

Mobile Integrated Enterprise Resource Planning System Architecture

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Abstract

The Enterprise resource planning (ERP) is business process management software that allows an organization to use a system of integrated applications to manage the business and automate back office functions. ERP software integrates all facets of an operation, including product planning, development, manufacturing processes, sales and marketing. ERP system is not a new concept. This has been used in business industry a long time ago. However, in the fast growing technological advances, the mobile ERP System concept was introduced. The contemplation of ERP to be mobilized is a challenging idea. This paper introduces a mobile ERP system with the concept of SaaS cloud.

Keywords: *ERP (Enterprise Resource Planning), SaaS, Cloud computing*

1. Introduction

ERP provides an integrated real-time view of core business processes, using common databases maintained by a database management system. ERP systems track business resources cash, raw materials, production capacity and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across the various departments that entered the data. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.

Organizations perceive ERP as a vital tool for organizational competition, as it integrates dispersed organizational systems and facilitates error-free transactions and production. ERP vendors traditionally offer a single ERP system. ERP systems suffer from limitations in coping with the integration challenges of changing requirements. However, many companies prefer to implement an ERP suite from one vendor that incorporates stand-alone point solutions to achieve higher levels of integration and improve customer relationships and overall supply chain efficiency.

However, though most companies still follow the single source approach, a significant number of firms employ a strategy of “best of breed” ERP to strive for a competitive advantage. ERP vendors acquire products, or develop new features comparable to or better than many top applications. This helps companies, via single source, maintain or create a competitive advantage based on customized business processes, rather than adopt the same business processes as their competitors.

Mobile device use for CRM and ERP functions is an inevitable extension of our increasingly connected wireless society, and offers a wealth of advantages as employees meet customers on their own turf. App development is fast and furious at the moment, but CIOs

need to take a proactive, thorough look at how mobile apps apply to their businesses and choose programs that will meet their current and future needs. Employee involvement is crucial to both the program evaluation and execution--take the time to investigate what features will be used effectively, and to ensure that employees are fully trained on the opportunities and responsibilities connected to the new programs.

2. Background of the Study

2.1 Mobile Enterprise

Mobile enterprise is a term to describe a corporation or large organization that supports critical business functions and use of business applications via wireless mobile devices. In a mobile enterprise, employees use mobile devices to do any or all of the following: access email, manage projects, manage documents, provide customer relationship management, conduct enterprise resource planning, fill out invoices and receipts, accounting vouchers, work orders, purchase orders, etc. and manage a corporate calendar and address book. These are the most common applications though many other corporate mobile applications are being developed and used by organizations around the world [2, 3].

2.2 Mobile ERP

ERP software developers are finally catching up to this expectation, creating dynamic new models of mobile connectivity that will allow for on-the-spot responsiveness at all levels. Any company involved in an ERP evaluation and selection process needs to consider the role of mobile apps in its overall business solution [5].

ERP software vendors are scrambling to deliver products that promise mobile access. For example, last spring major software vendors announced new mobile CRM apps to supplement their ERP applications. Mobile apps from SaaS solution providers are linking CRM and ERP functions to their cloud-based programs. The products now available run the gamut from highly specific to broadly generalize; an ERP software evaluation needs to carefully examine whether the mobile apps match up to company's individualized needs, and how much customization is available to improve the fit [5].

- *Increased productivity and better decisions* - search and retrieve up-to-date information whenever you need
- *Empowered employees* - work and access secure information anywhere, anytime
- *Improved customer engagement* - provide real-time sales and service information
- *Streamlined supply chain* - supplier and inventory data at your fingertips
- *Always accessible* - even when not connected, applications work offline.
- *Leverage existing skills* - use your existing web development skills to create mobile business solutions without worrying about the requirements of each specific make and device.
- *Simplify development* - use the component architecture to simplify development and speed up deployment.
- *Empower your customers* - drive adoption of your mobile solution by letting your customers choose whatever device they want, with the assurance that they will have the same user experience.

- *Integration* - Integrate messaging, device sensors and notifications to deliver state-of-the-art mobile apps.

2.3 Component Based Development

Component-Based Development claims to offer a radically new approach to the design, construction, implementation and evolution of software applications. Software applications are assembled from components from a variety of sources; the components themselves may be written in several different programming languages and run on several different platforms. CBD architecture is being used nowadays and the research on how to make it more efficient is the focus of this study. A component re-used is one of the most convenient ways for the fast software production. There have been many methods on how to do this and it does involve more technical and detailed view. In this paper we tried to integrate the concept of CBD to develop a mobile enterprise application. We believed that enterprise application uses software components that are being re-used repeatedly; hence, component re-used for mass application developments is necessary [9, 10]. Component Based Development (CBD) is popular methodology to develop a mobile component through component re-used. One of the interesting researches is the enterprise mobile application development with CBD.

