Smart Scheduler: A Service for Managing Student Task

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Abstract:

Dealing with multiple tasks that have various requirements and submission dates is a massive challenge that students struggle with, especially if there is difficulty in accomplishing the required tasks. Students may end up missing one or more tasks that may negatively affect their final grade. However, having a smart scheduler that prioritizes the tasks, organizes them based on student's free hours, and shows the daily tasks is a smart way to save a student's time and manage various tasks easily. In Smart Scheduler, I created a new set of tools that will complement the features provided by Blackboard, and will assist the students in tasks such as time management and data-driven tools to evaluate course assignments. Smart Scheduler is a web-based service that not only assist in completing tasks on time but also helps in accomplishing the tasks correctly. Using these smart tools gives students a chance to look at previous student works, comments, and advice. Furthermore, it visualizes the data and provides statistics of the average time of completing tasks based on historical data. In this version, students only need to add task names, due dates, task values, course names, CRN, instructor names, and the estimated time for every task to be done. Then, the program calculates the priority based on the due dates, worth percentages, and the estimated time. Tasks have priority in the following order: The closer due date has higher priority. Then, the higher task value has medium priority. After that, the longer estimated time; then, the shorter estimated time is considered as the lowest priority. Smart Scheduler is a flexible tool which allows users to update, modify, and delete tasks. Smart Scheduler will be integrated with Blackboard to receive student data automatically which will be much easier and more convenient.

Introduction:

Students' lives are full of responsibilities and duties. They are not only expected to take care of their daily tasks, but also to perform and submit their projects, research, and assignments on time. Moreover, they are required to attend their classes frequently. All these varieties of tasks may cause students to feel confused and frustrated.

Working with different tasks that have various requirements and conflicting due dates and making sure that they are completed and submitted in the required time is a very hard issue, especially for students who find themselves under pressure from an ever-growing task list. However, the problem is exacerbated when the tasks are anonymous. They have no idea how long these tasks will take, how they will start working on these tasks, and how they will find good, helpful materials if they are needed. In addition, sometimes students take a long time working on a task that has a small value; yet, when the due date is close, they find there is not enough time to complete the other task which is worth a much higher value. Having multiple tasks without any idea about them and proper management makes students feel stressed and overwhelmed, which sometimes ends with them missing one or more tasks that unfortunately, will have an effect on their final grade.

To overcome this issue, I developed *Smart Scheduler,* which prioritizes students' tasks based on the due dates, worth percentages, and the estimated time (in this version, these data should be entered by the user.) Tasks have priority in the following order: The closer due date has highest priority. Then, the higher task value has medium priority, followed by the longer estimated time. Lastly, the shorter estimated time is considered as the lowest priority. Moreover, these set of tools gives the students good knowledge about the tasks, even before starting work on them, by having comments, advice, and documents that illustrate the topic and assist the student in accomplishing the task correctly. In addition, it visualizes the data and provides statistics of the average time of completion for tasks based on historical data.

By using *Smart Scheduler*, students' lives will be much easier. *Smart Scheduler's* functionalities (described in this documentation) ensure that there is no need to worry and think about completing and submitting all the assigned tasks correctly and by the required due dates. This unique system has a good impact on students' lives, which will help them to focus only on doing their tasks rather than spending their time managing them instead.

In this document, the tools that have been used to develop this project will be described. Moreover, the functionalities, database design and priorities will be described as well. *Smart Scheduler* is a web-based system that was built in NetBeans IDE 8.1 environment, and it uses XAMPP Control Panel V3.2.2 to provide Apache and MySQL servers. It was developed using PHP and HTML languages.

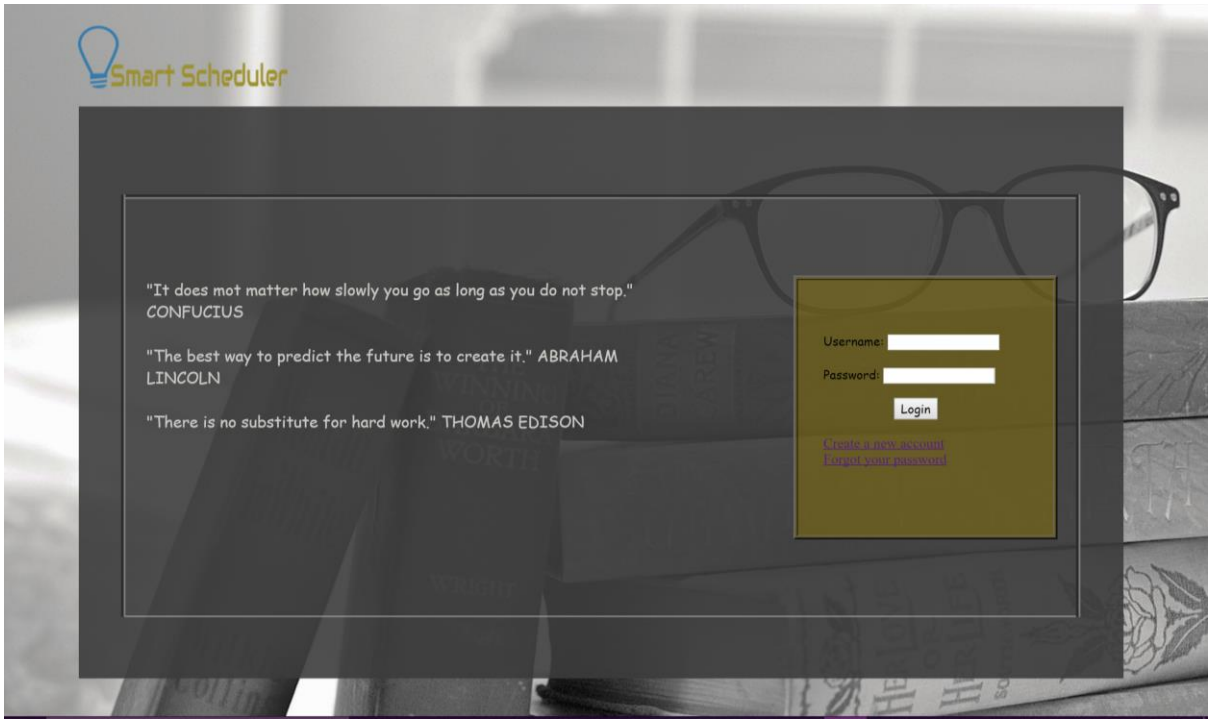

Figure 1: Main Page. This page allows users to create a new account, log in their account, and reset passwords.

Functionalities:

Smart Scheduler was designed to be a simple and convenient system for students to provide them with an idea about their tasks even before starting work, useful references, and a good way to manage their tasks. It includes the required functionalities that the users need to manage their tasks. Students are able to register in the system by using the “Create a new account” link. Student ID, first name, last name, email, username, and password are the required information to create a new account as shown in Figure 2. Moreover, they can reset their passwords by using “Forgot your password” link. It is required to input the student ID, username, and new password in order to rest the password. Then, they could sign in to access their accounts which have the following features.

