



UNIT 1: INTRODUCTION TO ENTERPRISE RESOURCE PLANNING

Information System & Its Components:

Information system is an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products.

Business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers, and compete in the marketplace.

Information systems are used to run inter-organizational supply chains and electronic markets.

For instance, corporations use information systems to process financial accounts, to manage their human resources, and to reach their potential customers with online promotions.

Many major companies are built entirely around information systems.

Components of information system	Definitions
Data	Input the system takes to produce information
Hardware	A computer and its peripheral equipment: input, output and storage devices; hardware also includes data communication equipment
Software	Sets of instructions that tell the computer how to take data in, how to process it, how to display information, and how to store data and information
Telecommunications	Hardware and software that facilitates fast transmission and reception of text, pictures, sound, and animation in the form of electronic data
People	Information systems professionals and users who analyses organizational information needs, design and construct information systems, write computer programs, operate the hardware, and maintain software
Procedures	Rules for achieving optimal and secure operations in data processing; procedures include priorities in dispensing software applications and security measures



- “An Information system (IS) is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data.”^[1]
- “Information systems are combinations of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational settings.”
- “Information systems are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.
- As you can see, these definitions focus on two different ways of describing information systems: the *components* that make up an information system and the *role* that those components play in an organization. Let’s take a look at each of these.

The Components of Information Systems:

- Hardware,
- Software,
- Data,
- People, and
- Process

1. Hardware

Information systems hardware is the part of an information system you can touch – the physical components of the technology. Computers, keyboards, disk drives, iPads, and flash drives are all examples of information systems hardware.

2. Software

Software is a set of instructions that tells the hardware what to do. Software is not tangible – it cannot be touched.

When programmers create software programs, what they are really doing is simply typing out lists of instructions that tell the hardware what to do.

There are several categories of software, with the two main categories being **operating-system software**, which makes the hardware usable, and **application software**, which does something useful.

Examples of operating systems include Microsoft Windows on a personal computer and Google's Android on a mobile phone.



3. Data

The third component is data. You can think of data as a collection of facts. For example, your street address, the city you live in, and your phone number are all pieces of data. Like software, data is also intangible.

4. People

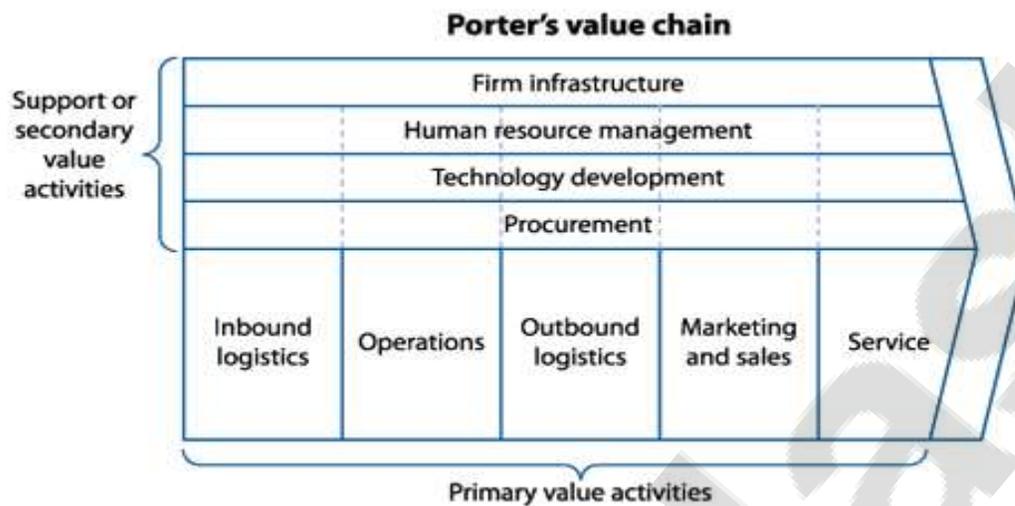
The people involved with information systems are an essential element. Qualified people are a vital component of any information system. Technical personnel include development and operations managers, business analysts, systems analysts and designers, database administrators, programmers, computer security specialists, and computer operators. In addition, all workers in an organization must be trained to utilize the capabilities of information systems as fully as possible. Billions of people around the world are learning about information systems as they use the Web.

5. Process

The last component of information systems is process. A process is a series of steps undertaken to achieve a desired outcome or goal. Information systems are becoming more and more integrated with organizational processes, bringing more productivity and better control to those processes.



