



香 港 大 學

THE UNIVERSITY OF HONG KONG

Faculty of Engineering

COMP4801 Final Year Project

DETAILED PROJECT PLAN

MOBILE HOTEL MANAGEMENT SYSTEM

GROUP MEMBERS:

Yip Mei Hui (2012571603)
Mak Amanda Yee Ting (3035073721)
Lam Chung Fan (3035044665)

DATE OF SUBMISSION:

04 OCTOBER, 2015

Table of Contents

I.	Summary	3
II.	Basic Background	4
III.	Theoretical Background	4
IV.	Literature Review: Related Studies/ Existing Solutions	5
V.	Project Scope	6
	Functions	6
	Initial Set Up	6
	Front Desk Management.....	6
	Room Management and House Keeping	6
	Reports and Invoices	6
	Value-added Features	7
	1. Calendar View for Managing Reservations	7
	2. Room Statuses in Floor Plan View	7
	3. QR Check In / Check Out.....	8
	4. “Hot” Rooms Concept	8
	5. “Member-points” Concept	9
	6. Multiple End Users Support: Manager, Front-Desk Staff, Cleaning Staff, Hotel Guests	9
VI.	Objectives	10
VII.	Benefits	11
VIII.	Prerequisites	12
IX.	Approach & Methodology	13
X.	Feasibility	13
XI.	Project Management	14
XII.	Risks, Challenges and Mitigation	14
XIII.	Deliverables	14
XIV.	Detailed Schedule	15
	Milestones, Task List and Division of Work	15
XV.	Conclusion	16
XVI.	Appendices	17
XVII.	References	18

I. Summary

Many major hotel chains are currently using Customer Relationship Management (CRM) business solutions offered by big companies such as Oracle for their hotel management system. These systems, however, are too expensive to use for most Small/Medium Enterprises (SME) hotels. Thus, many of the small hotels maintained their traditional yet inefficient way of hotel management by using Excel spreadsheets or manual bookkeeping. To accommodate the increasing demand for an efficient and affordable hotel management system, an efficient mobile hotel management system that could be used easily and be maintained at a lower cost is required.

The main objective of this project is to create a mobile application targeting SME hotels that offer operational integration between multi-site reservations, front-desk management, room maintenance, housekeeping, customer relationship management and reporting modules. As the target user groups will be middle-aged and above hotel staff with limited computer literacy, simple and self-explanatory user interfaces will be adopted. Several value-added features will also be incorporated to provide better-quality service experience and customer satisfaction. Some functions we will include are QR code check in/out, calendar view for reservations, room statuses in floor plan view, “hot rooms” concept, “member points” concept and multi-end user support, including support for hotel guests. The SME hotels can benefit in terms of cutting costs, increasing operational efficiency, improving service experience and attaining greater customer satisfaction.

The methods to tackle this project include building a cloud relational database that is hosted on force.com to handle all the objects, relationships, validation rules and workflow. At the same time, a web application will be developed entirely with HTML5, CSS and JavaScript. The data from the cloud database will be accessed using REST API. Lastly, PhoneGap will be used to create a mobile application that can operate on multiple platforms.

Several risks such as overcommitting functionalities and scope creep are foreseen. Our team will adopt suitable mitigations to tackle these problems. The project is scheduled to be finalized by February, 2016 after appropriate optimization and testing. A project exhibition is to be expected in May, 2016.

By creating a visually appealing mobile application with several value-added features, our project team hopes that the operational efficiency, guest satisfaction and revenue opportunities of SME hotels can be optimized by this project.

II. Basic Background

On account of improved aviation technology nowadays, people have started to travel more as travelling has now been made cheaper and easier. The tourism and hospitality industries have grown rapidly in recent years as the influx of visitors led to a higher demand for tourist accommodation. As Small/Medium Enterprises (SME) hotels expand their businesses to manage multiple sites, the traditional way of hotel management is no longer appropriate. In terms of providing better service experience to customer and maintaining better operational integration among hotel staff, a cloud-based database would be more suitable than local servers. In addition, unlike the traditional way of staying mainly behind the front desk, hotel staff now need more mobility to improve customer relationship and operational efficiency. With the rapid growth of mobile devices, people are capable of managing business through their portable smart devices, and are no confined to computer web pages on their desktops. To accommodate such increasing demands for SME hotels and to ensure their continual business growth, an efficient mobile hotel management system that could be used easily and maintained at lower cost is required.

