

Multitenancy using Cloud Computing Features

Dillan Muthanna C G¹ Sanjay Kashyap J², Sumanth Raj S³,

Pradeep Kumar H S (Guide)[Assistant professor]⁴

¹⁻⁴Department of Information Science and Engineering, The National Institute of Engineering. (NIE), Mysuru, Karnataka, India.

Abstract- In the sphere of cloud computing, multi-tenancy basically refers to the sharing of computing infrastructure such as databases, processors, Storage among various customers and organizations which will result in tremendous price and performance advantages.

Cloud is a "network based environment" or "internet based environment" comprising of servers, software and hardware. Customers can get a part of the cloud to run their business as a pay-per-scale model. As a result the customer will only pay for what he actually uses. The added advantage of not being concerned about maintaining the server and other backend hardware has made cloud computing one of the most important technology of this century. Moreover the customers have the option to scale and use added services when the demand rises. All the cloud services can be accessed on demand anywhere, anytime. The lack of standard service line agreement remains the major concern that has to be dealt with in the future.

Key words: Cloud computing, multi-tenancy, Storage, servers, Cloud, customers.

1. INTRODUCTION

Cloud computing is a modern alternative to traditional server system. Traditional server maintenance includes various painstaking tasks such as procuring and installing hardware, software and operating system installation, network configuration and firewall. Maintaining the installed resource is another headache for the organization.

cloud computing is a modern solution where the users can request and use Information Technology services on a pay-per-use basis where the cloud vendor is responsible for all the painstaking duties of the traditional server system. Various advantages include reduced expenditure, high performance, increased productivity and reliability with the added security provided by service level agreement.

1.1 About Cloud Tenant

Tenants refers to the people or organizations using the cloud computing resources provided by the service providers. Amazon web services, Microsoft Azure are some of the major cloud service providers. They have many services such as web hosting, Cloud storage, media hosting, application

hosting etc. Popular online services such as Netflix, Reddit, SAP, Ubisoft and many more are all moving on to amazon cloud. Each firm will have its own customers who store data like payment details, preferences etc.

2. LITERATURE SURVEY

We have received lot of attention to integration and storage of data at management and application level. Mansouri and other Authors deal with the problem of availability and cost factors in multi-cloud storage.

If we move large amount of data to a single provider we may have risk of vendor lock-in. Depsky[1] author also analyzes the situation about if we stores data to the multiple cloud what about our data availability and security.

Aafreen Naaz[2] author also tells about the benefits of the cloud computing features to the users if they provide the services at low cost and make data available to them all the time. He also stress that providing security to the cloud computing should be the main objective of the service providers.

Usually users do not trust the single cloud service for their entire data because the server of the cloud provider may become inactive or overloaded with the data and availability of data will be threatened. Also there is a possibility of failure in service due to malicious attackers who aimed to corrupt the stored data.

So the idea of multi-cloud emerged and the service providers aims at addressing the problem of single cloud and how the situation could be tackled with the help of cloud of clouds or multi-cloud.

Some of the advantages and disadvantages caused by replication and erasure coding in the area of peer-to-peer system is also considered by the multi cloud providers.

The main disadvantage of the cloud computing that is vendor lock-in is explained by the author M P Papazoglone etc[3]. The cloud service providers will not provide the service for free so they will not allow to mix the applications. So they come up with the idea of cloud blueprint so that developers can mix and match the applications for free. So with the help of cloud blueprint one can able to mix and match the application and also stacking the resources into cloud.

This idea made simplified methods for provisioning and automating cloud services and which also helpful in running applications dynamically on fully virtualized clouds.

The author R.Thandeeswaran et al [4] suggested that the major concerns for critical apps and sensitive information is security need.

So the uses of the multiple cloud are

1. Data can be exchanged between multiple clouds.
2. Users can select the clouds based on cost and services.

The author S.Ortiz[5] has suggested that many of the companies and industries are lacking in idea of extension of adopting cloud computing technologies. This implementation may leads to vendor lock-in and instability in security purposes. Thus standardization introduced the idea of virtualization which indeed plays a vital role in cloud computing.

The schemes which are mentioned in our paper focuses on many challenges of cloud computing such as vendor lock-in, selecting suitable data hosting strategy, optimization of performance and also ensuring availability and security.

2.1 Software Development

The main aim of software engineering is to provide the good and quality maintainable software within short period of time at the minimum affordable cost for the users. This can be achieved only if we have a good processes to produce it. This can be achieved with the help of past experience, that will help in measure the application process. The key component for any application is life cycle model on which the application or process is based on.

