Work-hour Registration Project

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1. Visions for the Work-hour Registration System

1.1 Business goals

a. A system can record the work hours of all employees based on the recorded arrival times and departure times and employees can check their working time.
b. The company wants to introduce flexi time, where employees to a large extent can decide when they want to arrive and leave. And the system can trace the real work hours and required ones.
c. Employees can do the necessary registration themselves. Company does not want to give training to employees on it. The system must be used by all employees, including cafeteria staff and guards that have very little IT experience.
d. Either the external device or the internal system should be easily installed.
e. The system should be easily maintained and the number of people to do the maintaining job should not be many to reduce the maintaining costs.

1.2 Large-scale solution

a. The system could supply a card for each employee and each employee should use the card as a key to enter or depart company so that the system can record the arrival times and departure tines via a card reader to get the working times of employees.
b. The system should use Browse-Server software architecture so that employees can just use the system via browser without installing and company only need to hire small number of people to maintain the service in order to make sure the system to work well.
c. The system only has one card reader external device for each main passing door to install.
d. The system software will provide a small demo to show how to use it when an employee firstly uses it.

1.3 Requirements

Functional requirements:

Requirement 1: Data to be stored: The system must store the data described in section.

Requirement 2: System should be able to record employees' entering time and leaving time from company working place to generate working hours of each employee.

Requirement 3: System should provide interface to let employees check their registered working hours.

Requirement 4: System should provide interface to let employees manually register working hours for exception cases.

Technical interfaces:

Requirement 5: Platform (Client-end): In order to support any operating systems of computers in company (cross platform), the whole system takes Browse-Server software architecture to connect the whole clients in company and server.

Requirement 6: Platform (Server-end): In order to have biggest compatibility, we should use PHP and MySQL to set up server end database system.

Quality requirements:

Requirement 7: After 10 minutes of instruction, 90% of novice users must be able to carry out tasks T1 to T5, including variants. (Task lists are in section 4)

Requirement 8: Without any instruction, 50% of novice users must be able to carry out tasks T1 to T5, without variants. (Task lists are in section 4)

Installability:

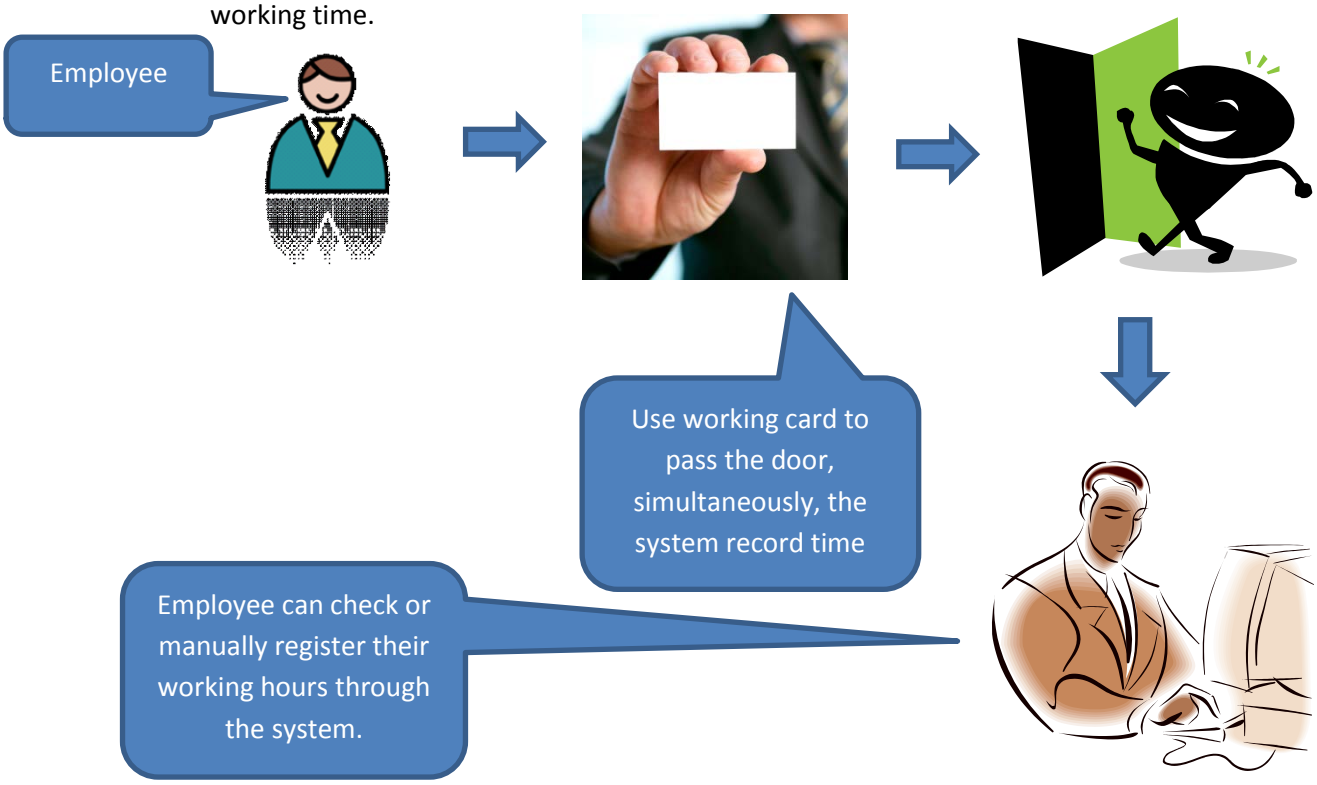
Requirement 9: Support people must have the ability to set up the web server system of PHP and MySQL. And they also need the ability to set up the card reader on the main dorr of the company.

2. Metaphor and mental model

The main purpose of this whole system is letting company leaders or boss to trace the working time of staffs. The way to trace that is making use of the working card each staff has. Employees use the working card as a key to enter or leave the company working place and simultaneously, the working hour registration system records the time of entering and leaving of each employee. Then the system uses these records to generate the working time of each employee.

And the company wants to introduce flexi time, where employees to a large extent can decide when they want to arrive and leave as long as weekly total is the required number of hours. The difference between the hours worked and the required hour is called the flex-status. All employees are very interested in this status, so the system should provide interface to let employees to check the flex-status.

Finally, there may have some exceptions that the system lose some working hours employees actually worked, so the system should provide interface to let employees manually register the working time.



3. Data Model

Let us use Entity (Attribute 1, Attribute 2, … , Attribute n) to show entities or relationships with attributes.
Then we have such **main** entities or relationships listed below:
Pass (Time, EID, In/Out)
Employee (EID, EName, Sex, Birthday)
Work (EID, DID)
Department (DID, DName, Place)
Card (CID, EID)
Flex-status (Date, EID, AHour, RHour)

OK, now I make some explanation to entities, relatonships and attributes.
First, “Pass” entity is used to record working hours of each day for each employee.
“Time” attribute is used to record time of passing.
“EID” attribute means employee’s identification.
“In/Out” attribute is used to record whether this employee passed in or out working place door.

Second, “Employee” entity is used to record information of one employee.
“EID” attribute means employee’s identification and it is primary key.
“EName” attribute means employee’s name.
“Sex” attribute means employee’s sex.
“Birthday” attribute means employee’s birthday.

Third, “Work” relationship is used to record relationship of employees and their working departments.
“EID” attribute means employee’s identification.
“DID” attribute means the identification of department.

