

Cloud Management System – A Case Study of Bundelkhand University

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Abstract— Today’s, Cloud computing is an information & communication technology (ICT) trend that provides pervasive access to shared groups of configurable computing resources and as well as their higher-level services that can be quickly associated with minimal management effort, often over the Internet. Most of the universities are adopting various ICT based services to provide e-learning, e-governance resources to their students and as well as their staff. For efficient management of these split resources, there is a common trend of adoption of cloud computing in universities. This paper presents a standard cloud model for the Bundelkhand University (BU) for the main campus and its affiliating colleges as well. A design strategy is described here to develop University Cloud from existing ICT infrastructure.

Keywords— Cloud computing, IaaS, SaaS, PaaS, BU, ICT.

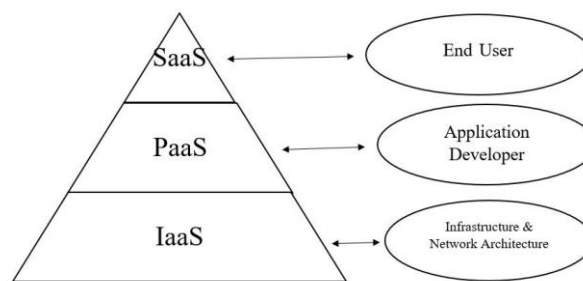
I. INTRODUCTION

Computers are being commonly used for creation of virtual environment for e-learning, distance learning and educational administration. Here e-learning covers aspect of virtual class rooms, virtual laboratories, online discussion boards etc.[1]. It is made possible by giving accessing of data centers having the digital educational content over the internet. ICT makes possible the e-administration of the universities with containing major tasks like Faculty management, staff management, Finance management, Payroll system, library management, student management, store management, e-tender etc. These individual systems are making available round the clock by the university data centers. The cloud computing provides the solution for integrating these individual resources along with their services in one efficient scalable manner and makes available them for web accessing over the internet by user friendly interfaces. These interfaces inherit their deep structural details and gives easier access of virtual resources [2]. This paper identifies major university activity classification for developing cloud framework. This framework is associated with various services provided by existing university ICT infrastructure.

II. LITERATURE REVIEW

In 1993, the term cloud was firstly used for reference of a platform for distributed computing. Cloud computing has come in existence in the year 2000. Cloud computing is the easier mechanism to access computing services instead of an individual service of a product. Here services or information

is provided to the devices by service provider servers or data centers distributed across the networks as a utility. In simple word cloud computing is to provide services for data bases along with storage, access of network, particular software with analysis of results to the user lying in the internet without having deep knowledge of above services. As per NIST, It is common to categorize cloud computing services as infrastructure as a service (IaaS), platform as a service (PaaS) or software as a service (SaaS) [3].



Cloud Service Model

Figure 1

A. Software as a service (SaaS)-

It provides access to software as a remote-service to the computers in the cloud using internet and browser. These services run on remote systems while they are owned and operated by others. These services are referred as hosted applications. Using this, we avoid requirement for individual setup, maintenance, license- purchasing of that software. We

can start using application by just signing up. Since data is stored in cloud, so it is accessible through any system with in cloud. There is no risk for data-loss even individual system crash.

B. Platform as a service (PaaS)-

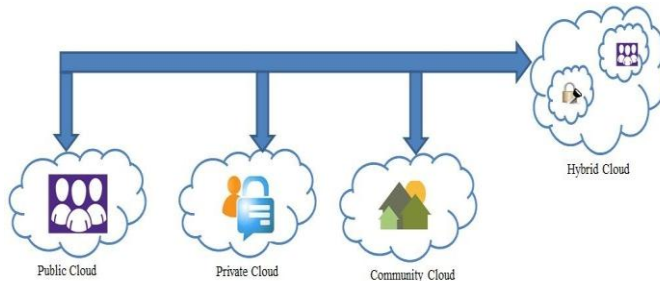
It provides an environment to the users for developing their applications. Users don't have need for worrying about economical & operational feasibility of hardware, special software, hosting etc. It encompasses the complete software development life cycle for web based applications. User can faster develop new web application and launches it into market. A User does not take care about complexities of middleware.

C. Infrastructure as a service (IaaS)-

It provides facilities to use services of Infrastructure as a pay per use. Infrastructure resources include data centers, networking and space for storage. We can efficiently utilizes budget rather than investing it for own hardware resources. As per need we can dynamically hire resources including hardware computing devices as well software services.

III. TYPES OF CLOUD COMPUTING

On the basis of security and resource sharing, cloud computing may involves following four model-



Types of Cloud Computing

Figure 2

A. Private cloud

Private cloud infrastructure is designed for the needs of a particular organization. So, only users of that organization may access cloud services. IT services and data centers are maintained by the organization on its cost. Large organizations launch their cloud to meet their enterprise solution.

B. Community cloud

Community cloud infrastructure is shared among different organizations working together in same types of business environment or cooperate each other's to achieve their business goal. They involve a third party to govern, manage and secure the cloud.

C. Public cloud

Public cloud infrastructure provides their services in public domain. These services may be free or as pay per use. We can access cloud services as web based application through internet.

