World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

Check for updates

Design and implementation of computerized office attendance system (A case study of project e-DELTA)

Ibezim Collins Obiora [1,*] and Monday Ernest Micheal Chukwu [2]

[1] *Department of Computer Science, Faculty of Applied Science, Federal Polytechnic Oko, Anambra State, Nigeria.*
[2] *Department of mathematics, statistics and computer science, Faculty of Physical Science, University of Calabar, Cross River State, Nigeria.*

World Journal of Advanced Research and Reviews, 2025, 28(01), 1997-2013

Publication history: Received on 31 August 2025; revised on 06 October 2025; accepted on 08 October 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.28.1.3454

Abstract

Office attendance software is an efficient tool to manage the whole company's component including level of productivity, resource department data, human resource data, etc. The main function is to capture the time of employee attendance, to avoid error of manual calculation by human. Office attendance program is an answer or instant solution to an efficient labour management. It will provide a company with an easy time and payment management systematically. Computerizing office attendance in organizations enables organizations to track, plan and transform basic labour data into intelligent information, thereby improving productivity and labour resource utilization. It is a method of managing a whole range of business processes, thereby minimizing time wastage associated with manual methods.

Keywords: Office Attendance; Software; Tracking; Automation; Artificial Intelligence

1. Introduction

The use of computer to solve several human problems in recent years has evolved drastically [1,2]. Way back in mid 1940s and early 1950s, when the First Generation computers – like the MARK I and UNIVAC I machines respectively were invented [3]. To the recent fifth generation computers which are programmed to human thinking, whereby users are able to easily communicate with these computers simply by using their native languages (that is English) [4,5,6]. Recent computers are programmed to imitate the human qualities of creativity, judgement and intuition [7,8]

Computerized methods of solving complex tasks have taken meaningful dimension in the 21st century and new ways are being invented each day [9,10]. In line with this trend, this project introduces a computerized approach that record employee's attendance and non-attendance to work including arrival and closing times. Presently, office attendance is by manual entry which is prone to falsehood.

Office attendance is a method of keeping record of presence and absence of employees to work, arrival time and closing time of work daily, using a defined method [11,12]. This project is concerned on the software aspect. Ordinarily in Africa, manual time attendance is prone to human error, which may or may not be verified for correctness [13]. The common phenomenon of an office employee writing the name and time of attendance for a fellow employee is rampant and is becoming a major concern in the business circle. Computerized office attendance record keeping is aimed at eradicating some if not all the limitations of manual office attendance recording[14,15].

Office attendance system has been found as a useful tool to assist employers to analyze and make decisions based on the consistency of their employees to workplace. Attendance control has traditionally been approached using time clocks and timesheets [16]. A time clock sometimes known as a clock card machine or punch clock was first invented in

* Corresponding author: Ibezim Collins Obiora

November 20 1888, by William Bundy, a jeweller Auburn, New York. Specifically, a time clock is a mechanical (electronic) timepiece used to assist in tracking hours an employee of a company worked[17,18]. Due to mechanical means of punching day and time to punched cards, wrong entries are likely to occur. Also, storage of official record of hours an employee worked cannot be guaranteed, which might result to complications during payment. To effectively track employees' attendance and non-attendance to work place, there is need for a modern office attendance system like the one introduced in this project [19,20].

This project was made to introduce a computerized method to keep record of employees' attitude to work – attendance and non-attendance. The project would stand as an aid to employers, Chief Executive Officers (CEOs) and most especially, the Head of Information System, Project-e-Delta, Delta State secretariat, Asaba, Delta State, Nigeria – my case study, on their underlying struggle to minimize and possibly eradicate non-attendance to work place.

Therefore, the objectives of this project include:

- To track direct employees attendance and non attendance to work place.
- To eliminate manual entry errors of attendance recording.
- To make payroll processing more efficient.

2. Material and methods

2.1. Methodology

An essential aspect of any research is the ability to show clearly the procedure and method by which data related to the topic under study is gathered. A correct statement of the methodology will help provide a logical and consistent work, thereby making it credible.

Computerized office attendance system is made to have the capabilities of an expert system, otherwise, known as expert systems methodology. An expert system is software that attempts to provide an answer to a problem, or clarify uncertainties where normally one or more human experts would need to be consulted. Expert systems are most common in a specific problem domain, and are a traditional application and/or subfield of artificial intelligence (AI).

During the gathering of facts at the case study, certain techniques were employed which are:

- Observation
- Interview

2.2. Observation

This is a systematic selection, recording and encoding of a set of behaviors. This entails selecting facts, not all observed facts are being selected.

Project-e-Delta is located at Delta state Secretariat Asaba, Delta state. Standing at the entrance, early before work commences, we observed the different times, workers enters the building and signed in, also, towards closing, 5.00pm in the evening, the same routine was carried out.

According to time intervals each worker arrives, it could be deducted that a particular hour is the starting hour for daily work.

Interview: a face-to-face contact between the analyst and the people connected with the enquiry he wants to carry out. It allows for more probing (deeper) unlike observation. Responses from the Unit Heads and Help Desk provided an idea to the nature of attendance, in view of the current system and consequently, what the final system to be designed will look like.

2.2.1. OOADM

Object oriented analysis and design methodology (OOADM) promote better understanding of requirements, clearer design and more maintainable systems. It is used to analyse problems and implement a solution in a programming language or database. The most popular OOADM are object modelling technique (OMT) and unified modelling language (UML). These two provide a set of concepts and notations which can be used through the entire software development

process. Object oriented analysis is the discovery analysis and specification of requirements in terms of object with identity that encapsulates properties and operations, message passing, classes, inheritance, polymorphism and dynamic binding.

2.2.2. Expert system methodology

This method is best for artificial intelligence (AI) and expert system (ES) software development. Expert system is an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solution. The expert knowledge must be obtained from specialists or other sources of expertise, such as texts, journals, articles and database.

2.2.3. Prototyping

This is the creation of incomplete version of a software program being developed. The process involves identifying basic requirements such as input and output information needed, developing initial prototype including user interface, review with customers, revise and enhance the prototype using a feedback from both specification and customer to improve the prototype.