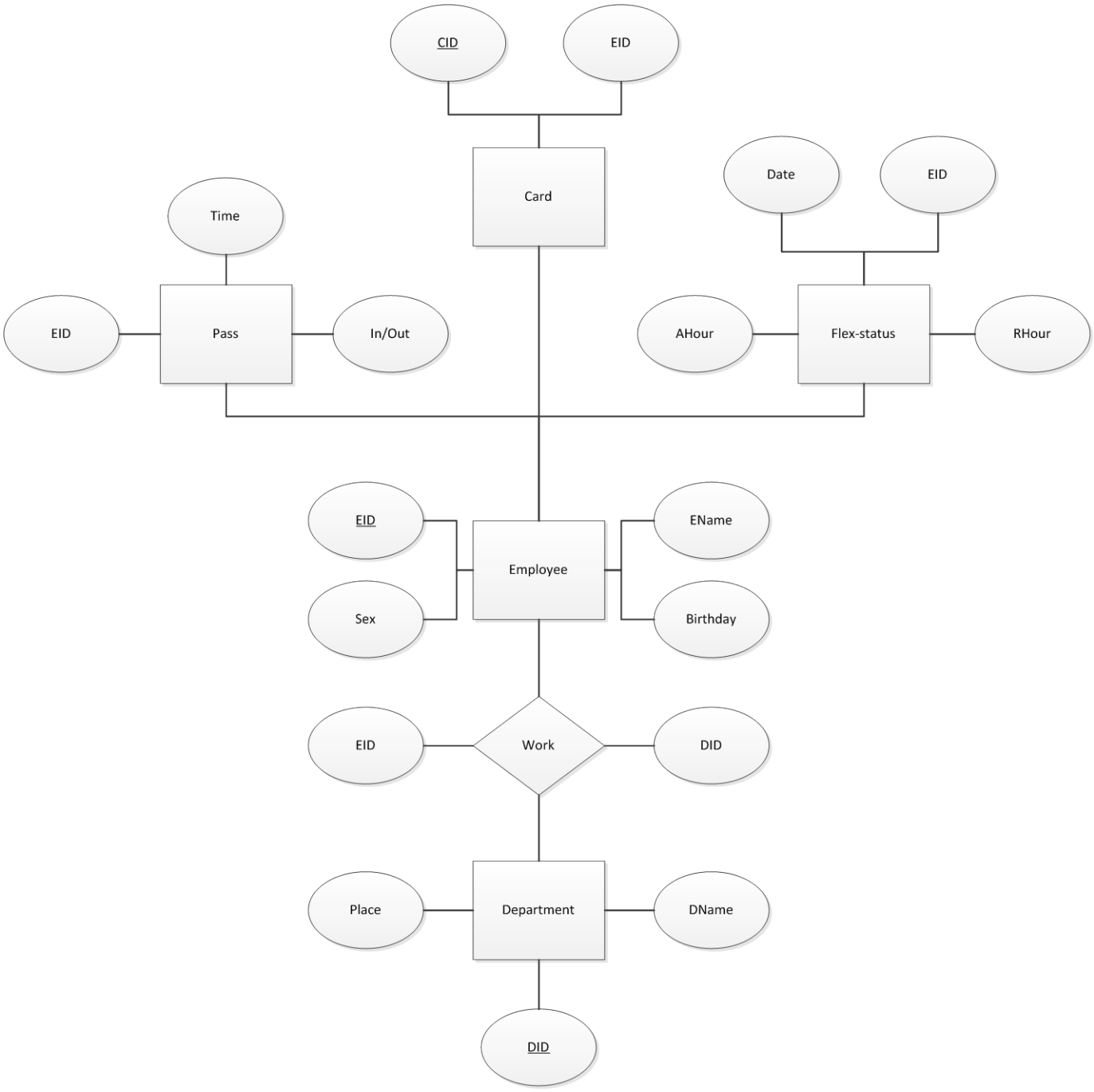
Forth, “Department” entity is used to record information of one working department.
“DID” attribute means the identification of department and it is primary key.
“DName” attribute means the name of department.
“Place” attribute means the place or location of department.

Fifth, “Card” entity is used for recording working card.
“CID” means identification of card and it is the primary key.
“EID” means identification of employee.

Sixth, “Flex-status” entity is used to record flex hours of **each day** for each employee. Flex hour means the difference between required working hours and actual working hours. But in the data we just use record the actual working hours and required working hours.

“Date” attribute is used to record date.
“EID” attribute means employee’s identification.
“AHour” attribute is used to record actual hours this employee worked.
“RHour” attribute is used to record required hours this employee should work.

Below is the E-R diagram of these main entities or relationships.

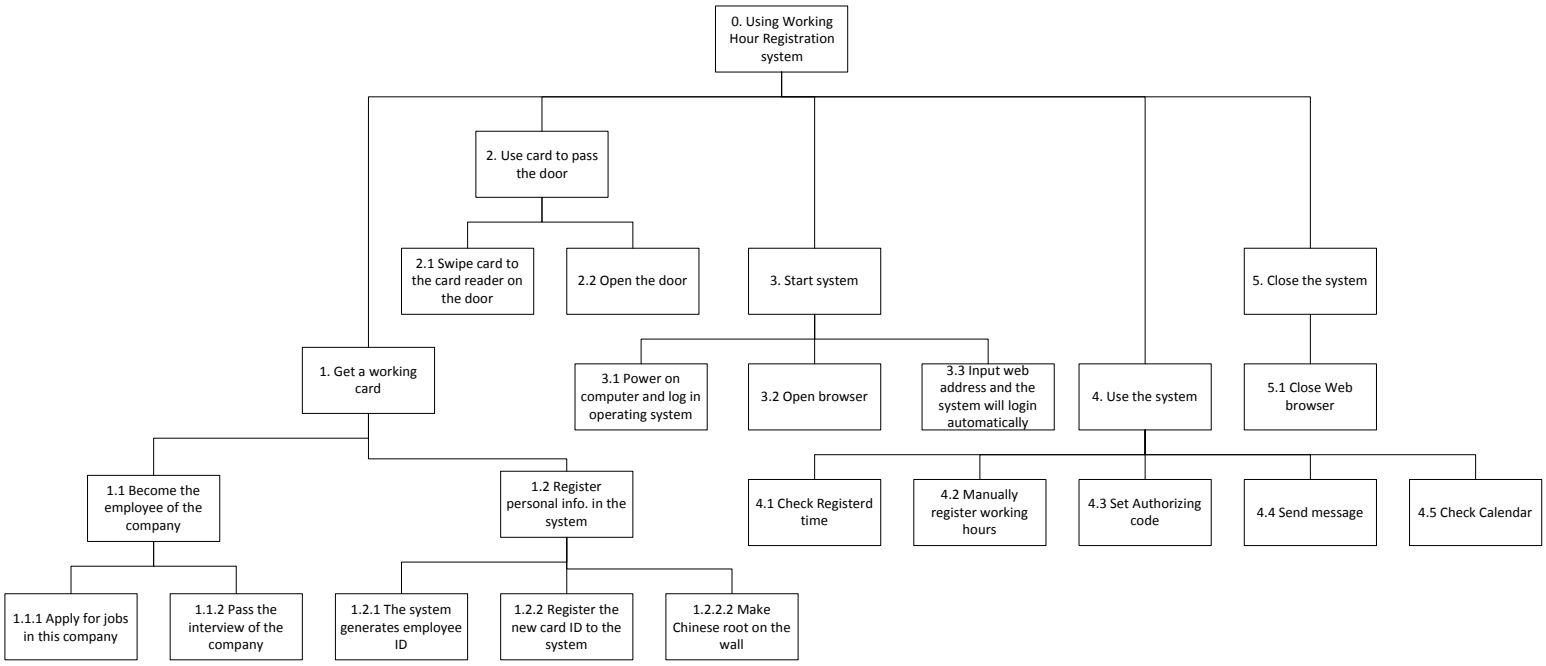


OK, like I emphasized repeatedly, these are main entities or relationships, since there may be other entities or relationships exist.

4. Task lists

T1. Let an employee carry a working card to pass a door installed with card reader.
T2. After passing the door, let the employee login the working hour registration system.
T3. After login, let the employee check the time he/she just passed.
T4. Then let the employee check his/her flex-status.
T5. Let the employee manually register a working time.
T6. Let the employee contact his/her boss using this system.
T7. Let the employee pass out the door again with swiping his/her working card twice to the card reader.
T8. Let a user try to open the door without card.
T9. Let a person install the card reader on a door.
T10. Let a support person set up the system server.