Porters Value Chain Framework



The idea of the value chain is based on the process view of organizations, the idea of seeing a manufacturing (or service) organization as a system, made up of subsystems each with inputs, transformation processes and outputs.

Inputs, transformation processes, and outputs involve the acquisition and consumption of resources - money, labor, materials, equipment, buildings, land, administration and management. How value chain activities are carried out determines costs and affects profits.

Most organizations engage in hundreds, even thousands, of activities in the process of converting inputs to outputs. These activities (Value) can be classified generally as either primary or support activities that all businesses must undertake in some form.

According to Porter (1985),

The primary activities are:

1. **Inbound Logistics** - involve relationships with suppliers and include all the activities required to receive, store, and disseminate inputs.
2. **Operations** - are all the activities required to transform inputs into outputs (products and services).
3. **Outbound Logistics** - include all the activities required to collect, store, and distribute the output.
4. **Marketing and Sales** - activities inform buyers about products and services, induce buyers to purchase them, and facilitate their purchase.



5. **Service** - includes all the activities required to keep the product or service working effectively for the buyer after it is sold and delivered.

Secondary activities are:

1. **Procurement** - is the acquisition of inputs, or resources, for the firm.
2. **Human Resource management** - consists of all activities involved in recruiting, hiring, training, developing, compensating and (if necessary) dismissing or laying off personnel.
3. **Technological Development** - pertains to the equipment, hardware, software, procedures and technical knowledge brought to bear in the firm's transformation of inputs into outputs.
4. **Infrastructure** - serves the company's needs and ties its various parts together, it consists of functions or departments such as accounting, legal, finance, planning, public affairs, government relations, quality assurance and general management

Evolution of ERP systems

ERP (Enterprise Resource Planning) is the evolution of Manufacturing Requirements Planning (MRP) II.

From business perspective, ERP has expanded from coordination of manufacturing processes to the integration of enterprise-wide backend processes.

From technological aspect, ERP has evolved from legacy implementation to more flexible tiered client-server architecture.

The following table summarizes the evolution of ERP from 1960s to 1990s.



2000s	Extended ERP
1990s	Enterprise Resource Planning (ERP)
1980s	Manufacturing Resources Planning (MRP II)
1970s	Material Requirement Planning (MRP)
1960s	Inventory Control (IC) Packages



1960s: Inventory Management & Control

- Inventory Management and control is the combination of information technology and business processes of maintaining the appropriate level of stock in a warehouse.
- The activities of inventory management include :
 - Identifying inventory requirements,
 - Setting targets,
 - Providing replenishment techniques and options,
 - Monitoring item usages,
 - Reconciling the inventory balances, and
 - Reporting inventory status.

1970s: Material Requirement Planning (MRP)

- Materials Requirement Planning (MRP) utilizes software applications for scheduling production processes.
- MRP generates schedules for the operations and raw material purchases based on :
 - The production requirements of finished goods,
 - The structure of the production system,
 - The current inventories levels and the lot sizing procedure for each operation.

1980s: Manufacturing Requirements Planning (MRP II)

- Manufacturing Requirements Planning or MRP utilizes software applications for coordinating manufacturing processes, from product planning, parts purchasing, inventory control to product distribution.

1990s: Enterprise Resource Planning (ERP)

- Enterprise Resource Planning or ERP uses multi-module application software for improving the performance of the internal business processes.
- An ERP system often integrates business activities across functional departments, from product planning, parts purchasing, inventory control, product distribution, fulfillment, to order tracking.
- ERP software systems may include application modules for supporting **marketing, finance, accounting and human resources.**



Role of ERP:-

What is ERP and How Does it Work?



- Enterprise Resource Planning (ERP) is a business process management software.
- This is used by an organization to manage the office and automate the business functions. These system make the data easily accessible and more usable in terms or organization of files.
- This allows accurate planning by the company and have result oriented approach.
- The company can also schedule the daily activities with the help of ERP software solutions. It also helps in managing the finances well.
- ERP software plays a very crucial role in the development of a company.
- ERP solutions also help in managing the records of the employees and allow the employer to plan the growth accordingly.
- This also allows the company to have fluent communication with the clients.



