_row($mysql_result))
        {

```

```

        printf("<li><a
href=\"chapter8_storeAdminMenu.php?nav=Discipline&action=Edit&discipline_id=%s\
\">%s</a>", $row[0], $row[1]);
    }
    print("</ul>\n");
    include("../chapter8_dbdisconnect.php");
}
}
?>

```

```
//select menu choice
```

```

<?
print("Select from one of the menu choices above.");
?>

```

```
//store menu
```

```

<?
include("../chapter8_storeAdminAuth.php");
print("<html>\n");
print("<head>\n");
print("<title>Coach Admin</title>\n");
print("</head>\n");
print("<body background=\"./turtle_bg_admin.gif\" text=\"#000000\" bgcolor=\"#ffffff\"
link=\"#2FB472\" alink=\"#2FB472\" vlink=\"#2FB472\">\n");
print("<p><b>Coaches Menu:</b>
<a href=\"./chapter8_storeAdminMenu.php?nav=Workouts\">Workouts</a> |
<a href=\"./chapter8_storeAdminMenu.php?nav=Discipline\">Disciplines</a> |
<a href=\"./chapter8_storeAdminMenu.php?nav=Orders\">Orders</a> |
<a href=\"./chapter8_storeAdminMenu.php?nav=Home\">Home</a>");
print("<hr>\n");

```

```

if($nav == "")
{
    $nav = "Home";
}
printf("<b>%s : </b>", $nav);

```

```

switch ($nav)
{
    case "Home":
        include("../chapter8_storeAdminHome.php");
        break;
    case "Workouts":

```

```

    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Workouts&action=Add\">Add</a> | ");
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Workouts&action=Edit\">Edit</a> | ");
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Workouts&action=Delete\">Delete</a>");
    if($action == ""){$action = "Edit"; }
    switch ($action)
    {
        case "Add":
            include("./chapter8_storeAdminWorkoutsAdd.php");
            break;
        case "Edit":
            include("./chapter8_storeAdminWorkoutsEdit.php");
            break;
        case "Delete":
            include("./chapter8_storeAdminWorkoutsDelete.php");
            break;
    }
    break;
case "Discipline":
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Discipline&action=Add\">Add</a> | ");
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Discipline&action=Edit\">Edit</a> | ");
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Discipline&action=Delete\">Delete</a>");
    if($action == ""){$action = "Edit"; }
    switch ($action)
    {
        case "Add":
            include("./chapter8_storeAdminDisciplineAdd.php");
            break;
        case "Edit":
            include("./chapter8_storeAdminDisciplineEdit.php");
            break;
        case "Delete":
            include("./chapter8_storeAdminDisciplineDelete.php");
            break;
    }
    break;
case "Orders":
    print("<a
href=\"./chapter8_storeAdminMenu.php?nav=Orders&action=View\">View -
Process</a>");
    if($action == ""){$action = "View"; }

```

```

switch ($action)
{
    case "View":
        include("../chapter8_storeAdminOrdersView.php");
        break;
    }
switch ($action)
{
    case "Delete":
        include("../chapter8_storeAdminOrdersDelete.php");
        break;
    }
break;
}
print("\n</body>\n");
print("</html>");
?>

//add workout

<?
if($submit)
{
    print("<h3>Adding Workout...</h3>");
    //printf("Code: <b>%s</b><br>\n", $workout_id);
    printf("Discipline: <b>%s</b><br>\n", $disciplineName);
    printf("Workout: <b>%s</b><br>\n", $title);
    printf("Description: <b>%s</b><br>\n", $description);
    printf("Image: <br><img src=\"%s\"><br>\n", $workout_image);

    include("../chapter8_dbconnect.php");
    $query = "insert into workouts (workout_id, workout_discipline, title, description,
workout_image) values ('$workout_id','$workout_discipline','$title','$description',
'$workout_image')";
    $mysql_result = mysql_query($query, $mysql_link);
    include("../chapter8_dbdisconnect.php");
}
else
{
    print("<h3>Add Workout</h3>");
    print("<form action=\"../chapter8_storeAdminMenu.php\">");
    print("<table width=\"500\" border=\"0\" cellpadding=\"3\">\n");
    /*print("<tr><td><b>Code</b></td><td><input type=\"text\"
name=\"workout_id\"></td></tr>\n");*/

```

```

print("<tr><td><b>Discipline</b></td><td>\n");
print("<select name=\"workout_discipline\">");
include("./chapter8_dbconnect.php");
$query = "select * from disciplines order by discipline";
$result = mysql_query($query, $mysql_link);
while($row = mysql_fetch_row($result))
{
    printf("<option value=\"%s\">%s", $row[0], $row[1]);
}
include("./chapter8_dbdisconnect.php");
print("</select>\n");
print("</td></tr>\n");

print("<tr><td><b>Workout</b></td><td><input type=\"text\"
name=\"title\"></td></tr>\n");
print("<tr><td><b>Description</b></td><td><input type=\"textarea\"
name=\"description\"></td></tr>\n");

print("<tr><td><b>Image URL</b></td><td><input type=\"text\"
name=\"workout_image\"></td></tr>\n");

print("<input type=\"hidden\" name=\"nav\" value=\"Workouts\">");
print("<input type=\"hidden\" name=\"action\" value=\"Add\">");
print("<tr><td colspan=\"2\" align=\"right\"><input type=\"submit\" name=\"submit\"
value=\"Add\"></td></tr>");
print("</table>");
print("</form>");
}
?>

