Development of paperless load allocation tool for HOD using Linked Google Spreadsheets

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Abstract: In any academic institute teaching load allotment for the next academic session is a tedious job of the Head of Department (HOD).The process involves steps from database creation, faculty preferences, and allotment by HOD till fulfilling of complete departmental load without overloading any faculty. During the process of actual allotment HOD needs to constantly update the load of each faculty in all the related documents so that final tally is made and time table can be prepared based on the allotted load. As number of faculty and teaching load increases handling of paper documents becomes cumbersome.

The paper presents case study of use of linked Google spreadsheets as a useful tool to HOD in an Autonomous institute in University of Mumbai. HOD can manage the entries in all sheets to complete the process without worrying about missed or wrong entries. Use of this ICT tool reduces time, errors in entries and usage of paper.

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1. Introduction

The workload of an academic faculty member consists of a great deal more than meeting with students in a classroom and presenting lecture material.[1] .The teaching load based on norms set by statutory bodies like AICTE,UGC is allotted to faculty members at the beginning of every semester by parent department. A department in any institute runs one or more programs at UG and PG level. The HOD needs to prepare the workload sheet that consists of course wise total contact hours of all classes including lectures, practical's, tutorials of parent department, load of other departments in case of interdisciplinary teaching load of individual faculty, calculation of fractional load that shows division of faculty load at UG or PG levels etc.

As the number of faculty members goes on increasing or changes are required in load allotment due to multiple un foreseen reasons, managing the paper documents becomes difficult.

Many researchers have given their inputs specifying the different nature of ERP implementation in Educational institutions then the corporate organizations. Researchers have already started applying cloud computing in ERP implementations of Higher education.[4]

Ahmad Raza Khan and Ahsan Ahmed suggested to use cloud based services for E- learning and educational ERP for various modules such as finance

account, academic, alumni, cloud ready library, DSR etc. [2].

The above mentioned load allotment is one of the applications of ERP implementation. For commercial ERP implementations cost and flexibility of the software is major concern.

This paper is an experience report about how this tedious work can be completed efficiently using modern technology that is freely available in Google drive using spreadsheet. This is demonstrated for a department with 32 faculty members having one UG course with intake of 120 students and one PG course with intake of 18 students.

The next section explains advantages of using Google apps which acted as motivation for our work followed by comparison of methodology used in past and now for the purpose of teaching load allotment.

1. Motivation

Cloud computing environment provides a great flexibility and availability of computing resources at a lower cost. This emerging technology opens a new era of e-services in different disciplines.[3]

G Suit (formerly Google Apps for Work) is a brand of cloud computing, productivity and collaboration tools, software and product developed by Google. G suit comprises Gmail, Hangouts, Calendar, and Google+ for communication; Drive for storage; Docs, Spreadsheets, Slides, Forms and Sites for Collaboration [5].

The Edu accounts created in academic institutes are provided with unlimited storage on the google drive. Thus we can create different applications required for our academic purpose with the help of google applications. The main advantages of using the google apps are:

1. No More Backup: It is designed from the beginning to be a cloud based tool.

2. Minimal Learning Curve and ease of Customization: The use of Google Apps is simple, and the applications developed by the same are easy to customize depending on need of organization.

3. Flexibility in capacity:Cloud handles elastic demand and the scalability limits go to infinity.[4]

Taking the advantage of above features provided by the Google Apps, we have developed a tool for academic workload distribution by the HOD, using linked Google spreadsheet.

