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MODELLING OF WEB-BASED VIRTUAL UNIVERSITY ADMINISTRATION FOR NIGERIAN UNIVERSITIES

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Abstract

This research work focused on development of a model of web based virtual University Administration for Nigerian universities. This is necessary as there is still a noticeable administrative constraint in our Universities, the establishment of many University Web portals

notwithstanding. More efforts are therefore needed to enhance or improve on the software that drives these portals to make them more efficient and render real time services. The model enables members of academic community to set up curriculum, register students and staff, enter exam scores, post news, view results, pay school fees, request for transcripts, obtain vital information from the university and update information on daily basis. The model has a watch-dog monitor called Web Patrol that monitors and keeps a log of the transactions by students and staff. The methodologies adopted for this work are top-down, prototyping and Structured Systems Analysis and Design Methodology (SSADM). This research work helps in bringing university administrative products and services to the door steps of people, thereby reducing administrative bottleneck witnessed in our universities today. It generates results and transcripts, thereby solving the current problems of delay in result and transcript processing and transfer in our universities.

Introduction

Recently, the number of staff and students in tertiary institutions has tremendously increased. This has resulted to managing larger number of staff, students and large amount of data generated. These data if not well managed are bound to constitute a problem. This might be the cause of delay in rendering of real time services by some universities in terms of computation of results, issuance of certificates, transcripts and information dissemination. Commenting on the challenges facing Nigerian Universities, Ogu (2008) observed that Nigerian University education needs reformation for it to meet the societal needs. Nigerian universities must seek to remove the constraints that prevent them from responding to the needs of rapidly changing society. This can only be achieved by introducing democratic university structures and management style.

Writing on transcript request from Nigerian universities, Abidde (2008) noted that:

If you have ever attempted to secure academic transcripts from any Nigerian University, or from other institutions of higher learning, you will know how difficult and frustrating it can be; and in fact such difficult experience is not limited to schools. Procuring medical records or government documents can also be an uphill task. Although securing documents and transcripts may be easier if you live in Nigeria, attempting to do so from abroad can be annoying, traumatic and time consuming. I am in line to believe that it is easier to rob a bank than to secure transcripts and other official documents.

Abidde also stressed that apart from the official fee to be paid to the school, facilitators within the university system would need their palms to be greased. Moreover, friends and relatives who spent their time going back and forth must be compensated. Therefore, transcript that ordinarily should cost less money may end up costing more.

Adekiigbe and Amosa (2009) observed administrative problems in the issuance of transcripts in our tertiary institutions of higher learning. According to them, one of the top challenges for institutions and students of higher learning in Nigerian today is the issuance and collection of transcripts respectively. Students sometimes apply for transcript from their respective institutions and it takes several months before such transcript could be issued to the applicants. These scenarios do cost the applicant a number of failures. Admission process is not complete without including the transcripts with the admission forms especially for students going for higher degrees in other institutions. So, in some cases students lose admission due to late arrival of transcripts.

Ifedili and Agbaire (2011) noted that record keeping in Nigerian universities was below average. They stressed that the essence of good record keeping is to make the right information available to the right person in the right order at the right place and time with the most

minimal of cost. Nwangwu (2008) observed that there exist a general low –level of utilization of the web for sharing and dissemination of information produced by Nigerian universities. Almost all Nigerian universities have web portals which are supposed to add Information Technology (IT) content into university management. One, therefore, wonders why Nigerian university administration is facing a lot of problems in the presence of universities web portals. Speaking on the importance of technology as a change agent, Emeagwali (2009) contended that intellectual capital and technology now rule the world and that natural resources such as gold, diamond, oil, etc, are no longer the primary determinant of wealth. In view of the above, almost all businesses and organizations especially in advanced countries have become aware that they must adapt to the changing technology or be left behind. To remain afloat in the competitive world, Nigerian universities should adapt to technology that is prevalent in advanced countries.

Our universities being citadel of learning should lead the way so that others can follow. Universities administrative offices should not only be automated but should adopt a web-based virtual administrative system. It is against this background that modeling of a Web-based Virtual University Administration (WEBVUA) becomes imperative.

Virtual university administration model when designed and implemented is expected to perform among others the following tasks:

- Give comprehensive online services to students, staff, ex-students, prospective students and other members of the academic communities.
- Provide services to those who are unable to make physical contact with the university due to distance.
- Provide real-time services to people, thereby making university administrative services flexible.

The new proposed system when implemented is bound to enhance university administration and remove administrative bottlenecks in our universities.

