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Implementation of Cloud Based Query Solver System for Educational Institutes featuring Ontology

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Abstract— These Educational systems in India are facing a new challenges to improve quality and efficiency in Institutional system. The integration of communication and computation technologies, the availability of pocket hand held computers, and the widespread penetration of mobile radio access networks will enable a range of new mobile services to be offered to the users. With the recent advances in mobile computer technology and the penetration of wireless networks, the nature of the services proposed to the users is moving towards mobile and cloud computing supported services. My aim is to propose methods and technologies for the development of such services and implement a Cloud based Query solver system for the students which will provide them Infrastructure as a Service .Cloud computing, is a technology which has gained an increasing amount of attention in recent years. Mobile handheld devices, which have been highly adopted by large user groups, especially in the form of mobile phones and tablets/laptops constitute an interesting platform for cloud computing. Cloud computing is a very well-known term these days. Cloud computing featuring Ontology provides users of handheld devices personalized services tailored to their current location. Ontology is a formal specification of a shared conceptualisation. Using the Ontology search interface, the user searches a registry of Ontologies based upon domain, keywords, category or another searchable metadata field. In general, cloud computing customers do not own the physical infrastructure, instead avoiding capital expenditure by renting usage from a third-party provider. They consume resources as a service and pay only for resources that they use. User can access this service anywhere anytime. Since this service is deployed on cloud, it is going to offer complete location transparency. There won't be any need to maintain physical servers thus helping in cost reduction.

Key words – **Cloud Computing, Ontology ,IaaS (Infrastructure as a service).**

I. INTRODUCTION

During the last ten years, mobile handheld devices have become a part of our everyday lives. Cloud Computing is easily defined as "***Anything that is provided as a Service".***

Cloud computing is the delivery of computing resources as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet). Cloud computing is a marketing term for technologies that provide computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services. A parallel to this concept can be drawn with the electricity grid, wherein end-users consume power without needing to understand the component devices or infrastructure required to provide the service. Or similar comparisons can also be done with the bus service we use. We don't have to buy the bus for our purpose of travelling we just have to pay for the service we use. Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of scalable and often virtualized resources. It is a byproduct and consequence of the ease-of-access to remote computing sites provided by the Internet. This may take the form of web-based tools or applications that users can access and use through a web browser as if the programs were installed locally on their own computers.

Cloud computing providers deliver applications via the internet, which are accessed from web browsers and desktop and mobile apps, while the business software and data are stored on servers at a remote location. In some cases, legacy applications (line of business applications that until now have been prevalent in thin client Windows computing) are delivered via a screen-sharing technology, while the computing resources are consolidated at a remote data center location. At the foundation of cloud computing is the broader concept of infrastructure convergence (or Converged Infrastructure) and shared services. This type of data center environment allows enterprises to get their applications up and running faster, with easier manageability and less maintenance, and enables IT to more rapidly adjust IT resources (such as servers, storage, and networking) to meet fluctuating and unpredictable business demand.

Most cloud computing infrastructures consist of services delivered through shared data-centers and appearing as a single point of access for consumers' computing needs. Commercial offerings may be required to meet service-level agreements (SLAs), but specific terms are less often negotiated by smaller companies. The tremendous impact of

cloud computing on business has prompted the federal United States government to look to the cloud as a means to reorganize their IT infrastructure and decrease their spending budgets. With the advent of the top government official mandating cloud adoption, many agencies already have at least one or more cloud systems online.

II. CLOUD COMPUTING

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software, and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet). Cloud computing entrusts, typically centralized, services with your data, software, and computation on a published application programming interface (API) over a network. It has a lot of overlap with the software as a service (SaaS).End users access cloud based applications through a web browser or a light weight desktop or mobile app while the business software and data are stored on servers at a remote location. Cloud application providers strive to give the same or better service and performance than if the software programs were installed locally on end-user computers.

