UNIT 4:Building E-Commerce System

E-commerce Website/Software, Building Catalogs: Static, Dynamic, Building Shopping Cart, Transaction Processing, Development of E-commerce Website/Software: Databases, Application Programs, Integration with ERP Systems, Integration with Payment Gateways, Using Open Source CMS for Development of E-commerce Applications

E-Commerce Web Site /Software:

- Ecommerce software is the engine behind the scenes of an online store, making it possible to easily manage inventory, add or remove products, calculate taxes, and everything else required to manage a website and fulfill orders.
- Ecommerce software simplifies Complicated processes in a friendly user interface that enables people non-technical backgrounds to oversee an entire ecommerce operation.
- Despite the ease of use that ecommerce software brings to an online business, it is a **multifaceted(Versatile)** and complex machine.

Types of Ecommerce Software

- Ecommerce software comes in two basic flavors, with many varieties of each:

On-Premise:

- Installed and managed on-site by developers who facilitate manual updates, fix problems and do general troubleshooting.
- Traditionally, merchants went with on-premise solutions due to the increased flexibility from hosted solutions.

SaaS:

- Software as a Service (or "hosted") solutions are much more hands-off from a technical standpoint.

- The only development requirements are for additional design and custom features — all updates, patches, and newly-released features are done automatically or with one-click integrations.
- Hosted ecommerce software has evolved to the point where the customization and flexibility, previously exclusive to on-premise, is robust, making it more than sufficient for most online retailers.
- Ecommerce stores using SaaS software can be launched in 1/3 of the time and at a much lower cost than on-premise solutions.

What does Ecommerce software do?

- The purpose of ecommerce software solutions is to put everything you need to run your store in one place.
- While the platform itself doesn't fulfill every task, integrations with leading providers make it possible to seamlessly run a business without jockeying between different services.
- Accounting software, ERP, social media — such as Facebook, Twitter and and much more can be linked to ecommerce software so data sharing is not manual.

Benefit of Ecommerce software:

Simplifies marketing: Built-in SEO and easy optimization allow online stores to rank higher in organic search engines such as Google for increased discovery and lower customer acquisition costs.

Automates shipping and taxes: Printing shipping labels, calculating sales taxes based on customer location, and sending notification emails to customers.

Manage products:Ecommerce software allows an online store manager to get a high-level view or drill down to the specifics without any technical knowledge required.

Customer & order management: Managing an order from inception to delivery is crucial to the success of any business. Ecommerce software lets you filter by customer, check order status, and make changes on the fly. Integrations with email platforms provide another medium for managing customer communications.

Enhance overall user experience: If customers can't find what they need — and fast — then ecommerce software hasn't done it's job. Hosted solutions offer service-level agreements to guarantee uptime, and simple website management with analytic insights help you find optimization opportunities.

Shopping Cart:

- A shopping cart is a software used in eCommerce to assist visitors to make purchases online.
- Upon checkout, the software calculates the total of the order, including shipping and handling, taxes and other parameters the owner of the site has previously set.
- The shopping cart typically provides a means of collecting the shopper's payment information.
- Some shopping carts strictly allow for an item to be added to the basket to start a checkout process (such as the PayPal shopping cart), other shopping carts actually provides additional features that the merchant can fully manage the online store
- Shopping cart softwares consists of two main components:

Storefront The area of the website that is accessed by the visitor.

Administration The area of the website that is accessed by the merchant to manage the online shop.

- E-commerce websites use the shopping cart to not only make a customer's shopping experience easier but also to increase sales.

- For the uninitiated(inexperienced), the shopping cart is a virtual cart that "holds" items you wish to purchase until you check out. An unlimited number of items can go into the cart. Just as in a physical store, when you are finished shopping you checkout. The online shopping retailer will total all items in the cart and you will pay the amount requested. This is an easy and intuitive process.

- The e-commerce cart, or an online shopping cart, allows a shopper to pick out items to buy online. A shopper only has to point and click on an item and it can place in a virtual cart for later checkout. This makes it easy on the buyer, and also helps the seller.

- When a shopper can effortlessly pick items to buy, they tend to spend a long time browsing other items. This can increase sales for the vendor, and ultimately increase profits.

- The cart has a save feature. Many times shoppers are not ready to purchase an item when they are surfing the web. Perhaps they are using a work computer or do not have their credit card handy. The cart's save feature allows the customer to keep items in their cart and come back at another time to purchase them. Many carts will hold an item for up to a month or more.