If the components are available in repository, then it is easier to develop an application. Like for example, when we want to develop an inventory system. The inventory system has an user interface which accept data inputs. The data are then stored in the database for calculations or analysis. The main use of inventory system is to produce a report at the end of processing. In figure 1, as you can see, Interface for data inputs (GUI) component is in the first layer. GUI plays the important role in enterprise mobile computing, it is where the data is being inputted, and hence it must be user friendly and easy to understand. Next to that is the Database components, database also is very important as it will store the data that has been input by the user. Report Generator templates are also needed. This template is also a component. There are many available report template components which are ready to be connected to the applications to generate reports. Also, the printing option is very important.



Figure 1. Mobile Enterprise Application

Figure 1 shows the composition of the mobile enterprise application. These are the Enterprise connectors, Communication platform, mobile devices and storage or databases. Enterprise connectors are software, middleware and also components which are used to

develop the applications. Communication platform, are the communication technology that support the mobility of the devices. Mobile devices are of course the devices; this can be smartphones, PDAs, tablets and etc. Also the most one of the most important is the databases. Data warehouse are essential and must be secured as it stores all the data from day-to-day business transactions.

3. Migration and Implementation Issues

As the business expands; the complexity of your operations increases along with it. Chances are your systems and processes aren't producing the same results they once did. Perhaps you no longer have an accurate idea of how much inventory is in your warehouse. Or maybe it's becoming more challenging keeping up with orders and your customer satisfaction levels are wavering because of it. If any of this sounds familiar, it may be time to consider an ERP manufacturing software system.

New advances in business intelligence (BI) and mobile cloud technology are transforming ERP as we know it. ERP has become an even stronger business asset, and this is changing how mid-market customers define successful ERP implementations.

Key mid-market industries such as manufacturing, retail, distribution, food, and services are eager to harness the power of cloud computing to implement cost-efficient IT solutions that ultimately drive improved bottom-line benefits to their organizations.

At the same time, these mid-market customers are seeking to understand how to leverage the vast amounts of ERP data. More specifically, they are trying to determine how they can easily access, manage, and interpret the reams of information scattered throughout their enterprises to make faster, more informed business decisions. New advances in BI and mobile cloud computing will drive efficiencies across every business function. Mid-market customers who make the investment in BI and the cloud will realize improved cost and operational efficiencies, expanded real-time collaboration with customers, vendors and partners as well as faster and more personalized customer relationships.

3.1 ERP System in the Cloud

Mobile cloud applications move the computing power and data storage away from the mobile devices and into powerful and centralized computing platforms located in clouds, which are then accessed over the wireless connection based on a thin native client.

- Mobile devices are connected to the mobile networks via base stations that establish and control the connections and functional interfaces between the networks and mobile devices.
- Mobile users' requests and information are transmitted to the central processors that are connected to servers providing mobile network services.
- The subscribers' requests are delivered to a cloud through the Internet.
- In the cloud, cloud controllers process the requests to provide mobile users with the corresponding cloud services.

Compared to traditional cloud computing, mobile cloud computing poses a challenges in the way mobile device access data stored in the cloud. This is due to the inherent challenges of mobile computing such as low bandwidth, mobility, limited storage and battery life. One of the recent researches issue is the live virtual machine migration, this paper focus in this issue. Virtualization technologies enable the abstraction and hence pooling of resources to be shared

across the organizations. Data centers are designed around virtual machines, which are the new atomic units of computing. Virtual machine runs as a normal application inside a host OS and supports a single process. It is created when that process is started and destroyed when it exits. Its purpose is to provide a platform-independent programming environment that abstracts away details of the underlying hardware or operating system, and allows a program to execute in the same way on any platform. In mobile cloud computing, to assess the limitation virtual machine migration is one of solution.

This is quickly turning into a year of transition for many supply chains, with the shift most noticeable in aerospace and defense. Tighter project schedules driven by reduced budgets, coupled with more aggressive launch schedules is making this the year of the agile supplier. Cloud-based ERP systems are essential to suppliers in this industry especially.

Cloud ERP is Enterprise Resource Planning software that is hosted in a platform over the Internet. The use of the term “Cloud” includes a broad set of applications and software deployment models, namely Software-as-a-Service (SaaS). After compiling several online resources, we created a generally accepted definition of cloud computing.

