

A Measurable Multitenant Customer Relationship Management Application on Cloud Platform: Cloud CRM

¹Mehmet Akif Nacar and ^{*2}Harun Darbaş

¹Department of Computer Engineering, Harran University, Osmanbey Campus, Sanliurfa, Turkey

^{*2}Vocational School of Technical Sciences, Department of Information Technologies, Adiyaman University, Turkey

Abstract

Cloud Computing provides seamless access to resources of computer hardware, software and service infrastructure. One of the cloud systems is Software as a Service (SaaS) that provides services on Cloud without any burden. Software as a service is a best practice applying business services for small companies. In our case, by using multitenant SaaS cloud application performs well done applications of customer relation management systems. Thus, many small companies should be able to utilize the common software resources to run their own CRM applications. In this study, we performed cloud CRM application can serve to a few small companies. We have conducted an experimental study to measure performance of cloud CRM system by comparing classical client server applications. As a result, we have found out the system is usable and measurable for small companies.

Key words: Cloud Computing, Multitenant, SaaS, CRM

1. Introduction

The cloud computing model acts as a new model in internet based which computational resources are named 'as a service' [1]. Cloud computing has got fast adoption for the last years as collective, effective and productive ways in handling its information technologies. It supplies talent for cloud users to use measurable services without having the computing resources fixed immediately on costumer's system [2].

In the light of the literature, the definition of cloud computing is users of software, hardware, and service infrastructure. Cloud computing enables access to applications regardless of the location or service. Cloud computing is technological infrastructure significantly offers many advantages, such as cost and flexibility [3].

There are three models (SaaS, PaaS, and IaaS) from inside which offers cloud solutions [4]. In Software-as-a-Service (SaaS) model software host software instances. Since the software is hosted by the third party the customer need not worry about the updates and the fundamental substructure needs. It is the accountability of service supplier. The physical infrastructure is isolated form the end user [5]. Cloud Computing is developing as a key computing paradigm for sharing resources. One type of Cloud, which supplies platform resources containing all the

*Corresponding author: Harun Darbaş Address: Vocational School of Technical Sciences, Department of Information Technologies, Adiyaman University, Turkey. E-mail address: hdarbas@adiyaman.edu.tr, Phone: +904162232128 Fax: +904162232129

elements of application runtime environments, is considered as Platform-as-a-Service (PaaS) Cloud [6]. Infrastructure as a Service is a form of hosting. It contains network access, routing services and storage. The IaaS supplier will usually provide the hardware and administrative services needed to store applications [7].

Cloud computing has drawn attention of organizations in last few years as its advantages of cost profit in installing and controlling software and hardware infrastructure especially for start up and small and medium organizations. The other advantages of cloud computing are: Focus on adding customer value, trustworthiness, Better storage and back up capacity, Secured Data [5].

Cloud Computing is a well-rounded technology that can assist a wide-spectrum of applications. The poor cost of cloud computing and its dynamic measuring offers it an improvement driver for small companies, especially in the developing world. Cloud distributed Customer Relationship Management (CRM) applications [8].

Conventional CRM is a software system attribute to analysis of sales, marketing, customer service, applications assistance and so on. Its target is to decrease the sales cycle and marketing expenses, increase income, find new markets and channels, enhance client value, pleasure, profitability and loyalty [9].

The fundamental function modules of the SaaS-based CRM containing customer management, contact management, time management case, the potential customer management, sales management, telemarketing, customer service, and so on. The software as a service usually faces a lot of initiative, the needs of each enterprise has its own characteristics. Some enterprises maybe use only a few modules due to the limits operations, and some firms need the whole module functions. For the user interface of the same module, different users will have different needs. Thus, SaaS-based CRM offers a variety of interfaces for customers to select freely [9].

We have developed using cloud computing resources Unlike traditional CRM applications and our practice we refer to as Cloud CRM, reducing the installation cost, scalability, 7/24 support, reduce costs through pay as you go, high calculation capacity, escape from licensing fees, technical support and technical personnel to eliminate the need for with a modular structure and multitenant architecture alongside such advantages can serve multiple companies simultaneously.

2. Architecture of Cloud CRM Application

Most powerful and time-tested ways to supply security is over Role Based Access Control (RBAC); with stress in cloud computing ambits on data protection, authentication and authorization. RBAC assures a policy framework to make possible delegation of liabilities of the super user permissions to other users [10].

The fundamental role-based access control (RBAC) standard includes two designated connections. The first connection is user-role designation connection which assigns users to suitable roles, and the second connection is permission-role designation connection which partners permissions with roles [13].

2.1 Types of User Accounts and Rights

Cloud CRM architecture identified using RBAC roles are as follows.

2.1.1. Standard User

Module can access authorization is done by CRM manager. You can access all menus and submenus of the module and use their authorized service defined in an active way in this menu. The number of standard users that can be defined is limited by the number requested by the firm.

