

Mobile Based Attendance Management System

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Abstract: Managing the attendance using traditional approach is really a cumbersome process. The person has to maintain the attendance record in registers and file using pen and paper. The problem with this approach is that it requires lots of paper which are the part of our non-renewable natural resources. We are in the age, where we have to think about sustainable development. Managing the attendance using mobile phones, provide an alternative way in this direction. Communication between teachers and the parent is also an important issue that should also be considered, because parent can only get the information about their ward after the interaction with teachers. So, we also tried to bring the system which enables parent to receive the information of their ward of regularity on daily basis.

1. Introduction

Attendance is taken every day on each working day whether it is college, school or any other institution and in this process every institution wasted lots of paper just for keeping the record. With such small reasons, our natural resources are depleting at the enormous rate and it can be possible that our descendants don't able to get those resources. It is also important to inform guardians of the students about the absence or presence of their ward. Some reputed schools and colleges are there, who do it by arranging meetings between them at a specific interval of time. But that's not enough, parent need the report of their ward on regular basis.

So, there is a need to solve this problem and automate this process so that for the absentees' student, the sms or by any other means we should able to inform that their ward is absent. This could be very helpful for both the teachers and their guardians to keep an eye on their ward about their activity, his interest, their regularity etc. So, they can take appropriate action accordingly.

2. Related Work

Many systems and applications have been developed in this regard to solve the automating the process of attendance, but almost none of them fulfil the whole requirements. Many problems can be seen on those existing applications, some lack GUI, some lack automating the process of informing the care taker or guardians. There are software available for automating such problem of attendance but being the fact that desktop it consumes more energy or power consumption that the mobile.

Nowadays, attendance is generally taken on the piece of paper in register. Using mobile for taking attendance, consumes not only less energy but also helps in reducing the wastage of paper and can serve as green way for taking the attendance. Use of paper, nowadays can be eliminated by the use of mobile or automating the process of attendance. As now generally every person has a mobile device and thus can read the sms easily on the spot to get the status of their ward in their college or school.

Thus although there exists a system for implementing this feature as desktop application^[11] for particular college or school or any other place, But with the mobile, we get solution that is green

and eco -friendly i.e. consume less energy and power and also provide a good interface and easy to use for taking the attendance. Mobile being portable can help teachers or any other user to take attendance on their mobile and view the various statistics to analyze the attendance record of the student.

3. Proposed system

We tried to implement a system which overcomes the limitations of the existing approach. Taking the attendance on mobile phones instead of traditional approach is one step forward to sustainable development. Doing the same work on mobile phones not only saves our resources but also enables the user to get easy and interactive access to the attendance records of student. We tried to make an application that can help the teacher to take attendance of the students through their own mobile device. What could be more interesting for that!!

The problem that guardians or parents are not able to get the status of their child time to time or we can say on daily basis. The application that we are building can allow teacher or any departmental head to take the attendance through their mobile devices, manage records, inform to their parents or guardians to the status of his/her child of what actually they are doing it. It provides a good interactive user interface to get the user of taking the attendance and he become able to send the sms to the mobile number given in the details of the students in the file. User should make sure that the mobile number entered is of their mobile device. So sending emails and sms or calling them individually is old process now. It reduces many things like energy coefficients thus green method and helps user to get reduce the effect of greenhouse gases.

4. Platform selection

The system is implemented on S60 Symbian platform. So, all Symbian based mobile phones (i.e. S60 Nokia phones or any other device capable of running .sis file) are supported by the system. Symbian OS is a C++-based system. Therefore, to support the native OS, C++ becomes the major programming language. Besides, Java (possibly J2ME), which always provides platform-independent solution to developers, can also be a choice. Qt language is used to develop the system since it uses the concept of *write once, compile for n* which is faster than Java based applications.

