

Design and Implementation of Employee Computer Usage Behavior System (5 May 2015)¹Ainee Riaz, ²Shahid Islam¹ Research Scholar, University of Engineering and Technology Lahore, PakistanE-Mail: Ainee_riaz@yahoo.com Phone no: +923016543211² Assistant Professor, University of Engineering and Technology Lahore, Pakistan (Computer Science Department)

Abstract—The proliferation of software applications has great impact on our lives. It not only saves the time but also makes the life easier. The aim of this research is to design and develop a software application that could help the managers to maximize the office productivity by monitoring the computer activities of each employee. This system provides the server application that logs the employees' computer usage and archives them at central server. Authorized users like managers can retrieve this information like web history, printer usage, installed applications, running programs etc from server using web based interface.

[Ainee Riaz, Shahid Islam. **Design and Implementation of Employee Computer Usage Behavior System (5 May 2015)**. *J Am Sci* 2018;14(6):30-37]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). <http://www.jofamericanscience.org>. 4. doi:[10.7537/marsjas140618.04](https://doi.org/10.7537/marsjas140618.04).

Keywords— employees, computer usage, monitoring, system.

Introduction

Organizations are established to achieve special goals. Employees of these organizations are the problem solvers who work to achieve these goals. If employees behave like givers then office profitability, productivity and efficiency increases. Success of an organization depends on the behavior of its employees.

Some employees misuse the company computer technology for personal use and abusing the company privileges. Employees misuse the internet for social networking, personal emailing and in reading news [1]. They installed their applications for personal use and spend most of their time in playing games. They use office resources like printer for personal use and use removable devices to copy company's confidential data for misuse.

To avoid all such activities and to gain more control over the employee's activities, for best performance evaluation of employees and to save company's resources and confidential data from being deleted or copied, a system is proposed called office monitoring system which monitors the employees' activities.

To get data about employees activities, an application is designed which runs on employee's PC in background, monitors the activities of employees and stores them to the central server.

Section 2 describes the system design, component of the system, usecase diagram, entity relationship diagram, and class diagrams of the system. Section 3 describes system specifications. Section 4 and 5 describes system implementation and results respectively.

System Design

The system is based on a powerful MS Windows based application that runs on employee PC. This application runs in background and employee may be unaware of this.

Application monitors the activities of employee on his system and collects the information like running applications, installed applications, browsing history, sent and received emails etc. This information is stored on employee PC.

After specific intervals of time, this information is sent to central server where it is saved in the database. Managers can access the employee information using web browser which gets data from central server.

A. Components of system:

Office monitoring system consists of 3 basic components that are given below:

1) Server application:

This application collects data for central server and runs on employee PCs in background.

2) Central server:

This server contains the employee's activity data that is sent from server application through internet.

3) User Interface:

Managers and CEOs may use web based interface to retrieve data from central server.

B. Use-case:

Use case diagram is used to show interaction between user and the system. following diagram shows use case which has 2 actors; manager and employee. Employees can do activities and managers can view employee's activities.

