

Deployment of Student Management Application (Campus SIA) in Wakkanai Hokusei Gakuen University

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●要約

本論文では、構成変更しにくいモノリシックな管理システムに共通する定義、ウェブベースのキャンパス管理、そして管理システムの評価といった問題について論述する。ウェブベースの管理システムについて比較分析を行い、その内容を詳述することは難しい。なぜなら、ウェブベースの管理ソフトウェア、特に学術コミュニティやIT業界で利用されている最新の商用ソフトウェアでは、多様な実装方法が進められているからである。そこで我々は、広く普及している商用ソフトウェアについては分析を行わない。しかしながら、本論文では、我々が実装を進めてきた Campus-SIA に基づき、システム管理全体のパフォーマンスを高めるウェブベースの管理システムを利用することの重要性について強調していきたい。本論文では、ポータルサイトの考えかたに則ったウェブベースの管理システムを用いるアプローチを提示する。また、アクセス方法をひとつに限定したいいるモジュール化されたモノリシックな管理システムは、キャンパス管理システムにおいて、さまざまな場面で作成されるソフトウェアをひとつにまとめることができる構成主義を支援し、さらに管理システムの共同管理を促進していくことについて論じる。それゆえに、我々は、キャンパス職員が行う一体型管理業務を促進する Campus-SIA について紹介する。さらに本論文では、職員の管理業務を自動化および最小化するために、各年度に対応する構成管理ツールを提供することによる、キャンパス職員の事務作業の支援について論じる。

●キーワード

Monolithic management

Transparent Workflow

Role Based User Management

Multilingual System

Social Administrative Software.

1. Introduction

Campus-SIA is a web enabled software application for the management of student data that enables the administration to enter the academic and financial data related to the student through web enabled browser that ultimately enhance the overall productivity of the administration.

While definitions of Campus Management in terms of e-Management vary, the main elements tend to include greater focus on “ Web or Cloud ”[1] the current dimensions of e-Management a more “ usability ”based view of e-Management and greater recognition of the role of “ multi-divisions of the organization ” rather than single division environments. While e-Management structure does not exclude single layer of management, it draws attention to a wider range of collaborative multi-divisions management approaches in addition to single and monolithic approaches.

This paper describes the implementation of an effective campus Management system given the name of Campus SIA (Student Information Application). It includes environments for user management, student personal information management, student financial management and student career management as major components while it has numbers of other features by which campus administration can extract in order to enhance the entire productivity. Campus SIA is inspired by, and entirely implemented in PHP language.

Campus Administration Management

Campus administration must be safe and well managed in order to maximize quality of service level and the performance of administration that can pave the way for the academic success of each student and also the management of the University. The purpose of this paper is to provide prototype for supporting the establishment of effective management-focused campus community so that campus may achieve adequate yearly progress, ensuring that all students achieve remarkable services in timely manner. Campus SIA is a powerful yet web enabled system which has centralized database that lets you handle all daily operations of campus administration that includes entering new enrollments, tracking student personal information, tracking and monitoring fee payment, processing enter, drop, expelled and other status thereby making it easy for campus staff to update, share, and use student information to among the responsible academic staff in secured manner.

Monolithic management through desktop oriented tools

We termed monolithic management as a management approach through a set of methods and techniques in order to manage sequences of tasks to accomplish a series of results within a well-defined schedule through a single tool. In this sense, monolithic management is not a bad approach of data management, however, the problem of monolithic tools such as Excels and other desktop oriented tools[4] used in the administration has limitations for effective data management such as organizing, sorting, deleting and version control. In terms of data management, there are lots of campus staffs who still use Microsoft access, and other monolithic tools however, these tools have lots of difficulties and the campus staffs were compelled to encounter these difficulties as follows:

- The prevailing monolithic tools are only accessible to limited number of campus staff and could not update the data at the same time.
- It requires numbers of redundant tasks as per the change of each academic year.
- These tools are entirely static and are very inflexible due to monolithic design and require IT expertise to upgrade and change with business requirements.
- It involves large paper work to support key business activity such as enrollment, course adjustments, handling records of finance, student information and other reports.
- The system does not have relations with other software applications used by the university such as financial management, Human Resource Management and Schedule systems.

In order to address these difficulties we develop the web-based Campus-SIA. This has been built using PHP programming language and MySQL database management system. Campus-SIA has been developed in fully object oriented development and has relatively clean separation between presentation, business logic, and data access layers, with transparent set of business processes. These business processes are implemented in transparent manner so that we can extend other modules in the future. This system is easily accessed to all the academic staff of the organization through the local intranet. In this paper, we will furthermore discuss the key properties of our system and key outlines of our systems in architecture sections.