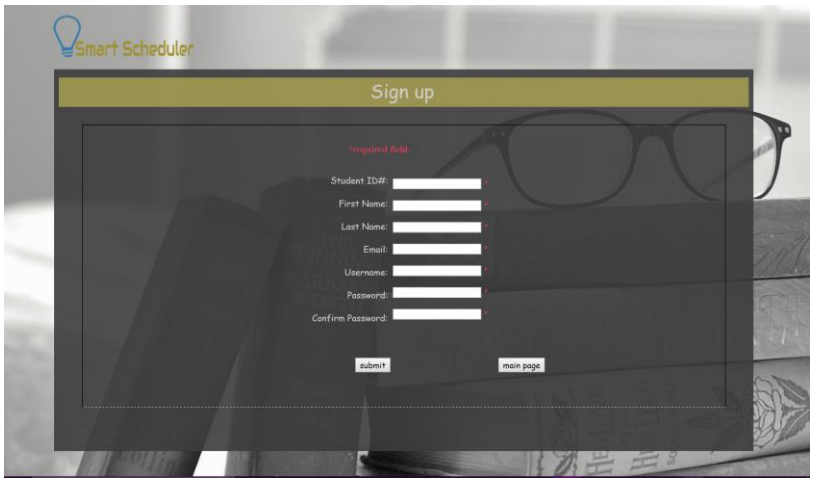

Figure 2: Sign Up Page

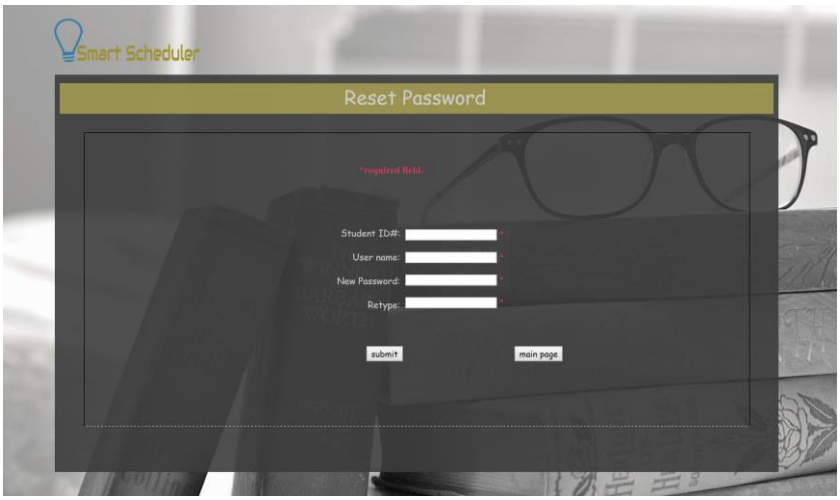

Figure 3: Reset Password Page

- **Home**

This page shows today's tasks that the system chooses based on its priority and their information such as priority, task name, CRN, and status. Initially, task status is set as "Created". By selecting a task and clicking either the "Completed" or "In Progress" button, the student is able to update the status. If the student has done only part of a specific task, the status can be changed to "In Progress", and the estimated time can be updated by using either" My Account" or "Update Task" functionalities. when the "completed "button is pressed, the task's status will be completed, and the Survey window will be displayed to ask the student to provide the actual time was spent to complete the task, his/her comment or advice, and helpful documents. This data will be used to feed the database system, then *Smart Scheduler* processes the data to provide helpful information, statistics, and diagrams.

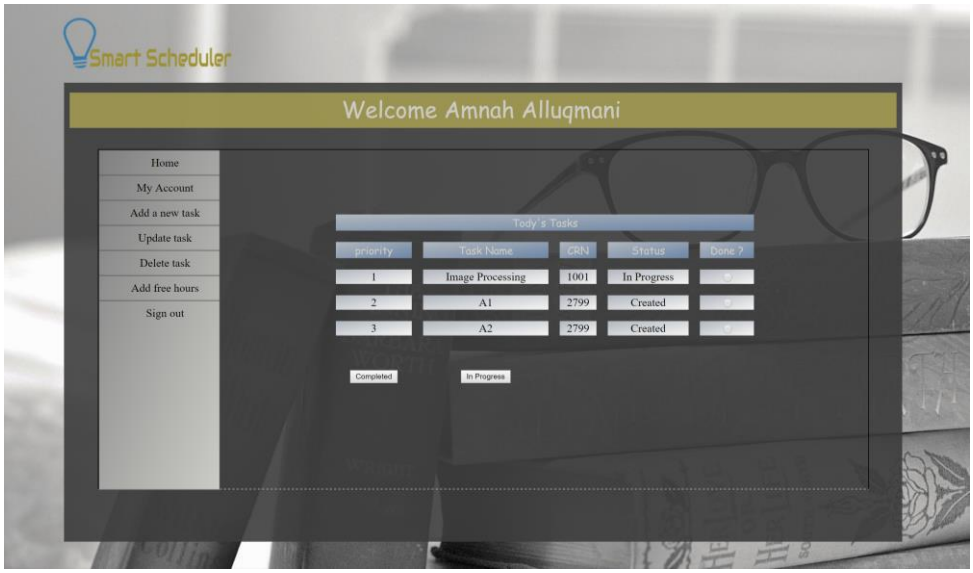

Figure 4: Home Page. The daily tasks based on the priority algorithm. In this example the "Image processing" task is the highest priority with "In Progress" status, then," A1" and "A2" respectively which have not been started yet. However, the status can be updated by selecting the desired task and pressing either "Complete" or "In Progress" button. Whenever the task is completed, it will be removed from the "Today's Tasks" list and the priority will be updated.

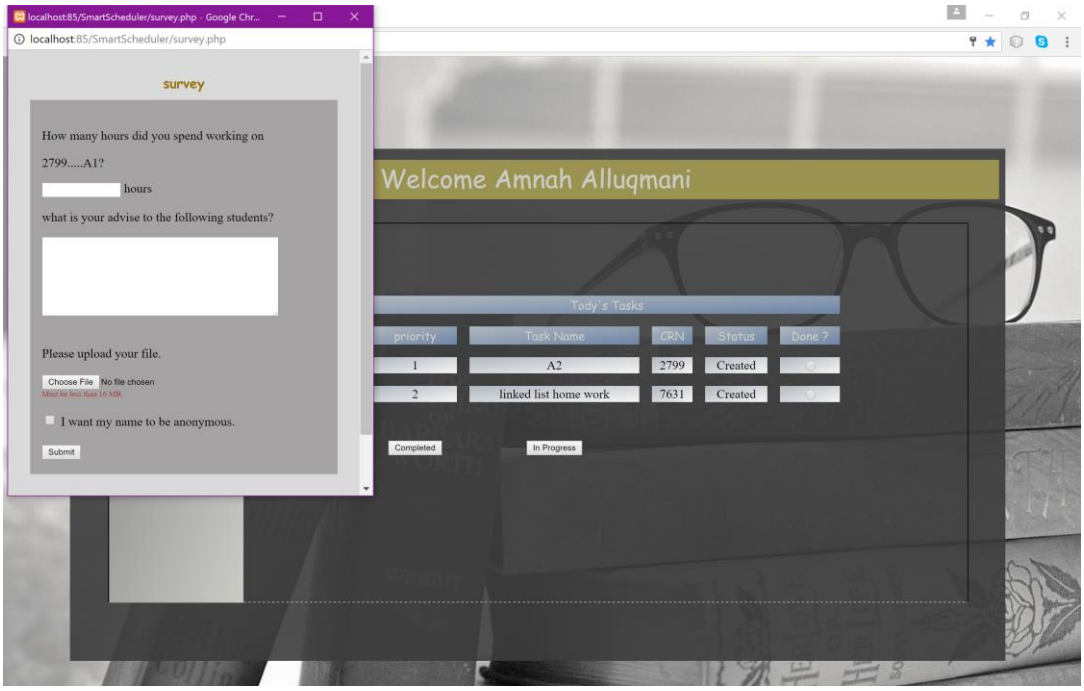

Figure 5: The "Survey" window is a data collection service that displays when a task is completed. This window displays the task's information (task name & CRN), and asks the user to provide the time that was consumed to complete this task (mandatory), comments (optional), and a helpful file (optional, must be less than 16 MB). The user can make his/her name anonymous by checking the check box. All of the information provided in the survey can be utilized by future students performing the same task, to help them complete it more quickly and efficiently.

