



Mahatma Gandhi Mission

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Final Year Engineering **Department of Information Technology**

Labmanual

Subject: Enterprise Resource Planning

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Vision of Information Technology Department:

To develop expertise of budding technocrats by imparting technical knowledge and human value based education.

Mission of Information Technology Department:

- A. Equipping the students with technical skills, soft skills and professional attitude.
- B. Providing the state of art facilities to the students to excel as competent professionals, entrepreneurs and researchers.

Programme Educational Objectives:

- PEO1. The graduates will utilize their **expertise** in IT industry and solve industry technological problems.
- PEO2. Graduates should excel in **engineering positions** in industry and other organizations that emphasize design & implementation of IT applications.
- PEO3. Graduates will be **innovators & professionals** in technology development, deployment & system implementation.
- PEO4. Graduates will be pioneers in engineering, engineering management, research and **higher education**.
- PEO5. Graduates will be good citizens & cultured human being with full appreciation of importance of IT **professional ethical & social** responsibilities.

Program specific outcomes

- PSO1. An ability to design, develop and implement computer programs in the areas related to Algorithms, Multimedia, Website Design, System Software, DBMS and Networking.
- PSO2. Develop software systems that would perform tasks related to Research, Education and Training and/or E governance.
- PSO3. Design, develop, test and maintain application software that would perform tasks related to information management and mobiles by utilizing new technologies to an individual or organizations.

List of Experiment

1. To study the basics of ERP system
2. Study of ERP technologies and its ecosystem.
3. Study of different Management Information Systems (MIS).
4. Case study: Customer Relationship Management (CRM).
5. Study of different ERP modules.
6. Study of ERP implementation life cycle.
7. Study of open source ERP systems.
8. Case study on Integrated Enterprise applications.
9. Case study: SAP.
10. Case study: Microsoft Dynamics.

Experiment 1

Title: Study of ERP technologies and its ecosystem.

ERP technologies

Below you will find the list of ERP technologies:

1. Databases
 - a. PostgreSQL
 - b. MSSQL
 - c. Oracle SQL
2. Programming Technologies
 - a. .NET and ASP.NET
 - b. Java
 - c. Ruby
 - d. Python
 - e. PHP
3. Frontend Technologies
 - a. JavaScript
 - b. AngularJS
 - c. React

SIMPLIFIED STRUCTURE OF ERP SYSTEMS

Before giving you an ERP technologies list, it is very important to understand the typical structure of ERP systems. In a real life, enterprise resource planning solutions consist of dozens of connected application, databases, modules, APIs etc. However, as any applications, they can be viewed as a structure built of the database, backend or server part and the frontend or the user interface:

1. **Database** – it is where the data about the assets (like the number of products in the warehouse etc) is stored.
2. **Backend** – the engine that performs the operations in the system according to the users' request, for example, make a request for the database to make a list of the products and goods on the particular warehouse and render it to the user.
3. **Frontend** – the graphical interface that allows the users to communicate with the backend and to form the requests and then display the received information.

Those are the very simplified explanation of the ERP components from the software architecture perspective. In this article, we will use them as the criteria for listing of the technologies in ERP systems to show their role and exhibit their value for the business intelligence software as a whole.

1. Database Systems and DBMS

Developers have a significant list of the ERP-friendly database technologies at their disposal. A DBMS interacts with the users and the database which is the significant part of the framework that holds data which is inquired by the user. The most recommended DBMS is MSSQL.

a. PostgreSQL

Another database which is super powerful is PostgreSQL, which comes handy in troubleshooting with its powerful tools including server management studio and server profiler. It's arguably the most advanced open-source database technology which can be included in the ERP technologies list. If the development team has decided to opt for the open-source technologies for the ERP project, then PostgreSQL is definitely the best choice because it shares the same philosophy as the rest of the ecosystem and has an advanced connectivity that allows it to be easily integrated

b. MSSQL

Microsoft's SQL is one of the popular ERP databases. Its primary function includes storing and retrieving data whenever it is requested by the applications. MSSQL can assist you in optimizing the performance of a server thus ensuring availability and restorability. Low cost of installation, enhanced performance, and better security features make it developers' favorite choice.

c. Oracle SQL

The major goal of Oracle SQL is upgrading the data, saving it, and retrieving it when needed with super intense speed. One of the complex new ERP technologies this relational database boosts productivity. The self-governed characteristics of SQL allow excluding system failures. Both relational cloud and non-relational database services maintain Oracle SQL. The best thing about SQL is its automated backup allows easy accessibility of data and it's elimination of manual tasks.

2. Backend Programming Technologies

When it comes to back-end programming languages there is no shortage of options, and there is a huge list of ERP technologies. However, the ultimate decision depends upon your long term goal.

a. .NET

.NET, and ASP.NET are the all-time favorites in the developers' ERP technologies list. Those frameworks include less code and enhanced reuse of its codes, which consequently involves less time and cut short extra costs. .NET allows easy integration of applications via the internet with partners. They include value chain management, product applications, accounting management, and service applications. .NET is mostly applicable for web services due to its ability to transmit and communicate information using standard internet protocols. It comes with a rich set of tools for web and desktop development, such as WPF and Winforms for creating excellent interfaces in a short period of time.

b. Java

Same as the .NET, Java can be used for the ERPs that are planned solely for the desktops or web or both at the same time. The frontend for the desktop would be built on the SWING, for example. Things even better with the web version connected to the same Java backend because there is a vast choice of the web development frameworks that give consistent experience across different browsers and platforms.

