

## The Design of Collaboration System for Data Sharing In the Mobile Cloud Environment

Hyung-Seok Kim\*, Jong-Yong Lee\*\*, Kye-Dong Jung\*\*

\* Department of Information System KwangWoon University Graduate School of Information Contents, 20 Kwangwoon-ro, Nowon-gu, Seoul 01897, Korea

\*\*Ingenium college of liberal arts, KwangWoon University, 20 Kwangwoon-ro, Nowon-gu, Seoul 01897, Korea

e-mail : {tyuio7779, jyonglee, gdchung}@kw.ac.kr

### Abstract

With the continuous effort to make business management more efficient, companies have started to utilize smart workplaces and the incorporation of mobile devices. Furthermore, big data processing, using Database as a Service (DBaaS), is also being researched for integration. Similarly, mobile cloud can be utilized to allow for data sharing among employees. In this paper, in order to solve the issue of efficiency in business management, a collaboration system for data sharing using mobile cloud environment is explored. The proposed system, looks to benefit the increased integration of environment and corporate public through use of standardized data, in a design capable of efficient integrated management system.

**Keywords:** Big Data, Mobile Cloud, DBaaS

### 1. Introduction

Big Data is the tendency of analytical techniques that are favored in many technical disciplines. This technology and processing data that is not standardized large-capacity high-speed, conventionally a combination of new techniques in the analysis is difficult data, meaning that the re-analysis and the analysis becomes possible. The company, by taking advantage of these new analysis techniques, the figure to be trying to apply to collect big data in various fields have been actively[1]. Business activities that integrated consistency purposes, holding the joint data, the research of the system to increase efficiency and management have been actively conducted, among which, cloud computing technology, the IT technology new It shows a lot of influence on the theme of collaboration as a paradigm.

Cloud and computing technology, to integrate a huge IT resources to the cloud server, refers to technology that allows users to, if necessary resources can be shared on demand (On Demand) method. Of technology these cloud computing is already network, server, storage, applications, services, etc., have been applied in a variety of IT resources. Moreover, cloud computing technology utilizes the terminal, to connect to a cloud server, it is possible to create an environment for the mobile cloud capable anywhere data sharing in real time[2][3]. Storing large amounts of goods in this base and to check the inventory, returns, shipping status of real-time products through the cloud to other companies requiring goods from companies that transport is available to manage the goods right place according to need.

However, data transmission and reception between the company that is the companies and received to manage the goods, if you want to save this, because of the heterogeneity of the data problems, a problem occurs that it is difficult interoperability of data [2].

In this paper, in order to solve this problem, the mobile provides a collaboration system platform for cloud-based big data processing.

## 2. Related works

### 2.1 Mobile Cloud Computing

Mobile Cloud computing can perform the same operation in wireless devices such as smartphones and a tablet PC, it refers to a technique for providing environmental constraints no mobility. This is obtained by expanded by applying the conventional cloud concept to the wireless terminal. Depending on the characteristics of the terminal, store the data in the target, shared, streaming services, are introduced in a variety of services such as software utilization of working environment[2]. Compared to the conventional, mobile cloud computing, smooth mobility in accordance with the terminal, high stability, easy accessibility, extension of service is requested. Capable of transmitting to integrate disparate data platform to provide the movement of data between the terminals is required. Mobile cloud computing technology, currently, to define the parentheses of the standard in the domain standard in a variety of media and ubiquitous collaboration field, we have been studying.

### 2.2 DBaaS(Data Base as a Service)

Enterprises, the purpose for collaboration in order to solve the heterogeneity of data problem, and promote various researches. Companies, because of its own system is built, it is difficult collaboration according to the data. If you want to re-build a system for collaboration between companies, there are many difficulties associated with problems in terms of cost and time[4][5]. DBaaS To solve these problems, as a cloud technology, depending on the state of application, it is possible to effectively database design[5]. DBaaS is, have the two types of integration of integration and the RAC (Real Application Clusters) at the schema level. In the case of the integration of the schema level, it is difficult to many problems at the time of implementation to define a standard schema, and implementation is, is the most efficient use of that use[5]. Since the basic function by holding the de Bull Oso local database is provided, it is possible to use the SQL. Divided access to large amounts of data, it is possible distributed processing, in this paper, and converts the data obtained from the seller to the data of the standardized schema format Data Hub, mobile, cloud-based big data processing and transmitted to the collaboration system, it is possible to share data in a wireless terminal.