- The online shopping cart also has a totaling feature. When consumers purchase several items, they only have to click on the cart and a subtotal of all items will be available to them. This allows a consumer to stay on budget and potentially get more sales again. Some carts even charge all applicable sales taxes and shipping costs and let the customer make an informed decision about the actual cost of the purchased items.

- The introduction of the cart feature to internet shopping has contributed to its great success. The cart is easy to use. It has memory capability and a helpful totaling feature. It is very good for consumers and Online retailers like it too. This is mostly because it increases the number of sales for the retailer, which results in greater profits.

How a Shopping Cart Integrates into Your E-Commerce System

- A shopping cart is just one of the components that makes shopping online possible.

- It comes with a payment mechanism. The cart links up to the product database and depending on what system you have, it could also be linked up to your inventory and delivery system. When products are added to the cart, your product database is updated.

- An online shopping cart is the number one step in the payment processing. Since most online transactions are paid by credit card, the shopping cart is usually linked to your merchant account, or could be using a different payment method.

- In order to facilitate the payment process, it is important that the entire payment process runs smoothly, quickly and efficiently. Using a system that starts with the shopping cart and ends with the payment confirmation is one of the best ways to ensure this.

Basic Types of E-Commerce Shopping Cart

Hosted shopping cart

This choice is ideal for those who operate a small business because of it's easy to use interface where you can enter the details of the product easily. These details are the price, description and shipping options. This kind of online shopping cart is usually provided by a third party web host. They function through HTML code and make ready for you the purchase options. Therefore, the shopping cart page appears only at the final step of the transaction.

Licensed shopping cart

Here you purchase the shopping cart that you want to host on your own server. It is available as a premium solution but you can also get the free and open source option. With this option, you have more flexibility, but you need more technical know-how.

Some of the benefits of E-Commerce Shopping Carts are listed below:

Open for Business 24/7

Your customers will have access to your online store 24 hours a day, 7 days a week.

Credit Card Processing

This will allow you to provide your customers with the option of making credit

card purchases with your credit card processor or your merchant account (for ex. PayPal), or a chosen payment method.

Manage Products
Give online shoppers discounts, coupons, create special offers, and perform shipping and sales tax calculations. You can customize your shopper's buying experience by including the product name, invoice number, and ID number. This also allows your customer to add to their cart or remove things without losing the whole transaction and starting over.

Ad Trackers
Keep track of your online marketing results and measure how many products you have sold. View how many subscription sign-ups you had from the previous month and keep track of unique clicks.

Secured Shopping
Will provide your online shoppers with a safe and secure way of shopping on your website.

Transaction Processing System:

- A transaction is a series of events that when performed together complete some unit of work that is important to an organisation. Each transaction has two possible outcomes, either it is a complete success or it is a complete failure.
- A transaction process system (TPS) is an information processing system for business transactions involving the collection, modification and retrieval of all transaction data. Characteristics of a TPS include performance, reliability and consistency.
- TPS is also known as transaction processing or real-time processing.

Characteristics of Transaction Processing System:

- TPS collect, store, modify and retrieve transactions.
- It is also a unit of work composed of multiple operations that must all succeed or must all fail (Atomicity)

- Each operation generates and/or modifies data.
- Must pass the ACID test.
- Examples:
  - POS
  - Processing credit cards
  - Motel/Hotel reservations
- The main Information Processes are collecting and storing.

THE ACID Properties of TPS :

Transactions are known as atomic, meaning that the transaction will either happen or not. If one account is debited, then another account has to be credited.

- Atomicity:- all transactions/operations must succeed or fail as a group.
- Consistency:- all parties must agree on the facts of the exchange
- Isolation:- transactions must be independent of each other.
- Durability:- the effects of a completed transaction should be lasting

Characteristics OF TPS:

- **Rapid processing/response**- customers cannot wait for a TPS to respond. Speed from input to output must be in a few seconds.
- **Reliability-** Breakdown will disrupt or stop business. Failure rate must be low. Quick and accurate recovery. Backup and recovery procedures are essential.
- **Inflexibility-** Every transaction to be processed in the same way. Operation must be standardized. Transactions must be processed in the same way each time to maximise efficiency. To ensure this, TPS interfaces are designed to acquire identical data for each transaction, regardless of the customer.

- **Controlled processing-** must support the business operations. A TPS should enforce and maintain roles and responsibilities of an organization.