- It is a very cost effective system and the benefits are always greater than investment. This helps in long-term planning and management.
- This eliminates the need of multiple management software. It helps to integrate the interaction between marketing, sales, quality control, product processes, supply lines, stocks, human resource module, customer relationship management, information technology, and many other functions in a single database.
- It reduces the chances of typing errors and re-entry.
- Enables the company to use single software and maintain one database for the whole company.

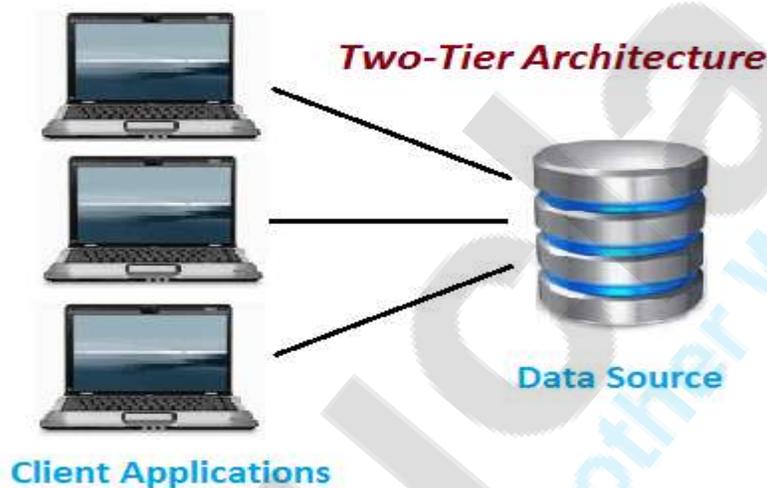
ERP software-why is Important for Business?

- ERP tools help in managing accounts, employee records and internal and external factor affecting the company.
- It reduces cost in the long term by increasing the productivity.
- Reduces the time and effort of managing records as compared to the paper records.
- The merger of financial and operational information allows the company to analyse the business needs and act in a more effective manner.
- By combining all the records in one whole, ERP makes the management of data easier and more productive.
- Apart from records, ERP also helps in the management of material and ensures that no material is lost or stolen. It would also automate the process of buying and maintaining material after analyzing the stock.
- Helps the company to predict market trends and decide the course of action accordingly.
- Allows the company to expand business using the internet.

Architecture of ERP:

1. Two-Tier Architecture:

- The two-tier is based on Client Server architecture.
- The two-tier architecture is like client server application.
- The direct communication takes place between client and server.
- There is no intermediate between client and server.
- Because of tight coupling a 2 tiered application will run faster.



The above figure shows the architecture of two-tier. Here the direct communication between client and server, there is no intermediate between client and server.

Let's take a look of real life example of Railway Reservation two-tier architecture:

Let's consider that first Person is making Railway Reservation for Mumbai to Delhi by Mumbai Express at Counter No. 1 and at same time second Person is also try to make Railway reservation of Mumbai to Delhi from Counter No. 2

If staff from Counter No. 1 is searching for availability into system & at the same staff from Counter No. 2 is also looking for availability of ticket for same day then in this case there is might be good change of confusion and chaos occurs. There might be chance of lock the Railway reservation that reserves the first.

But reservations can be making anywhere from the India, then how it is handled?



So here if there is difference of micro seconds for making reservation by staff from Counter No. 1 & 2 then second request is added into queue. So in this case the Staff is entering data to Client Application and reservation request is sent to the database. The database sends back the information/data to the client.

In this application the Staff user is an end user who is using Railway reservation application software. He gives inputs to the application software and it sends requests to Server. So here both Database and Server are incorporated with each other, so this technology is called as "**Client-Server Technology**".

The Two-tier architecture is divided into two parts:

- 1) **Client Application (Client Tier)**
- 2) **Database (Data Tier)**

On client application side the code is written for saving the data in the SQL server database. Client sends the request to server and it process the request & send back with data. The main problem of two tier architecture is the server cannot respond multiple request same time, as a result it cause a data integrity issue.