### 2.3 Data Hub System

You provide when you run the application, database resources as needed, storage, and access to the environment, including the network device on demand. DB as a service (DBaaS) solutions and PaaS solutions as database shows the availability and scalability of the DB. Data Hub is to be able to gather the necessary data from the DB, generates a Meta Query, the collected data according to a standardized schema type, converts the document-oriented format data informs the user be able to. Collaboration system proposed in this paper, in each dealer through the Data Hub to collect standardized data, aims to provide us with the necessary user of the device.

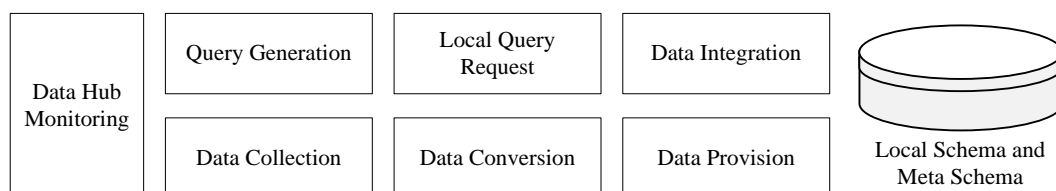
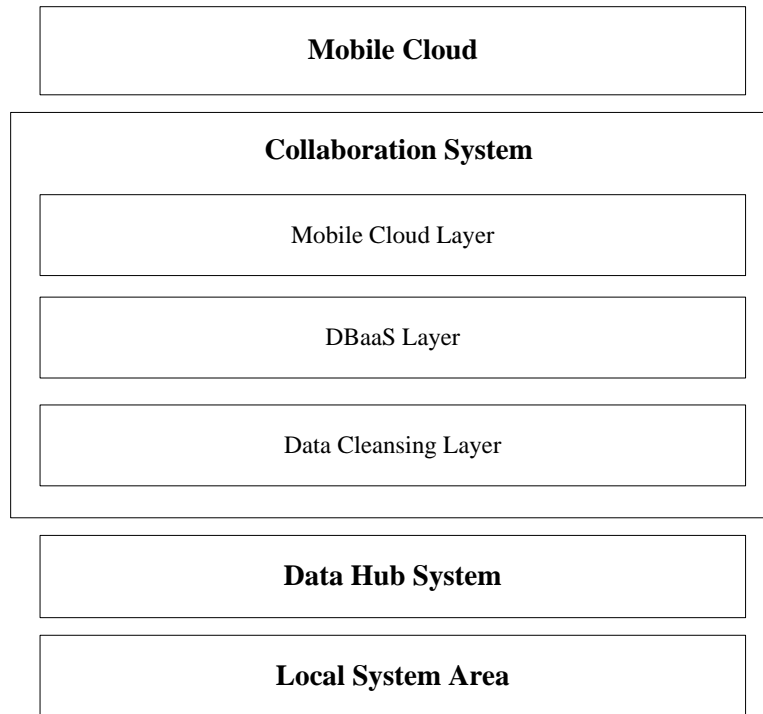


Figure 1. Data Hub System architecture

### 3. Mobile Cloud-based Collaboration System Architecture

Collaboration-oriented system for big data processing proposed in this study are shown in Figure 2. Save to Local System in the data purification process that the business data that has been processed in the local system and wireless terminal to define the properties of the relationship between the standardized schema type of each company. Further, by connecting to each local DB, it is individual management is possible. Applications to share the business processes required by the collaboration between the installed wireless terminal, or integrated management from the system, it provides to the user through the Data Cleansing layer.