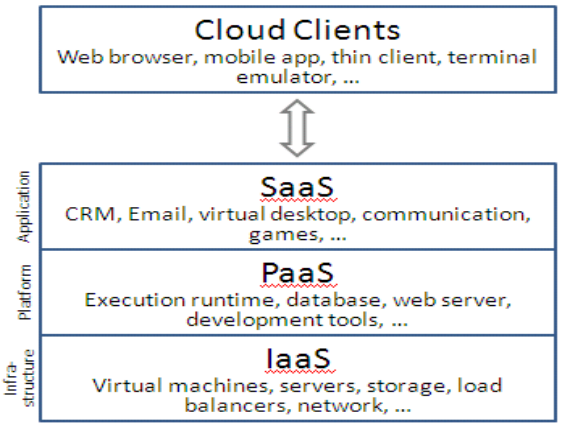
Cloud Service Models - Cloud computing providers offer their services according to three fundamental models: Infrastructure as a service (IaaS), platform as a service PaaS), and software as a service (SaaS) where IaaS is the most basic and each higher model abstracts from the details of the lower models.

a) Iaas (Infrastructure as a Service)- In this most basic cloud service model, cloud providers offer computers – as physical or more often as virtual machines –, raw (block) storage, firewalls, load balancer, and networks. IaaS providers supply these resources on demand from their large pools installed in data centers. Local area networks including IP addresses are part of the offer. For the wide area connectivity, the Internet can be used or - in carrier clouds - dedicated virtual private network can be configured.

To deploy their applications, cloud users then install operating system images on the machines as well as their application software. In this model, it is the cloud user who is responsible for patching and maintaining the operating systems and application software. Cloud providers typically bill IaaS services on a utility computing basis, that is, cost will reflect the amount of resources allocated and consumed. In our Cloud based query solver system the service provided to the students is the Iaas and Saas. It provides computer as virtual machines to the students and the software given as the service is the Query solver interface with the help of which the students can ask their queries to their respective Prof.

b)Saas (Software as a Service) - In this model, cloud providers install and operate application software in the cloud and cloud users access the software from cloud clients. The cloud users do not manage the cloud infrastructure and platform on which the application is running. This eliminates the need to install and run the application on the cloud user's own computers simplifying maintenance and support. What makes a cloud application different from other applications is its elasticity. This can be achieved by cloning tasks onto multiple virtual machines at run-time to meet the changing work demand. Load balancers distribute the work over the set of virtual machines. This process is transparent to the cloud user who sees only a single access point. To accommodate a large number of cloud users, cloud applications can be multitenant, that is, any machine serves more than one cloud user organization. It is common to refer to special types of cloud based application software with a similar naming convention: desktop as a service, business process as a service, Test Environment as a Service, communication as a service.

c) Paas (Platform as a Service) - In the PaaS model, cloud providers deliver a computing platform and/or solution stack typically including operating system, programming language execution environment, database, and web server. Application developers can develop and run their software solutions on a cloud platform without the cost and complexity of buying and managing the underlying hardware and software layers. With some PaaS offers, the underlying compute and storage resources scale automatically to match application demand such that the cloud user does not have to allocate resources manually.



III. CLOUD COMPUTING FEATURING ONTOLOGY

In many cases, better knowledge can be more important for solving a task than better algorithms. To have truly intelligent systems, knowledge needs to be captured, processed, reused, and communicated. Ontologies support all these tasks.The term "Ontology" can be defined as an explicit specification of conceptualization. Ontology capture the structure of the domain, i.e. conceptualization. This includes the model of the domain with possible restrictions. The conceptualization describes knowledge about the domain, not about the particular state of affairs in the domain. In other words, the conceptualization is not changing, or is changing very

rarely. Ontology is then specification of this conceptualization - the conceptualization is specified by using particular modeling language and particular terms. Formal specification is required in order to be able to *process ontologies and operate on ontologies automatically*