Use of the Internet to access hardware, software, and other resources that are provided on-demand in order to perform work and other business processes.

A more in-depth definition of cloud computing has been provided by the National Institute of Standards (NIST). Despite this work, disputes over multi-tenant, internal clouds, and cloud infrastructure versus cloud application create conflicting opinions of cloud requirements.

The bottom line is that ERP software that is deployed in a cloud environment becomes Cloud ERP Software. Most Cloud environments are built using virtualization and load balancing technology that allows applications to be deployed across multiple servers and database resources.

Cloud based ERP benefits customers by providing application scalability and reduced hardware costs. In addition, Cloud computing technology made it easier to deliver our ERP software as a service (SaaS) for customers who want to acquire cloud ERP and not have to manage 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.

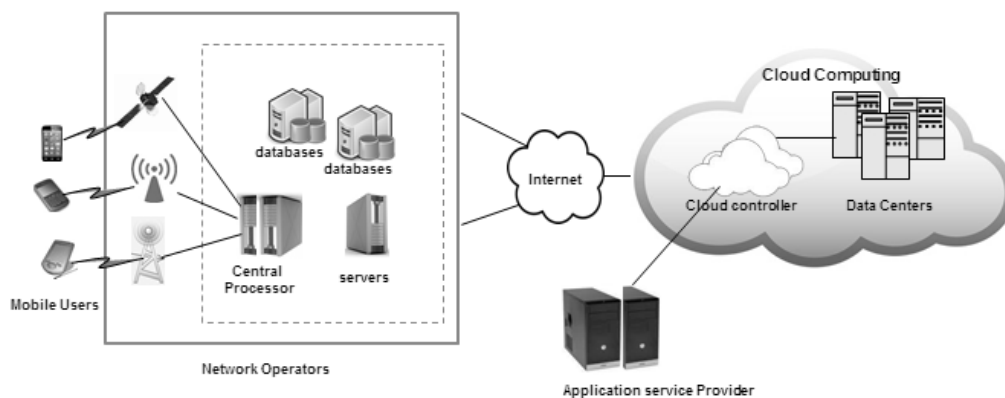


Figure 2. Mobile cloud

Software as a service (SaaS) is a software delivery model in which software and associated data are centrally hosted on the cloud by independent software vendors or application service providers. It is sometimes referred to as service(s) as a software substitute (SaaS) or on-

demand software. SaaS is typically accessed by users using a thin client via a web browser. SaaS has become a common delivery model for many business applications, including office & messaging software, DBMS software, management software, CAD software, dDevelopment software, gamification, virtualization, accounting, collaboration, customer relationship management (CRM), management information systems (MIS), enterprise resource planning (ERP), invoicing, human resource management (HRM), content management (CM) and service desk management. SaaS has been incorporated into the strategy of all leading enterprise software companies. One of the biggest selling points for these companies is the potential to reduce IT support costs by outsourcing hardware and software maintenance and support to the SaaS provider.



Figure 3. Advantages of Cloud based ERP

4. Management Requirements

4.1 Mobility Management

Enterprise mobility management (EMM) is the set of people, processes and technology focused on managing the increasing array of mobile devices, wireless networks, and related services to enable broad use of mobile computing in a business context. When we say mobility management it is refer to the management for mobility of the device. To perform a daily transaction, employees maybe move from one place to another, hence mobility is very important. This is an emerging discipline within the enterprise that has become increasingly important over the past few years as more workers have bought smartphone and tablet computing devices and have sought support for using these devices in the workplace [3, 4].

4.2 Application Management

Application Management is very important consideration. We can install application in to many mobile devices; however, it can be compromise by other users if not kept well. System administrators cannot expect to have the same access to mobile device clients as they would have to desktop devices that don't leave an office. Lack of access combines with operating system heterogeneity to make routine tasks such as deployments, configuration settings, and application installations and help desk tasks very difficult. Each device has unique management requirements and tasks often must be performed remotely, over the air. Enterprise mobility management systems generally provide middleware to automate management tasks and insulate administrators from the complexity of performing tasks on many different types of devices.

4.3 Financial Management

Since mobile enterprise can be used as general or typical device, billing should be taken into account. The cost of voice and data were once wholly contained within the walls of the enterprise. With mobile devices this is no longer the case. Often, each employee negotiates their own contract with a mobile carrier and then bills his employer for some or all of these costs as a reimbursement, creating budget unpredictability for the organization. Other tasks such as carrier contract negotiations, invoice processing and/or device requisition costs, when appropriate, can also be included. Enterprise mobility management often includes telecom expense management features that help organizations plan for and control the overall costs of mobile voice and data transmissions.