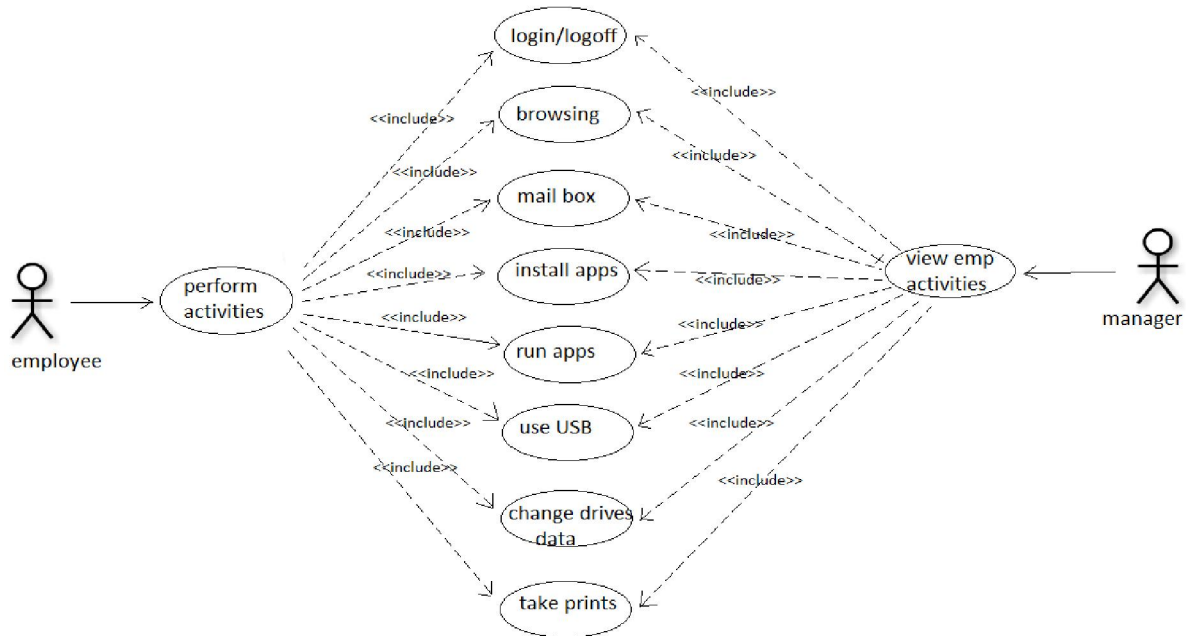


Figure 1: usecase diagram

C. Data model:

ERD diagram shows relationship between entities and provides graphical representation of entities [2]. ERD for the proposed system is given below:

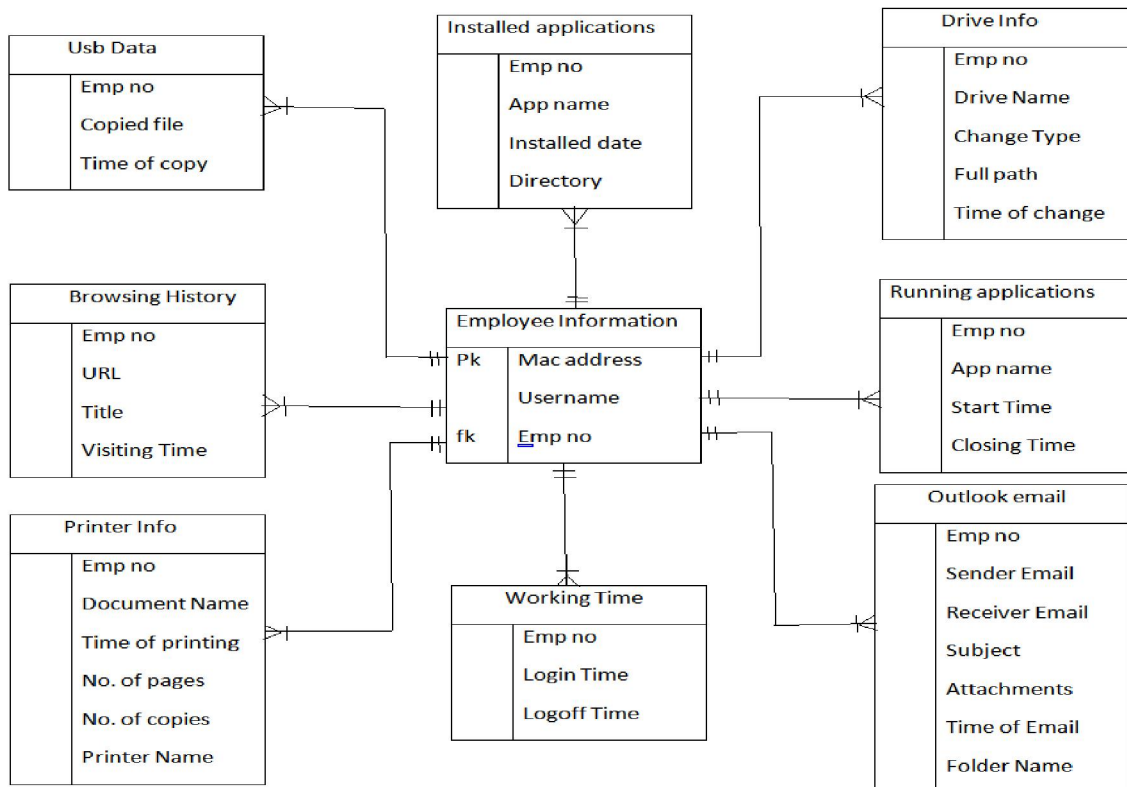


Figure 2: Entity Relationship Diagram System Architecture:

System architecture consists on server application that runs on employee's computer, central server and web interface

System architecture is given below:

