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Attendance Monitoring and Displaying System using Python Automation

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Abstract: The purpose of the research, is to design monitoring and displaying system from current attendance capturing system. Current attendance system only record data to access database. There is no way to access the information directly and show to the student. Student need to monitor the lecturer'sattendance to get information about when they could do a meeting and also consultation for final project. If the information cannot shown directly, student become distress and must waiting for long time to recheck and adjust the student schedule with the lecturer schedule.The existence of this monitoring system make the student become more easy to monitor the lecturer attendance although they have contact the lecturer directly via messaging. C# application which contain the SDK of the Solution type X-601 fingerprint attendance is developed to save data in MySQL database. Every attendance recording becomes the triggering event to record to the database. The database then showed with PHP and AJAX technologyto do the refresh every second to show real time database condition. Python automation is developed to maintain the connectivity of the system to the internet or the network. The result of this research shows that the monitoring system could last from disconnect of networking issue and also could wake up automatically when the connection is running well again.

Keywords: monitoring, attendance system, C# application, AJAX, Python automation

1. Introduction

Background of this research is the fingerprint attendance system data is not directly shown the attendance of the lecturer. The student need to monitor the attendance of the lecturer to make a meeting appointment. Before the student meet the lecturer they make an appointment. The lecturer sometime have another schedule which is urgent and directly ordered without consider synchronizing with current activity. Attendance displaying system can help the student make decision to wait if the lecturer have come to the campus.

The system that has been developed is connecting the fingerprint attendance system with C# programming on another monitoring computer. C# programming detect the trigger event every lecturer attendance tapping. C# programming work as listener for database inserting mechanism. MySQL library needed by C# programming to insert the event to the database. PHP and AJAX help the view of the database on the web interface. AJAX used to refresh view of the system because database is triggered every time there is a tapping event.

The aim of the research beside make a view in the web, is also test the stability of the system in there is an interference in network connection. The benefits of this system is also to remind the lecturer to keep the attendance if the forgot. The system also keep the backup database directly not using the access system embedded in the hardware. The mechanism of get the database is connecting the flash disk to attendance hardware to get access database. The main benefit beside all of the benefits is that student can show the attendance of the lecturer to make sure the appointment can be held or not.

2. Related Work

Research conducted by Rajesh [1] uses automation to screen capturing and performance analysis of the attendance monitoring in laboratory. Rajesh system is collaborating attendance information with computer log and screen capture. Besides recording there are some monitoring in laboratory resources use. Methodology of the Rajesh system that was same with this system in this research is the data recorded directly to database. The functionality of the research is different because this research focus on the stability of data visualization of database inserted from attendance tapping hardware.

There is another research done by Kumar [2] which using biometric and RFID combination[3],[4] to enhance performance appraisal. The attendance system is integrated with payroll system which measuring how long that user stay at the office. Kumar [2] has done aninitial research to gain a data for data science process by combining biometric, RFID also voice from the user to capture the hidden pattern later.Kumar research only show the process and how to data collecting without be equipped with some technique or proper methodology.

Another research from Setyawan[5] also implemented the system using Raspberry Pi. The different from Kumar[2] and Setyawan[5] research, this research show methodology and programming algorithm to process the request and also for displaying the system continuously.

In the term of early education, we can see that there is an online early detection system for school attendance problem [6]. From Brian research, there is some important information that we can get from the behavior of attendance. Brian research find the pattern of the absence on every stage of education by doing a survey. Different from Brian research, this research is used by student rather than by school. Student can develop a further analysis of the lecturer attendance by developing in inference system not discussed in this research.

There is another research [7] which have developed an attendance monitoring system to integrate with ERP system. There is an employee attendance monitoring system (EAMS) that automatically calculate any delay in employee attendance using the concept of ERP system. The attendance time matched with data in database and used in rather payroll analysis of delay.Another research developed a smart system of attendance system using face recognition [8] and fingerprint [9].Different from another employee, lecturer have a unique attendance behavior because only need to tap the attendance once. Lecturer have specific duty that could be included outside the job, such as study for teach, make a research and some extra activity like workshop. In the term of attendance lecturer get some discretion because of the intellectual activity. The attendance monitoring could help the student to overcome the little factor of this attendance uncertainty.

