

## FDBKaaS: A Cloud Based Multi-Tenant Feedback as a Service

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### ABSTRACT

In this research work, a cloud SaaS based multi-tenant framework for feedback gathering and processing is implemented. The feedback from users helps the organizations to further enhance their services. Besides, providing feedback services to organizations; the proposed framework can also be used to gather feedback of other existing services. To implement few modules of this application, a Python based Google App Engine is used.

**Keywords:** *Cloud Computing, Multi-tenancy, Service Level Agreement (SLA), SaaS*

### 1. INTRODUCTION

Cloud computing is a flavor of distributed computing that supports on-demand access to dynamically scalable virtualized resources and services with a pay-per-usage charge model [1]. Clouds favor generic services and users and where appropriate, benefit both. Now days any IT-related capabilities cloud be provided as a service to users. Vendors allow users to access technology enabled services in their cloud, without any need for knowledge how the technology infrastructure has supported the services. These services often called Software-as-a-Service (SaaS) can be accessible over the internet [2]. SaaS holds the distinction of being both an application delivery model and business model [3] [4]. Google Apps, one of the most powerful tools for building and hosting SaaS applications, provide a variety of web-based applications for business, education and government [5]. SaaS applications usually support various users through a single instance of that application also known as multi-tenancy. To achieve multi-tenancy at application level, single-instance application or configurable single-instance application design can be used [6] [7]. In former case, the same functionality is offered to all tenants and they can have their own data. While in later case, along with the support to have individual data, as per the requirements of tenants the application functionality can be configured.

Feedback from users always helps an organization to make more sound business decisions [8]. It is a very powerful and surprisingly cost effective means to access and develop the business or service. Soliciting, accepting and organizing feedback is always a daunting task. In this paper, a configurable single-instance cloud application has been designed to help an organization for getting feedback of its services from the users over the web.

### 2. PROPOSED FRAMEWORK

Figure 1 illustrates the proposed framework for developing Feedback as a Service (FDBKaaS) that utilize

cloud computing. This service will be available to authorized users through web browser as it is hosted on Google App Engine.

#### 2.1 Service Control

The service control module categorizes the users as service provider, organization (tenant) and end-user. It also authenticates the users to submit the feedback for the organizations of interest. The feedback questionnaire of an organization can be related to a product, a patient history, a sort of research survey etc.

#### 2.2 User Management Dashboard

This service will maintain the accounts of various end users. It also specifies the usage cycle and other details of feedback process, the users have gone through. The feedback of same organization as suggested by previous users will also be available to current users in a customized manner.

#### 2.3 Organization Management Dashboard

This service will maintain the accounts of various organizations. These dashboards are organization specific and show the detail of all questions uploaded, log of all feedback results submitted by users, current and total usage of feedback process of an organization. This service will be configured at run time and vary for each organization.

#### 2.4 Organization Rules

This module of framework gathers the information regarding the feedback questionnaire, options along with scores and stores them in the data base. Organization can specify the constraints in the feedback process using this module e.g. if a user has not availed this service from last six months then he is not permissible for feedback.