Today many tertiary institutions are trying to change from orthodox way of carrying out tasks to electronic method - hence the existence of universities' web portals. They run critical tasks of admission and course registration on the internet. This has brought about efficiency in those areas covered (Sadiq et al, 2008). As the orthodox way of University Administration is no longer satisfactory, some University authorities took a giant stride and adopted web portal solution. In doing this, many vital areas were neglected or considered unimportant and the portals were not primarily designed to cater for the entire University Administration

Materials and methods

Data collection

Data was collected from primary and secondary sources.

Primary data source: In the primary data collection, major sources of data were through interview and questionnaire. Oral interview and filling of forms were used to find out the functions of various sections of university administration, such as, the Registry, Bursary, Vice Chancellors office, student affairs, and faculty. Copies of questionnaire were directed to sampled students and staff of computer science of sampled universities. Data collected border on modus operandi of the universities. Copies of the questionnaire were distributed and collected by the researcher and his aides.

Secondary data source: Secondary data was collected from the records kept by the university. Data and information were also collected from web documents including various university web portals. A lot was revealed from secondary data, especially from the web.

Research questions

This study is based on the following research questions.

- (i) To what extent has the current University web portals helped to enhance University administration?
- (ii) What are the challenges facing the current University web portals.
- (iii) How can management/administration be improved in our tertiary institutions.

Research hypothesis

The following hypothesis were formulated to guide this study

Ho: There is no significant effect of the existing web portal on university administration.

Hi: There is significant effect of the current web portal on university administration.

Ho: There are no significant challenges facing the current university web portals.

Hi: There are significant challenges facing the current university web portals.

Ho: Web based virtual university administration software cannot improve university administration.

Hi: Web based virtual university administration software can improve university administration.

Test of hypothesis 1

Table 2.1: The extent of contribution of the current web portals to university administration

Question item No	SA	A	D	SD	Total
1.	(49.29) 88	(59.29) 78	(54.29) 21	(37.14)13	200
2.	(49.29) 68	(59.29) 62	(54.29) 40	(37.14) 30	200
3.	(49.29) 17	(59.29) 19	(54.29) 86	(37.14) 78	200
4.	(49.29) 40	(59.29) 87	(54.29) 60	(37.14) 13	200
5.	(49.29) 60	(59.29) 79	(54.29) 40	(37.14) 21	200
6.	(49.29) 5	(59.29) 15	(54.29) 93	(37.14) 87	200
7	(49.29) 67	(59.29) 75	(54.29) 40	(37.14) 18	200
Total	(49.29) 345	(59.29) 415	(54.29) 380	260	1400

$$X^2 = \sum \frac{(O-E)^2}{E}$$

E

Degree of freedom = (R-1) (C-1)

$$= (7-1) (4-1) = 6 \times 3 = 18$$

At 0.05 level of confidence

Table 2.2: Calculation of chi-square

Observed Oi	Expected Ei	Oi – Ei	$\frac{\sum(Oi-Ei)^2}{Ei}$
88	49.29	38.71	30.40
78	59.29	18.1	5.53
21	54.29	-33.29	20.41
13	37.14	-24.14	15.69
68	49.29	18.71	7.10
62	59.29	2.71	0.12
40	54.29	- 14.29	3.76

30	37.14	-7.14	1.37
17	49.29	-32.29	21.15
19	59.29	- 40.29	27.38
86	54.29	31.71	18.52
78	37.14	40.86	44.95
40	49.29	- 9.29	1.75
87	59.29	27.71	12.95
60	54.29	5.71	0.60
13	37.14	- 24.14	17.07
60	49.29	10.71	2.33
79	59.29	19-71	6.55
40	54.29	- 14.29	3.76
21	37.14	- 16.14	7.01
5	49.29	- 44.29	39.80
15	59.29	- 44.29	33.08
93	54.29	38.71	27.60
87	37.14	49.86	66.94
67	49.29	17.71	6.36
75	59.29	15.71	4.16
40	54.29	- 14.29	3.76
18	37.14	- 19.14	9.86 =480.55

X^2 Critical value at 0.05 level of significance and 18 degree of freedom is 28.9

X^2 – calculated = 480.53

X^2 – critical = 28.9

Degree of freedom = 18

Level of significance = 5%

Since X^2 calculated value exceeds the X^2 critical value (ie 480.53 > 28.9), we rejected the null hypothesis and accepted H_1 hypothesis. This implies that there are significant effects of the existing web portals on university administration.

Test of hypothesis 2

Table 2.3: Challenges from current university web portals.