Java is one of the best options available for the systems that require both cloud and desktop computing. Once you use Java in your ERP, then you use the code for any of other business. It is easy to code and has excellent networking abilities. The benefits include high UI for mobile and desktop experiences. Java ensures proper data security; users can download resources from any of the non-trusted websites

without causing damage to the data. It offers a variety of flexibility; therefore, it always comes handy. Java is an efficient, dynamic and neutral architecturally.

c. Ruby

In our list of new ERP technologies, next comes Ruby. The two reasons that led to the choice of Ruby, first, it has the ability to extend the modules and classes due to its self-hosting feature. Secondly, its quick database makes it the best programming language for the CRM. Ruby is also a nice choice for the backend if you're planning to make a web-based ERP without the desktop version and with the mobile apps. However, it is slightly harder to maintain, because Ruby is supported only by the community and it is quite hard to find many Ruby developers because there is lack of them on the job market and they are highly demanded.

d. Python

From the main architecture to its core scripting, ERP needs a simple language and it is one of the easy to use open technology in ERP. The goal-oriented Python is easy to use and easy to read, thus programmers can easily implement it. It offers sophisticated data and allows regular check-in. It also serves as an automatic garbage collector. It is used to create byte-code for large-scale applications and allows high-end abstraction in the ERP model.

e. PHP

Is also a programming language worth mentioning in terms of the ERP technologies, but from the slightly different angle. Many of the enterprise applications have been written using PHP and it is still one of the most commonly used languages for the content management systems. Being the first server-side technology has given PHP a great start, but it was rather used because of the lack of good alternatives. .NET, Java, and Ruby beating PHP in all comparisons. Thus, we don't recommend anybody to use PHP for a new application in 2018 and as a technology used in ERP in particular.

3. Frontend Technologies for the ERP

For the last few years, a plenty of frontend ERP technologies are available for creating the beautiful, fast and responsive interfaces.

a. JavaScript

It is worth starting this list with JavaScript because, together with HTML5 and CSS, it is one of the pillars of modern web applications and single page applications are standing on. In most cases, it is a great choice if you are going to build a cloud-based ERP system that will be used by the staff via web browsers or mobile apps. To make it even more accessible, it can be used with the Node.js as a server-side technology, to execute JavaScript code outside the users' browser thus delegate the heavy-lifting to the cloud.

b. AngularJS

AngularJS is a great framework if you have the backend as Java or C# to make a responsive web application that would work across different browsers, devices, etc. AngularJS can help programmers to boost the development process. When a query is fed, the pre-information data is retrieved with ease. It also allows the formation of dynamic applications, which means that you can always get things done according to your own requirements.

c. React

React offers a great approach to the development of ERP due to its extensive capabilities. It is perfect for the solution driven results of an organization. It is easy to use because once you develop codes for the websites you can use them for the mobile app development as well, thus reducing the overall costs involved.

ERP Ecosystem

The ERP ecosystem is comprised of three major parties: software vendors, consulting services (including both consulting firms and independent consultants), and adopting organizations. In the ERP game, these parties work closely to achieve a common goal--to improve operation performance for the adopting party, through the establishment of ERP systems.

The vendor is the main source of software technologies. Without the software (behind which are methodologies, system designs, programming and testing, and all other efforts that make the delivery of a software package possible), the adopting organization would have to build its own system from scratch at much greater cost. The adopting organization is the financial source for the whole ecosystem. Without this party, the whole ERP industry would not exist. Consulting services are the bridge between the other two parties. The existence of consulting is the result of a division of labor, which allows every party to focus on what it, does the best.

If we look at this three-party game from a short-term perspective, or on the level of a single case, it is possible to see that only one or two parties win the game at the cost of the rest. For example, we have seen certain cases in which vendors made good money, but the systems they provided didn't work well. However, taking a long-term perspective, this game is able to reach a triple-win situation in which every party receives what it deserves.

As there are already many articles talking about key factors for successful ERP projects, it would be interesting to take a different view of success. And so I'll begin by zooming in on the main factors each party requires to be successful in this ecosystem, based on observations and perceptions formed as a result of recent visits to different parties within the ERP ecosystem. To the vendors, the most important factors are development capability, market leadership, and the ability to maintain the balance of the ERP food chain. To the consulting services, knowledge capital, human capital, and creativity are critical, while to the adopting organizations; winning factors are in-house expertise, financial capacity, and independency.

Success factors for vendors include:

a. Development capability:

Development capability can be divided into two parts--the technology side and the business side. First of all, as application system developers, vendors need to have sufficient technology inventory. Generally speaking, all the technologies that are involved in a software package for commercial purposes should be mature. However, due to the fast pace of the IT industry, application system developers should always work with the latest mature technologies. For example, the evolution from SAP R2 to R3 and then to mySAP is in tune with improvements to the architecture of information systems.

b. Market leadership:

Developing software that fits a great variety of enterprise requirements demands tremendous resources. However, only a few market leaders have enough resources to do so. The competition for market share is probably one of the major forces that led to a series of mergers and acquisitions in the ERP industry during the past few years. Seeing that the adoption of ERP systems had reached a plateau in big organizations, major ERP players are now trying to maintain their market leadership via two major dimensions. One way is by expanding the scope of their products to include other relevant application areas, such as customer relationship management (CRM), supply chain management (SCM), supplier relationship management (SRM), and product lifecycle management (PLM). The second way is by expanding the range of their customer base to reach smaller-sized customers with different offerings.

c. Knowledge capital:

Nowadays, renowned consulting firms have built massive knowledge assets to conduct their business effectively and efficiently. These firms all have a powerful consulting methodology (as examples, Deloitte's value-driven approach and Capgemini's Collaborative Business Experience), which is believed to be one of the core competencies of being successful in the consulting industry.

d. Human capital:

Consulting is probably one of the few industries that rely on human capital development the most. It's not a surprise to see how actively the top consulting firms compete to acquire the most talented people, and to provide sophisticated programs to help employees to grow.

Some consulting firms are working creatively to develop their people. In 2007, Accenture published a book titled Return on Learning, which tells the story of how the company reignited learning for a whole new generation of its people, including details about its award-winning study and demonstrating the return it makes on its learning investment.

e. Financial capability:

The investment in an ERP system is usually comprised of two major parts: software licenses and implementation services. When project scope and scale are determined and a software vendor is selected, the license investment is relatively stable, but the implementation part is associated with more uncertainties (consulting fees are more likely to change, compared with license fees). It is not rare to see an ERP project go over the initial budget due to unexpected issues or changes that come up during implementation. As soon as it is realized that things aren't going as planned, the adopting organization needs a strong contingency plan to address the uncertainties.