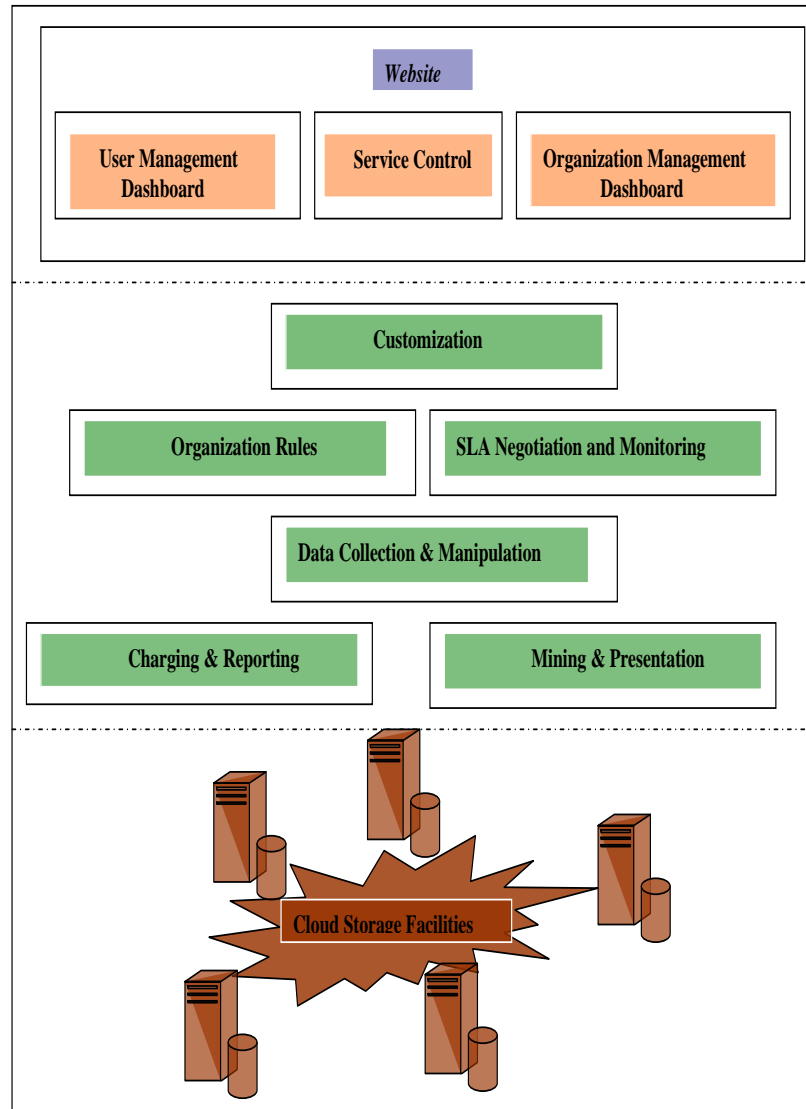


Figure 1. Proposed Framework of FDBKaaS

## 2.5 Customization

For each organization, the feedback service is to be configured as per their specific participation. It is necessary to ensure that feedback process of one organization does not mix with other. So, the prime responsibility of this module is code configurability and resource instance separation.

## 2.6 Data Collection & Manipulation

This module will handle the output of feedback service i.e. collect data from organization specific feedback process and manipulate this data according to their score and finally deliver the results to mining and presentation module.

## 2.7 SLA Negotiation & Monitoring

This module has a responsibility of presenting a Service Level Agreement whenever an organization or end user registers for this service. The role of SLA negotiation is to manage and incentivize efficiency at operational and technical levels while SLA monitoring mechanism will keep a track of the execution of service requests.

## 2.8 Mining & Presentation

The role of this module is to extract the pattern of interest from the results provided by data collection & manipulation module. The mining process can be user or organization specific, e.g. a university is interested in maintaining the information of those students which have received the scholarship through out their course

completion. After mining, the required results can be delivered to organization or end user in a presentable fashion.

## 2.9 Charging & Reporting

This module will be responsible for calculating the usage of resources by a particular organization for feedback service. Reporting service in combination with charging will inform the organization periodically regarding their usage records by mail.

## 2.10 Cloud Storage Facilities

The cloud storage facilities store the data- pertaining to provider, shared among organizations, private to

organization, feedback results and of end users in separate databases. The storage facilities are also responsible for performing maintenance operation.

## 3. IMPLEMENTATION AND RESULTS

### 3.1 Implementation of Organization Feedback Process (Phase I)

An organization will perform the following steps while making an initial access to this service:

- Organization has to register itself with the cloud service provider as shown in Fig. 2.