Question item No	SA	A	D	SD	Total
1.	45 (62.29)	74(63.29)	51(45.57)	30(28.86)	200
2.	68(62.29)	61(63.29)	29(45.57)	42 (28.86)	200
3.	70 (62.29)	57(63.29)	52(45.57)	21(28.86)	200
4.	78(62.29)	62(63.29)	33(45.57)	27(28.86)	200
5.	60(62.29)	82(63.29)	34(45.57)	24(28.86)	200
6.	48(62.29)	32(63.29)	80(45.57)	40(28.86)	200
7.	67(62.29)	75(63.29)	40(45.57)	18(28.86)	200
Total	436	443	319	202	1,400

$$\begin{aligned} \sum (O_i - E_i)^2 &= 4.80 + 1.81 + 0.65 + 0.045 + 0.52 \\ &\quad + 0.08 + 6.03 + 5.98 + 0.95 + 0.63 + 0.91 \\ &\quad + 2.14 + 3.96 + 0.03 + 3.47 + 0.12 + 0.084 \\ &\quad + 5.53 + 2.94 + 0.82 + 3.28 + 15.47 + 26.01 \\ &\quad + 4.30 + 0.36 + 2.17 + 0.68 + 4.09 \\ &= 97.86 \end{aligned}$$

Chi-square calculated = 97.86

Chi-square critical = 28.9

Degree of freedom = 18

Level of significance = 5%

Since X^2 calculated is greater than X^2 critical (i.e. $97.86 > 28.9$) we reject the null hypothesis and accept the alternative. This implies there are significant challenges facing current university web portals.

Test of hypothesis 3

Table 2.4: How management and administration of our university can be improved

Question item Number	SA	A	D	SD	TOTAL
1.	66 (66.57)	66 (70.71)	42 (35.00)	26(27.71)	200
2.	80(66.57)	74(70.71)	22(35.00)	24(27.71)	200
3.	58(66.57)	79(70.71)	30(35.00)	33(27.71)	200
4.	84(66.57)	78(70.71)	28(35.00)	10(27.71)	200
5.	51(66.57)	65(70.71)	41(35.00)	43(27.71)	200
6.	64(66.57)	66(70.71)	42(35.00)	28(27.71)	200
7.	63(66.57)	67(70.71)	40(35.00)	30(27.71)	200
TOTAL	466	495	245	194	1,400

$$\frac{\sum (O_i - E_i)^2}{E_i} = 0.004 + 0.31 + 1.40 + 0.11 + 2.71 + 0.22 + 4.83 + 0.5 + 1.10 + 0.97 + 0.71 + 1.01 + 4.56 + 0.75 + 1.40 + 11.32 + 3.64 + 0.46 + 1.03 + 8.44 + 0.10 + 0.3 + 1.40 + 0.03 + 0.19 + 0.19 + 0.17 + 0.19 = 43.78$$

Chi – square calculated value = 43.78

Chi – square critical value = 28.9

Degree of freedom = 18

Level of significance = 0.05

Since X^2 calculated value is greater than X^2 critical value (i.e. $43.78 > 28.9$), we reject the null hypothesis and accept the alternative, which implies that web based virtual university administration software can improve university administration.

Limitation of the existing system

From the foregoing discussion, there is no doubt that the current web portals have helped in enhancing university administration electronically, though not without their limitations. From web and survey research carried out, it has been discovered that the current web portals have the following limitations:

- i. The web portals do not cover all the critical needs of university administration
- ii. Most web portals do not take care of transcript processing and transfer.
- iii. Most portals are information portals and are not very interactive
- iv. The portals are updated by network administrator or the designer at a given interval or on request by management. Updating therefore is not on daily basis.
- v. Some portals do not have monitoring system.

New system specification/Analysis of proposed system

The design of the new system was done using a hybrid approach which involves top-down, SSADM and prototyping methodologies which have been discussed already. Structured systems Analysis and Design methodology (SSADM) uses data flow Diagram (DFD) to show the functionality of the system which involves data flow and transformation of data in the system. System program modules were done using top-down design, which broke program task into small units called modules. Evolutionary prototyping which created a model that was continually refined and rebuilt and eventually became part of the final developed Web Based Virtual University Administration

(WEBVUA) software was adopted. The proposed system is computer based. The implementation corresponds to a fully computerized solution with all information available online. The system is set to achieve the following:

- Create interface for information up dating on daily basis by staff and students.
- Create platform for registration of staff and students as soon as they join the academic community.
- Instant display of result and transcripts on demand by staff.
- Create interface for checking of results and making request for transcripts by the student/ex-students
- Create platform for entry of the student exam scores by the Head of department as soon as the result are ready
- Provide monitoring system to keep a log of transactions in the system.

