



Cloud Computing and Enterprise Resource Planning (ERP) Systems in Cloud Environment

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Abstract—Cloud Computing provides a Computing environment where different resources, infrastructures, development platforms and software are delivered as a service to customers virtually on pay per time basis. With increasing number of users, Job scheduling becomes a strenuous task. Ordering the jobs by scheduler while maintaining the balance between quality of services (QoS), efficiency and fairness of jobs is quite challenging. An attempt is made to study the current issues of the cloud computing solutions for the Enterprise resource systems in the industries. This Research paper includes the review of development of Low cost ERP Solution to Indian industries on Mobile using latest technologies such as Mobile computing, SaaS, Cloud Computing etc.

Keywords— Cloud Computing, cloud service, ERP system, ERP Life Cycle.

I. INTRODUCTION

Business is evolving very faster in terms of enterprise systems and industries needs a very specialized solutions and at the same time most of the economies are coming out of recession and the companies are catching up on the growth curve. Industrial problems are very complex and need lot of resources for high quality outcomes. The ERP platform is evolving to address these emerging needs of global enterprise. The use of ERP has changed radically over a period of few years. Today ERP can be applied to any company operating in any kind of field. Cloud ERP is evolving as a solution model. Cloud ERP is simple to deploy and its controlling depends on the support of the vendor. Organizations need not to bear additional server and other dependent costs. Cloud ERP Vendor can ensure the control of ERP on behalf of business organizations[1].

Implementing ERP to a business level it relies purely on internet. SaaS (software as a service) is currently the most popular and prolific type of cloud computing service. SaaS ERP enables smaller, budget limited companies to have access to incredible technologies in an affordable way. Its high flexibility and scalability, high performance with better availability, vast services and less maintenance makes SaaS the key setting for the rapid development that Cloud Computing is creating. As SaaS gaining more popularity, enhanced by the advent of web based computing options and virtualization platforms, the enterprise infrastructure is rapidly expanding into a large computing cloud environment.

1.1. Cloud Computing

Cloud computing, is distributed computing, can provide dynamic resource buffer, virtualization and highly usable next generation of enterprise data center. With cloud computing, the resources are shared and so are the costs[3]. Users can pay as they go and only use what they need at any given time, keeping cost to the user down. Cloud computing is very much a business model as well. Providers of cloud computing solutions, whether they are software, hardware, platform, or storage providers, deliver their offerings over the Internet. There are no shrink wrapped boxes containing discs or hardware for you to buy and set up yourself. Cloud providers typically charge monthly recurring fees based on your usage. as shown in fig 1.

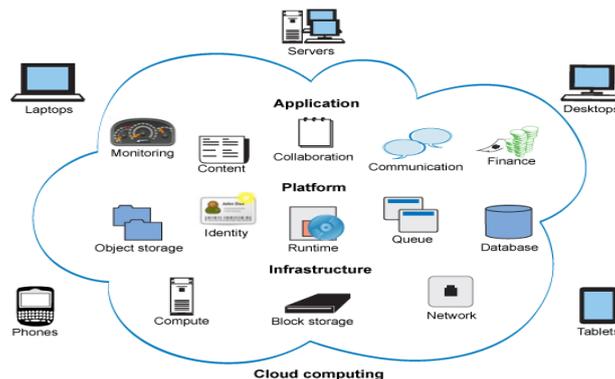


Fig: 1 Cloud Environment

1.2. Cloud Computing Models

The cloud computing can be categorized as Public Cloud, Private Cloud and Hybrid Cloud as depicted in given below defines the various models of cloud computing[4] .

A. Public Cloud Computing: The cloud infrastructure is made available to the general public or a large industry group and is owned by an organization selling cloud services.

B. Private cloud Computing: The cloud infrastructure is operated solely for an organization. It may be managed by the organization or a third party and may exist on premise or off premise.

C. Hybrid cloud Computing: The cloud infrastructure is a composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load-balancing between clouds).

1.3 ERP System

An **Enterprise Resource Planning (ERP)** is the term that covers whole product line[2]. It is an integrated computer-based application used to manage internal and external resources, including tangible assets, financial resources, materials, and human resources. Any business greatly benefits by adapting this feature because you can customize it or integrate it with other packages to satisfy unique requirements. Its purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. Built on a centralized database and normally utilizing a common computing platform, ERP systems consolidate all business operations into a uniform and enterprise-wide system environment.