5. Hierarchical Task Analysis



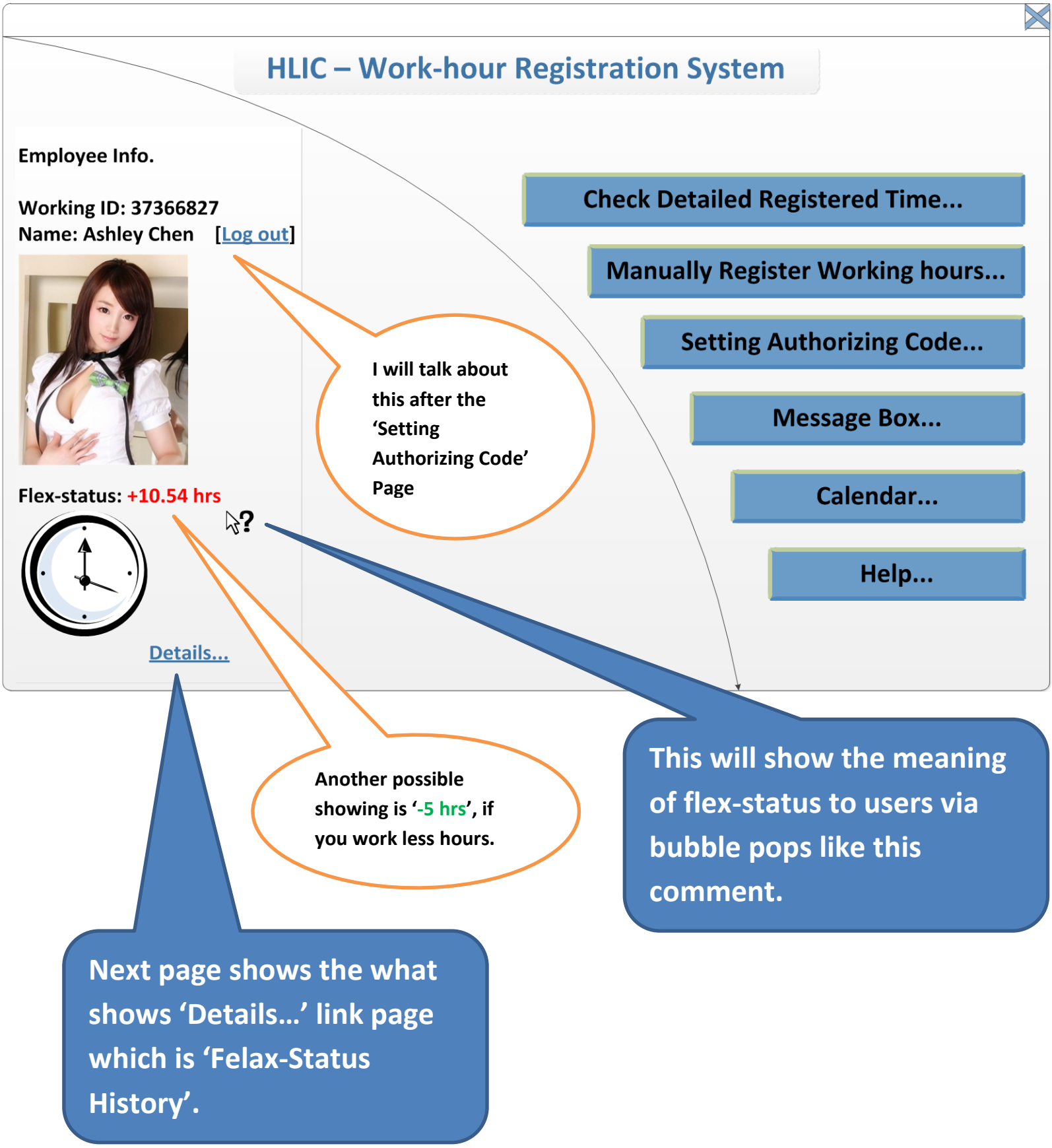
(If it is small, please use zoom tool 

to zoom up)

6. Prototype

6.1 Front-end system

Front-end system is just the system showed to employees in their computers.



Felax-Status History

From Year Month Day To Year Month Day 

Date	Required working hours (hrs)		Required working hours (day)	
1/1/2012	0	New Year's Day	0	
1/2/2012	8		8	
1/3/2012	8		8	
1/4/2012	8		8	
1/5/2012	8		8	
1/6/2012	8		8	
1/7/2012	4	Boss's birthday	4	
1/8/2012	8		8	
1/9/2012	8		8	
1/10/2012	8		8	
1/11/2012	8		8	
1/12/2012	8		0	Sick Leave
1/13/2012	8		8	
1/14/2012	8		8	

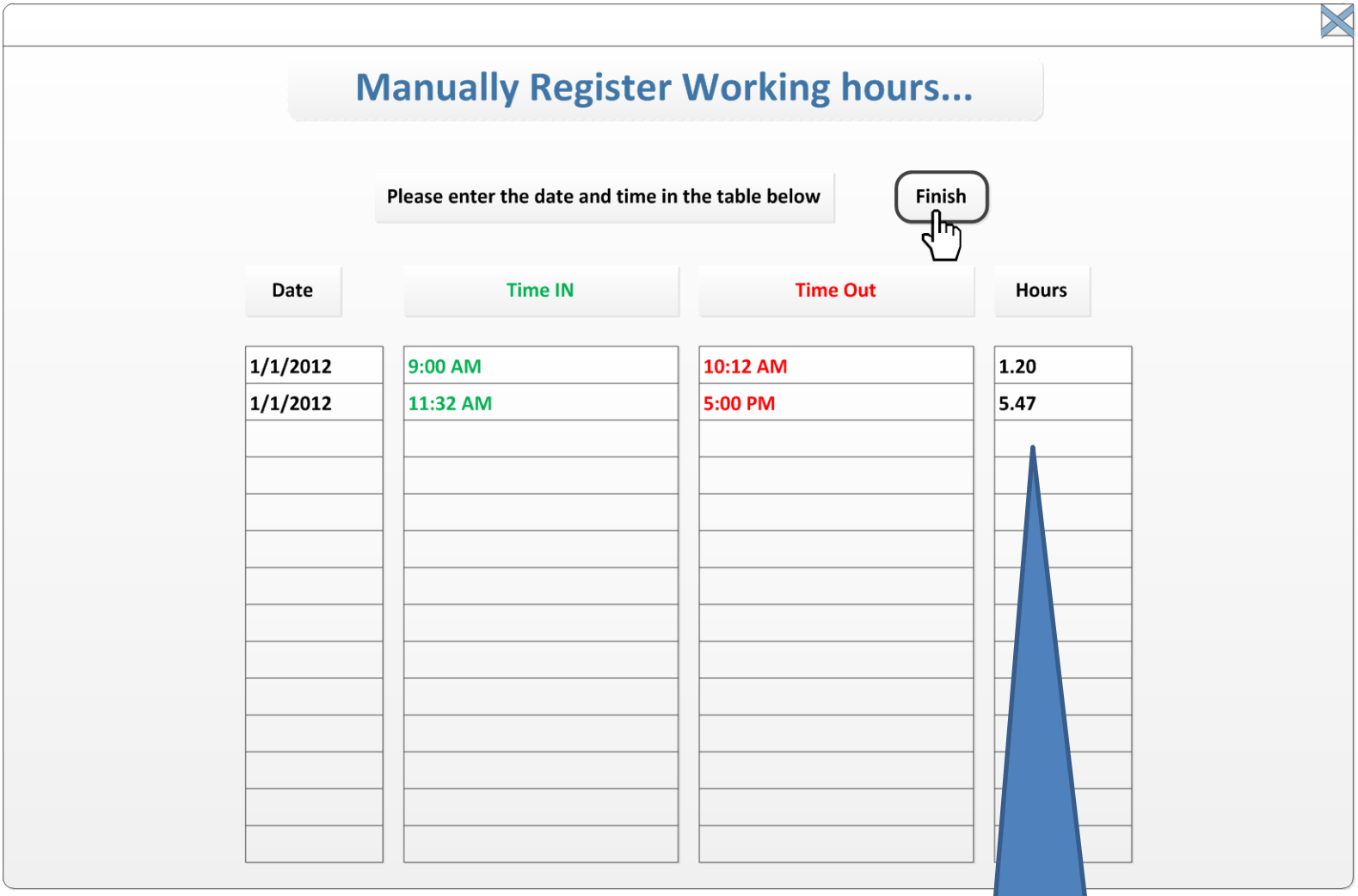
Next page shows the 'Check Detailed Registered Time...' Page:

Check Detailed Registered Time...