The benefits of prototyping include the following:

- It provides proof of concepts to attract funding.
- It encourages active participation by user and product development cost is reduced.
- It increases system development speed.
- Prototyping identifies any problem (s) with the efficiency of earlier design requirements analysis and coding activities. Etc. However, prototyping also have some demerits attached to it, which is as follows:
  - User's expectation may be above the performance of the prototype.
  - Possibilities of causing systems to be left unfinished.
  - Implementing system before they are ready might prove to be inadequate for overall organizational needs.
  - Insufficient analysis can lead to poorly designed software with limited functionality.

From the understanding of the different concept of methodology as discussed, the prototyping is best suited for this piece of project work and therefore it will be implemented and expected.

2.3. System analyses

System analysis can be defined as the process of examining or studying the structure of an existing system with a goal of improving or modifying it. In other words, it is concerned with functional and non functional requirements of a system. It is also the process of breaking down a problem into smaller units for a close study of individual parts. The purpose of such process is to discover a feasible solution to the identified problems in the system and have a clear understanding of it.

In this chapter, a system analyst will analyze the existing system of Project-e-Delta manual method used and problems encountered and finally the reason for developing a new system.

2.3.1. The organization and her environment

Preject-e-Delta, Asaba was established in May 2004 to provide human capacity-building technologies, including satellite and wireless internet access, telephony and US instructor-led technical training to workers and students throughout Delta State, as well as to the country's business and government sectors.

Demographic variable

- Preject-e-Delta is a wholly owned subsidiary of Delta state Government, which is based in Delta state, Nigeria.
- Preject-e-Delta has offices and operations in Ministries in Delta state,
- Preject-e-Delta's culture is to strive, control and maintain ICT in Delta state as a whole by providing best in service delivery quality.

2.3.2. Present procedure

The current fashion of attendance management in Project-e-Delta Asaba is poor. For example a worker comes to work by 9.45am, could put down 8.00am as time of attendance. This is not acceptable, because it will slow down productivity in the particular area the worker occupies.

Also, monthly payments are not based on time of attendance to work. A worker could be coming late to work for over a month, and still be paid fully as if nothing is happening.

2.3.3. Organogram to explain power bases

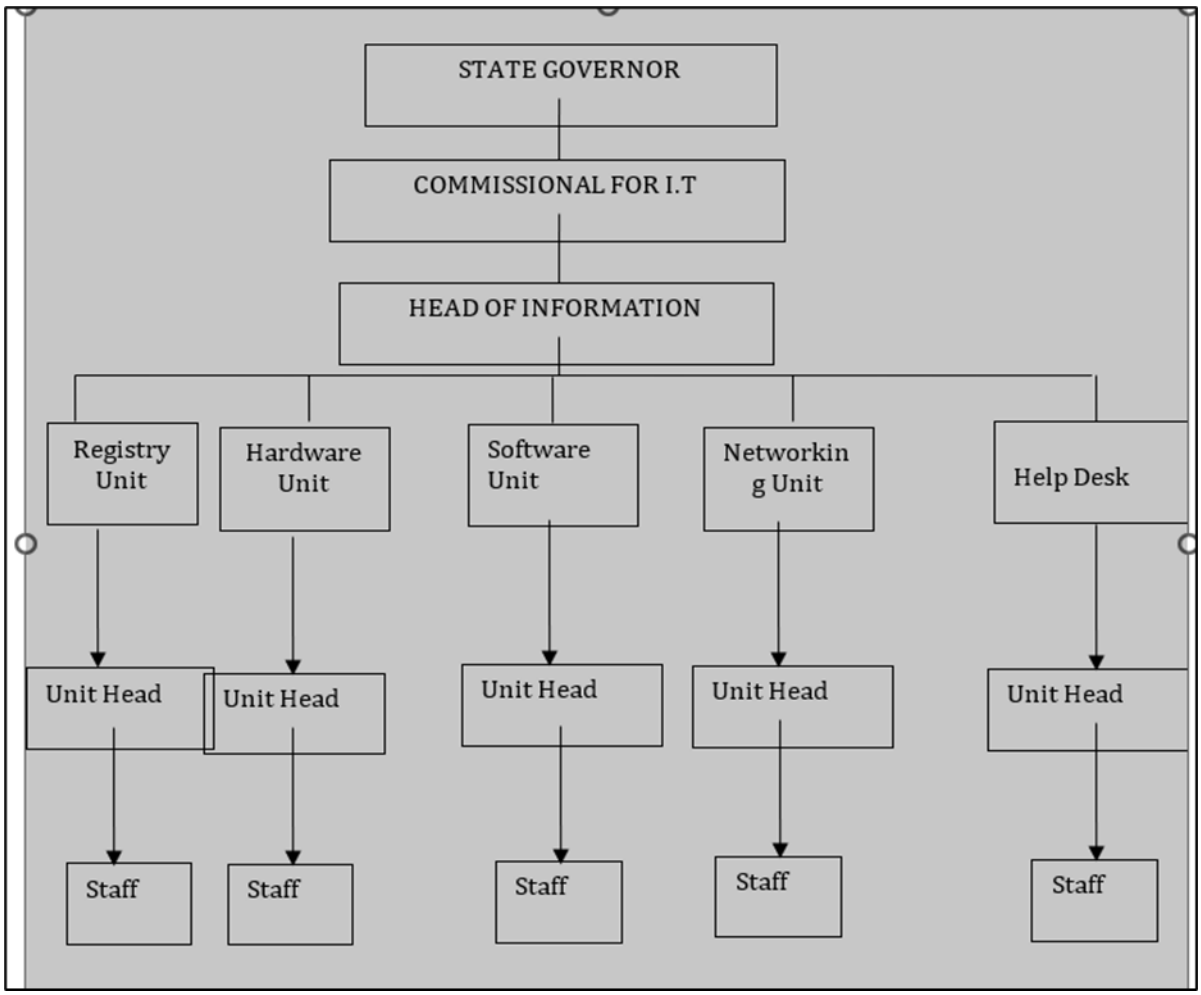

Figure 1 Organogram To Explain Power Bases

2.3.4. Modus operandi (method of operation) of the present system.

Input format

Input involves entering of data in their respective fields in a form.

With computer, data is entered through some input devices such as keyboard, mouse, joystick etc. when staff comes to work; he/she will sign IN and sign OUT when leaving the Office. This is to enable the cultivation of critical interpretation and judgment at the end of the month.