**Figure 2. Mobile Cloud-based Collaboration System**

#### 3.1 The Architecture design of Mobile Cloud-based Collaboration System

System proposed in this paper, the mobile cloud, collaboration systems, Data Hub System, are configured on the local system area. Description of each component is as follows. If the user requests the data necessary for the work through the application to the requirements received through the collaboration system through which the generated metadata query to collect data in each local area, and transmits. The adapter of the system, the transmitted Meta Query to be able to collect data for each DB, me converted into local query, it extracts the data, and converts it to a document-oriented data, collaboration us send it to the system. Collect document-oriented data transmitted from the system, indicated by the requested through a conversion process user interface. To save the consolidated data according to the user's additional request to the DB of the local system. The overall structure of the proposed collaboration oriented system is as Figure 3.

- **M\_SaaS Management:** It provides an interface screen for using an application, for managing deployment of applications, and the DB of the data processed by the application.
- **Mobile Device Management:** Managing mobile devices registered in the system. Management of mobile account / domain, monitoring of the system, user access management, to support remote development server module.
- **Mobile Data Input and Output Management:** To manage the input and output of all the data through the application between mobile devices are shared.

- **X\_SaaS Management:** Management of local account / domain, monitoring of the system, user access management, to support remote development server module. It provides an interface for use by the local system, to transmit the requirements transmitted via the interface to DBaaS layer.
- **SaaS Mapping Management:** To manage the real-time mapping of M\_SaaS management and X\_SaaS management.
- **Document-oriented DB:** Collected through the Mepurideyusu layer, conversion, and stores the document-oriented data integration has been completed area. The stored data is provided in the user interface of M\_SaaS management and X\_SaaS management if necessary.
- **MDR:** Zone standardized data required mapping for the purification of the transmitted data in duplicate are integrated deleted data is stored.
- **Meta Query Creation:** M\_SaaS depending on the requirements transmitted from the management and X\_SaaS management, generates a Meta Query.
- **Meta Query Request:** The Meta Query that are generated by the requirements that have been transmitted from the M\_SaaS management and X\_SaaS management to transfer to each local system.
- **Collection:** To collect the transmitted document-oriented data.
- **Integration:** The collection is document-oriented data was to delete the duplicate data, to integrate, to save the document-oriented DB.
- **Provision:** It transmits the data stored in the document-oriented DB in response to a user request..
- **Data Hub:** The Meta Query converts the local data extracted as the role of converting the local query to the document-oriented data transfer in the system.