From Year Month Day To Year Month Day 

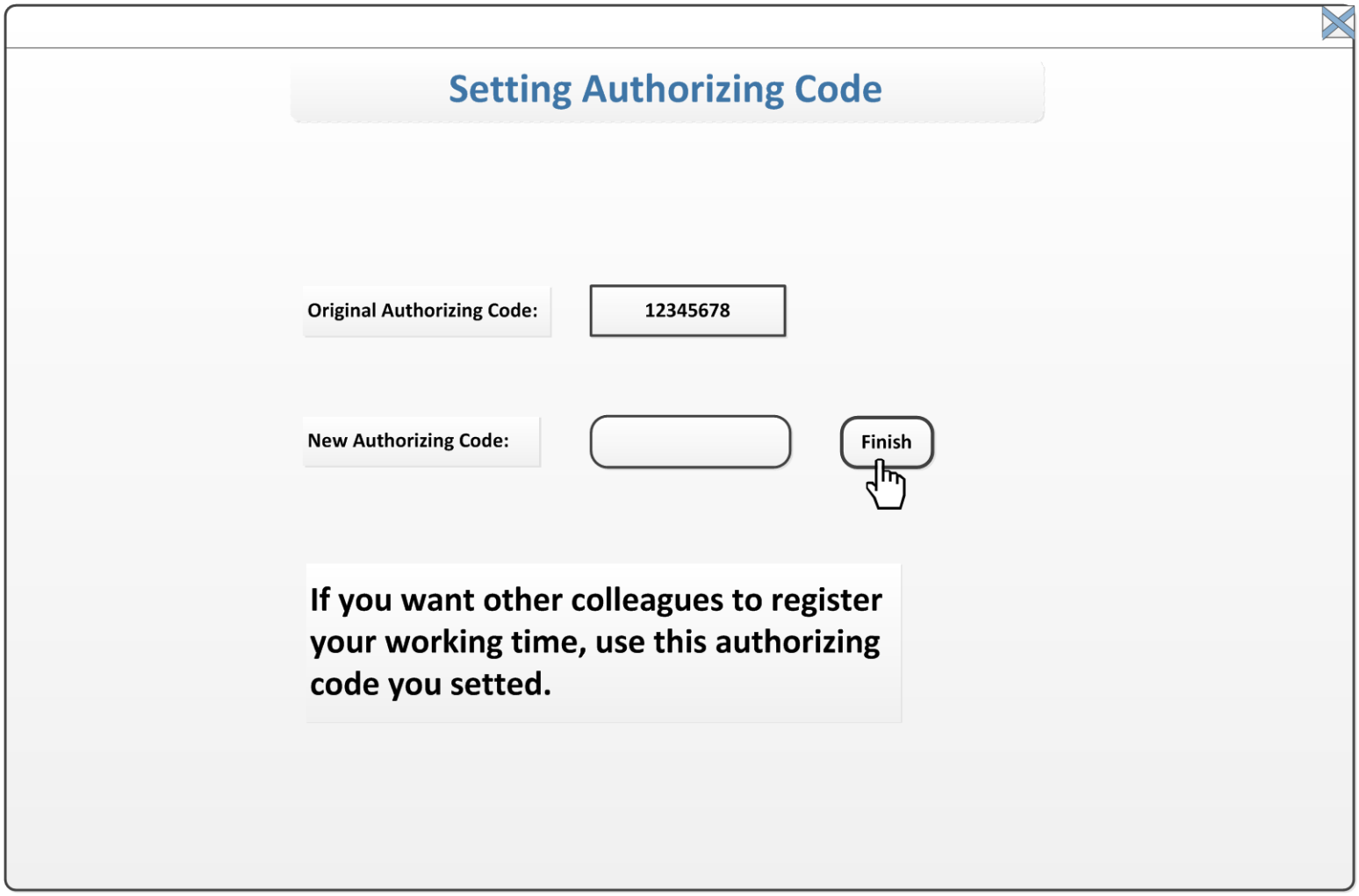
Date	Time IN	Time Out	Hours
1/1/2012	9:00 AM	10:12 AM	1.20
1/1/2012	11:32 AM	5:00 PM	5.47
Day Line			6.67 (Day hrs)
1/2/2012	9:00 AM	10:22 AM	1.37
1/2/2012	11:23 AM	1:11 PM	1.80
1/2/2012	2:00 PM	3:10 PM	1.17
1/2/2012	3:32 PM	4:00 PM	0.47
1/2/2012	5:11 PM	5:31 PM	0.33
1/2/2012	6:12 PM	7:02 PM	0.83
Day Line			5.97 (Day hrs)
1/3/2012	9:00 AM	5:00 PM	8
Day Line			8 (Day hrs)
1/5/2012	9:00 AM	5:00 PM	8
Day Line			8 (Day hrs)

Next page shows the ‘Manually Register Working hours...’ Page:



Next Page shows the 'Setting Authorizing code…' page:

The Hours will be calculated automatically if entered the needed time.



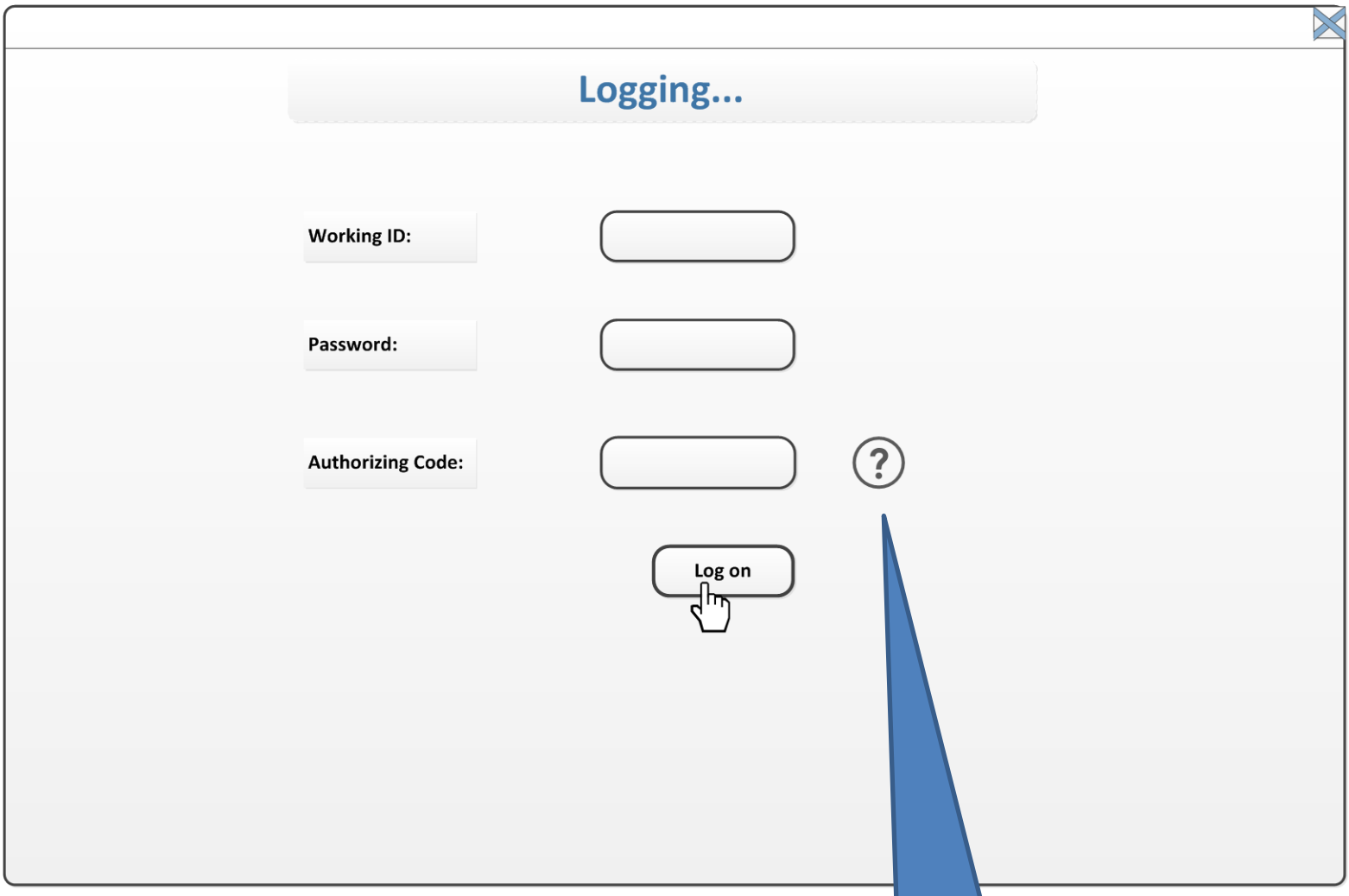
Remember the 'Log out' at the first page? I designed the system using web browser to view it. And according the assignment requirement, when you use your own computer in the company, the system will be automatically logged in when you open it.

But if you want to let other colleagues to register your working hours, the colleague only need to use their own computer and system.

