

Online Court Sign in Board for Sports Complex

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Abstract— This project is to develop an automatic sign in board for the court management and membership management for badminton players using sports complex.

Index Terms— Automatic sign in board, sports court management, computer engineering.

I. INTRODUCTION

In many community athletic centers in the United States, people who register to become members and/or check-in to these centers for various services must do so exclusively through the front desk workers. Additionally, some of these athletic centers must divide or assign basketball courts in order to serve multiple purposes during various operational hours. For example, the Tualatin Hills Athletic center in Beaverton, Oregon, has six indoor basketball courts that must be divided down the center to accommodate for up to eight badminton courts and four pickle-ball courts in one week. During a subsequent week, however, this facility may have to instead accommodate for only four badminton courts and six pickle-ball courts. Each time this is done, the front desk workers need to determine how many badminton players are allowed to check in to fit the number of the badminton courts allocated on that day. Then, a color wristband is issued to each player to allow check in. This process is both tedious and less efficient, especially when an event or tournament is going on within the center. This project's goal is to build an automatic sign-in board for badminton players.

There are many web based online applications and research works in the areas of scheduling management [1-2], sports and game management [3-9], membership registration and management [10-15]. A lot of work have been carried out using online planning and management for energy effective operation [16-17]. Bradley J. Bartos [18] also proposed a discrete event simulation model with Auto-Regressive Integrated Moving Average (ARIMA) for planning and resource allocation in a state hospital. Although these online planning and management applications are available, no one can be used for sport

complex resources planning, membership registration and court management. Therefore there is a need to start our project -online court sign in board. The board has not only put the three tasks into one but also helped to keep things fair and to ensure that both new players and highly experienced players get to enjoy playing.

Here are the guidelines for the automatic sign-in board:

1). Doubles matches take precedence over singles matches. Every badminton court has a maximum of four players in a match. There are two lists for each court: a list for match, and a waitlist. Each list has a maximum of four people.

2). Once there are two people on the list of match for a court, a timer will start counting. There will be a 30 minute time limit on each court for the players in the list for match.

3). To prevent "hogging", a player's name can only appear actively on the board once. When they are on the court or in a waitlist, their name will be active on the board. Once they have finished their match, they are allowed to sign-in their name on the board again on either the list of match or the waitlist, depending on which court they choose.

4). Each match will take place in the order based on their sign-in time. Once a match is finished on a court, the names on the waitlist on the court are moved to the list of match. The waitlist for the court then becomes available for people to sign-in again.

Two programs were involved to implement the above tasks: one for administrator management and the other for court management. We first used Matlab to develop a prototype of the proposed algorithm. When prototype was successful, we immigrated it to C# programming language since C# serves the better user interfaces.

II. ADMINISTRATOR MANAGEMENT

The administrator management program handles three tasks: 1) Membership registration. Through the program, a new member is enrolled by paying the membership fee and completing the personal profile such as name, date of birth, contact information, password and etc. The program maintains a member list that includes all active members for the sport complex. 2) Membership renewal. When a user login to the system, the program will display his membership status. If his membership is expired, it

shows “inactive status”. The system will lead him to pay the fee and complete the renewal process. After his membership is renewed, his name and his password are put in a sign-in list which includes all active members who signed in on that particular day. Fig. 1 shows the details of the administrator management program.

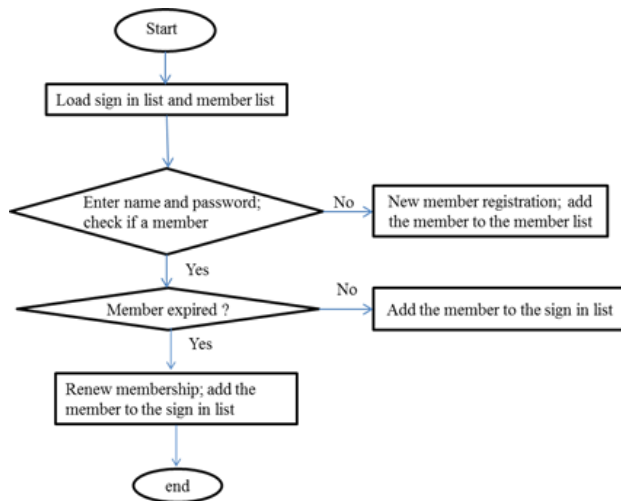


Figure 1. Administrator management program

A. Sgin-in Program

1). When a member login in to the sign-in program, the program first checks if his name is in the members' list that was loaded into the system at beginning of the program and his password is correct.