Why Campus SIA?

Student management through monolithic software as of Excel and Access has been the cause of low performance of the administration. There were repeated tasks going through the daily business process of the campus thereby degrading the productivity of the campus.

There are numbers of student management system in the software industries which vary in size, scope and capability, from packages that are implemented in relatively small campuses to cover student records alone, to enterprise-wide solutions that aim to cover most aspects of running large multi-campus organizations with significant local responsibility. Many systems can be scaled to different levels of functionality by purchasing add-on modules and can typically be configured by their home institutions to meet local needs. However, most of the times, the industry standard tools can't meet the specific requirement of the University due to their insufficient flexibility of configuration. We have implemented Campus-SIA which is entirely configurable and fully dynamic so that campus administration can customize this system as per the growth or shrinkage of the organization, its departments or other key divisions of the University.

SAS Application: Social Administrative Software

The term social software in terms of campus administration is a very complex concept to define. Social software includes wide range of IT technologies which incorporate the social aspect into technologies. Social software varies from communication tools aimed for communities in networks to interactive tools between the working groups in the organization. The examples of social software technologies can be named as weblogs,

wikis, RSS feeds and social bookmarking. It is, however, important to note that social software is in no way limited to these specific technologies. The prevailing social software, nonetheless, are more concerned with interactive features such as chat, blog, wikis and video conferencing features. However, we do not incorporate all of those features rather introduce new features that were lacked in prevailing social software which could depict the concept of optimization of internal administrative processes of campus through a simple, effective and efficient web enabled application at which all staff can work together in collaborative manner. We were very impressed with the functionalities of social software and thus explore to incorporate the features of social software into Campus-SIA so that all the staffs can work together.

Key Features and functions of Campus-SIA

- **Role based user management**

Campus-SIA has been implemented with supportive feature of user management that provides super administrators with the ability to create, delete, identify and control the state of users logged or registered in the application. At the phase of user creation, administrator can define the role to each user.

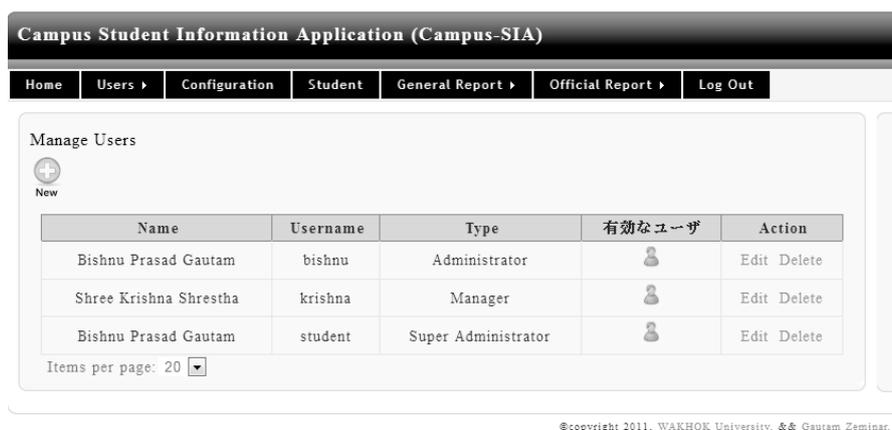


Fig 1: User List View

Particularly, the entire user management of Campus-SIA is done in role based policy categorizing at least consisting of 3 layers user model. We categorize this layer as super admin user, admin user and registered user. Using role based policy, super administrators can define other layers of roles in order to minimize the difference between the role control and the scope values associated with configured roles and administrator can define specific role on users such as capability of creating users, viewing or editing of specific report based on predefined criteria. For extreme cases while more serious action is needed such as deleting a user, User Management module in such a case can modify or delete the role of a user via the User Management menu.

Fig 2: User Role

● **Customizable**

Every campus has unique requirements, and operates differently. In order to achieve the dynamicity of the system, Campus-SIA has been implemented as to make its components customizable and configurable. For example, University may increase or decrease its campus, faculty or department, in that case the administrator of this system can easily customize the system to Campus-SIA provides a highly customizable and flexible platform, where you can tailor everything from data entry screens to reports and more.