The below structure is the input format

PROJECT-e-DELTA

ID_ NO ……..

PERSONAL DATA

NAME……

Sex……..Date of Birth……

Marital Status……..State of origin……

Unit……

User name……..Password……..

Address……

Age……

Figure 2 Input Format

2.3.5. Output format

Output is the result of the processed data supplied to any system, which could be used for decision making process.

Below is the output format

PROJECT-e-DELTA

LIST OF ALL STAFF

Date……..

Name	Date of Birth	Sex	Marita-status	State of Origin	Unit	Address

Figure 3 Output Format

2.3.6. Data Flow Diagram (DFD).

Wikipedia, the free encyclopedia (2008) defines data flow diagram (DFD) as a representation of the "flow" of data through an information system. NOTE: 'Data' can be understood as anything e.g. raw materials, filed information, ideas etc. which is processed within the system. Tony Drewry (2008) claimed that data flow diagrams illustrate how data are processed by a system in terms of inputs and outputs. The DFD is an excellent communication tool for analysts to model processes and functional requirements.

Data flow diagram notations

A data flow diagram illustrates the process, data stores, and external entities in a business or other system and the data flows between these things.

Four diagrammatical components are used to develop a DFD. These are:

Data flow (represented by arrows)

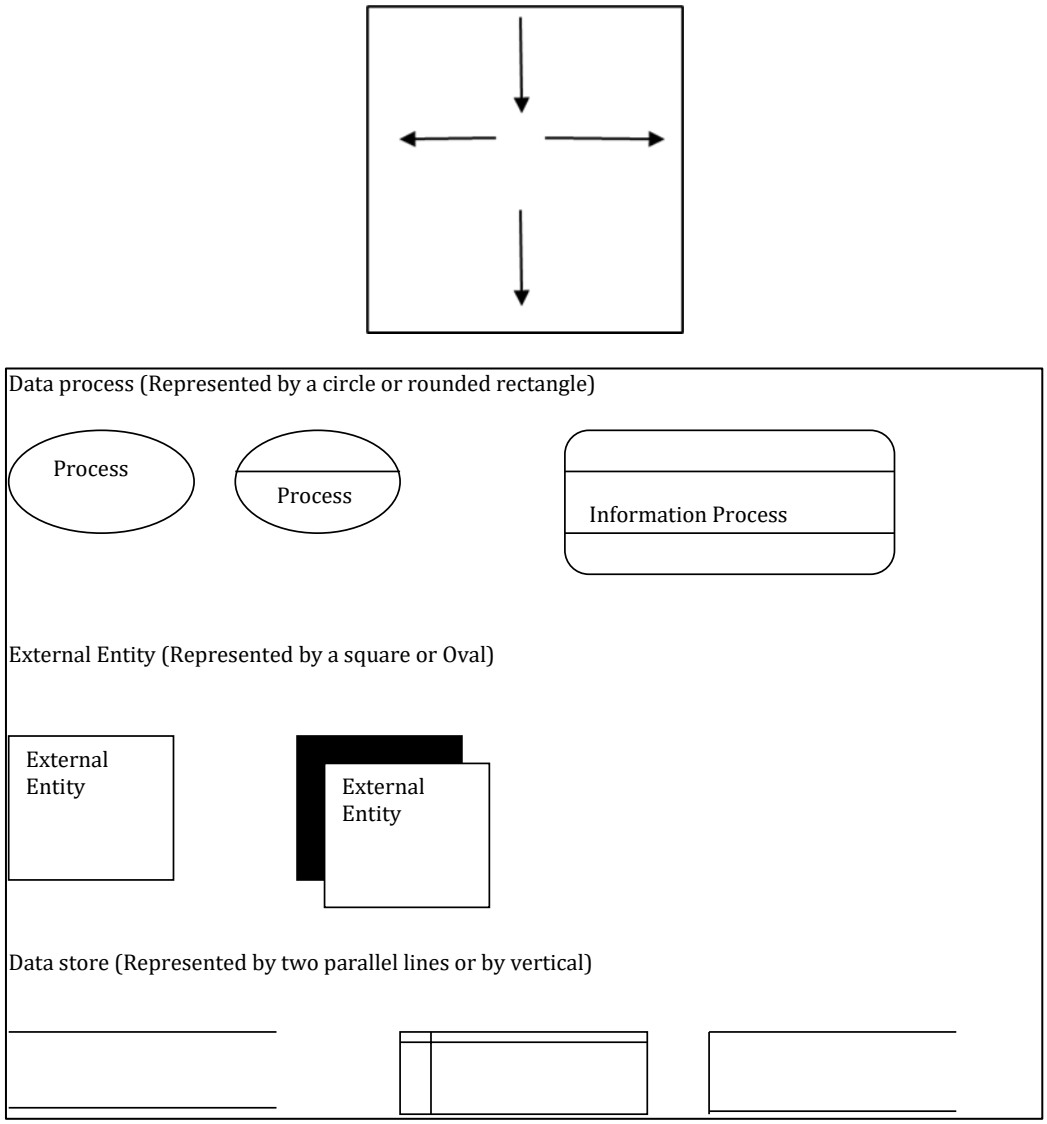

Figure 4 Data flow Diagram Notation

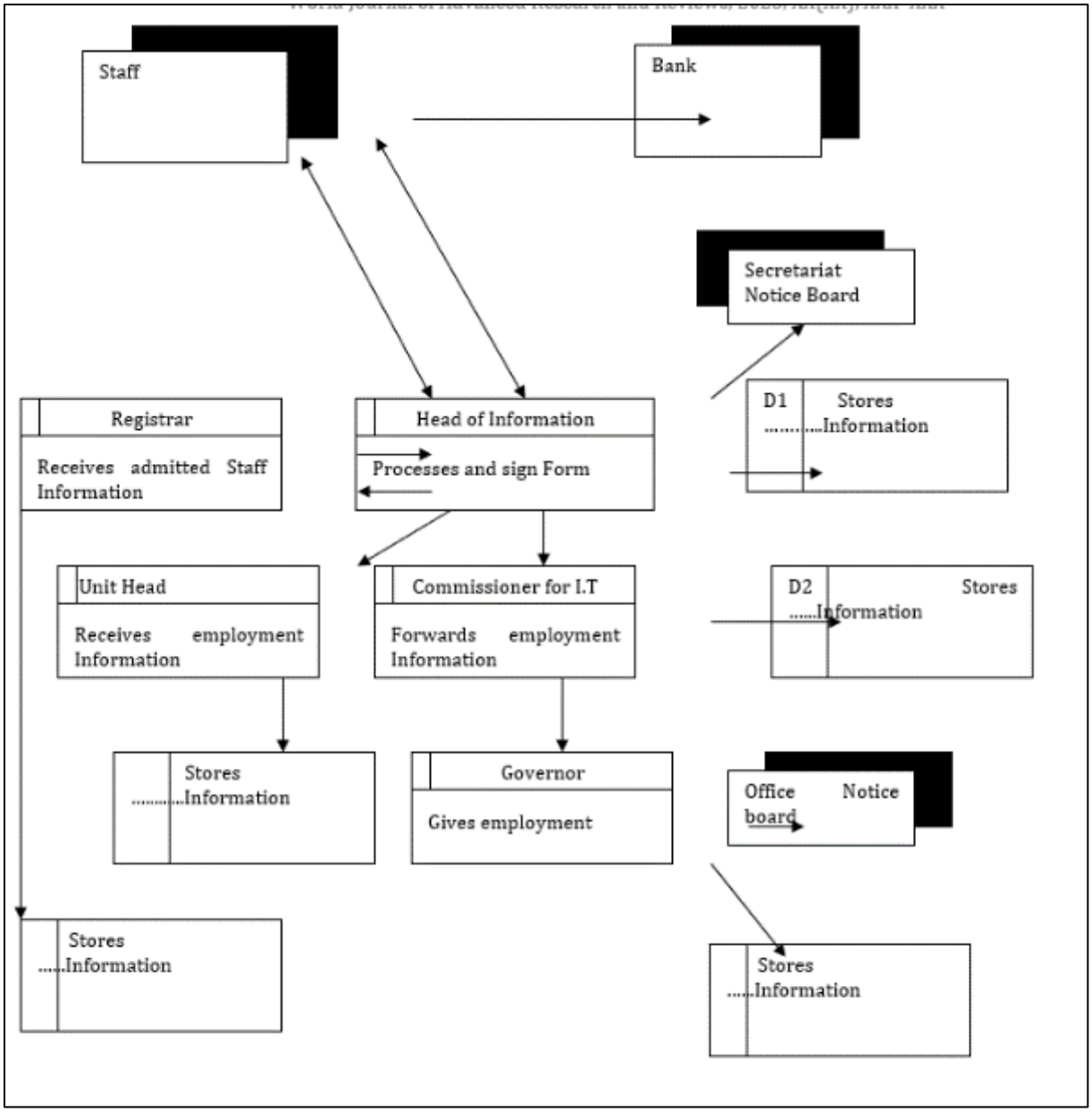

Figure 5 Data flow diagram of the present system

2.4. Information/product flow

2.4.1. Product flow

Project-e-Delta ICT offer a full range of affordable, services, including super-fast, always-on internet access, Voip telephony and support services for students and business including printing, photocopying and facsimile- an exact copy of something.

2.4.2. Information flow