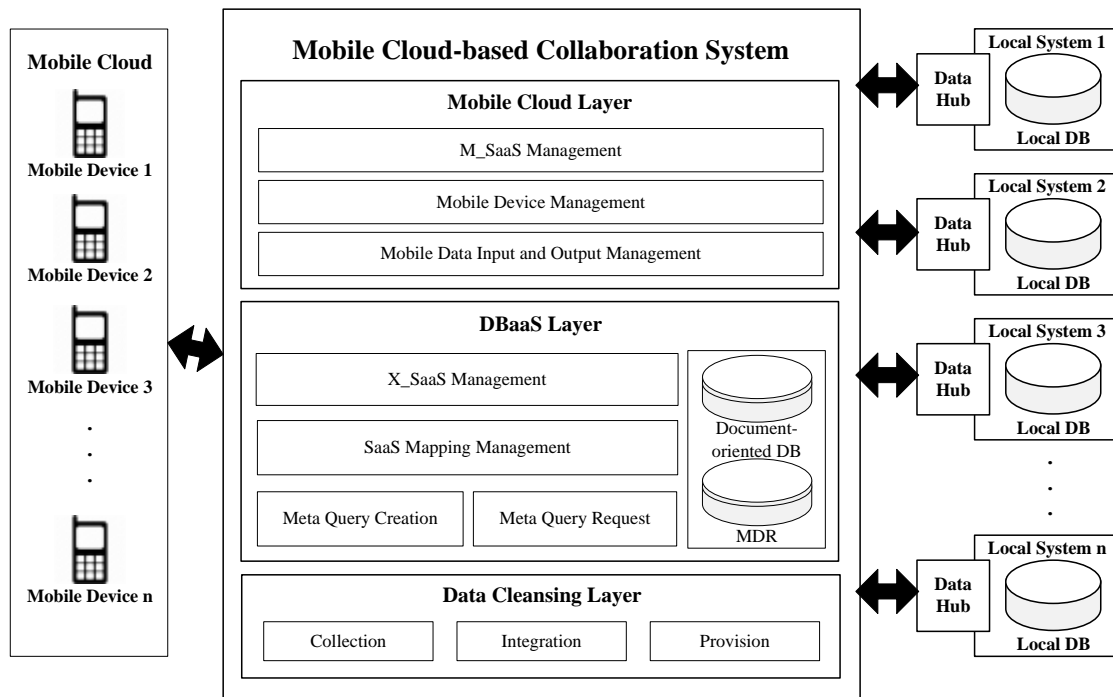


Figure 3. The Mobile Cloud-based Collaboration System Architecture

### 3.1.1 Mobile Cloud Layer

Mobile cloud layer, is installed on the mobile device, to manage the data that is input and output with the needs of the user to be shared through the application. By M\_SaaS management, receive tell the mobile device and the user to the requirements requested by using the account management, and passes it to the DBaaS layer, to produce a MetaQuery. In addition, to provide a document-oriented data that purification is completed in the application interface of M\_SaaS management so that users can see.

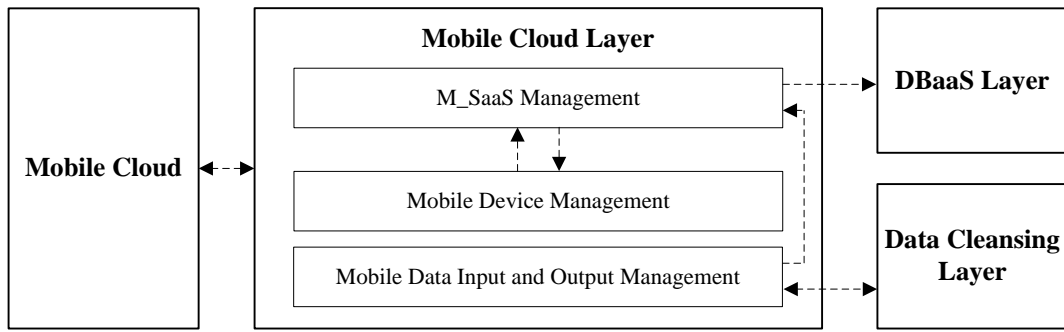


Figure 4. Mobile Cloud Layer

3.1.2 DBaaS Layer

DBaaS layer using a standardized schema type mapping table requirements and XMDR transmitted by M SaaS management or X SaaS management, creating a Meta Query, sends it to the Data Hub System between each local system to. The document-oriented data received is temporarily stored in the document-oriented DB, and the role that they provide in response to user requests.