III. Theoretical Background

Many major hotel chains are currently using CRM business solutions such as Oracle Hospitality as their hotel management system. However, business solutions as such are normally very costly and, most of the time, too comprehensive for SME hotels. Computer literacy is yet another hindrance for SME hotels to fully digitalize their management system, as many of the systems are operated by middle-aged or above generations. These people do not feel comfortable with existing solutions, which they found complicated and confusing. Thus, many SME hotels would opt for cheaper choices instead. While many SME hotel staff have chosen to use Excel spreadsheets for handling reservations and storing customer details, there are those who feel that even Excel spreadsheets are too messy and complicated and resort to the traditional way of bookkeeping manually in hardcopy — both of which are highly inefficient practices. Although some SME hotels have adopted a slightly more advanced system of installing a local server as their database, this method would incur high costs for hardware maintenance and data security, thus contradicting cost-effectiveness.

In the long run, these traditional methods of managing hotels would be detrimental to the interests of the enterprises in terms of business opportunities, efficiency and overall expenses.

IV. Literature Review: Related Studies/ Existing Solutions

There are currently several existing applications and web-based systems in the market providing similar services to hotels. Listed below are a few that have been reviewed by our group.

1. Clerk Hotel Management ¹
 - This particular system targets SME hotels, but it requires online training and the management staff would need to learn API in order to utilize the management system. Limited room statuses such as pending, confirmed, checked-in/out are covered, but certainly more would be helpful for better room maintenance. For instance, it would be helpful if the system could include which rooms have been inspected, and whether they are clean or dirty.
2. Oracle Hospitality²
 - Oracle Hospitality provides a variety of different software, hardware and services to suit needs of different enterprises. Many major hotel chains such as Marriott International is using this service for their hotel management. It provides robust and comprehensive systems, but it is too expensive for SME hotels.

On deciding which existing platform to be utilized, a few options were considered. Of all, our team has chosen force.com. It is a cloud-based platform as a service (PaaS) that allow developers to create applications using a Java-like language, Apex. Data security and hardware maintenance will also be handled by the cloud platform. Most importantly, being the No.1 cloud-based CRM according to Gartner's market report³, many existing SMEs are already using Salesforce.com as their CRM. Hotels such as HotelTonight and Kimpton Hotels have started to utilize Salesforce for their system⁴. Existing hotel management systems such as Hotel Ninjas that utilize Salesforce would generate more SME hotels that use Salesforce as their CRM. By building our application on Force.com platform, these SMEs could easily install the application and integrate it with their current system with minimal setup. Similarly, those who use our mobile hotel management system could easily adopt Salesforce as their CRM or integrate with other applications that run on the same platform.

¹ (Clerk Hotel Management n.d.)

² (Oracle n.d.)

³ (Gartner 2015)

⁴ (Salesforce 2015)

V. Project Scope

This project aims to offer operational integration between front desk management, housekeeping, room management, utilization statistics and reporting modules. As mentioned before, the main target will be SME hotels. As the target user group will be middle-aged and above hotel staff with limited computer literacy, the user interface will be designed to be as simple and as intuitive as possible. Several value-added features will also be incorporated to provide better-quality service experience and customer satisfaction. This project however, will not cover integration into existing e-payment systems or e-booking systems such as Agoda.com and Booking.com. These integrations will nonetheless be included in our future development list should time permits.