//delete workout

<?
if($submit)
{
    print("<h3>Deleting Workout...</h3>");
    printf("Workout: <b>%s</b><br>\n", $title);
    include("./chapter8_dbconnect.php");
    $query = "delete from workouts where workout_id = '$workout_id'";
    $result = mysql_query($query, $mysql_link);
    include("./chapter8_dbdisconnect.php");
}
else
{
    if($workout_id)

```



```

{
    include("./chapter8_dbconnect.php");
    $query = "select * from workouts, disciplines where workouts.workout_id =
'Sworkout_id' and disciplines.discipline_id = workouts.workout_discipline";
    $mysql_result = mysql_query($query, $mysql_link);
    while($row = mysql_fetch_row($mysql_result))
    {
        print("<h3>Delete Workout...</h3>");
        print("<form action='./chapter8_storeAdminMenu.php'>");
        print("<table width='500' border='0' cellpadding='3'>\n");
        printf("<tr><td><b>Workout Name</b></td><td>%s</td></tr>\n", $row[2]);
        printf("<tr><td><b>Discipline</b></td><td>%s</td></tr>\n", $row[1]);
        printf("<tr><td><b>Description</b></td><td>%s</td></tr>\n", $row[3]);
        printf("<tr><td><b>Image</b></td><td><img src='%s'></td></tr>\n", $row[4]);
        printf("<tr><td><b>Code</b></td><td>%s</td></tr>\n", $row[0]);

        print("<input type='hidden' name='nav' value='Workouts'>");
        print("<input type='hidden' name='action' value='Delete'>");
        printf("<input type='hidden' name='workout_id' value='%s'>",
$workout_id);
        printf("<input type='hidden' name='title' value='%s'>", $row[2]);
        print("<tr><td colspan='2' align='right'><input type='submit'
name='submit' value='Delete'></td></tr>");
        print("</table>");
        print("</form>");
    }
    include("./chapter8_dbdisconnect.php");
}
else
{
    print("<h3>Delete Workout</h3>");
    include("./chapter8_dbconnect.php");
    $query = "select * from workouts, disciplines where workouts.workout_discipline =
disciplines.discipline_id order by discipline";
    $mysql_result = mysql_query($query, $mysql_link);
    print("<ul>\n");
    while($row = mysql_fetch_row($mysql_result))
    {
        printf("<li><a
href='./chapter8_storeAdminMenu.php?nav=Workouts&action=Delete&workout_id=%s\
'>[%s] - %s</a>", $row[0], $row[6], $row[2]);
    }
    print("</ul>\n");
    include("./chapter8_dbdisconnect.php");
}
}
}

```

```

?>

//edit workout

<?
if($submit)
{
    print("<h3>Updating Workout...</h3>");

    printf("Discipline: <b>%s</b><br>\n", $workout_discipline);
    printf("Workout: <b>%s</b><br>\n", $title);
    printf("Description: <b>%s</b><br>\n", $description);
    printf("Image: <br><img src=\"%s\"><br>\n", $workout_image);
    include("./chapter8_dbconnect.php");
    $query = "update workouts set
        workout_discipline = '$workout_discipline',
        title = '$title',
        description = '$description',
        workout_image = '$workout_image'
        where workout_id = '$workout_id'";
    $mysql_result = mysql_query($query, $mysql_link);
    include("./chapter8_dbdisconnect.php");
}
else
{
    if($workout_id)
    {
        include("./chapter8_dbconnect.php");
        $query = "select * from workouts where workout_id = '$workout_id'";
        $queryCat = "select * from disciplines order by discipline";
        $mysql_result = mysql_query($query, $mysql_link);
        $mysql_resultCat = mysql_query($queryCat, $mysql_link);
        while($row = mysql_fetch_row($mysql_result))
        {
            print("<h3>Editing Workout...</h3>");
            print("<form action=\"./chapter8_storeAdminMenu.php\">");
            print("<table width=\"500\" border=\"0\" cellpadding=\"3\">\n");
            printf("<tr><td><b>Workout</b></td><td><input type=\"text\" name=\"title\"
value=\"%s\"></td></tr>\n", $row[2]);
            print("<tr><td><b>Discipline</b></td><td>\n");
            print("<select name=\"workout_discipline\">");
            while($rowCat = mysql_fetch_row($mysql_resultCat))
            {
                if($row[1] == $rowCat[0])
                {

```

