Specification of the UFT Web-Based Fitness Tracking Software

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Abstract: - The main components of the UML-based specification of the Ultimate Fitness Tracker (UFT) software are presented in this paper. The UFT is a web-based fitness tracking application that allows users to define and plan exercising programs and keep track of their progress. The application's main functionality is outlined in the paper in terms of functional and non-functional requirements and samples of use case modeling, high-level design, and user interface are provided. The current status of the UFT application as well as several planned directions of further research and development are also presented in the paper.

Key-Words: - fitness tracking software, web application, requirements specification, use cases, scenarios, UML.

1 Introduction

The Ultimate Fitness Tracking (UFT) is a web-based application designed with the average physically active person in mind. The application's main goal is to provide to a large variety of users, from the beginners to the most advanced, a practical, convenient, easy to understand and easy to use tool for defining, planning, and keeping track of exercising programs.

In UFT, a workout can be either weight-bearing or cardiovascular. A *weight-bearing workout* consists of a set of exercises, each exercise being of a specific type and having a weight and a number of repetitions assigned. For example, a short weight-bearing workout could consist of the following sequence of exercises: bench press (100 pounds, 10 repetitions), incline bench press (95 pounds, 12 repetitions), and cable crossover (50 pounds, 12 repetitions).

A *cardiovascular workout* (or, in short, *cardio workout*) consists of an exercise, time spent on that exercise, and the number of calories burned by performing the exercise. Examples of cardio workouts are a treadmill exercise (30 minutes, 300 calories) and a bike exercise (45 minutes, 400 calories).

There are five main sections (pages) in the Ultimate Fitness Tracker, which can be accessed via [1]. The first is the *add/change workout page,* where users can enter a workout, view and modify previous workouts, and go to their own personal exercise database page. The second is the *workout templates page,* on which users have the ability to enter up to one week worth of planned workouts, separated on days. This section of the UFT also includes a comprehensive set of exercise descriptions, including photos (parts taken from [2]). On the the third page, *the progress page,* users can enter their current body measurements (which include neck, chest, left arm, right arm, waist, left leg, right leg, left calf, and right calf), have their bodyfat percentage calculated, and check their progress over a range of dates. The fourth page, the *reports and graphs page*, provides users with a variety of information pertaining to the workouts they have performed and recorded into the system. Finally, the *help and links page* provides complete instructions on how to use the UFT as well as links to some of the most popular fitness related sites on the Internet.

The motivation for developing this application was to create a more comprehensive fitness tracking system than those currently available on the market. The majority of applications for fitness tracking on the market today specialize in either cardiovascular or weight-bearing programs, but not in both. However, the average person's workout typically consists of both cardiovascular and weight-bearing exercises. For example, the software available from the Fitwatch web-site [3] allows users to track nutritional information but, while it does track physical activity, it is tailored towards the casual user as it does not support weight-lifting or cardiovascular exercises. As an additional inconvenience for more active users, this site makes the users search for each and every activity they perform, therefore many users have a hard time entering data. On the other hand, Ironwarrior [4], a program after which parts of the UFT were inspired, is excellent for very active, adavanced weight-lifters, but cardiovascular activity is only supported in the form of a note at the end of the day's workout. Thus, what distinguishes UFT is that it is suitable for any level of fitness activity, from the most casual to the most advanced. Furthermore, the UFT allows users to add their own exercises, therefore completely customizing their workout experience.

In future versions, the UFT will include the ability to track the users' nutrition in a similar fashion as the exercise portion. In addition, it will allow users to search for a specific food's nutritional value. These two features will provide users with a better understanding of their personal nutrition profile. A recipe database is also a planned extension for this application. This database will allow users to post and rate their favorite recipes, thus sharing their experiences with other. Several other planned enhancements for the UFT are described later in the paper.

The development of the UFT application has followed a simplified version of the Unified Process (UP) [5] and its software model has been built using constructs of the Unified Modeling Language (UML) [6, 7]. Guidelines regarding both the development process and the modeling notation have been taken from [8].