Functions

Initial Set Up

1. Easy Customization of Room Prices and Features
2. Easy Addition of New Item and Price
3. Creation or Edition of Customer Details

Front Desk Management

1. Check-In / Check-Out
2. Bookings and Cancellations of Reservations
3. Multisite Room Allocation
4. Special Requests: Room Services, Item Purchase, etc.
5. Visitor Records

Room Management and House Keeping

1. Variety of Room Statuses: Needs Cleaning, Inspected, Vacant, Checked-In, Facility Malfunction, Do-Not-Disturb, etc.
2. Request for Inventory Restock
3. Report of Malfunctioned Facility

Reports and Invoices

1. Customized Report Generation
2. Invoice Generation
3. Utilization Analysis
4. Customer Statistics

Value-added Features

1. Calendar View for Managing Reservations

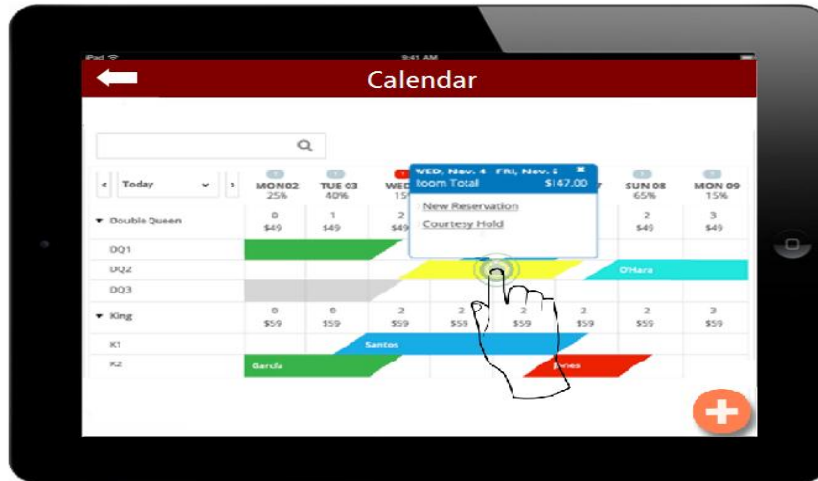


Figure 1 Tentative Calendar View for Reservation

2. Room Statuses in Floor Plan View

- Rooms will be highlighted with different colors to represent room statuses:
 - For instance, Green: Available; Red: Facilities malfunctioned; Purple: Needs Cleaning
- Further details of the room will be displayed on touch: eg. Toilet Bowl Malfunctioned



Figure 2 Tentative Floor Plan View of Room Statuses

3. QR Check In / Check Out

- A function will be added to handle check in and out by scanning QR-Code.



Figure 3 Tentative QR Check In/Out

4. "Hot" Rooms Concept

- To optimize revenue by utilizing the time gap for each room when customer checks out early, a 'Hot' Rooms Search function will be created to rent out rooms at a cheaper price. This system targets budget travelers or travelers in transit.



Figure 4 Tentative "Hot Rooms" Concept

5. “Member-points” Concept

- To provide better CRM, loyal customers can choose to register as members. The tentative idea is to accumulate member-points for each stay and provide discounts whenever the accumulated member-points hit a certain amount. This would retain returning customers.

6. Multiple End Users Support: Manager, Front-Desk Staff, Cleaning Staff, Hotel Guests

- A customized UI for hotel guests will be created for the guests to make room services request or handle self-booking. A chat function would also be implemented for the guest to chat directly with the working staff in case assistance is needed.

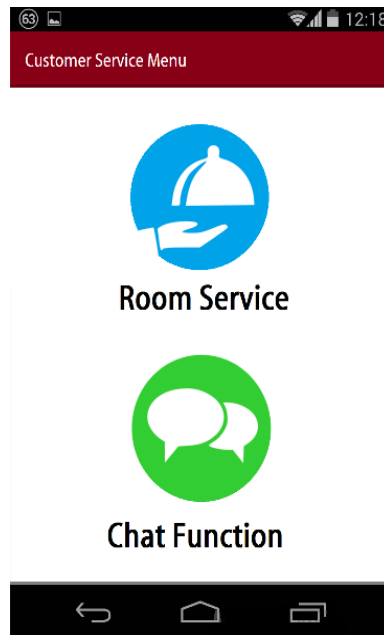


Figure 5 Tentative UI for Hotel Guests

VI. Objectives

The objective of the project is to create a mobile hotel management system with web-based user interface and hosted by cloud databases. The mobile application will provide multi-site room allocation, customer statistics and utilization analysis. The main aim is to construct an efficient system that would suit the needs of SME hotels while keeping the cost low enough for them to afford.

