Thin Client Cloud Computing Network for University and Academic Institutions

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ABSTRACT
Cloud an on-demand virtual and integrated resource sharing. Extends its boundaries by providing services such as SaaS - Software as Service, PaaS - Platform as Service, AaaS- Application as Service, IaaS - Infrastructure as Service. For the past several years the education institutions in all over the world are increasing rapidly and necessity of computer system for students in the institution are highly in demand. Intended for the making of the laboratory infrastructure and software install on all systems in a university and each institution associated with university radically amplify the outlay of the university. With the emergence of education and education system cloud computing are incorporated into educating the student. In this paper we have proposed a model for cloud based SaaS - Software as Service and AaaS- Application as Service for university in collaborating with the thin client network.

Keywords
SaaS - Software as Service, PaaS - Platform as Service, AaaS- Application as Service, IaaS - Infrastructure as Service.

1. INTRODUCTION
A. Cloud computing
Cloud computing the new technology boom in computing industries. Since from 1996 the cloud computing are used by the peoples in form of Hotmail today the cloud computing are used in the most famous social network Face book. Google, Microsoft, Amazon and many companies provide cloud based service to their clients. Most of IT companies are migrated to cloud computing due to extended service provided by the cloud environment. As an average 60% of IT industries are moved to cloud environments to reduce the cost o computing and to organize the infrastructure in a distinct way. Cloud become famous for it personality such as reliability, scalability automation, resource sharing and pay for use services. Service oriented architectures are used in Cloud for resources sharing. Cloud plays a vital role in multi-user and multi-platform culture in computing networks. Cloud users are allowed to share their information with the other group of people and give rights to access and control their data. Which enable a friendly approach in data sharing among computing professionals, developer and system designers. Cloud provides affordable and professional way for data management. Cloud computing are classified as Public cloud, Private cloud, Hybrid cloud.

A.1 Private Cloud
Private cloud computing is a infrastructure used in an organization as a solution for the computing problem. Hence Shared services are allowed inside the clients for sharing resources. Pay for use of cloud computing make an elastic service for the clients in private cloud. Data administration is enhanced with advanced virtualization and distributed system.
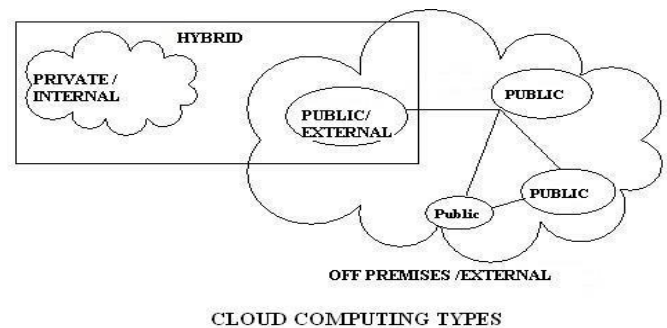

CLOUD COMPUTING TYPES

Fig 1. Types of Cloud Computing

A.2 Public Cloud
Cloud which combines all resources within and resources shared virtually a m o n g the associated clients. Amazon, Google, Windows Azure offer a range of cloud computing.

A.3 Hybrid Cloud:
The combination of private cloud and public leads to the hybrid cloud computing different company are using hybrid cloud to emphasis the business.

B. Cloud Virtualization
Cloud Virtualization offers an efficient method for the implementation of the cloud architecture. Virtualization technology gives a platform to share the resource. It facilitates the cloud computing by increasing the level of reliability and scalability. All resources are available virtually and it's also highly facilitated in recovery of the service. The clients connected to the server are able to use a different operating system and hardware as per their needed.