The remainder of this paper is structured as follows: Section 2 discusses selected functional and non-functional requirements of the UFT, Section 3 illustrates the applications' use case modeling via the system's use case diagram and sample use cases and scenarios, Section 4 presents two major components of UFT's high level design, namely the site map and the application component diagram, Section 5 reports on the current status of the project, Section 6 describes planned enhancements and extensions, and Section 7 concludes the paper with a summary of our work on the UFT.

2 Requirements Specification

Within the specification of the UFT a set of functional and non-functional requirements have been identified as mandatory for the initial version of the application. Using the practical, efficient style proposed in [7] selected requirements for the UFT, both functional and non-functional, are presented below.

2.1 Functional Requirements

Functional requirements for the UFT include:

R1. Upon accessing the UFT, the users shall be presented with a screen that shall allow them to log in, register, or take a tour of the web site.

R2. If a registered user chooses to log into the site the system shall take the user to the main membership page. An unregistered user shall be taken to a registration page after two failed attempts to log into the site.

R3. When the users register, they shall be asked a series of questions for forming each user's profile. This profile shall be used to customize the site to the users' needs and shall include (but shall not be limited to) the following data: age, sex, weight, and height.

R4. After selecting the add/delete workout page, the users shall be presented with a page that lists the dates of recent workouts either in the form of a drop-down list or a scroll box. There shall also be buttons that shall allow users to add or change a workout. When an existing date is selected, an un-editable table shall be displayed, and on each line of the table an exercise set shall be displayed, including the name of the exercise, weight used, repetitions, and a comment box. Bellow this table, in a separate table, any cardio performed on that day shall be displayed in the same tabular format as above, including name, time, calories burnt, and a comment box. The user shall have the option of editing the table from this view.

R5. When users select to add or change an existing workout the table shall become editable and the user shall be able to add a set or multiple sets to the database. Weight and cardio exercises shall be edited separately, so that one or the other can be skipped on any day. The user shall also be able to remove sets from the table. From this view the user shall be able to delete the entire workout and remove it from the database.

R6. When the users select the template page they shall be able to store up to one week of future exercise routines, separated on days of the week.

R7. When the users select the progress page, they shall be shown a screen that allows them to input by date their weight, body fat, and their body measurements: neck, chest, arms (left/right), stomach, waist, thighs (left/right), and calves (left/ right). All measurements are optional, and shall be treated as such, for example if the user chooses to enter some but not all measurements he or she shall be able to partially complete the template.

2.2 Non-Functional Requirements

Following are some of the more important non-functional requirements for the UFT:

T1. The UFT shall be a web-based application.
T2. The UFT shall be written in HTML, ASP 3.0 (VBScript) /ASP.NET (C#).
T3. The UFT shall contain a database with at least six tables.
T4. The UFT shall support multiple users at any given time.

3 Use Case Modeling

As shown in Figure 1, the use case diagram of the application, derived from the requirements presented in Section 2, describes at a high level of abstraction the functionality of the UFT. Based on this diagram, use cases and scenarios have been created as basis for further development of the UFT software model. An example of UFT use case, CheckTemplates, is shown in Figure 2 and a scenario related to the ManageWorkouts use case is presented in Figure 3.