2.1.2. CRM Administrator

For each company, equipped with certain administrative rights, a certain number of user-definable types. CRM administrator, the system related companies in the number of users defined to be related companies in which the user of when and how many times the input-output, users are few operations (add, delete, update) does, how much document sharing their escapes in the relevant company of table records and where a user is able to access information such as the type of raw data in the tables. CRM administrator can be defined as the number of users is limited to the number requested by the company.

2.1.3. Cloud CRM Administrator

For Cloud is a user type equipped with special rights. Cloud CRM Administrator user, database information of the companies (footprint), companies add, defined firms module identification, CRM process related to the Admin user is a special user that can do things like billing and firms metering.

2.2 Service Oriented Architecture

An SOA supplies processes for system development and combining where systems group functionality around business process, and packages these as interoperable services. In elaboration, An SOA is a strategic skeleton of technology that lets all related systems, inside and outside of an organization, to bring out and access well- defined services, and knowledge bound to those services, that may be further isolated to process layers and compound applications for solution development [11].

SOA (Service Oriented Architecture) is one of practical touches of Cloud Computing. It propose SaaS (Software as a Service), which can be used free of platform inside and outside of foundations over a network [12].

Service company are designed to meet the needs of companies can benefit from this service they want.

Each service, the log data using as input the company, the report presents some specific

outcomes, such as invoices or statistical information.

Services defined in the Cloud CRM:

- Authentication - Login Service
- Authorization Service
- Software Metering Service
- Billing Service

2.2.1. Authentication - Login Service

In order to allow accesses to the system, user identity verification is needed. Authentication credentials are entered by the user service and access is controlled individually. Cloud CRM users are redirected to the login page after registration process. Requesting the user enter the user name and password information, if this information is confirmed on the database, the company can access the defined module.

2.2.2. Authorization Service

In practice, companies have access to only authorized modules. Which belongs to the company and the users of the company authorized to access the service module determines to which they have access privileges.

2.2.3. Software Metering Service

One of the main functions of the metering service is to monitor the amount of use of the software. In the metering service, some of the data that is monitored using administrator module, which is the number of users defined in the company, where users when and how many times the input-output, how many operations (add, delete, update) does, how the document they share and escapes in the relevant company of table records form that can be sorted. Data can be input with the output of the measuring service of other services. Examples of such service billing service request.

2.2.3. Billing Service

Company based metric data is obtained by measuring the CRM cloud. Cloud manager module prepare bills weekly or monthly.

2.2 Multitenant Cloud CRM

In contrast to traditional CRM applications, data in the cloud services and resources, can access

multiple company resources at the same time. All companies are kept in the same storage , but as a means of keeping a company can access only its own data. If a company does not have access to certain data, it is certainly not belong to that company.

3. Implementation of Cloud CRM application

In this context, the application is modeled in five main modules, as shown on Table 1.

- Customer, Order and Product Management Module
- Customer Complaint Management Module
- Report Module
- CRM Management Module
- Cloud CRM Management Module

Table 1: Cloud CRM composed of five modules.

Customer, Order and Product Management Module	Customer Complaint Management Module	Report Module	CRM Management Module	Cloud CRM Management Module
<ul style="list-style-type: none"> [-] Customer <ul style="list-style-type: none"> ... Add Customer ... Update Customer ... Customer List [-] Order <ul style="list-style-type: none"> ... Add Order ... Update Order ... Order List [-] Product <ul style="list-style-type: none"> ... Add Product ... Update Product ... Product List 	<ul style="list-style-type: none"> ... Add Complaint ... Edit Complaint ... Complaint State ... Complaint List 	<ul style="list-style-type: none"> ... Firm Report ... User Report ... Customer Report ... Order Report ... Product Report ... Complaint Report 	<ul style="list-style-type: none"> ... User Management ... User LOG ... Product Log ... Raw Datas 	<ul style="list-style-type: none"> [-] Firm Management <ul style="list-style-type: none"> ... Add Firm ... Update Firm ... Firm List ... Firm - Module ... CRM Managers ... Metering ... Billing ... Cloud Database LOG