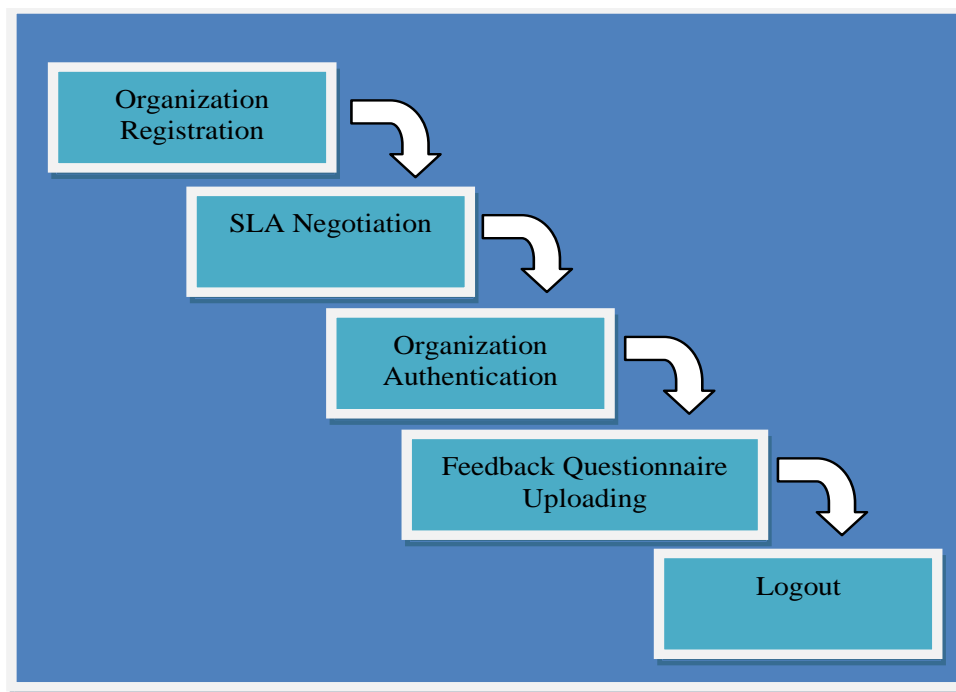


Figure 2: Organization Involvement in Feedback Process

- The registration process will not be completed until it completes a SLA negotiation process. This negotiation process will be responsible for defining the terms and conditions for usage of the service.
- After registration, the organization will be authenticated with three parameters- email, organization name and password.
- After successful authentication and authorization, organization will logged in and can upload their feedback questionnaire along with options and grades.

- After successful uploading of feedback relevant information, the organization can log out.

### 3.2 User Feedback Process (Phase II)

A user can submit his feedback for the registered organization through the following steps:

- A volunteer interested in providing the feedback will initially register for this service and also accept the terms and conditions of usage. This registration process includes providing the relevant details such as user name, age, sex, location and most importantly the tenant for which the feedback will be submitted.

- After the successful registration, user will log in and according to its registration parameters, feedback questionnaire is displayed on the user’s device.
- Fig. 3 reveals that user will fill the choices as per his past/ present experience and submit it via web.