Development of a high level model of the proposed system

Data Flow Diagrams (DFDs) are an important technique for modelling a system's high level details by showing how input data is transformed to output results through a sequence of functional transformations. This stage is geared to explain more the flow of data in the proposed new system. The results that are expected as output are the different exploded diagrams of the data flow diagram. Data flow diagrams reveal the relationship among and between the various components in a program or system. Data flow diagram consists of four major components: entities, processes, data stores, and data flows.

Data flow diagram of the high-level model of the proposed system and the explosion of the data flow diagram are shown in figures 2.1 to 2.7

Discussion/result

Data collected and analyzed shows the weaknesses of the existing system. This has justified the need to design a new system that will remove the weaknesses of the existing system. The new system designed has achieved the following:

- Created platform for information updating and uploading on daily basis.
- Create platform for instant registration of students and staff as soon as they join the academic community.
- Created platform for entry of students' scores by the staff as soon as the result is ready.
- Displayed results instantly on demand by staff and students.
- Displayed transcripts to staff instantly on demand.
- Responded instantly to student's request for transcripts transfer by way of acknowledgement of the receipt of the request.

Contribution to knowledge

This work has contributed to knowledge in the following ways:

- It gives prompt response to transcript request. This will enable post graduate candidates secure admission in a good time. This will definitely enhance knowledge.
- The new system designed (WEBVUA) will make it possible for one to obtain required information at one's door step. Readily available information will improve knowledge.
- The web patrol embedded in the new system acts as a watch-dog of the system.

- Real-time information offered by the new system will reduce rumour mongering and lead to knowledge based reaction to issues by both staff and students.
- This work will enable people obtain up-to date and accurate information as the database of the new system will be updated on daily bases.
- It also offers authentic and reliable information as the source is primary.

Concluding Remarks

The major weakness of the current system is the delay in rendering of real time services. This has adversely affected the issuance of result and transcripts. Many prospective students have lost admission to pursue their post graduate studies due to this transcript problem. This has necessitated the need to apply IT solution.

In view of the above, a Web-based Virtual University Administration has been modeled to take care of the inherent problems of the current system. Since it is web-based it can be accessed and used globally. In view of this, a monitoring system called web patrol was designed to keep log of transactions done in the system. This new system designed and developed is a big relief to staff, students, ex-students who have suffered untold hardship in trying to obtain transcripts and other services from our universities.

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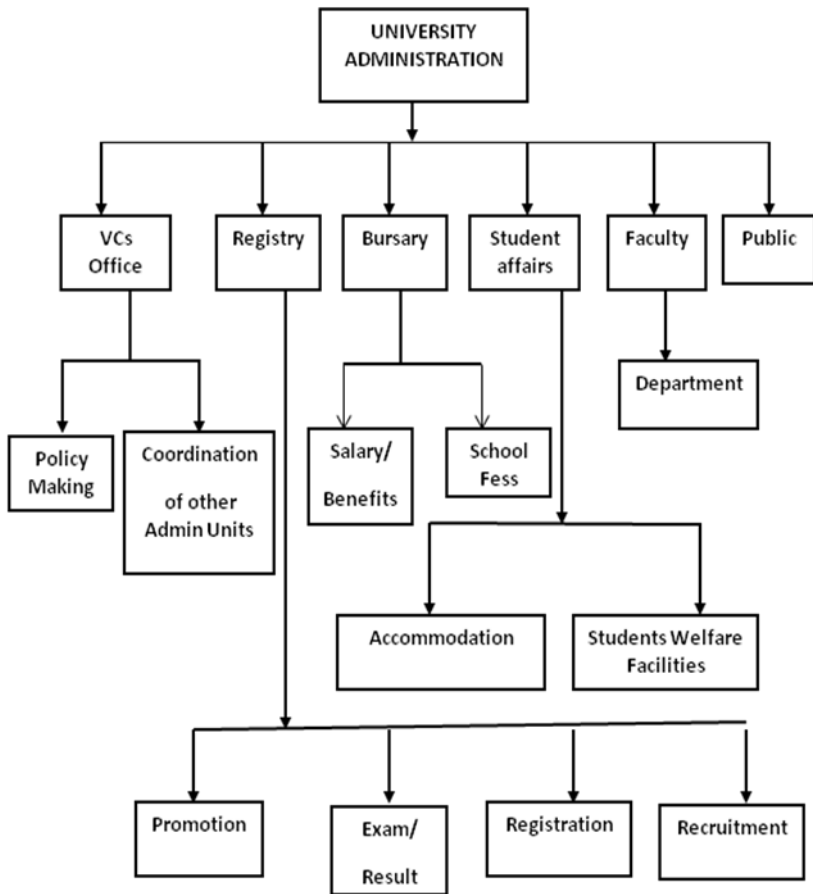