Number of tasks per day:

The system has a limited number of tasks to display per day. The maximum number of tasks is four (the four highest priority), and the minimum number of tasks depends on the student's free hours. The system shows from one to four tasks as long as the total tasks' estimated time equals or is greater than the student's free hours. (See Figure 6:)

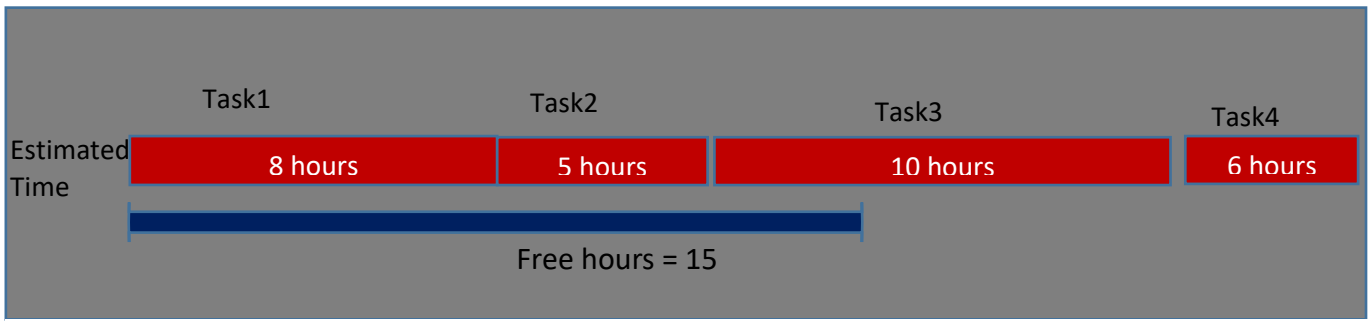

Figure 6: This is an example of how the program calculates task prioritization based on remaining Free hours. The time in red is how much time the system will subtract from the "Free hours" for each task. As seen in the example above, the system will stop by Task 3 and then display all previous tasks reached before Free hours became 0 (Tasks 1-3). The task with the highest priority (in this case Task 1) will be subtracted first and so on, subtracting from tasks decreasing in priority value, until Free hours is at 0.

- **My Account**

"My Account" page displays the personal information, the current tasks, and the current courses. All the general information can be updated, except for free hours, which can be updated by using the "Add free hours" function. In the "Current Tasks" section, a student is able to update the due date, task value (the maximum value is 100%, and the minimum value is 1%), and the estimated time (the maximum value is 50 hours, and the minimum value is 1 hour). Moreover, the user can look at the comments, and download the documents for every task by clicking on the "View files", and ''View comments'' links. As Figure 7-A: My Account Page; General Information & Figure 7-B: My Account Page; Current Tasks show, there are three colors to visualize the task status. Green represents completed tasks, red shows created tasks, and yellow is for in-progress tasks. In the "Current Courses", the registered courses are displayed in addition to two links "View comments" and "Add your comments". By using the first link the user will get general information about the course. However, in the second link the students can participate and share their course comments which will be added to the database system and assist future students.

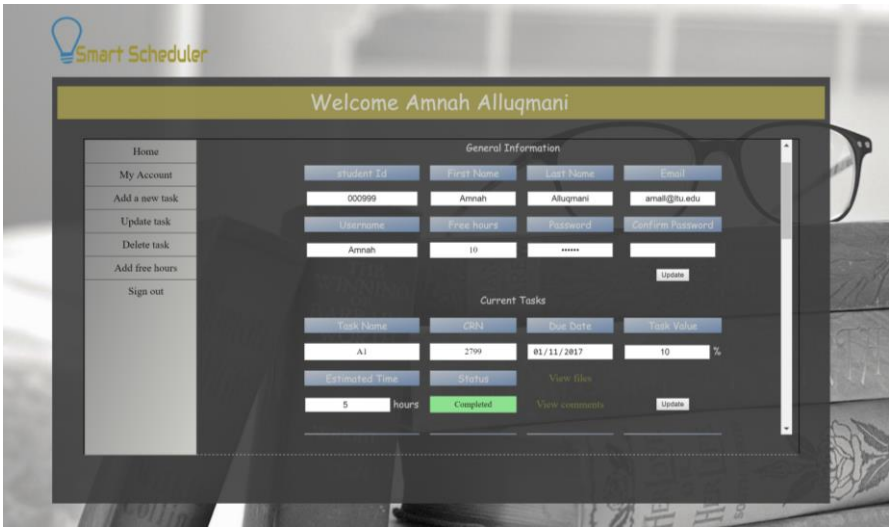

Figure 7-A: My Account Page; General Information. This page provides a summary contains three segments (General Information, Current tasks, and Current courses). This figure shows the personal information, and the "Current Tasks".

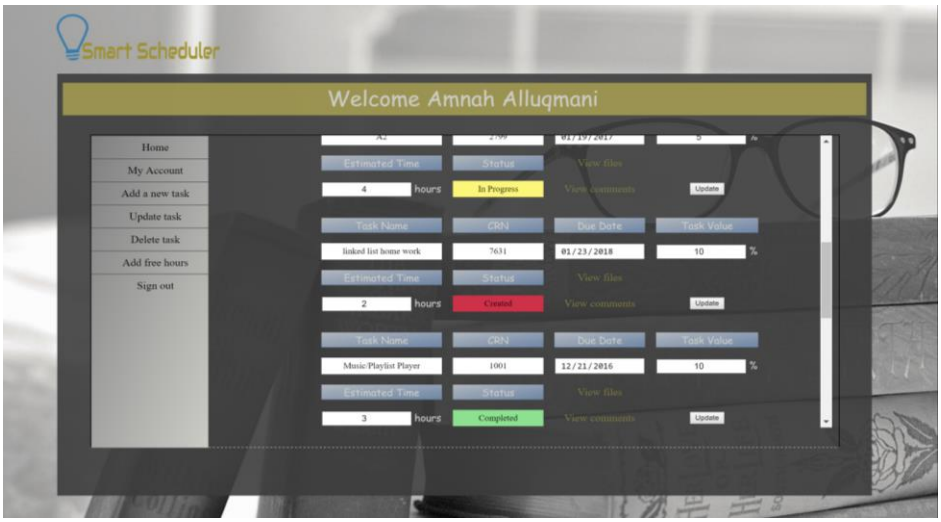

Figure 7-B: My Account Page; Current Tasks. This figure describes the "Current tasks" segment, which holds all the related data for every task. Each task's status is colored either yellow, red, or green based on the status value. In this example, the "Music Playlist Player" status is colored green since the status is "Completed". However, "A2", and "linked list home work" status are yellow (for "In progress") and red (for "Created") respectively. In every task section, there are two gold links "View files", and "View comments "which provide processed information (See Figures 7-C and 7-D)

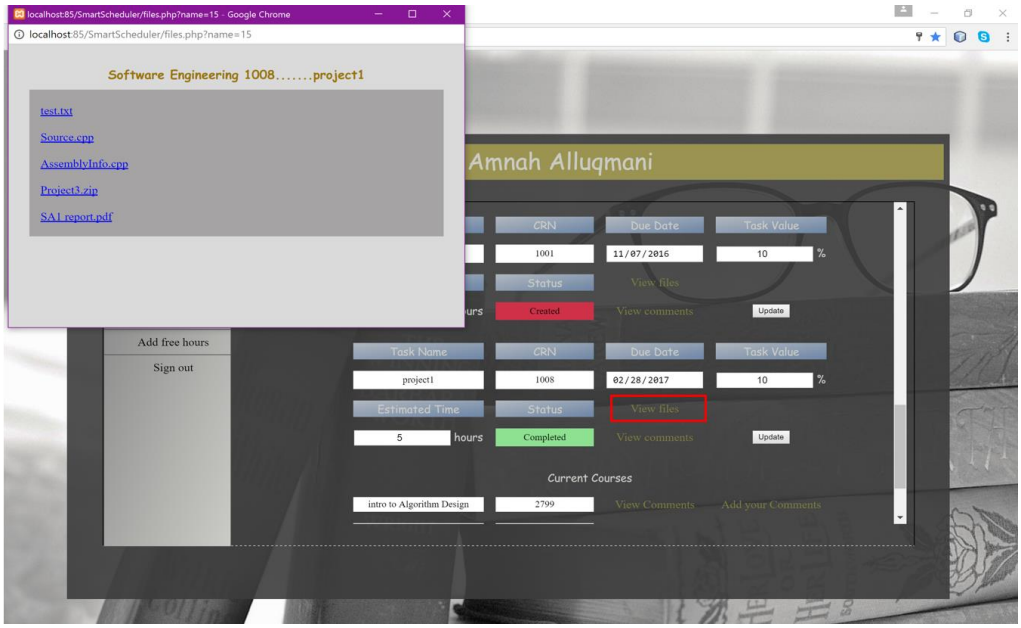

Figure 7-C: My Account Page; View Files. This window shows all the documents for the selected task. By clicking the "View files" link, a list of files will be displayed. In this example the opened window shows a list of helpful documents for "project1" in "Software Engineering" class. These documents can be downloaded by double clicking on the desired link. The files in this window are taken from the database contributed to by previous students.