An ERP system can either reside on a centralized server or be distributed across modular hardware and software units that provide "services" and communicate on a local area network. The distributed design allows a business to assemble modules from different vendors without the need for the placement of multiple copies of complex and expensive computer systems in areas which will not use their full capacity. ERP is a massive software architecture that supports the streaming and distribution of geographically scattered enterprise wide information across all the functional units of a business house. It provides the executives with a comprehensive overview of the complete business execution which in turn influences their decisions in a productive way. ERP referred to the way a large organization planned to use its organizational wide resources. Formerly, ERP systems were used in larger and more industrial types of companies. However, the use of ERP has changed radically over a period of few years. Today ERP can be applied to any type of company, operating in any kind of field.

II. HOW ERP VENDORS ARE DEVELOPING CLOUD SOFTWARE

Depending on the history of the software vendor and product, there are different approaches to developing a cloud-based ERP solution. The vendors can be divided into two main groups:

2.1. Traditional ERP Software Vendors. These are vendors that have been providing ERP software for many years in the traditional on-premises manner and are in the process of developing hosted or cloud solutions as the market moves to a cloud environment. They're doing this in one of two ways: modifying their software technology to fit a cloud model (which is the direction Microsoft Dynamics is going) or building a separate cloud solution from the ground up (which is what SAP did with Business ByDesign). In general, the on-premises ERP software providers have mature functionality but have varying levels of cloud technology offerings[5].

2.2 Cloud ERP Software Vendors.

These are newer software vendors, such as NetSuite, Workday, Intacct, Acumatica, Plex, and others, that have developed a cloud solution from the ground up[6][8]. These companies are in the process of building functionality and require an Internet connection to access the system. Though some of them may not have a large installed base at the present time, they don't have to support older versions (like the traditional ERP vendors) because all clients are maintained on the latest version. A number of cloud ERP companies have entered the market over the past few years that have been built by veterans of the traditional on-premises ERP market and are making a new start. They include Workday (former PeopleSoft employees), FinancialForce (former CODA employees), and Acumatica (former Solomon employees). For example, Workday is repeating a deployment strategy that worked well for PeopleSoft in 1990s, which is to start with an HR/payroll solution and then develop a financial/ERP software solution by targeting sectors such as healthcare, higher education, government, services, and manufacturing.

III. STATE OF THE CLOUD ERP MARKET

As I mentioned earlier, ERP solutions continue to mature as time passes, but here's the state of the cloud ERP market as of the beginning of 2013:

In general, cloud ERP vendors are still building out functional capabilities as compared to traditional ERP vendors that have spent decades developing their systems. We've found that, at the time of this writing (January 2013), there's a tradeoff between deeper functionality and cloud technology.

On-premises vendors are still in the process of modifying their technology to serve a cloud environment. For many of them, timing to release a cloud solution will depend on their approach. Some vendors are working on modifying

their solutions, which is the faster development scenario, while others are building cloud solutions from the ground up, which will take more time but allow them to start fresh with the latest technologies[7].

At this time, the majority of cloud ERP installations are in smaller companies because they have basic functional requirements, typically don't have a large investment in IT infrastructure, and have relatively few users. This is changing as acceptance moves up-market and larger companies implement cloud ERP solutions.

The cloud vendors are able to implement faster than on-premises vendors because their solutions are simpler and they don't usually offer the sophistication or flexibility that on-premises vendors do.

3.1 Security Considerations

One of the biggest impediments to the adoption of the cloud model in the ERP space is concern for security. Reports of security breaches of credit card and personal customer data at large online companies have contributed to this concern. The good thing is that, at this time, we aren't aware of any specific case where sensitive data was exposed from a cloud ERP provider. Still, companies have been concerned that putting financial and operational information in the cloud increases the possibility of exposing sensitive data to hackers and outside entities.

To address this concern, cloud vendors have put significant resources into improving the security of their systems [9]. Many cloud ERP vendors are adopting compliance with Statement on Standards for Attestation Engagements No. 16 (SSAE 16), "Reporting on Controls at a Service Organization," which replaced Statement on Auditing Standards No. 70 (SAS 70), "Service Organizations." This attest standard developed by the American Institute of Certified Public Accountants (AICPA) includes requirements for in-depth audits of internal controls over data and network security, backup and restoration procedures, and system availability.