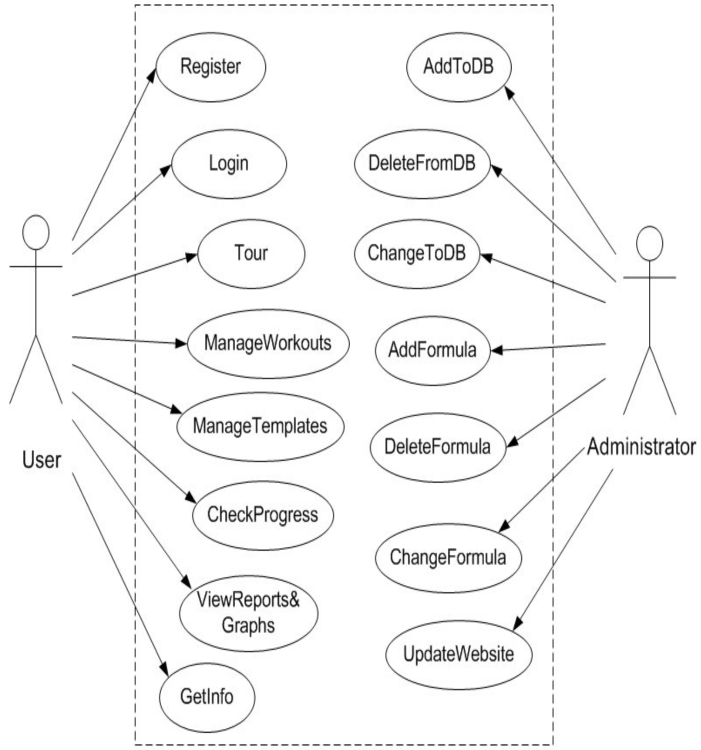


Fig. 1 Use Case Diagram of the UFT

Use case: CheckProgress

ID: UC-6

Actors: User

Preconditions: The User is logged on the UFT main page

Flow of events:

1. The User selects “Progress”.
2. The system displays text fields for the date, weight, body fat percentage, and body measurements.
3. The User enters information for each field.
4. If the User selects “Compare Dates” then:
   4.1. The system prompts the User for the start and end dates.
   4.2. The User enters this information.
   4.3. The system displays the start date, the end date, and changes on weight, body fat percentage, and body measurements.
5. The system displays the user profile in editable text fields for the User to update.
6. The User modifies data in the profile and saves it.
7. The system updates the User’s profile in the database.

Postconditions:

Alternative flow:

1. At any point the User may go to a different page.

Postconditions:

Fig. 2 Example of Use Case in UFT

Scenario: AddWorkout
[Use Case: ManageWorkouts]

ID: SC-4.1

Actors:
User

Preconditions:
The User is logged on to the Add/Change Workouts page

Primary Scenario:

1. The User selects “Add Workout”.
2. The system populates a drop down box with the ten most recent dates in the database for that User and displays a drop-down box with a “Display All Dates” button and a “Add Date” button, as well as several empty, non-editable tables for the exercise data.
3. The User selects “Display All Dates”.
4. The system queries the database for all dates the user has entered data.
5. The User selects “Add Date”.
6. The system displays blank tables.
7. The User selects a date.
8 The system queries the database and populates the non-editable tables with the information, if any, stored for that date.
9. [continued]

Postconditions:

Fig. 3 Example of Scenario in UFT

4 High Level Design

Since UFT is a web-based application that does not fit completely on the traditional object-oriented model supported by the UML [9], several additional, web-specific high level design diagrams have proved to be necessary to complete UFT's specification. Specifically, the site map of he UFT, shown in Figure 4, and the component map, shown in Figure 5, have been used to describe the web-specific architecture of the UFT.

5 Current Status

Currently, the UFT is fully operational as described in its Software Requirement Specification (SRS) document from which excerpts have been provided in Sections 2 and 3 of this paper. Although an initial working version of UFT is available, including a well populated database of exercises, there are several forms of validation controls that need to be implemented before the application can be fully operational. We estimate that these validation checks will be resolved soon and by early 2004 the UFT could be released as beta version.

To illustrate the present "look and feel" of the application and provide more details of its graphical user interface, snapshots of the application's most important components are presented in Figures 6 and 7. Specifically, Figure 6 shows the *add/change workout page* where users enter completed workouts and Figure 7 shows the *templates page*, where users can enter up to seven days' worth of planned workouts.

6 Future Work

Future extensions to the UFT include new GUI features and functional options that will allow the users to completely customize their experience with the site.

In particular, planned extensions include a nutrition section and a comprehensive database of recipes, user forums such that the users can interact with each other, share their experiences, and pass on useful recommendations and tips, an workout routine developer with artifical intelligence for automated generation of new workouts, and an on-line connection with licensed personal trainers and nutrition experts who can answer users' questions and help them achieve their fitness goals.

