­­MINISTRY OF EDUCATION AND TRAINING

FPT UNIVERSITY

Capstone Project Document

Cloud-based Backend as a Service for Building Mobile Applications

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| Capstone Project code | CSBM |

-Ho Chi Minh, *11-05-2016*-

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**Definitions, Acronyms, and Abbreviations**

|  |  |
| --- | --- |
| Name | Definition |
| BaaS | Back-end as a service |

# **A. Introduction**

## **Project Information**

- Project name: **Cloud-based Backend as a Service for Building Mobile**

**Applications.**

- Project code: **CSBM.**

- Project type: **Web Application and Mobile Framework.**

- Start date: **11-05-2016.**

- End date: **21-8-2016.**

## **Introduction**

In this document, we introduce a solution for mobile developers. Developing mobile applications is more and more popular and cloud computing also extremely develops. The combination is very complex to build the effective application on smartphone. Based on our researches and analysis, we proposed a cloud-based backend as a service for mobile developers.

We provide a service that includes website application and mobile framework, which helps mobile developers to develop their application quickly, easily to change, and flexibility in modification. Somethings supported the developer building their application without worrying about the backend services.

## **Current Situation**

When developing mobile applications, developers need to concern too much about back-end such as: creating service support push notification, creating and managing database mobile… Most modern mobile applications store data and interact with other services on the internet. User accounts, shared content, documents and purchases; these things all need to be stored somewhere else, and cloud is a good solution. There is a cloud-based backend as a service of Facebook named “Parse” (https://www.parse.com), however the “Parse” is shutdown in first month 2016…

## **Problem Definition**

Others backend as a service:

* Advantages:
* Parse, Firebase… are well-known and already had much users.
* Disadvantages:
  + Parse (http://parse.com/) is shutdown in first month 2017.
  + CloudKit (<https://developer.apple.com/icloud/>) is limited to iOS and require user to use iCloud.
  + Firebase (<https://www.firebase.com/>) hasn’t push notification

Common mobile development:

* Advantages:
* Taking control everything from mobile layout to back-end component.
* Disadvantages:
* Mobile developers need to have the knowledge about web service or wait provided services from web service developer.
* Mobile developers hard to focus on creating user experience.
* Mobile application development is waste of time on building API.

## **Proposed Solution**

Our proposed solution is to develop the Cloud-based Backend as a Service named “CSBM” to support mobile developer manage application data via our provided framework and only focus on creating extraordinary user experiences. We’ll take care of the rest.

### **5.1. Feature functions**

* Web application: design for developer to manage data and configuration of their mobile application.
* Server: parse data from client side to store and sync data with our NoSQL cloud database.
* Mobile framework: provide framework for mobile developer to interact with our database.

### **5.2. Advantages and Disadvantages**

* **Advantages:**
  + Real-time database: data is stored in cloud database and synced to all connected clients in real-time.
  + Push notification: auto push notification to all connected client after data is changed.
  + Mobile framework for developers to interact with their data on server database.
* **Disadvantages:**
  + Security: users only manage their data while the security is based on the service provided.
  + Application downtime: users can’t control downtime when CSBM server has problem.

## **Functional Requirements**

* **Server component**
  + Parse data from client dashboard to system storage.
  + Notify to connected client.
  + Sync database to server automatically.
* **Web component**
  + Manage applications.
  + Manage data.
* **Mobile framework** 
  + Provide framework for mobile.

## **Role and Responsibility**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Full Name | Role | Position | Contact |
| 1 | Kiều Trọng Khánh | Project Manager | Supervisor | khanhkt@fpt.edu.vn |
| 2 | Nguyễn Mạnh Hùng | Developer | Leader | hungnmse61388@fpt.edu.vn |
| 3 | Nguyễn Hữu Lộc | Developer | Member | locnhse61312@fpt.edu.vn |
| 4 | Vũ Văn Quyết | Developer | Member | quyetvv61071@fpt.edu.vn |
| 5 | Phạm Bảo Toàn | Developer | Member | toanpbse61011@fpt.edu.vn |

*Table 1: Roles and Responsibilities*

# **B. Software Project Management Plan**

## **Problem Definition**

### **1.1. Name of this Capstone Project**

- Official name: Cloud-based Backend as a Service for Building Mobile Applications.