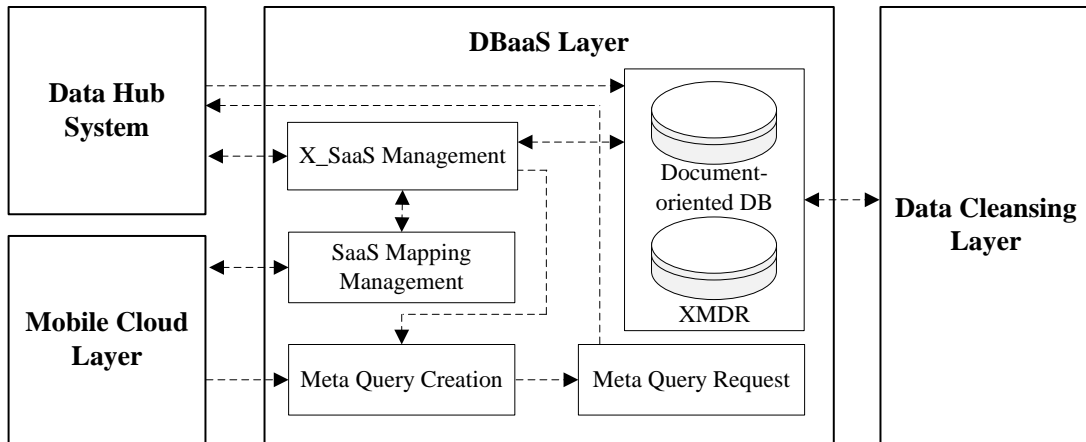


Figure 5. DaaS Layer

3.1.3 Data Cleaning Layer

Data Cleansing layer, the collected data integrated filtering and conversion to, or to provide the requested user interface, serves to store the Local DB in response to a request for additional user. Data integrated document-oriented temporarily stored via the document oriented DB from DBaaS Layer, is applicable as required.

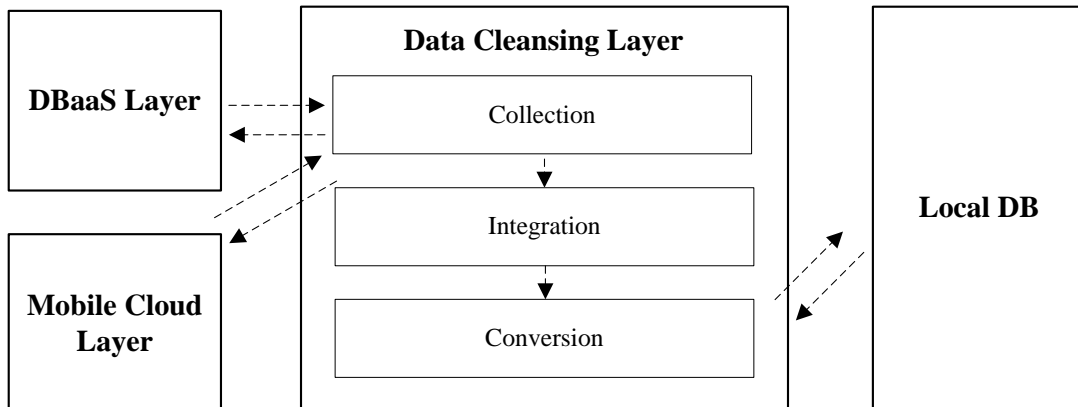


Figure 6. Data Cleaning Layer

### 3.2. The Collaboration System operation process

Table 1 is a process for performing a process for transferring standard data distributor integrated collaboration system co cloud. Description of execution of each process are as follows.

**Table 1. DBaaS Layer Algorithm**

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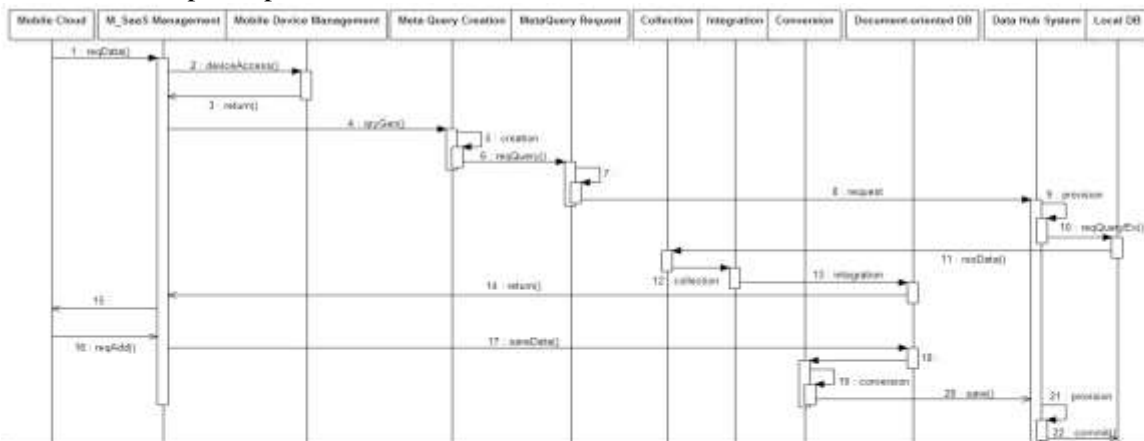
x = 0; //Initialize the value of x
y = 0; //Initialize the value of y

