

Cloud-based ERP systems and Traditional ERP Systems : A Comparative Study

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Abstract : Resource Planning (ERP) systems provide extensive benefits and facilities to the enterprise that adopt it and help the enterprise to share and transfer the data and information across all functions units inside and outside the enterprise. It integrates various departments by Sharing data and information among them and aims to achieve different objectives. Cloud computing model works with internet and provides scalability, reliability, availability and low cost computer resources. Cloud based ERP system can be implemented and runs over the cloud and provides great advantages and benefits, in spite of its many difficulties and challenges. In this paper, we provide a comparative study between a Cloud based ERP system and Traditional ERP system.

IndexTerms - ERP, Cloud Computing, Cloud ERP, SaaS, Benefits, Challenges

I. INTRODUCTION

ERP Systems: An Enterprise Resource Planning (ERP) system is a generic term for an integrated enterprise computing system. It is a customized packaged software based system that handles the majority of an enterprise's information systems requirements. It is a software architecture that facilitates the flow of information among all functions within an enterprise (Watson et al, 1999). ERP product is a computer software. The objective of ERP development is mapping of process and data into integrated structure. Major suppliers of ERP solutions. SAP, Oracle, PeopleSoft/J.D. Edwards, etc. The most important modules or processes that an ERP system supports are: marketing, sales and distribution, enterprise solution, production planning, quality management, assets accounting, materials management, cost control, human resources, project management, financials, and plant maintenance (Duan et al, 2013)

ERP system's commercial market grew in 1990, due to following reasons:

- It provides client /server environment.
- Provides standard interface on centralized database
- It works as a catalyst for enabling reengineering activities in large corporations. It helped them to redefine business culture.
- ERP applications were year 2000 compliant

II. CLOUD COMPUTING

According to the US National Institute of Standards and Technology (NIST)(Mell et al, 2011)

“Cloud Computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction”. This definition highlights following major characteristics of Cloud Computing:

- On-demand Self-Services: A consumer can acquire any cloud computing resources from service provider, without any human interaction.
- Broad Network Access: All cloud computing resources could be access over network through standard mechanism by any platform.
- Resource Pooling: Multiple users are served using a multi-tenant model, by controlling and adjusting the resources at a meta level.
- Rapid Elasticity : Unlimited provisioning and release of resources automatically and on-demand.
- Measured Service: Provider can control and optimize resources by providing metering services. Resource use & metering facilities are transparent to provider as well consumer

There are three service models in cloud computing (Mell et al, 2011, Surgient et al, 2009, Amrhein 2011). They are :

- Software as a Service (SaaS): A service provider delivers software and applications through the internet. Users subscribe to the software and access it via the web or vendor APIs.
- Platform as a Service (PaaS): A service provider offers access to a cloud-based environment in which users can build and deliver applications. The provider supplies underlying infrastructure.

- Infrastructure as a Service (IaaS): A vendor provides clients pay-as-you-go access to storage, networking, servers and other computing resources in the cloud

Cloud computing is composed of four deployment models (Mell et al, 2011, Surgient et al, 2009, Amrhein 2011) which are :

- Public cloud: Cloud infrastructure is owned by cloud service vendor but available to general public.
- Private cloud: The cloud infrastructure provided to a single organization.
- Community cloud : Cloud infrastructure shared by several organizations within a community.
- Hybrid cloud: The cloud infrastructure could be combination of more than one cloud models.

III. TRADITIONAL ERP VS CLOUD ERP:

Traditional ERP solutions cloud be provided in two different ways hosted and on-premise ERP. On-premise is the licensed version of ERP. It is loaded into the servers and computers of the enterprise. The enterprise handles all hardware, software and maintenance costs. Nowadays the companies are shifting from on-premise to hosted version of ERP. ERP hosted on Cloud is called Cloud ERP. In this form ERP the software solution is provided via Software as a Services model. These applications can be accessed via browser over internet connection with minimum dependency on client side configuration. It enables the users to use, share and transfer data across departments and organizations in real time.

Unlike traditional ERP, the software is cloud-hosted, therefore installation and updations are done online and immediate. To make Cloud ERP software robust, they come with backup and recovery plans. Cloud ERP follows the pay per use and on demand service model of cloud.

IV. BENEFITS OF CLOUD ERP

Low implementation cost: On-premise implementation of ERP requires hardware & software purchase, human resource allocation, installation and maintenance. These typical costing issues of on-premise ERP can be significantly reduced by adopting ERP-cloud solutions (Peng et al, 2014)

Low implementation time: As compare to traditional ERP system on-premise, ERP system on cloud reduces implementation time, from 12-36 months to 4-8 months. (Catteddu, 2010) Since ERP system on cloud need not any physical infrastructure therefore the business need not to worry about IT infrastructure (hardware, software etc.) and other resources like human resources[8].

Low maintenance cost: In terms of testing, backup, support and upgradation, less guidance and support is required from consultants because all these could be done on the cloud (George, 2016).

High Transparency : The cloud ERP system can be accessed anywhere through web browser or web-applications from any device like PC/ Laptop or mobile etc. without any extra customization or hardware cost. (George, 2016)

Enhanced Performance: Cloud providers offers much powerful IT infrastructure like hundreds of servers and huge data storage capacity, to host ERP. ERP-cloud have un-expectedly high-response time as compare to on-premise implementation. Increase in ERP data or CPU intensive MRP calculations do no effect the system performance.(Peng et al, 2014).

Efficient System Installation & Upgrades: With On-premise ERP, software packages and new upgrades need to be installed on each system, for every user at every geographical location. This complete process is time consuming, complicated and difficult to manage. In contrast the cloud-ERP can be centrally installed and upgraded by providers. To improve the package the upgrades could be released by provider constantly and regularly(Peng et al, 2014).

V. CHALLENGES OF CLOUD ERP

Security and Privacy: Data privacy refers to “data kept by service providers is controlled and used properly” security relates to the practice of the protection of data against unauthorized access, disclosure. Due to different policies and legal aspects, most of the clients are concern about the security at all levels like network, data, application and host levels (Avram, 2014).

Cloud Provider Selection : Different cloud providers offers different services. The characteristics to be assessed are : Service Level Agreement(SLA), Key Performance Areas(KPA), monitoring, number of Data Centers, supported operating systems, standards etc.

Vendor Lock-In : Cloud ERP is relatively new and immature. The service provided by different vendors vary significantly. The possibilities are high that a client feels unsatisfied by the services and may with to move to different service provider Cloud ERP (Peng et al, 2014). The change in service provider is not so easy due to :

Complicated cloud infrastructure

- High cost
- Time consuming
- Legal restrictions (SLA)
- Inter organizational issues

Lack of seamless interoperability: Lack of seamless interoperability between in-house application and cloud applications, as well as other cloud vendor’s services (Avram, 2014)

Organizational Challenges : There are many organizational barriers responsible for potential failure of ERP implementation in an organization. (Peng et al, 2014).

- Lack of top management support
- Poor cross-functional communication
- Inefficient business process reengineering
- Inadequate change management

VI. CONCLUSION

ERP systems are evolved from monolithic applications. They could be installed on-premise or deployed as a SaaS application, available on cloud. The cloud ERP vendors are offering various attractive solutions to overcome the limitations of traditional ERP systems. It is important for organizations to consider technical and business implications cloud be brought by cloud ERP. The organizations should also assess the pros and cons before making any decision towards selection and use of cloud ERP implementation.

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