2.2 Life cycle model used

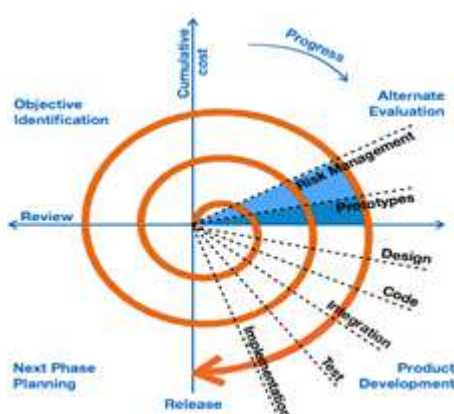


Fig 1: Spiral model

Explanation

Initial stage is to identify the objective of the problem then we processed to identify whether any alternate solutions are

there for the problems and review their advantages and disadvantages.

The next stage is to found out the system requirements and availability of the data and then we formulate the graphical representation of the solution we are going to find.

After the design we write the necessary code required for the system and make sure that all the necessary conditions are tested for the code also specify the maximum and minimum boundary for the problem.

Finally try to implement the code for solution and release the beta version of the design and check for standardization and take the review from the customers and release the product. Keep on getting the reviews from the customers and keep updating the code as per the requirements of the users.

3. ABOUT THE PROBLEM

Cloud service providers can provide in multiple flavors that may differ in the abstraction, storage facilities, security and cost effectiveness. There are number of common features among them. Some services may run over the commodity hardware and some may are symmetric and decentralized. Decentralized means some code can be run on several machines of different platform. In our system service runs for multiple users with the same code and can be accessed by them through authorization. The data can be shared among many users if they are willing to do through authentication and authorization. Although data will be shared security is taken care of. Since multi tenancy is trade-off between cost and security more the users wants the security to their data users has to pay more cost and avail the service. However sharing of data may lead to higher security risks since the authorized users must be trustworthy.

4. System platform

We have used a new expertise called SLIM that will resolve the drawbacks of the earlier idea which includes a security model and list of principles for the safe isolation in between tenant resources of a cloud storage and also few methods for the basic implementation of the model.

4.1 Users platform

As soon as the user opens the application, a login page will be displayed. If user is a new customer he has to register. After the registration the user will be provided with an view of different cloud platform packages, which consists of cloud organization, cost to compute cloud, bandwidth, cloud type for implementation. After all the process the user is able to proceed with other options. Later he will be able to log into his application to access allied resources.

4.2 Provider platform

It is the application which is installed on the user's system which is connected to a server. This application helps the vendor who needs to verify the applicant's entries and who will also look into the suggestion box to know whether he has applied for it or not. On this basis vendor will provide the services in an order. The order depends on the payment as soon as the payment is done the order is placed. If the service is about to expiry then the user gets a notification informing the expiry details. The services will be stopped as soon as the expiry date approaches.

4.3 System modules

4.3.1 User Interface:-The multitenant application will allow multiple tenants to access the services all together at the same time. Each tenant's view is different in perspective of using it, administering and customizes as a instance of software. Tenant's will provide a different feel and look for the application.

4.3.2 Software interface:-Multitenancy is an architecture or a design in which a single software instance will serve huge number of customers, called tenants. Tenants are allowed to customize some of the application parts like color of the UI but cannot customize the application's logic or code.

4.3.3 Hardware interface:-Cost savings can be increased by overcoming the growth in demand .Faster hardware is the only solution to increase the performance of a single instance of a server taking the load. Faster hardware includes faster CPU's, large memory and faster disks.

4.3.4 Communication interface:-Multitenancy features a network programming framework to isolate the controller and Middle boxes and also provides a good communication interface.

4.4 System features

Tenants are allowed to customize some features of the application which ensures that other tenant's do not have access to some other tenant's data.

4.4.1 User Interface:-Special type of application interface can be designed.

4.4.2 Business Process:-Rules, work flow of processes and logic used in application implementation can be customized.

4.4.3 Data model:-Customization of the application data structures can be done which includes extension of data schema in order to include, exclude and rename the fields.

4.4.4 Access Control:-User rights and group access rights can be controlled by the Tenant's.

4.5. Requirements

Pertaining to systems engineering and software engineering, it includes the tasks which specify the requirements or specifications that a new product should meet, considering the requirements which behave as conflict's provided by the stakeholders such as users.

Requirement analysis plays a vital role in the success of the project .It should be well defined, documented, actionable, well measured, examined related to current user needs or business needs as formulated. Requirements analysis can be one of architectural, functional, structural or non- functional.

Basic three types of requirements analysis activities are:

1. Eliciting requirements: It includes the process of communicating with the users and also getting information about their needs which can be termed as requirements gathering.
2. Analyzing requirements: Examining the requirements. Finding out whether the requirements specified are unclear, contradictory and find ways to resolve them.
3. Recording requirements: Requirements documentation is done in different ways which includes use cases, user process specifications or natural language documentation.