First, log out the system, then use the employee's ID and authorizing code to log in and you will see the page of the employee's.

That means, if you logged out, you can use ID + Password to log on and you also can use ID + Authorizing code to log on.

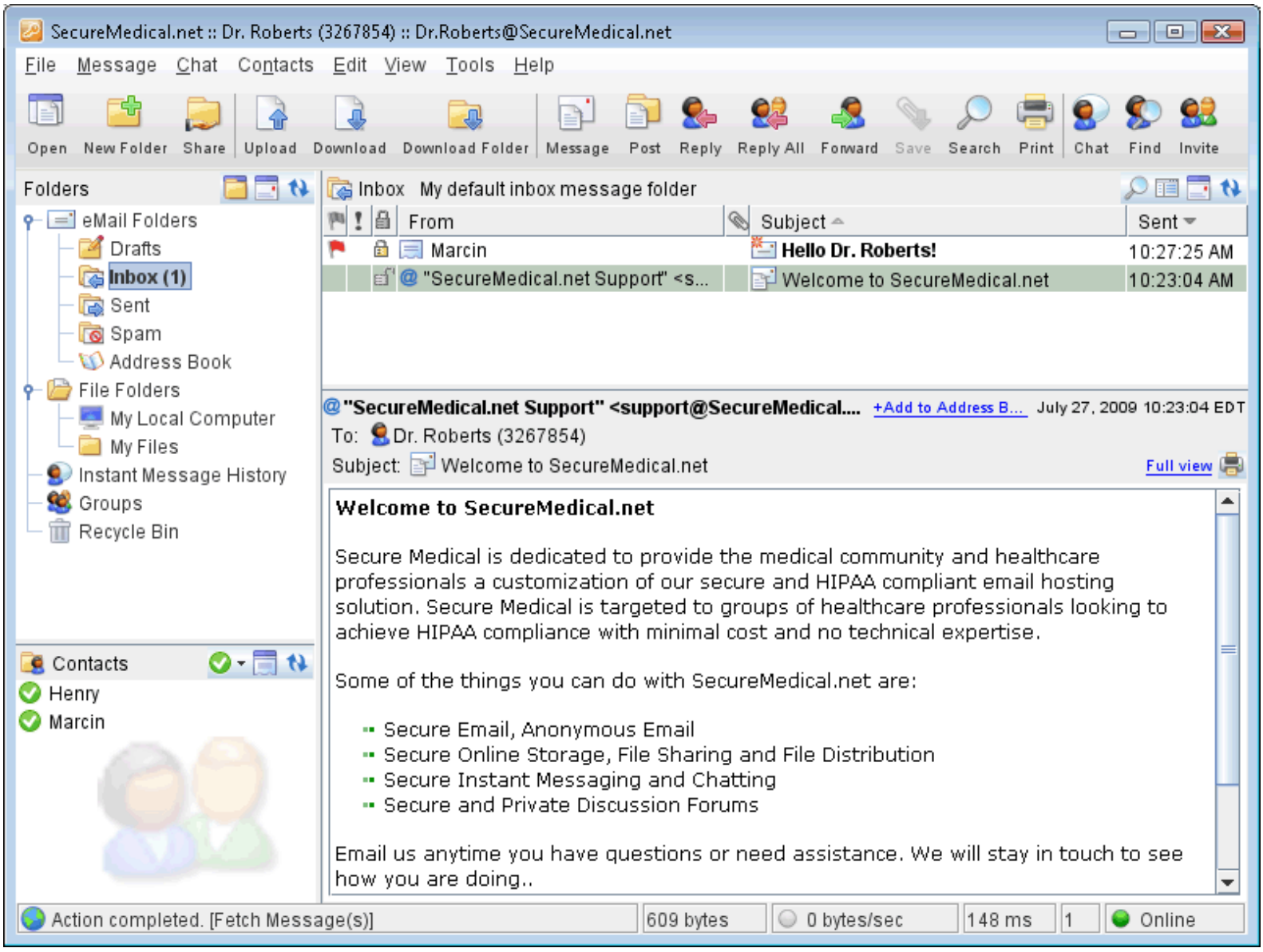
Next page shows the logging page:



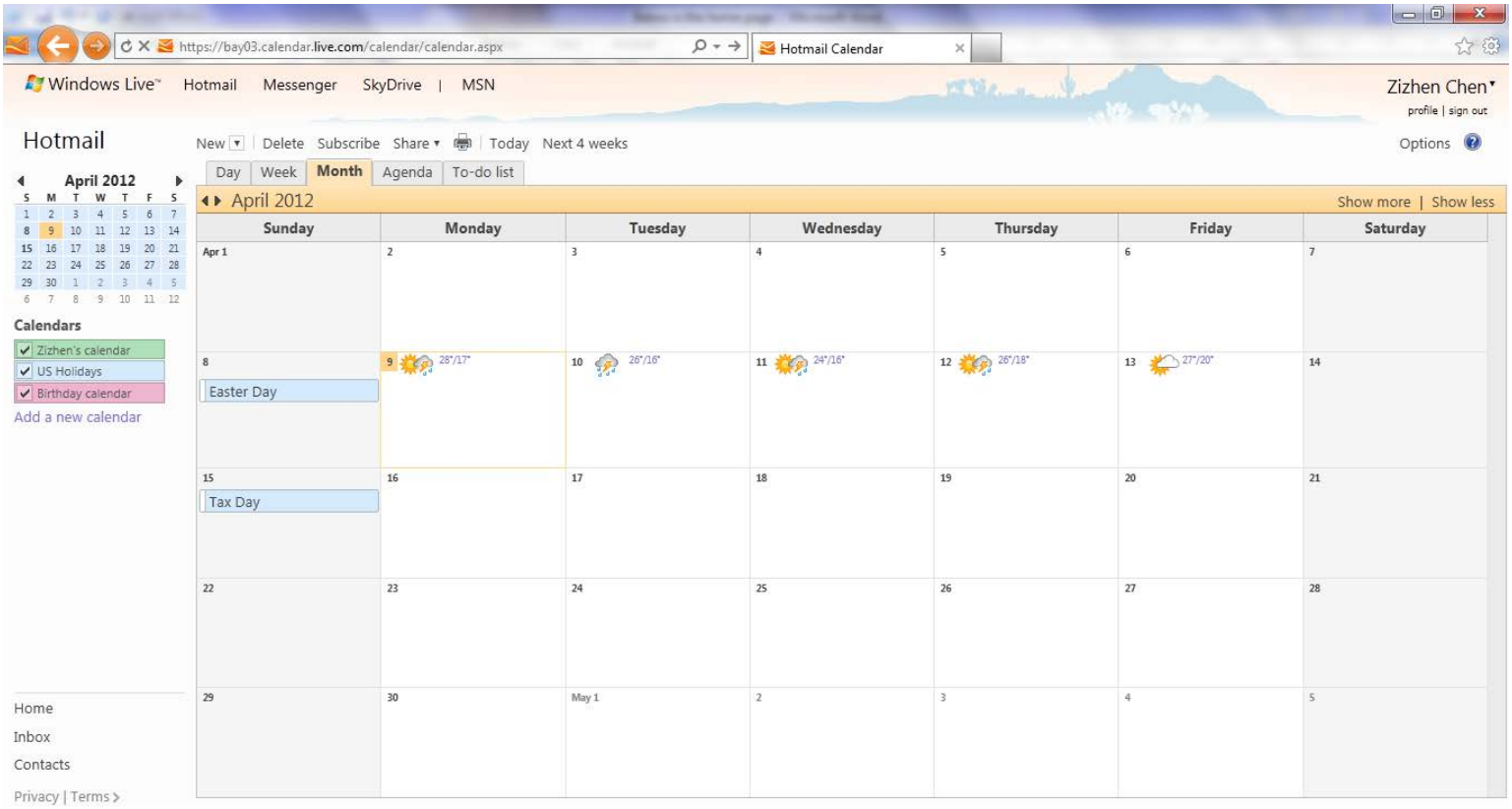
It is really hard to draw these pictures, so now I quote some pictures to show my design… sorry!

Next page shows 'Message Box', actually Message Box is just Email box, or we can design like this: when you click the button, It opens a new tab in the browser which open your email page. This can be used to contact with boss or manager.

This show the function of authorizing code when mouse over it.



Next page shows the calendar and it will show up with important holiday and working events, we can also add working hours to each day on that.