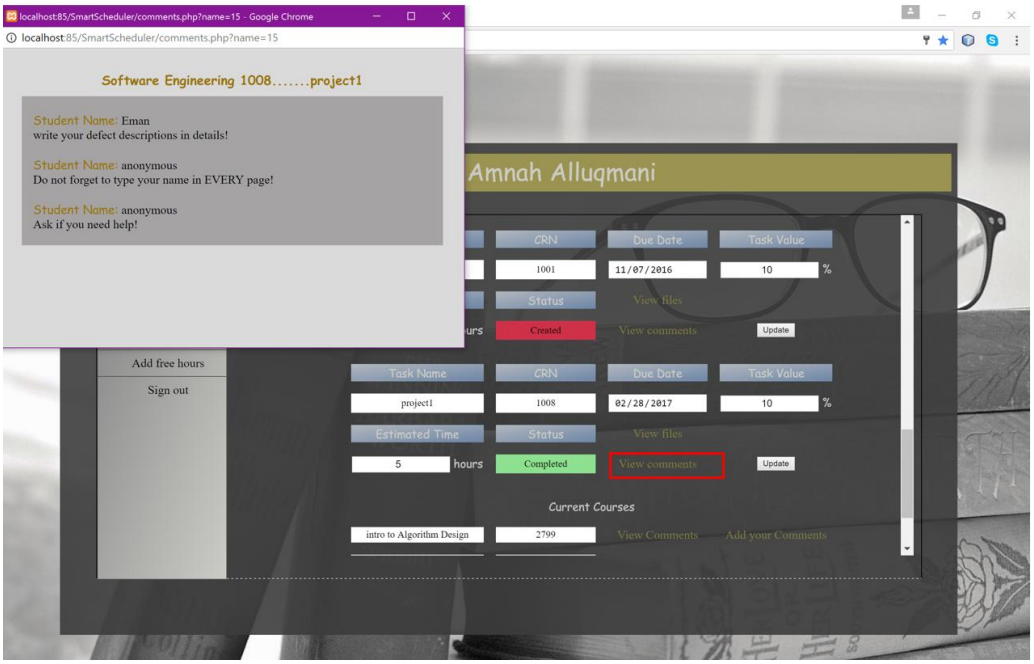

Figure 7-D: My Account Page; View Comments for Tasks. This window shows all the comments of the selected task. In this example, the window shows all the comments and advice from the previous students for "project1" in "Software Engineering" class. The adviser's name can be either explicit or anonymous based on the writer's choice. Like the "View files" window, the comments and advice are taken directly from the student contribution database.

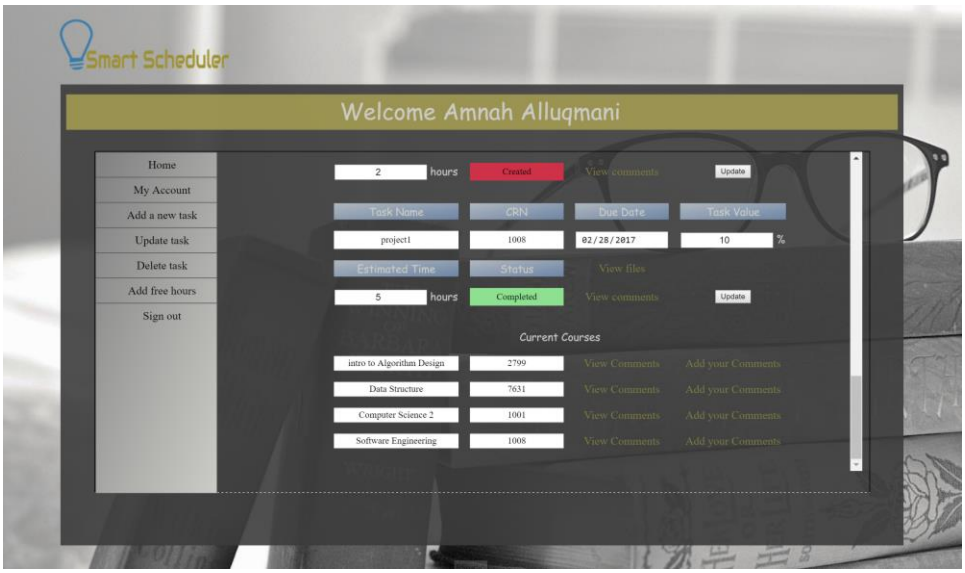

Figure 7-E: My Account Page; Current Courses. This figure shows "Current Courses" segment which displays every registered course name with its CRN, and two gold links: "View Comments" & "Add your Comments".

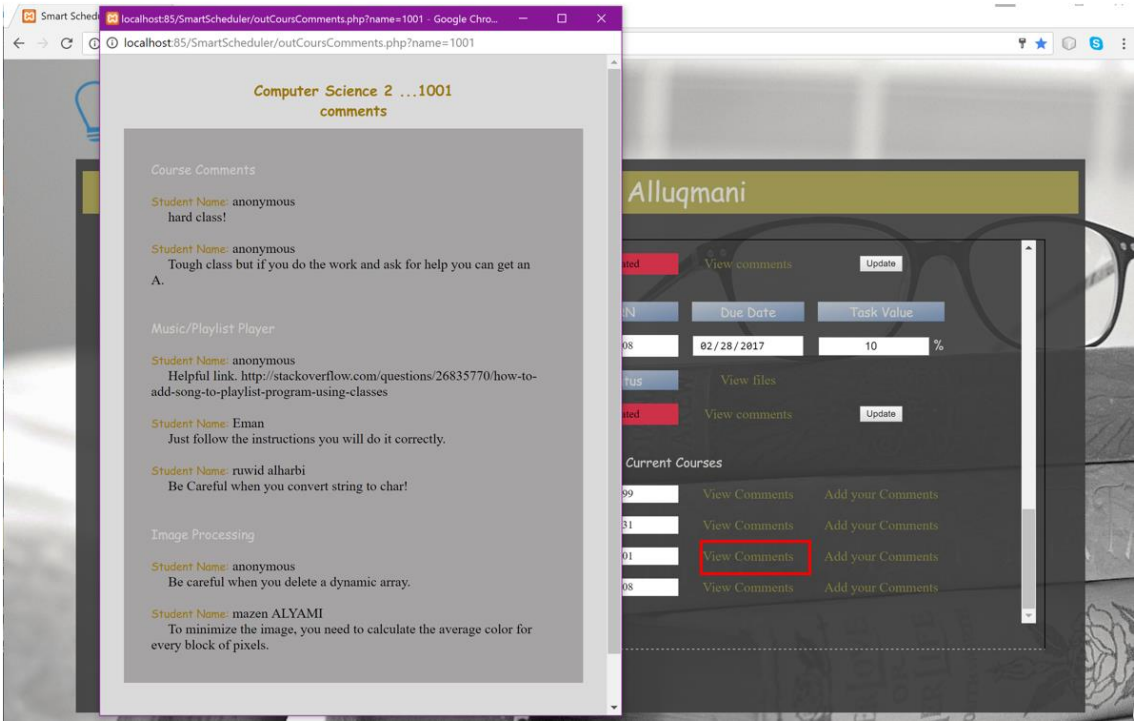

Figure 7-F: My Account Page; View Comments for Courses. In this example, "View Comments" window shows all the comments and advice for "Computer Science 2" class which were collected from the previous students. The advisor's name is either shown or anonymous based on the writer's choice. The window has multiple sections, starting with the course comments, and followed by comments for every task in this course.