Fig 2.1: High level model of the proposed system

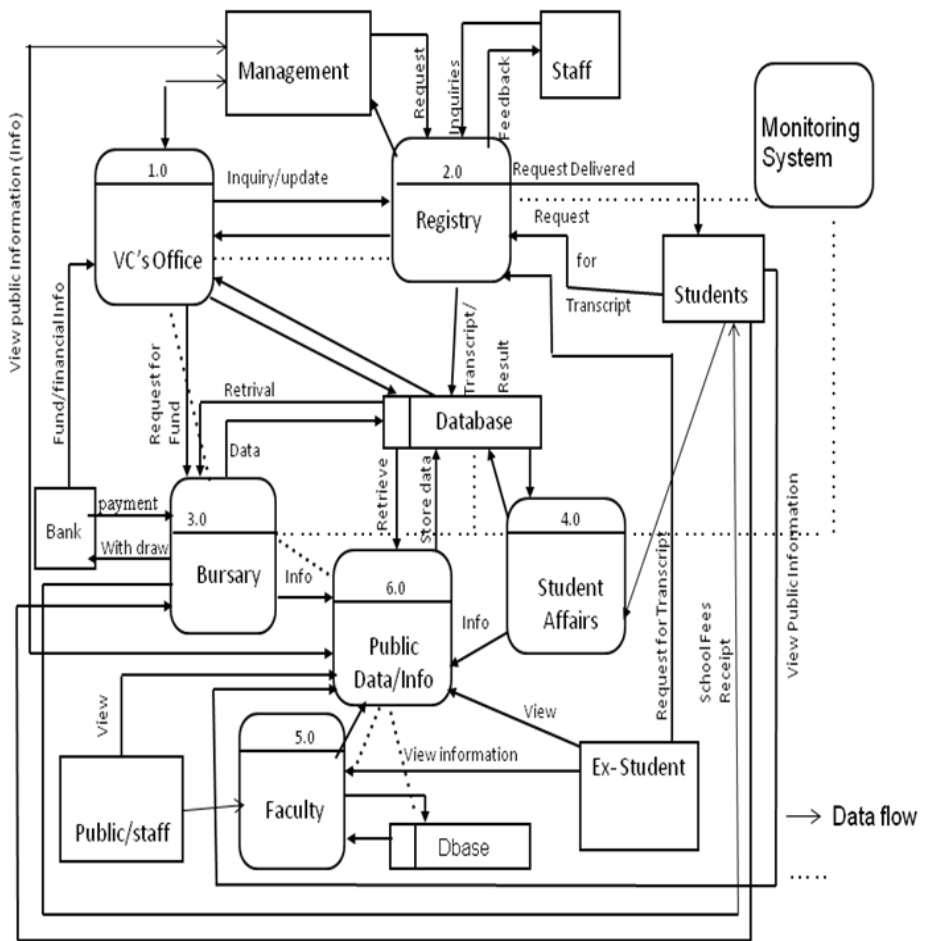


Fig 2.2 Data flow diagram of high level model of the proposed new system.