In addition to providing tangible services to the hotels at a lower price, the mobile application will provide target users better control over their hotels. Access permissions will be given to the certain users to add or edit room attributes easily, while having a mobile application will give hotel staff better mobility to engage with the customers and conduct housekeeping activities virtually anywhere using mobile devices. The application will also improve operational efficiencies by allowing the staff to carry out their tasks outside of the front desk. When the staff could work virtually anywhere using mobile devices, they would have more opportunities to interact with the customers and understand their needs in order to improve customer satisfaction.

Better customer relationship management is also one of the objectives of the project. The introduction of membership points to loyal customers would generate more revenue to the SME hotels by retaining returning customers. The chatroom function would allow the customer to communicate with the hotel staff whenever they require assistance, which would again, improve service experience and customer satisfaction.

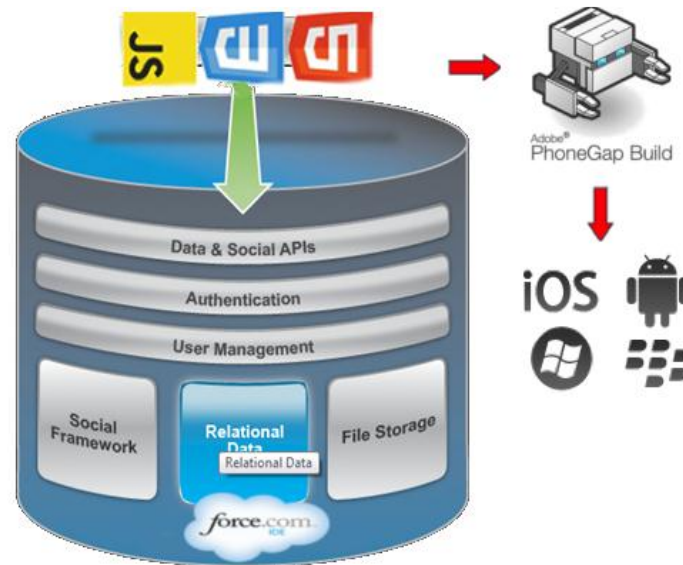
VII. Benefits

1. Despite the existence of several business solutions on the market, many SMEs still opt for traditional methods of managing hotels. This shows that even if they understand how a systematic and digitalized option could help with their operations, they would not consider these options if the cost is too high. Our team's mobile application will offer a cheaper option for SME hotels to digitalize their operations. While utilizing a cloud-based system, the expenses of hardware maintenance, data security and human training can be reduced.
2. With a mobile system, the mobility of the hotel staff will greatly increase. The receptionists no longer have to resort to the traditional way of staying behind the front desks or rush to the front desks whenever they need access to the management system or database. The mobile system supports hotel staff to check customers in and out wherever they are, be it at the airport or bus terminal. The cleaning staff will know exactly which room to clean and the inventory request function allows them to easily prompt management to restock the inventory. Moreover, the floor plan view makes it easier for all the staff to visualize the statuses of all hotel rooms. The simple and intuitive design of the user interface will prevent users from spending too much time and energy trying to figure out how to use the application instead of utilizing it to aid operations. This project will thus help SME hotels improve their operational efficiency.
3. By having a member portal, loyal customers who become members can install their own version of the application for self-booking or self-cancellation of reservations. The room service and chatroom functions allow customers to make requests easily. By introducing membership points, better customer relationship management could be achieved. This would help generate more revenue by retaining repeating customers.
4. The whole world is moving towards e-commerce and cloud computing. This project would be a great channel for SME hotels to switch from traditional systems to a modern cloud-computerized system. In the long run, this would be the starting point for SME hotels to venture deeper into the world of e-business strategies, which can aid further business expansion.

