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Design and implementation of academic allowance management information system

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Abstract
An academic allowance calculation has been a major issue affecting the lecturers in institution because they are short paid and the payment is not promptly. Most of the lectures do not even know what academic allowances they are supposed to collect which makes them to do overload which reduce the efficiency of the course allocated. This prompts to the development of academic staff allowance management system.
The methodology used for the implementation was web technology 2.0. Mysql database was used as the back-end, PHP (Hypertext preprocessor) was used as the front end. Apache web server links the administrator and the lecturer platform together to achieve an object oriented features.
It will help to assist lecturer if problem exist for allowance payment and also the computerized system will help to reduce mistakes or frauds associated with manual calculations of academic allowance. Hence, this will help to provide valid and reliable information to aid management decision on matters relating to academic allowance during time constraints.

Keywords: academic, allowance, lecturers, payment, institution

Introduction
An academic allowance is a form of allowance granted for encouraging academic research and training pursuits in educational and institution. This helps to support teaching and or leadership role activities of colleagues. Each of these allowances can be monthly/quarterly or yearly. Computer systems are efficient and achieve results accurately and at great speed if they work the way they are designed to. They have controls provided to ensure this but the controls have to be effective (Alan, 2012). The controls are of great value in any computerized system and it is an important task for academics to see that not only adequate controls exist, but that they also work effectively to ensure results and achieve objectives. Also controls should be commensurate with the risk assessed so as to reduce the impact of identified risks to acceptable levels and to enable them know the allowance associated with a particular course so that they will not be short paid.

Computerize academic allowance management system reduces computational error due to involvement of a computer. It's also increases performance of auditing in terms of speed, and reliability. Generate Management Information and other reports for decision making. It will help to assist lecturer if problem exist for allowance payment and also computerized help to reduce mistakes or frauds associated with manual calculations of academic allowance. Hence, this will help to provide valid and reliable information to aid management decision on matters relating to academic allowance during time constraints

All research active colleagues (including Research Assistants and those confirmed by the Institution will be eligible for this allowance. The forms of academic allowance includes
i. Excess Work load
ii. Project supervision
iii. Marking allowance
iv. Moderation of undergraduate/post graduate examinations
v. Postgraduate study grants

The aim of this research is to develop a system that will help lecturer to determine the academic allowance based on the duty assigned. The objectives include;
i. To design a system to calculate an academic allowances of academic staff

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i. To implement the system in (1) above
ii. To test the developed system in (2)

Review of Existing Systems
The first software to be tested against the Sample Errors Spreadsheet was Excel's own built in academic allowance functions. These built in functions were unique, in that, as they are included in Excel as standard, they were also used to supplement other software tools tested. As a general rule, the test utilized the built in functionality when testing other software tools only when the software had indicated potential errors within the cell or range of cells (Aagarwarl, 2013).) .

In the test, which was performed largely on a cell-by-cell inspection basis, the built in functions successfully highlighted the four 'formulas overwritten by values' errors, using both the view formula mode on the offending worksheets, and by showing that the cells in question did not contain any precedents. The functions failed to identify the use of a constant in a formula as a potential error, and had no options to identify patterns in labels on the report sheet so failed to identify the 'illogical presentation' error. As the built in functions required the user to remove worksheet protection before use, and makes no attempt to identify unprotected cells, the functions failed to find the 'incorrect protection' error (Belle et al, 2014).

The built in functions had more success on the three mechanical errors, only struggling on the formula that involved a totaling of separate rows rather than a whole column. On the first three logical errors (domain errors) the functions clearly showed the constituents of the formulae, but this gave no suggestion that the constituents were incorrect. The built in functions fared slightly better on the final two logical errors (totaling and averaging of percentages) although it would still be possible for the user to overlook these errors, particularly if the user did not posses sufficient domain knowledge. The built in functions failed to indicate any possible errors in the final two errors in the test, both omission errors.