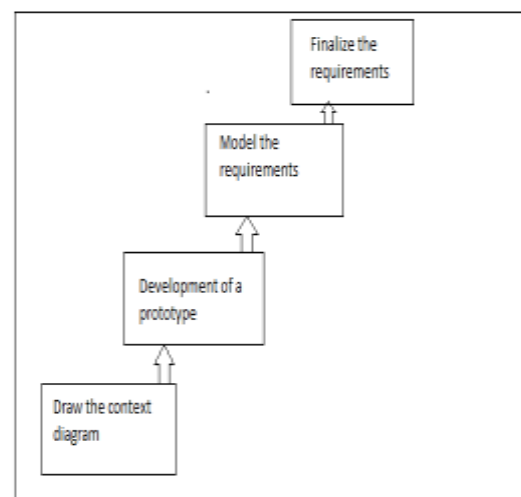


Fig 2: Requirements Analysis steps

Draw the context diagram: This defines the limits and interfaces of the posit system. Helps in identifying the objects external to the posit system which interacts with the system.

1. Development of a prototype:-It specifies the customer needs accurately and helps customer in visualizing the posit system and enlarge the requirements understanding.

2. Model the requirements:-It deals with the graphical representation of the relationship between data and external entities. It helps in figuring out inconsistency in the requirements specification.

3. Finalize the requirements:-It is done after the modeling and in later stages we need to document these requirements.

5. System Architecture

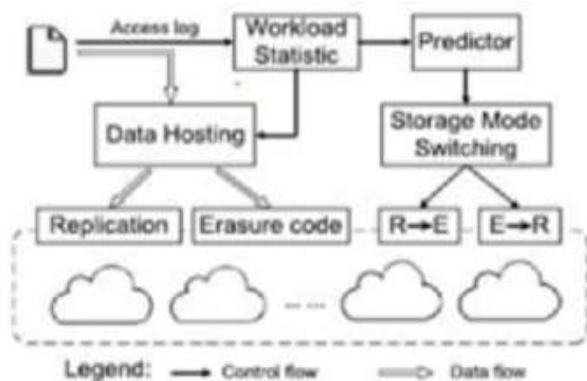


Fig 3: System architecture

6. Multi cloud system

There are so many Data Centers in the world among which some of them belong to the same or different cloud service providers. So we can find the difference in the performance even though the user can access the service from any region in the world. Latency of several data centers is very low while some have high latency. CHARM selects clouds for data storage using all the clouds that are available which meet the specified performance requirements. Storage transition mode doesn't affect the performance because it does not have nothing to do with latency. Whenever there is less proxy overhead we can suppress the priority of the transition operations.

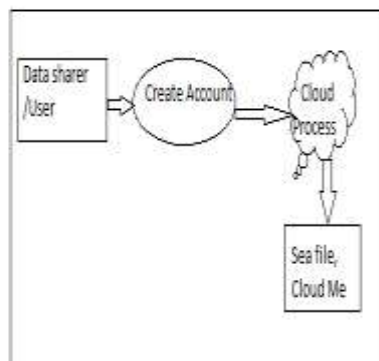


Fig 4: Multi cloud

7. CONCLUSIONS

With all of its advantages, cloud computing is the next step in the evolution of server management. Both the startups as well as old players are rapidly moving their business into cloud. The market size of cloud computing is expected to grow from 270 billion USD in 2018 to 623.3 USD in 2023. The average Internet speed is also increasing rapidly to match up the bandwidth needed for the proper operation of cloud computing services. We conclude that cloud computing will be extremely useful in the future both for testing your startup projects as well as moving the existing technology into cloud. It will also eliminate the issues of resource unavailability and provide excellent services at a reduced cost with pay-per-use model. Our application uses the Node java script technologies such as Express Js and React Js with a mongo db database and Amazon ec2 storage to provide a web app, using which large files can be efficiently shared.

8. References

- [1] Cloud Computing: Concepts and Practices By Naresh Kumar Sehgal, Pramod Chandra P. Bhatt 2018.
- [2] Big Data: Principles and Paradigms Edited by Rajkumar Buyya, Rodrigo N. Calheiros, Amir Vahid Dastjerdi 2016.
- [3] H. Alaqrabi, Lu Liu, Jie Xu, Richard Hill, Nick Antonopoulos, and Yongzhao Zhan, "Investigation of IT security and compliance Challenges in security-as-a-Service for cloud computing" 2012.
- [4] Dimitrios Zissis, and Dimitrios Lekkas, "Addressing cloud Computing security issues," Future Generation Computer Systems 2011.
- [5] W. Sellami, H. Hadj-Kacem, and A. Hadj-Kacem, "Elastic multi-tenant business process based service pattern in cloud computing," In International Conference on Cloud Computing Technology and Science, 2014.
- [6] N. Papanikolaou and S. Pearson, "Cross-disciplinary review of the concept of accountability," HP Laboratories, Tech. Rep., 2013.
- [7] Security of Self-Organizing Networks: MANET, WSN, WMN, VANET Edited by Al-Sakib Khan Pathan 2019.
- [8] S. Subashini, and V. Kavitha, "A Survey on security issues in Service delivery models of cloud computing," Journal of Network and Computer Applications 2011.