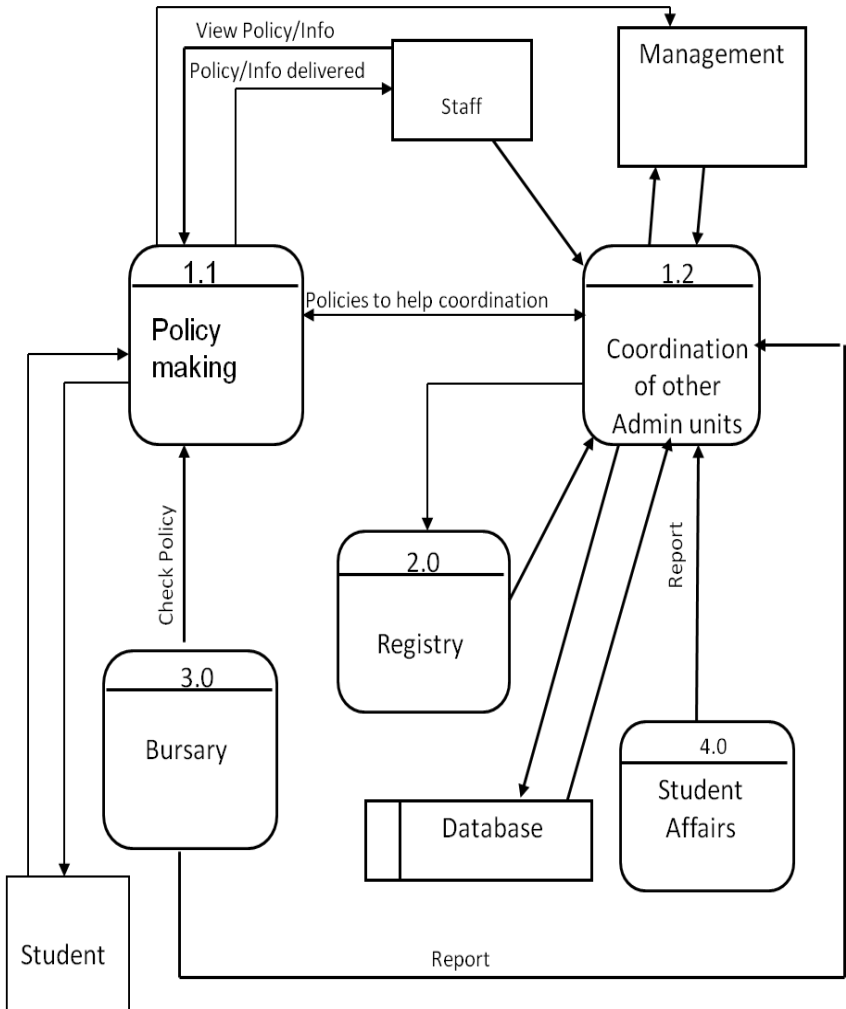


Fig2.3: Exploded data flow diagram of the V.C- Office

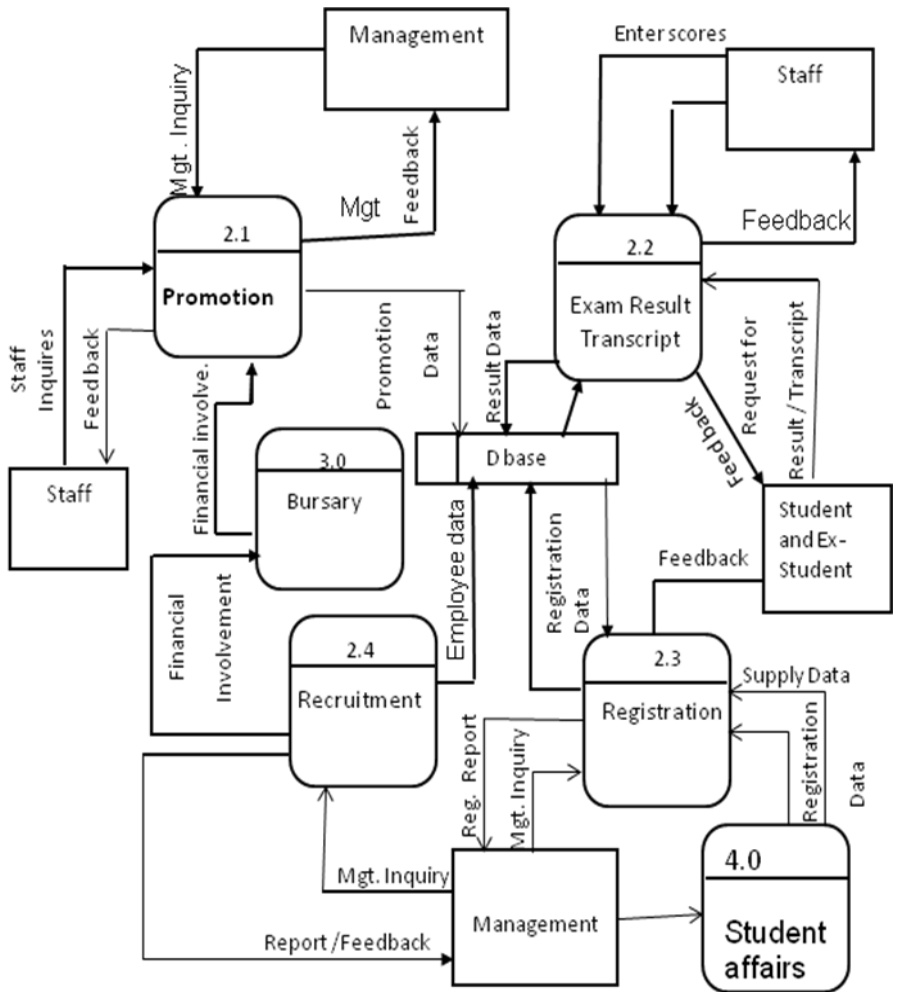


