Constructing Smart Campus with iPhone Development

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Abstract: With the development of wireless communication, the popularity of smart phones, the increasing of social networking services, mobile social networking has become a hot research topic. The characteristics of mobile devices and requirements of services in social environments raise a challenge on building a platform for mobile social services. In this paper, we elaborate a flexible system architecture based on the service-oriented specification to support social interactions in campus-wide environments. A prototype of mobile social networking system is deployed on campus, and several applications are implemented based on the proposed architecture to demonstrate the effectiveness of the architecture.

Keywords: mobile application, smart campus

I. INTRODUCTION

Our primary goal was to create an architectural framework which allows various members of the community to create and use services based on the data that is collected in a college environment. These data include information on course enrollments, timetable, exam dates, office hours, and various deadlines along with community provided data. These collected data can then be subject to analysis, based on which they can either be fed back into the services, or we can provide recommendations or offer new services for our users.

Smart Campus

In this paper, when we explain the concept of the smart campus, the smart campus is such a community that is served by smart applications i.e. iOS. The requirements of the
smart campus applications are the following:
- connectable—networking devices bring the sensing information to the web;
- accessible—the information is published on the web, and accessible to the users;
- ubiquitous—the users can get access to the information through the web, but more importantly in mobile any time and any place;
- sociable—a user can publish the information through his social network;
- sharable—not just the data, but the object itself must be accessible and addressable;
- visible/augmented—make the hidden information seen by retrofitting the physical environment.

II. STRUCTURE OF SMART CAMPUS

The smart campus is not static, it is continuously changing, and it is persistently on the move. The aspect and the amount of the collected information is changing from time to time. So, the evolution of the smart applications is a never-ending process.
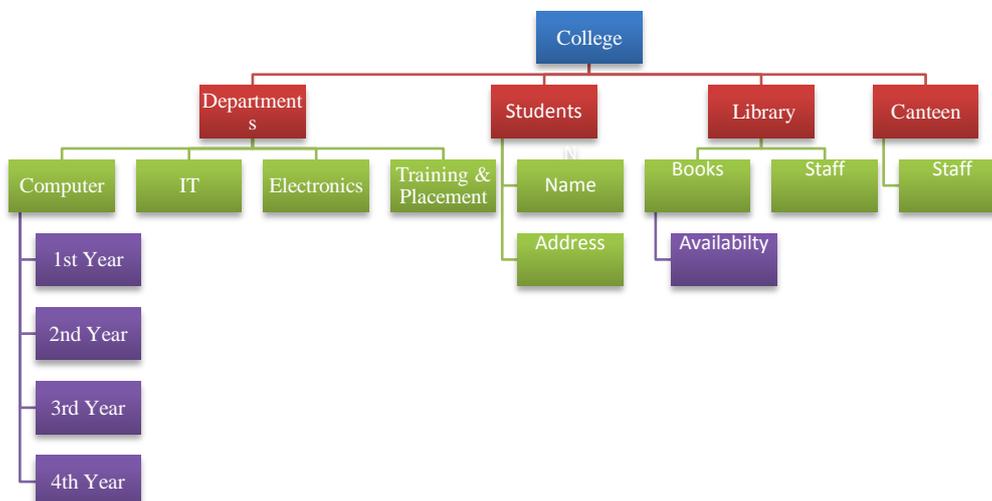

Figure1:- Pictorial representation of Smart Campus

New applications could be created, and their pure existence—the information about how we could use them—also could improve the amount of the sensible things. With this, we could collect new data about the working of the Campus. From the new data, we could know something about the behavior of the campus.

A visualization of smart campus and its subsections are given in Figure 1.

Each of the four sections (e.g. departments, students, library, canteen) are having subsections. Each department has four divisions, year wise i.e. first year, second year, third year, fourth year. Students section has student information. Library section has information related to books, their availability. Canteen section have information regarding dishes available, special dishes, cost of dishes etc.

III. THE EXTENSIBLE ARCHITECTURE

From the Smart Campus perspective, one of the main Challenges is to collect content from various sources where the majority of them might be created at a later time. That is why we need a highly extensible system which is designed for change.

Smart Campus environment has lots of various (and most importantly, heterogeneous) data sources including the following:

- An Education Administration System that contains information on course enrollments, timetable information of courses, exam dates and times, etc.,
- Faculty members offering office hours, consultations, etc.,
- Education Offices of the various faculties offering office hours,
- Student Governments organizing events for students,
- The menus of the canteens located at the Campus,
- A Library Information System that is able to tell whether a given book is available or not

These are only examples of data sources not an exhaustive list. These demonstrate that what kind of diversity in data sources should a complex application face. Applications that provide value-added services typically require integration of some data coming from more of these data sources. That was the reason of developing an architecture providing the ability of accessing information from existing sources along with making the addition of new sources possible and (relatively) easy.

Some of the data can be collected in an automated way (e.g., sensor data), some others might require manual interaction (like canteens' menus or office hours of instructors. We have successfully implemented services in the portal to serve the lecturers' opening hours. One connector is used inside the Educational part to periodically check the available data. If there are changes the students are notified. Based on the actual data all the affected users are notified about the change. An other ongoing development is the creation of a notification portal that is integrated to the Faculty portal where users can see each other's online presence and start conversations without leaving the site. It is straightforward because we can provide a platform where all the education-related tasks could be done therefore users can experience the added value of the services. It is similar to what we have as push notifications on the mobile platform. The portal changes its information provider role to an online collaboration environment.