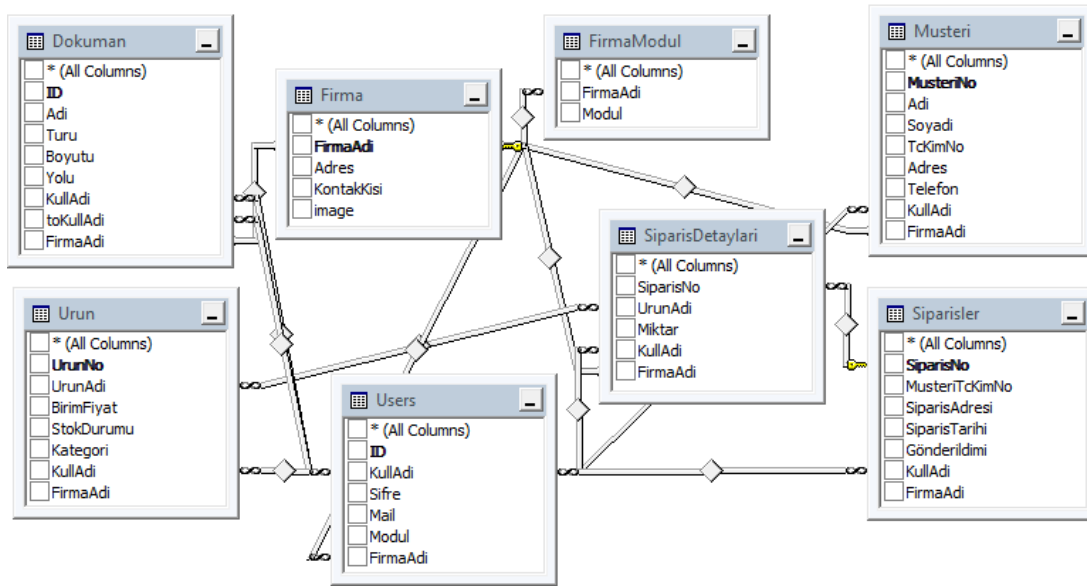


Figure 1: Cloud CRM manages relational database tables.

Cloud CRM database structure used in database tables in Figure 1. Relational database structure introduces tables for company, customer, and product. Each table is connected to others with primary and foreign keys. Thus the whole database system could serve the different companies at same domain. Additionally accesses to data and manipulation of data can be kept in the records of the log table designed as in Figure 2.

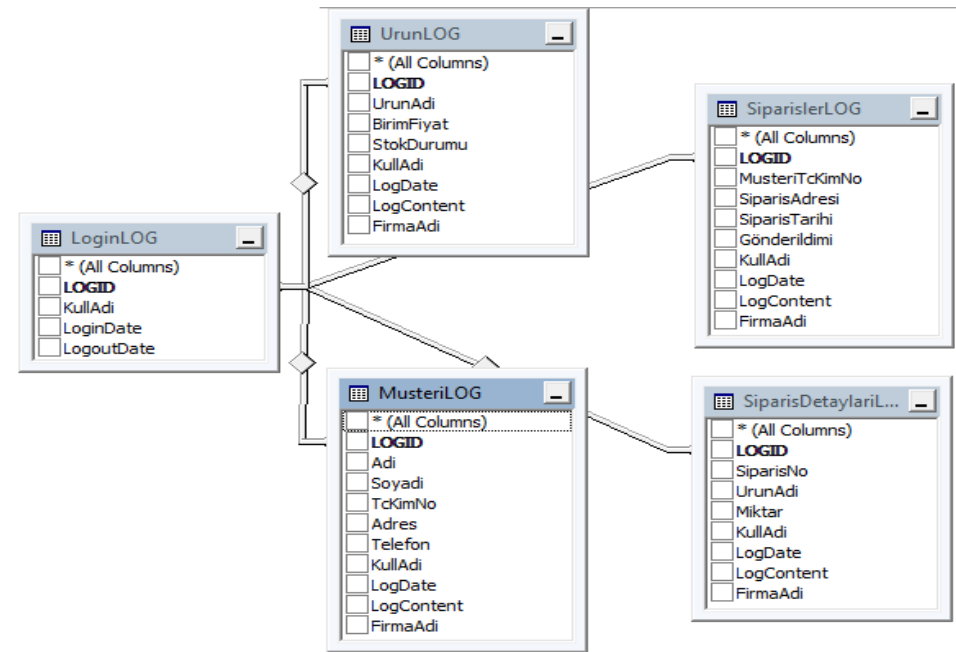


Figure 2: cloud CRM maintains log module data stored in log tables.

4. Test Scenarios of Measurable and Multiteant Cloud CRM

4.1 Test cases

In this section, we have done three major test cases for cloud CRM.

4.1.1. Multitenancy

In this case, we can store many small companies CRM system at the same cloud without any privacy protection problems. Thus, the major service implementation stay same but the data could change.

4.1.2. Billing Service

Billing service provides usage bills to small companies. This scheme could be daily, weekly or monthly basis. In between any dates, customer's software usage is calculated and billed by customer rate.

4.1.3. Metering Service

Metering service provides the amount of usage by data size or usage time. In a large perspective, we can measure number of requests, number of users, amount of shared documents size or database size of each firm.

4.2. Discussion of test results

The first case in the single company and its more than one user that their CRM application, users average response time by more than one company's multitenant is Cloud CRM reached the same average response time for users in applications, each company users were able to access the data only belong to their respective companies.

Also, in the multi-tenant cloud CRM application, the Cloud CRM Administrator user successfully completed billing for all companies in daily, weekly, monthly or in two specific date range in the second case.

In the metering service, number of requests, number of users, amount of shared documents size or database size of each firm is measured successfully without any performance or data loss by the Cloud CRM Administrator.

5. Conclusions

A newly introduced Cloud CRM application has presented in this article. In Cloud CRM architecture measurement and multitenancy are different aspects from traditional CRM software. Cloud CRM has implemented on Microsoft Azure platform. It may support many small companies CRM application simultaneously. It also measures usage by SaaS services. In several

cases this services tested by authorized users and results are shared. The results showed that the Cloud CRM system can performs well in case of small companies. According to the test results Cloud CRM application is measurable and capable in multitenant systems.

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