Design and Implementation of Employee Computer Usage Behavior System (5 May 2015)

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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.


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.
C. Data model:
ERD diagram shows relationship between entities and provides graphical representation of entities [2]. ERD for the proposed system is given below:
System architecture consists on server application that runs on employee’s computer, central server and web interface

System architecture is given below:

![System Architecture Diagram](image)

**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.

![Class diagram of server app](image-url)
**Results**

Snapshots of the results are given below:

- **Figure 5:** login page for managers

- **Figure 6:** login/logoff info

- **Figure 7:** installed application list
Results for browser history is given below:

```
<table>
<thead>
<tr>
<th>URL</th>
<th>Title</th>
<th>Status Code</th>
<th>Max Address</th>
<th>User Agent</th>
</tr>
</thead>
</table>

Figure 8: browser history
```

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

```
<table>
<thead>
<tr>
<th>Drive</th>
<th>copied File</th>
<th>Time</th>
<th>Mac Address</th>
<th>User Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q:</td>
<td>New folder</td>
<td>5/12/2015</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>Q:</td>
<td>New folder</td>
<td>5/12/2015</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>Q:</td>
<td>New folder</td>
<td>5/12/2015</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>Q:</td>
<td>New folder</td>
<td>5/12/2015</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>Q:</td>
<td>New folder</td>
<td>5/12/2015</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
</tbody>
</table>

Figure 9: usb data
```

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

```
<table>
<thead>
<tr>
<th>Drive Name</th>
<th>Change Type</th>
<th>Time</th>
<th>Mac Address</th>
<th>User Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>D:</td>
<td>Remained</td>
<td>5/3/2017</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>D:</td>
<td>Deleted</td>
<td>5/3/2017</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>D:</td>
<td>Created</td>
<td>5/3/2017</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
<tr>
<td>D:</td>
<td>Deleted</td>
<td>5/3/2017</td>
<td>64237D/D18B</td>
<td>ADEE-PC</td>
</tr>
</tbody>
</table>

Figure 10: drives info
```

Snapshot for the printer information is given below:
Snapshot for outlook emails is given below:

Figure 12: outlook emails

Snapshot for running application is given below:

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.

References
2. entity-relationship diagram (model). Webopedia. [Online] [Cited: May 6, 2015.]
5. Introduction to the Oracle Database. Database Concepts. [Online] [Cited: MAY 6, 2015.]