IV. PURPOSE OF SMART CAMPUS

From our point of view, the basis of the intelligent smart campus is to make the services online available. The first step is to collect the useful information into one online accessible database. First, it means a simple data service. For example, it could be a simple collection of news, a schedule, or even a timetable. In the second step, we have to pay attention on the use of available information. Notice the most popular news or columns, and then we can reorganize the information such as order the most popular columns to the first page. It is still not an intelligent service, but if we have a lots of application working together, which can share the information in the mentioned way, the service goes to be smarter and smarter.

Case Study as the Workflow of the Framework

Scenario:

When a student reaches the campus he/she wants to;

- o Know the schedule of his/her classes for the day
- o Meet his supervisor
- o Attend the classes of the day
- o Attend the seminar conducted by the concerned department
- o Join a party arranged by his/her friends at the campus café.

V. WORKFLOW

When a student enters in the campus, the system automatically recognized him/her, it can be done by getting the device ID he/she is carrying with, registration card and number. Once the student is recognised the list of services available at the campus is displayed on his/her device, the students executes for the tasks as follows;

1. The student's schedule is just a click away, then he/she can opt accordingly.

2. To meet the supervisor, the student will be made available with the schedule of the supervisor and next he/she can plan the meeting at the empty time slot and an alarm is set automatically to inform the student about the meeting.

3. While wandering in the campus he/she will be informed about the next class's time and venue and even the student will be directed towards the venue by the system by showing him/her the entire path towards classroom. Here in the classroom an interesting learning environment is available, as the lecture starts students will be made available all the lecture related material i.e. presentations, questions, examples etc. The context-aware interactive learning environment is created as students are asked questions during the lecture periodically regarding the current lecture to judge the understanding (%age) of the students about the topic. After collecting the data of questions asked to the students during the lecture, the system runtime decides whether the lecture is to be proceeded or some previous things are to be revised. The students are also opted to learn lecture by some other examples which are not discussed in the class by using any mode of learning i.e. through pictures, animated pictures, movie, audio or some example from the real world. The student is provided with all type of learning material related to the topic discussed in the lecture and his/her understanding is periodically checked by the system in order to make his/her learning up to the level best.

4. When the student wants to attend the seminar, he/she is automatically directed to the seminar room by the system and the same learning environment is provided as was in lecture room.

5. Now its party time and some alarm start ringing on the student's device to inform him/her about the party and he/she is moved towards the cafe. When the party starts, the system starts playing music as per user choices and as the out side weather accompanies. The system also provides the option to get pictures and these pictures will automatically be emailed to all the participants, the print of the pictures can also be made available as per request.

VI. ADVANTAGES OF SMART CAMPUS

A. Personal Calendar
Smart Campus is a simple data serving application gathering into one location all the important events at the College Campus.

B. Data Availability
Smart Campus application provides all required data to students like current lectures, information about events, special menus in canteen, books available in library, etc.

C. Interconnected Departments
Smart campus application connects all the departments in the campus so all the departments have access to data of every other department at all time.

VII. CONCLUSION

In this paper we outlined that the development of smart applications is a never ending process. The underlying service architecture are now in a development phase and several end-user application prepared but several more need to be created before we could call our system smart. The architecture fits well into the more general publish/subscribe based architecture of Smart Campus applications as its extensible with new data sources providing the capability of integration of heterogeneous data. In the future, development of the Analytics module is a major goal since providing good analysis of the collected data can add more value to the services.

The smart campus is a very rich learning environment and it provides the entire technological support to the learner and educator as well. The system proves its salient features for which it was designed and ultimately developed. It also fully supports the four key components of pervasive learning model i.e. community, autonomy, locationality and relationality. Context-awareness is the most important issue of such a pervasive computing application. There are many standards for such systems but there is need to make them interoperable using Semantic Web related technologies. The smart campus proposed gives the more reliable and convenient solution in order to cope the various issues of pervasive systems i.e. context-awareness, interactive in nature, event driven and "ever connected" motto as well.

The state-of-the-art technologies are used to solve the layered problems in the designed architecture for integration. In future the domain specific Markup languages (campusXML, learningML etc,) would be designed and used for the better understanding of the domain knowledge and query optimization as context is concerned. And finally here is the list of salient recommendations for educational leadership regarding learning.

- o Understand the culture of the institute or environment as the educator validates the unique nature of institute and its needs/
- o Value teachers and promote their professional growth
- o Extend what you value
- o Express what you value
- o Promote collaboration not cooperation
- o Make menus not mandates
- o Use bureaucratic means to facilitate, not to constraint
- o Connect with the wider environment

REFERENCES
[1]   M. Weiser, "The Computer for the 21st Century," Sci. Amer., Sept., 1991.

[2]   M. Satyanarayanan, "Pervasive Computing: Vision and Challenges", IEEE Personal

[3]   Communications, 2001.

[4]   DAML-S, http://www.daml.org/services/, 2003.

[5]   G. Borriello, M. Chalmers, A. LaMarca, P. Nixon "Delivering Real-World Ubiquitous Location Systems", ACM Communications, March 2005.

[6]   Harter et al., "The Anatomy of a Context-Aware Application," Proc. 5th Ann. ACM/IEEE Int'l Conf. Mobile Computing and Networking (Mobi- Com 99), ACM Press, 1999, pp. 59-68.