● **Student Information Tracking**

Campus-SIA is well designed system not only to store the student information system but also the tracking of the information. Information, which could be change, like address of the student, information of the guardian are kept as his history. The tracking of the faculty change and the career tracking after the graduation is also addressed while architecting the system.

Address History				
S.N	Cell Phone	Telephone	Postal	Address
1	980-9908-0909		097-0011	はまなす

Parent History				
Parent Name	Postal	Address	Cell Phone	Telephone
Yamada Taro	098-789		080-0000-0000	

Fig 3: Tracking of Address and Parents of Student

● **Search**

Well-equipped search functionality has extended the ability not only in pages but also in reports to get the desired lists of students. Further, the advance search feature makes capable to search by each Campus, Faculty, status, student year and many more.

Kanji Name Student Id Gender Country
 From To Status
 Order By Advance Search

Fig 4: Normal Search

Kanji Name Student Id Gender Country
 From To Status
 Years Campus Faculty Class Time 学生区分
 Order By Hide Advance Search

Fig 5: Advance Search

● Academic Report

Student academic record is analyzed by generating of different kinds of reports like personal Information report, Current Status Information Report, Parent Information Report. Furthermore, search features are available in all the reports to analyze move easily with each faculty, Student Year and Campus. The current available report is very much useful to know the fact about total students with no of male and female in each campus, no of male and female in leave. Academic reports required for the Official purpose are generated in printer friendly condition. The feature of exportability to Excel in each report has added flexibility to print the report changing in the design.

その他学生情報
個人情報

S.N	Student Id	Kanji Name	Furigana Name	Gender	Birth Date	High School	Joined Date	Faculty	Class Time	Status	Email	Cell Phone
2	10-01-001	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
3	10-01-002	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
4	10-01-003	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
5	10-01-004	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
6	10-01-005	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
7	10-01-006	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
8	10-01-007	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	
9	10-01-008	Yamada Taro	ヤマダタロ	男	1993-12-23	Wakkanai Higher Secondary School	2010-04-01	情報メディア学科	昼		yamada@yam.co.jp	

Fig 6: One of the many Student Academic Information Report

● Financial Report

One of the most attractive features of Campus-SIA is the generation of the Financial Report required for the accountant to analyze the financial condition of the University and to send to its governing body. The financial report is further divided into two categories in accordance with the use of report naming: Analyzer Report and Official Report. Analyzer reports are for analyzing of current financial situation about the student and university

itself. The advance search feature has added the feasibility to generate the campus wise report, faculty wise report, student year wise report which will obviously add the accuracy in analyzing process. In the Official report, the accuracy in the design of reports are highly considered and generated in print friendly condition. Furthermore, the architecture for the report is designed to make compatible with Excel and export of the whole report in Excel can be easily done.

	no. of student	入学金 Amount	授業料 Amount	教育充実費 Amount	実験充実費 Amount	no. of student	教職課程 Amount
稚内北星学園大学 1年 昼	0	0	0	0	0	0	0
稚内北星学園大学 1年 夜間主	0	0	0	0	0	0	0
稚内北星学園大学 2年 昼	1	0	200,000	150,000	0	0	0
稚内北星学園大学 2年 夜間主	0	0	0	0	0	0	0
稚内北星学園大学 3年 昼	0	0	0	0	0	0	0
稚内北星学園大学 3年 夜間主	0	0	0	0	0	0	0
稚内北星学園大学 4年 昼	0	0	0	0	0	0	0
稚内北星学園大学 4年 夜間主	0	0	0	0	0	0	0
東京サテライト校 3年 昼	0	0	0	0	0	0	0
東京サテライト校 4年 昼	0	0	0	0	0	0	0
	1	0	200,000	150,000	0	0	0

Fig 7: One of the many Financial Report

● Unique ID system

The ID for each student is generated in the base of his admission year, campus, faculty and admission type, giving unique and informative 9 digit ID for each student. The ID system is architected in such a way that knowing of just the student ID will allow one to query student's information from the system.

● Multilingual Support

The multilingual support feature has added the Campus-SIA system to be used in any language with the easy addition of languages. The addition of XML file for additional language support will feature the new language in XML file based multilingual Campus-SIA system.