4.1 Symbian

Symbian is a mobile operating system (OS) and computing platform designed for smart phones and currently maintained by Nokia. The Symbian platform is the successor to Symbian OS and Nokia Series 60; unlike Symbian OS, which needed an additional user interface system, Symbian includes a user interface component based on S60 5th Edition. The latest version, Symbian^3, was officially released in Q4 2010, first used in the Nokia N8. Symbian OS was originally developed by Symbian Ltd. It is a descendant of Psion's EPOC and runs excessively on ARM processors, although an unreleased x86port existed.^[1]

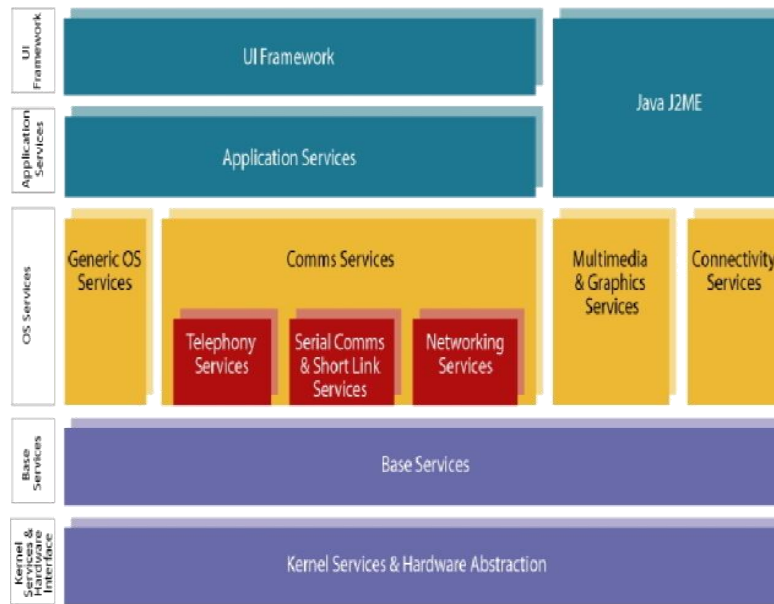


Figure 1: Symbian OS layered architecture ^[2]

4.2 Benefits of the Symbian platform to the industry and to consumers ^[4]

The Symbian platform is designed to be extendible – and is shared between all Symbian devices. What this means is that software need only be developed once for it to work on any Symbian device with the same UI. For different UIs, some extra work is needed to optimize the application.

This software could be stand-alone or used only by the user of the device. However, just as easily, the software could be a networking application, enabling users to communicate with other users, or to access a resource somewhere on the Internet.

The effect of this open platform will be the enabling of a Symbian economy. No longer will mobile devices only interact with a limited range of other devices (usually mobile devices from the same manufacturer, or PCs – via bespoke connectivity software). Users will be able to interact with any device using the Symbian platform. Consequently, it is to be expected that we see a lot of high-quality software systems, produced by different vendors, downloadable to wireless devices at low cost. This reduction in costs can only mean that competition intensifies – which is obviously in the interest of consumers.

Among the many Benefits to the consumer, perhaps the key ones are that there will be more software to choose from, as the reduced porting costs mean lower entry barriers for software developers and that consumers will also be able to seamlessly interact with many more users than ever before.

4.3 Qt for Symbian and its architecture ^[5]

Qt for Symbian offers:

- Cross-platform application development without needing to know Symbian C++
- Qt Mobility APIs for taking advantage of mobile features
- Qt APIs have been implemented on top of Open C / Symbian APIs

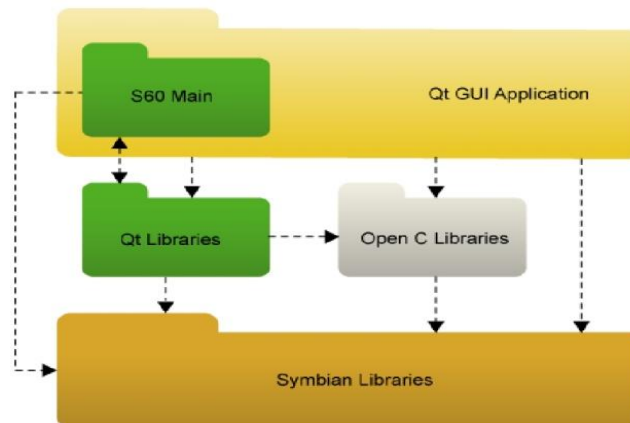


Figure 2: Architecture of Qt for Symbian ^[5]