```

        printf("<option value=\"%s\" selected>%s", $rowCat[0], $rowCat[1]);
        }
        else
        {
        printf("<option value=\"%s\">%s", $rowCat[0], $rowCat[1]);
        }
    }
    print("</select>\n");
    print("</td></tr>\n");
    printf("<tr><td><b>Description</b></td><td><textarea
name=\"description\">%s</textarea></td></tr>\n", $row[3]);
    printf("<tr><td><b>Image URL</b></td><td><input type=\"text\"
name=\"workout_image\" value=\"%s\"></td></tr>\n", $row[4]);

    print("<input type=\"hidden\" name=\"nav\" value=\"Workouts\">");
    print("<input type=\"hidden\" name=\"action\" value=\"Edit\">");
    printf("<input type=\"hidden\" name=\"workout_id\" value=\"%s\">",
$workout_id);
    print("<tr><td colspan=\"2\" align=\"right\"><input type=\"submit\"
name=\"submit\" value=\"Update\"></td></tr>");
    print("</table>");
    print("</form>");
    }
    include("./chapter8_dbdisconnect.php");
}
else
{
    print("<h3>Edit Workout</h3>");
    include("./chapter8_dbconnect.php");
    $query = "select * from workouts, disciplines where workouts.workout_discipline =
disciplines.discipline_id order by discipline";
    $mysql_result = mysql_query($query, $mysql_link);
    print("<ul>\n");
    while($row = mysql_fetch_row($mysql_result))
    {
        printf("<li><a
href=\"chapter8_storeAdminMenu.php?nav=Workouts&action=Edit&workout_id=%s\">
[%s] - %s</a>", $row[0], $row[6], $row[2]);
    }
    print("</ul>\n");
    include("./chapter8_dbdisconnect.php");
}
}
?>

//store (main page)

```

```

<? if($gearBag=='Login'){include("./chapter9_storeLogin.php");} ?>
<html>
<head>
<title>Training Resources</title>
</head>
<body background= text="#000000" bgcolor="#ffffff" marginwidth="0"
marginheight="0" leftmargin="0" topmargin="0" link="#0000FF" alink="#0000FF"
vlink="#0000FF">

<table width="700" height="600" border="0" cellpadding="0" cellspacing="0">

<tr>
<td colspan="2" height="85" align="center"><hr><p></p></td>
</tr>
<tr>
<td width="175" valign="top">

<p align="center"><b>Log Your Workouts..</b><br>
<?
include("./chapter8_dbconnect.php");
$query = "select * from disciplines order by discipline";
$mysql_result = mysql_query($query, $mysql_link);
while($row = mysql_fetch_row($mysql_result))
{
    printf("<a
href='./chapter9_store.php?disciplineID=%s&disciplineName=%s\'>%s</a><br>\n",
$row[0], $row[1], $row[1]);
}
include("./chapter8_dbdisconnect.php");

?>
<p align="center"><b>Athlete..</b><br>
<?
if (!isset($PHP_AUTH_USER) || $unauthorized)
{
    print("<a href='./chapter9_store.php?gearBag=Login\'>Login to Existing
Account</a><br>\n");
    print("<a href='./chapter9_store.php?gearBag=New+User\'>Create New
Account</a>\n");
}
else
{
    include("./chapter9_storeLogin.php");
    printf("<!-- User ID: %s -->\n", $user_id);
}
}

```

```

    print("<a href='./chapter9_store.php?gearBag=My+Log'>View All
Workouts</a><br>\n");
    print("<a href='./chapter9_store.php?gearBag=Seven+Days'>View Last 7
Days</a><br>\n");
    print("<a href='./chapter9_store.php?gearBag=Thirty+Days'>View Last 30
Days</a><br>\n");
    print("<a href='./chapter9_store.php?gearBag=Account+Info'>Account
Info</a><br>\n");
    //print("<a href='./chapter9_store.php?gearBag=Check+Out'>Check
//Out</a><br>\n");
}
?>
<br>
<p align="center">
<b>More Information..</b><br>
<a href="mailto:parramod@email.unc.edu">Contact Us</a><br>
</td>
<td width="525" valign="top">
<?
if($disciplineID) // viewing stuff
{
    include("./chapter8_dbconnect.php");
    if($workoutID)
    {
        include("./chapter9_storeWorkoutsView.php");
    }
    else
    {
        include("./chapter9_storeWorkoutsList.php");
    }
    include("./chapter8_dbdisconnect.php");
}
else
{ // home page or shopping cart (Gear Bag)
    if($gearBag)
    {
        printf("<h2><font color='\#0000FF'>Training - %s</font></h2>", $gearBag);
        switch ($gearBag)
        {
            case "View Log":
                include("./chapter9_storeCartWktsAdd.php");
                break;
            case "My Log":
                include("./chapter9_storeCartWktsView.php");
                break;
            case "Seven Days":

```