Transparency of Workflow in terms of Management

Campus-SIA provides accountability at all the level thus the data entered in system will be open to top level management. So, the staff of campus is accountable towards the data and thus the management can have a closer look at the activities of the campus. Campus-SIA has been built in such a way that it can automate redundant tasks and ensures that uncompleted tasks are followed up and the status of which can be confirmed by all staff who have the privileges to monitor, modify or update the tasks. The system reflects the steps required for the completion of each task and produces report of corresponding task that has been completed. We emphasizes in creation of report for each business process as it is one of the troublesome for campus staff who need to produce the report in timely manner and requires much effort. Unless documentation and report creation is performed properly, both systems and administrative processes will become a kind of black boxes somewhere in the workflow. Campus-SIA has the features of creating report automatically which enables the transparency [3]- a vital feature for efficient workflow.

The Fully Web Enabled Model

In the case of WAKHOK campus administration and still there are numbers of campuses at which, the job of an administrator is seen as monolithic: to perform a collection of tasks that are, with few exceptions, carried out alone and the status of tasks are hidden from their colleagues. In most colleges and universities, this sort of repetitive and monolithic approach can be of labor-intensive and cost ineffective thus need to be transferred with web enabled application which are more transparent. Individual administrative member can work with this web enabled Campus SIA and deliver multiple works each of which can be assisted and monitored by other colleagues too. This sort of web-based applications can be used largely as supplemental resources in the administration.

Performance Enhancement of the Administration

The traditional administrative tools utilized in the administration for managing student records, including student financial records and other information system, has become bottle neck for the total performance of any college or University. We witness that changes in campus working culture, especially due to the wide usage of Internet, have raised student expectations of services provided by technology. However, there are still few colleges and universities who still utilize those traditional tools characterized by monolithic tools which cannot meet the quality of services expected by the student. As a result, those colleges and universities are vulnerable to lose the trust of student. This will obviously hamper the number of enrollment too. Information management system such as Campus-SIA has become an important management tool in the drive to become more effective and more competitive in terms of quality management and service delivery.

One of the goals of development of Campus-SIA was to maximize the total performance of campus administration. Before deciding the development of Campus-SIA, we measured the current performance of the administration on the basis of the tools and the system used by the administration and we were convinced that the existing system does not give the output which should be replaced with more robust systems. The key decision factor of this case study was to understand performance management from perspectives of different parameters and develop a framework that meets all objectives of performance enhancement. In order to meet this goal, we developed Campus SIA so as to enable the administration to understand all steps required in performance enhancement and examine shortcomings at each stage. The facility of providing common interface to each individual at which all members of the administration can work in the application will maximize the performance of the administration.

System Architecture

The appropriate software architecture is discussed, analyzed, reviewed and developed in order to meet all the objectives of Campus-SIA system. Fig 8 shows the Network Architecture consisting of Apache enabled Application server, data object enabled Database server and variants of Client. The system is fully web based so that the variant of clients can browse the system running in the Application server using any of the available web browsers.

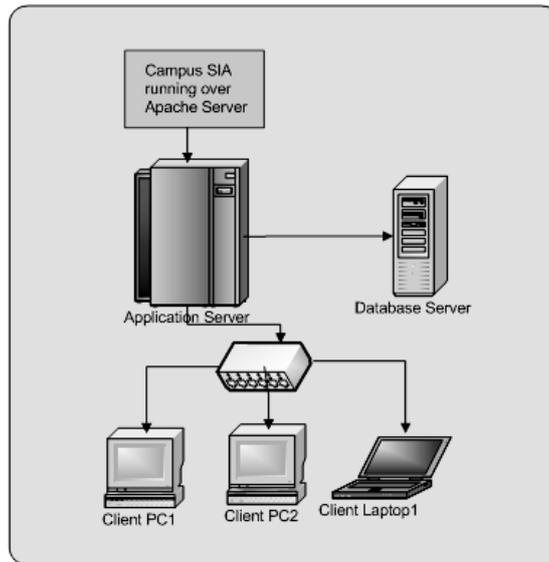


Fig 8: Network Architecture

The Campus SIA is 3-layer architecture: User Interface Layer, Application Layer and Database Layer. User Interface Layer is the presentation layer for the clients from which user input is accepted from users. The accepted data will be posted to application logic layer. The different reports will be viewed by users from user interface layer. The user interface is implemented using HTML and PHP. The dynamicity on usability of the user interface is added using JQuery and AJAX Technology. The user interface is totally managed from the user role management which means the interface will be changed dynamically according to the role of the logged in user. For example, the user management interface is only displayed for the super administrator, student account management. Whereas, scholarship management interface will only be displayed for Account Administrator and so on.