4.4 Advantages of Qt^[6]

- Target multiple platforms from a single source
- Shorter development time – faster time to market
- Reduced maintenance expense
- Avoid OS-subgroups in development organization
- Enjoy true platform independence
- Target a new platform in weeks, not months
- Rapidly respond to evolving market requirements
- Remain insulated from platform changes
- Qt is actively maintained and developed to support all new mainstream OS variants
- Focus development efforts instead on value-adding innovation
- Qt delivers real, lasting competitive advantage
- Qt increases the productivity of developers by making C++ programming faster, easier and more intuitive
- Qt delivers true platform freedom – targeting a new platform is measured in days or weeks, not months or years

5. System Architecture

5.1 Brief System Architecture Diagram

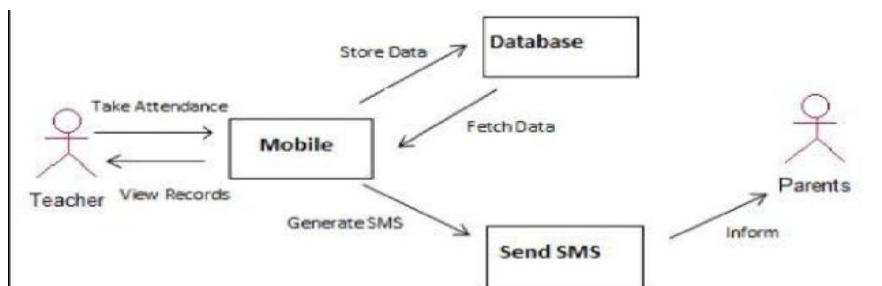


Figure 3.1: Overall System Architecture

Architecture diagram (fig 3.1) shows the overall architecture of the system, how the complete process moves on. The teacher takes the attendance on his/her mobile phones and mark the attendance , the record is then stored in the database so that can be fetched later on when required. The mobile will then generate the sms and send the sms to the parents or guardians of the students informing them about the attendance status of their child in the class.

The interaction between the teacher and the mobile is two way as it's not just the teacher marks the attendance of the student present in the class, the teacher can also access the records like search for the attendance on the particular date or view the attendance status of the particular students on a specific date, along with the basic operation of creating, deleting the class, inserting the students and editing their existing records. The interaction between the mobile phone and the database too is two way as the mobile phones are used not just for storing the data but can also fetch that data. The data required for the above operations can be fetched from the database and viewed by the teacher on his/her mobile phones as per his/her requirements.