The major drawback of the built in analyzing tools in Excel for calculation of academic allowance is the fact that in the majority of cases, the tools are used on an individual cell basis that means that the auditor is, in effect, doing a cell-by-cell inspection. Whilst this has proven successful in tests, and the auditing functions provide a more visual representation of the cell under investigation, a major reason for using a software tool is to reduce the time spent on allowance calculation by avoiding the time-consuming cell-by-cell method. The built in tools prove useful in the investigation of single cells and as a result can be used alongside other tools. The built in functions do not, however, provide the user with any guidance to identify potentially unsafe cells (Barney, 2014).

The Spreadsheet Detective is an Excel add-in and is produced on a shareware or license ware basis by Southern Cross Software. The full registered version costs approximately £ 100. Unlike the test on the built in auditing functions in Excel, the test of The Spreadsheet Detective was not done on a cell-by-cell inspection basis. The first is the identification of formula schema, which should mean that the user has to check far fewer formula than under a cell-by-cell inspection method, as copied formula are identified as belonging to the same schema and therefore need not be checked. The second is the listing of potential problems such as references to non-numeric cells or unprotected schema in the footer report. On the test itself, The Spreadsheet Detective performed particularly well, only really struggling on the errors that were particularly difficult to find. The annotate sheet function which provided an overlay to a worksheet with different types and colours of shading and text descriptions of formulae, meant that the first four errors concerning formula that were overwritten as values were obvious.

The footer report included a list of potential error cells including the 'constant in formula' error so this was also easy to find. The software failed to highlight the 'illogical presentation' error, although this could come to light when the adjacent cells are examined as they were deemed to be within a new formula schema as the order had changed. The 'incorrect protection' error was particularly easy to identify as unprotected cells were listed in the footer report despite the fact that worksheet protection had been disabled (Bo-Hanson, 2010).

The Spreadsheet Detective achieved two 'almost-passed' and a 'passed' result for the three incorrect summation errors. It achieved the 'passed' result because of the automatic naming function which shows the formula in an English language type format, based upon the row and column headings, which meant that the error resulting from totaling the wrong rows stood out. The two logical domain errors, involving formulae looking at the wrong columns, were also much easier to find due to the automatic naming function. The error concerning the total formula that included both sub totals and detail lines was highlighted in the footer report under references to non-numeric as it also included blank cells, so this was also easy to identify. A combination of the new schema shaded overlay, and the automatic naming function, meant that the totaling and averaging of percentages errors were relatively easy to identify. The lack of any un-referenced cells identification, or label pattern recognition, meant that the software did not highlight the final two omission errors.

The Spreadsheet Detective proved successful in the test, and has many functions that go well beyond those errors in the test spreadsheet. The two pronged approach of using an overlay to identify formula schema and types of cell, and having a summary report of potential errors, meant that the user was guided towards many of the errors by the software, the summary report proving particularly useful in identifying the more subtle errors such as unprotected ranges. The automatic naming of the constituents of formulae worked well in the errors spreadsheet, although this may prove less useful in a spreadsheet that is not as logically laid out with easy to identify row and column labels. However, this naming function remains one of the best features of the software and could even encourage developers to design spreadsheet models in a more logical way, to comply with these naming conventions.

Dehning (2015). The Excel Auditor is an add-in for Excel and, despite its name, provides many functions outside the usual scope of auditing software.

The Excel Auditor provides two primary and two secondary auditing tools. The primary tools being the Audit Map, which provides a traditional audit map of a worksheet, and the Worksheet Cell Analyzer, which documents the contents of a worksheet's cells. Both of these tools produce a report on a separate workbook. The secondary tools are the Cell Roots and Circular Reference

Analyst functions.

On the test itself, The Excel Auditor performed poorly. Unlike the test of Excel's built in auditing functions, The Excel Auditor was not tested on a cell-by-cell inspection basis. This was because a primary aim of a supplementary auditing package should be to save the auditor the time that would be taken if a cell-by-cell inspection were necessary, and also to keep the test consistent with the other supplementary tools tested in this report. Unfortunately this meant that The Excel Auditor did not perform as well as the Excel functions due to the method of testing (Dennis, 2015).