Project-e-Delta offers a unique set of blended training solutions, tailored to meet the needs of every kind of computer user- from beginners to students and professionals looking for advanced career tracks.

Project-e-Delta's systems approach – combining infrastructure services and training- based on years of experience in designing, implementing and operating telecommunications and IT-related projects in more than 15 countries.

2.5. Weakness identified

Weaknesses identified in the present system (Project-e-Delta) are as follows:

- Poor method office attendance system(pen and paper)
- There is no means of having daily reports on each worker's job, at closure.

2.6. Design of high level model of proposed solution

An expert system to provide solution to the issue of attendance in Project-e-Delta should have the following modules:

- An Administrator that oversees the activities of each employee in the workplace.
- A method by which employees accept a unique log on and log out key each day to mark attendance.
- A daily, weekly, or monthly report for jobs done.

3. Results and discussion

3.1. System design

System design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements for the user. System design is a process problem solving and planning for a software solution. It is also to deliver the requirements as specified in the feasibility report.

3.2. Objective of design

This chapter deals with the development of detail pattern and presentation from analysis obtained from the proposed system. The objectives include:

- To track employees time-in to the office and ensure minimal falsification of employees' attendance to work.
- To improve payroll department's capability to pay employees adequately.
- To boost IT technology in this field.

3.3. Program design steps

- Identification phase
- Conceptualization phase
- Formalization phase
- System design phase
- System development phase
- Testing/Evaluation phase
- Prototype phase