Advantages:

1. Easy to maintain and modification is bit easy
2. Communication is faster

Disadvantages:

1. In two tier architecture application performance will be degrade upon increasing the users.
2. Cost-ineffective

2. Three-Tier Architecture:

Three-tier architecture typically comprises a presentation tier, a business or data access tier, and a data tier. Three layers in the three tier architecture are as follows:

- 1) **Client layer**
- 2) **Business layer**
- 3) **Data layer**



1) Client layer:

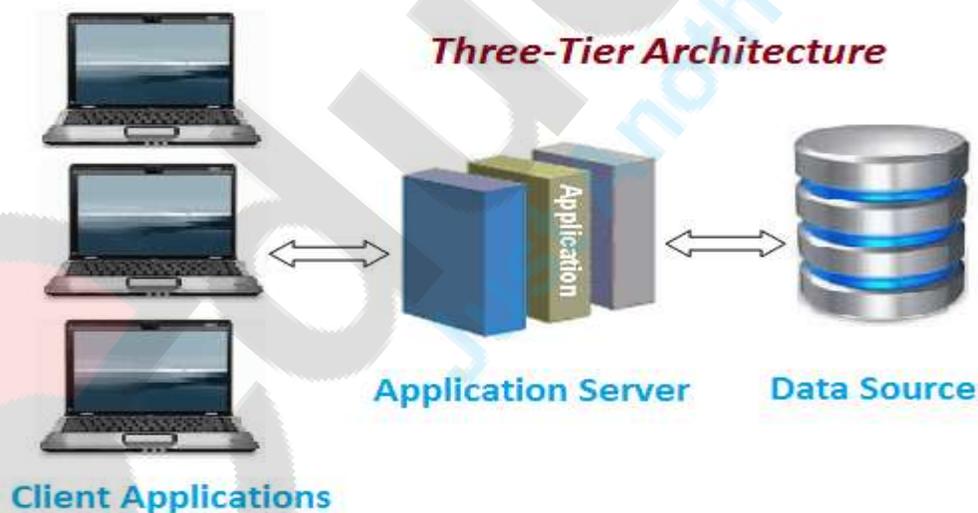
- It is also called as *Presentation layer* which contains UI part of our application.
- This layer is used for the design purpose where data is presented to the user or input is taken from the user.
- For example designing registration form which contains text box, label, button etc.

2) Business layer:

- In this layer all business logic written like validation of data, calculations, data insertion etc.
- This acts as an interface between Client layer and Data Access Layer.
- This layer is also called the intermediary layer helps to make communication faster between client and data layer.

3) Data layer:

- In this layer actual database is comes in the picture.
- Data Access Layer contains methods to connect with database and to perform insert, update, delete, get data from database based on our input data.



Advantages

1. High performance, lightweight persistent objects
2. Scalability – Each tier can scale horizontally
3. Performance – Because the Presentation tier can cache requests, network utilization is minimized, and the load is reduced on the Application and Data tiers.



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4. High degree of flexibility in deployment platform and configuration
5. Better Re-use
6. Improve Data Integrity
7. Improved Security – Client is not direct access to database.
8. Easy to maintain and modification is bit easy, won't affect other modules
9. In three tier architecture application performance is good.

Disadvantages

1. Increase Complexity/Effort



All ERP packages contain many modules. The number and features of the modules vary with the ERP packages. Some of the most common modules available in almost all packages are:

- Finance
- Plant Maintenance
- Quality Management
- Material Management,
- Inventory Management
- Manufacturing and production planning
- Sales and distribution

FINANCE MODULE

- The entire concept of information technology is based on the premise that providing the right information, to the right people, at the right time can make a critical difference to the organization.
- Much of this key information could be taken from the financial data. But merely having the financial data is not enough.
- You need a set of processes and views of your data that provided up-to-the minute financial information in exactly the form you need it to make that critical difference and help with that critical decision.
- Accounting software needs access to information in each area of organization, from R & D and market research through manufacturing, distribution and sales. Financial solution must provide the management with information that can be leveraged for strategic decisions, in order to achieve comprehensive advantage.
- This section provides an overview of the financial solutions in most the ERP packages. In today's business enterprise, you need to know that your financial decisions are based on today's data, not numbers from records closed a month ago, or even a week ago.
- And you need to know that this same 'today's' data represents every segment of your organization's activities, whether your enterprise stretches across a room or around the globe. This is essential, because the most efficient way to get our enterprise to where you want it tomorrow is to know exactly where it is today.



- Whatever be the financial goals of the organization, the financial application components of the ERP solutions work hand-in-hand to improve the bottom line.
- This is true because the financial functioning is tightly integrated across all business area sand all geographic areas. This tight integration includes all the other different modules, from materials management to human recourses to logistics.
- The Finance modules of the most ERP systems provide financial functionality and analysis support to thousands of businesses in many countries across the globe. These ERP systems include not only financial application components, but also Human resources, Logistics, Business workflow and links to the internet.