2. Methodology

A. Paper based method:

In our institute planning related to teaching load allocation starts typically two months before actual starting of next semester so that finalised time table is displayed on the website at least one week before starting date.Fig. 1 shows the flowchart of activities that are performed by HOD while making teaching load documentation.
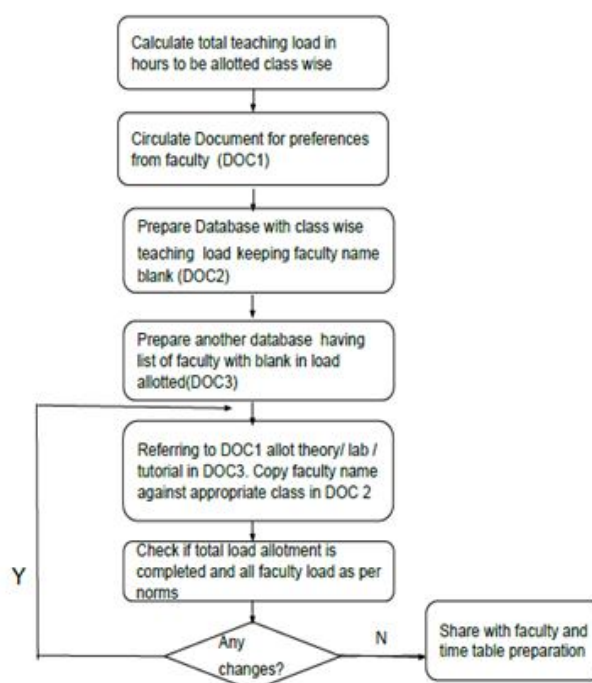
Fig.1: Typical steps in load allotment in traditional method

In addition to above documents department needs to create documents related to fractional load calculation based on load allotted, various course in charges for theory and laboratory activities.Difficulties faced in paper based method.

1. Normally once database is created in excel sheets as DOC2 and DOC3, actual allocation is done by paper and pencil. Hence HOD needs to handle multiple pages especially when number of courses, classes and faculty members are more.

2. For the department with 32 faculty members having one UG course with intake of 120 students and one PG course with intake of 18 students there are around 200 to 220 work entities need to be allotted in Doc 1.The same entries need to be copied correctly in different format in Doc 2 without any mistake.

3. While allocating load HOD needs to think about factors like faculty choice, his/her competency for the course etc.

4. If it is required to change load of any faculty due to various reasons like fulfilment of departmental load, disparity in load of a particular faculty member or any unforeseen reasons, modifications needs to make in both documents simultaneously. In case of any mistake HOD may allocate extra or duplicate load or some load may remain un-allotted and once the allotment is completed, it becomes tedious process to trace back and find the problem. Hence re checking of the entries is required.

5. Typically 20 to 25% entries need changes after first cycle of allotment. Hence total number of entries can go near about 500 during allocation process. The process may multiple iterations with further added entries and HOD may create additional copies of documents to avoid overwriting. This will further increase entries and number of papers.

6. Once allotment is completed on paper HOD needs to make data entry in multiple sheets for proper documentation. Hence the staff typically makes 400 data entries.

7. Need to preserve the documents for further reference.

B. Linked Google Spreadsheet Method:

Google spreadsheet is an application available in G suite and can be easily accessed through HOD's drive. The use of functions and formulas available with google spreadsheets, made our tool customized and reduced both time and energy of HOD.

In the first stage, the database has to be prepared for all courses running in that particular semester along with the theory, practical, tutorial hours as per curriculum (Sheet 1). The specimen of the database is shown in following Fig. 2.

Before actual allocation of courses, preferences are asked from faculty using another application of 'Google forms'.

K.J. Somaiya College of Engineering, Mumbai-77				
(Autonomous College Affiliated to Universiy of Mumbai)				
EXTC Department (sem-II,IV,VI,VIII,M.Tech II, courses with teaching load) Jan-May 2017				
Name of Faculty	**Year/Division**	**Courses**	**TH/PR/TUT**	**Teaching load**
BAS	F.Y./E	BEEE	TH	2
KVA	F.Y./E	BEEE	TH	2
M_W	F.Y./E1	BEEE	PR	2
SSS	F.Y./E2	BEEE	PR	2
SCR	F.Y./E3	BEEE	PR	2

Fig.2:Database of teaching load (Sheet 1)

Once the database is prepared allocation of individual courses, theory and practical is done by selecting faculty names from the drop down list. The drop down list has been prepared by using data validation feature of the google spreadsheet. The specimen of the drop down list is shown in the following Fig. 3.