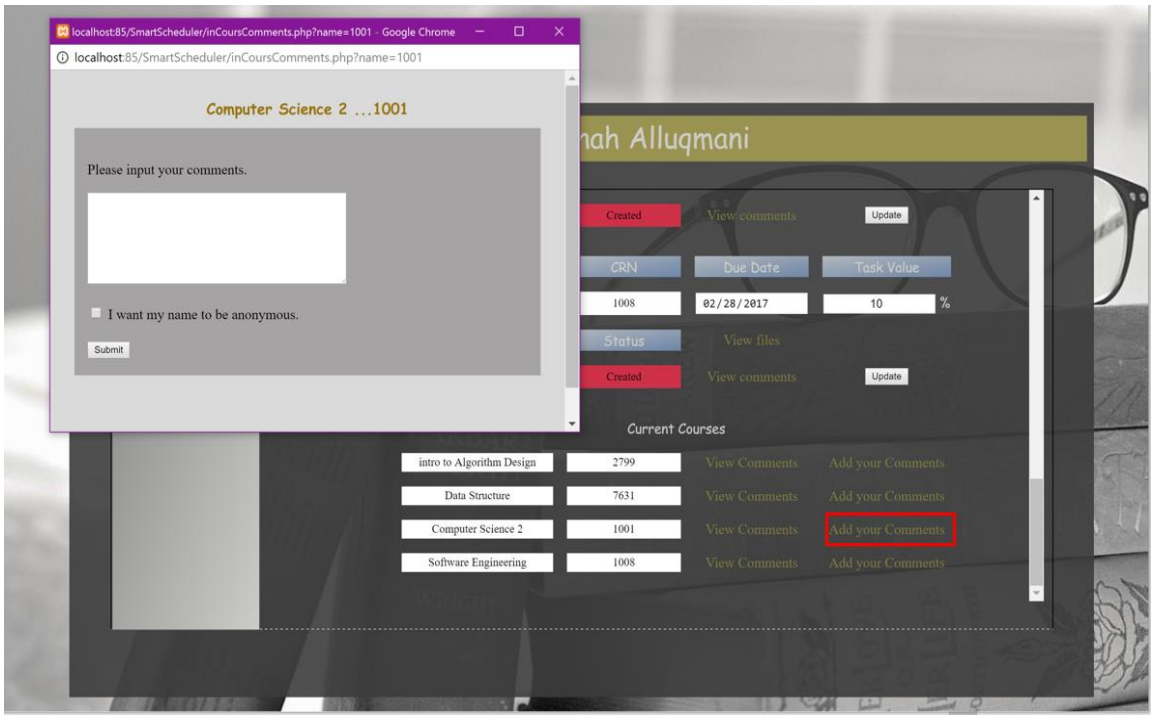

Figure 7-G: My Account Page; Add Your Comments. By clicking the "Add your Comments" link, a new window will be displayed. In this example the window shows the chosen course name and CRN, and asks the user to input comments for this course. The user can make their name anonymous by checking the check box.

Add a new task

This page is used to add a new task. Task name, course name, CRN, Instructor's name, estimated time (from 1 to 50 hours), due date, and task value (from 1 % to 100%) are required to submit the request. Users can use "See the previous students' actual time" to have a more accurate estimation.

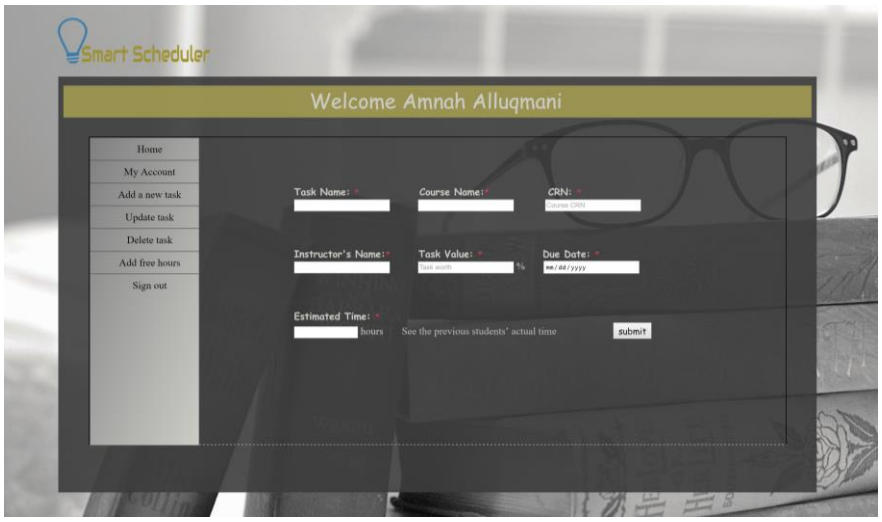

Figure 8-A: Add a New Task Page; General Information . This page allows the user to register a new task by typing the task name, course name, CRN, instructor's name, task value, due date, and the estimated time.

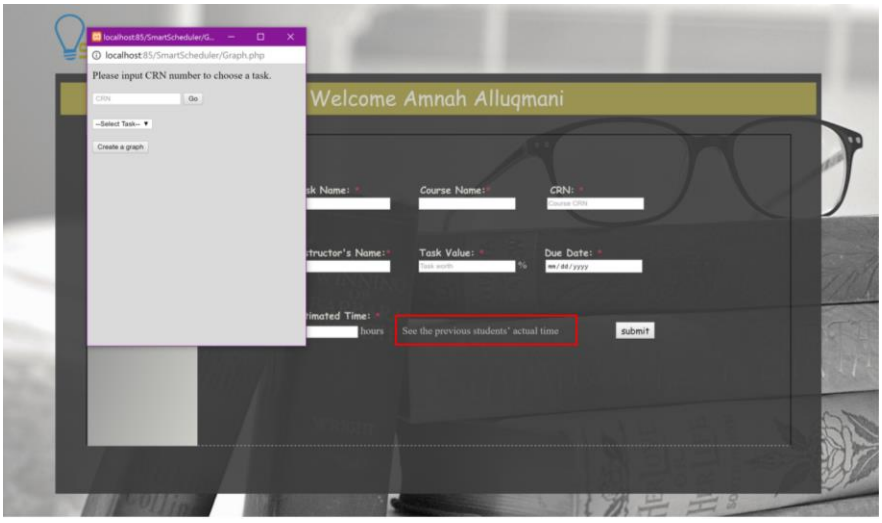

Figure 8-B: Add a new task Page; Time Estimation. To help the students to have an accurate estimation, this page provides "See the previous students' actual time" link which visualizes the previous students' data for the specific task. An example of the results of this estimation can be seen in Figure 9.