Experiment 2

Title: Study of different Management Information system(MIS)

A management information system (MIS) is a computer system consisting of hardware and software that serves as the backbone of an organization's operations. An MIS gathers data from multiple online systems, analyzes the information, and reports data to aid in management decision-making.

Management information systems mostly concerned with Data Management and then making roles in order to give the right kind of data to the right people. Different industries, the use of the data is different but in every department, there is just a use of the data. Without the use of the Management information systems, you can't communicate with other departments or take better decisions. For managing data we use a software called "MYSQL", it is the advanced version for managing data and mostly big corporations used it. A medium-sized corporation uses Microsoft Access as a database tool while small organizations or shops used Microsoft to excel as a data storage.

Organization Structure:

Any Organization has a three-level structure, viz Operational Management, Tactical Management, and Strategic Management. The level of information required for each level varies. The Database Management System (DBMS) shows a different set of data to a different Organization level. In some cases, the data required for the top management is never shared across any level of organization because of the sensitivity of the information.

Operational Management:

These people are mostly related to the technical side of the story. The information required to them mostly is on a day-to-day basis. In some cases, a reorder point for a product and the total inventory of raw material left is what concerns the operational management. This is where the Internee Engineers work the most.

Tactical Management:

Mostly, the people in the Tactical Management is mostly people who are middle managers, supervisors, head of the departments, etc. These people mostly concern and take care of the activities occurring in Operational Management.

Strategic Management level:

People in those levels of organizational structure are mostly Managers, Stock Holders, Chief-executives and the board of the directors. Mostly the decisions regarding the future of the organization are taken here. The information flow is shown as:

Information flow:

Strategic Management Tactical Management Operational Management

There are 4 types of MIS

In this article, we will discuss 4 different types of management information systems.

1. Transaction Processing System

This is the type of management information system that deals with the data related to different financial related activities in an organization. Different processes occur in an organization that is related to different inflows and outflows of cash and the data of each transaction is kept in the system to promote accuracy and authenticity in the organization.

2. Management Information System

The management information system is managing and accessing data and to present it in the simple form. The data MIS provided you is the number of products sold. The data reported is in the simple form.

Example: Management Reporting Systems, Sales management System, Inventory control System

3. Decision Support System.

A decision support system is the use of data to make intelligent decisions. Information system software gives us the simple, more easily manageable and data in a more informative way to make intelligent decisions.

Example: Logistics Systems, Financial Planning Systems

4. Expert Systems and Artificial Intelligence.

An expert system is a software where the input variables are feed in the system where the input and output variables are also defined at the same time. One disadvantage of the expert system is that it works under a restricted environment, this means you will never get the result if you feed different input variables other than the specified one.

Artificial intelligence is the use of the software or application program to let the machine takes its own decision depending upon input/output fed to it. Example: Executive Information System

Experiment 3

Title: Case Study: Customer Relationship Management

Customer relationship management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle, with the goal of improving customer service relationships and assisting in customer retention and driving sales growth. CRM systems compile customer data across different channels, or points of contact between the customer and the company, which could include the company's website, telephone, live chat, direct mail, marketing materials and social media. CRM systems can also give customer-facing staff detailed information on customers' personal information, purchase history, buying preferences and concerns.

Components of CRM

At the most basic level, CRM software consolidates customer information and documents into a single CRM database so business users can more easily access and manage it.

Over time, many additional functions have been added to CRM systems to make them more useful. Some of these functions include recording various customer interactions over email, phone, social media or other channels; depending on system capabilities, automating various workflow automation processes, such as tasks, calendars and alerts; and giving managers the ability to track performance and productivity based on information logged within the system.

1. Marketing automation:

CRM tools with marketing automation capabilities can automate repetitive tasks to enhance marketing efforts at different points in the lifecycle. For example, as sales prospects come into the system, it might automatically send the prospects marketing materials, typically via email or social media, with the goal of turning a sales lead into a full-fledged customer.

Sales force automation: Sales force automation tools track customer interactions and automate certain business functions of the sales cycle that are necessary to follow leads and attract and obtain new customers.

2. Contact center automation:

Designed to reduce tedious aspects of a contact center agent's job, contact center automation might include prerecorded audio that assists in customer problem-solving and information dissemination. Various software tools that integrate with the agent's desktop tools can handle customer requests in order to cut down on the time of calls and to simplify customer service processes.

3. Geolocation technology, or location-based services:

Some CRM systems include technology that can create geographic marketing campaigns based on customers' physical locations, sometimes integrating with popular location-based GPS apps. Geolocation technology can also be used as a networking or contact management tool in order to find sales prospects based on a location.

4. Workflow automation:

CRM systems help businesses optimize processes by streamlining mundane workloads, enabling employees to focus on creative and more high-level tasks.

Case Study : AMAZON

Amazon uses CRM for:

1. Personal Data Storage
2. Customer Interaction
3. User Interface

Personal Data Storage

Most CRM systems will be processing massive amounts of data in their data warehouse every single day. Amazon's CRM, being no exception, is constantly gathering information through customers searching and browsing, data mining, their wish list and so on. Whatever you decide to buy - or not buy - you are providing the system with information, and this information is then analysed and used to tailor your experience on Amazon and their service accordingly.

If you want to buy something at Amazon, you will need to set up a personal account. It's through said account that Amazon can track your purchases and your browsing history. This information makes it easy for them to tailor marketing campaigns and email campaigns based on things you will probably like. What's more, you can store payment details and personal information in your private account, and this dramatically speeds up the checkout process the next time you make a purchase - anything you could possibly want is only a click away.

Anyone who uses Amazon regularly will notice that they are constantly suggesting products you might be interested in. Impressively enough, most of these suggestions tend to be quite accurate, and frequent customers will also appreciate their "customers who bought this item also bought" feature. Social proof is a powerful tactic which consistently boost sales for Amazon, the secret to this feature lies in their CRM system's ability to save data.