Another interesting research was conducted by Ishan [10]. Ishan made non biometric attendance identification based on Internet of Things (IoT). Weight and height fusion function used for identification. Ishan research focus on defining matrix that match with attendance rather than using biometric because biometric sometime can be failed. Different from Ishan research, Solution X-601 as the device of attendance system in this research using face recognition as a biometric matrix rather than other factor.

Contribution in this research is to provide a proper solution for displaying attendance information directly to the student. The information of attendance was hiding on the access database and needed to be extracted. Another contribution is to make the data visualization that could recover automatically if there is a disturbance in network system.

3. Methodology

Attendance system that developed in this research divided into two sub system. The main system of attendance system is fingerprint attendance system which is trademarked by Solution X-601. Solution X-601 save the user face in its database by registering user in the first time. Every successful face tapping in attendance system make the data from the user identification inserted into access database inside the Solution devices. The second sub system is Solution devices connected with network using LAN cable interconnection. There is a desktop computer which using Windows Operating System which have installed the Visual Studio programming tools to compile the modified C# application to maintain MySQL insert to the database. PHP used as web interface to connect with MySQL database. AJAX used as refresh mechanism to show real time change in database system. Python embedded in PC desktop with "ping" library to maintain networking activity and to ensure program could run automatically when there is a disturbance in network such as network unreachable. The PC desktop is connected the VGA output to the big screen LCD to show to the student at the waiting room. Complete sub system shows in Figure 1.