Methodology

Use of the internet, banking journals and other library materials. Very close observation was taken about how the process described above takes place in the banks, the various process and the various approval level before the credit is finally granted

System Model and Design

Every system inform of software such as academic allowance must pass through some stages of development to ensure proper documentation of the implementable system. This stages of development enable this developer i.e. programmer to develop with ease a usable system for the end user i.e. consumer. These stages of development are been illustrated inform of a software engineering approach as waterfall model.

1. Requirement Gathering and Analysis.
2. Design Phase.
3. Implementation (coding).
4. Testing/Verification.
5. Maintenance.

Requirement Analysis

In this stage, all possible requirements of the system to be developed are captured and documented in a requirement specification doc. This phase or stage allows the developer or programmer to have a clear vision of what the entire system itself requires. At this stage the developer is concerned about what the inputs into the system are. In academic allowance system dealing storage of staff records, the inputs into the system are listed below.

1. Staff type (Teaching or Non-Teaching).
2. Staff full name.
3. Marital Status (Single or married).
4. Sex (male or female)
5. Arrival Status (Visiting or Permanent).
6. Educational Qualification.
7. College Staff belongs to.
8. Department Staff belongs to.
9. Course of Study.

This information listed above serves as the input into the academic allowance and is required by all staffs in a university system. For future retrieval of the above inputs or information, a data base for records storage is required. This data base stored staff records in a manner that is easy to edit and understand for maintenance purpose. Every record of staff that is sent into the data base by the academic allowance system is in form of "Text or String". The data base been used for this research is a Microsoft Access 2007 data base been protected by a password for security purpose. This base is very easy to integrate with the IDE (Microsoft Visual Studio (2012)) been used to develop the academic allowance system. Every information listed above are been provided by staff into a form before been converted to digital format by the computer sand saved into a data base designed for the academic allowance system.

Design Phase

In this phase, the requirement specifications from first phase (Requirement gathering/ analysis) are studied in this phase and system design is prepared. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture. In the design of academic allowance system, every input that is required in the first phase must be linked together in a manner that they must work together by activating one another after a certain records is been filled by the software or program user.
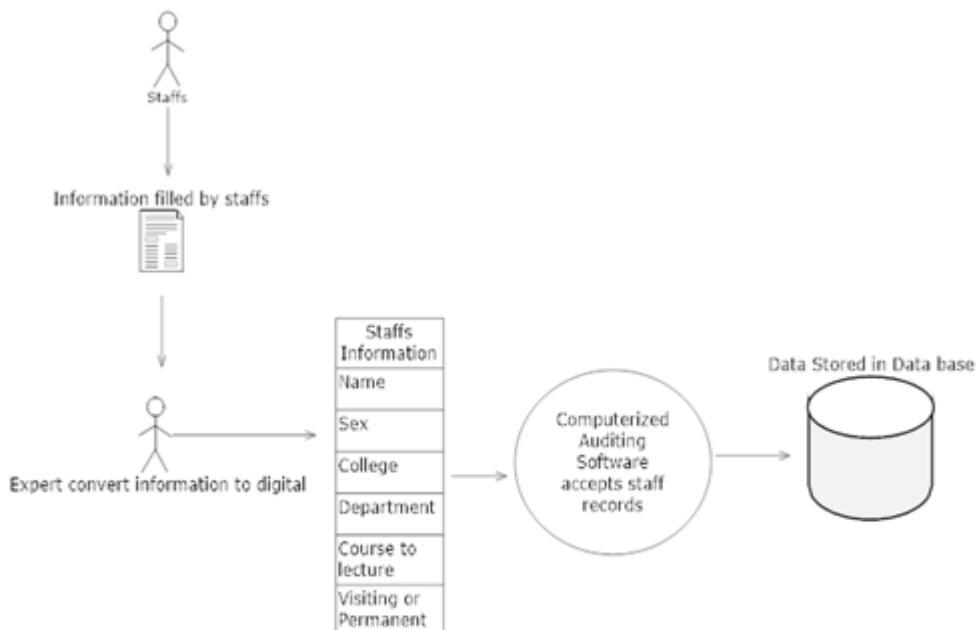
Fig 3.3: Model for academic allowance System.