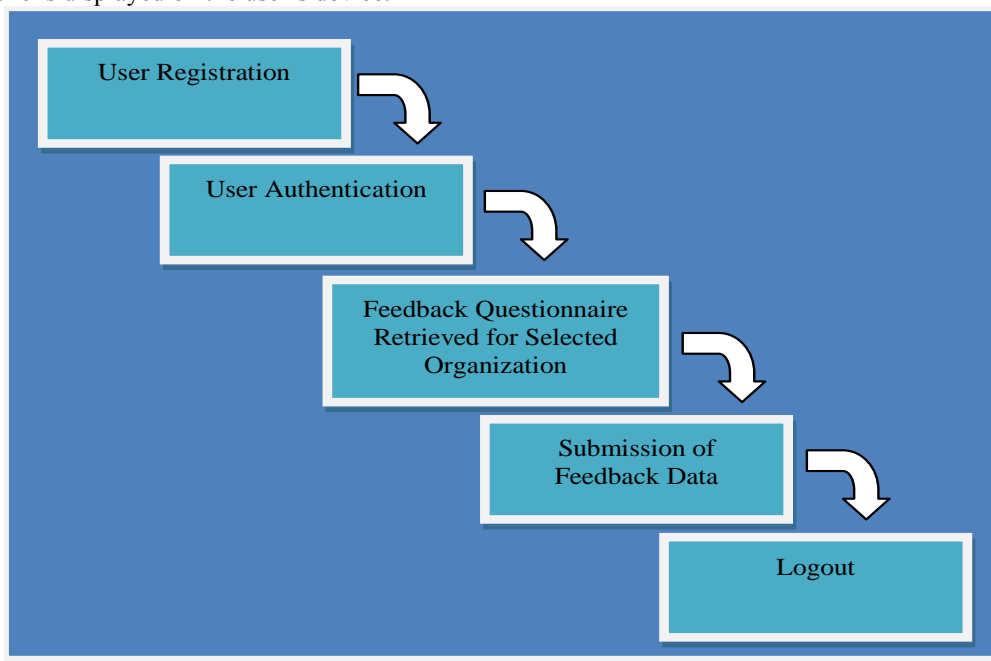


Figure 3: User Involvement in Feedback Process

### 3.3 Results

This application is developed on Google App Engine as platform and Python as the programming language, while using the Google Query Language for database

interactions. Fig. 4 shows a feedback form used by the students to give the feedback of a university. The developed application is also accessible on mobile phones as illustrated in Fig. 5.

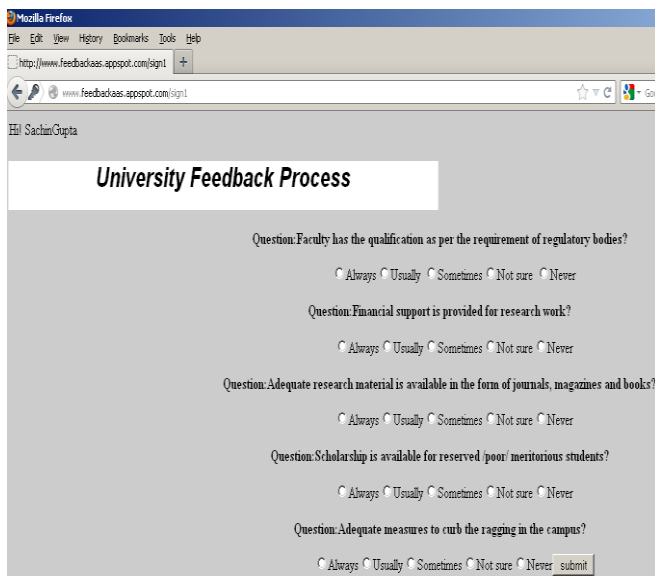


Figure 4. Feedback Questionnaire Form of a University

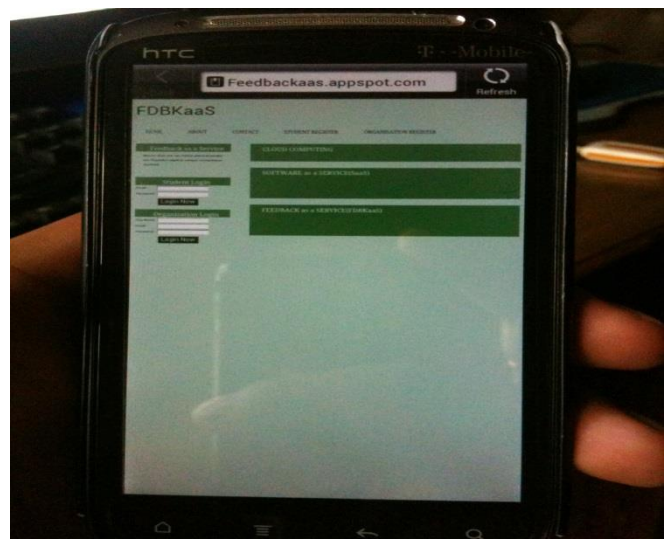
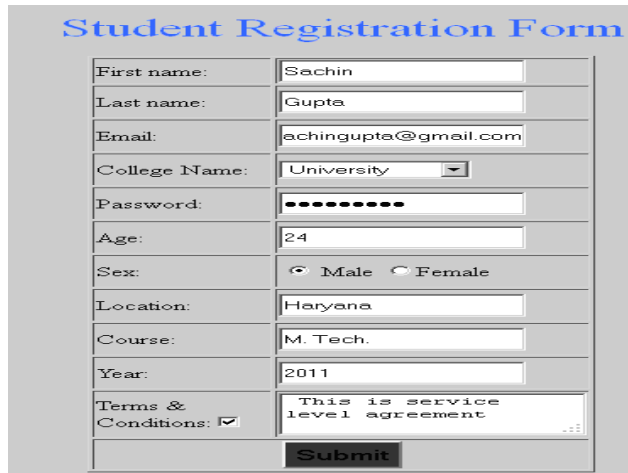