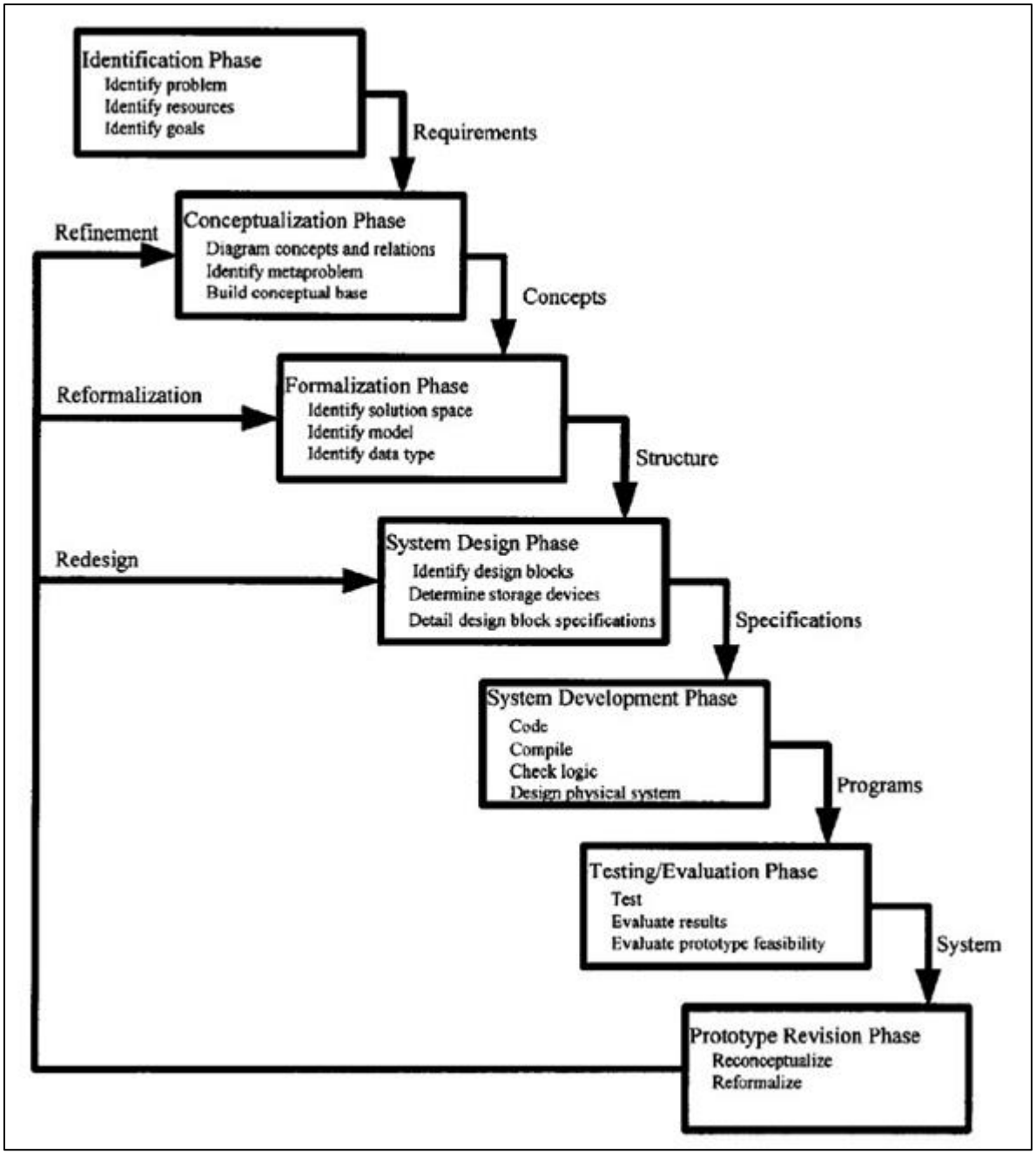

Figure 6 Program design steps/life cycle

3.3.1. Main menu (control centre)

The main menu (Multiple Document Interface) is the bedrock of other modules inside the program. Hence, it is an intermediary among the forms in the program. The organization has a system administrator who oversees all activities of workers. The main menu provides administrative and user privilege access to program modules. The system administrator adds all workers in the organization with the ADMINISTRATOR account option.

The USER account option logs in the employee/worker with the username and password created by the ADMINISTRATOR. The employer logs in with the given password and username from the ADMINISTRATOR.

3.4. Database specification

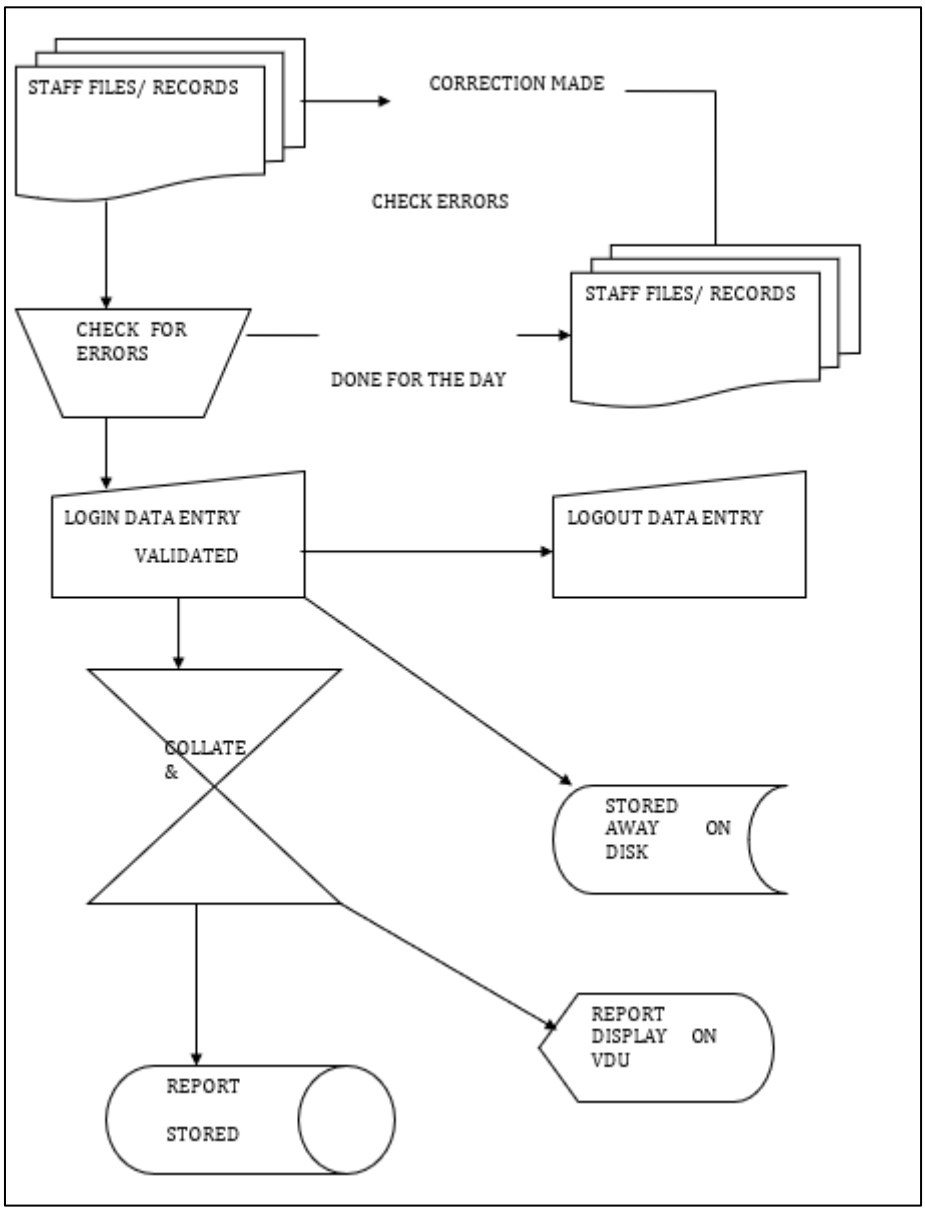

Figure 7 Database Specification

3.4.1. Database for the reasearch

The database that holds data for this program is defined using Microsoft Access 2007. The following modules are inside the database:

Login Password: the administrator has the privileged to view the users' USERNAME and PASSWORD. This is so in case the user forgets his/her password, he/she meets the admin to get it back.