Fig 3.3 above is the model of the academic allowance system. The staff will fill in the details of the allowance , the information will be converted to digital form before processed by the developed application and then stored in the database for processing and future use.
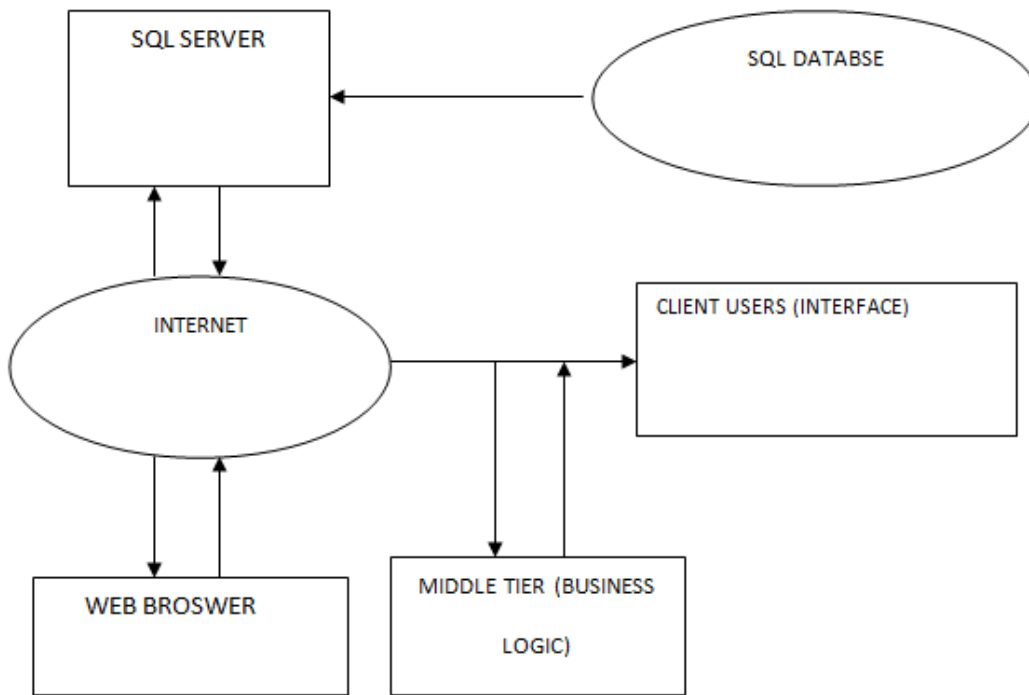