Fig 2.4 Exploded Data Flow Diagram (DFD) of the Registry unit

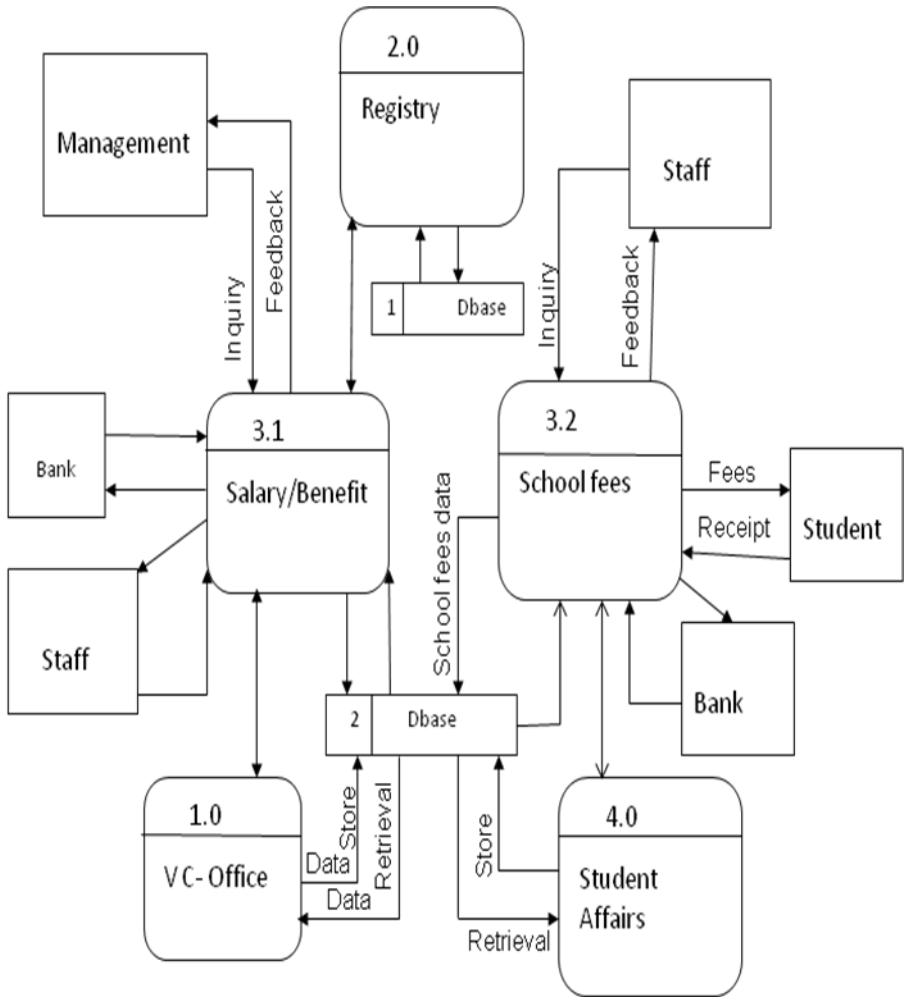


Fig 2.5 Exploded DFD of the Bursary unit