VIII. Prerequisites

1. As force.com offered by Salesforce will be used as the main platform to design, develop and deploy this cloud-based mobile application, knowledge for Apex is needed to code the business logic, execute workflow and customize functions on the platform. Data-fetching will be conducted in APEX for the mobile application to interact with the cloud database hosted by force.com through API. Apex is similar to Java and thus will be easy to learn if one has knowledge in Java.
2. SOQL will be the language needed for data query on force.com's relational database. It is very similar to MySQL and thus can be easily learned as long as one has basic knowledge in any form of query languages.
3. Since the mobile application will be built entirely on HTML5, CSS and JavaScript, knowledge for web development languages is mandatory.
4. In terms of prototyping the mobile application, Pixate, an open-source mobile interaction design service, will be used to create interactions and build the prototype application that runs directly on devices.
5. To create a cross-platform mobile application, PhoneGap, an open source technology to develop hybrid application using web-based technologies, will be required. Through Adobe PhoneGap Build, an IPA file will be generated for iOS devices; APK file for Android devices and etc. The mobile application will be created and it will consume and access data from the cloud database on force.com.
6. Several JavaScript libraries will be required. Forcetak.js is required as a wrapper for the application to communicate with the cloud database. D3.js may be employed for interactive charts and graphs for the statistical analysis. To improve development productivity, existing frameworks such as Zepto.js and Mustache.js will be helpful in creating dynamic applications and separating the UI from the JavaScript logic.

IX. Approach & Methodology



1. Relational database will first be constructed on force.com. Relationships between objects will be created and validation rules will be generated. Permission set and user profile will be stored in force.com as well as some app logic. APEX will be used to code the business logic and custom app logic to meet some unique requirements. Functions will be written in APEX and stored in force.com too for them to be called from the mobile application using API. REST is the API that is most likely be used in this project to access the data stored in cloud.
2. All the application interface will be built in HTML5, CSS, and JavaScript. The application logic will be coded in JavaScript. Forcetek.js will act as a JavaScript wrapper to the REST API and at the same time provide helper methods to smoothen data accessing processes.
3. Deployment will be done by utilizing Adobe PhoneGap Build, where code can be uploaded for cloud-based compilation. PhoneGap build will output QR codes for application binaries once complication is completed, which can then be installed onto mobile device.

X. Feasibility

As explained in the background, the main hindrance for SME hotels to digitalize their system is the high cost of existing business solution and low computer literacy of middle-aged and above staff. This project is technologically feasible as force.com is an open source IDE. PhoneGap Build offered by Adobe is an open source framework as well. In terms of programming languages involved, the main problem lies with tackling the API and coding in APEX, as HTML5, CSS and JavaScript are mostly within the group members' existing skill sets and should not be bringing too many difficulties. The feasibility is also backed by existing web-based hotel management that utilizes Salesforce such as Hotel Ninjas⁵.

⁵ (Salesforce Appexchange n.d.)

XI. Project Management

The work will be split among the three members equally. For detailed division of work, refer to section XIV. *Detailed Schedule*.

XII. Risks, Challenges and Mitigation

Risks and Challenges	Probability	Impact	Mitigation
Insufficient skill set	High	Medium	<ul style="list-style-type: none"> · Dedicate more time to learning and researching · Utilise more existing skills and tools rather than use too many new development paradigms
Insufficient time due to other on-going coursework	High	High	Better time management and track progress frequently
Overcommit functionalities	Medium	High	Adjust and estimate time needed to commit to each function as the project progresses
Scope Creep	Low	Low	Constantly review functionalities to ensure they are still aligned with the project requirements and scope

XIII. Deliverables

The deliverables for this project are shown in the table below.

Deliverable	Details	
Phase 1	Project Plan	A detailed project plan is prepared and a project webpage is created to update the on-going progress.
	Project Webpage	
First Presentation	Explanation of progress, problems faced and solved	
Phase 2:	Preliminary Implementation	Initial implementation: GUI design, database construction, mobile application and cloud database integration. Interim report will be prepared to report progress from the start of the project
	Interim Report	
Phase 3:	Finalized Tested Implementation	The mobile application will be tested. Its implementation will be finalized. Final report will be generated for the whole project
	Final Report	
Final Presentation	Presentation of the complete mobile application	
Project Exhibition	Poster will be designed for the project exhibition	