Transaction Processing Activities (Process Control)

The processing of individual transactions, of course, depends to a degree on their nature. The general elements of transaction processing include:

1. Data capture and validation
2. Transaction - dependent processing steps
3. Database maintenance

- ### Date Capture

  Direct data entry is commonly employed through source data automation. Increasingly, transaction processing systems rely on electronic data interchange (EDI). By replacing paper documents with formatted transaction data sent over telecommunications networks, these systems provide for computer-to-computer communication without repeated data entry. Although used internally by some firms, EDI primarily serves the needs of intercompany communication.

- ### Data Validation

  Typical validation tests include checking for missing data items, valid codes, and valid values. More extensive validation may entail authorization of the transaction based on the customer=s record and available inventory.

Development of E-Commerce Software/Web Site:

- Two most important management challenges in building a successful e-commerce site are:
  - Developing a clear understanding of business objectives
  - Knowing how to choose the right technology to achieve those objectives

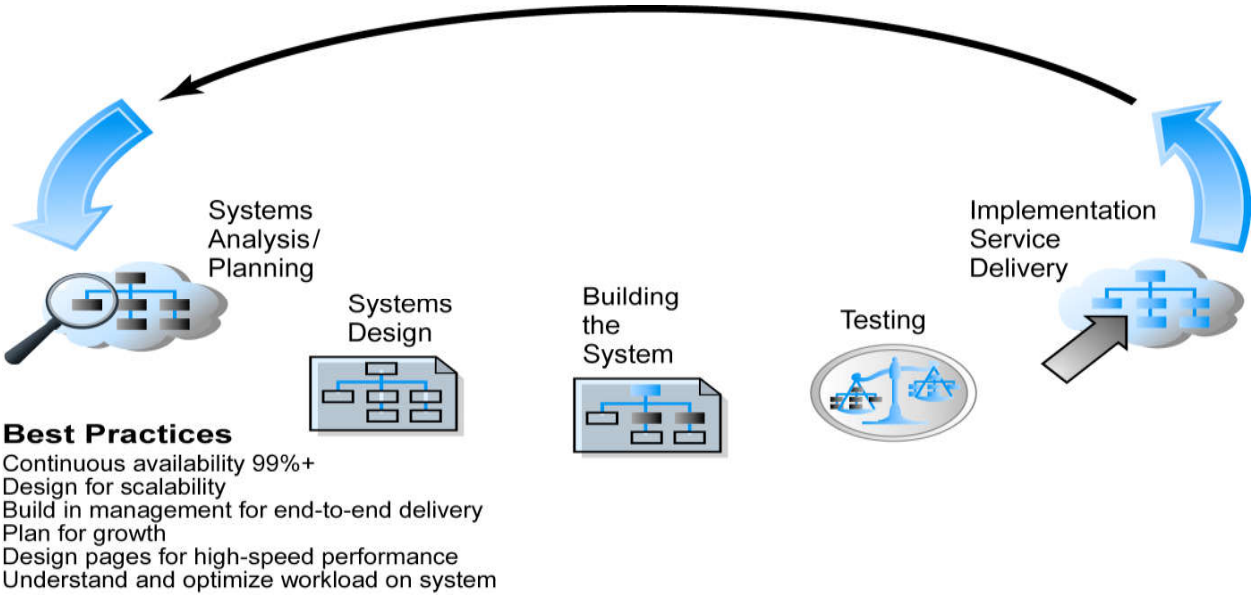
- Main areas where you will need to make decisions in building a site include:
  - Human resources and organizational capabilities—creating a team that has the skill set to build and manage a successful site
  - Hardware
  - Software
  - Telecommunications
  - Site design

The System Development Life Cycle:

- Systems Development Life Cycle (SDLC) is a methodology for understanding the business objectives of a system and designing an appropriate solution
- Five major steps in the SDLC are:
  - Systems analysis/planning
  - Systems design
  - Building the system
  - Testing

  Implementation

Web Site System Development Life Cycle:



System Analysis/Planning: Identifying Business Objectives, System Functionality, and Information Requirements

- **Business objectives:** a list of capabilities you want your site to have
- **System functionalities:** a list of the types of information system capabilities you will need to achieve your business objectives
- **Information requirements:** the information elements that the system must produce in order to achieve the business objectives

Systems Analysis: Business Objectives, System Functionality, and Information Requirements for a Typical E-commerce Site