Customer Interaction

Your personal account on Amazon ensures that you rarely have to reach out to customer support. Update your card details? You can do that yourself. Cancel an order? You can do that too. In the rare cases where you do require to speak to customer support, you will find that it's dealt with quickly and efficiently as the CRM software allows them instant access to your information. In other words, Amazon is stress-free for both customers and its employees.

Another feature that makes Amazon so successful and trusted is the focus on peer reviews. Under every product, you can find a section where other buyers have reviewed the product you are looking into buying. All of these buyers are verified, and they are freely sharing the good, the bad and the ugly about a certain product. A recent article by Forbes reveals that 88% of consumers trust online reviews just as much as personal recommendations. In other words, if your online store is not offering user reviews, you are basically alienating 88% of your buying population. Arguably, while a bad review might stop someone from ordering that specific product, it will still contribute to and enhance your image as a trusted and honest retailer.

User Interface

If you are to only take one lesson from this case study, let it be the following: user interface is everything. Take a peek at Amazon, and you will find that their website is clean, streamlined, easy to understand, and easily searchable. The images are inspiring and high-quality, the descriptions are

detailed and accurate, the prices and reviews are plainly visible, everything is neatly organised into departments and categories, and the checkout process is clear as day.

In short, everything is intuitive;

As a matter of fact, shopping on Amazon is so easy that anyone can do it. And that's one of their biggest strengths as a company - accessibility for all. Their overall focus on customer experience, or "customer obsession" as they themselves call it, is one of the major reasons why they consistently outperform other online retailers. As the leading Retail Analyst at Barclays, Paul Vogel, puts it: "It's selection. It's service. It's convenience. It's how easy it is to use their interface. And Amazon's got all this stuff already. How do you compete with that? I don't know, man. It's really hard."

Amazon won by investing in a CRM system that can grow with their business. You see, Amazon is not just Amazon anymore, instead they have evolved into a provider of everything. Prime members will find a Prime Video selection that seriously challenges providers such as Netflix and HBO, their Alexa is a serious competitor on the AI market, and they're financial investors in up and coming tech firms. Not to mention that they're the world's largest provider of cloud infrastructure.

Experiment 4

Title: Study of different ERP modules

ERP can make a business more efficient than ever and also it can create an IT infrastructure for the business. ERP can take care of a lot of work for each section in a business. The structure of ERP for different departments is called modules of ERP or ERP modules.

Different types of Manufacturing ERP modules are:-

Material Management module

Management of materials is a tedious and difficult but necessary task in any manufacturing industry. As it ensures the availability of raw materials for production and also to ensure that these materials are not in abundance that can result in wastage which will be adverse for the organization. ERP can simplify things in this area. ERP does the following functions in material management:-

- Material Management process ensures that there is never a shortage of materials or any gaps in the supply chain process of the organization. ERP speeds up the procurement and material management activities making the business run smoother with complete time and cost efficiency.
- It deals with managing the materials (products and or services) resources of an organization with the aim of accelerating productivity, reducing costs and increase improvement and at a similar time be versatile to accommodate changes in day to day life.
- It deals with the Procurement Process, Master Data (Material & Vendor Master), Account Determination & Valuation of Material, Inventory Management, Invoice Verification, Material Requirement Planning etc.

Sales and Distribution module

In any business organization, sales are the department that generates revenue. No matter how good your manufacturing operation is, how cutting-edge your technology is, how tight your financial goals are or how progressive and forward-thinking your management techniques are, you must still have a sales mechanism in place, or everything else is useless. And with the rising competition in markets customer doesn't like to wait hence it is necessary that customer receives the product as fast as he could and hence leading to the importance of proper and early dispatch. This makes the management of sales and dispatches important in any organization. Following are the ways in which ERP can help in the management of these departments:-

- Clients' activities can be found out with the help of ERP, this can be used to create opportunities for sales, ERP can also be used for managing order fulfillment.
- Automation is the current trend in the market. It is used in every department to make processes easy. ERP is used for marketing automation, it provides the ability to generate qualified leads, streamline the sales process, manage multi-channel marketing campaigns, and collaboration between marketing and sales.

- Speed is one of the major factors on which organization depends upon. ERP can provide real-time information about the transactions which took place in the organization
- ERP has the ability to provide fully customizable dashboards providing up-to-the-minute information with the ability to drill down to underlying information.

Production module

This module is responsible for turning inputs into outputs through series of production processes. The quality and quantity of the product depend on this department, and hence future sales and success of any organization can be completely linked with this department. This is why proper functioning of production department with good efficiency is necessary. ERP can help increase the efficiency of production department in the following ways:-

- As manufacturers grow, their operations become more and more complex. ERP manufacturing software automates all business operations, providing accurate, real-time information. ERP increases efficiency and productivity by helping users navigate complex processes, preventing data re-entry, and improving functions such as production, order completion and delivery.
- With one source of accurate, real-time information, ERP software reduces administrative and operations costs. It allows manufacturers to proactively manage operations, prevents disruptions and delays, breaks up information logjams and helps users make decisions more quickly.
- ERP software now is flexible and configurable. They are not a one-size-fits-all proposition but can be tailored to the unique needs of a business. ERP systems also have the ability to adapt to the ever-changing needs of a growing business.

Finance and Accounting module

Without a proper flow of finance, industry will cease to exist. so it can be said that finance and accounting is one of the most important departments in any organization. Low efficiency in this department can cause an impediment to the flow of money hence leading to inconvenience in all the departments therefore proper functioning of this department is necessary for any organization. ERP helps in ensuring good efficiency in finance and accounting by following factors:-

- Determination of sales and profitability becomes painless due to this module. This module can also manage multiple accounts and supervise the collection of payment
- Multiple payment gateways can be used hence making online payment easy. Online payment is popularity is increasing every day now so this will help the business to not fall behind.
- ERP can provide bills online to the customers hence reducing the efforts of the customer and making doing business with the organization easy.
- The transaction with the customer in retail stores can be updated immediately in the software and thus eliminate the requirement for repetition of process hence saving time
- Financial modules of ERP provide a report of the organization finance and accounting in details. This can be used to determine the organization financial stability and if any changes are required.