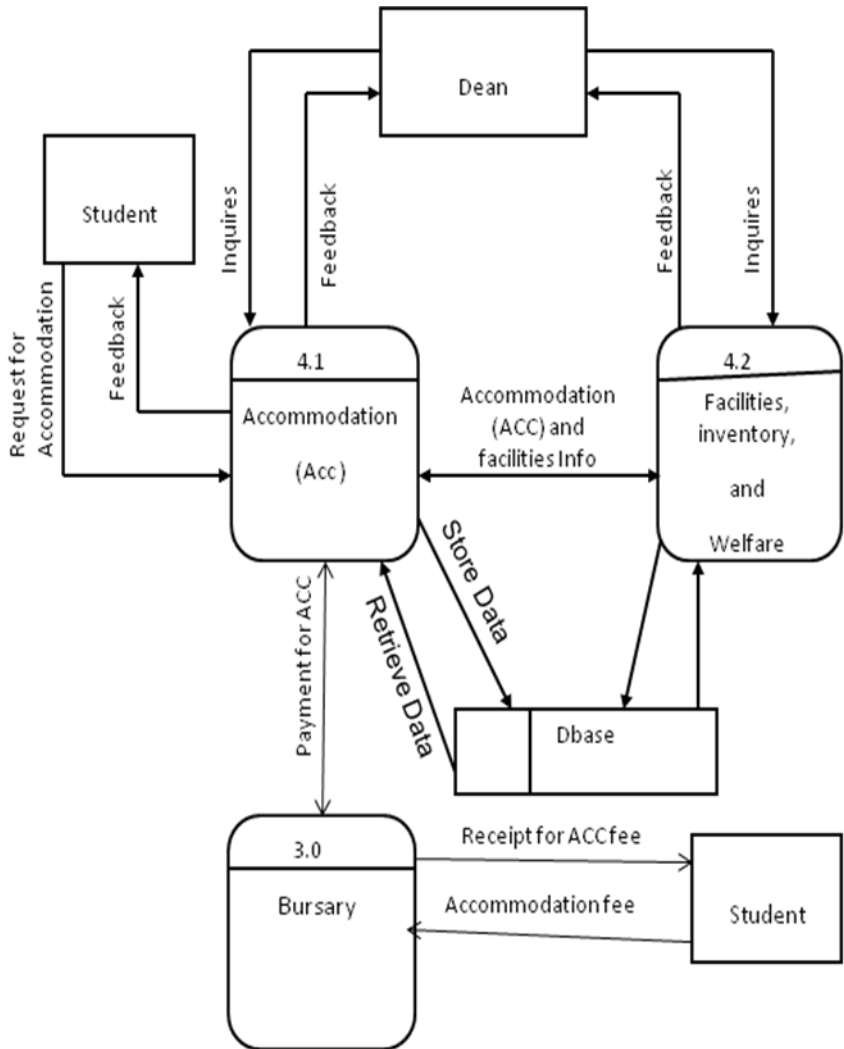


Fig 2.6 Exploded DFD of Student Affairs Unit

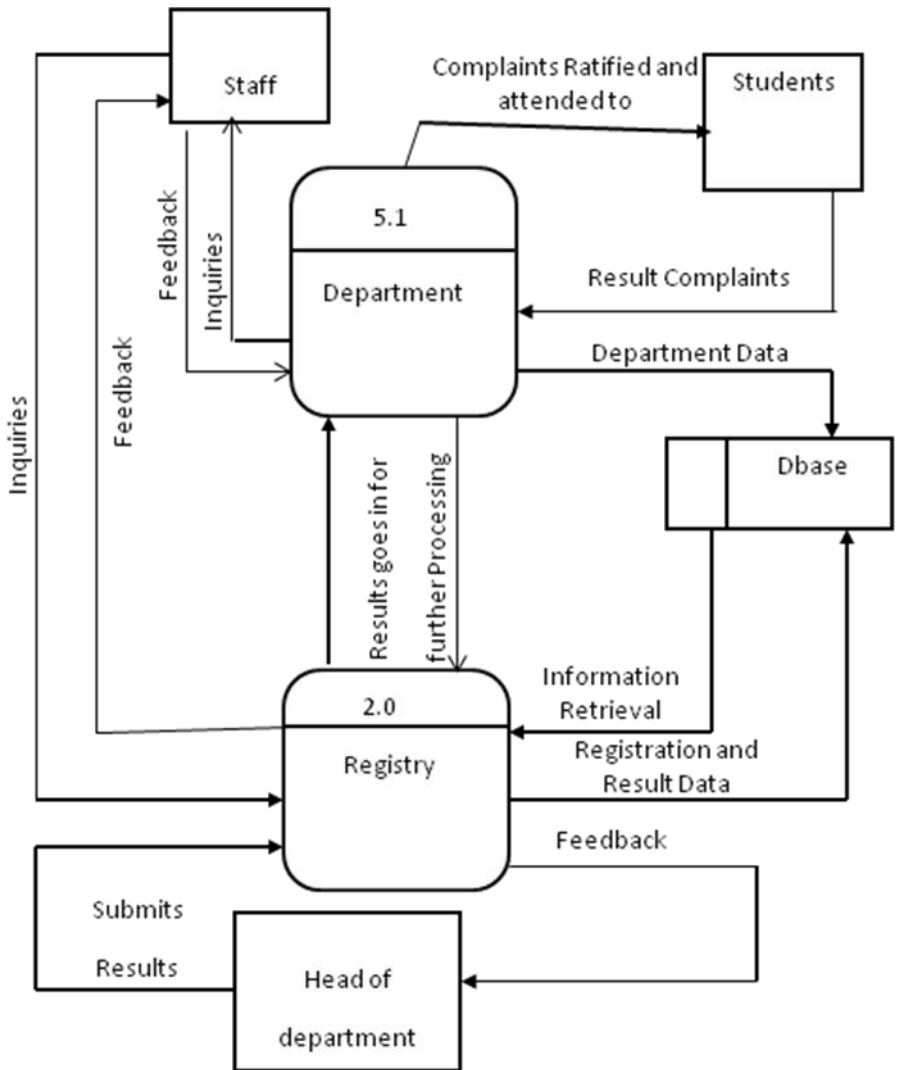


Fig 2.7 Exploded DFD of Faculty unit