Another related area of research and development that we have started to explore recently is that of building a handheld device that incorporates UFT's functionality.

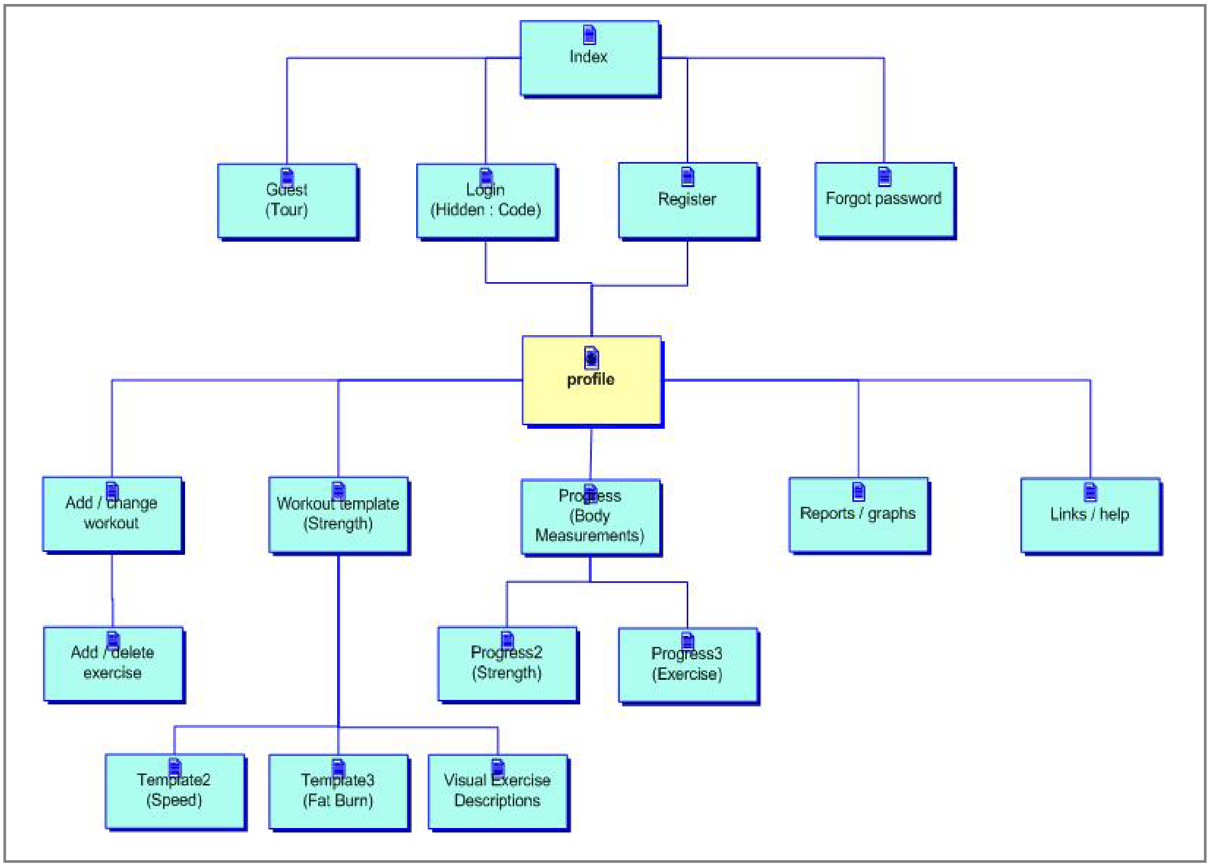


Fig. 4 The Site Map of the UFT

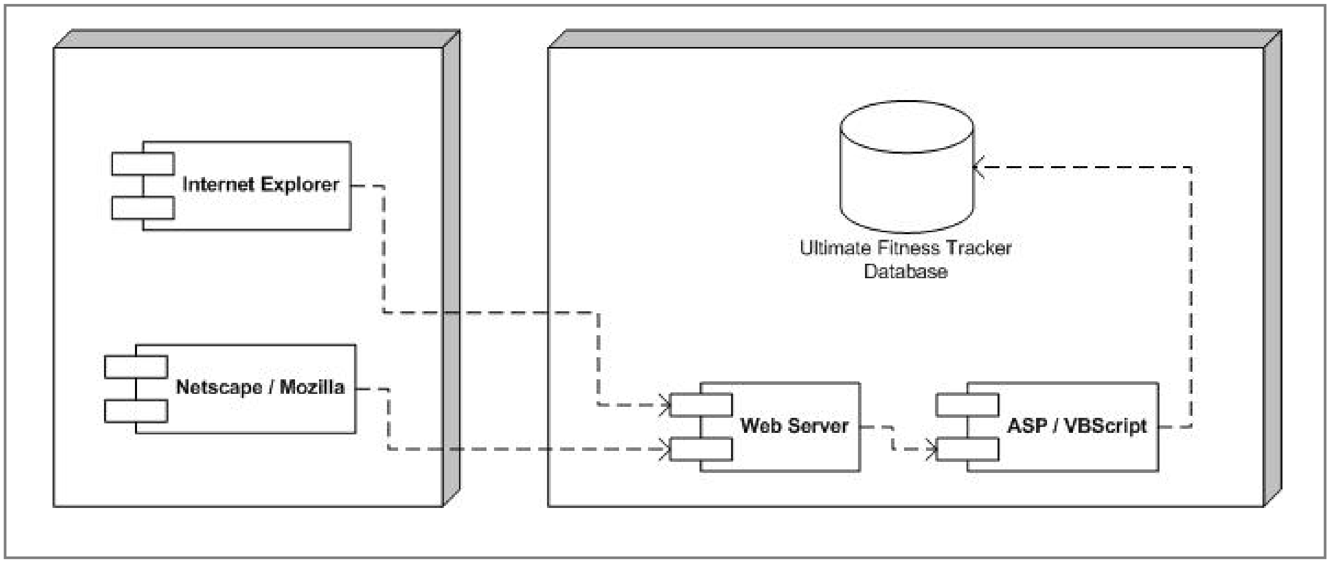
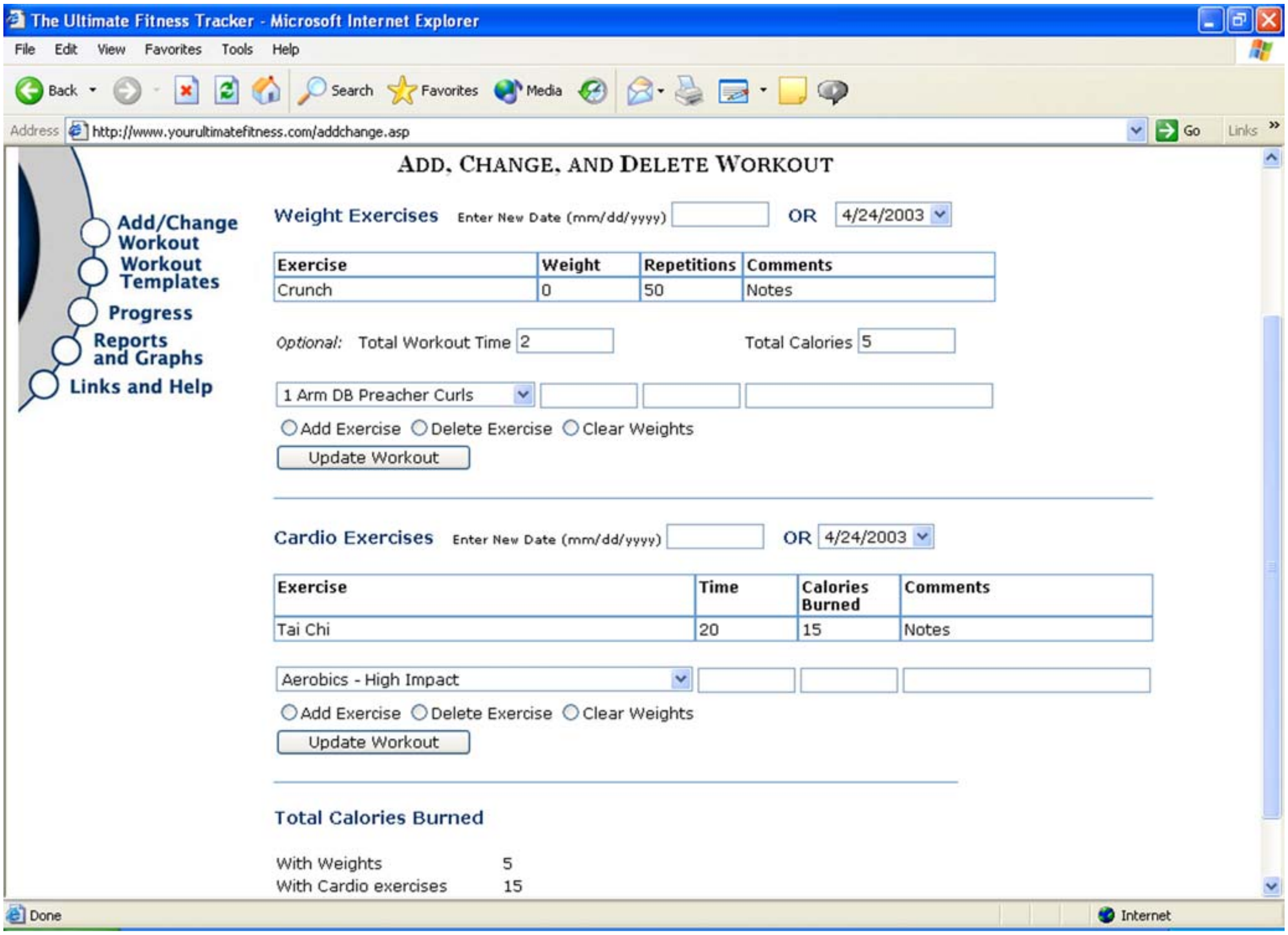