XIV. Detailed Schedule

Milestones, Task List and Division of Work

2015	September	Researched on the feasibility and existing solutions in the market	Yip, Mak, Lam
		Gathered existing techniques and platforms to be utilized	
		Brainstormed on additional value-added features	
		Determined the project scope	
		Designed the project webpage	
		Completed the project plan	
	October	Building schema for the database with force.com <ul style="list-style-type: none"> ▪ Creating objects and fields 	Lam
		Adding relationship and validation rules for each object <ul style="list-style-type: none"> ▪ E.g. relationships between facilities and hotel sites, rooms with hotel sites, reservation and invoice, etc. ▪ Set up validation rules to prevent conflicting reservations, negative price, etc. 	Yip, Lam
		Adding workflow rules to automate field updates	Yip
		Design wireframes for the mobile application <ul style="list-style-type: none"> ▪ generate prototypes: <ul style="list-style-type: none"> • considering different user actions and interactions with the app 	Mak
		Import data and test the relationship and validation rules of the database schema	Yip, Mak, Lam
	November-December	Code Custom App logic using APEX	Yip, Lam
		Develop API to allow remote access from application	Yip, Lam
		Construct preliminary GUI for the application	Mak
		Integrate mobile app to the force.com cloud database using API for each function <ul style="list-style-type: none"> ▪ E.g. adding new site, room, price, site.... 	Yip, Lam
		Add invoicing function	Yip
		Add reporting function to the application	Yip

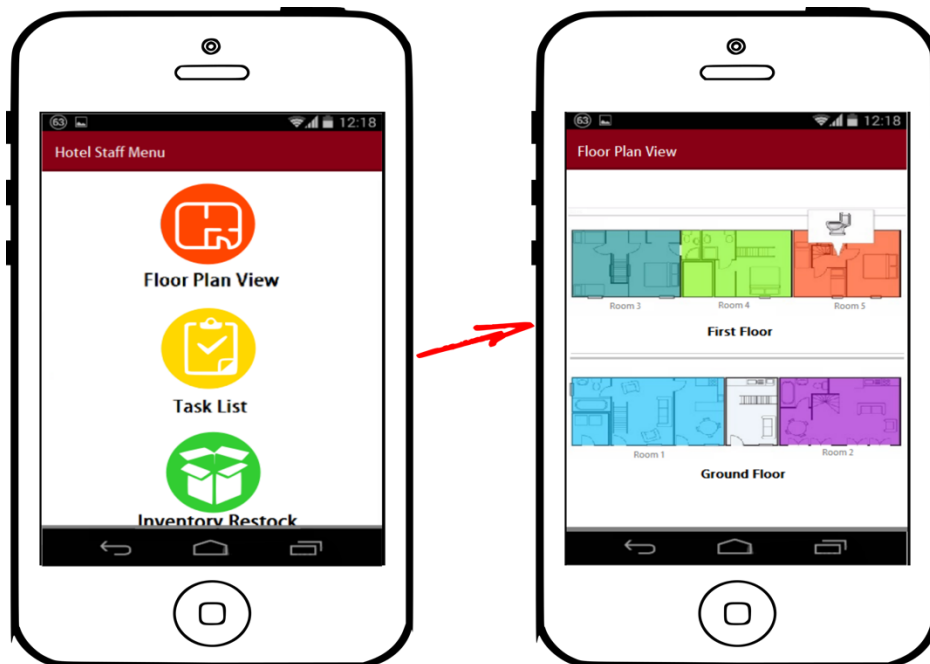
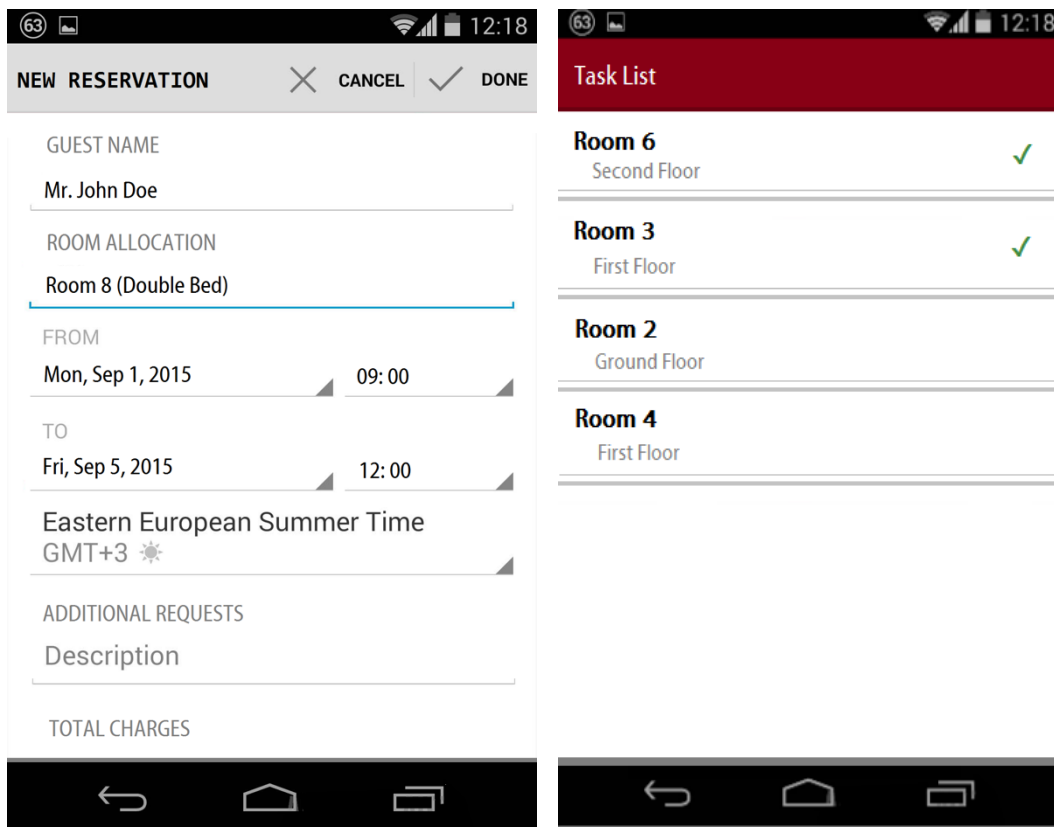
		Allow the application to produce utilization statistics in forms of charts and graphs	Lam, Mak
		Add value-added features <ul style="list-style-type: none"> ▪ QR Check in/out ▪ QR code for each item (eg. food and beverages) to create a front-desk catalog ▪ Floor plan view showing room status: malfunctioned facilities, dirty room, etc ▪ Add 'hot room' search function for short period rental of rooms to suit budget travellers or travellers in transit's needs ▪ Create e-notifications to notify staff on changes in room status or inventory restock 	Yip, Lam, Mak
2016	January	Create profiles and permission sets for different user groups	Yip
		Deliverables of Phase 2 <ul style="list-style-type: none"> ▪ Application test-run ▪ Check for bugs ▪ Interim report 	Yip, Mak, Lam
	February-March	Application refinement	Yip, Mak, Lam
		Optimization and testing	
		Design poster	
		Finalization of implementation	
	April-May	Prepare final report	Yip, Mak, Lam
		Prepare for exhibition	
	Project exhibition		