- Vietnamese name: Dịch vụ đám mây hỗ trợ developer xây dựng mobile application.

- Abbreviation: CSBM.

### **1.2. Problem Abstract**

At the moment, especially in Viet Nam, not much developer use BaaS (Backend as a Service). The development of mobile application include building back-end so it requires mobile developer have knowledge about coding web api or they may wait for web api from others developers. This situation makes mobile developers can’t focus on creating good user experiences, and then the effective of build a mobile application is always not best liked developer hope.

Besides, currently there are Parse (<http://parse.com/>), Cloud-Kit (<https://developer.apple.com/icloud/>), Firebase (<https://www.firebase.com/)>,... But they have not provided developers a good way to build a mobile application. Cloud-Kit is limited to iOS and require user to use iCloud. Firebase hasn’t push notification. Parse is stop service provider in first month 2016 and is shutdown in first month 2017, but many applications are there. If Parse shutdown, developers who are using Parse will have difficulty in finding another BaaS like Parse.

For the goal that improving mobile development, we provide a service which base on Parse Server, to reduce the time consuming in mobile development and mobile developers can focus more on user interface and user experiences. By using Parse Server, we develop a website to create new applications, and a service to sharing data between user’s different devices. The service also haves push notifications, if either of those are important to developer applications, our service will likely save develop time.

### **1.3. Project Overview**

#### **1.3.1. Current Situation**

Below are the problems encountered in this project:

* + **Disadvantages:**
    - Parse source code was developed with NodeJs that nobody in team has much knowledge about.
    - Parse source code not public function to allow users create new application.
    - Parse server now can only run one application. If developers have many application they will need many Parse server to run all of them.
    - Team hasn’t much knowledge about how to code and build a mobile framework.
  + **Advantages:**
    - The server is ready to run based on Parse source code.

#### **1.3.2. The Proposed System**

According to technology researches, we found out that Parse server of Facebook can help us resolving the problem of reducing time consuming in mobile development and also help developers who are using Parse now can move to and continue develop application.

To resolve the problem that Parse uses NodeJs as main language for the server, we can use NodeJs Tutorial from <http://www.tutorialspoint.com/nodejs/> for understanding how NodeJs work. We also find the necessary help from NodeJs development forum to solve problems.

We must to know what dashboard send request to server to create a new application to write a function allow developer can create new application from our service dashboard. According to technology researches, we decided AngularJs will be the framework for dashboard.

We assign responsibility in horizontal, it means everyone will do a whole big think and separated from the others. This decision based on that everything about this project is really new for all of the member so let each one focus on one problem is the best way.

##### **1.3.2.1. Website (Dashboard)**

Main web application is a place for developer to create a new application or register account to use main function of the service website. Developer also can use this website to management the data of their application.

* For developer
  + - Create a new application: Developer can create a new application.
    - Manage data: Create/Edit/Remove developer data in application.
  + For guest
    - Register: User can register new account to use the service.

##### **1.3.2.2. Mobile Framework**

This framework is use for Developer’s mobile Application, which provide APIs to control mobile application data. Mobile developers can control their data really easily after download framework which appropriate to their language (Android or iOS) and apply to their application.

#### **1.3.3. Boundaries of the System**

* This service is built basing on Parse server of Facebook. Our main target is improving the mobile development and help developers, whose applications is using Parse now, have an appropriate place to migrate to.
* The complete product includes:
  + A web application that allow:
    - Register account to use main function of the system
    - Create a new application
    - Manage data
  + Mobile Framework that allow:
    - Provide API

#### **1.3.4. Future Plans**

Current service only support for mobile. In future we will:

* + - Provide framework for website developers.