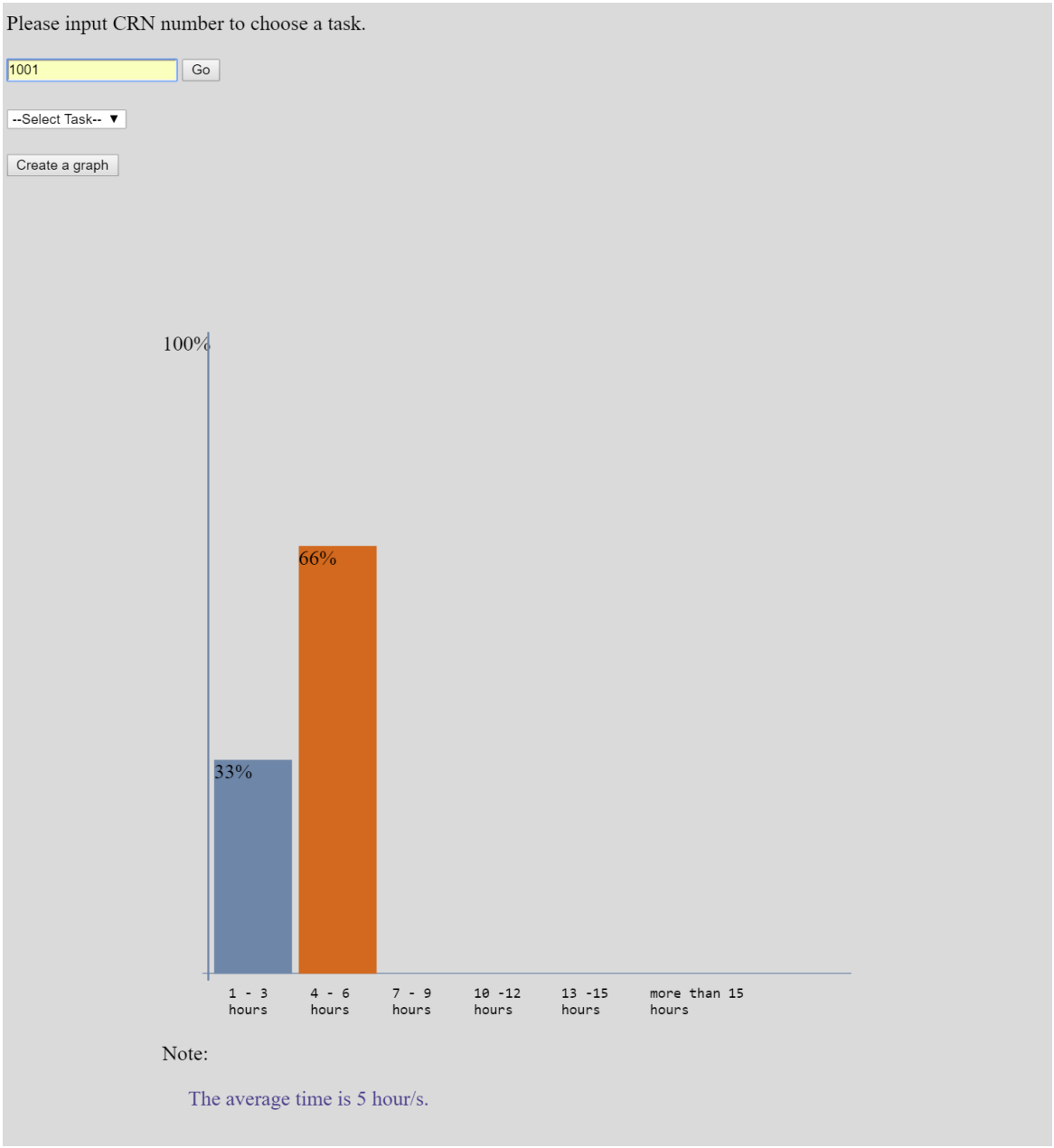

Figure 9: Visualize the actual time. The user should input the CRN, and select the task name to create a graph. This example visualizes the hours that the previous students consumed to complete "Music Playlist Player" task in "Computer Science" class CRN "1001". The graph shows that most of the students (66%) spent between 4 to 6 hours to finish this task. However, the rest of the students (33%) spent about 3 hours or less. This window also, provides the average time that was consumed in the selected task. In this example, the average time that the students spent was 5 hours.

- **Update task**

In this section the user is able to look at all the tasks and update them. However, due date, task value, and estimated time are the only data that can be updated as shown in Figure 10: Update Task.

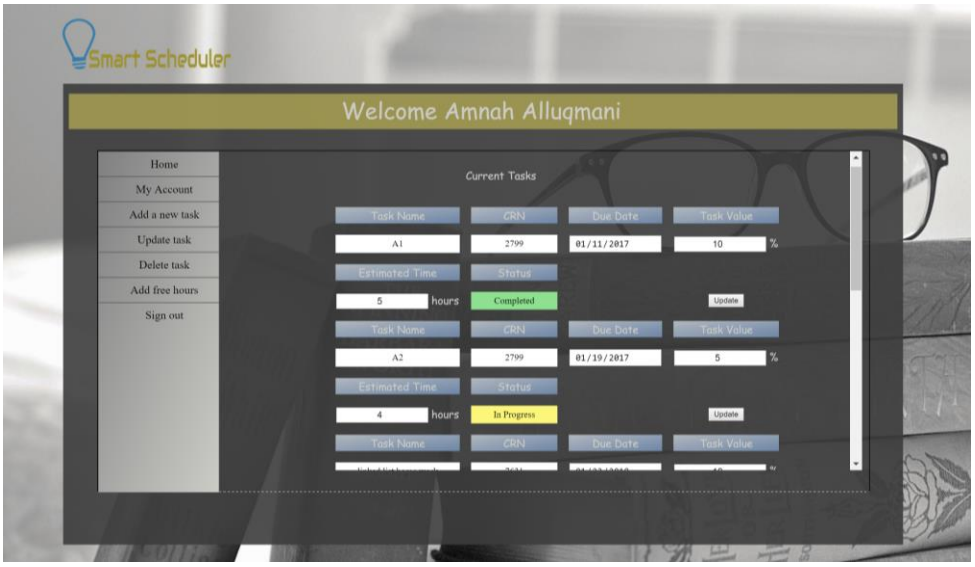

Figure 10: Update Task. This page shows every task and its related information. The due date, task value, and estimated time are able to be updated. Each task's status is colored either yellow, red, or green based on the status value.

- **Delete task**

With the “Delete task” function, the student is able to delete one or more tasks by checking one or more tasks and clicking the delete button.

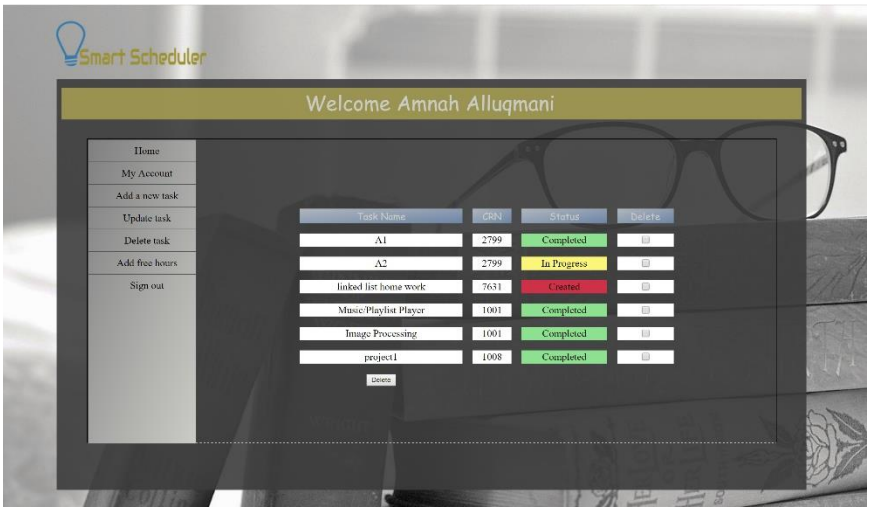

Figure 11: Delete task Page. This page shows all the registered task names, CRNs, and statuses. The user is able to delete any task by checking one or more tasks, and clicking the “Delete” button.

- **Add free hours**

Initially, the system adds ten hours to be used as default free hours. However, the user can update the value by using the "Add free hours" function. One hour is the minimum value and 24 hours is the maximum value.

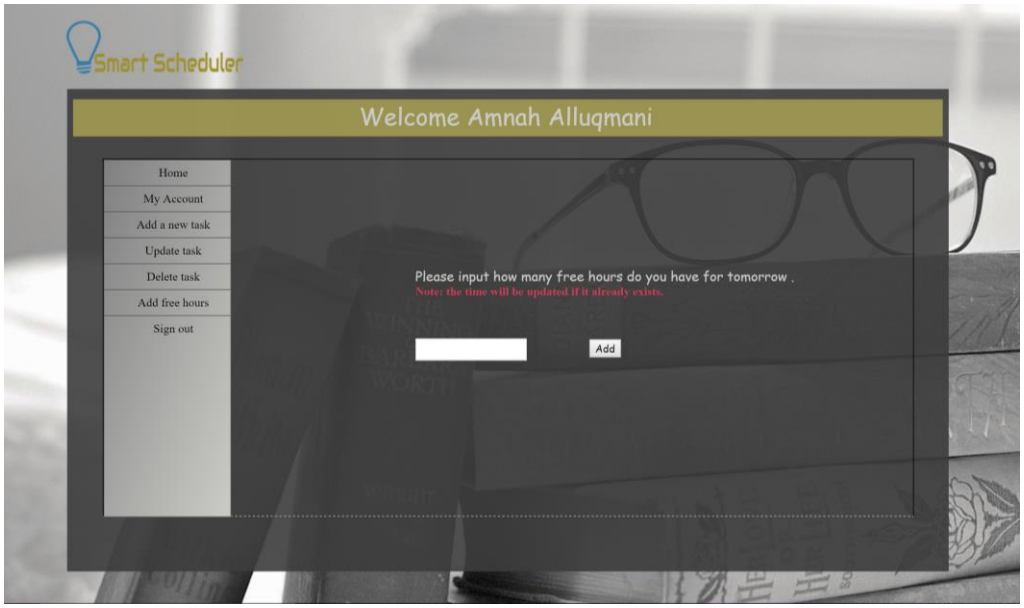

Figure 12: Add free hours Page. The user is able to input his/her free hours for tomorrow. However, the free hours are set to ten hours by default. The interred data will be used in the priority algorithm.