Project Management module

The welfare of a project or how well an organization completes a project completely depends on project management. Project management is the discipline of initiating, planning, executing, controlling, and closing the work of a team to achieve specific goals and meet specific success criteria. Functions that ERP can do in project management are:-

- The data that is acquired from the project if not saved correctly can lose and this can give rise to many problems. ERP provides a single point for all the data entry of the project hence ending the worry of losing any data about the project.
- Any project cannot be completed by a single department in an organization, and due to the involvement of different departments efficient transfer of data is required. ERP provide this, it creates a single database hence making it easy to transfer data among different departments of an organization.
- Different data structures can create confusion between various departments hence leading to delay in operations etc. ERP provides standardization of data structure in an organization so as to avoid any confusion.
- ERP provides a consistent interface among all business function. This will lead to the understanding of the data from separate function easy.

HR and Payroll module

No matter how good automation becomes or how advanced the technology of the organization is humans will always be the most important part of the organization. Hence proper human resource is a must in any organization.

Compensating correctly and in time for the work done by people in any organization will keep them motivated to work their hardest without complaints. Hence a successful payroll system will benefit the employers as well as the employees in the organization.

ERP functions in HR and Payroll department are:-

- Because HR is a central function of any business, data related to HR needs to eventually be shared with other teams or departments. With ERP for HR, data is stored in a central location, or brought together to a central location, which means that data from different sources can be shared faster and easier. This also ensures that the right data is shared, thus enhancing overall outcomes and making it simpler for other teams to work together.
- HR systems usually involve data from various locations. This means that there is always a chance of duplicate or incorrect information. An ERP module can help ensure that the data is not only correct but also not duplicated, which can in turn speed up decision-making and enable better decisions to be made.
- A large function of HR, as with many other business processes, is data entry and reporting. An ERP module data will be more accessible. This simultaneously makes it easier to enter and pull data together into reports.
- HR and Payroll modules stores salary details as well as statutory details viz. PF, ESI, Gratuity etc. this makes storing details easy hence avoiding any confusion which can lead to delay in the salary of employees.
- It also keeps records of attendance and leaves records so if an employee is on unpaid leave His/her salary will be deducted fairly or if She/he is on a paid leave She/he will be compensated fairly.

Plant Maintenance Module

Maintenance in an industry is the most underappreciated necessary job, as without proper maintenance machines will lose their efficiency which will lead to deterioration in product quality leading to drop in sales which can lead to loss and even bankruptcy of the organization.

The uses of ERP in plant maintenance can be classified as:-

- ERP keeps a log according to the breakdown repair in a machine so as to verify when the machine will need maintenance again and if the parts are working as they should or not.
- ERP also keeps the record on the type of maintenance done on different machines. This can verify the effectiveness of a particular type of maintenance and if there is a need to change the process of maintaining a machine.
- ERP keeps details about the manpower required to operate a certain type of machine hence whenever there is a shortage of manpower or more than needed manpower is being used for a particular machine it can be known instantly hence making required adjustments.
- ERP keeps log on details of the spare part, if any, used in a machine. The efficiency of a machine before and after spare part can be measured to look at the efficiency of the spare part used.

Experiment 5

Title: Study of ERP Implementation Life Cycle

The 8 stages of ERP implementation life cycle

Implementing an ERP software reaps many benefits for a business, from streamlining your business operations to reducing your company costs, which makes an ERP system is a must every business should have.

Yet, ERP implementation is not one day or one week process, as the implementation comes with a set of 8 important steps. To help those who are considering investing in a quality ERP system, here we discuss the ERP implementation life cycle, so you can get a better idea about the process.

1. Selection of packages:

This is the very first stage of the ERP implementation life cycle, where the company has to select a good ERP package that suits your company and your business needs, with a proper research. When selecting an ERP system, degree of matching and customization it can provide your business and stability and future assistance of the software provider, are few things you should keep in mind for a successful ERP implementation.

2. Project Planning:

At this phase of the ERP life cycle, you should come up with a clear and realistic plan for the process. This includes scheduling timelines and deadlines for projects, identifying roles and assigning responsibilities for the ERP implementation process.

3. Analysis GAP:

Being one of the important and crucial steps in the ERP life cycle, GAP analysis is the analysis done to create a clear and complete model to identify the current state of the company and the direction it will head to in the future depending on the business goals of the company.

4. Re-engineering:

This is where the human factor of the business comes to spot light. The step involves many changes and alteration in the number of employees and job responsibilities which should be performed carefully as it directly affects the efficiency of the company.

5. Training:

To enhance the efficiency, having a group of employees who are well trained and familiar with the new system is essential which is why this step becomes important in the ERP implementation life cycle.

With the help of the software service provider, at this stage, the company should start training their employees for the ERP system who been selected after considering the following qualities; willingness to change, the ability to learn new thing quickly and accurately and familiarity with new technology.

6. Testing:

Testing is not an exception for a new system to run smoothly. Here the company will test real life extreme scenarios like user error detections, system overload, simultaneous multiple user log-ins, data security and more. This will help the company to identify errors, bugs and weak links before the implementation.

7. Application:

It is in this stage the ERP system's actual implementation happens. After the data conversion and data base work is over, the implementation of the new ERP system will be done and then, the old system will be removed.

8. Maintenance:

After implementation, maintenance is the last step of the ERP life cycle where the constant maintenance of the system involves. This is where the employees will learn to face and deal with system related problems while the system should be updated corresponding to the future updates of the software solution provider.

Experiment 6

Title: Study of Open Source ERP systems

There are a number of flexible, feature-rich, and cost-effective open source ERP systems out there. Here are nine to check out if you're in the market for such a system.

ADempiere

Like most other open source ERP solutions, ADempiere is targeted at small and midsize businesses. It's been around awhile—the project was formed in 2006 as a fork from the Compiere ERP software.