C. Thin client
Client server the term which is very familiar with computer networks. As the need of computer based services are increased by the computer user and usage much architecture is designed and implemented one such client server architecture is thin client computing. Thin client architecture follows the same method of operation as a client server network .The immense difference is in the components

that included in the client machine. Thin clients are designed with the minimum hardware component in order to reduce the overall cost of the network. Client shares all resources with the server. A thin client computing simply states it as a client with only keyboard, mouse, and screen run all applications from the server. Computation and processing in the clients are handled by the server in an enhanced way. As the uses of the thin client are amplified it leads to high perform in thin clients as Ultra- thin client and we based thin client networks
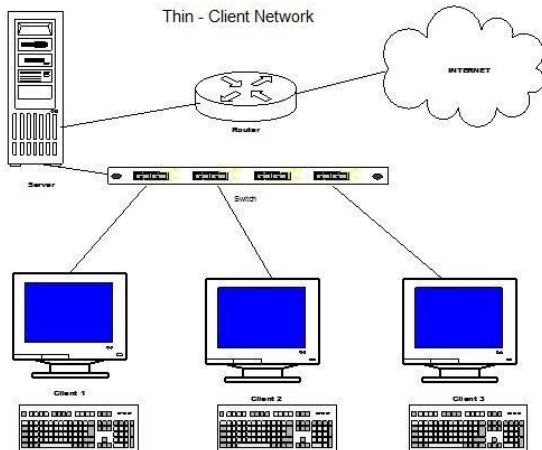

Fig 2.Simple Thin Client Network Diagram

D. Ultra- Thin Client

Ultra thin clients are introduced to maximize the use of the thin client environment. In traditional thin client operating system are used in each machine but in ultra thin client operating system are shared by the client. The operating system is utilized by clients with the merge of kernel and installed in the network itself.

E. Web Thin Client

As the growth of the internet's are increased its lead technique for the wed based thin clients. In which the basic operation of web thin clients is the operating system installed in a web base application that are shared by the clients with the help of the internet.

II. T H I N CLIENT CLOUD NETWORK AND RELEVANCE IN UNIVERSITY

Advance technology and emerging new tools are integrated in each year in the university syllabus but the institution associated with is not taking up the new technology & laboratory due to the laboratory implementation cost and installation cost of new software and operating system. Hence the cloud computing in university is used to reduce the cost saving, scalability and provide a flexible resource environment for all students and staff members. Both public cloud computing and private cloud computing are implemented.

Public cloud computing is allowed to maximize utilization of software and application by the institutions associated with the university. The private cloud is allowed within the university and associated institutions which lend a hand to authenticate the student and staff member. By using the software as a service which lead a way to use any software or language and operating system that are in the university syllabus. Thin client enhanced the benefits of cloud

in university in various ways. Think client saves up to 80% of the hardware cost and a single host computer are used to server more than 30 computers. WIN5.0 – WIN CE are built inside the thin clients are used to for the upgrade of software and package Following are some of profit of thin clients

- Simultaneous and shared operation of operating system is used server and client.
- Fast boot up for clients
- Improve working environment
- Low cost for cooling infrastructure
- Maintains efficiency is less
- Smaller than traditional desktop

Figure 2: Energy Requirement with Server Share
From a 2007 Report by the Fraunhofer Institute as found on WindowsforDevices.com

	Thin Client (TC)	Thin Client with Server Pro Rata + Server Cooling[3]	Personal Computer (PC)
Power Consumption[1]	16 W	41 W	85 W
x 8 hours per day	128 Wh	328 Wh	680 Wh
X 220 working days per year	28 kWh	72 kWh	149 kWh
Costs for 1 working station per year[2]	$5.67	$14.54	$30.03
10 working stations	$56.70	$145.40	$300.30
100 working stations	$567.00	$1,454.00	$3,003.00
1,000 working stations	$5,670.00	$14,540.00	$30,030.00
Savings: TC compared to PC	81%	51%	

Notes:
[1] Average active power
[2] Electricity tariff = 0.15 kWh
[3] Worst case: 20 users/server

Fig 3 .Energy Efficiency Of Thin Client Network

Hence when the university and an institution using the thin client network over the private cloud are exceedingly resourceful for all types of computing problem. Students' knowledge is updated to lasted and for most advanced concepts. It provides a gateway for the students to get involved in new technology and enhanced their knowledge various fields. This environment boosts up the staff members of the university and institutions to upgrade their knowledge in a click. Research scholar has extremely got involved in doing research and it makes the research an interesting job with the aid to all latest tools and software. An added advantage is by using the Virtualization for the clients. Cross flat environments are also stimulated threw Virtualization. The client working with the thin clients over Virtualization provide a forum for project developing students in university and institution to use a different type of hardware and software from the server. Hardware resources of different machines are shared among the clients it increase the efficiency of the computing process.