D. Hybrid cloud

Hybrid cloud infrastructure deploy the combination of above model (private, public & community clouds).It provides facilities to the service providers for extending their domain as per need. It provides unified environment to integrate, manage different types of cloud services.

IV. BU Cloud Model

Bundelkhand University, a leading state university of Uttar Pradesh State of India, has more than three hundred affiliated colleges in distinct seven districts. BU also has more than two dozens of departments in their campus. There are approximately two hundred thousand students enrolled in affiliating colleges along with five thousands campus students. BU provides undergraduate, post graduate and doctoral degree indifferent streams. BU authorities' wants to take advantages of cloud computing by providing cloud based applications to enhance performance of university staff as well as to improve learning of the students. We can divide university activity into following six categories to make university cloud framework [4]-

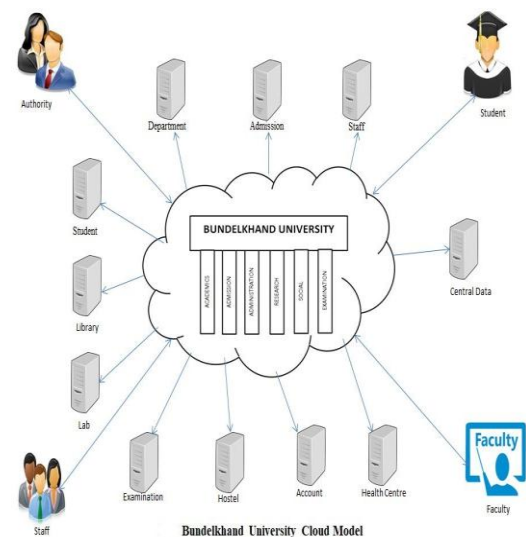


Figure 3

A. BU_Academics-

It involves both student and faculties performing activities for acquiring and delivery of knowledge. Preparation of electronic content may play important role [6]. Daily class room activities like attending lectures, referencing books, preparation of lectures are the example of this category.

B. BU_Research-

It involves activities to execute and enhance research works. Laboratory daily routine work, coordination with distinct research bodies, deployment of research assistant are the example for this category.

C. BU_Admission-

It covers whole procedure for admission starting from commencement of admission notice to preparation of enrolled students in different courses of campus and as well colleges.

D. BU_Examination-

It covers all examination relating tasks from paper setting, allocation of students to examination centers, evaluation up to declaration of results. Most of the works of this category require confidentiality.

E. BU_Administartion-

Daily routine works of university authorities falls in this category. There are various sections of the administration covering various sections like vice-chancellor office, Finance & account section, civil maintenance, RTI & legal cell etc. These sections also require strong coordination with each other.

F. BU_Social-

It contains various curricular and extracurricular activities of the offices of NCC, NSS, Student well fair, Proctor and different departmental student's council. These activities make an impact to society.

V. INTEGRATION OF SERVICES

Now we can integrate managerial tasks of several categories into a single cloud solution. These managerial tasks [5] [7] are classified into following applications as-

- Department Management
- Health Center Management
- Admission Management
- Account Management
- Student Management
- Faculty / Staff Management
- Library Management
- Lab Management
- Examination Management
- Hostel Management
- Central Store Management

VI. CLOUD DESIGN STRATEGY

Figure-4 shows a complete vision that is described in the four steps to achieve a complete desired solution from existing university status.

A. Infrastructure-

It provides the necessary foundation for hardware, software and cloud technologies that works as a platform to create a virtualized cloud computing environment of university.

B. Applications-

It identifies the right processes and determines feasible optimization techniques that deliver the scalability, resilience and flexibility required to deliver university goals.

C. Processes-

Optimizing university tasks to take advantage of the dramatically reduced cycle times or increased scope of analysis.

D. Resultant-

Strategy is directed as profitability, cost reduction and minimized processing time for improving the response time of university applications.

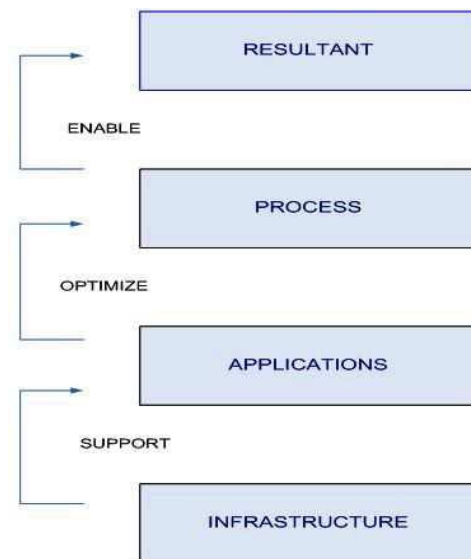


Figure 4 Design Strategy

VII. CONCLUSION

Cloud computing will reduce the required cost and effort of university for setting up and maintaining the hardware and software. It also provides web-based interfaces for students and staff to accomplish their daily routine tasks, support e-learning, accessing of remote simulator. Also, we can improve utilization of university IT infrastructure using virtualization. This solution will be flexible, scalable, and sustainable in nature. The design strategy deploys existing infrastructure. So there is no need for replacement of infrastructure.

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