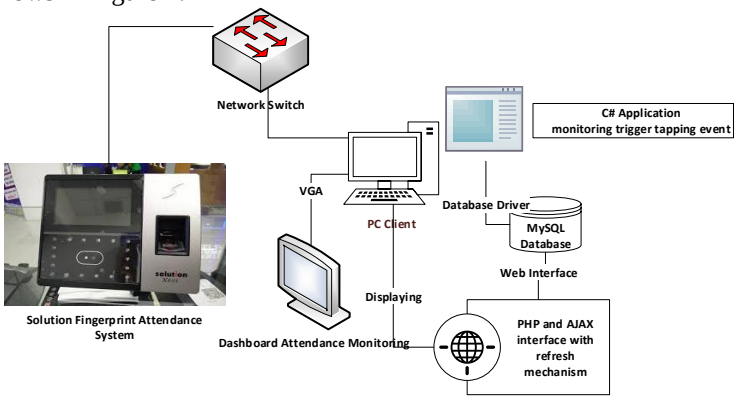

Figure 1: Complete Attendance Monitoring System

C# application added with some MySQL connector to do a MySQL query functionality on the selected mechanism.This is the MySQL connector function added to the C# application SDK from Solution.

```
usingMySql.Data.MySqlClient;
//If your fingerprint(or your card) passes the verification,this event will be triggered
private void axCZKEM1_OnAttTransactionEx(string sEnrollNumber, intiIsInValid, intiAttState, intiVerifyMethod, intiYear, intiMonth, intiDay, intiHour, intiMinute, intiSecond, intiWorkCode)
    {
lbRTShow.Items.Add("RTEventOnAttTrasactionEx Has been Triggered,Verified OK");
lbRTShow.Items.Add("...UserID:" + sEnrollNumber);
lbRTShow.Items.Add("...isInvalid:" + iIsInValid.ToString());
lbRTShow.Items.Add("...attState:" + iAttState.ToString());
lbRTShow.Items.Add("...VerifyMethod:" + iVerifyMethod.ToString());
lbRTShow.Items.Add("...Workcode:" + iWorkCode.ToString());//the difference between the event OnAttTransaction and OnAttTransactionEx
lbRTShow.Items.Add("...Time:" + iYear.ToString() + "-" + iMonth.ToString() + "-" + iDay.ToString() + " " + iHour.ToString() + ":" + iMinute.ToString() + ":" + iSecond.ToString());
if (iIsInValid == 0)
      {
try
        {
          //This is my connection string i have assigned the database file address path
stringMyConnection = "datasource=localhost;port=3306;username=root;password=";
          //This is my update query in which i am taking input from the user through windows forms and update the record.
          string Query = "insert into absensi.kehadiran(id,jam_kedatangan,status) values('" + sEnrollNumber + "','" + iYear.ToString() + "-" + iMonth.ToString() + "-" + iDay.ToString() + " " + iHour.ToString() + ":" + iMinute.ToString() + ":" + iSecond.ToString() + "','Ada');";
          //This is  MySqlConnection here i have created the object and pass my connection string.
MySqlConnectionMyConn = new MySqlConnection(MyConnection);
MySqlCommandMyCommand = new MySqlCommand(Query, MyConn);
MySqlDataReaderMyReader;
MyConn.Open();
MyReader = MyCommand.ExecuteReader();
MyConn.Close();//Connection closed here
        }
catch (Exception ex)
        {
MessageBox.Show(ex.Message);
        }
      }
    }
```

The program used special identification data such as enroll number and date component separated from year to second to record attendance check in and check out mechanism. The data from attendance inserted to “kehadiran” table on the “absensi” database on MySQL. The method used to record the gathered data was “OnAttTransaction” which show transaction process in attendance library.

Beside the modification of the SDK, there is the script in the web application side which using PHP to get select query from the database. Figure 2 shows the algorithm for displaying the correct information between check in and check out. Lecturer could considered as check in from the 06:00 AM until 04:00 PM as the office hour. The algorithm check the earliest time that the lecturer come between 06:00 AM until 04:00 PM. For the checking out mechanism the script check the latest time that the lecturer come out. If the lecturer get into the attendance system after 16:00 PM, then recorded as checked out rather than check in although it doesn’t matter if lecturer tap the attendance on returning.

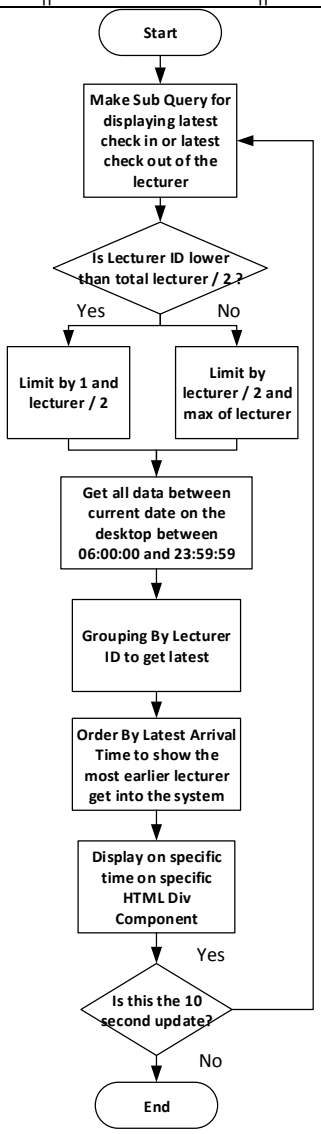

Figure 2: Flowchart of Displaying System

Python program implemented in desktop computer to check the state of network connection and state of C# application. C# application must be reset if the state of connection is down. There is some basic logic to check network connection continuously in loop state with "ping" command using "subprocess" library in Python. Inside the looping there is a join combination of checking the state of connectivity and also state of application with using "shlex" library. Figure 3 shows the logic of the Python automation software.