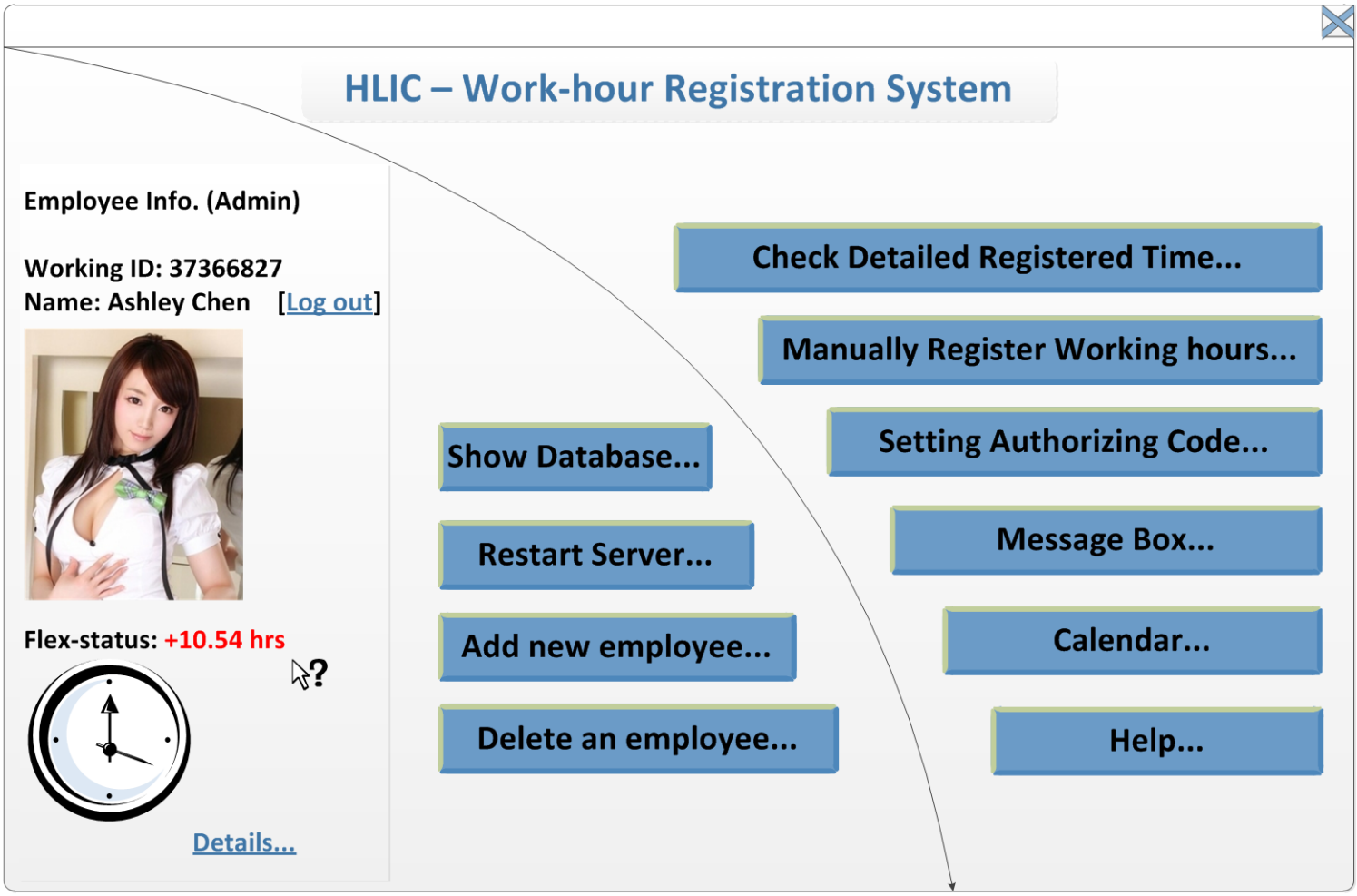
Finally, when you click the 'Help…' button, it will open a pdf file which contains the whole help document of this system.

6.2 Administrative system

Administrative system is just the system used by administrator to manage and maintain the whole system.

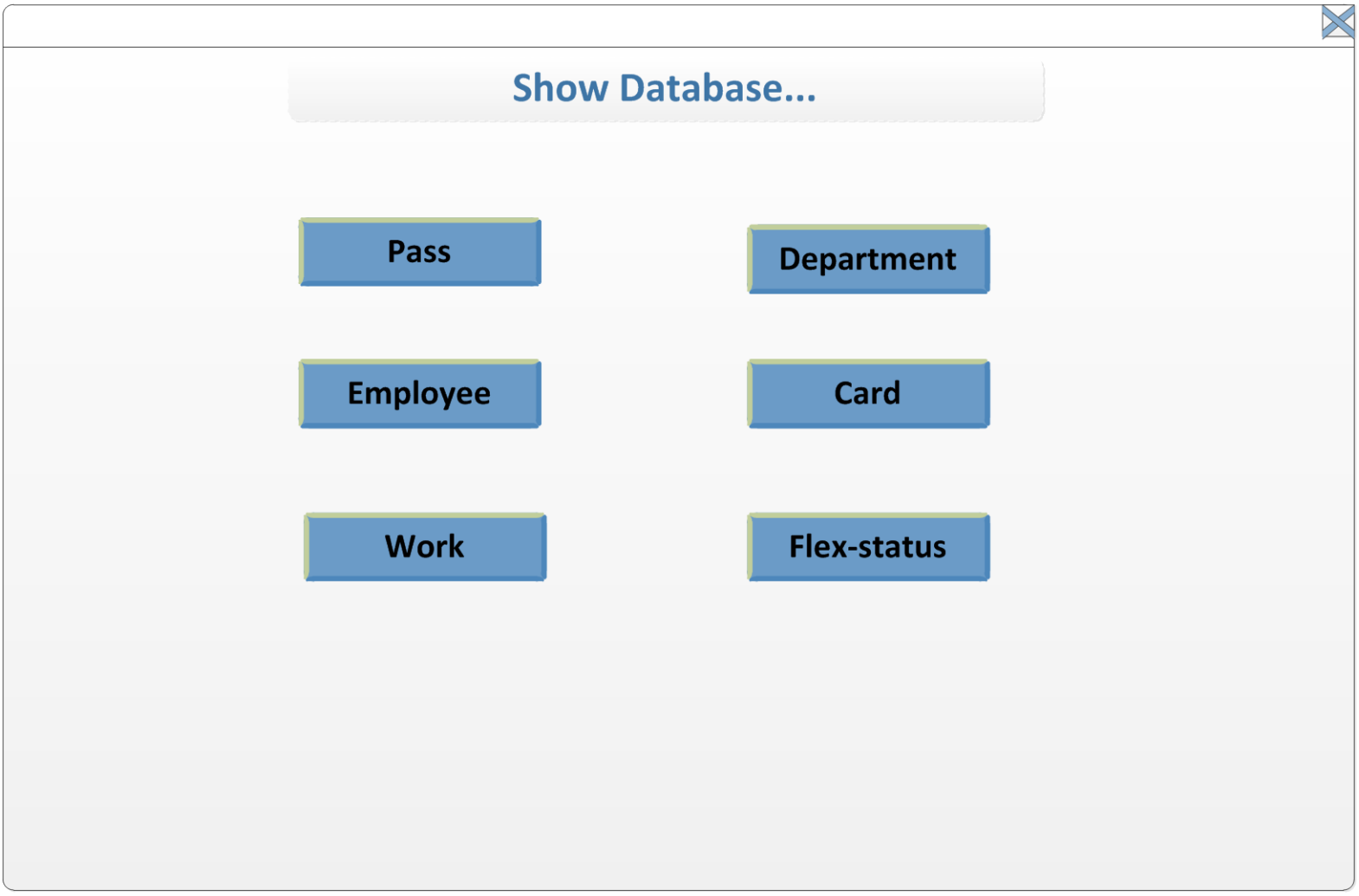
Since the system will automatically login according to the username and password of its host computer, if an administrator opens this system, it will show a similar user interface with some additional function.