#### **1.3.5. Development Environment**

##### **1.3.5.1. Hardware requirements**

* + For server

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 4 Mbps |
| Operating System | Ubuntu Server 12 LTS | Ubuntu Server 14.04.2 LTS |
| Computer Processor | Intel® CORE i3 Quad core 2.1 GHz | Intel® CORE i7 Quad core 2.4 GHz |
| Computer Memory | 1GB of RAM | 4GB of RAM or more |

*Table 2: Hardware Requirement for server*

* + For website development

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 4 Mbps |
| Operating System | Ubuntu Server 12 LTS | Ubuntu Server 14.04.2 LTS |
| Computer Processor | Intel® CORE i3 Quad core 2.1 GHz | Intel® CORE i7 Quad core 2.4 GHz |
| Computer Memory | 1GB of RAM | 4GB of RAM or more |

*Table 3: Hardware Requirement for website development*

* + For mobile framework development

|  |  |  |
| --- | --- | --- |
| Hardware | Minimum Requirements | Recommended |
| Internet Connection | 512Kbps | 4 Mbps |
| Operating System | Ubuntu Server 12 LTS | Ubuntu Server 14.04.2 LTS |
| Computer Processor | Intel® CORE i3 Quad core 2.1 GHz | Intel® CORE i7 Quad core 2.4 GHz |
| Computer Memory | 1GB of RAM | 4GB of RAM or more |

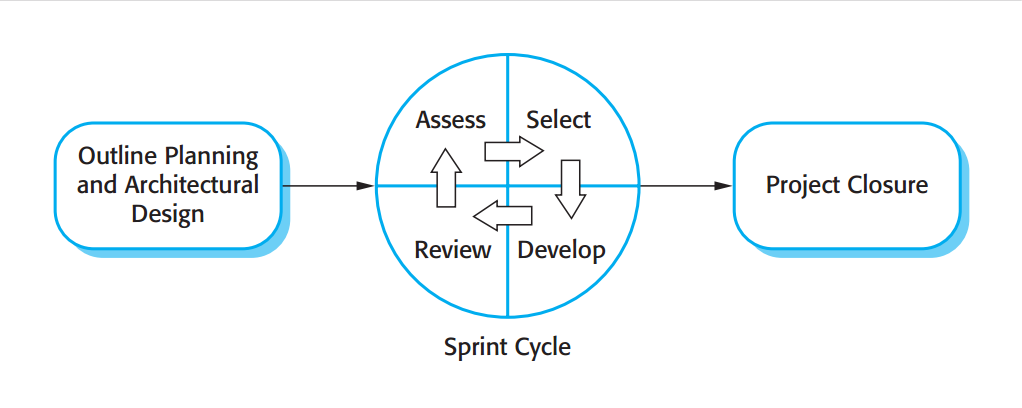
*Table 4: Hardware Requirement for mobile framework development*

## **Project organization**

### **2.1. Software Process Model**

The project is developed under Scrum model. We choose this model because the following reasons:

* + This project is about Parse server, NodeJs and building mobile framework these are really new to all of member. That why our team need focus on research, study and try our best to implement a core flow of this project early.
  + We need to provide many demo for each requirement to make sure that our team can complete this project.
  + This project is about building framework so it’s really hard to finish the document first. We need coding through some demo to understand more about the operation mechanism of Parse server and figure out how to build framework effectively.



*Figure 1: Scrum model (Source: Software Engineering, 9th Edition, Chapter 3, Figure 3.8)*

### **2.2. Roles and responsibilities**

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Full name** | **Role in Group** | **Responsibilities** |
| 1 | Mr. Kiều Trọng Khánh | Scrum Product Owner – Technical Expert | * Specify user requirement * Specifying the business * Control the development process * Give advices on techniques, solutions and business analysis support |
| 2 | Nguyễn Mạnh Hùng | Scrum Master, Business Analyst, Developer, Tester | * Managing process * Researching solutions and techniques * Assigning task for members * Study Parse server for building “Create new app”. |
| 3 | Nguyễn Hữu Lộc | Team Member, Business Analyst, Developer, Tester | * Researching solutions and techniques * Build framework for iOS developers. |
| 4 | Vũ Văn Quyết | Team Member, Business Analyst, Developer, Tester | * Researching solutions and techniques * Build framework for Android developers. |
| 5 | Phạm Bảo Toàn | Team Member, Business Analyst, Developer, Tester | * Researching solutions and techniques * Build Dashboard |