5.2 Detailed System Architecture Diagram

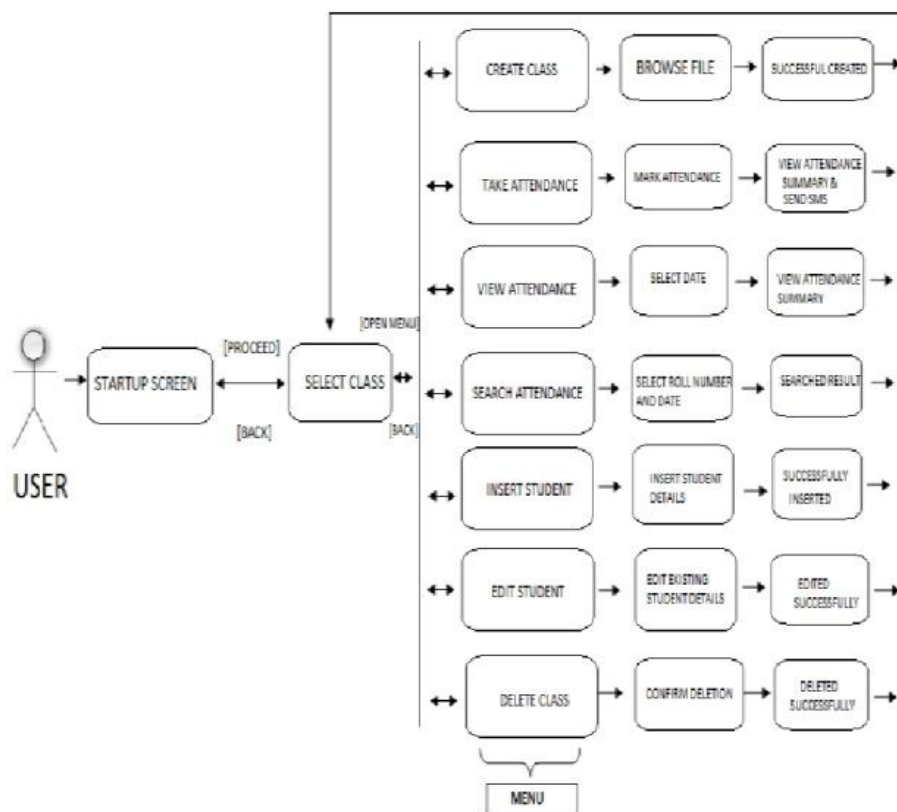


Figure 3.2: Detailed System Architecture

Detailed System Architecture diagram (fig 3.2) is the self-explanatory. This diagram shows all the modules which are being used in this system and also show how user can navigate from start-up screen to other operations till send sms. Other descriptions are being mentioned earlier.

5.3 USE CASE DIAGRAM

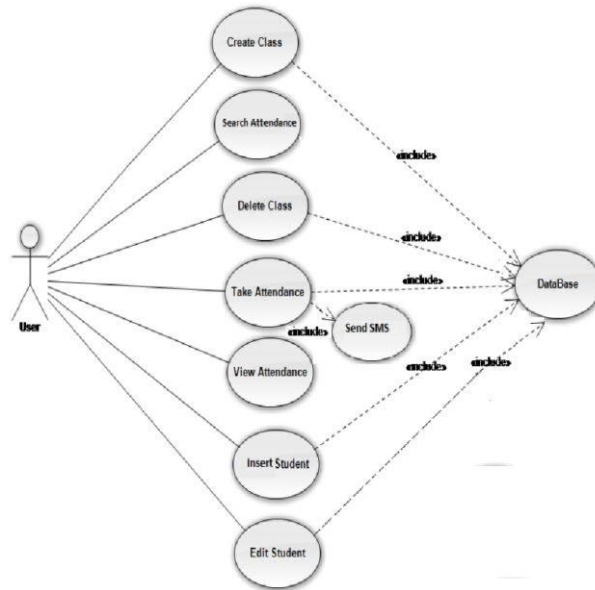


Figure 4: System Use Case Diagram

5.3.1 Description of the Use case Diagram

The above use case describes the facilities enjoyed by the user in our case mobile user. The use cases shown above are:

1. Create Class
2. Search Attendance
3. Delete Class
4. Take attendance
5. View Attendance
6. Insert Student
7. Edit Student

These are the facilities that are provided to the user by our application. The use cases shown above use functionalities provided by other use cases to get the work done .