2). If either one is not, re-direct him to sign in. If both of them are yes, check if he is already in a match list or wait list of any court. If yes, reject him to sign in. If no, allow him to choose a court that he wants to sign in. For the court, check if the match list is full (players numbers = 4).

3). If the match list is not full, sign him in the match list. Set his status “active”. Number of players in the match list increases by one for the court. If the match list is full, check if the wait list of the court is full (waiting numbers =4). If the waiting list is not full, sign him in the wait list. Set his status “active”. The number of players in the waiting list increases by one. If the waiting list is full, show the message “ The court you want to check in is full” and direct him to choose another court.

We started this project using Matlab to build a prototype. To simplify the process, we built a membership list with members' name ID and their passwords in an easy way that was shown in Figure 2. We used A, B, C, D, ... Z as their name identifications, IDs and Apw, Bpw, Cpw, ... Zpw as their respective passwords. This indeed helped us to write codes easily and verify the algorithm's workability. The last column in the Figure 2 were initialized as T for true at beginning, which means their names were neither in any waiting list nor playing list. Whenever a member's name ID appears in any of the lists, their status is changed to False (F). This means the member cannot sign in any other court when he is playing or on waiting list.

A	B	C
ID	passwd	status1
Cell	Cell	Cell
ID	passwd	status
A	Apw	T
B	Bpw	T
C	Cpw	T
D	Dpw	T
E	Epw	T
F	Fpw	T
G	Gpw	T
H	Hpw	T
I	Ipw	T
J	Jpw	T
K	Kpw	T
L	Lpw	T
M	Mpw	T
N	Npw	T
O	Opw	T
P	Ppw	T
Q	Qpw	T
R	Rpw	T
S	Spw	T
T	Tpw	T
U	Upw	T
V	Vpw	T
W	Wpw	T
X	Xpw	T
Y	Ypw	T
Z	Zpw	T

Figure 2. Membership list with their passwords.

```

>> auto_sign_in_board
Please enter the total number of the courts: 3
Initial List of Match
pppp
pppp
pppp
Initial List of Wait
wwwww
wwwww
wwwww
Enter your name
G
Enter your password
Gpw
Enter the court number you want to play
3
You have signed in the list of match at 3th court successfully
List of Match at courts
pppp
pppp
Gppp
List of Wait at courts
wwwww
wwwww
wwwww
  
```

Figure 3. A scenario when the courts were just opened when running Matlab code.

Fig. 3 shows a scenario when the courts were just opened with the initial list of match (empty seats p) and initial list of wait (empty seats w) when running Matlab

code. In the list of match and list of wait, total number of rows displayed on the screen represents the total number of badminton courts being allocated for badminton courts at the sport complex currently. Since the user enters the court number of 3, it results in three rows in the both lists. Each row has four columns meaning that maximum 4 players in a court either on playing or on waiting list. We used p and w for the empty seat for the list of match and the list of wait respectively. Once the user's ID and passwords are matched correctly, the algorithm prompted the user for a court number that he or she wants to play. Have this function set up because the member normally likes to choose their own teammates who have a similar level of badminton's skill to play in the same court. Once the court number is put in, the algorithm first checks if there is a seat available in the list of match in the court. If the list is full, the algorithm will put his or her in the list of wait in the court if the wait list is not full. When both wait list and play list is full, the algorithm will prompt the user for another court. Each court maintains two lists which we have called the list of match and list of wait. In Fig. 3, the member chose court 3, his name G is placed on the first column in the row 3 in the list of match in court 3 since there is an empty seat in the list.