Because cloud ERP vendors can't afford to lose data for their clients, their focus on security is typically much higher than if you were to set up security for an in-house/on-premises solution. Nevertheless, the strategy for maintaining security varies by vendor, so be sure you review the security policies of the cloud ERP vendor before signing the service level agreement (SLA). For larger organizations that want to take advantage of the benefits of cloud technology but are still concerned with regulatory compliance, security, and control issues, there's a growing trend to form a "private cloud." This involves a single company or group of companies with common requirements that set up a cloud to deploy software solutions that are accessed only by that private group.

3.2 Customer Relationship Management In The Enterprise

As market competition is increasing, the customer has become a prime resource for the enterprises, which in-turn initiates the development of Customer Relationship Management (CRM). Basically it is a philosophy which focuses on the customers. By the proper utilization of IT technologies, reforming the business function and reengineering the workflow, many new customers can be attained and existing can be stopped going away from the business. Today plenty of prospective applications of CRM and supply chain management are available in industrial clusters. ERP systems are being utilized by Enterprises or organizations to increase their profits as well as growth. These systems can also curtail the time required for production phase and definitely enhance the services required by the customers[10][11]. However, it is not always easy to implement and effectively use these ERP systems because of few constraints

IV. CLOUD ERP

ERP software that is deployed into a cloud environment becomes "Cloud ERP Software". Most (if not all) cloud environments are built using virtualization and load balancing technology that allows applications to be deployed across multiple servers and database resources. Cloud ERP is positioned as a revolutionary approach to deploy an ERP solution. It provides a solution that is flexible, adaptable, scalable, efficient and affordable. Cloud ERP as a business management software has provided big success to deliver business critical data. ERP software as a service (SaaS) for customers who want to acquire ERP without managing hardware, software, and upgrades while reducing up-front expenses. Customers can build an internal cloud to reduce ongoing hardware costs while maintaining greater control over integration and require local access to their data server.

4.1 Scope Of Cloud ERP

The future of Cloud ERP is going to be an exciting one. The next five years will be very exciting as more and more providers and customers transitioning to Cloud ERP and as a result, many legacy systems will likely be retired. Software that is running on old platforms will begin to disappear. Cloud updates and version controlling happens so fast and so regular. No more waiting for disks and announcing downtime to your users while you test, load, and then patch updates. The end user will authenticate and confirm that the system is fit for their purpose and will make an efficient use of the system.

4.2 Cloud Computing In The Enterprise

Cloud computing is a new paradigm in which computing resources such as processing, memory, and storage are not physically present at the user's location. Instead, a service provider owns and manages these resources, and users access them via the Internet. For example, Amazon Web Services lets users store personal data via its Simple Storage Service (S3) and perform computations on stored data using the Elastic Compute Cloud (EC2). The business will be definitely benefitted by making use of this kind of computing platforms. Some of the benefits could be less initial capital

investment, a smaller amount of time will be required to start new services, maintenance and operation costs could go lower, effective utilization through virtualization and the most important thing is simpler disaster recovery. All these points make cloud computing a striking option. Reports suggest that there are plenty of advantages of moving computing from desktop to the cloud. Limited energy and bandwidth are the main source of limitations of cloud computing.[12]

The third generation mobile system such as UMTS (Universal Mobile Telecommunications System), soon will be set in any of the countries, which will not revolutionize but reform the telecommunication technology by providing feature rich contents to mobile users, wireless broadband access to internet and worldwide roaming.

4.3 ERP Life Cycle: Implementation

Typically (Casual Analysis), Cloud ERP can save almost 50% cost over traditional ERP in five years.