Fig.3:Dropdown list with faculty initials

Once the course is allotted to faculty, course details such as course name, theory or practical, division, number of hours, is linked in separate google spreadsheet (Sheet 2). This course information will be added in the faculty's account. This step avoids need of simultaneous entry in DOC2 and DOC3 and hence chances of errors in paper based method. The specimen of sheet 2 is shown in following Fig. 4.

The sheet 2 will be getting filled automatically on allotment of the course in Sheet 1. For an individual faculty the total load is also calculated in the sheet 2. While allocating all the courses in the database, HOD can have look in Sheet 2, and make a note of total load allocated to each faculty.

Mrs. S.S. Kulkarni				
Name of Faculty	Year/Division	Courses	TH/PR/TUT	Teaching load
SSK	S.Y./B	SS	TH	3
SSK	S.Y./B1	SS	TUT	1
SSK	B.E.	TNM	TH	2
SSK	M.Tech	PLD and HDL Lab _M.Tech	PR	2
		Total Load		8

Fig.4:Courses allotted to individual faculty's account(sheet 2)

If HOD finds that for a particular faculty load needs modification then Sheet 1 can be edited by replacing other faculty name from dropdown menu or adding other load as per best available choice.

The above mentioned step may be repeated by HOD multiple times, which is very tedious process with the traditional paper based load allotment method. Here numbers of entries by HOD are reduced to 50 % as compared to paper based method. Also the time required for creation of multiple entries and verification is reduced to a large extent upto40%.

With our developed tool this process becomes simple, and once the course is removed from faculty account or added to a faculty account the number of hours will be subtracted or added automatically in Sheet 2. The load of individual faculty can also be mailed to him/her if required from sheet 2.

We have also added linked sheets for calculations of fractional load (Sheet 3) derived from Sheet 2 in the same application. Following Fig. 5 shows calculation of fractional load.

K.J. Somaiya College of Engineering, Mumbai-77							
(Autonomous College Affiliated to University of Mumbai)							
Department of Electronics and Telecommunication Enginnering							
Even Semester: January-May 2017							
Fractional Load Calculations							
Sr. No.	Name of Faculty	Load				Total	
		F.Y.B.Tech	S.Y.B.Tech to B.E.	M.Tech	Total	F.Y.B.Tech	S.Y.B.Tech to B.E.	M.Tech
1	Faculty 1		6	2	8	0	0.75	0.25
2	Faculty 2		7	5	12	0	0.58	0.42
3	Faculty 3		9	3	12	0	0.75	0.25
4	Faculty 4		9	3	12	0	0.75	0.25
5	Faculty 5		9	3	12	0	0.75	0.25

Fig.5:Fractional load calculations from Sheet 2(sheet 3)

The developed tool is completely paperless, and the HOD needs to make changes in the google

spreadsheet, which will be updated and saved automatically. If required, finalised sheets can be downloaded and preserved.   The complete flowchart of Linked Google spreadsheet method is shown in the following Fig. 6.

Fig.6:Steps in paperless teaching load allotment

3. Discussions and Conclusion:

The paperless teaching load allocation tool is implemented for last two semesters in our department.It was found that number of entries by HOD is reduced up to 50% as there is no duplication of work. Since checking of entries in multiple sheets and final entry for documentation purpose is eliminated time is saved up to 40%.

Use of this tool has eliminated the chances of mismatched entries in different documents. Since the tool is available in HOD's Google drive it is easier to use and easily accessible from anywhere. Modifications in entries are easier to manage because of linkages of sheets and functions and formulas available for customization.

The spreadsheets created in the allocation process can be further imported in Time table software.

Based on similar concept of linked spreadsheets academic applications like students attendance monitoring system, test marks record systems can be developed in future.

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