```

        include("../chapter9_storeCartWkts7dView.php");
        break;
        case "Thirty Days":
            include("../chapter9_storeCartWkts30dView.php");
            break;
        case "Check Out":
            include("../chapter9_storeCartCheckOut.php");
            break;
        case "New User":
            include("../chapter9_storeAccountAdd.php");
            break;
        case "Account Info":
            include("../chapter9_storeAccountEdit.php");
            break;
    }
}
else
{
    include("../chapter9_storeAccountAdd.php");
}
}
?>
</td>
</tr>
<tr>
<td colspan="2" height="50">
<br>
&nbsp;
</td>
</tr>
</table>

</body>
</html>

//add account

<?
include("../chapter8_dbconnect.php");
if($submit)
{
    print("Creating Account...");
    $query = "insert into athlete (user_name, password, email,";

```

```

$query .= " gender, age)";
$query .= " values ('$user_name', '$password', '$email', '$gender',";
$query .= " '$age')";
$result = mysql_query($query, $mysql_link);
print("Done.");
}
else
{
print("<table border=\"0\" width=\"500\" cellspacing=\"0\" cellpadding=\"3\">\n");
print("<tr>\n");
print("<td colspan=\"2\"><h2>Create a New Account</h2>");
print("<form action=\"./chapter9_store.php\" method=\"get\"></td>\n");
print("</tr>\n");
print("<tr>\n");
print("<td align=\"right\" width=\"25%\"><b>User Name</b></td>");
print("<td><input type=\"text\" name=\"user_name\"> (10 characters
maximum)</td>");
print("</tr>\n");
print("<tr>\n");
print("<td align=\"right\"><b>Password</b></td>");
print("<td><input type=\"password\" name=\"password\"> (16 characters
maximum)</td>");
print("</tr>\n");
print("<tr>\n");
print("<td align=\"right\"><b>Email</b></td>");
print("<td><input type=\"text\" name=\"email\"></td>");
print("</tr>\n");
print("<tr>\n");
print("<td align=\"right\"><b>Gender</b></td>");
print("<td><input type=\"text\" name=\"gender\"></td>");
print("</tr>\n");
print("<tr>\n");
print("<td align=\"right\"><b>Age</b></td>");
print("<td><input type=\"text\" name=\"age\"></td>");
print("</tr>\n");

print("<input type=\"hidden\" name=\"gearBag\" value=\"New User\">");
print("<tr>\n");
print("<td colspan=\"2\" align=\"right\"><input type=\"submit\" name=\"submit\"
value=\"Create Account\">&nbsp;</form></td>\n");
print("</tr>\n");

```

```

    print("</table>\n");
}
include("../chapter8_dbdisconnect.php");
?>

//edit account

<?
include("../chapter8_dbconnect.php");
if($submit)
{
    print("Updating Account...");

    $query = "update athlete set
        password = '$password',
        email = '$email',
        gender = '$gender',
        age = '$age'
        where user_id = '$user_id'";
    $mysql_result = mysql_query($query, $mysql_link);
    print("Done.");
}
else
{
    $query = "select * from athlete where user_id = '$user_id'";
    $mysql_result = mysql_query($query, $mysql_link);
    while($row = mysql_fetch_row($mysql_result))
    {
        print("<table border=\"0\" width=\"500\" cellspacing=\"0\" cellpadding=\"3\">\n");
        print("<tr>\n");
        print("<td colspan=\"2\"><b>Your Account Information</b>");
        print("<form action=\"./chapter9_store.php\" method=\"get\"></td>\n");
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\"><b>Account #</b></td>");
        printf("<td>%s</td>", $row[0]);
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\" width=\"25%\"><b>User Name</b></td>");
        printf("<td>%s</td>", $row[1]);
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\"><b>Password</b></td>");

```



```

        printf("<td><input type=\"password\" name=\"password\" value=\"%s\"></td>",
$row[2]);
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\"><b>Email</b></td>");
        printf("<td><input type=\"text\" name=\"email\" value=\"%s\"></td>",
$row[3]);
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\"><b>gender</b></td>");
        printf("<td><input type=\"text\" name=\"gender\" value=\"%s\"></td>",
$row[4]);
        print("</tr>\n");
        print("<tr>\n");
        print("<td align=\"right\"><b>age</b></td>");
        printf("<td><input type=\"text\" name=\"age\" value=\"%s\"></td>", $row[5]);
        print("</tr>\n");

        print("<input type=\"hidden\" name=\"gearBag\" value=\"Account Info\">");
        printf("<input type=\"hidden\" name=\"user_id\" value=\"%s\">", $row[0]);
        print("<tr>\n");
        print("<td colspan=\"2\" align=\"right\"><input type=\"submit\"
name=\"submit\" value=\"Update\">&nbsp;</form></td>\n");
        print("</tr>\n");
        print("</table>\n");
    }
}
include("../chapter8_dbdisconnect.php");
?>