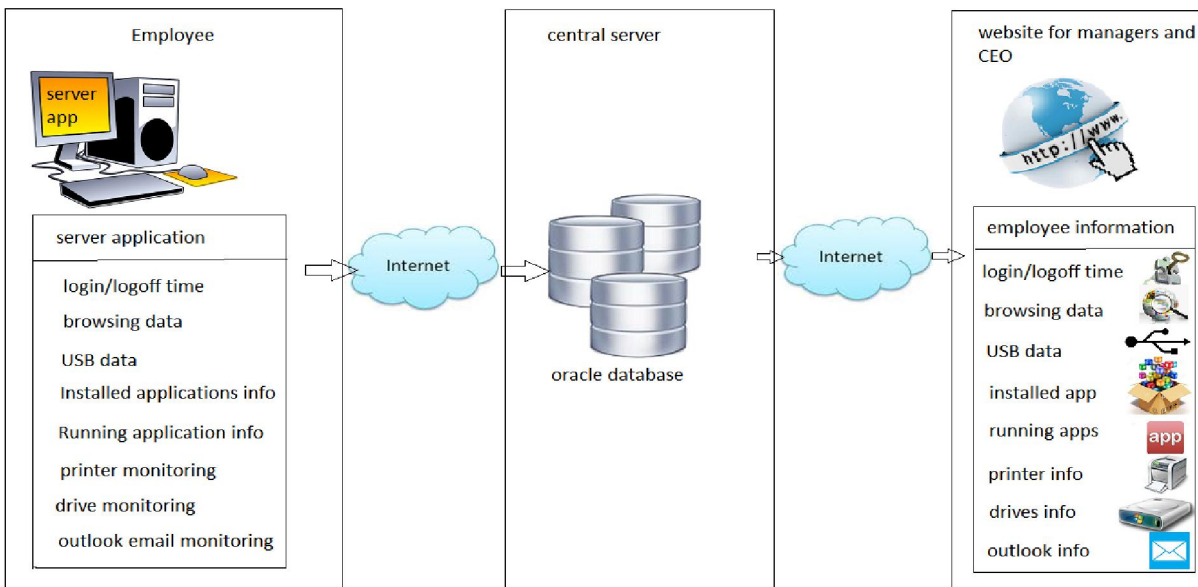


Figure 3: system architecture

D. Class diagram:

Class diagram of the server Application is given below:

System specification Technologies which are used to implement the system are given below:

a) Visual C# is used to build sever application which is general purpose programming language that uses.net framework [3].

b) JAVA programming language is used to access data from central server.

c) JSP/Servlet technology is used for web development to display data on webpages.

d) The Database or backend can be created on relational database management system like oracle database. [4] Oracle database is used to store relational data. this database is self-managing and providing great portability across major platforms [5].

System implementation:

System implementation consists of three main parts

- a) Server application to get data
- b) Database for central server
- c) Website to display data

E. Server application modules:

This app has 8 major modules which are implemented using C# and described below:

1) Login/logoff time:

This module gets the login and logoff time of the employee which shows the working hours of employee.

2) USB Reader:

This module gets information about the data which is copied to USB from employee PCs. hence provide security to office data.

3) Browsing history:

This module keeps track of browsing history of employee's system

4) Drive monitoring:

This module checks that is any new file, folder or any type of data created, deleted or renamed in drives. if any changes occur in drives then it gets information about change type, time of changes, name of drive where changes occurs, name of data which is created, deleted or renamed and full path where changes occur.

5) Printer Information:

This module monitors which document is going for printing from employee's system. It gets document name, time at which document is sent for printing, number of pages and number of copies of document, printer name where it is sent for printing.

6) Running applications:

This module keeps track of all applications which are running on employee PCs. It also keeps track of application starting time and closing time.

7) Installed Application:

This gets information about all installed applications, time of installation and directory where the applications are installed.

8) Outlook data:

This module gets outlook emails information. Information includes sender email id, receiver email

id, email subjects, email time, attachment names, size of email in kb.

F. Central server:

To store data, oracle database is used. All server application's modules send data through internet to

central server where all employees data is stored and retrieved by webpage to display them to managers.

G. Website:

A website is designed for this system where managers can login to watch employee's activities.