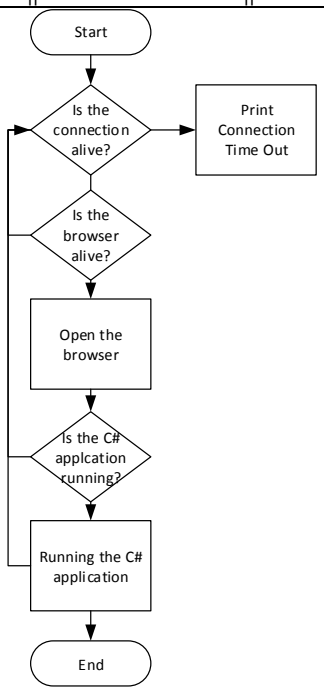

Figure 3: Flowchart of Python Automation

Web program running as a service on every computer wake up. After web program is running then Python application executed to run C# application and to running browser. Python program periodically checks the status of the network connection and make decision to close C# application if there is no connectivity and run the program again if there is a connectivity.

4. Evaluation

Attendance system that has been developed could running well after some fix. There is some condition based on error connectivity that make the program suddenly crash. Tuning of the program is done on the condition of error that clearly explained in Figure 3. The condition that make program crash in the "ping" scenario. "Ping" scenario is work well when the system sent with IP address, byte, and also time to live. "Ping" scenario is also returning reply condition but can be followed with "destination host unreachable". This condition must detected on program as unsuccessful access to make program not crash suddenly. System is running well in 24 hours stateand on the Saturday, system is turning off to maintain the endurance of the hardware.

Testing scenario for evaluation process is done by testing the tapping process directly on the Solution hardware and then check the result on the web that displaying the view of attendance. Figure 4 shows the interface of web viewing device in the LCD. Web view shows the order of the attendance and also the current time. Web view also shows the check in and check out time of each lecturer. Table 1 shows the testing scenario of attendance tapping process.

Figure 4: Web view of attendance monitoring system

Table 1 shows that all the tapping process is successful. The tapping process is not successful because the state of network connection. If there is new lecturer added in the system, the record must also be added to database. In SQL query also must be filtered with some ID, because in web view there is two separated table. After first testing scenario there is also a test for connection problem. Table 2 shows that the testing scenario in unsuccessful network connection.

Table 1: Testing Scenario in Attendance System

Lecturer ID	Lecturer Name	Successful Tap	Time	Date
255	Wahyudi	Success	07.03	October 30th 2019
265	M. Arfan	Success	07.23	October 30th 2019
250	Agung Nugroho	Success	07.26	October 30th 2019
738	Denis	Success	07.29	October 30th 2019
233	AchmadHidayatno	Success	07.32	October 30th 2019
261	MunawarAgusRiyadi	Success	07.35	October 30th 2019
236	AjubAjulian	Success	07.40	October 30th 2019
258	NugrohoAgusDarmanto	Success	07.49	October 30th 2019
242	Sumardi	Success	08.52	October 30th 2019
249	BambangWinardi	Success	09.11	October 30th 2019

Table 2 show system action after testing the state of network state before and network state after. From the testing we can know that every state on the network could maintain the state of the system. The state of the system could be maintenance if the state of C# application is not up when the tapping process is happen.

Table 2: Network State Testing

Network State Before	Network State After	Action
Down	Up	Turn on C# Application
-	Starting System First	Turn on C# Application, Open the Browser
Up	Down	Turn off C# Application
Up	Up	Maintain state up
Down	Down	Give down notification by status

5. Conclusion

This research can concluded some conclusions. The web view system shows that the attendance system can be monitored successfully. The testing scenario from network connectivity can show that the system needed

some improvement to maintain the state of the hardware and software. The term of automation in this research is to maintain the state of network connection. C# application need to be reset in order to take out the data from the Solution hardware. The disadvantage of the system is there is no preventive action when the network connection is down. If the connection is down then the system cannot show the result. For improvement, there is need a state to save the information in the machine that could be extracted or triggered automatically to insert to the database when the network state is available again after down.

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