Working days: the administrator specifies the working days the employees should be present for work.

Report: this menu displays the record for office attendance of a worker. It shows the – sign in and sign out times, daily, monthly, and yearly information of the worker. These parameters help to determine attendance report for each employee, and assist the payroll department to pay workers accordingly.

3.4.2. Programs in the control center

The modules included in the main menu (multiple document interfaces) are as follows:

- File: the file menu contains all operations involved in modifying the USER and ADMINISTRATOR passwords, and deletion of USER.
- Database: the database menu checks all records in the database. The login password, the selected working days overall reports of workers' attendance are stored here.
- Reports: this menu contains USER (client) submenu with their username and password. A print option is also provided for safety and storage of the username password in event of forgetting the password.
- Support: the support menu provides the installation, about and warning submenus. The installation gives the directions to set up the software. The "about" submenu displays the program designer, while the "warning" submenu shows that the program is copyrighted.

3.5. Program design specifications

There are many aspects to consider in the design of a piece of software. The importance of each should reflect the goals the software is trying to achieve.

- The output specification
- Processing specification
- Input specification

3.5.1. The output specification

The output specification produces what the software should achieve for the user. In this case, the program gives the time of attendance, the working days, which are used for payroll calculations.

3.5.2. Processing specification

it focuses on the processing of each module individually. It ensures that information within a module is inaccessible to other modules that have no need for such information.

3.5.3. Input specification

The software user interface must be usable for its target user/audience. Default parameters must be chosen so that they are a good choice for a majority of users. The designed system in this research provides an interface for USERS' and ADMINISTRATORS' privilege.

3.6. Input and output specifications

3.6.1. Output specification

The output of a program determines the input and procedure format. It is necessary to consider what is required from a system before deciding on how to set about producing it. The system analyst will need to consider content, format, and frequency of documents to be produced.

There are four (5) major reports generated by the system and 3 sub reports that are very important to the system.

- List of all Late staff
- List of all staff that attended work early
- List of all absence staff
- List of all present staff
- List all staff
- Daily report
- Monthly report
- Yearly report

List of all late staff

Table 1 List of all late staff

Staff Name	ID_Number	Login Time	Logout Time	Day	Month	Year

List of all staff that attended work early

Table 2 List of staff that attended work early

Staff Name	ID_Number	Login Time	Logout Time	Day	Month	Year

List of all Present staff

Table 3 List of all Present staff

Staff Name	**ID_Number**	**Login Time**	**Logout Time**	**Day**	**Month**	**Year**

List of all absence staff

Table 4 List of all absence staff

Staff Name	ID_Number	Login Time	Logout Time	Day	Month	Year

3.6.2. Input specification

Login/logout screen

Table 5 Login/Logout screen

FIELD	**DATA TYPE**	**WIDTH**
Username	Text	30
Password	Numeric	20

Registration form

Table 6 Registration form

Field name	**Data type**	**Width**
Identification Number	Numeric	15
Name	Character	15
Marital Status	Character	8
Sex	Character	6
Address	Character	50
Date of Resuption	Character	10
Unit	Character	10
Password	Numeric	20