III. F R A M E W O R K FOR IMPLEMENTATION

The proposed system is implemented by the cloud architecture and with an enhanced cloud environment. Private cloud are configured for university local network and institution networks. The system with high configuration, large memory and powerful computing equipment use as a server in the university. The server is connected to the cloud interface network threw internet connection. Private cloud computing is

an infrastructure used in an organization as a solution for the computing problem. Hence Shared services are allowed inside the clients for sharing resources. Pay for use of cloud computing make an elastic service for the clients in private cloud. Data administration is enhanced with advanced virtualization and distributed system. A dynamic platform is created for the security of the network to prevent the instruction and detection. Security algorithm is incorporated for preventing the encryption and application monitoring Automate network software are used to manage and admin the data centre .Special policy is designed for the network administration to control the multi-user platform. Application platform is included in the cloud server to provide the visibility and control system to the end to end networks with the enhancement of network resources. A private cloud is used on the client side of this implementation. Since the private cloud has built with thin clients Fig.3 clearly highlight the component used and network framed for the thin client cloud network a great scalability is delivered in the network.
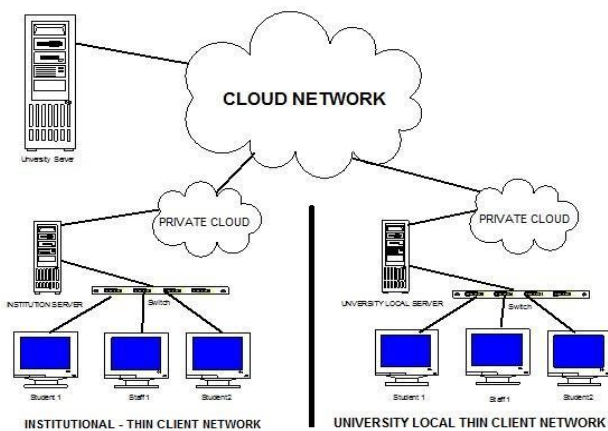
private cloud looks after the data movements among the clients and server such as the location of the client data, access rights of data and clients' security. In this implementation private cloud has the capability to offer steady support and service-level agreements (SLAs). Thin client architecture is introduced to this system to enhance and to reduce the implementation and operational cost. Each thin client is connected to the server of the thin client network and server is merged with a private cloud computing network to maximize the utilization.

IV. FUTURE WORK

Thin clients and cloud computing are used in this proposed system which extends its advantages in LAN and WAN networks of universities and associated institution of university. In future these thin clients cloud networks are implement in wireless network. Advance wireless components are identified and thin clients machines are migrated to wireless system. New communication methodology is to be followed to establish the connection with thin clients server and wireless network. Cloud computing also enhanced to make for sophisticated and cost dropping network to make use to students to work in wireless connectivity

V. CONCLUSION

In this paper we discussed to implement cloud and thin clients in university to enhance the potential for the education

system and to swell up quality of students. By this Universities syllabus are stranded and subject lab are virtually used by all institution in associated university. It offers a systematic way to organize and manage the software and operating system in an effective manager. The students from various part of the country are benefited equally and knowledge of the students is enhanced. New era of technology boom are created in the education system. The universities are modernized to its new resource with the software as service from cloud computing. It provides a complete computing solution to the student. Applications as a service provide resources to the associated institutions. All the students application form, examination form are submitted to the university in centralized way. University is benefited by having a secure, centralized database of all institutions. Students are motivated and trained in latest technologies to meet the industries need. Which result in students to get better placement in top MNC Company with higher understanding of industrial need. The cost of computing in the educational industries are compact by the pay for use service of cloud computing. The budget estimation and spending for lab in each institution are packed together which reflects in trim down the cost to giving education to students.

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