Database design and relationships:

The database has been designed to have four main tables which are: students, courses, tasks, and upload. The Students table holds the general information (its attributes are student ID, first name, last name, email, username, password, and free hours). The Courses table includes course information such as course ID, CRN, course name, and instructor's name. The Tasks table presents the required tasks, and its attributes are task Id, task name, CRN, due date, and task value. Lastly, the upload table includes the uploaded documents and their information (id, task id, file name, type, size, and content.)

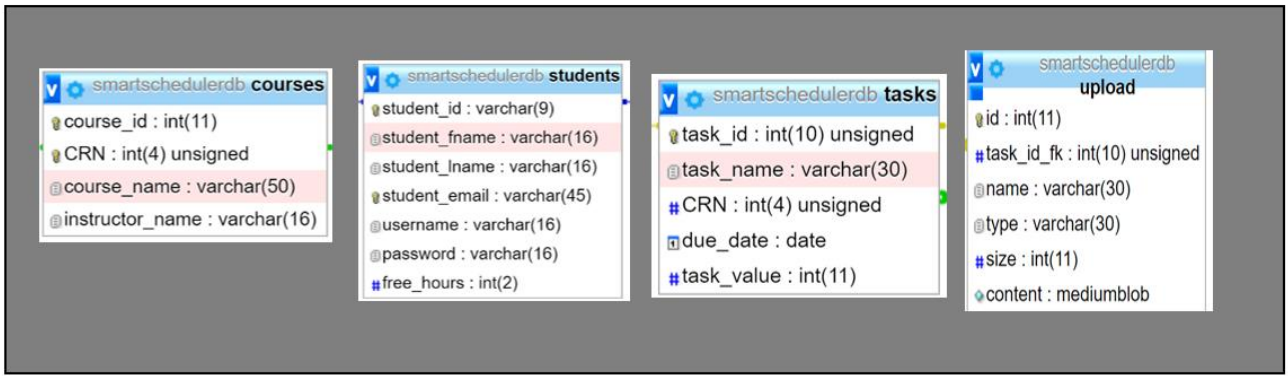

Figure 13: The main four tables that Smart Scheduler uses to store user data

The designed database contains two relationships (see *Figure 14*) which are 'Many too Many', and 'One too Many'. Students table associates with the Courses table in a 'Many too Many' relationship. So, there is a junction table (jnct_students_courses) which presents the relationship between the Students and Courses tables. This junction table holds registration ID, course comments, is _anonymous and two foreign keys (student ID and CRN). Moreover, the relationship between Students table and Tasks tables is also 'Many too Many'. So, there is jnct_students_tasks table which associates between these two tables. The junction table includes enrollment ID, time of completion, status, estimated time, task comments, is_anonymous and two foreign keys which are: task ID and student ID. On the other hand, there are two One too Many relationships between Courses & Tasks tables which are associated with CRN attributes, and task & upload tables which are connected by the task ID.

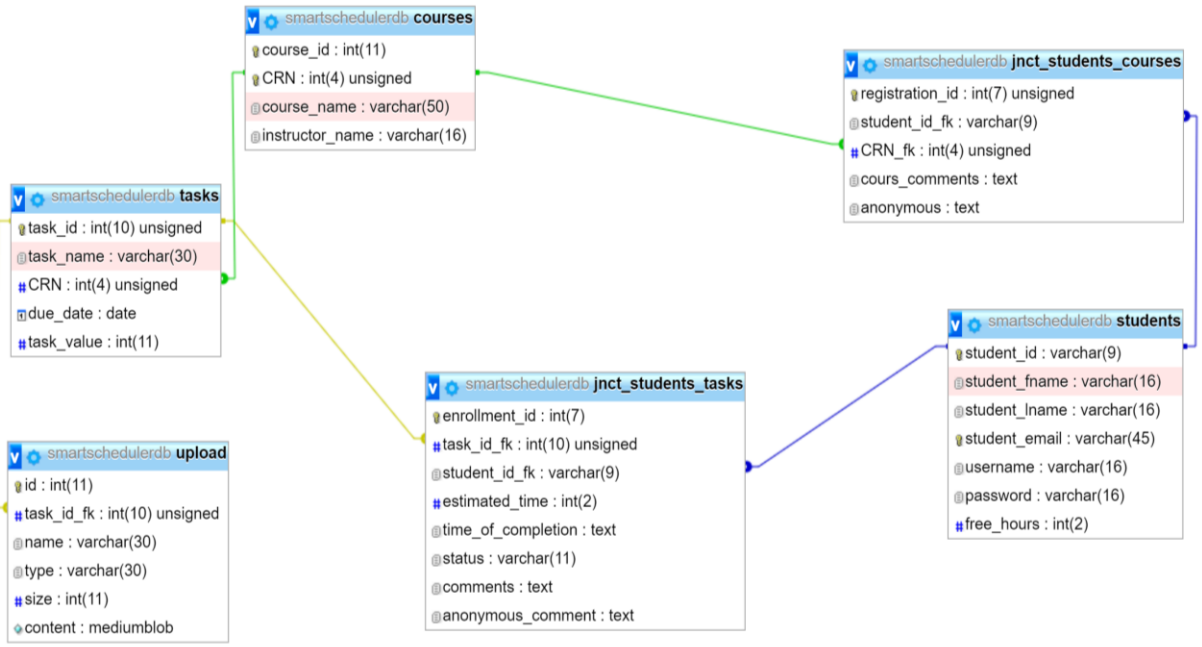

Figure 14: Database relationships showing how each part of the system interacts with the other parts

Prioritization algorithm:

The system has three priorities *(see Figure 15)* which are as follows:

Red Tasks: A task is considered as a red task when its estimated time plus 20% of that time is greater than the rest of hours from today until its due date *(see Figure 16).*

Closer Due Date: Closer due date is the task that has the closest due date all around the current tasks.

Higher task value: Higher task value is the task that has the highest task value all around the current tasks.

Describe the algorithm:

The priority algorithm first checks the red tasks. There are two situations.

There is at least one red task:

If there are more than one red task, the system is going to choose the task that has the higher task value to be the first required task for today(task1). Otherwise, if there is only one red task, the system is going to choose this task to be task1.

There is no red task:

If there is no red task found, the system is going to the lower priority (closer due date).
If the closest due date includes more than one task. The algorithm is going to choose the higher task value to be the first required task for today(task1). Otherwise, if the closest due date includes one task, the system is going to choose this task to be task1.

Note: Every time the system chooses a task, it subtracts the chosen task's estimated time from the student's free hours (this data should be entered by the student. Otherwise, the free hours will be 10 hours which is the default value). The system will go through the previous situations as long as either the free hours equals zero or number of today's work has reached four tasks (*see Figure16*).