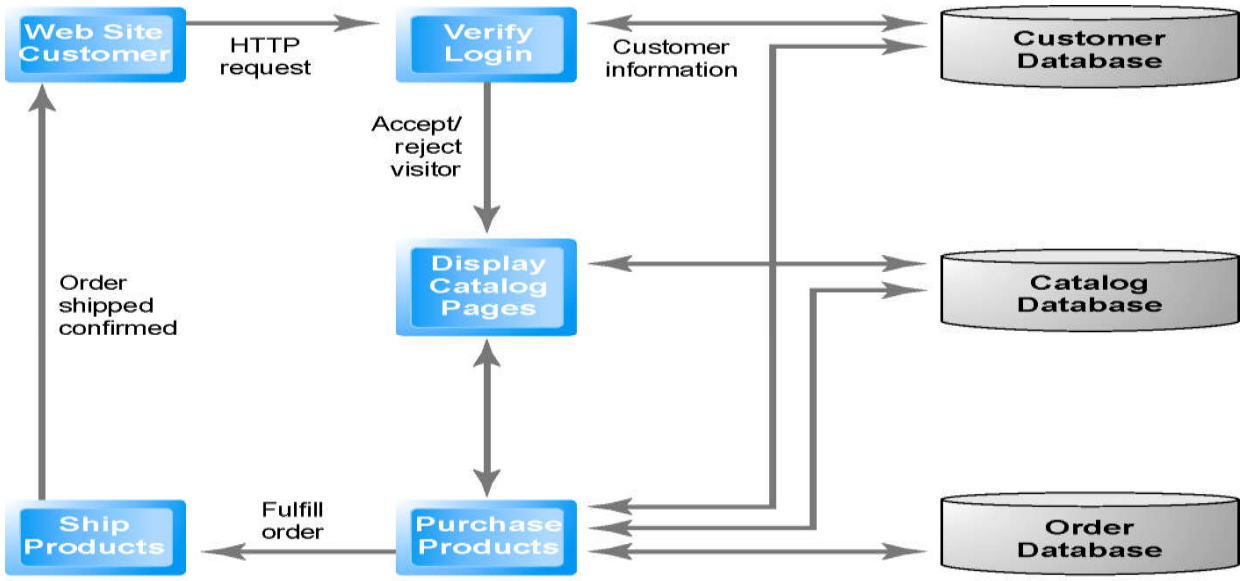
TABLE 4.1 SYSTEM ANALYSIS: BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE

BUSINESS OBJECTIVE	SYSTEM FUNCTIONALITY	INFORMATION REQUIREMENTS
Display goods	Digital catalog	Dynamic text and graphics catalog
Provide product information (content)	Product database	Product description, stocking numbers, inventory levels
Personalize/customize product	Customer on-site tracking	Site log for every customer visit; data mining capability to identify common customer paths and appropriate responses
Execute a transaction	Shopping cart/payment system	Secure credit card clearing; multiple payment options
Accumulate customer information	Customer database	Name, address, phone, and e-mail for all customers; online customer registration
Provide after-sale customer support	Sales database	Customer ID, product, date, payment, shipment date
Coordinate marketing/advertising program	Ad server, e-mail server, e-mail campaign manager, ad banner manager	Site behavior log of prospects and customers linked to e-mail and banner ad campaigns
Understand marketing effectiveness	Site tracking and reporting system	Number of unique visitors, pages visited, products purchased, identified by marketing campaign
Provide production and supplier links	Inventory management system	Product and inventory levels, supplier ID and contact, order quantity data by product

Systems Design: Hardware and Software Platforms

- System design specification: a description of the main components of a system and their relationship to one another
- System design can be broken down into two parts:
  - Logical design
  - Physical design