XV. Conclusion

By creating visually appealing and self-explanatory UI with interesting features, our group hopes that SME hotels will change from their traditional way of managing into this cloud computerized system to engage with their work and customers. By offering all the aforementioned functions and features on mobile devices, the application should be able to suit the needs for many SME hotels by providing operational integration between front-desk management, housekeeping activities, room maintenance and reporting modules. It is thus anticipated that the operational efficiency, guest satisfaction and revenue opportunities would be optimized by this project.

XVI. Appendices

Below are some other tentative UI's for the mobile application:



XVII. References

Clerk Hotel Management. *Clerk Hotel Management*. <http://www.clerkhotel.com/en/> (accessed September 18, 2015).

Gartner. *Gartner Says Customer Relationship Management Software Market Grew 13.3 Percent*. May 19, 2015. <https://www.gartner.com/newsroom/id/3056118> (accessed September 10, 2015).

Oracle. *Oracle Hospitality for Hotel and Resorts Solutions*. <https://www.oracle.com/industries/hospitality/hotels-resorts/solutions/index.html> (accessed September 12, 2015).

Salesforce Appexchange. *Hotel Ninjas - Hotel Management System*. <https://appexchange.salesforce.com/listingDetail?listingId=a0N3000000B3n86EAB> (accessed September 20, 2015).

Salesforce. *Customer Success Stories*. <https://www.salesforce.com/customers/> (accessed September 10, 2015).