Its Italian name means to achieve or satisfy, and its "multidimensional" ERP features aim to help businesses satisfy a wide range of needs. It adds supply chain management (SCM) and customer relationship management (CRM) features to its ERP suite to help manage sales, purchasing, inventory, and accounting processes in one piece of software. Its latest release, v.3.9.0, updated its user interface, point-of-sale, HR, payroll, and other features.

As a multiplatform, Java-based cloud solution, ADempiere is accessible on Linux, Unix, Windows, MacOS, smartphones, and tablets. It is licensed under GPLv2. If you'd like to learn more, take its demo for a test run or access its source code on GitHub.

Apache OFBiz

Apache OFBiz's suite of related business tools is built on a common architecture that enables organizations to customize the ERP to their needs. As a result, it's best suited for midsize or large enterprises that have the internal development resources to adapt and integrate it within their existing IT and business processes.

OFBiz is a mature open source ERP system; its website says it's been a top-level Apache project for a decade. Modules are available for accounting, manufacturing, HR, inventory management, catalog management, CRM, and e-commerce. You can also try out its e-commerce web store and backend ERP applications on its demo page.

Apache OFBiz's source code can be found in the project's repository. It is written in Java and licensed under an Apache 2.0 license.

Dolibarr

Dolibarr offers end-to-end management for small and midsize businesses—from keeping track of invoices, contracts, inventory, orders, and payments to managing documents and supporting electronic point-of-sale system. It's all wrapped in a fairly clean interface.

If you're wondering what Dolibarr can't do, here's some documentation about that.

In addition to an online demo, Dolibarr also has an add-ons store where you can buy software that extends its features. You can check out its source code on GitHub; it's licensed under GPLv3 or any later version.

ERPNext

ERPNext is one of those classic open source projects; in fact, it was featured on Opensource.com way back in 2014. It was designed to scratch a particular itch, in this case replacing a creaky and expensive proprietary ERP implementation.

ERPNext was built for small and midsize businesses. It includes modules for accounting, managing inventory, sales, purchase, and project management. The applications that make up ERPNext are form-driven—you fill information in a set of fields and let the application do the rest. The whole suite is easy to use.

If you're interested, you can request a demo before taking the plunge and downloading it or buying a subscription to the hosted service.

Metasfresh

Metasfresh's name reflects its commitment to keeping its code "fresh." It's released weekly updates since late 2015, when its founders forked the code from the ADempiere project. Like ADempiere, it's an open source ERP based on Java targeted at the small and midsize business market. While it's a younger project than most of the other software described here, it's attracted some early, positive attention, such as being named a finalist for the Initiative Mittelstand "best of open source" IT innovation award.

Metasfresh is free when self-hosted or for one user via the cloud, or on a monthly subscription fee basis as a cloud-hosted solution for 1-100 users. Its source code is available under the GPLv2 license at GitHub and its cloud version is licensed under GPLv3.

Odoo

Odoo is an integrated suite of applications that includes modules for project management, billing, accounting, inventory management, manufacturing, and purchasing. Those modules can communicate with each other to efficiently and seamlessly exchange information.

While ERP can be complex, Odoo makes it friendlier with a simple, almost spartan interface. The interface is reminiscent of Google Drive, with just the functions you need visible. You can give Odoo a try before you decide to sign up.

Odoo is a web-based tool. Subscriptions to individual modules will set you back \$20 (USD) a month for each one. You can also download it or grab the source code from GitHub. It's licensed under LGPLv3.

Opentaps

Opentaps, one of the few open source ERP solutions designed for larger businesses, packs a lot of power and flexibility. This is no surprise because it's built on top of Apache OFBiz.

You get the expected set of modules that help you manage inventory, manufacturing, financials, and purchasing. You also get an analytics feature that helps you analyze all aspects of your business. You can use that information to better plan into the future. Opentaps also packs a powerful reporting function.

On top of that, you can buy add-ons and additional modules to enhance Opentaps' capabilities. They include integration with Amazon Marketplace Services and FedEx. Before you download Opentaps, give the online demo a try. It's licensed under GPLv3.

WebERP

WebERP is exactly as it sounds: An ERP system that operates through a web browser. The only other software you need is a PDF reader to view reports.

Specifically, its an accounting and business management solution geared toward wholesale, distribution, and manufacturing businesses. It also integrates with third-party business software, including a point-of-sale system for multi-branch retail management, an e-commerce module, and wiki software for building a business knowledge base. It's written in PHP and aims to be a low-footprint, efficient, fast, and platform-independent system that's easy for general business users.

WebERP is actively being developed and has an active forum, where you can ask questions or learn more about using the application. You can also try a demo or download the source code (licensed under GPLv2) on GitHub.

xTuple PostBooks

If your manufacturing, distribution, or e-commerce business has outgrown its small business roots and is looking for an ERP to grow with you, you may want to check out xTuple PostBooks. It's a comprehensive solution built around its core ERP, accounting, and CRM features that adds inventory, distribution, purchasing, and vendor reporting capabilities.

xTuple is available under the Common Public Attribution License (CPAL), and the project welcomes developers to fork it to create other business software for inventory-based manufacturers. Its web app core is written in JavaScript, and its source code can be found on GitHub. To see if it's right for you, register for a free demo on xTuple's website.

Experiment 7

Title: Case Study On Integrated Enterprise Application

Enterprise application integration (EAI) is the use of technology and services to enable the integration of business processes, workflows, and databases across all of an organization's systems. Especially where older, legacy systems are responsible for some business roles and newer applications handle others, it is imperative for organizations to find solutions that enable all of their existing enterprise applications to communicate and share data.

A business may use enterprise application integration services to create a middleware framework to help them better integrate vital systems, such as customer relationship management (CRM), business intelligence (BI) applications, supply chain management (SCM), payroll, and enterprise resource planning (ERP).

Examples of enterprise application integration

application integration is usually applied when a new application connects with an old one, or when a new software application is used to replace an outdated one. For example, if you need to connect a new price quoting software application with an older CRM application, middleware software can be used to help you consolidate your systems. With today's businesses utilizing dozens of applications, applying effective application integration is essential for seamless workflows.

