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CLOUD SERVICES SERVICE AGREEMENTS DOCUMENTS AND IMPLEMENTATION

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Abstract—Cloud computing is an area that has influence across major fields of data collections. The unique services it offer makes organisations curious about understanding the cloud and its likely benefits. The cloud offers services such as custom built applications deployed on remote systems and ready to use platforms which reduce the efforts needed to develop and deploy applications for cloud users. In addition to these, there are other services such as data storage and various infrastructural resources which the cloud also avails to its users. These services are usually provided to users on a cost bases, thus leading to the need to have legal documented agreements in place to ensure a smooth relationship between the providers and the users. These documented agreements are referred to as Service Level Agreements (SLAs). SLAs detail the terms, conditions and service expectation of the users from their service provider in terms of availability, redundancy, uptime, cost and penalties for violations. These ensures users' confidence in the services being offered. In this paper, the usage of the resources with respect to cloud SLAs is presented.

Keywords-Cloud computing, Cloud providers, Cloud users, Service Level Agreements

I. INTRODUCTION

"Cloud computing is a model for network access to a shared pool of configurable networks, servers, storage, applications, and services that can be rapidly provisioned and released with less management effort or service provider interaction. Cloud computing gives the provision of services by a cloud service provider to facilitate computing, storage and applications development by a user facilities. Cloud computing can also be defined as a computing model for permitting omnipresent, suitable and on-demand service access to a common group of configurable computing resources such as networks, services, storage and applications that can be quickly provisioned and released with minimum management involvement . Cloud computing has three basis service types, SaaS, PaaS and IaaS. In SaaS, application are made available over the Internet for cloud users by cloud providers. Users do not need to install and configure applications for usage. Applications can be accessed anywhere and at any time over the Internet. In PaaS, a platform is provided for cloud users to create and deploy own applications using application programming interfaces provided by the cloud provider. In this model, the user has control over the application being developed and deployed. In the IaaS model, infrastructure is provided and controlled by the cloud provider. Cloud users are provided with networks, servers, storage, computing and other resources usage and at a pay. The cloud

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provider controls all the components, while the user manages the operating system, applications and storage.

Cloud computing utilizes the concept of virtualization and multi-tenancy to provides service to users. Enterprises can migrate some of their application and utilize services based on suitable agreements. Cloud computing offers four deployment types. The public, private, community and hybrid clouds. The private cloud is owned by an organization. The facilities may be on premise or off – premise and can be managed by a third party. Private clouds are considered more secured. Public clouds are owned by major service providers offering services at a cost to cloud users. Public cloud utilizes large data centres sometimes across several geographical locations. They are considered less secure. Community cloud are owned by several organizations who have a common requirements. It could be managed by that community or a third party. Hybrid cloud is a combination of either private, community or public cloud.

Service Level Agreement (SLA) is defined as an agreement between service providers and consumers to guarantee that consumer's service quality expectation can be achieved.

SLA lifecycle has six steps which are:

1. Discover the service providers
2. Define the SLA
3. Establish an agreement
4. Monitor likely SLA violators
5. Terminate SLA and
6. enforce penalties

SLAs embody key elements to achieve full success in cloud computing since they represent the desired guarantees between service providers and customers

SLAs are used to formally describe the functions being offered, the QoS expected from the provider, responsibilities of both parties and likely penalties.

SLAs should contain five basic items which are:

1. Set of services being offered by the providers
2. An unambiguous and future proof terms of service
3. Set of QoS metrics for measuring service delivery levels and a means of monitor these metrics and means of resolving disputes arising from failure to meet the SLA terms.
4. It is important for cloud users to enjoy the resources and service guaranteed by the cloud provider
5. While the cloud provider should benefit optimally from the resources being provided.

According to NIST, a cloud SLA is "a document stating the technical performance promises made by the cloud provider, how errors are to be discovered and handled and any remedies for performance failures".

Clearly, an SLA is must for a getting relationship between a cloud provider and cloud user. No serious enterprise will want to lose valuable data migrated to the cloud and no viable provider will want to lose data because of miss used channel of access.

Cloud user attributes are:

1. Quality
2. Accessibility
3. Trustworthiness and

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4. Performance of connected resources

The purpose of this paper therefore is to discuss cloud computing Service Level agreement. The paper will discuss SLA architecture and the challenges.