Fig. 4 shows another scenario. Six courts were allocated for badminton courts. The court 2 is full of players named B, C, F and G. When a new member named A wanted to sign in the court, it displayed a message of "Court 2 is full and you are sign in the list of wait in the court 2 now" and the member was assigned in the list of wait at the court 2.

```

Enter your name
A
Enter your password
Apw
Enter the court number you want to play
2
Court 2 is full and you are sign in the list of wait in court 2 now
List of Match at courts
pppp
BCFG
pppp
pppp
pppp
pppp
List of Wait at courts
wwwww
Awwww
wwwww
wwwww
wwwww
wwwww

```

Figure 4. A scenario when the list of match is full when we run Matlab code.

After we completed the Matlab algorithm as a prototype, we immigrated it to C# to have a better user friendly interface.

Fig. 5 shows the interface with information of court 6 that is full when we run the algorithm in C #.

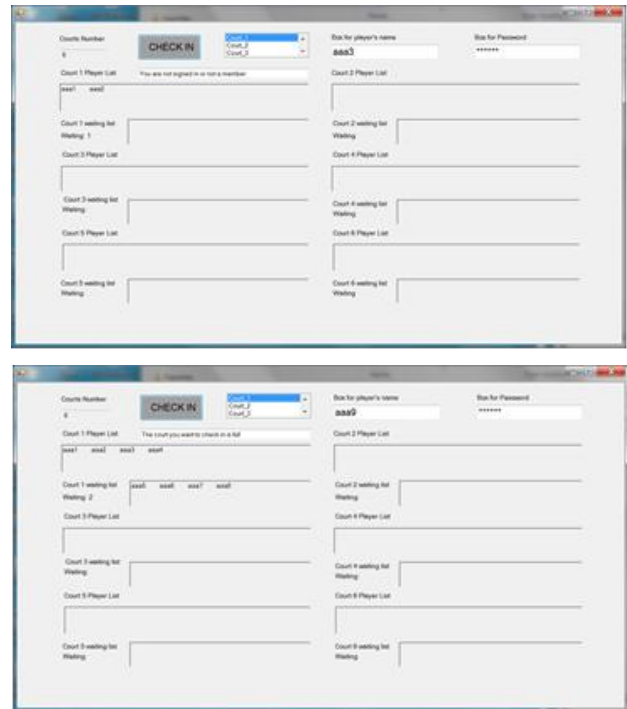


Figure 5. The interface with information of court 6 that is full when we run C #.

For the whole picture of sign in program, please refer to Fig. 6 which shows the details of the program.

B. Court Time Management

This program has the following functions:

- 1). Each court has a timer. Start the timer if there are more than two players in the court.
- 2). Check the timer if the time is greater than 30 minutes. Once the timer is 30 minutes, remove players' names in the match list from the court. That is to vacate the court. Set the players to inactive status so that they are allowed to sign in to other courts.
- 3). Move players in the waiting list on the court to the match list. Remove the players from the waiting list. Set the number of players in the wait list zero.
- 4). Display all the players' names in the match list and waiting list for each court. Fig. 7 shows the details of court time management program.

III. CONCLUSION

We use Matlab programming language to develop the prototype of project to validate the proposed methods workable. We then developed the coding using C sharp programming language to have a better interface. Though the program was designed for badminton court management, it can be easily extended to other sport court management such as table tennis and pickleball. The program can also be used in any sport complex that have a need to divide or assign basketball courts in order to serve multiple purposes. With this program, the courts can be managed effectively and efficiently, which also enable the members to have a fair usage of facilities in the sport complex.