Ontology class diagram

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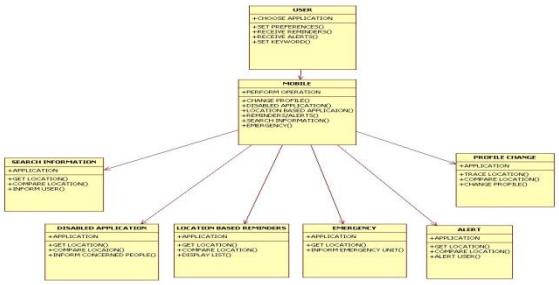
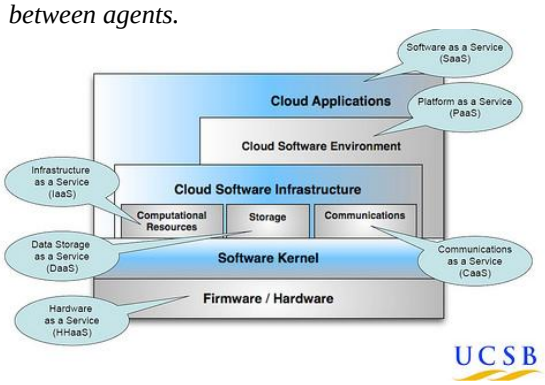


Ontology describes a domain, while a knowledge base (based on Ontology) describes particular state of affairs. Each knowledge based system or agent has its own knowledge base, and only what can be expressed using ontology can be stored and used in the knowledge base. When an agent wants to communicate to another agent, he uses the constructs from some ontology. In order to understand in communication, ontologies must be shared between agents.



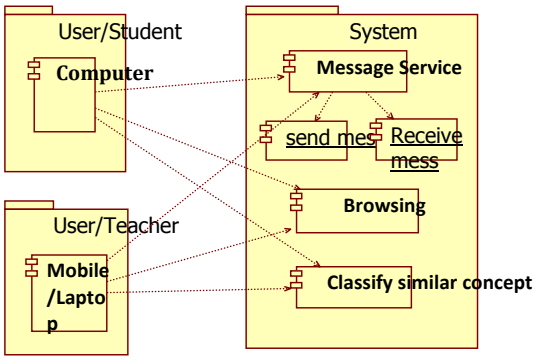
Cloud Ontology diagram

The term "cloud computing" is being bandied about a lot these days, mainly in the context of the "future of the web". But cloud computing's potential doesn't begin and end with the personal computer's transformation into a thin client - the mobile platform is going to be heavily impacted by this technology as well.You may be wondering: what does the term "mobile cloud computing" really mean? Basically, it refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Today, there are already some good examples of mobile cloud computing applications including mobile Gmail, Google Maps, and some navigation apps. However, the majority of applications today still do most of the data storage and processing on the mobile devices themselves and not in the cloud. In a few years, that could change. In this diagram , there are two new services which are used other than the normal four services. The Caas(Communication as a service) is used for the communication happening between two hand held devices or wireless devices and Daas(Data as a storage)service is for the users to get the data they requested based upon domain keywords and category.

IV. PROPOSED WORK

Cloud Based Query Solver System featuring ontology is a cloud based query solving system.This a query solver sytem for the students of educational organization. The query solver system will help the students in solving their doubts instantly by just browsing the web browser and this will help the teacher in analyzing students. The services provided is Iaas and Saas The ontology concept helps in collecting all the data from different departments within the institute and will categorize the data into a shared concept(used frequently) which will help in better decision making and will generate required inferences to the queries generally asked by the students. The data in the database is divided domain wise , the students asking questions will be directly redirected to the domain questions and answers which are already present in the database

Component diagram



The concept of ontology is highlighted in the component diagram the student will ask the question to the professor , but before the question reaching the professor the database verifies if the question has already been asked and if the question is already answered then that answer is sent to the student. And if the student is still not satisfied with his query then the domain of the question is found out concept wise, and the student is redirected to the page of that particular domain on which he has asked the question.

A .We propose a Cloud based Query Solver System featuring Ontology that will provide following features

1) Iaas and Saas - . It provides computer as virtual machines to the students and the software as a service is the Query solver interface with the help of which the students can ask their queries to their

respective Professor. This will act as a virtual class interaction between the students and the Professor. The students don't have to worry about the hardware and the software. Just by browsing the internet they can access the Query Solver System and fire their queries same is with the Professor.