//30 day workout view

<?
print("<b>My Workouts</b><br>\n");
include("../chapter8_dbconnect.php");
$orderTotal = 0;
print("<p><b>Workouts Last 30 Days:</b>");
$query = "select * from training_activities, workouts, athlete, disciplines where
training_workout_id = workout_id and training_user_id = '$user_id' and training_user_id
= user_id and workout_discipline = discipline_id and TO_DAYS(NOW()) -
TO_DAYS(tdate) <= 30 order by tdate";
$result = mysql_query($query, $mysql_link);
print("<table width=\"500\" border=\"1\" cellpadding=\"3\">\n");
print("<tr><td width=\"15%\"><b>Date</b></td>
<td width=\"15%\"><b>Discipline</b></td>
<td width=\"15%\"><b>Workout</b></td>

```

```

<td width="15%"><b>Distance</b></td>
<td width="15%"><b>Duration</b></td></tr>\n");
while($row = mysql_fetch_row($mysql_result))
{
    $itemSubTotal = ($row[6] * 1);
    $itemSubTotal = number_format($itemSubTotal, 1, '.', '');
    $orderTotal = ($orderTotal + $itemSubTotal);
    $orderTotal = number_format($orderTotal, 1, '.', '');
    print("<tr>\n");
    printf("<td>%s</td><td>%s</td><td>%s</td><td align="center">%s</td><td
align="right">%s</td>", $row[1], $row[19], $row[9], $row[2], $row[6],
$itemSubTotal);
    print("</tr>\n");
}
printf("<tr><td colspan="4" align="right"><b>Total Hours: </b></td><td
align="right">%s</td></tr>", $orderTotal);
print("</table>\n");
include("../chapter8_dbdisconnect.php");
?>

```

7 day workout view

```

<?
print("<b>My Workouts</b><br>\n");
include("../chapter8_dbconnect.php");
$orderTotal = 0;
print("<p><b>Workouts Last 7 Days:</b>");
$query = "select * from training_activities, workouts, athlete, disciplines where
training_workout_id = workout_id and training_user_id = '$user_id' and training_user_id
= user_id and workout_discipline = discipline_id and TO_DAYS(NOW()) -
TO_DAYS(tdate) <= 7 order by tdate";
$mysql_result = mysql_query($query, $mysql_link);
print("<table width="500" border="1" cellpadding="3">\n");
print("<tr><td width="15%"><b>Date</b></td>
<td width="15%"><b>Discipline</b></td>
<td width="15%"><b>Workout</b></td>
<td width="15%"><b>Distance</b></td>
<td width="15%"><b>Duration</b></td></tr>\n");
while($row = mysql_fetch_row($mysql_result))
{
    $itemSubTotal = ($row[6] * 1);
    $itemSubTotal = number_format($itemSubTotal, 1, '.', '');
    $orderTotal = ($orderTotal + $itemSubTotal);
    $orderTotal = number_format($orderTotal, 1, '.', '');
    print("<tr>\n");
}

```

```

    printf("<td>%s</td><td>%s</td><td>%s</td><td align=\"center\">%s</td><td
align=\"right\">%s</td>", $row[1], $row[19], $row[9], $row[2], $row[6],
$itemSubTotal);
    print("</tr>\n");
}
printf("<tr><td colspan=\"4\" align=\"right\"><b>Total Hours: </b></td><td
align=\"right\">%s</td></tr>", $orderTotal);
print("</table>\n");
include("../chapter8_dbdisconnect.php");
?>

```

```
//add workouts
```

```

<?
include("../chapter8_dbconnect.php");
$query = "select * from training_activities where training_user_id = '$user_id'";
$result = mysql_query($query, $mysql_link);
$recordCount = 0;
$recordCount = mysql_affected_rows($mysql_link);
if($recordCount == 0)
{
    srand(time());
    $orderNumber = (rand()%10000)+1;
}
else
{
    while($row = mysql_fetch_row($result)) { $orderNumber = $row[6]; }
}
$query = "insert into training_activities (orderNumber, training_user_id,
training_workout_id, tdate, distance, time) values";
$query .= " ('$orderNumber', '$user_id', '$workout_id', '$tdate', '$distance', '$time' )";
$result = mysql_query($query, $mysql_link);
include("../chapter8_dbdisconnect.php");
print("<p><b>Your workout has been added to your training log.</b><br>");
print("To view all of your workouts, click <a
href=\"./chapter9_store.php?gearBag=My+Log\">here</a>.");
print("<p></p>");
print("To view your workouts in the last 7 days, click <a
href=\"./chapter9_store.php?gearBag=Seven+Days\">here</a>.");
print("<p></p>");
print("To view your workouts in the last 30 days, click <a
href=\"./chapter9_store.php?gearBag=Thirty+Days\">here</a>.");
?>

```