In its simplest and most practical form, enterprise application integration is designed to improve the connectivity of applications within an enterprise. For example, Sapho Employee Experience Portal surfaces the most relevant tasks and data from across all your existing business system, breaking down data silos and ensuring employees have access to everything they need for work—anytime, anywhere, and on any device. This can lead to smoother workflows, lower overheads, increased productivity, as well as other tangible benefits like employee job satisfaction.

EAI is a collection of processes, software and hardware tools, methodologies, and technologies. When implemented together, they have the aim of consolidating, connecting, and organizing all the businesses computer applications, data, and business processes (both legacy and new) into a seamlessly interfaced framework of system components that allow real-time exchange, management, and easy reformulation of the company's mission-critical information and knowledge. It is an unrestricted sharing of data throughout the networked applications or data sources in an enterprise.

When designing an Enterprise Application Integration (EAI) solution, it is important to recognize that there are different levels of integration, each with its own requirements and considerations. Successful implementation of consistent, scalable, reliable, incremental, cost-effective EAI solutions depends on the standards and methodologies that we define for these levels. It must be determined how we need to share information:

1. Within an application
2. Between applications within an enterprise
3. Between enterprises
4. Directly with customers

Experiment 8

Title: Case Study :Sap

SAP stands for Systems Applications and Products in Data Processing.

SAP, by definition, is also name of the ERP (Enterprise Resource Planning) software as well the name of the company.

SAP Software was Founded in 1972 by Wellenreuther, Hopp, Hector, Plattner, and Tschira.

SAP system consists of a number of fully integrated modules, which covers virtually every aspect of business management.

SAP Case Study Example

Case study:Sales and Distribution

Sales and Distribution

A.1.Organization

A.1.1 Sales Organization

Business in the Philippines is divided into two sales organizations, one for the ABC Motors International and one for AMI Marketing. Each sales organization is responsible for negotiation and fixing of conditions and characteristics of business transactions.

A.1.2 Distribution Channels

Both the ABC Motors International and AMI Marketing sales organizations use two distribution channels through which to sell their goods:

Wholesale trade
Retail trade

A.1.3 Divisions

The products of ABC Motors International are divided into three groups. All product lines can be sold through both distribution channels by both sales organizations.

Street motorcycles
Motorcross motorcycles
Accessories

A.1.4 Sales Offices

It has been decided to use sales offices to differentiate the sales made by the various regions. This will allow easy reporting of business volume by office. The following sales offices must be defined:

1. Laguna
2. Cebu

There is no freight charge or profit, thus there is no accounting implication re transfer of stock between distribution points.

A.1.5 Distribution Centers

As discussed earlier, Laguna is responsible for all manufacturing. The other locations Cebu, do not manufacture any products.

Inventory at the Cebu distribution center is replenished through plant transfers that result from sales forecasts. There is no accounting implication since ABC Motors International owns both locations.

The Marketing Company (AMI Marketing) purchases inventory in Cebu from ABC Motors International according to annual agreement. This agreement is in the form of a scheduling agreement, which outlines quantities and dates.

ABC Motors International serves as a vendor for AMI Marketing, and AMI Marketing is defined as a customer of ABC Motors International. Therefore a scheduling agreement is created by ABC Motors International for the delivery schedule of their customer AMI Marketing. The lines in the scheduling agreement appear as demand in the Laguna distribution center.

A.1.6 Shipping Points

Each plant has two shipping points that are responsible for the processing deliveries. For normal delivery there is a shipping point which processes the bulk of the deliveries. In addition ABC Motors International offers its customers an express delivery options using Guaranteed Overnight Delivery (G.O.D) which guarantees delivery in one day anywhere in North America. This shipping point represents a special shipping area reserved for express deliveries.

Shipping point	Description
R001	Laguna Regular delivery
REXP	Laguna Express delivery
C001	Cebu Regular delivery
CEXP	Cebu Express delivery

A.2 Functions

A.2.1 Pricing

Pricing used during order entry and invoicing is the responsibility of each sales organization. Therefore any material pricing, discounts and surcharges can vary depending on the sales organization. It has been decided that each sales organization is to have a separate pricing procedure to reflect its own pricing policy. Therefore certain condition types procedure used for Canadian customers.

Furthermore, the distribution channel also influences pricing. A special discount is to be defined for wholesale customers, which reduces the gross price of the product. It has been decided that the price group field in the customer master will be used to determine if a wholesale discount applies. It would be possible to simply make the discount dependent on the distribution channel alone, but the use of the price group field was decided upon since it allowed for multiple discount rates based different price groups.

The following conditions apply to pricing at ABC Motors International:

A basic material price is established for each sales organization scaled by quantity.

Customer –specific material prices are possible. At 25%discount applies for wholesale customer orders. Pricing determined at order entry is firm and is not re-determined at billing time

The value of discount based on the terms of payment used should appear in the pricing details for an item.

Material cost should also be included in item pricing details along with the computed Gross profit margin.

An addition freight charge should be included in the item in the case of express delivery. The amount is dependent on the weight of the goods shipped and is triggered by a special Incoterms that you enter in the sales document for express delivery.

A.2.2 Availability checks and Transfer of Requirements

Both ABC Motors International and AMI Marketing., would like to track each requirement generated by a sales order separately. This means that individual requirements will be passed for the materials. The alternative would be to accumulate demand into collective requirements for a day or a week but then the details of the source of the requirements is not available.

A.2.3 Shipping

The data required for shipping should be defaulted as much as possible by the system. Areas where this determination is to be automated included shipping point, and picking location determination.

A.2.3.1 Shipping points

The shipping point is specified for every order item. In the determination tables, one shipping point is specified as default and others can be specified as alternates. The default shipping point is influenced by the shipping condition from the customer master, loading group from the material, and delivery plant. Ensure that two shipping conditions, one for regular and one for express delivery are defined as well as the related determination table. A single group can be used since all materials are located onto trucks using a forklift.