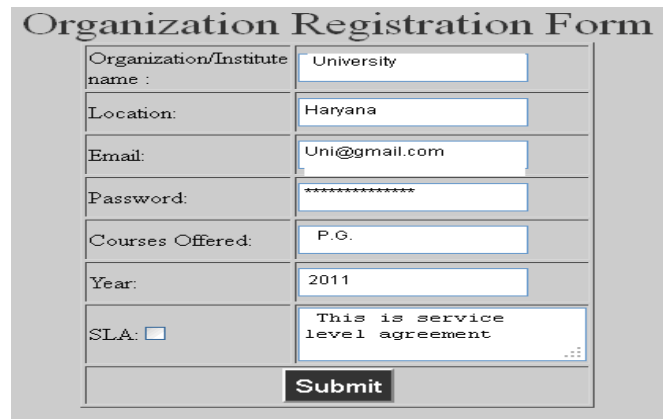
Figure 5. FDBKaaS Running on a Mobile Phone



**Student Registration Form**

First name: Sachin  
 Last name: Gupta  
 Email: sachingupta@gmail.com  
 College Name: University  
 Password: [masked]  
 Age: 24  
 Sex:  Male  Female  
 Location: Haryana  
 Course: M. Tech.  
 Year: 2011  
 Terms & Conditions:  This is service level agreement