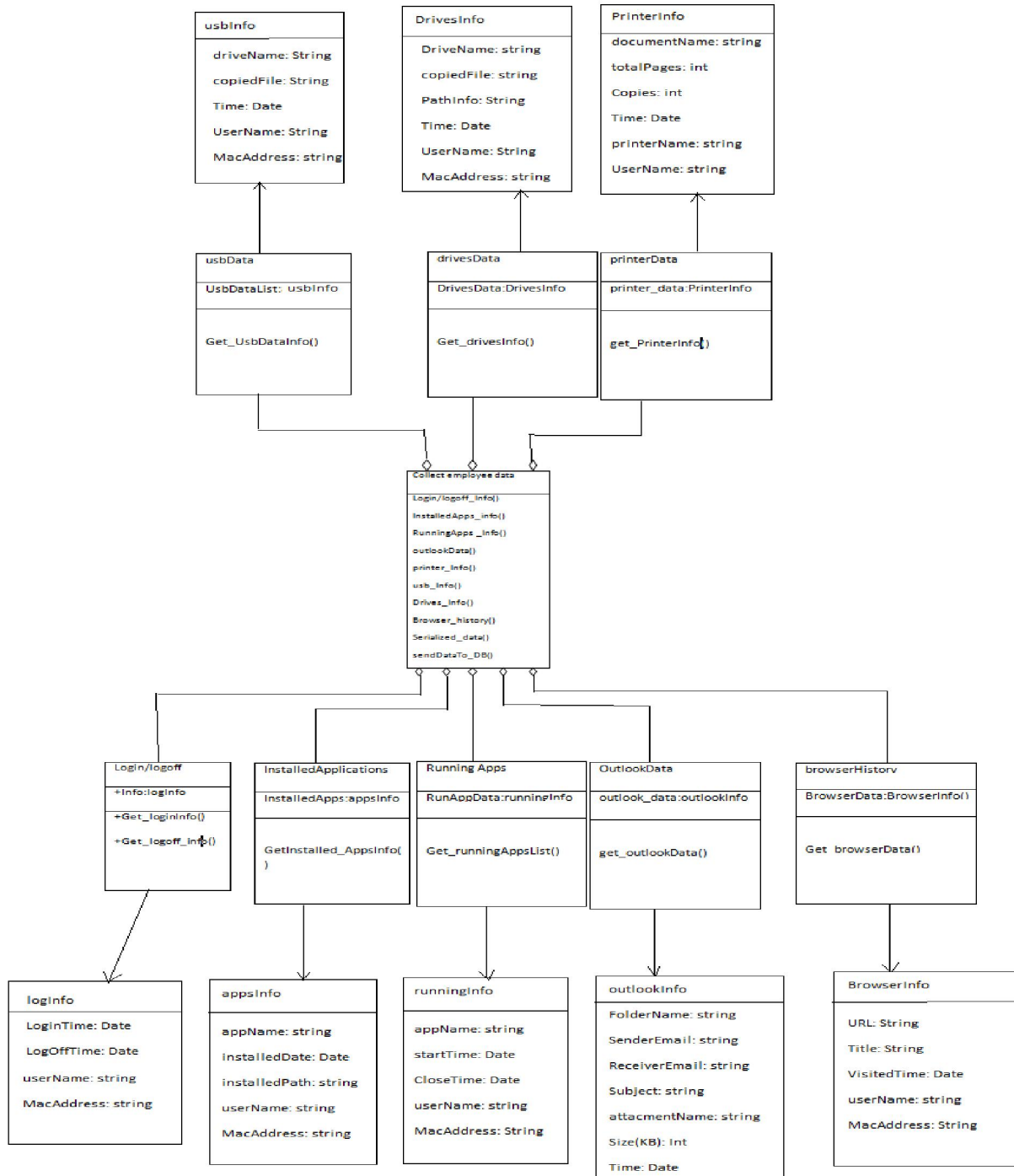


Figure 4: class diagram of server app

Results

snapshots of the results are given below:

login page for the managers and CEO. Is shown below:

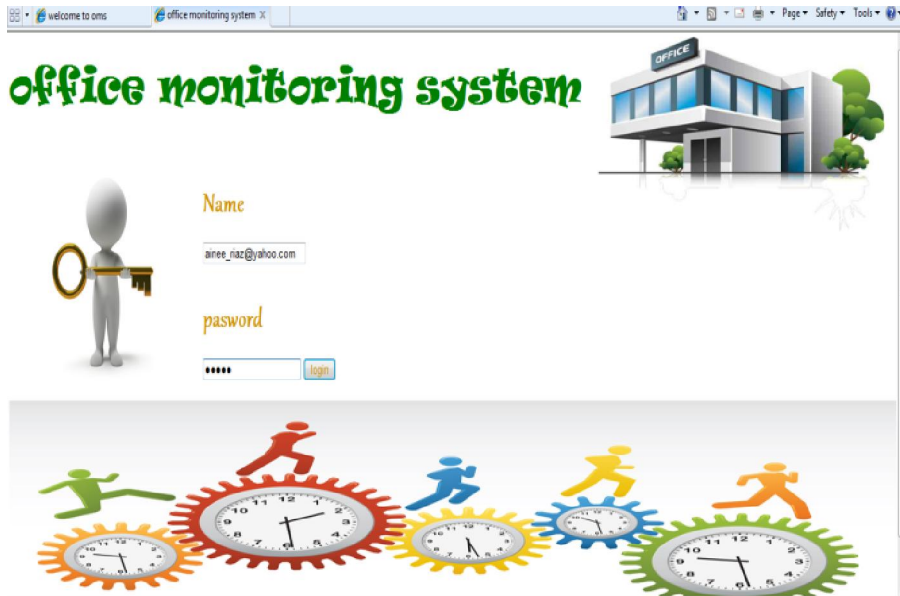


Figure 5: login page for managers

Snapshot for login and logoff info of the employee is given below:



Figure 6: login/logoff info

Result for installed application is given below:



Figure 7: installed application list

Results for browser history is given below:

URL	Title	visited time	mac address	user name
https://www.google.com.pk/url?sa=t&rectj&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0CEsQFjAJ&url=http%3A%2F%2Fjava.ittoolbox.com%2Fgroups%2Ftechnical-functional%2Fjava-%2Fhow-to-include-date-picker-in-jsp-page-2124019&ei=4vhAVb-mC9SeugS_ziGABA&usq=AFQjCNEirRgva063Qo3GoE113apuOQA&bvm=bv.92189499.d.c2E	null	4/29/2015 8:30:22 AM	642737D79B1B	AINEE-PC
https://www.google.com.pk/url?sa=t&rectj&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0CEsQFjAJ&url=http%3A%2F%2Fforums.asp.net%2F281890.asp%3FTrm%2Bfunction%2B%2BSharp.&ei=6eRDVHlDuGa7gb-yHoDw&usq=AFQjCNEirRgva063Qo3GoE113apuOQA&bvm=bv.92189499.d.c2E	null	5/1/2015 1:41:45 PM	642737D79B1B	AINEE-PC
https://www.google.com.pk/url?sa=t&rectj&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0CF4QFjAJ&url=http%3A%2F%2Fwww.w3schools.com%2Faspnet%2F&ei=Ayc7VY70HeidPamRgcAG&usq=AFQjCNHauDm9s1.0N1VihW1L.26EWV5NLA&bvm=bv.91665533.d.bGQ	null	4/25/2015 10:33:32 AM	642737D79B1B	AINEE-PC
https://www.google.com.pk/url?sa=t&rectj&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0CF4QFjAJ&url=http%3A%2F%2Fwww.pythonindiaireen.net%2FProgramming%2Ftips-and-tricks%2Fcreating-restful-urls-with-spring-mvc-3-1-part-one-default-servlet-handler%2F&ei=AWIDVbJdJpMuQ89uHgCQ&usq=AFQjCNEmqNuSyM9YGLj93lAdP39pNVCEg&bvm=bv.92189499.d.c2E	null	5/1/2015 4:19:14 AM	642737D79B1B	AINEE-PC
https://www.google.com.pk/url?sa=t&rectj&q=&esrc=s&source=web&cd=9&cad=rja&uact=8&ved=0CGIqFjAJ&url=http%3A%2F%2Fstackoverflow.com%2Fquestions%2F12178359%2Fvisual-studio-2012-where-has-asp-design-and-split-view-gone&ei=U0k_YyUKEIDKaO7nqPgL&usq=AFQjCNGly1comGRLwoiduZZ3mdJuVCHQ&bvm=bv.91665533.d.d2s	null	4/28/2015 2:29:09 AM	642737D79B1B	AINEE-PC
https://www.google.com.pk/webhp?sourceid=chrome-instant&ior=1&espv=2&ie=UTF-8	Google	4/27/2015 6:35:57 AM	642737D79B1B	AINEE-PC
https://www.google.com.pk/webhp?sourceid=chrome-instant&ior=1&espv=2&ie=UTF-8#q=csc%20login	null	4/27/2015 6:36:05 AM	642737D79B1B	AINEE-PC
https://www.google.com/settings/?authuser=0&hl=en	Account settings	4/29/2015 10:04:57 AM	642737D79B1B	AINEE-PC
	Account	4/29/2015		AINEE

Figure 8: browser history

Snapshot for usb data that copied to usb is given below:

Drive	copied File	Time	mac address	user name
G:\	G:\7th semester\New folder\chrishulbert-datepicker-bc2dcb2\datepicker.js	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC
G:\	G:\7th semester\New folder\chrishulbert-datepicker-bc2dcb2\datepicker-example.html	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC
G:\	G:\7th semester\New folder\chrishulbert-datepicker-bc2dcb2\datepicker.css	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC
G:\	G:\7th semester\New folder\chrishulbert-datepicker-bc2dcb2\README.md	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC
G:\	G:\7th semester\New folder\chrishulbert-datepicker-bc2dcb2\timepicker.js	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC
G:\	G:\7th semester\project	5/12/2015 12:10:08 PM	642737D79B1B	AINEE-PC

Figure 9: usb data

Snap shots of the changes that occurred in drives are given below:

drives info

period: to selected employee mac: 642737D79B1B

drive name	change Type	path Info	time	mac address	user name
D:\	Renamed	D:\7th semester\project\b.txt renamed to D:\7th semester\project\asdb.txt	5/3/2015 4:49:17 AM	642737D79B1B	AINEE-PC
D:\	Deleted	D:\7th semester\project\asdb.txtis deleted	5/3/2015 4:49:23 AM	642737D79B1B	AINEE-PC
D:\	Created	D:\7th semester\project\New foldens created	5/3/2015 4:49:42 AM	642737D79B1B	AINEE-PC
D:\	Deleted	D:\7th semester\project\New foldens deleted	5/3/2015 4:49:52 AM	642737D79B1B	AINEE-PC

Figure 10: drives info

Snapshot for the printer information is given below:

Printer information

period: to selected employee mac: 642737D79B1B

document name	total pages	copies	submit time	printer name	mac address	user name
Microsoft PowerPoint - Amazon ec2	10	4	5/12/2015 6:41:51 AM	HP LaserJet P2050 Series PCL6	642737D79B1B	AINEE-PC
Microsoft PowerPoint - Compiler 07-05-2013	9	6	5/12/2015 6:42:16 AM	HP LaserJet P2050 Series PCL6	642737D79B1B	AINEE-PC
Microsoft PowerPoint - Presentation1	13	1	5/12/2015 6:41:11 AM	HP LaserJet P2050 Series PCL6	642737D79B1B	AINEE-PC

Showing 1 to 3 of 3 entries

Figure 11: printer information

Snapshot for outlook emails is given below:

folder	sender_email	receiver_email	subject	time	size (kb)	attachments	mac address	user name
Inbox folder	ainee_riaz@yahoo.com	ainee_riaz@yahoo.com	1st mail	3/11/2015 7:24:03 AM	96	.files.jpeg	642737D79B1B	AINEE-PC
Inbox folder	ainee_riaz@yahoo.com	ainee_riaz@yahoo.com	1st mail	3/11/2015 7:24:17 AM	96	.files.jpeg	642737D79B1B	AINEE-PC
Inbox folder	ainee_riaz@yahoo.com	ainee_riaz@yahoo.com	FW: 1st mail	3/11/2015 7:27:40 AM	96	.files.jpeg	642737D79B1B	AINEE-PC
Inbox folder	ainee_riaz@yahoo.com	ainee	Microsoft Office Outlook Test Message	3/11/2015 7:12:48 AM	10	No Attachment	642737D79B1B	AINEE-PC
Outbox folder	no email	no email	no email	null	no email	no email	642737D79B1B	AINEE-PC
Sent Items	ainee_riaz@yahoo.com	ainee_riaz@yahoo.com	1st mail	3/1/2015 5:11:56	90	.files.jpeg	642737D79B1B	AINEE-PC

Figure 12: outlook emails

Snapshot for running application is given below:

Running applications info

period: to selected employee mac:

application name	start time	exit time	mac address	user name
µTorrent 3.4.3 (build 40097) [32-bit]	5/1/2015 3:42:10 PM	5/1/2015 3:45:11 PM	642737D79B1B	AINEE-PC

Figure 13: running application

Snapshot for the complete webpage is given below. Where you can select a range of date and employee to get specific data in that range and can select any specific module like printer info, usb info etc.



Figure 14: selection criteria

Conclusion

This work has proposed a system which monitors the employees' activities on office computers and save them to central database. System also protects the company data from being copied or deleted and also monitors the printer utilization. Authorized persons like managers and CEO can view the data using web interface. This system performs continuous monitoring of employees PCs and helps the managers to evaluate employees' performance in an efficient way.

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6/24/2018