II. RELATED WORKS

SLA-Based Admission Control for a Saas Provider in Cloud Computing Environments. In this work, an algorithm determining customer satisfaction for SaaS cloud model was presented. The aim of the work was to develop a means of maximizing profit by saving virtual machine cost through a process formed by conducting implicit analysis. A dynamic data-driven simulation approach for preventing SLA violations in federated cloud environments was presented are available. The work presented an architecture for enabling the release of consumer resources without issues in terms of the agreement. This was achieved using multiple cloud service providers being utilized by a consumer. Web SLA framework was then proposed, implemented and validated. Aframework for negotiating Service Level agreement of Cloud-based Services was presented. It was a framework that helped decided the most suitable cloud service provider for a cloud user. Cloud brokers for optimum resource utilization by the consumer and a capacity driven utility model for SLA negotiation of cloud services. The work proposed a dynamic system which ensured that cloud users effectively utilized resources provided by their cloud provider and noted that customers' requirement and utilization of cloud resource were relevant criteria to be considered when drawing up SLAs that are expected to satisfy both provider and consumers. The role of governance and other SLA issues in cloud environment are the key attributes to be considered when drawing up service contracts in cloud computing. The issue of cloud maintenance was also examine with a view of determining suitable means of managing information with minimum consequences. The proposal of cloud maintenance presented a pricing strategy for cloud computing. Pricing services between a vendor and consumer and the approach was to use service interruptions as a determinant in the relationship between the cloud users and the provider in terms of services to optimize profit. The issues and challenges faced when providing QoS and SLAs in cloud environments were discussed and the issues that could arise from the service providers optimizing users' workloads in view of ensuring adequate quality of service were examined. Proposed an architecture for providing SLA between the cloud providers and users model that simultaneously catered for QoS adherence and resource utilization in cloud data centres. The pproaches which grouped user workloads into categories and then used these categories to prevent SLA violation and also improve resource utilization, thus benefitting both the cloud users and providers. An Inter Cloud SLA brokering service was presented in the work discussed inter-cloud environments, which allowed running of applications across different cloud platforms. The proposed framework via implementation and Cloud SLA considerations for the government consumer are given a detailed discussion on SLA.

Several aspects of SLA was examined including cloud service brokers. The SLA evaluation model for cloud computing proposes

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a new method of developing SLA. As the cloud continues to evolve so also should the SLA, hence the paper presents an optimized SLA that is more suitable for use by both the provider and consumer alike. A formal model for SLA negotiation was proposed. The agent-based multiple round SLA negotiation model is proposed model was based on Web Service Agreement but targeted at SLA management for Cloud services provided by multiple parties. The model incorporated multiple runs, multiple providers and multiple negotiation round.

III. CLOUD COMPUTING SERVICES

A. *Service Level Agreement Concepts*

1) NIST

The NIST in its publication on cloud computing synopsis and recommendations as described in as viewed SLA from one from the service provider. According to this report, a typical commercial cloud SLA should consists of These promises should explicitly contain promises made to the users. The providers service limitations resulting from effect of acts of natural disasters. The expectations from cloud users, which includes acceptance of terms and conditions as well as payment for services used.

This NIST's view to SLA is quite rigid and skewed in favour of the Cloud providers. For instance it does not take into consideration the option for users to discuss modification to service agreements with service providers if the default SLA terms do not address all of the users' needs. The report also implores users to be aware that SLAs may be changed at the providers' with reasonable advance notice be ready to migrate workloads to alternate providers if the changes are unacceptable. This however is not an easy task, as providers and a lack of standard which could allow interoperability between cloud providers is still an open cloud computing issue. NIST's report assumes a blanket approach to SLA agreement for all Cloud services. Multiple SLAs were presented based on the cloud service model being subscribed. The authors also specified two types of SLA for each service model – the provider SLAs and the user SLAs. These contained the promises and expectations from the service provider and the users respectively.

The contractual agreements are:

1. Monitoring and
2. Enforcing

Service statistics are usually provider by service provider and the user can not totally rely on these as it might have been changing. However for cases relating to security, it is even more challenging as often times the audit about the security provided by the CSP is harder to carry out and even agreed upon in the first place as security is an ever dynamic issue.

Every agreement has some challenges that both parties must satisfy with are as follows:

1. SLAs beyond cloud providers.
2. Multi-tenancy and service isolation.
3. Software/application with varied system configuration beforehand.
4. DDoS in Cloud environment.
5. SLA in distributed and multi-cloud application deployment

IV. CONCLUSION

Cloud computing provides scalable, on demand, elastic, multi-tenant and virtualized services to users over the net users. The service types are the SaaS that provides

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applications, PaaS that provide platform for application development, and IaaS that provides storages and computing infrastructure to users.

These services are provided on the basis of service level agreements between the CSP and the user. The SLA specifies the terms of the services provided for ay beneficial transaction between both parties. In this paper, a recent developmental trends of cloud SLA are listed.

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