```
//view all workouts
```

```
<?
```

```

print("<b>My Workouts</b><br>\n");
include("./chapter8_dbconnect.php");
$orderTotal = 0;
print("<p><b>Workout Information:</b>");
//$today=date("Y-m-d");
//$lastweek > $today-7;
$query = "select * from training_activities, workouts, athlete, disciplines where
training_workout_id = workout_id and training_user_id = '$user_id' and training_user_id
= user_id and workout_discipline = discipline_id order by tdate";
$mysql_result = mysql_query($query, $mysql_link);
print("<table width='500' border='1' cellpadding='3'>\n");
print("<tr><td width='15%'><b>Date</b></td>
<td width='15%'><b>Discipline</b></td>
<td width='15%'><b>Workout</b></td>
<td width='15%'><b>Distance</b></td>
<td width='15%'><b>Duration</b></td></tr>\n");
while($row = mysql_fetch_row($mysql_result))
{
    $itemSubTotal = ($row[6] * 1);
    $itemSubTotal = number_format($itemSubTotal, 1, '.', '');
    $orderTotal = ($orderTotal + $itemSubTotal);
    $orderTotal = number_format($orderTotal, 1, '.', '');
    print("<tr>\n");
    printf("<td>%s</td><td>%s</td><td>%s</td><td align='center'>%s</td><td
align='right'>%s</td>", $row[1], $row[19], $row[9], $row[2], $row[6],
$itemSubTotal);
    print("</tr>\n");
}
printf("<tr><td colspan='4' align='right'><b>Total Hours: </b></td><td
align='right'>%s</td></tr>", $orderTotal);
print("</table>\n");
include("./chapter8_dbdisconnect.php");
?>

//login to store

<?
$loginPage = "./chapter9_store.php?gearBag=Login";
if (!isset($PHP_AUTH_USER) || $unauthorized)
{
    $realm = "MyPHPStore_".time();
    Header("WWW-Authenticate: Basic realm=\"$realm\"");
    Header("Status: HTTP/1.0 401 Unauthorized");
    print "<h1>401 Unauthorized</h1>Unable to authorize you. Please <a
href=\"$loginPage\">click here</a> to try again.";
    exit;
}

```

```
}
else
{
    include("../chapter8_dbconnect.php");
    $query = "select * from athlete where user_name = '$PHP_AUTH_USER' and
password = '$PHP_AUTH_PW'";
    $mysql_result = mysql_query($query, $mysql_link);