Figure 6. Student Registration Form



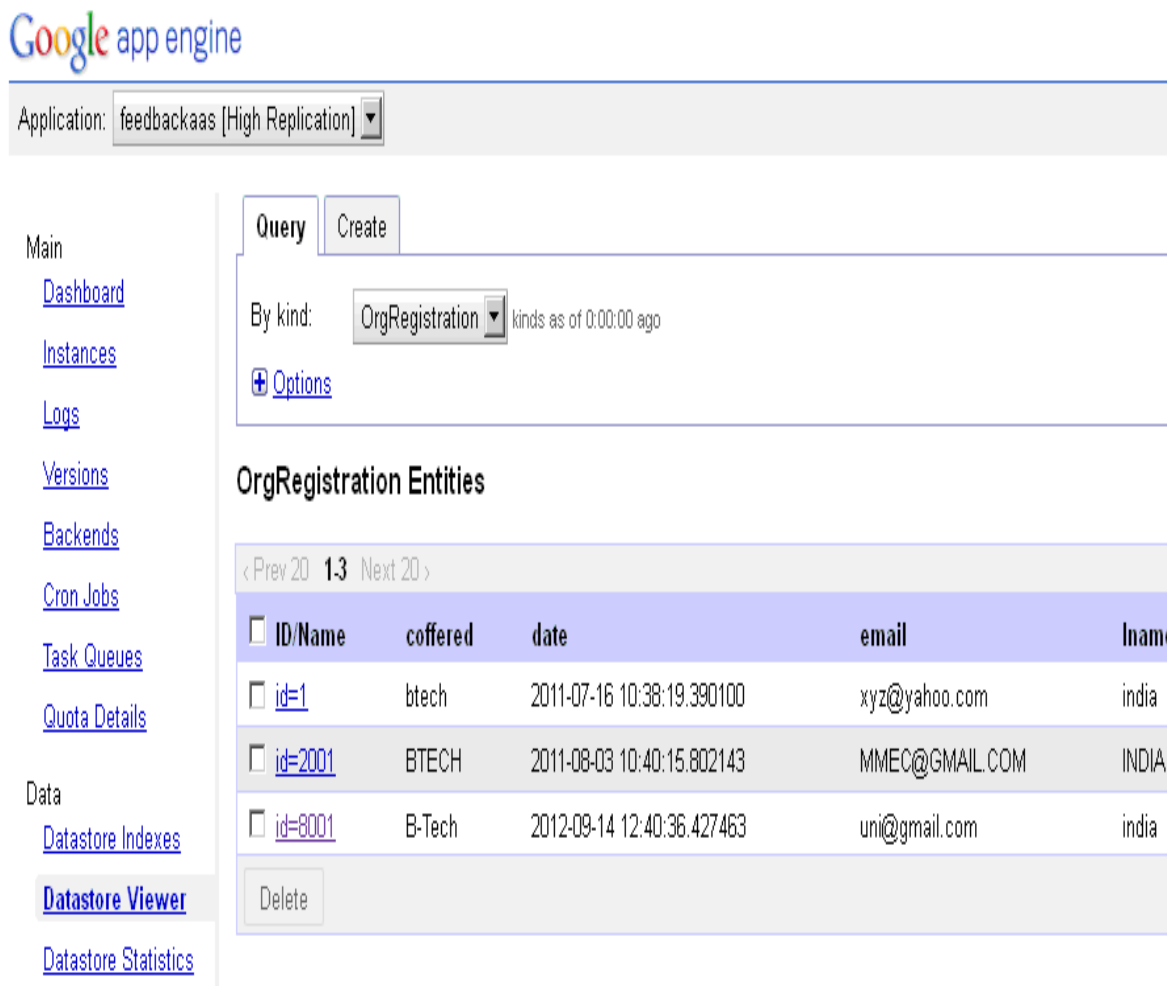
**Organization Registration Form**

Organization/Institute name: University  
 Location: Haryana  
 Email: Uni@gmail.com  
 Password: [masked]  
 Courses Offered: P.G.  
 Year: 2011  
 SLA:  This is service level agreement

Figure 7. Organization Registration Form

Fig. 6 to Fig. 9 highlights the registration phase of student and organization in FDBKaaS. The data store viewer in fig. 10 shows the database used to store the questionnaire

uploaded by all organizations. Depending upon the user’s authorization, the workflow of specific organization will be presented to him.



Google app engine

Application: feedbackaas [High Replication]

Main

- [Dashboard](#)
- [Instances](#)
- [Logs](#)
- [Versions](#)
- [Backends](#)
- [Cron Jobs](#)
- [Task Queues](#)
- [Quota Details](#)

Data

- [Datastore Indexes](#)
- [Datastore Viewer](#)
- [Datastore Statistics](#)

Query Create

By kind: OrgRegistration kinds as of 0:00:00 ago

[Options](#)

**OrgRegistration Entities**

< Prev 20 13 Next 20 >

<input type="checkbox"/> ID/Name	coffered	date	email	lname
<input type="checkbox"/> <a href="#">id=1</a>	btech	2011-07-16 10:38:19.390100	xyz@yahoo.com	india
<input type="checkbox"/> <a href="#">id=2001</a>	BTECH	2011-08-03 10:40:15.802143	MMEC@GMAIL.COM	INDIA
<input type="checkbox"/> <a href="#">id=8001</a>	B-Tech	2012-09-14 12:40:36.427463	uni@gmail.com	india

Figure 8. Data Store Viewer Showing Organization Registration

Application: feedbackaas [High Replication]

Main  
[Dashboard](#)  
[Instances](#)  
[Logs](#)  
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[Backends](#)  
[Cron Jobs](#)  
[Task Queues](#)  
[Quota Details](#)

Data  
[Datastore Indexes](#)  
[Datastore Viewer](#)