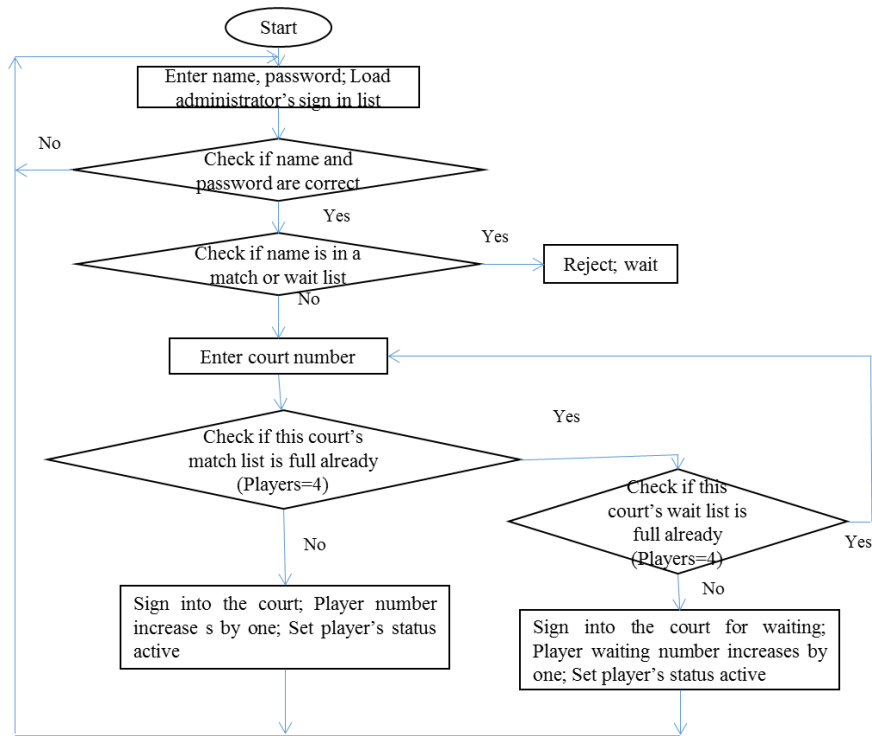


Figure 6. Details of sign in program.

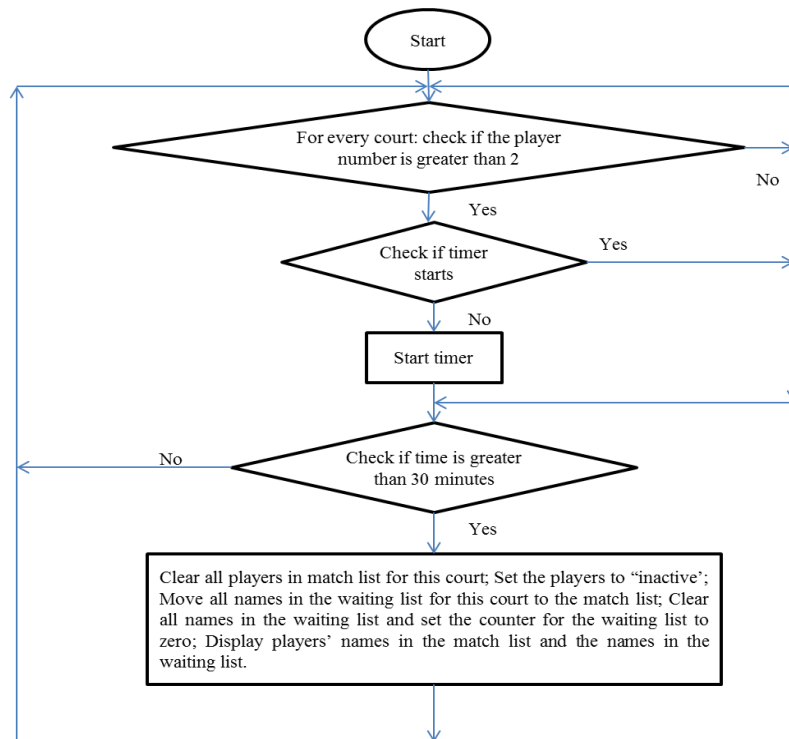


Figure 7. Court time management.

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