Fuction DBaaS Layer(User Requirements, XMDR)
  Begin Meta Query Column
    FOR Request User Requirements of M_SaaS Management
      LOOP User Requirements[x] = Meta Schema
        THEN Meta Query Column[x] = User Requirements[x]
        x++
      IF User Requirements[x] == NULL
        THE LOOP EXIT
  Begin Meta Query Condition
    FOR Request Meta Query
      LOOP User Requirements[y] = Meta Schema
        THEN Meta Query Condition[y] = User Requirements[y]
        y++
      IF User Requirements[y] == NULL
        THE LOOP EXIT
  Return Meta Query;
    
```

Table 1 is a collaboration system, to create a query statement through the requirements transmitted from the application, a process of generating a Meta Query The generated Meta Query does not include the FROM clause, through M\_SaaS and X\_SaaS requirements transmitted by the management, the target of information defining the <Meta Query Column> region as requested search criteria <Meta Query Condition> meta schema in the area has been configured. To send the generated Meta Query to Data Hub System of each local DB.

### 3.3. Collaboration System Workflow

7, requests the data between the local system and sent to a user to pass to manage Mars DBaaS layer generating metadata query to the local machine through the application of the mobile device. A description of each as follows steps are performed.



**Figure 7. Collaboration System Workflow**

User from 1 to 3 provides the requirement to M\_SaaS management from the application. 4-8 to create a Meta Query to the transmitted requirements, to transfer the generated Meta Query to the local system area. The Meta Query transmitted 9-11 and re-converted to local queries, through which to extract the local data from the DB. Then, the extracted local data is converted into the document-oriented data, and transmits to the collaboration system. Collect document-oriented data transmitted 12-15, integrating, and save the document-oriented DB, and provides the M\_SaaS management of the user who requested it. From the last 16 to 22, to save the data stored in the document-oriented DB in M\_SaaS management depending on the user's additional request to the user's local DB.

## 4. Application Example and Comparative Analysis

### 4.1 Application Example

The figure displays two screenshots of a web application interface. The top screenshot shows a 'Data Request' form with a sidebar menu and a 'Details' section. The bottom screenshot shows the 'Integrated Processing Results' table with columns for Factory, Code, Inventory Name, In/Out Date, Unit Price, Amount, In Quantity, and Out Quantity.

Factory	Code	Inventory Name	In/Out Date	Unit Price	Amount	In Quantity	Out Quantity
SUJUNG	SU13345	Manual - Vision Operating System	2015-08-26	1,000	4,500,000	2,300	
CHANGWON	CH16755	Keyboard - 101 key	2015-10-30	1,000	350,000	130	
CHANGWON	CH16769	Hard Drive - 2068	2015-06-12	1,000	550,000	1,012	

Figure 8. Web interface screen for the X SaaS administrator access on the local system.

In order to manage large-scale data in real time to the seamless, high scalability and rapid processing power is required. Web interface environment, using a boot strap, a simple, yet designed as a flexible grid system, mobile interface environment, was designed in the Android OS-based applications. Description of the interface screen is as follows. User membership registration has been completed, the case of an application, it is possible to register the device you want to use. Figure 8 is a Web interface to use the X\_SaaS management to the local system. Users can select other users who can be us to transmit operational data for each department, it can be controlled by the setting of several buttons types of output results. In addition, to