3.7. Overall data flow diagram and systems flowchart

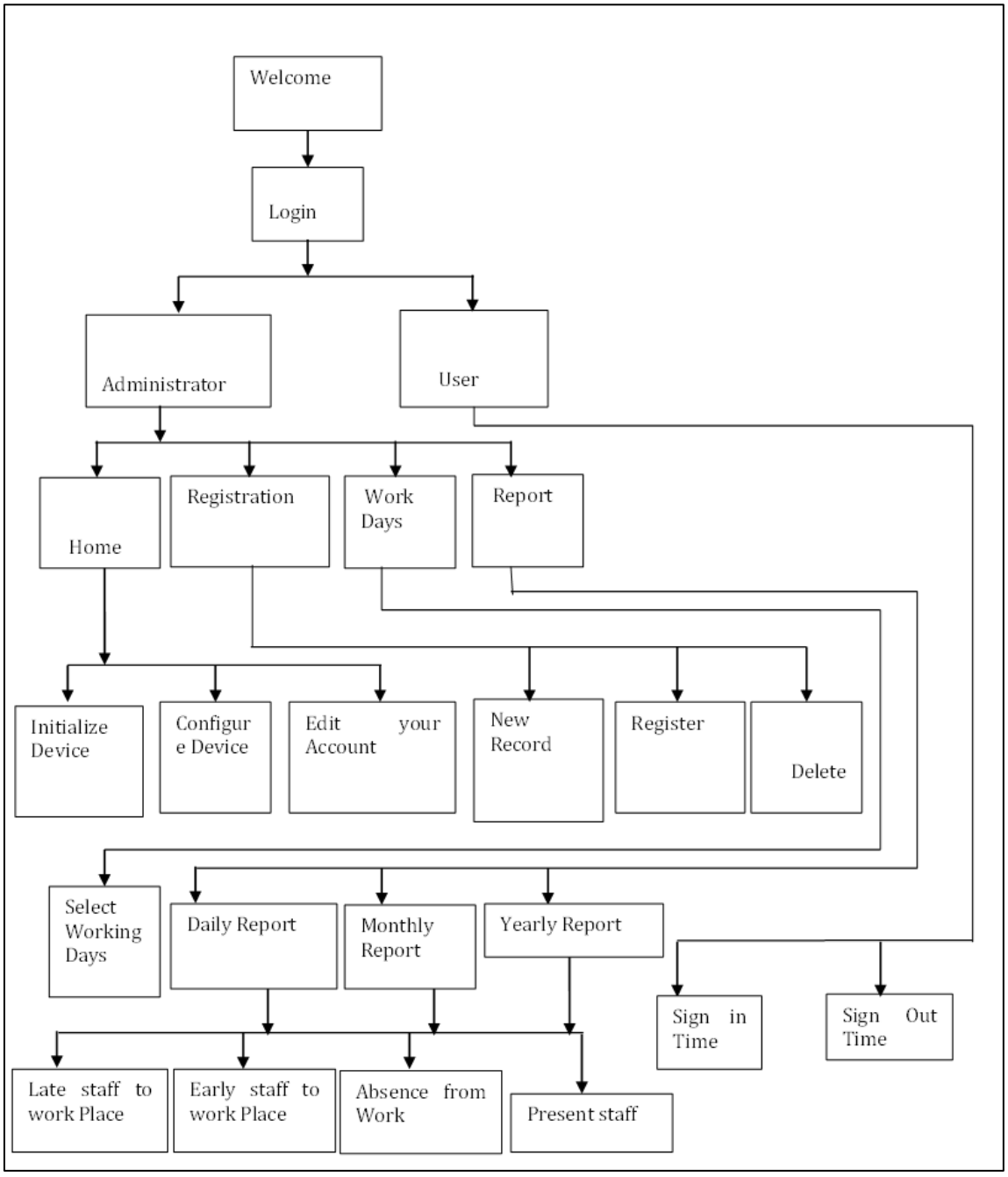

Figure 8 Top-down design of the proposed system

3.7.1. Systems flowchart

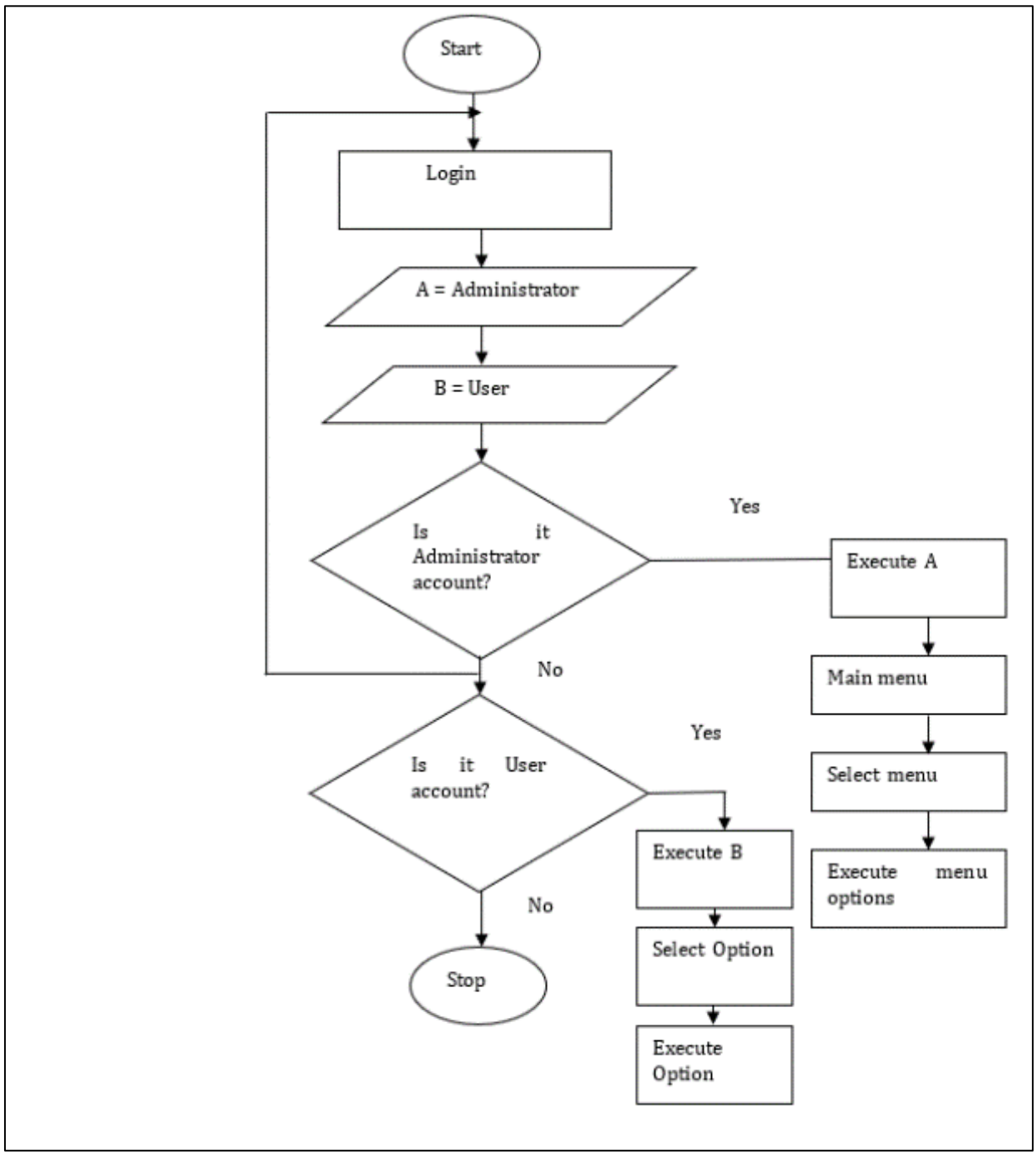

Figure 9 System flowchart of the proposed system

3.8. Algorithm of the proposed system

3.8.1. *Algorithm*

- Open the Program
- Login Form:

  Enter the correct username/password to be granted access to the system

- Registration form:

- Get all personal data from staff
- Save form
- Print confirmation slip of registration(if necessary at that time)
- Goto home page or Exit

- Head of Information Technology (H.I.S) (Processing of staff's Data)
  - Access Database and query it to get staff details automatically
  - Get Daily report
  - Get Monthly report
  - Get Yearly report
  - Take decision based on the data

3.8.2. Data dictionary

- Data dictionary is a traditional and a separate entity understood to contain the description of items in the file or database.
- Data dictionary contains the list of all files in the database, the number of records in each file and the names and types each field contains.