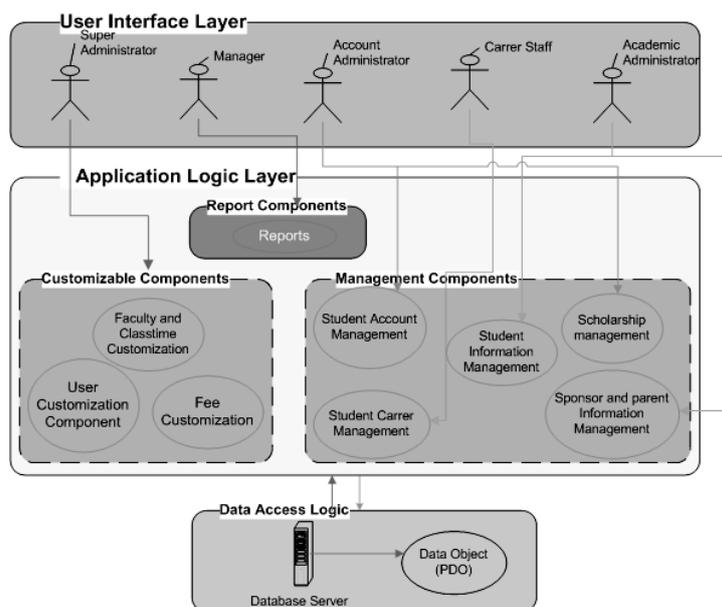


Fig 9: Campus-SIALayer based architectural view

The business logic and web logic is implemented in Application Logic Layer. This layer takes input from user interface layer and stores in the database layer according to applied business logic. The input data are logically separated according to the business logic which has divided whole Application Logic Layers into 3 major components. Customizable components are used to customize the business logic itself. The faculty and classtime customization, user customization and fee customization is used to configure the parameter of business logic. Each management components are dedicated to their respective tasks and responsibility. Report Components are the output for the User Interface layer generating the report by joining the datasets from different table to make analyze of data more easy and effective.

MYSQL database is chosen as database server considering its Usability, Portability and Localization features. The database abstraction layer of PHP Data Object (PDO) provides consistent API for our system regardless of the type of database server we connect which provides dynamicity in the use of database server also. The datasets are managed in the different table with respect to the data access logic.

The UseCase Diagram shown below explains system flow of Campus-SIA.



Fig 10: Campus-SIA Use Case Diagram

Future Works

In order to enhance the campus administration through monolithic with modular management, we have identified that there are two distinct fields as future work, one of which is online developing of student portfolio management and the other is the online syllabus management. In addition to these modules, we recommend to implement the following modules with collaboration of third party learning management system so as to make Campus-SIA as full fledged virtual university system in the future:

- Online Application
- Class Registration
- Credit and transcript management
- Portfolio Management
- Syllabus Management
- Schedule Management.

Conclusion

Our implementation illustrates that Campus-SIA presents many potentials to University administration management in terms of performance enhancement. Management issues are not new to those of us teaching and researching in the field of enabling campus administration into the web. Our research and the system we implemented suggests that Campus-SIA can be of very effective tool to transfer monolithic administration management into very effective and service oriented by utilizing the feature of all in one web enabled interface. Campus-SIA would serve specifically to the academic and administration staff to enter student information along with his/her financial data. This paper presented an overview of Campus-SIA with its major functionalities, architecture and the difficulties that monolithic management encounters. The architecture of Campus-SIA described the modular type of software architecture, separating presentation logic, web logic, business logic and data logic as much as possible. Future work would be carried on implementing further modules into the application and we will explore to standardize Campus-SIA so as to meet the management environment of any campus around the world.

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● Abstract

This paper addresses some of the issues of definition among monolithic management, web enabled campus administration and assessment management systems. It is difficult to depict the comparative analysis of web enabled management because of the evolutions of very diverse models of implementation, especially in some of the new commercial tools that are available in the academic communities and IT industries. We will not analyze the prevailed commercial tools. Nonetheless, we will try to highlight the importance of usage of web enabled management system that enhances the entire performance of the administration on the basis of Campus-SIA that we implemented during our research. Furthermore, the purpose of this paper is to discuss the potential of web enabled management system that we hope to enable the entire campus management beyond its monolithic management systems. This approach of using web enabled management system in support of all-in-one portal approach is presented, and it is argued that monolithic with modular management systems via single access of point does support a constructivist approach of campus management and further encourage the collaborative management style, thus we introduce Campus-SIA that emphasizes all-in-one management activities of campus staff. This paper will further argued that campus staff administrative processes are supported by providing configuration tools for each successive year in order to automate and minimize the administrative tasks.