2) Infrastructure as a service offered in a dedicated cloud computing environment allows developers to entirely control the provisioning, configuration and deployment of virtual machines. The IaaS cloud is used for everything from building and validating new applications to operating production environments that require scalability.

3) Data Storage – The students can store their data and access their data from any location by just logging onto ther account. This reduces the work effort of student of carrying data from one location to another. No loss of important data as it is stored in remote servers. Storage maintenance tasks, such as backup, data replication, and purchasing additional storage devices are offloaded to the responsibility of a service provider, allowing organizations to focus on their core business, but the fact stays the same that someone has to pay for the administrative effort for this tasks

4) Cloud based Ontology - Ontology is a formal specification of a shared conceptualization that will collect all the data from different departments within the institute and will categorize the data into a shared concept which will help in better decision making and will generate required inferences to the queries generally asked by the students

5) Domain Specific data – The questions and answers in the database are compared thoroughly and divided domain wise. Domain wise specification of the data. Suppose 10 students ask questions related to cloud computing domain and some ask questions regarding network domain then the next student who asks the question in cloud domain is directly redirected to the page that has all the data about cloud questions and answers

V. IMPLEMENTED WORK

1) Designed a Query Solver System interface for the students and professor of the educational institutes. This query solver system was developed using WAMP/LAMP application.

2) Installed Eucalyptus(Iaas) cloud on the server that will create instances of operating system through which the interface will be provided to the students.

3) User friendly interface for the students and professor so that the gap between them is reduced and they can discuss any topic just by browsing the internet.

4) Database Ontology is used so that the data which is collected is divided properly concept wise and the students just don't have to ask the same questions again and again. Ontology is a formal specification of the shared concept.

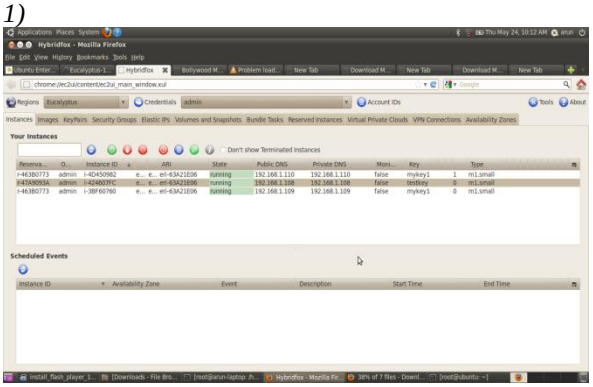
5) Iaas (Infrastructure as a Service) is provided to the students and professor which include all networking devices and server.

6) Domain wise specification of the data. Suppose 10 students ask questions related to cloud computing domain and some ask questions regarding network domain then the next student who asks the question in cloud domain is directly redirected to the page that has all the data about cloud questions and answers

A. Screen Shorts of the implemented work

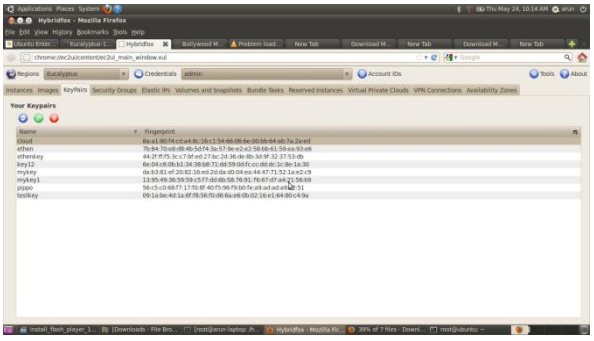
Part I – Instances generated in eucalyptus cloud

1)



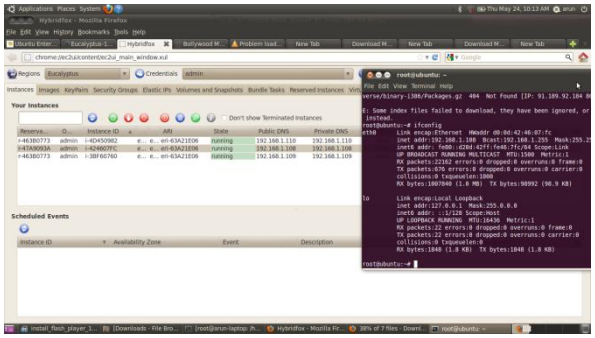
No of instances created

2)