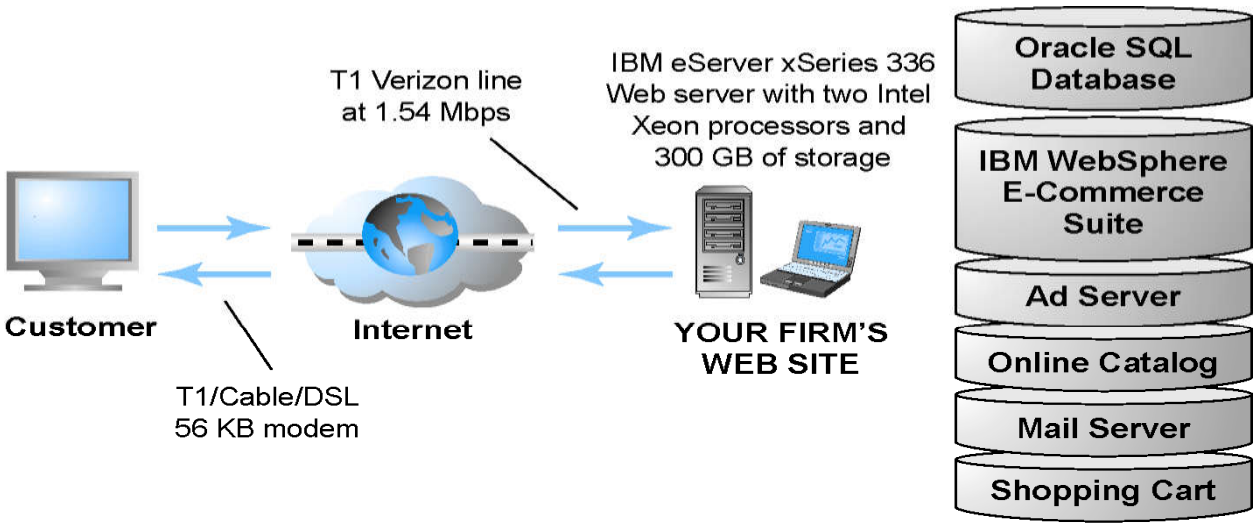
A Logical Diagram For a Simple System:



(a) Simple Data Flow Diagram

This data flow diagram describes the flow of information requests and responses for a sample Web site

A Physical Diagram For a Simple System:



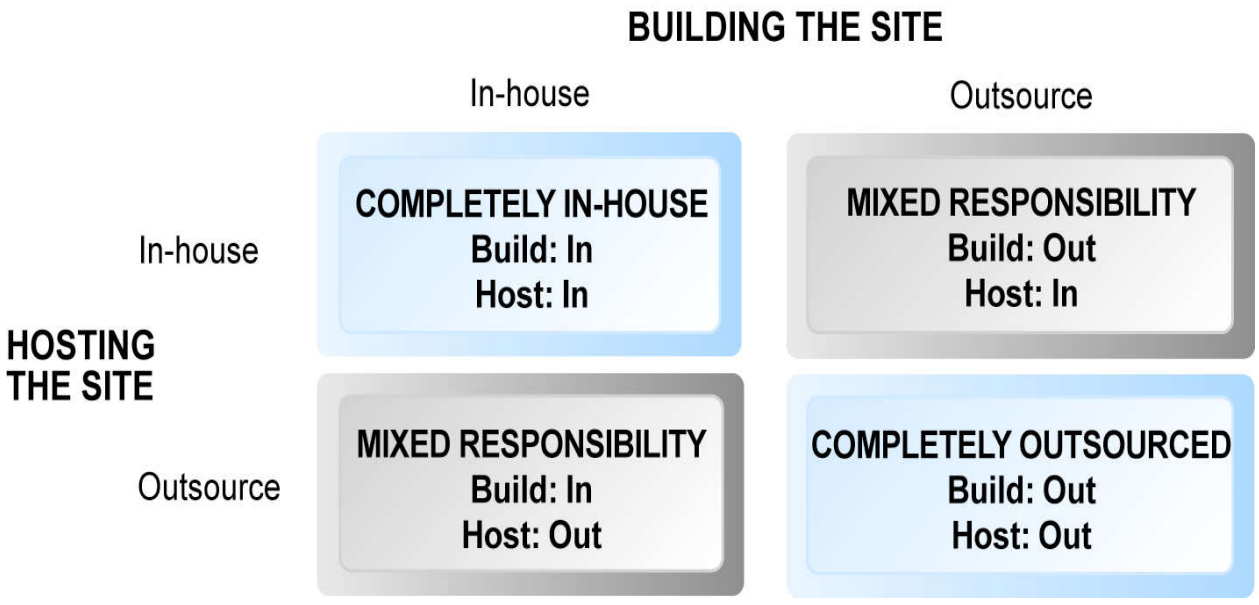
(b) Simple Physical Design

A physical design describes the hardware and software needed to realize the logical design

Building the System: In-House versus Outsourcing:

- **Outsourcing:** hiring an outside vendor to provide services involved in building the site
- The build your own versus outsourcing decision:
  - Build your own requires team with diverse skill set; choice of software tools; both risks and possible benefits
- Host your own versus outsourcing
  - **Hosting:** hosting company is responsible for ensuring site is accessible 24/7, for monthly fee
  - **Co-location:** firm purchases or leases a Web server (with control over its operation), but server is located in at vendor's physical facility

Choices in Building and Hosting:



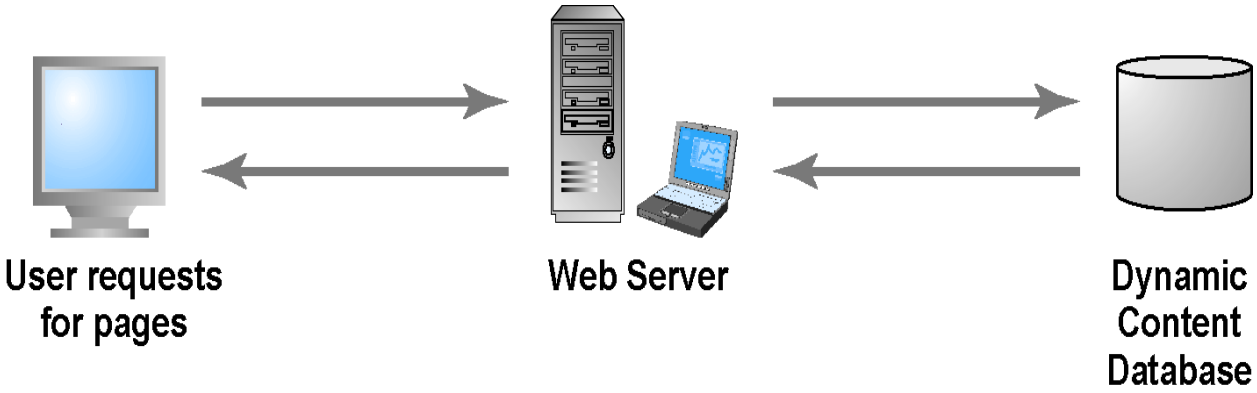
Testing ,Implementation and Maintainance:

- Testing: Includes unit testing, system testing, and acceptance testing
- Implementation and maintenance:
    - Maintenance is ongoing
    - Benchmarking: process by which site is compared to those of competitors in terms of response speed, quality of layout, and design

Simple versus Multi-tiered Web Site Architecture

- **System architecture:** refers to the arrangement of software, machinery, and tasks in an information system needed to achieve a specific functionality
- **Two-tier architecture:** Web server responds to requests for Web pages and a database server provides backend data storage
- **Multi-tier architecture:** Web server is linked to a middle-tier layer that typically includes a series of application servers that perform specific tasks, as well as to a backend layer of existing corporate systems

Two-Tier E-commerce Architecture:



(a) Two-tier Architecture

In a two-tier architecture, a Web server responds to requests for Web pages and a database server provides backend data storage.

Multi-tier E-commerce Architecture:

(b) Multi-tier Architecture

In a multi-tier architecture, a Web server is linked to a middle-tier layer that typically includes a series of application servers that perform specific tasks, as well as to a backend layer of existing corporate systems.

Web Server Software:

- All e-commerce sites require basic Web server software to answer HTTP requests from customers
- Apache is the leading Web server software; works only with UNIX operating systems
- Microsoft's Internet Information Server (IIS) is the second major Web server software

Basic Functionality Provided by Web Servers:

TABLE 4.3 BASIC FUNCTIONALITY PROVIDED BY WEB SERVERS

FUNCTIONALITY	DESCRIPTION
Processing of HTTP requests	Receive and respond to client requests for HTML pages
Security services (Secure Sockets Layer)	Verify username and password; process certificates and private/public key information required for credit card processing and other secure information
File Transfer Protocol	Permits transfer of very large files from server to server
Search engine	Indexing of site content; keyword search capability
Data capture	Log file of all visits, time, duration, and referral source
E-mail	Ability to send, receive, and store e-mail messages
Site management tools	Calculate and display key site statistics, such as unique visitors, page requests, and origin of requests; check links on pages

Application Servers:

- Web application servers: software programs that provide specific business functionality required of a Web site
- Are an example of middleware software
- A number of different types available, providing a variety of functionality

Application Servers and Their Functions:

TABLE 4.4 APPLICATION SERVERS AND THEIR FUNCTION

APPLICATION SERVER	FUNCTIONALITY
Catalog display	Provides a database for product descriptions and prices
Transaction processing (shopping cart)	Accepts orders and clears payments
List server	Creates and serves mailing lists and manages e-mail marketing campaigns
Proxy server	Monitors and controls access to main Web server; implements firewall protection
Mail server	Manages Internet e-mail
Audio/video server	Stores and delivers streaming media content
Chat server	Creates an environment for online real-time text and audio interactions with customers
News server	Provides connectivity and displays Internet news feeds
Fax server	Provides fax reception and sending using a Web server
Groupware server	Creates workgroup environments for online collaboration
Database server	Stores customer, product, and price information
Ad server	Maintains Web-enabled database of advertising banners that permits customized and personalized display of advertisements based on consumer behavior and characteristics
Auction server	Provides a transaction environment for conducting online auctions
B2B Server	Implements buy, sell, and link marketplaces for commercial transactions

E-commerce Merchant Server Software Functionality:

- Provides the basic functionality needed for online sales, including:
    - Online catalog
    - Shopping cart
    - Credit card processing

Merchant Server Software Packages (E-commerce Suites):

- Offer integrated environment that provides functionality and capabilities needed to develop sophisticated, customer-centric site
- Key factors to consider in choosing include:
    - Functionality
    - Support for different business models
    - Business process modeling tools
    - Visual site management tools and reporting
    - Performance and scalability
    - Connectivity to existing business systems
    - Compliance with standards
    - Global and multicultural capability
    - Local sales tax and shipping rules

Integration With ERP System:

Enterprise resource planning (ERP) systems:

- Enterprise resource planning (ERP) systems are the foundation of many business processes.

- When inventory falls below a pre-prescribed level, the inventory modules in an ERP can trigger an order from a vendor.
- When a customer calls your support team, the key takeaways from the interaction can be filed in the ERP as a reference for future conversations.
- When you want to analyze sales trends relative to specific operational decisions, custom reporting is possible.
- All of this data visibility and accessibility helps organizations get the job done as efficiently as possible, but value creation hinges on getting information to the right people at the right times.

E Commerce And ERP Integration

- Today, e-Commerce has turned into a revolutionized way of selling the products at relatively cheap cost.
- With the outbreak of E-commerce in past decades, many businesses have opted(Select as an alternative to other) for keeping an online
- With the advent of advanced technologies, some business has decided to solely go for the online option.
- But often, in this case, business owners use an e-commerce platform and an ERP software as two separate components making it difficult to manage.
- Each application acts as an independent silo with no communication in between, missing out on the benefits of an integrated ERP system.
- But if we integrate E-commerce with the ERP system, one can easily manage the online sales along with efficient internal business functional management.

Benefits Of ECommerce Integration In An ERP System

Improves Functionality:

The integration of an ERP software initiates the availability of real-time data to the storefront, allowing customers to view and access the information pertaining to the available inventory, latest order status, and also tracking the shipments using the lot/serial or other tracking numbers. This helps in reducing the cost of operations and improving the customer experience with your storefront.

Reduces the inventory cost:
Via integrating the ERP, one can initiate the updated sales information. An ERP gives all web sales information and also timely updates about the web transactions. The updated web sales information and inventory details get you to forecast and properly plan the purchase, reducing the inventory operational cost. With an ERP, one can easily track the inventory in real-time and also forecast how much inventory you need in the future.

Generate financial reports:
An E-commerce application can easily generate financial reports on sales. Via integrating the E-commerce with an ERP, the end user can move a step ahead, as an ERP software provides Balance Sheet, P/L Statement, Trial Balance, Cash Flow, etc. ensuring transparency about on the web transactions and financial information across the organization.

Increase productivity and saves time:
The integrated ERP software streamlines multiple business processes, reducing the human resource involvement in the business processes. The employees no longer have to manually input data from one platform to another (e.g. shipping info, inventory levels, product info); instead, communication takes place automatically. This saves time and money and also makes employees free to be productive in other ways.

Reduces Data Redundancy and Error:
With integration, all information like the web customer details, web orders, payment & shipping information will be integrated to ERP software. In addition, the Item and Inventory details can be uploaded from ERP to e-commerce portal, eliminating the need of re-entering the data. Thus the integration reduces human involvement, data redundancy and error happening across the two different platforms.