The finance modules of most ERP systems will have the following subsystems:

1. Financial Accounting:

- General Ledger
- Accounts Receivable/Payable
- Special Receivable/Payable
- Legal Consolidation

2. Investment Management:

- Investment Planning
- Budgeting
- Controlling
- Depreciation Forecast
- Simulation
- Calculation

3. Controlling

- Overhead Cost Controlling
- Activity-Based Costing
- Product Cost Accounting
- Profitability Analysis

4. Treasury Module



Financial Accounting:

The objective of a good financial accounting system is to provide companywide control and integration of financial information that is essential to strategic decision –making. The financial accounting module of an ERP system, gives you the ability to centrally track financial accounting data within an international frame work of multiple companies, languages, currencies and charts of accounts.

1) General ledger

- The General ledger (GL) is essential both to the financial accounting system and to strategic decision-making.
- Through active integration with business processes in logistics and in the accounting sub-ledgers, the GL serves as a central pool of financial data for financial reporting as well as for other accounting areas.
- The general ledger supports all the function needed in a financial accounting system.

2) Accounts receivable and payable:

- ERP system offers financial overviews of global business partner relationships in the Accounts, Receivable and Payable functions.
- These sub-ledgers are integrated, both with the general ledger with the areas in sales and distribution and Materials Management, where financial data originates.
- Accounts Receivable and payable transactions are performed automatically when related processes take place in other modules.

3) Special Ledgers, Fixed Asset Accounting

- Asset Accounting, manages the company's fixed assets.
- Within the Financial Accounting system, Asset Accounting serves as a sub-ledger to the General Ledger, providing detailed information on asset- related transactions.

4) Legal Consolidation

- Consolidated financial statements need to be integrated effectively with operational data at the individual company level.
- By using different valuation methods, you can plan balance sheet strategies to suit the company's requirements.



Investment Management

- Investment Management provides extensive support for investment processes right from planning through settlement.
- Investment management facilitates investment planning and budgeting at a level higher than that needed for specific orders or projects.
- You can define an investment program hierarchy using any criteria-for example, department-wise.
- Investment program allows you to distribute budgets, which are used during the capital spending process.
- The system helps you monitor, and thereby avoid, budget overruns.
- Investment Management provides tools, enabling you to plan and manage your capital spending projects right from the earliest stage Investment Management module recognizes the importance of the asset accounting aspects of investment measures.
- The system automatically separates costs requiring capitalization from costs that are not capitalized, debiting the correct costs to the asset under construction.
- Asset accounting provides precise proof of origin for all transactions affecting acquisition and production costs.

Controlling

The controlling system gathers the functions required for effective internal cost accounting. It offers a versatile information system, with standard reports and analysis paths for the most common questions. In addition, there are features for creating custom reports to supplement standard reports.

1) Overhead Cost Controlling

- Many organizations experience a significant increase in the percentage of indirect costs, which cannot be directly assigned to either the products manufactured, or to the services rendered.
- The Overhead Cost Controlling subsystem focuses on the monitoring and allocation of overheads

2) Cost Centre Accounting

- Cost Centre accounting analyses where overheads occur within the organization.
- Costs areas signed to the sub-areas of the organization where they originated.
- They system offers a wide variety of methods for allocating posted amounts and qualities.



3) Overhead Orders

- Overhead orders subsystem collects and analyses costs, based on individual internal measures.
- This system can monitor and automatically check budgets assigned to each measure.

4) Activity- Based Costing

- The goals of the entire organization should come before the goals of individual departments, when it comes to business process reengineering.
- The Activity- Based Costing module is a response to the growing need for monitoring and controlling cross-department business process, in addition to functions and products.

5) Product Cost Controlling

- Product Cost controlling module determines, the costs arising from manufacturing a product, or providing a service.
- Plan and standard values, serves in valuating warehouse stock and for contrasting revenues received with costs.
- In addition, the values in product Cost Controlling are crucial for determining the lowest price limit for which a product is profitable.

6) Cost Object Controlling

- It helps to monitor manufacturing orders.
- Integration with the logistics components results in a logistical quantity flow that provides instant information on actual cost object costs, allowing ongoing costing calculations at any time.