4.4 Security Management

The mobile devices are easily lost or stolen; the data on those devices is highly vulnerable. If corporate data is accessible via a personal mobile device, organizations suddenly lose a great deal of control over who can access that data. These can include password protection; encryption and/or remote wipe technology, which allows an administrator to delete all data from a misplaced device. Enterprise mobility management proposes systems to prevent unauthorized access to enterprise applications and/or corporate data on mobile devices. With many systems, security policies can be centrally managed and enforced. Such device management systems are programmed to support and cooperate with the application programming interfaces from various device makers to increase security compliance without increased labor. The used of mobile devices should follow the company's policies to prevent misused of the devices.

5. Mobile ERP

The advances in mobile industry also brought an idea to put the ERP system into to next level. The business owners are still hesitant to migrate from standard hardware support to mobile system. This is a challenging innovation and takes a lot of risk, however, with the promising outcome, some owners are already adopted the concept.

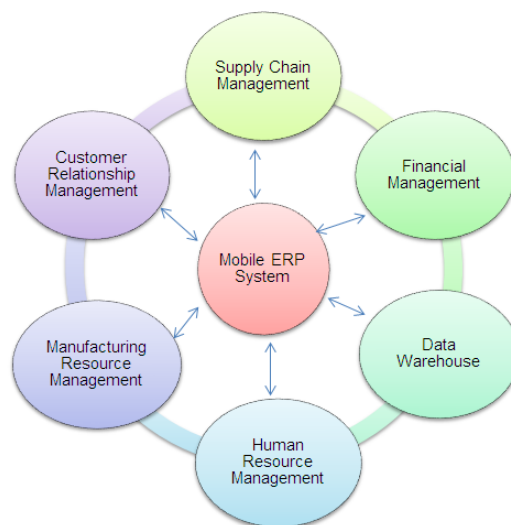


Figure 4. Mobile ERP System Component

With full ERP access on their smartphone, managers can even authorize changes to expedite specific work orders or deliveries. And with links into the finance applications, then finance managers become aware of the implications of supply or manufacturing issues straightaway, enabling better decisions to be made. In very large manufacturing facilities, using mobile ERP might eliminate the need for expensive networks and ruggedized terminals.

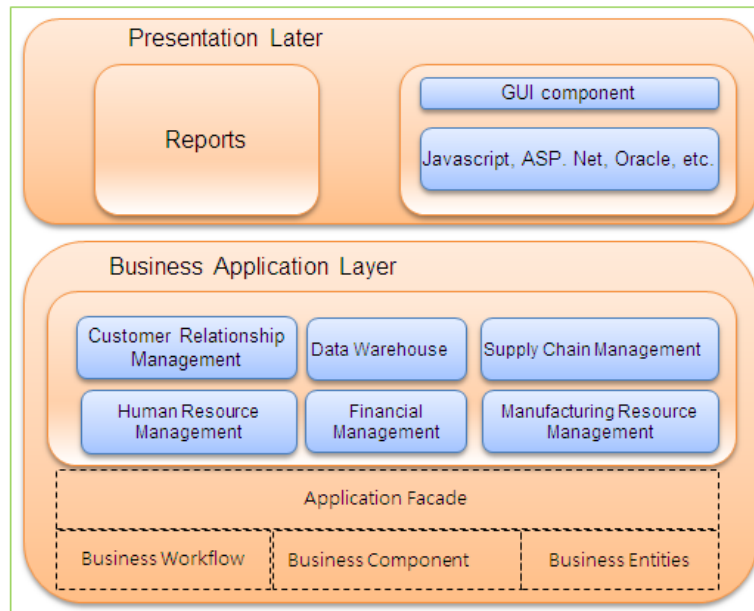


Figure 5. Mobile ERP SaaS

Figure 5, shows the Mobile ERP SaaS architecture. The ERP system will be hosted by SaaS, to support mobility. It is accessible to any devices. With SaaS, there is no need a physical hardware support on the part of the business owner. Therefore, it is cost effective and maintenance needed.

6. Conclusion

Cloud based ERP benefits customers by providing application scalability and reduced hardware costs. In addition, Cloud computing technology made it easier to deliver our ERP software as a service (SaaS) for customers who want to acquire cloud ERP and not have to manage hardware, software, and upgrades while reducing up-front expenses. The successful development and implementation of SaaS based ERP platform will takes advantage of the benefits of centralization through a single instance, multi-tenant architecture, and provides a feature rich experience competitive with comparable on premise applications.

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