Query Create

By kind: Registration kinds as of 0:00:41 ago

[Options](#)

### Registration Entities

< Prev 20 14 Next 20 >

<input type="checkbox"/> ID/Name	age	cname	course	date	email
<input type="checkbox"/> <a href="#">id=1001</a>	23	xyz	btech	2011-07-16 10:44:09.803029	kail@gmail.com
<input type="checkbox"/> <a href="#">id=3002</a>	23	MMEC	mtech	2011-08-03 10:52:31.585649	kapil@gmail.com
<input type="checkbox"/> <a href="#">id=13001</a>	23	University	B-TECH	2012-09-14 12:48:50.930133	KAPIL@GMAIL.COM
<input type="checkbox"/> <a href="#">id=15001</a>	24	University	M. Tech.	2012-09-14 12:54:55.006141	sachingupta@gmail.com

Figure 9. Data Store Viewer Showing Users Registration

Query Create

By kind: Questionupload kinds as of 0:00:35 ago

[Options](#)

### Questionupload Entities

< Prev 20 15 Next 20 >

<input type="checkbox"/> ID/Name	date	oemail	oname	option1	option2	option3	option4	option5	question	score1	score2
<input type="checkbox"/> <a href="#">id=9001</a>	2012-09-14 12:45:09.355272	uni@gmail.com	University	Always	Usually	Sometimes	Not sure	Never	Faculty has the qualification as per the requirement of regulatory bodies?	5	4
<input type="checkbox"/> <a href="#">id=10001</a>	2012-09-14 12:45:50.755310	uni@gmail.com	University	Always	Usually	Sometimes	Not sure	Never	Financial support is provided for research work?	5	4

Figure 10. Data Store Viewer Showing Questionnaire Uploaded by Organizations

#### 4. CONCLUSION

This work revolves around, applying the cloud computing, software as a service for the day to day need of business. Feedback service is crucial in helping organizations in their endeavor to achieve perfection. An effort has been made in this research work to provide a service for gathering feedback from users; which is always a difficult, challenging and time consuming task. The developed service in addition, of reducing the complexity of the process, also gives an opportunity to any other organization for collecting feedback of its product or service through application code configurability.

#### REFERENCES

- [1] B. Rimal, E. Choi and I. Lumb (2009), “A Taxonomy and Survey of Cloud Computing Systems”, Proceeding of 5<sup>th</sup> International Joint Conference on INC, IMS and IDC, pp. 44-51.
- [2] E. Olsen (2006), “Transitioning to Software as a Service: Realigning Software Engineering Practice with the New Business Model”, Proceeding of IEEE International Conference on Service Operations, Logistics and Informatics, pp: 266 – 271.
- [3] Jyoti Namjoshi and Archana Gupte (2009), “Service Oriented Architecture for Cloud based Travel Reservation Software as a Service”, Proceedings of IEEE International Conference on Cloud Computing, pp: 147-150.
- [4] T. Kwok, T. Nguyen and L. Lam (2008), “A Software as a Service with Multi-tenancy Support for an Electronic Contract Management Application” Proceeding of IEEE International Conference on Services Computing, pp:179-186.
- [5] What is(isn't) Google App Engine? <https://developers.google.com/academy/apis/cloud/apengine/intro/whatisgae>
- [6] C. Bezemer, A. Zaidman, B. Platzbeecker, T. Hurkmans and A. Hart (2010), “ Enabling multi-tenancy: An industrial experience report”, Proceeding of IEEE International Conference on Software Maintenance , pp. 1-8.
- [7] S. Kang and S. Hur (2011), “A Design of the Conceptual Architecture for a Multitenant SaaS Application Platform”, Proceeding of IEEE International Conference on Computers, Networks, Systems and Industrial Engineering, pp. 462-467.
- [8] S. Inshi and A. Youssef (2008), “Design an implementation of an online anonymous feedback system”, Proceeding of 24<sup>th</sup> Biennial Symposium on Communications, pp. 58-61.