

An Approach for Development of Multitenant Application as SaaS Cloud

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Abstract

Software as a Service (SaaS) is one of the striking features of cloud computing. SaaS has revolutionized the software engineering very significantly. SaaS eliminates the requirement of customers (tenants) to purchase, install and maintenance of infrastructure and software. Customers only have to pay for services provided by SaaS vendors. Multi-tenancy in SaaS application is most important feature for the success of SaaS application. However, there are many challenges in the development, deployment, and security of such application. This paper addresses the issue of how to effectively support multi-tenancy in SaaS application and proposes SaaS architecture to support multi-tenancy in e-commerce application.

Keywords: Cloud Computing, SaaS, Multi-tenancy, SaaS Architecture, and e-commerce.

Introduction:

Cloud computing has various definitions based on the mode of implementation, but the most accepted definition is given by National Institute of Standards and Technology is as follows:

NIST Definition of Cloud Computing:

Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential characteristics, three service models, and four deployment models [1]. The basic terminology and methodology to compare the cloud services that best fit for organizational needs are given by Miguel Reixa and et al. in their paper [2]. The authors give basic definitions and comparisons of various cloud computing services and models.

The basic ideology behind cloud computing is that, the user will be able to subscribe the service from cloud vendors and generally billing will be done by using pay-per-use method of the subscribed services. This will eliminate the hardware or software purchasing. The service architecture of cloud computing can be visualized in layers. The description of those layers is: The First layer Infrastructure as a service (IaaS) is present above the real infrastructure includes various services like resources enterprise infrastructure, cloud hosting, virtualization, network infrastructure, etc. The second layer Platform as a service (PaaS) uses the IaaS as foundation and provides services like platform for cloud application development, virtual machine allocation,

etc., and the uppermost Software as a Service (SaaS) layer is used by most of the cloud users, this layer provides the web based applications, business process software (e.g. CRM), etc.

In last decade or so web has become a platform for the deployment of many software products. This is the main reason behind innovation in web based application development of software. Software as a Service is one of the best solution for new software industry requirement. SaaS is defined by many cloud providers in different words. Here we can determine software as a service, a software delivery model which is accessed by its customers with the help of thin client or web browser and deployed on cloud platform. There is no need to buy hardware or licensed software to access SaaS application. Users of SaaS only need to subscribe the service and pay according to the agreement between provider and customer; generally pay-per-use basis for billing the customers.

Software-as-a-Service (SaaS) Web access of Application
Platform-as-a-Service (PaaS) Cloud Application Support, Development, Deployment
Infrastructure-as-a-Service (IaaS) Virtualization, Network etc.
Infrastructure (CPU, Memory, etc)

Figure 1: Cloud Computing Service Architecture

Many companies are willing to upgrade their web based application to a SaaS-based application [3]. Multi-tenancy is one of the most important characteristics of software as a service. The true multitenant SaaS application is a single instance multiple tenants (customers) model of application delivery i.e. the SaaS application – tenants shows one-to-many relationship, where a single application (code and database) is accessed by multiple tenants at a particular time.

Literature Review:

A lot of research has been done to find out ways of implementation of multi-tenancy in SaaS applications. A business based on SaaS application will be successful only if it supports multi-tenancy. Multi-tenancy is an organization approach for SaaS application. Key characteristics of multi-tenancy can be given as 1. Hardware and resource sharing, 2. High degree of reconfigurability, 3. Shared application and database instance [4]. Jinan Fiaidhi et al. [5] proposed general multitenant cloud architecture. Here author has written about managing data of multitenant SaaS application. He specified various approaches as follows 1. Storing tenant data in separate databases, 2. Housing multiple tenants in the same database, with tenant specific schema, and 3. Using the same database and a same set of tables to host multiple tenants.

The Proposed Work-

Before going to architecture approach, you should first look into the application that implemented using this approach. Here implementation of an e-commerce application is to be discussed, which will have carts, users, products, and orders as components and metadata of each tenant. This application is to be implemented using ruby on rails framework, Postgre SQL as database and deployed (Cloud Platform for rails) and then after deployment it will be accessible to users of various tenants through internet using browsers.

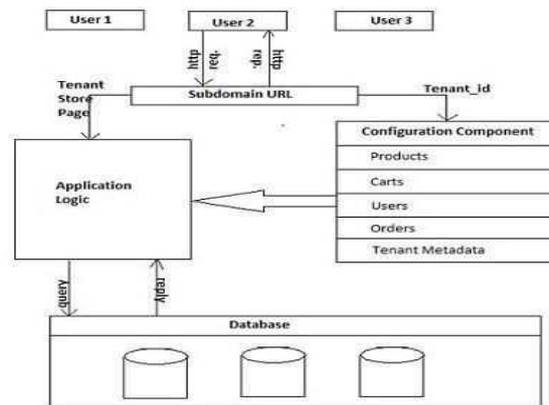


Figure 1: Multitenant SaaS e-commerce Application Architecture

The diagram shows architecture for the implementation of multitenant SaaS application in the cloud environment. The architecture has four main parts. Each of these parts is designed to support our multitenant SaaS e-commerce application.

Conclusion:

The paper suggests a whole new approach for implementation of the multitenant SaaS applications; it also withal describes the procedure for the implementation of e-commerce multitenant SaaS application. In this approach identification of tenant is done with the help of sub-domain URL, providing reconfigurability in multi-tenancy and most important a data separation for each tenant in the cloud environment. This architecture can be used for implementation of any other multitenant SaaS application.

The architecture can be modified according to the desideratum of application to implemented. The dashboard can be developed, which will help tenants to choose the configurable components for his applications in multitenant application. This will make the multitenant application highly configurable.

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