Fig. 5 The Component Map of the UFT



http://www.yourultimatefitness.com/addchange.asp

ADD, CHANGE, AND DELETE WORKOUT

Weight Exercises Enter New Date (mm/dd/yyyy) OR 4/24/2003

Exercise	Weight	Repetitions	Comments
Crunch	0	50	Notes

Optional: Total Workout Time 2 Total Calories 5

1 Arm DB Preacher Curls

○ Add Exercise ○ Delete Exercise ○ Clear Weights

Update Workout

Cardio Exercises Enter New Date (mm/dd/yyyy) OR 4/24/2003

Exercise	Time	Calories Burned	Comments
Tai Chi	20	15	Notes

Aerobics - High Impact

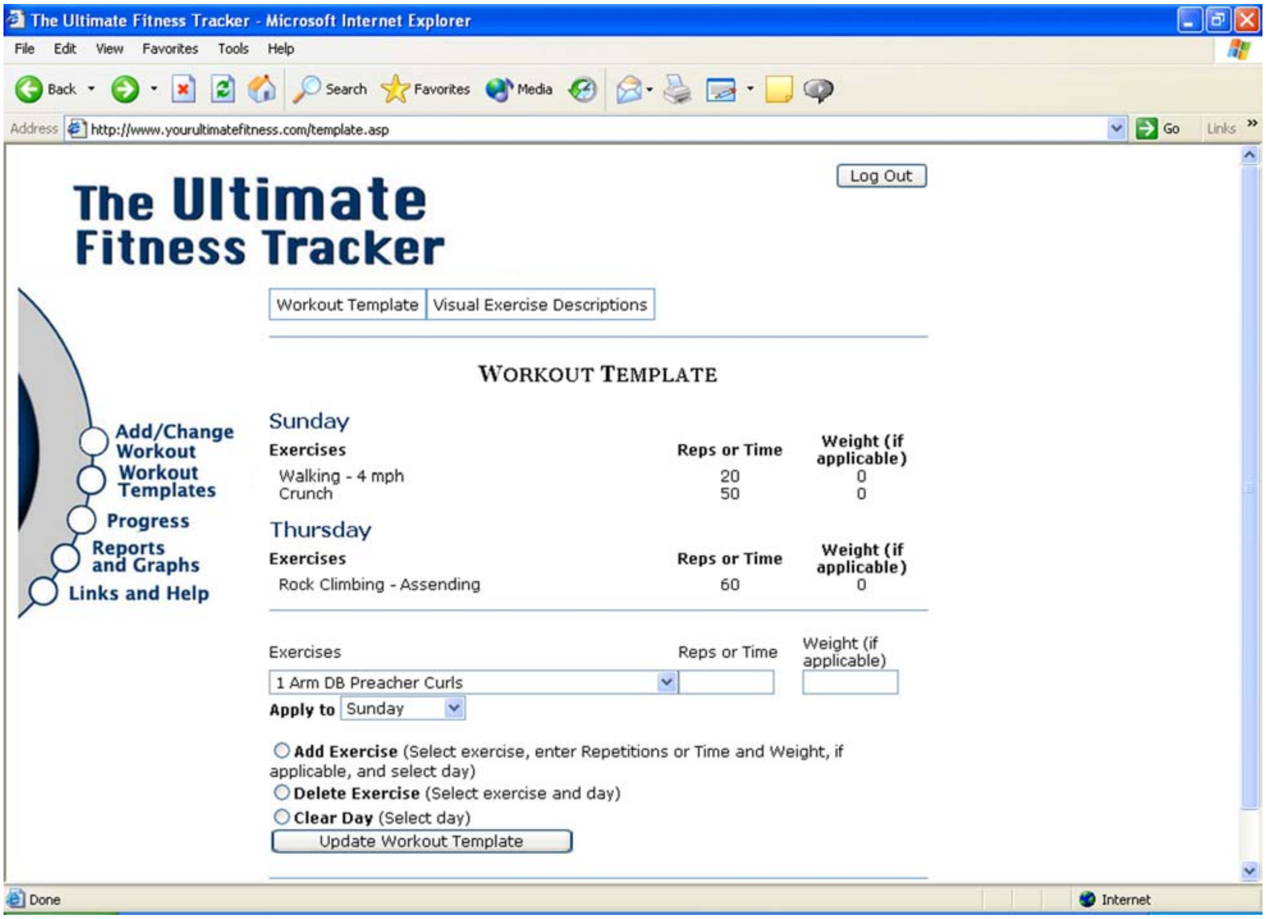
○ Add Exercise ○ Delete Exercise ○ Clear Weights

Update Workout

Total Calories Burned

With Weights	5
With Cardio exercises	15

Fig. 6 UFT’s Add/Change Workout Page



Address: http://www.yourultimatefitness.com/template.asp

WORKOUT TEMPLATE

Sunday

Exercises	Reps or Time	Weight (if applicable)
Walking - 4 mph	20	0
Crunch	50	0

Thursday

Exercises	Reps or Time	Weight (if applicable)
Rock Climbing - Assending	60	0

Exercises	Reps or Time	Weight (if applicable)
1 Arm DB Preacher Curls		

Apply to: Sunday

○ **Add Exercise** (Select exercise, enter Repetitions or Time and Weight, if applicable, and select day)

○ **Delete Exercise** (Select exercise and day)

○ **Clear Day** (Select day)

Fig. 7 UFT's Templates Page

7 Conclusions

This paper has introduced the UFT specialized fitness tracking web-based application by describing its main functional and non-functional requirements and by presenting excerpts from its use case modeling, its high-level design, and its user interface.

The main objective of the UFT is to provide users with an easy and practical way to plan and track their physical exercising progress and attain their fitness goals. The UFT has been developed using a UML-based, systematic software development process adapted from the Unified Process to encompass modeling of web applications.

The UFT software has been completed in its initial operational version and reached a stage from which numerous extensions are possible. We plan to work on these extensions and make UFT a practical and efficient web-based commercial product that will prove useful to many users interested in enhancing their level of fitness and health.

References

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