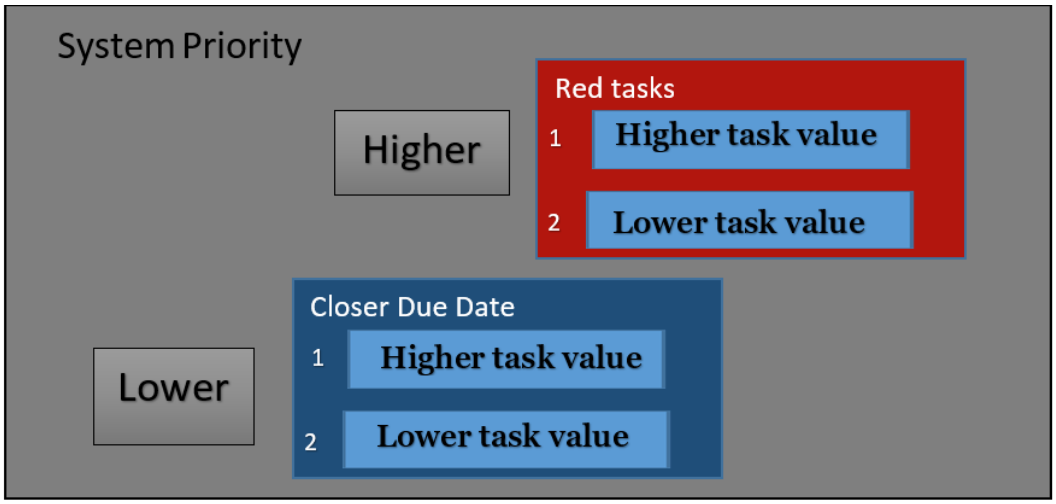

Figure 15: There are two main priorities: Red tasks, which have the higher priority, and Closer Due Date tasks, which have the lower priority. The higher task value in both boxes identifies the higher priority in case of multiple tasks found in either one of the main priorities. Task value within the priorities is determined by the system based on the input from the user.

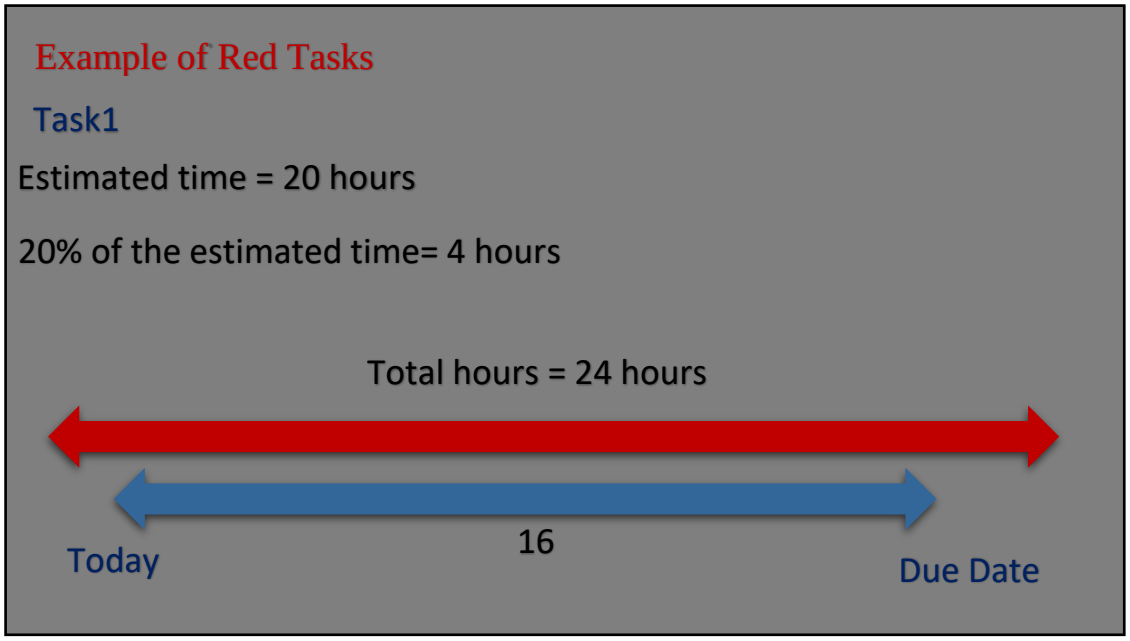

Figure 16: Tasks are considered as red tasks when the total hours are greater than or equal to the remaining hours from now until the due date.

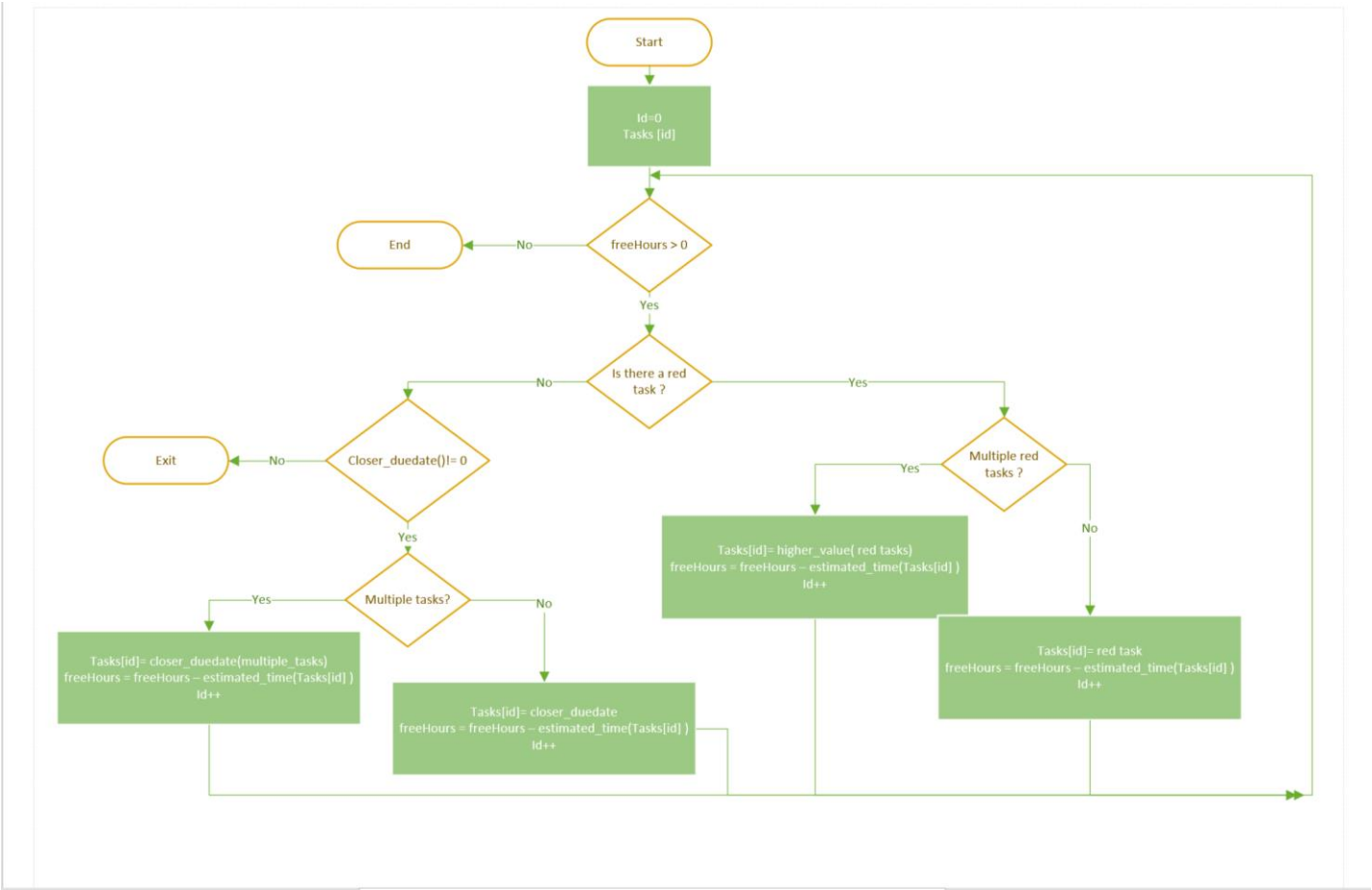

Figure 17: Smart Scheduler *Prioritizes the tasks and every time subtracts the higher priority's estimated time from the free hours until the free hours reaches zero. Then, only the four highest priorities will be displayed as today's work.*

Future work

In this version, the system is able to prioritize the entered tasks, visualize the data driven, calculate the average time and provides the students with helpful documents. However, in the future, the system will be integrated to Blackboard in order to receive the data automatically so students do not need to input the data manually