The shipping point should be determined as follows:

Delivering plant	Shipping Condition	Loading Group	Shipping point
Laguna	01	002	ROO1
Laguna	EX	001	REXP
Cebu 01	001		C001
Cebu EX	001		CEXP

A.3 Additional Sales Information

Configure the system to satisfy the following requirements:

Use the standard order type available in the system to process regular customer orders. ABC Motors International does not require specialized orders.

ABC Motors International has decided that in addition to the standard order type, credit and debit requests as well as the return order type will be used. Configure the system so that these document types are available at order entry but no others, e.g. Consignment order types.

It has also been decided that the business terms in the sales document header are valid for all items and cannot be changed at the item level.

The only partner function that can be different between items in a sales order is the ship-to-party.

An incompleteness procedure based on the standard procedure is to be used for order entry. However, do not include the purchase order number in the list of fields to be checked. Also issue a warning message if weights and volumes are missing.

Input facilities must be used in order to facilitate fast and efficient order entry by defining a product proposal.

A.4 Additional shipping Information

The shipping must be processed optimally and quickly. The shipping team has decided the standard functionality is adequate and that the standard delivery document type will be used for sales orders.

Due to the volume of deliveries expected, the creation of the delivery documents will be done daily using collective processing. The exception to this rule is the case of an order where the customer has requested the express delivery option. For express delivery, the delivery document will be created separately for the individual order.

Warehouse management will not be incorporated since the warehousing structure is not complex. However, the storage location for picking should be proposed in the delivery document.

A.5 Additional Billing Information

Consider the following billing related requirements:

A standard invoice related to a delivery is to be used. Customers normally receive individual invoices for each delivery. However, it has been decided that billing schedules will be supported for customers who request it. Initially a bi-weekly calendar will be defined to consolidate all deliveries into a billing date falling on the Friday of 2nd and 4th week of every month.

The accounting department maintains customer credit limits. The credit control area is the organizational unit, which sets the credit limit for customers and controls it. A credit control area at ABC Motors International contains only one company code. For every sales document (order type etc) it can be determined, whether a credit limit check is warranted.

Experiment 9

Title: Case Study:Microsoft Dynamics

Microsoft Dynamics CRM is a customer relationship management software package developed by Microsoft focused on enhancing the customer relationship for any organization. Out of the box, the product focuses mainly on Sales, Marketing, and Customer Service sectors, though Microsoft has been marketing Dynamics CRM as an XRM platform and has been encouraging partners to use its proprietary (.NET based) framework to customize it. In recent years, it has also grown as an Analytics platform driven by CRM.

The CRM Solution can be used to drive the sales productivity and marketing effectiveness for an organization, handle the complete customer support chain, and provide social insights, business intelligence, and a lot of other out-of-the-box functionalities and features. As a product, Microsoft Dynamics CRM also offers full mobile support for using CRM apps on mobiles and tablets.

As of writing this tutorial, the latest version of CRM is CRM 2016. However, in this tutorial we will be using CRM 2015 Online version as it is the latest stable version as well as frequently used in many organizations. Nevertheless, even if you are using any other versions of CRM, all the concepts in the tutorial will still hold true.

Example

RSM technology solutions help food bank better achieve its mission

Overview

Philabundance is the Delaware Valley's largest food bank, serving five counties in Pennsylvania and four counties in Southern New Jersey. Its mission is to drive hunger from our communities today and end hunger forever. Philabundance serves more than 90,000 people a week through a network of approximately 350 agencies, as well as through direct distribution programs and the nation's only nonprofit grocery store of its kind. Philabundance has nearly 17,000 volunteers who save the organization \$1.5 million a year which it puts back into serving the community.

Background

A number of Philabundance employees were manually tracking and managing member, donation and volunteer information with Microsoft Excel. Unfortunately, this led to problems with business processes, consistency and the up- and downstream impact of processes with other departments. Philabundance's goal was to develop a solution to efficiently manage the three areas while incorporating process flow for transparency across the organization, while at the same time giving the community's families a better shopping experience and more control over their choices.

Project

Philabundance and RSM have a long, successful relationship that goes beyond the typical connection between a consultant and a client. RSM has close involvement with the organization, providing strategic support to help enhance and support its mission. Ongoing conversations help RSM understand challenges and develop solutions, allowing Philabundance to be more proactive with information technology (IT) infrastructure and software decisions.

To help Philabundance address its data issues, RSM's technology and management consulting practice developed a tool on the Microsoft Dynamics CRM platform to manage member, donation and volunteer information. In addition, our infrastructure team helped implement best practices for

connectivity, emergency planning and vendor management, and serves as an overall advisor to their IT team as well.

RSM designed a member management tool to be utilized in a unique nonprofit grocery store run by Philabundance so the community's families, many of whom fall below the poverty line, could shop with their access cards during their scheduled donation periods. This solution kept track of the shoppers' shopping blocks, which are times in which the shoppers can receive free food from the store. At other times, outside the shoppers' designated times, they are charged for their food. Dynamics CRM managed the access, member information and coordination of acceptable shopping periods by groups.

"As is the case with nonprofits, strategic planning for IT expenditures was based on a variety of funding sources, so working with a strategic partner who understands the organization's goals and tight budget is key," said Ed Wong, Deputy Director of IT and management information systems (MIS). "Our relationship is a strategic partnership. In addition to the project work, we are having broader conversations about strategic objectives and how we can achieve our long-term business goals."

Outcomes

RSM's Dynamics CRM development and IT infrastructure solutions have helped Philabundance increase insight into data, as well as improve network accessibility and reliability. The RSM and Philabundance teams have worked together to enhance service offerings and help better achieve the organization's mission.

Additional benefits Philabundance has realized through its relationship with RSM include:

- Moving from siloed systems to a more dynamic environment with all departments connected for full transparency of process

- Leveraging Dynamics CRM as a platform to develop member, donation and volunteer management solutions

- Utilizing RSM resources, with experienced advisors helping guide the organization in all areas of technology