5.4 Interaction Diagram of System

5.4.1 Sequence Diagram

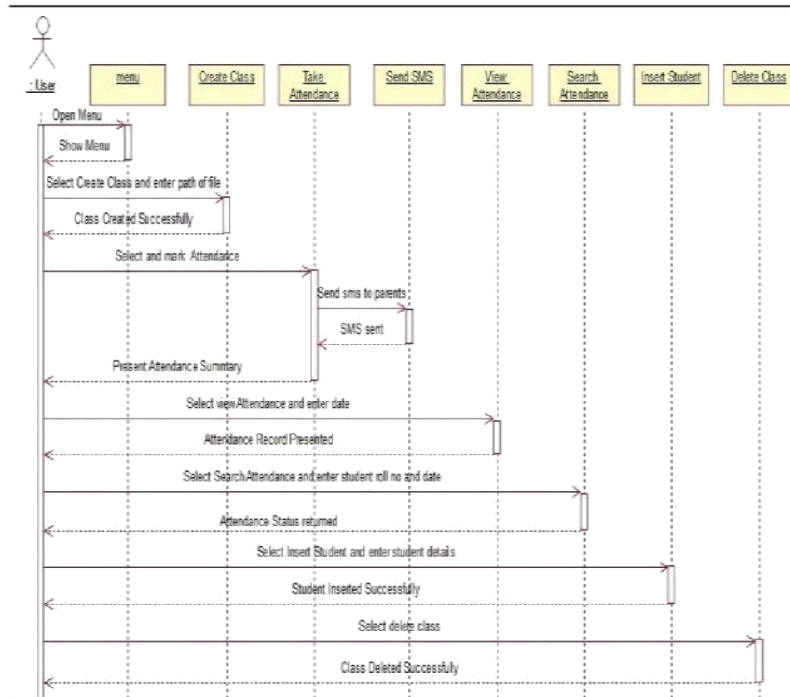


Figure 5: Sequence Diagram for whole system

Fig.5 represents the sequence diagram for whole system which is a kind of interaction diagram that shows how processes operate with one another and in what order. All the modules and their order of accessing are being shown in the diagram.

5.4.2 Collaboration Diagram

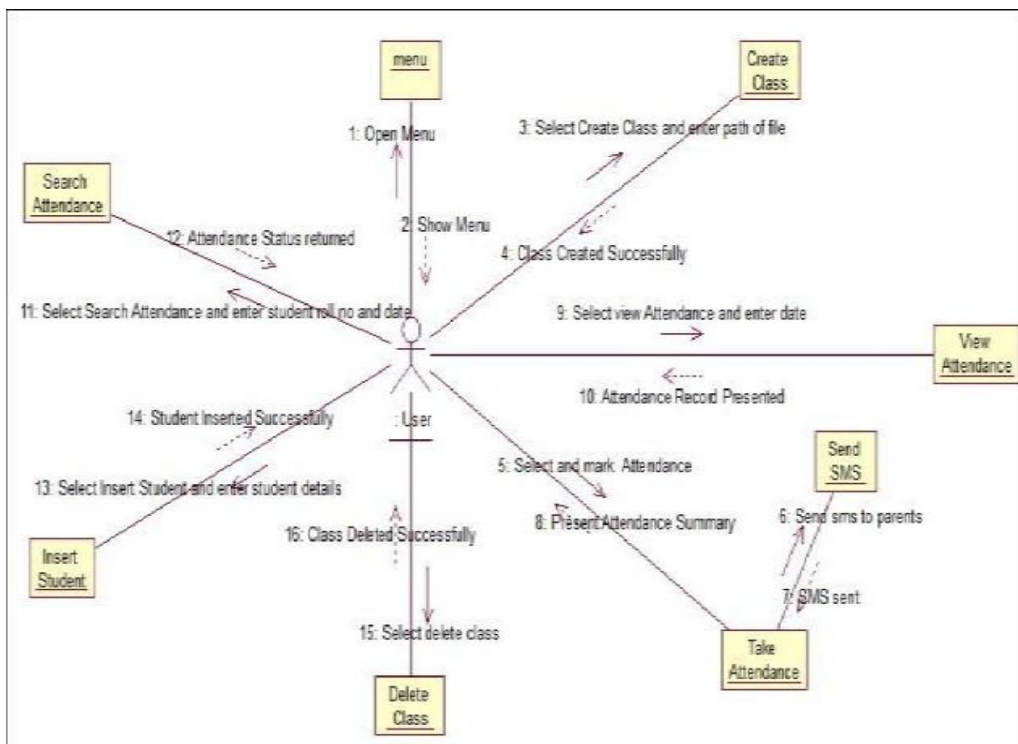


Figure 6: Collaboration Diagram

Fig.6 represents the collaboration diagram for whole system which is also a kind of interaction diagram that focus upon the relationships between the objects. They are very useful for visualizing the way several objects collaborate to get a job done and for comparing a dynamic model with a static model. Collaboration and sequence diagrams describe the same information.