    if(mysql_affected_rows() == 0)
    {
        header("Location: ".$loginPage."&unauthorized=1");
        exit();
    }
    else
    {
        while($row = mysql_fetch_row($mysql_result))
        {
            $user_id = $row[0];
        }
    }
    include("../chapter8_dbdisconnect.php");
}
?>
```

Appendix G (Survey 2)

Questionnaire

Thank you for taking the time to fill out this questionnaire. Your input is very helpful in the design of an online triathlon training resource.

Instructions: This questionnaire is designed to obtain your feedback on the system design for a triathlon digital library. Some questions are multiple choice, and some ask for a narrative. On the narrative questions, please type your answers in the text box provided. Once you complete the questions, click the **SUBMIT** button at the bottom of the form, and your results will be sent electronically.

1. Take a few minutes to explore the features of this digital library (hyperlink to site). Once you've finished, please return here to answer a few questions. Feel free to return to the site as often as you would like to help you answer the questions.

2. I found that the system uses words, phrases, and concepts familiar to me, and presents information in a natural and logical order.	<ul style="list-style-type: none"> a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
3. The objects, actions and options are clearly visible, and I don't have to remember information from one part of the site to the other.	<ul style="list-style-type: none"> a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
4. Each page contains relevant information about each topic, and ties in with the overall theme of the system.	<ul style="list-style-type: none"> a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
5. Each document (page) is short, and contains only one topic.	<ul style="list-style-type: none"> a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree

6. It is easy to determine my current position in the site structure, and convenient to return to the home page.	a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
7. The system is intuitive and can be used for the most common tasks without documentation.	a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
8. The idea of a site dedicated to the preparation of one particular race is especially helpful.	a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
9. I would select this digital library as my principal information source in my preparation for this race.	a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree
10. I would adopt this digital library as one of several sites I visit regularly.	a. Strongly Agree b. Agree c. Neutral d. Disagree e. Strongly Disagree

11. What do you like best about the site?

Text box

12. What would you improve about the site?

Text box

13. Please add any additional comments that you wish:

text box

14. Select the category which best describes the participant division you register for in a triathlon.

a. Novice. has participated in 5 or fewer triathlon races.

b. Age Group. participates regularly in triathlon races; registering in their own age category (e.g. Male 30-34)

c. Elite. competes successfully among the most talented athletes in triathlon; registering in elite, pro, or open categories.

15. Select yes if you are an expert (Examples of triathlon experts include, but are not limited to: triathlon coaches, personal trainers, swim coaches, cycling coaches, running coaches, exercise physiologists)

a. Yes

b. No

Once again, thank you for taking the time to fill out this questionnaire. Your input is very helpful in the design of an online triathlon training resource.

Appendix H (Usability Test Plan)

Introduction

This appendix describes the usability test plan for the project “Ironman Triathlon Digital Library.” The purpose of this usability test plan is to predict the expected performance of the actual triathlete using the product, as well as detect any serious problems prior to the distribution of the product. This plan includes the following sections:

- Purpose of the usability test plan
- Target audience
- Design of the usability test plan
- Data collection methodology
- Deliverables
- Resources

What is the “Ironman Triathlon Digital Library?”

Most triathletes are faced with a dilemma. They want to compete successfully, but the demands of their intense schedule of work, home, and school activities make it complicated to account for all of their training. Therefore, there is a need for a system to make it easier for triathletes to prepare for their most important race of the season. A system designed to synchronize all of these functional areas of triathlon information and training into one medium would minimize the confusion in this preparation.

Triathletes are the chief users of this system; athletes who participate or plan to participate in races involving the swim, bike, and run disciplines. They are divided into three categories:

- Novice: has participated in 5 or fewer triathlon races.
- Age-group: participates regularly in triathlon races; registering in their own age category (e.g. Male 30-34)
- Elite: competes successfully among the most talented athletes in triathlon; registering in elite, pro, or open categories.

Experts are the second category of users for this system. Examples of triathlon experts include: university triathlon coaches, personal coaches, swim coaches, and members of university exercise physiology departments.

Purpose of the Usability Test

The usability evaluation of the Ironman Triathlon Digital Library will evaluate the potential for errors and difficulties involved in using the application. Some of the areas that will be tested through the usability evaluation process were derived from a two-phased survey process performed on the Ironman Triathlon Digital Library. Other concerns were identified by the developer.

Concerns.

Some specific questions to be addressed in this usability evaluation include:

1. Will users be able to run the file from a network with no assistance?
2. Can a marginal-PC user successfully launch and use the application?

3. Can users successfully navigate through the application? Is the system status clear to users at all times?
4. Are the 'buttons' readily recognizable by the user?
5. Do the buttons facilitate the ability of the user to navigate through the application?
6. Is the information logically organized and grouped? Can they easily locate the information they are looking for?
7. Are there tasks that users will want to perform (i.e., printing specific reports) that are not currently supported by the Ironman Triathlon Digital Library?

Usability Test Plan Goals.

Specific usability goals were determined from the above concerns. These goals allow for the creation of evaluation scenarios and tasks that will let me know if my concerns are valid and what measures can help me determine if in fact the participants are having trouble completing the tasks.

This evaluation will be based on the following usability goals:

- Participants will be able to begin using the application with no documentation.
- Participants will be able to complete activities or locate specific information within specific time limits. A series of tasks will be designed and benchmark times established. I will time users during the usability evaluation. Users will be able to complete the tasks within the benchmark times.
- Participants will be able to move from tab to tab with no expressed or visible difficulty.

- Participants will be able to find related information with no expressed or visible frustration.
- Participants will have no more than two false attempts in finding specific information.

I will also use a survey to determine subjective reactions:

- Users feel the application and menu structure provides them with all of the information necessary to use the system.

Target Audience

The selection of participants whose background and abilities are representative of the product's intended end user is a crucial element of the evaluation process. Valid results will be obtained only if the participants selected are typical end users of the product, or are matched as closely to the criterion as possible.

User Background

Psychological characteristics

- Attitudes. Most triathletes are passionate about the sport, and have an exceptionally positive attitude about learning information related to triathlon.
- Motivation to use the system. Because of this attitude, triathletes are especially motivated to use a system that benefits their training and preparation for a race.

Knowledge and experience

- Level of education. It varies in all cases. Most users are adults, but there is no predictability on education level. However, this system will be designed with the

triathlete's level of education in mind. This, at a minimum, is someone with a high school education and some computer skills.

- Reading level/native language. I assume that they can read English.