The main page shows like below:

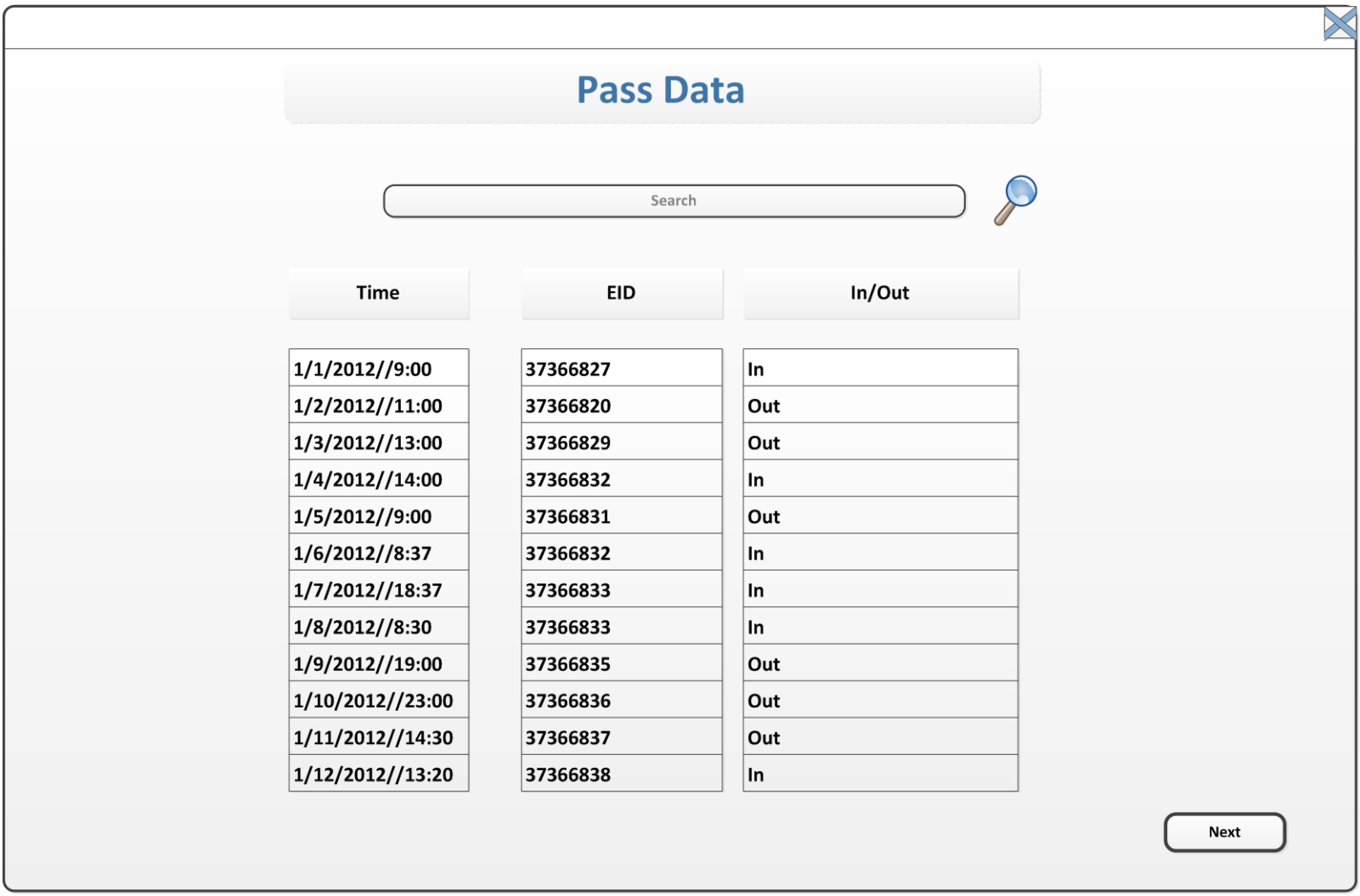


As you can see, for administrator himself/herself, he/she firstly is still an employee of the company, so the main page has the same function as the front-end system. **There is only one difference in the administrative system. The "Setting Authorizing Code…" function only is used for setting authorizing code to other administrators which means it can't set authorizing code to normal employees**. Added function includes "Show Database…", "Restart Server…", "Add new employee…" and "Delete an employee".

Then next page, let's look at the "Show Database…" page:

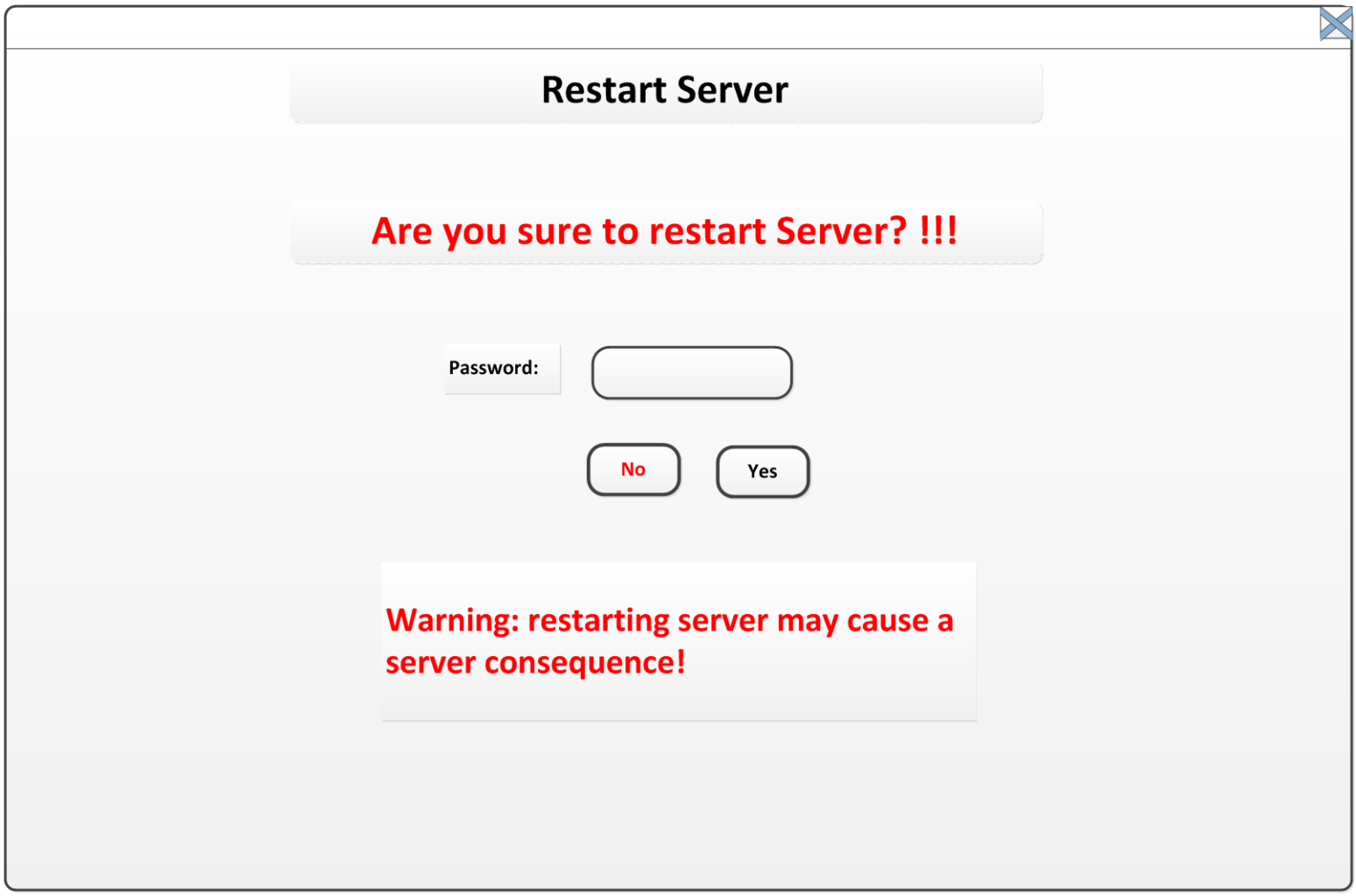


Now, it shows six buttons which represent six entities (tables). And click one of them will show the according data. Another thing should point out which is in the administrative system, it can only show database, it can't change them. If administrator wants to change database, he/she has to go to the server to change that in order to make data safe.
For example, if the administrator click "Pass", it will show pass table like below:



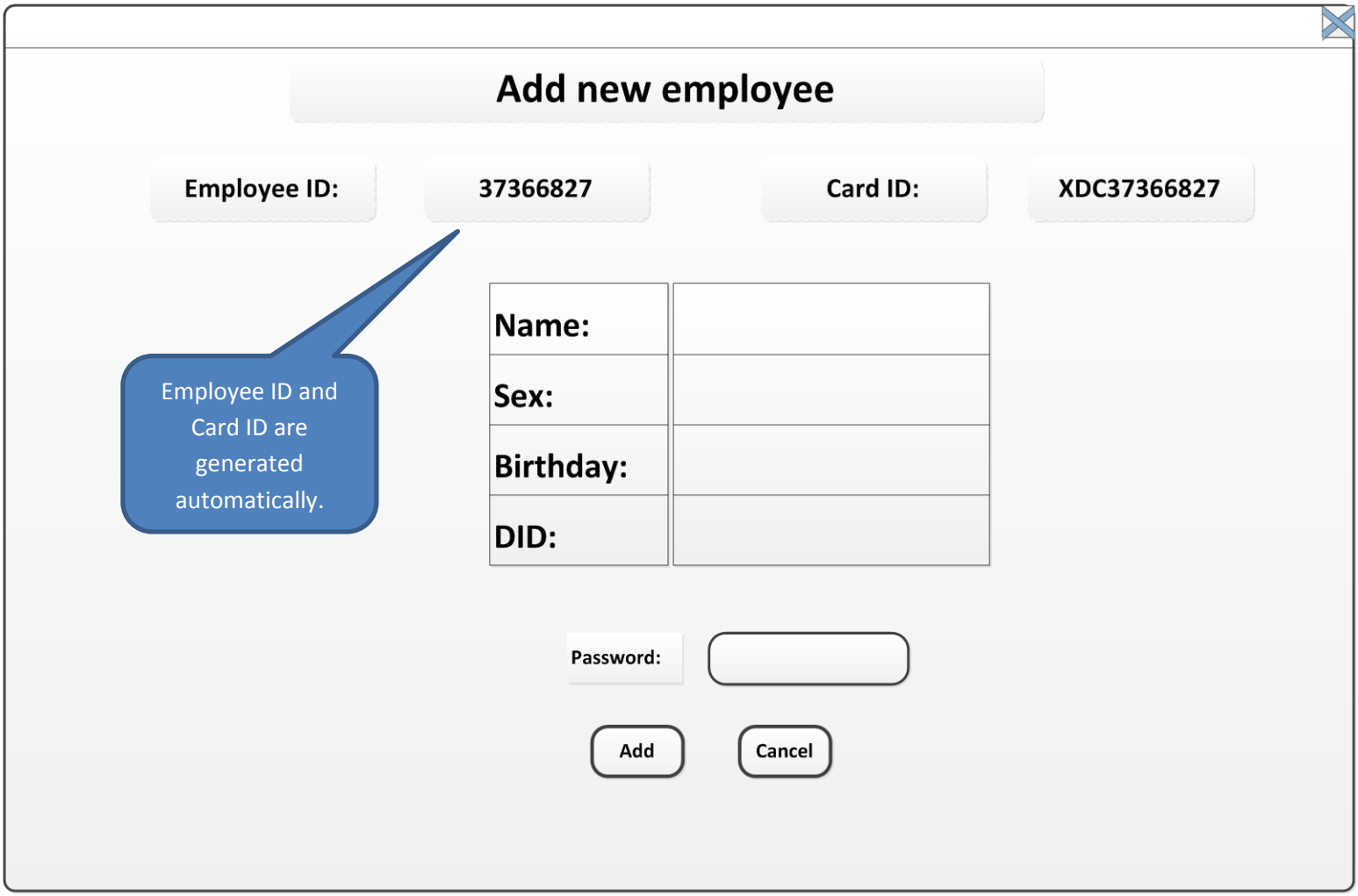
The data showing supports search function.

Next, let us see the “Restart Server…” function. After clicked this button, the system will show a page like in next page:



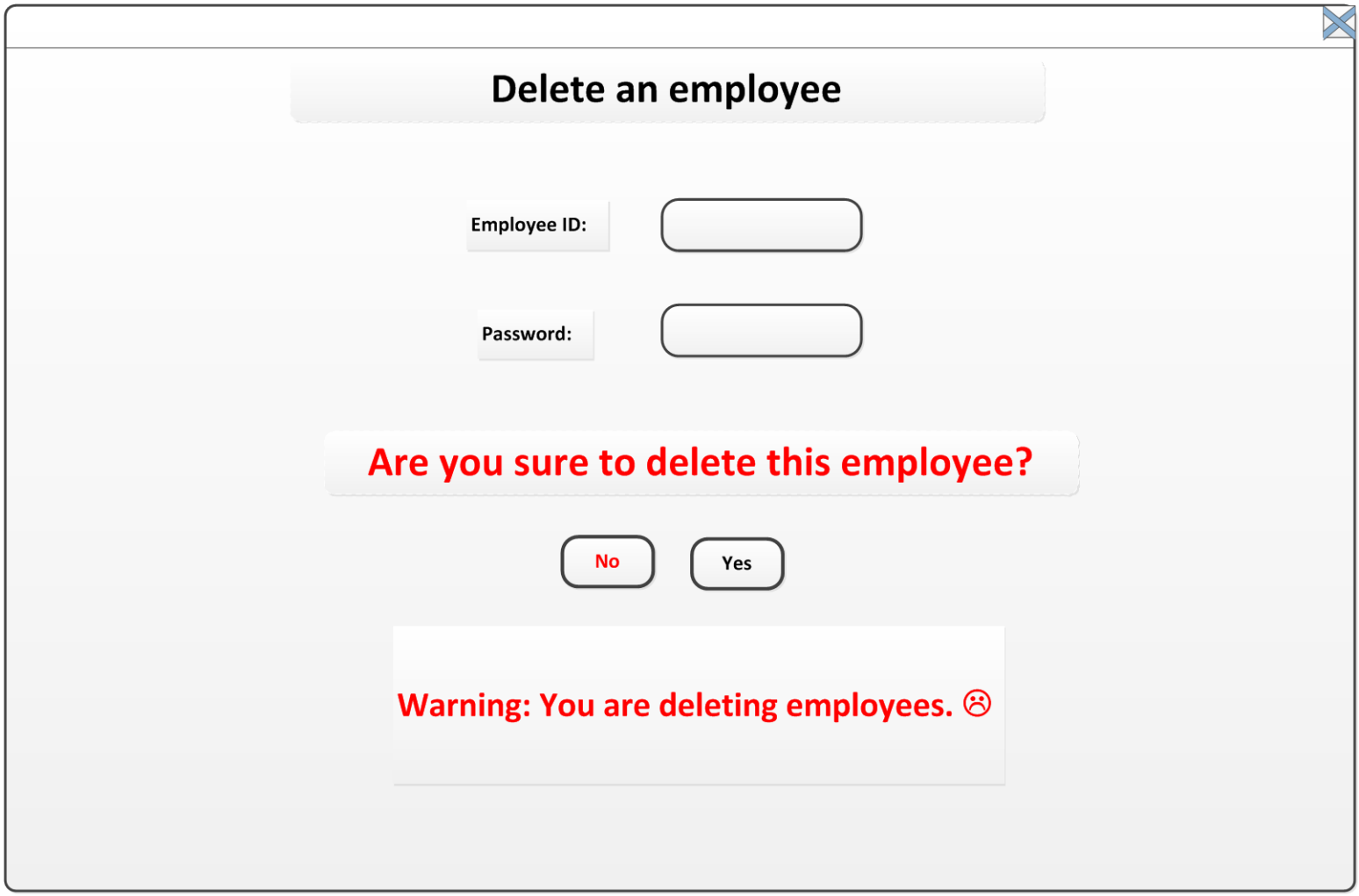
Here, you can see the warning and tip are showed as red color to let administrator be alert that restarting server is not a good action. And administrator has to input his/her password, then he/she can be allowed to do so. O**ne more design skill is I put "No" before "Yes" and "No" is in red**. All design above is to let administrator carefully do the restarting action.

Then, next page shows the "Add new employee" page:



As you see the employee ID and card ID will be generated automatically. All the rest thing is to fill in the basic information of the new employee and input password of administrator's, then we can add or cancel this operation.

Next page shows the "Delete an employee…" function.



Deleting employee is simple. Just enter his/her ID, then you can delete it. But it needs administrator's password. Same as the "Restarting Server…" function, this page also uses red color and warning tip to remind administrator be alert to do so.