6. Better than PC based System

It is better than PC based system in many ways:

1. In an environment of inadequate and erratic Power (Electricity) supply, the Mobile phones are much better than the Computer; Desktop or Laptop. The Mobile phone requires a small fraction of the power requirement of Computers and has power storing batteries that tend to store power for a longer period, when compared to Laptops
2. It provides mobility to the users to access the attendance record at any time and at any place.
3. The Mobile Phone is relatively cheaper than the Computer on the average, so economically it has advantage over that.
4. In an environment of poor maintenance culture, Mobile phones are less prone to malfunctioning when compared to Computers So, Cheaper Maintenance is the next added advantage for any system based on mobile phones.
5. The reduction in Paper material being used in traditional method of pen and paper based attendance system, thus preserving the Forests of the world (the small phone can contain hundreds of thousands of pages of books, and written materials). It is a Green technology.
6. Availability wise also it is preferable, today mobile phone is available to every other person as compared to computer. So, any institution does not need to incur any extra cost while installing the system.

7. Advantages and Limitations of the proposed system

7.1 Advantages

The advantages of our system are as follow:

- Ease up the process of attendance.
- Easy Analysis of data.
- Better user interface.
- Made access to the record of attendance available 24X7.
- Reduced dependency on natural resources for paper.
- Easy generation of summary of attendance.
- Make the process of attendance a green process.
- Provide communication between teachers and parents.
- Automatic SMS will be sent to parents to inform the status of their ward whether present or absent in the institution.

7.2 Limitations

The limitations of our system are as follows:

- Informing the parents for their child attendance status regularly can be irritating if they are not interested.
- Small screen of the mobile is a big limitation and can leads to difficulty in marking the attendance of the system.

- Limited storage capacity of the mobile is also a limitation in the system and due to this large number of records can't be kept in the mobile.
- It can be a little bit costly for the teacher to send the sms from the mobile every time she takes attendance in the class in case he/she has not used message card.
- Speed of the OS of the mobile is less than the computer if compared with computer so it has speed limitations if compared with computer based attendance system.

8. System Screenshots

Some of the system screenshots are:

8.1 Class Menu



Figure 7: Class Menu

Screenshot(Fig 7) shows the different menu options that the user have to choose from like creating the class ,take attendance, view the attendance record, search the attendance of particular student, inserting the new student in the class, edit details of the existing student in the class and the last is deleting the class.

8.2 Take Attendance:



Figure 8: Take Attendance

Screenshot (Fig 8) shows the screen for marking the attendance of the student whether present or absent along with the necessary details of the student and the current date. As the teacher or any other person who is taking the attendance submit after marking the attendance then automated sms are generated and sent to the parents or guardians of all those students who are marked absent. They are informed about the presence or absence of their ward from the class. In general parents are informed of the status of their child in the class.

9. Testing of the system

The system has been tested in the real time by giving the mobile phone Nokia 5233 with application installed in it to the professors of one of the reputed institution “Bhagwan Parshuram Institute of technology, Delhi” and then taking the attendance in the class. The feedbacks from the various professors are then recorded. Most of the professors are quite satisfied with the system. The feedbacks from the parents also are recorded in this process.

10. Conclusions and Future Work

In this paper we have discussed about the problems caused due to the use of traditional approach in taking the attendance and solutions for that through the use of mobile and provide a new approach.

The goals achieved in following this approach: Automate the attendance management using mobile devices to reduce the dependencies on natural resources and also provides a way of communication between parents and teachers. Integrating the student’s mobile phones with the application so that the application detects automatically the students that are present is a great thing to be added in the future.

Integrate it with the centralized server of the college/school so that the server will send the sms to the guardians of the absentee’s students and informing them about his or her ward. We will try to generate the daily report that will be submitted to the centralized server for its record. This can also use Bluetooth technology or Wi-Fi technology for communication between device and central server within campus. These are some future works which can be implemented further.

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