7) Profitability Analysis

- It examines the sources of returns. As part of sales controlling.
- Profitability Analysis is the last step in cost-based settlement, where revenues are assigned to costs according to the market segment.
- This subsystem can help defining any market segment-distinguishing, for example between products, customers, orders, sales organizations, distribution channels and business areas- and evaluate it, according to contribution and revenue margins.



Treasury Module

Company can gain significant competitive advantage by efficiently managing the short, medium, and long-term payment flows and the resulting risk exposure.

Tasks such as short-term monitoring and concentration of bank account balances, medium-term planning, and forecasting of incoming and outgoing resources in accounts receivable and payable, to a long-term view of areas such as materials management and sales, underline the importance of integrating information from various company divisions.

Linking these operating divisions to realized and planned financial transactions and positions in Treasury, has a significant impact on the company's success.

Such integration also facilitates management and control of cash flows, and risk positions through all the divisions in the company.

The treasury components provide you with a basis for effective liquidity, portfolio and risk management.

1) Cash Management

- The Cash Management subsystem allows you to analyze financial transactions for a given period.
- Cash Management also identifies, and records future developments for the purpose of financial budgeting.
- The company's payment transactions are grouped into cash holdings, cash inflows and cash outflows.
- The Cash Management provides information on the sources and uses of funds to secure liquidity in order to meet payment obligations when they become due.
- The Cash Management also monitors and controls incoming and outgoing payment flows, and supplies the data required for managing short term money market investments and borrowing.
- Depending on the time period under review, a distinction is made between cash position, short-term cash management and medium and long-term financial budgeting.
- The Cash Management component thus ensures that all information relevant to liquidity is available to you for analysis, creating a basis for the necessary cash management decisions.

2) Treasury Management

- Treasury Management component offers functions for managing financial deals and positions, from trading to transferring data to Financial Accounting.
- Treasury Management also supports flexible reporting and evaluation structures for analyzing financial deals, positions and portfolios.



- For short-term liquidity and risk management, you can use the money market, or to eliminate currency risks.
- By using common organizational elements throughout, various organizational structures can be represented in the system, such as a central enterprise-wide treasury department or 'in-house banks'.
- This also ensures full integration of Treasury into other modules of the system.

3) Market Risk Management

- Market Risk Management plays vital role within Treasury, in ensuring company's competitiveness.
- Market Risk Management involves a complex feedback loop encompassing data collection, risk management, analysis and simulation as well as active planning of financial instruments.
- Market Risk Management acts as an integrated central risk control station with monitoring and management functions.
- Access to information on current and future cash flows and on financial deals already processed, is an absolute must. As a result, Cash management, which pools all cash flows from the business sectors, such as sales and distribution or purchasing, forms the basis.
- Consequently, all cash flows from the company's operating business can be accessed for the purposes of risk management.
- Furthermore, all financial transactions managed in Treasury management can be evaluated together with the cash flows generated by the various operating divisions.
- The Market Risk Management component provides various measurements for analyzing and assessing interest rate and currency risks.
- Market-to-market, effective rate and effective yield calculations are based on up-to-the minute market data, uploaded via data feed, and financial transactions or position.

4) Funds Management

- Funds Management system enables you to control various funds commitments and determine how much of the budget has already been utilized via availability checking.
- The information system can supply with information at any time, on when, where, and how funds commitments arose. Analyses by responsibility area and commitment items allow identifying any budget bottlenecks.



5) Enterprise Controlling

- Enterprise Controlling comprises of those functions that will optimize shareholder value, while meeting internal objectives for growth and investment.
- This module usually includes executive Information System, Business planning and Budgeting, Consolidation, and profit Centre Accounting.

6) Executive Information System

- The Executive Information System provides an overview of the critical information necessary to manage the organization.
- This component integrates data from other ERP components, and non-ERP data sources both inside and outside the enterprise.
- Business planning and budgeting. Business planning and budgeting supports the management teams of business units and groups in the calculations of business targets, such as ROI.
- This module also supports central investment planning, budget release and tracking.
- This module automatically transfers data about investment requirements from transaction applications, and provides extensive analysis functions for budget monitoring.

7) Profit Centre Accounting

- Profit Centre Accounting analyses the profitability of internal responsibility centres.
- A company's organizational structure is represented in the form of a profit centre hierarchy, with the profit centre as the smallest unit of responsibility.
- All business transactions in financial accounting, Material Management, Asset Management, and Sales and Distribution, which affects profits, are automatically reflected in profit Centre Accounting