Increase Customer Satisfaction:
One can easily raise the level of customer satisfaction, via providing the up to date and real-time product information, inventory availability detail, order tracking detail, etc. in the E-commerce from ERP software. One can also automatically

notify about when the shipment goes out, and thereby track the shipment along its journey. With real-time information providence like knowledge about what's going on behind, adds value to the customer experience. Even if trouble comes by, e.g. a delay or lack of stock, knowledge about the situation can minimize any dissatisfaction.

Better Control of your Business:
Integration of e-Commerce and ERP business processes provides the business owners to manage the whole business process from one location. It also unifies the e-Commerce system with inventory, manufacturing, CRM, financials, e.tc. improving the communication between the internal departments. Finally, if you make money online and offline, integration allows you to have one holistic picture of your sales.

Payment Gateway Integration:

- Payment gateway integration is important to the success of e-Commerce business online. It comes with features that facilitate electronic payment processing for merchants and e-Commerce stores.

What is Payment Gateway?

- A payment gateway is an e-commerce service it facilitates a payment transaction by the transfer of payment details from the portal (such as a website, mobile phone or IVRS(Interactive Voice Response System)) and payment processor or acquiring bank.
- E-Commerce stores need to integrate application programming interfaces (APIs) that plug into the online store through programming that enables their functionality.

How does an online payment gateway work?

- The idea is to make payment processing easy, effective and secure. Here is a step by step guide detailing how Payment Gateways work:

1. It starts when customers place an order from an online store and fill its credit card details.
2. The web browser encrypts the data to be sent between it and the vendor's web server.
3. The gateway then sends the transaction data to the payment processor utilized by the vendor's acquiring bank.
4. The payment processor sends the transaction data to a card association.
5. The credit card's issuing bank views the authorization request and "approves" or "denies."
6. The processor then forwards an authorization pertaining to the merchant and consumer to the payment gateway.
7. Once the gateway obtains this response, it transmits it to the website/interface to process the payment.

8. Clearing Transactions – is only triggered once the merchant has actually completed the transaction.
9. The issuing bank changes the "auth-hold" to a debit, allowing a "settlement" with the vendor's acquiring bank.

Benefit of Payment Gateway Integration:

- Automated payment processing
- Data security
- Transaction security
- Improved workflow management
- Reduce errors
- Ease of use
- Feature-rich solutions
- Increased payment success rate
- Customized experience
- Integrating international payments
- Multiple payment modes

Using Open Source CMS for Development of E-commerce Applications

CMS (Content Management System):

- A content management system, often abbreviated as CMS, is software that helps users create, manage, and modify content on a website without the need for specialized technical knowledge.
- In simpler language, a content management system is a tool that helps you build a website without needing to write all the code from scratch (or even know how to code at all).
- Instead of building your own system for creating web pages, storing images, and other functions, the content management system handles all that basic infrastructure stuff for you so that you can focus on more forward-facing parts of your website.
- Beyond websites, you can also find content management systems for other functions – like document management.

Open Source CMS for E-Commerce Application Development:

- Open Source refers to free software that users and programmers can modify to customize it according to their specific needs.

Benefit of using Open Source CMS

- A few of the significant benefits of using an OS CMS include:

- There are cheaper because there are no license fees or upgrade fees.
- There are no contracts to sign and no long-term commitments one has to make.
- Anyone can develop OS applications—there are already countless free modules, plugins, and complimentary tools so you don't need to hire a developer.
- There are hundreds of thousands of free templates (otherwise called themes) available for OS CMS.
- Search engines love OS CMS and WordPress, in particular, which is very simple to optimize for search engines using simple plug-in tools.
- They practically work "right out of the box."

Examples of Open Source CMS

WordPress.

- Ideal for personal websites, blogs, small businesses, and those with few technical skills and no desire to learn programming skills
- WordPress is the best place to start. It has the most available free themes (i.e., templates) and plugins available.
- Originally developed as a blogging tool, it is now used commonly to create complicated websites.

Joomla:

- Olympus, Porsche, Sprint, and Vodafone are just a few of the major corporations that use Joomla.
- Joomla takes a little bit more time to set up than WordPress but is more powerful and still easier than the mighty Drupal.
- It also works for blogs.

Drupal:

- The White House switched from a proprietary CMS to Drupal.
- Other companies using Drupal include AT&T, McDonald's, Duke and Standford Universities, Symantec, and the Linux Foundation
- Drupal can be overwhelming for beginners.