confirm the results that have been provided, this is a can be stored depending on the user's needs. Figure 9 is logged through a mobile application can be like the local system, department, code specific, by plant, to set the conditions in accordance with the outgoing quantity and amount, it sets the requirements.

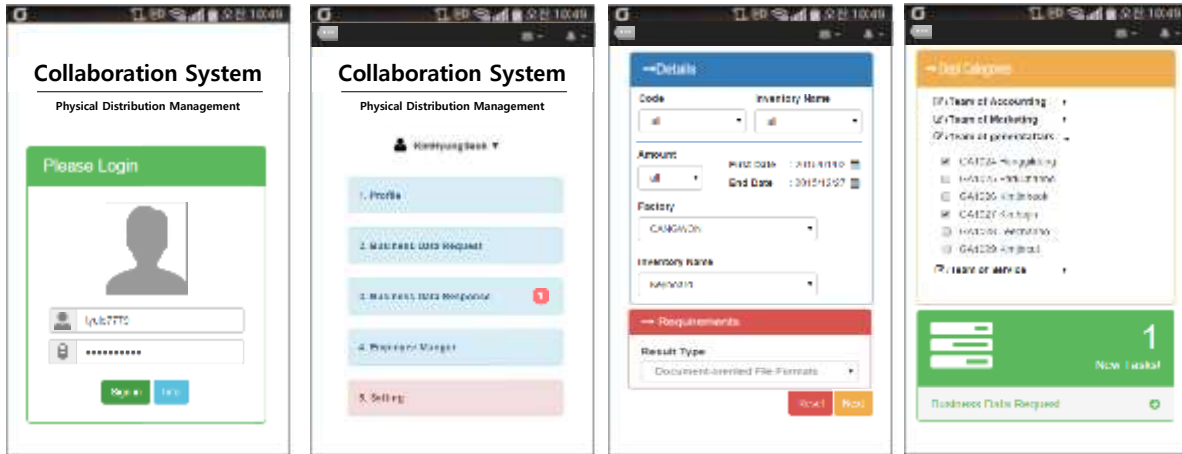


Figure 9. Web interface screen for the X SaaS administrator access on the mobile device.

#### 4.2 Comparison of Related System

Table 2 shows the results of the comparative analysis of the collaboration of the system and this paper Big data processing collaboration system for efficient processing of data in the business environment of the company. When integrating the data in an environment that is dispersed in both the systems, and overcomes the heterogeneity using standardized, an integrated work environment to minimize the effects of local system construction [6] [7]. XMDR-DAI-based collaboration system, while the distributed processing capabilities for sharing data, the proposed system, a large-scale data, not only in the region of the local system, using the cloud also function in a mobile environment, data collect, it is possible to save and purified. In addition, XMDR-DAI-based collaboration system, but to save the data type of the XML format, the proposed system is a file format of the document-oriented, less burden on the relatively data processing [8].

Table 2. Comparison of Related System

	XMDR-DAI based collaboration system	The proposed system
<b>Service form</b>	Distributed processing using the data sharing and BP of local DB between companies.	Cloud-based support data sharing and integration environment between mobile devices.
<b>Column scalability</b>	It allows customizing of the system that the system provider.	Providers and users can be customized for the application and the local system.
<b>Data Integration</b>	XMDR schema definition.	Standard schema definition of DBaaS base.
<b>Overcome heterogeneity</b>	Using the format of the standardized schema between the local DB.	Standardized schema type and use of the data sharing of document-oriented.
<b>Data Scalability</b>	Extended utilizing global schema.	Expanded using a mapping table and the standardized schema document-oriented.
<b>Data Consistency</b>	It keeps changes and consistency of the data using XMDR-DAI.	Maintain the integrity of the change of the standard schema data of DBaaS-based document-oriented.



## 5. Conclusion

If you plan to share data over a local system and a mobile device between the companies, in problems such as the economic costs, including the development environment is generated. In addition, not deer is that the formal heterogeneity of the problem caused by the difference between the data that is shared occurs, serious errors in synchronization occurs. Therefore, in this paper, business collaboration sharing and integration process using the standardized data using the collaborative system it is possible, by utilizing a large standardized data, processing big data capable applications It has proposed a mobile cloud-based collaboration system for. Real time by utilizing the application of mobile Da devices, the processes the input data, and purification, to provide an integrated operating environment having consistency. Also, large data, the definition of the relationship properties through the definition of standardization, if necessary, can be put to screen the data of excellent quality. In future research, is planning to collaboration system proposed in this paper advances the research of the technology on the integrity of an integrated environment.

## Acknowledgement

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