Fig 3.4: Showing web server architecture

Fig 3.4 above illustrate the web server architecture, this examines the relationship between the lecturer in charge who is the client and the server with the middle tiers. The web browser is the platform that integrates the client and server and the result stored in database with the help of SQL server.
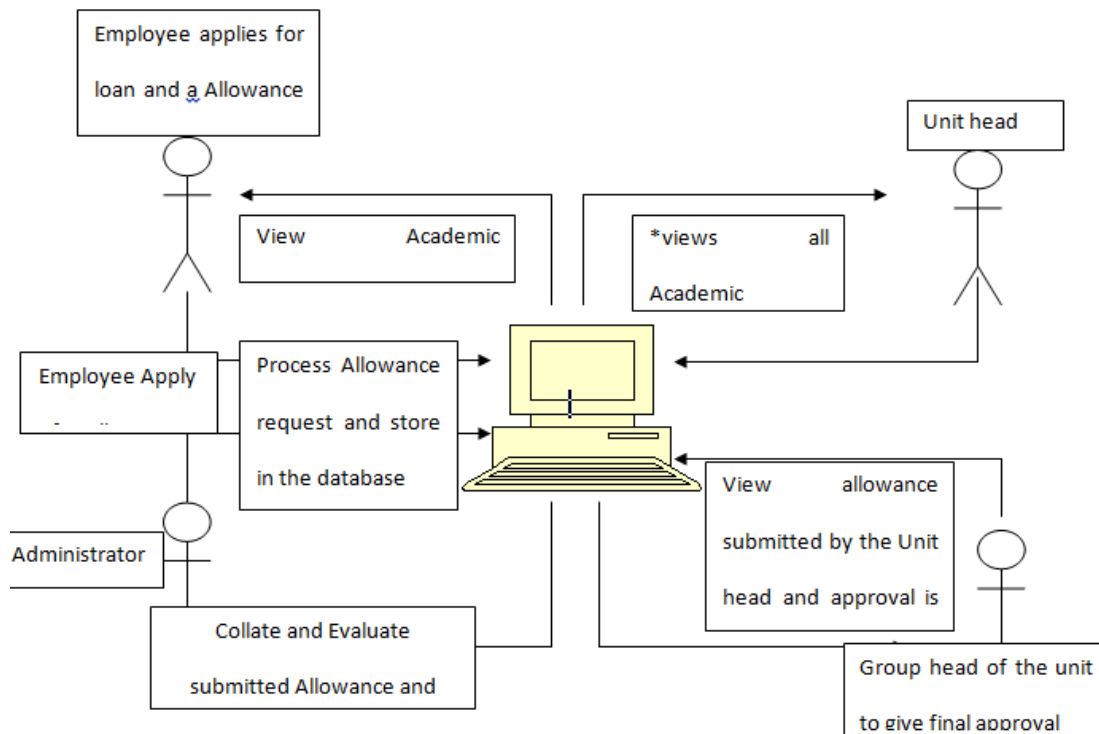
Fig 3.5: Use-Case Model Diagram of Academic Allowance

Fig 3.5 is the Ucase diagram. The lecturer fill in the allowance from his system and the allowance value will be calculated by the system while the result will be displayed on the monitor

Test and Result
Software Tools
1. Microsoft Visual studio 2005/2003 C# programming language

2. Microsoft SQL 2008 server as database
3. Microsoft Visio 2003 for flow chart design
4. ER Database Model Diagrams
5. Hardware tools
6. Windows server 2008 for implementation and deployment
7. Windows XP operating system for development

Fig 4.1: Server Configuration.

Fig 4.1 is the server configuration of the databse and the apache webserver. This helps the middle tier application to be integrated. The developed allowance application will be accesses and use by all lectures in different institution based on the allowance calculation formular for each institution.
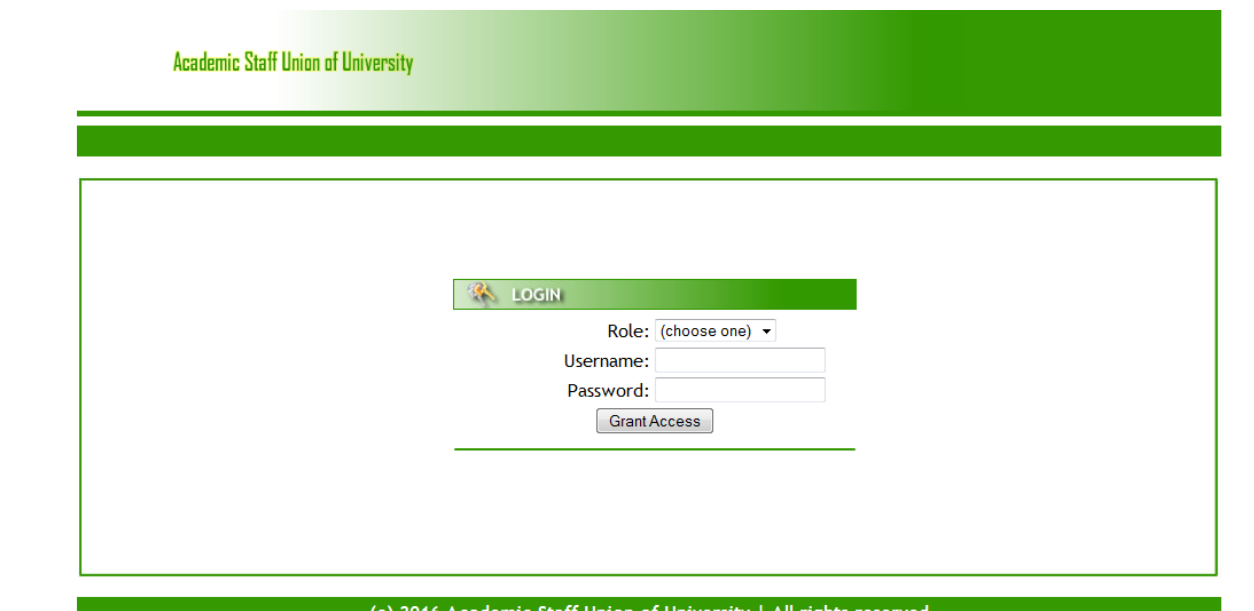
Fig 4.2: Login Page