*Table 5: Roles and Responsibilities Details*

### **2.3. Tools and Techniques**

|  |  |
| --- | --- |
| **Tools** | **Name / version** |
| Html, Javascript Editor | Sublime Text V3 |
| iOS IDE | Xcode 7.2 |
| Android IDE | Android Studio 2.1 |
| DBMS | Robomongo 0.9.0 RC8 |
| Source control | GitHub |
| Document | Microsoft Word 2016 |

*Table 6: Tools used for this project*

|  |  |
| --- | --- |
| **Techniques** | **Name / version** |
| Backend | NodeJs 6.2.0 |
| Frontend | AngularJs 1.5.0 |
| iOS Framework | Objective-C 2.0 |
| Android Framework | Java |
| DBMS | MongoDB 3.2.6 |

*Table 7: Techniques used for this project*

## **Project Management Plan**

### **3.1. Product Backlog**

|  |  |  |
| --- | --- | --- |
| **Id** | **User Story** | **Priority** |
| 1 | Create new application | High |
| 2 | Manage applications | High |
| 3 | Manage user account for an application | High |
| 4 | Mange user role for an application | Medium |
| 5 | Multiple application on one Parse server | High |
| 6 | Push notification | Low |
| 7 | Framework for Android | High |
| 8 | Framework for iOS | High |
| 9 | Application search | Low |
| 10 | Login | High |
| 11 | Logout | Low |
| 12 | Auto generate ApplicationId | Medium |
| 13 | Analytics | Low |

### **3.2. Deliverables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Deliverable** | **Delivery date** | **Delivery Location** | **Note** |
| 1 | Introduction Document | 12/5/2016 | FPT-CMS | Report No.1 |
| 2 | Software Project Management Plan | 16/5/2016 | FPT-CMS | Report No.2 |
| 3 | Software Requirement Specification | 30/5/2016 | FPT-CMS | Report No.3 |
| 4 | Application Demo 1 | 16/6/2016 | FPT-University | Core flow demo |
| 5 | Application Demo 2 | 21/7/2016 | FPT-University | Features demo |
| 6 | Design 1 | 21/7/2016 | FPT-CMS | Report No.4 |
| 7 | Application Demo 3 | 7/8/2016 | FPT-University | Semi-final application demo |
| 8 | Design 2 | 7/8/2016 | FPT-CMS | Report No.5 |
| 9 | Completed Document | 14/8/2016 | FPT-CMS | Report No.6 |

### **3.3. All Meeting Minutes**

All meeting minutes here: <https://github.com/hungnm2904/CSBM/tree/report/Meeting%20Minutes>.

## **Coding Convention**

Summary:

* Naming Convention:
  + Variable names should be short yet meaningful. The choice of a variable name should be designed to indicate to the casual observer the intent of its use.
  + Methods should be verbs, in mixed case with the first letter lowercase, with the first letter of each internal word capitalized.
  + All names start with a letter.
  + Variable and function names written as **camelCase**.
* Declarations Convention:
  + One declaration per line is recommended since it encourages commenting.

Using Java Code Convention from:

<http://www.oracle.com/technetwork/java/codeconvtoc-136057.html>

<http://www.w3schools.com/js/js_conventions.asp>

<https://github.com/mgechev/angularjs-style-guide>

Programming with Objective-C summary:

* Naming Convention:
  + Class names must be unique across an entire app.
  + Method names should be expressive and unique within a Class.
  + Local Variables must be unique within The same scope.
  + Accessor method names Must follow conventions.
  + Object creation method names must follow conventions.

Using Object Convention from:

<https://developer.apple.com/library/mac/documentation/Cocoa/Conceptual/ProgrammingWithObjectiveC/Conventions/Conventions.html#//apple_ref/doc/uid/TP40011210-CH10-SW1>