In this new system, the data dictionary for each type of data record stored includes:

3.9. Data dictionary

Figure 7 Data dictionary

Variable names	Meaning
Txtsurname	Textbox for holding surname
Cbomarital	Combo box holding marital status
Cbosex	Combobox for holding sex
Txtaddress	Textbox for holding address
Txtdob	Textbox for holding date of birth
Txtstate	Textbox for holding the state
TxtLGA	Textbox for holding local government
TxtPassword	Textbox containing user password
CboUnit	Combo box containing Unit

3.10. Choice of programming language

The selection of Visual Basic .NET for the programming language used for software design was based on the fact that:

Visual Basic .NET is the programming language the project designer (Obiekezie Chekwube C.Solomon) is capable of using and knows better than other programming languages.

4. Conclusion

Computerizing office attendance in organizations enables organizations to track, plan and transform basic labour data into intelligent information, thereby improving productivity and labour resource utilization. It is a method of managing a whole range of business processes, thereby minimizing time wastage associated with manual methods.

Office attendance software is an efficient tool to manage the whole company's component including level of productivity, resource department data, human resource data, etc. The main function is to capture the time of employee attendance, to avoid error of manual calculation by human.

Office attendance program is an answer or instant solution to an efficient labour management. It will provide a company with an easy time and payment management systematically.

Recommendations

Computerizing office attendance in organizations is new technology in IT and its still developing from one phase to a higher phase. With this tool, the company's management tracks untrustworthy employees who time-in wrongly, for self benefit. In the world of information technology, this software is a great improvement to educate illiterate persons to know more. Also, this attendance software is a powerful tool to improve proper payment of employees as and when due.

Compliance with ethical standards

Acknowledgments

The authors acknowledge the management and staff of project-e-Delta, Asaba, delta state, Nigeria for their cooperation and support during the data collection and system testing process.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Zhu S, Yu T, Xu T, Chen H, Schahram Dustdar, Sylvain Gigan, et al. Intelligent Computing: The Latest Advances, Challenges, and Future. Intelligent Computing. 2023 Jan 3;2. https://doi.org/10.34133/icomputing.0006

[2] Lu H, Li Y, Chen M, Kim H, Serikawa S. Brain intelligence: go beyond artificial intelligence. Mobile networks and applications. 2018 Apr;23(2):368-75. https://doi.org/10.1007/s11036-017-0932-8

[3] Targowski A. The history, present state, and future of information technology. Informing Science; 2016. https://scholarworks.wmich.edu/books/668/

[4] Li D, Du Y. Artificial intelligence with uncertainty. CRC press; 2017 May 18. https://doi.org/10.1201/9781315366951

[5] Garvey C. Artificial intelligence and Japan's fifth generation: The information society, neoliberalism, and alternative modernities. Pacific Historical Review. 2019 Nov 1;88(4):619-58.

[6] Sayers D, Sousa-Silva R, Höhn S, Ahmedi L, Allkivi-Metsoja K, Anastasiou D, Beňuš Š, Bowker L, Bytyçi E, Catala A, Çepani A. The Dawn of the Human-Machine Era: A forecast of new and emerging language technologies. DOI: 10.17011/jyx/reports/20210518/1

[7] Abbott R. I think, therefore I invent: creative computers and the future of patent law. BCL Rev. 2016;57:1079. https://doi.org/10.2139/ssrn.2727884

[8] Dong Y, Hou J, Zhang N, Zhang M. Research on how human intelligence, consciousness, and cognitive computing affect the development of artificial intelligence. Complexity. 2020;2020(1):1680845. https://doi.org/10.1155/2020/1680845

[9] Haseski Hİ, Ilic U, Tugtekin U. Defining a New 21st Century Skill-Computational Thinking: Concepts and Trends. International Education Studies. 2018;11(4):29-42. https://doi.org/10.5539/ies.v11n4p29

[10] Csapó B, Funke J. The nature of problem solving. OECD; 2017. http://dx.doi.org/10.1787/9789264273955-en

[11] Ugada C, Doe-Dartey KK. Methods of Checking Staff Attendance at Work in Managing Universities in Rivers State, Nigeria and Greater Accra Region, Ghana. International Journal of Educational Management, Rivers State University.. 2025 Feb 17;1(2):253-65. https://ijedm.com/index.php/ijedm/article/view/58

[12] Riyanto A, Smith IR. Building an employee attendance system in company. InIOP Conference Series: Materials Science and Engineering 2018 Aug 1 (Vol. 407, No. 1, p. 012018). IOP Publishing. DOI 10.1088/1757-899X/407/1/012018

[13] Morag I, Chemweno P, Pintelon L, Sheikhalishahi M. Identifying the causes of human error in maintenance work in developing countries. International Journal of Industrial Ergonomics. 2018 Nov 1;68:222-30. https://doi.org/10.1016/j.ergon.2018.08.014

[14] Rjeib HD, Ali NS, Al Farawn A, Al-Sadawi B, Alsharqi H. Attendance and information system using RFID and web-based application for academic sector. International Journal of Advanced Computer Science and Applications. 2018;9(1). http://dx.doi.org/10.14569/IJACSA.2018.090137

[15] Kakepoto I, Bhutto NA, Umrani AI. Biometric Attendance Management System: A University Perspective. Global Social Sciences Review, VII. 2022 Jun 30:309-18. https://doi.org/10.31703/gssr.2022(VII-II).31

[16] Lakshmi GS, Ghuli P. Design and Development of Timesheet Management System. Indian Journal of Science and Technology. 2017 Jul;10:27. DOI: 10.17485/ijst/2017/v10i27/115683

[17] Wajcman J. The digital architecture of time management. Science, Technology, & Human Values. 2019 Mar;44(2):315-37. 10.1177/0162243918795041

[18] Tippett E, Alexander CS, Eigen ZJ. When timekeeping software undermines compliance. Yale JL & Tech.. 2017;19:1. https://ssrn.com/abstract=2902756

[19] Gordon NA, Grey S. Approaches to measuring attendance and engagement. New Directions in the Teaching of Natural Sciences. 2018 Nov 30(13). http://orcid.org/0000-0001-6889-0781

[20] Ali A, Mustafa J, Khan IU. Relationship of Biometric Attendance System with Performance, Job Related Stress and Satisfaction of University Teachers in Pakistan. Liberal Arts and Social Sciences International Journal (LASSIJ). 2018 Dec 31;2(2):42-9. https://doi.org/10.47264/idea.lassij/2.2.5