Fig 4.2 is the login page . there are two type of roles. We have the lecturer and admin. The lecturer will log on with the username and password given by the admin. Once access is granted, dashboard will be displayed.

Fig 4.3: Access Page.

Fig 4.2 is the access page for the admin. The admin can register new lecture, calculate workload for the lecturer and give lecturer access to the developed program so that they will be able to know if they are short paid.

Fig 4.4: Lecturer Details

Fig 4.4 is the lecturer profile after registration. This shows the biodata of the lecturer with his appointment details.

FIRST NAME	Adegoke	OTHER NAME	Hammed	STAFF EMPLOYMENT NUMBER	1234	RANK	Senior Lecturer

DATE OF APPOINTMENT	28-5-1999	SESSION:	2014/2015	DEPARTMENT	Mathematic	FACULTY	BAS	SERIAL	1006

WORKLOAD INFORMATION

	Course Code	Credit Weight (a)	Level (L)	Students Enrolment (b)	Ration of Teaching (r)	Students Load M= b x r	Credits Load H= a x L	Approved Students: Staff Ratio (R)	K= 15 x R
First Semester	Mth 101	3	100	100		0	300	FAIS=30:1	450
	Mth 201	2	200	50		0	400	EDU=30:1	450
	Mth301	4	300	25		0	1200	LAW=30:1	450
						0	0	SMS=30:1	450
						0	0	Scl=20:1	300
						0	0	ENGR=15:1	225
						0	0	AGRIC=15:1	225
						0	0	FCSIT=15:1	225
						0	0	ENVIR=15:1	225
						0	0	PHARM=15:1	225
Second Semester	Mth 102	3	100	85		0	300	MED=10:1	150
	Mth 202	4	200	45		0	400	DENT=10:1	150
	Mth301	3	300	23		0	1200		

PSC(Project Supervision Component)	0
MR(Marking Ratio)	0
EWLU(Excess Workload Units)	4058.3333333333
EWLA(Excess Workload Allowance)	81,166.67

<<Prev	Exit	Reset	Insert	Update	Load Allowance	Get	Generate Report	Next>>

Fig 4.5: Output Requirement.

Fig 4.5 is the allowance allocation form. It might be different for each institution. This includes the project supervision, excess workload, marking and lot more

Conclusion and Recommendation

Development of an academic allowance management and processes solution to monitor facility acquisition of an employee in an organization; the solution will look into the process of facility acquisition through the various approval levels. This system was developed with PHP and Mysql database. Apache web server was used for the deployment of the developed web application program. This will enable the staff to know when there is excess workload and the amount attachable to it. Internet information services which work on all windows 7 or higher was integrated with the web server to make the application accessible to all tertiary institutions.

This paper "academic allowance management information" was recommended to be used by the academic staff of tertiary institutions to be used in order to process staff allowance schemes by making adjustment to the allowance scales formula. Future work should focus on addition of application protocol interface that will send SMS to the lectures in charge to know the status of his allowance.

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