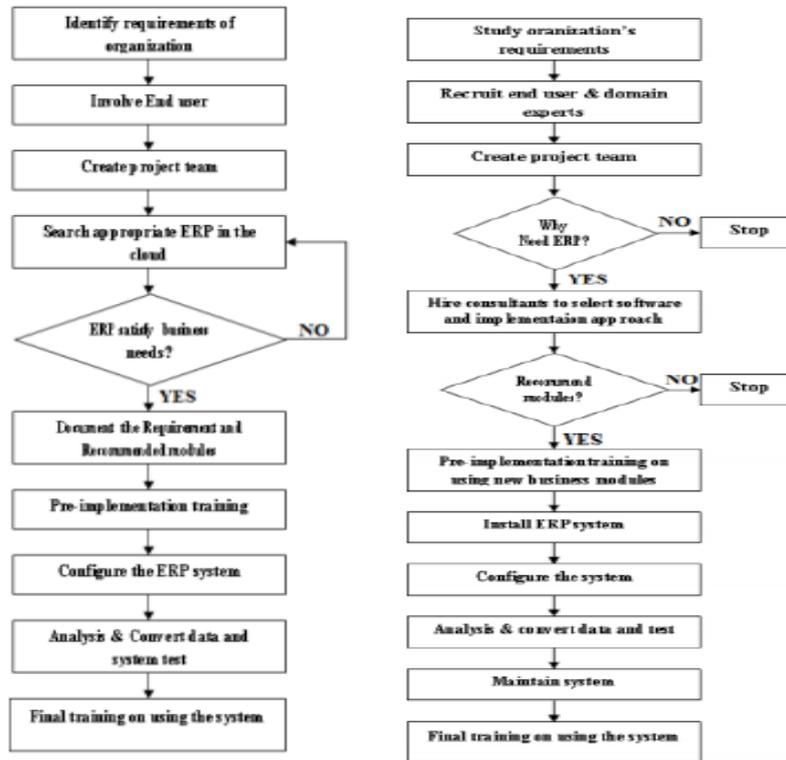


Fig 2: ERP Life-Cycle

Implementing a new ERP system is an excellent time to reassess your business processes and look for areas of optimization. Software implementation is just one part of the process. An effective system integrator will take you through each of these steps, and provide you with a fresh perspective on how you can change your way of doing business to optimize your work and your use of the ERP system. Urso recommends the following approach[13]:



STEP 1: ANALYZE YOUR BUSINESS SYSTEMS

During this step, analyze your business systems and their interactions to discover relationships between components and across processes that are often unrecognizable or not immediately visible. We would meet with you in a requirements gathering to identify the criteria for success, determine schedule and cost requirements, and prototype a new system.



STEP 2: OPTIMIZE CRITICAL AREAS AND PROCESSES

Once the Quickstarter Workshop is complete, optimize critical areas. We would develop and implement approaches for optimizing inventory, staff or machinery scheduling, materials management, or other systems you have identified as the most vital components of your business.



STEP 3: BUILD IT SYSTEMS TO AUTOMATE PROCESSES

Once the system is designed and the project is outlined, would automate your now improved processes by building and installing a customized business solution using the Odoo software package. using Odoo to design an easy-to-use enterprise system for your business, designed around simple workflows. Even though sets up a project plan, we still follow an agile approach to roll out your system, so that you can start using it sooner, and see quicker results in your business applications. Our goal is for you to see return on your investment as quickly as possible. To support this goal runs the following work areas concurrently.



STEP 4: PROVIDE TRANSITION ASSISTANCE

Once system automation is set up, would provide coaching, training, and warranty support to help you transition to independence. We don't consider the deployment of technology to be the end of our assistance to you. Because successful implementation of a new system is critical to achieving your return on investment, helping you achieve your goals. You invested in the system; we want you to get the ROI.



4.4. Benefits Of The Process

With any software implementation project, the process and plan should be designed to reduce risk early on and set you up to see early results from your investment. By starting the project with one week dedicated with your team, is able to quickly and effectively assess the needs of your business and reduce the uncertainty of the project.

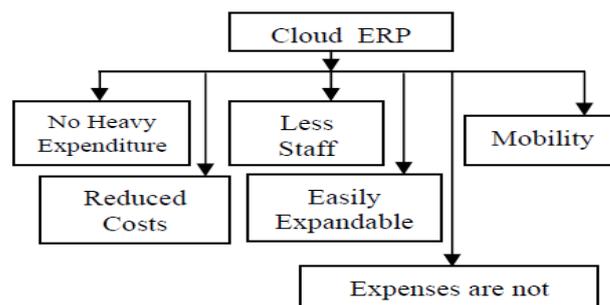


Fig 3: cloud ERP usage

V. CONCLUSION

Cloud ERP applications have been getting tremendous demand for companies battling the business challenges. It is a maturing deployment model that may provide a greater opportunity to capitalize on an ERP investment which encourages standardization through visible economic drivers and provides the opportunity for greater focus on strategic activities. Balance of enthusiasms for cloud ERP with realistic expectations is needed. The association of right people at the time the system is evolving is crucial.

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