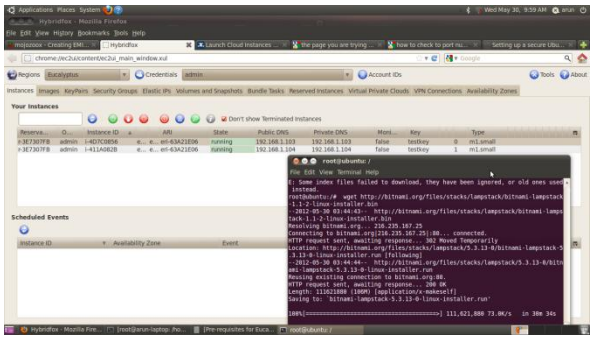
Keypairs created private and public

3)



Generated instance of ip 192.168.1.108

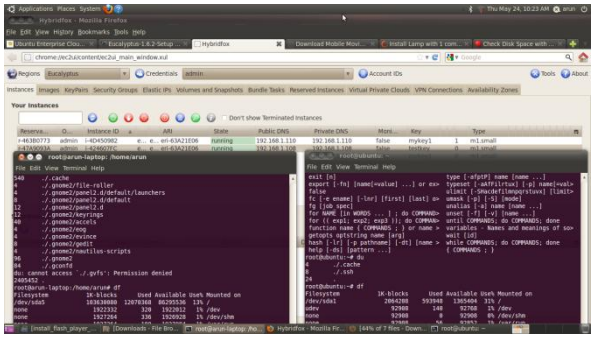
6)



Lampstack installation to deploy php code

Part II – GUI for Cloud based Query solver system

4)

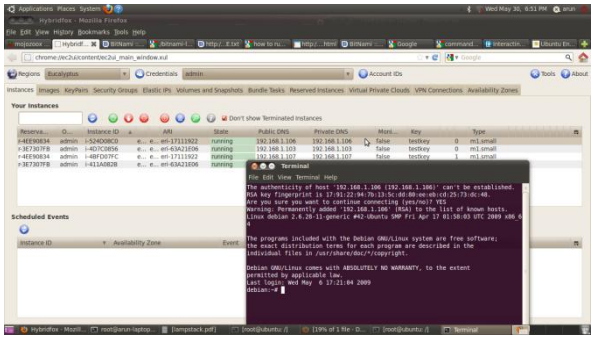


Disk Space given to each instances

1)

Home page of Cloud based Query Solver System

5)



Debian image instance of ip 192.168.1.106

2)

Login page

3)

Query submission page

4)

Domain wise distribution using ontology

5)

Professor Login page

The snapshots of the implementation of Cloud Based Query Solver system is given above. The concept of ontology is used to divide the data in the database domain wise. The student has to just fire a query to his professor on cloud and the professor will reply to the query, suppose if the query has already been asked then the professor need not answer the question, the answer will be redirected directly from the database.

VI .CONCLUSION

The dramatic rise in the usage of internet based services and high end networking components led us to the development of this application. The Cloud based Query Solver System featuring Ontology is a application on Cloud Computing for the students of the educational institutes. The application performs a simple operation with the help of which the students can ask their queries to their Professors and can clarify their doubt. We are providing the infrastructure as a Service(Iaas) is a service model that delivers computer infrastructure on an outsourced basis to support enterprise operations. Typically, IaaS provides hardware, storage, servers and data center space or network components, the students with the help of internet can just log in the Query Solver Website which will provide hardware, storage,servers and data storage to the students of educational institutes.We have another application called the database ontology in which the data which the students are dealing with get separated into a shared Domain. That means the user/prof need not message to the same question which was asked earlier requesting for some information, the application first process the users message. It then creates a log. The message is processed and broken down according to its semantics. The application then searches for the information and replies back with the correct information from the existing database.

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