- Typing skill. Unable to predict, but in accordance with their education level, I can predict that they have been exposed to computers, and are familiar with the functions and features of a basic keyboard.
- Level of computer literacy. Since most triathletes have, at a minimum, a high school education, we can predict that they have been exposed to basic computer skills, and that they can operate common Internet features.
- Particular aspects of the task that will be very familiar. Most of the task aspects are basic and familiar. This simply gives an added sense of simplicity.

Physical characteristics

- Perceptual abilities. Users have the ability to learn the task.
- Motor skills. Users have the motor skills to learn the task

Subject Selection Criteria

The selection of participants whose background and abilities that are representative of the products intended end user is a crucial element of a successful usability evaluation. The evaluation will be valid only if the people evaluated are typical end users of the product, or as close to a selected set of characteristics as possible. Recruiting for this project will take place through local triathlon clubs as well as electronic invitations on

triathlon newsgroups, message boards, and websites to coordinate for usability participants.

The following list shows the key characteristics of the end users that are considered as critical differentiators for successful adoption, and use, of the Ironman Triathlon Digital Library. These characteristics are the basis for participant selection for the usability evaluation. The participants will be selected to reflect the range of characteristics shown below.

- Status
 - Novice: has participated in 5 or fewer triathlon races.
 - Age-group: participates regularly in triathlon races; registering in their own age category (e.g. Male 30-34)
 - Elite: competes successfully among the most talented athletes in triathlon; registering in elite, pro, or open categories.
- Computer literacy
 - Low, medium, high
- Microsoft Windows experience
 - 0-6 months, 6-12 months, more than 12 months
- Internet Experience
 - 0-6 months, 6-12 months, more than 12 months
- Use of electronic support tools (email, Internet access, PC or workstation, etc.)
 - 0-2 tools, 3-5 tools, more than 5 tools
- Educational level
 - Up to AA or technical college degree, baccalaureate degree, graduate degree

Design of the Usability Evaluation

A single usability evaluation will be run in at least 10 individual participant sessions. Each individual session will consist of a set of tasks and an interview/questionnaire for the participants to complete.

The individual evaluations will take place in the following order:

- A performance evaluation in which each participant is asked to perform a series of real-life tasks
- A questionnaire and an interview after each performance evaluation to gather additional insights from the participants about the Ironman Triathlon Digital Library.

The Evaluation Process

The usability test plan process is as follows:

Participant greeting and background questionnaire

Each participant will be personally greeted by the evaluation monitor and made to feel comfortable and relaxed. The participants will be given name tags and asked to fill out a short background questionnaire. The issue of confidentiality will be explained and the participants will be asked to sign consent statements.

Orientation

The participants will receive a short, verbal scripted introduction and orientation to the evaluation. This material will explain the purpose and objective of the evaluation, and additional information about what is expected of them. They will be assured that the

product is the center of the evaluation and not themselves, and that they should perform in whatever manner is typical and comfortable for them. The participants will be informed that they are being observed and videotaped and asked to sign the appropriate release forms if not already completed.

Performance evaluation

The performance evaluation consists of a series of tasks that are evaluated separately and sequentially. The individual participants complete the tasks while being recorded on video and observed by the usability specialists. The scenario is as follows:

- After the orientation, the participants will be asked to sit down at the computer. The evaluation administrator will give the participants the task scenario booklet.
- After the participants begin working through the evaluation scenario, they will be encouraged to work without guidance except for the product itself. The evaluation administrator may ask the participant to verbalize his or her thoughts if the participant becomes stuck or hopelessly confused. These occurrences will be noted by the evaluation administrator, who will help to pinpoint the cause of the problem.

Participant debriefing

After all tasks are complete or the time expires, each participant will be debriefed by the evaluation administrator. The debriefing will be taped and will include the following:

- Completion of a brief post evaluation questionnaire in which the participants share their opinions on the product's usability, appearance of application screens, and general impressions of the product

- Participant's overall comments about his or her experience
- Participant's responses to probes from the evaluation monitor about specific errors or problems encountered during the evaluation

The debriefing session serves several functions. It allows the participants to say whatever they like, which is important if tasks are frustrating. It provides important information about each participant's rationale for performing specific actions, and it allows the collection of subjective preference data about the application and its supporting documentation.

After the debriefing session, the participants will be thanked for their efforts, and released. They will be given a small token of appreciation as they leave.

Logistics

I will simulate a typical computer desk environment during the usability evaluation. The office will be large enough to comfortably accommodate a desk for the participant to sit at while completing the evaluation.

There will be an additional area for placement of the usability lab. This area will consist of two average size desks and allocation for power usage. In case of a space limitation, the usability lab will be located in the same area as the participant but a visual barrier will be erected between the participant and the lab setup.

Requirements for the Evaluation

- Usability lab and 2 evaluation personnel
- Prepared evaluation documents

- Space arrangements required for evaluation environment and lab setup
- Participants that reflect the profile of potential users
- Support person for length of usability pilot evaluation and evaluation sessions

Materials Design

The following materials will be designed and developed for use in the usability evaluation:

- Participant profile analysis
- Task scenario package
- Evaluation participant debriefing materials

Data Collection Methodology

Data will be collected through the use of a “thinking aloud” protocol.

Measures to be collected include the following:

1. The average amount of time to complete each task.
2. The percentage of participants who finished each task successfully.
3. The number of cases in which the participants were not able to complete a launch due to an error from which they could not recover.
4. The number of times the participant asked for help for each task.
5. Number of and types of errors, including:

Observations and comments. The evaluation monitor notes when participants have difficulty, when an unusual behavior occurs, or when a cause of error becomes obvious.

Non-critical error. A participant makes a mistake but is able to recover during the task in the allotted time.

Critical error. A participant makes a mistake and is unable to recover and complete the task on time. The participant may or may not realize a mistake has been made.

6. The number of indications of frustration or joy from the participant.
7. The number of subjective opinions of the usability and aesthetics of the product expressed by the participants.

Deliverables

At the completion of the usability evaluation, a formal analysis will be performed. A final evaluation report and a highlight tape will be provided, which will detail the significant problems and observations detected during the usability evaluation, and recommendations to address the findings, will be used in the final development of the product.

Resources

The following is an estimate for the total resource requirements, in days.

Activity	Total Resource Time
Planning for the evaluation Creating evaluation materials	5
Arranging logistics	5
Piloting the materials and procedure	2
Running the evaluation (3-day duration)	3
Analyzing data	3
Preparation of final report and peer review	3

Highlight tape	2
Total Time	23