

Unit-3

E- COMMERCE and WWW

E-Commerce is used to describe a new online approach to perform traditional function such as payment and fund transfer, order entry and processing inventory management involving cargo tracking, electronic catalogue etc.

Advertising, marketing and customer support functions are also a part of E-commerce application.

No single technology can provide the full potential of E-commerce. Therefore we require an integrated architecture which is revolving in the form of WWW as E-commerce is becoming more matured. Thus we need to develop sophisticated applications on WWW.

Architectural frame work of E-commerce:

A Frame Work is intended to define and create tools that integrate the information found in today's closed system and allow the development of E-commerce applications.

The E-commerce applications architecture consists of 5 layers of functionality or services. They are

1. Application Services
2. Brokerage Services
3. Interface support layer
4. secure messaging & EDI
5. Middleware, structured document interchange.

1. Application services:

It will be composed of existing and future applications based on innate architecture. The three distinct classes of E-commerce applications can be distinguished as

- (a) Consumer to Business
- (b) Business to Business
- (c) Intra organization.

Consumer to Business:

We call this enterprise market place transaction. In market place transaction customer learn about product differently through Electronic publishing by them differently using Electronic cash and secure payment and have them developed differently.

Business to Business:

This is called as market link transaction. Here business, government and other organizations depend on computer to computer communication as a fast, economical dependable way to conduct business transactions.

Intra Organizational transactions:

This is called as market driven transaction. A company becomes market driven by dispersing throughout the firm information about his customers and competitors by spreading strategic and tactical decision making so that all units can participate and by continuously monitoring their customer commitment.

2. Information Brokerage and management:

This layer provides service integration through the notion of information brokerages. Information brokerage is used to represent an intermediary which provides service integration between customer and information providers, given some constraints such as low price, fast service, profit maximization for a client.

Information brokerage addresses the issue of adding value to the information that is retrieved.

3.Interface support service:

The third layer interface and support services will provide interface for e-commerce applications such as interactive catalogues and will support directory services and other functions necessary for information search and access.

Interactive catalogues are customized interface to consumer applications such as home shopping.

4. Secure messaging and structure document interchange service:

The importance of fourth layer is secured messaging. Messaging is software that sits between the network infrastructure and the clients or e-commerce applications.

Messaging services offer solutions for communicating non formatted data such as letters, memo, reports etc as well as formatted data such as purchase order, shipping notices and invoice etc.

5. Middleware services:

Middleware is a relatively new concept that emerged only recently. Middleware is a mediator between diverse software programs that enable them to talk with one another. It solves all the interface, translation, transformation and interpretation problems that were driving application programmers crazy.

Another reason for Middleware is the computing shift from application centric to data centric. i.e.,remote data controls all of the applications in the network instead of applications controlling data. To achieve data centric computing middleware services focus on three elements.

- (1) Transparency
- (2) Translation security management
- (3) Distributed object management and services

TECHNOLOGY BEHIND THE WEB:

Information providers (publishers) run programs called servers from which the browsers can obtain information. These programs can either be web servers that understand the hypertext transfer protocol (HTTP), “gateway” programs that convert an existing information format to hypertext, or a non-HTTP server that web browsers can access i.e FTP or Gopher servers.

Web servers are composed of two major parts.

1. The hypertext transfer protocol (HTTP) for transmitting documents between servers and clients .
2. HTML format for documents.

The link between HTML files & HTTP server is provided by Uniform Resource Locator (URL).

Uniform Resource Locator:

The documents that the browsers display are hypertext that contains pointers to other documents.

The browser allows us to deal with the pointer in a transparent way that is select the pointer we are presented with a text to which it points. This pointer is implemented by using a concept which is central to web browser known as URL.

URL's follow a consistent pattern that the first part describes the type of the resources, second part gives the name of the server posting the resources and the third part gives the full name of resources.

e.g : FTP://server.address / complete file.name

URL is central to web architecture. It is easy to address an object anywhere on the internet, it is essential for the system to scale & for the information space to be independent on network and server topology.

Hypertext Transfer Protocol (HTTP):

It is the simple request response protocol that is currently run over TCP and is the basis of WWW.

HTTP is a protocol for transferring information efficiently between the requesting client and server. The data transferred may be plain text, hypertext images or anything else. When a user browse, the web objects are retrieved in rapid succession from often widely dispersed servers.

HTTP is used for retrieving documents in an unbounded & extensible set of formats. It is an

internet protocol. It is similar in its readable, text based style to the file transfer (FTP) & the network news (NNTP) protocols that have been used to transfer files and news on the internet for many years.

HTML (Hypertext markup language)

At the heart of the web is a simple page description language called HTML. It is a common basic language of interchange for hypertext that forms the fabric of the web.

It is based on an international electronic document standard called Standard generalized markup language (SGML)HTML enables document orientation for the web by embedding control codes in ASCII (American standard code for information interchange) text to designate titles, headings, graphics and the hypertext links, making links of SGML's powerful linking capabilities.

Common Gate way Interface Services (CGI):

An important aspect of web server development is application gateways. More specifically it is CGI. CGI is a specification for communicating data between web server and other application server. CGI is used whenever web server needs to send or receive data from another application.

SECURITY AND THE WEB:

Security and confidentiality are essential before business conduct, financial transactions over the internet has become a big problem due to the increasing number of application oriented towards commerce. Therefore commercial application requires that the client and server be able to authenticate each other and exchange data confidentiality. This exchange has three basic properties.

1. Clients are confident about servers they are communicating with server authentication.
2. Client conversation with server is private using encryption.
3. Client conversation cannot be tampered or inter separated with data integrity.

Categories of Internet data & Transaction:

Several categories of data must be encrypted making internet data security an interesting challenge.

Public Data :Public data have no security distinctions and can be read by anyone. Such data should be protected from unauthorized tampering or modification because a reader may perform damaging actions on its contents.

Copyright Data:Copyright data have content that is copyrighted but not secret. The Owner of the data is willing to provide it but wishes to ensure that the user has paid for it. The objective is to maximize the revenue and security.

Confidential Data:Confidential data contains material that is secret but whose existence is not secret such data include bank account systems, personal files etc. such material may be referenced by public or copyright data.

Secret Data:Secret data existence is a secret such data might include algorithms which is necessary to monitor, log all access to secret data.

WWW based security schemes:

Several methods can provide security in the web framework. This includes the following.

1. **SHTTP:-** (Secured Hypertext Transfer Protocol)

2. **SSL:-** (Security Socket Layer)

3. **SHEN :**

Consumer Oriented E-Commerce:

The wide range of applications available for the consumer marketplace can be broadly classified into:

1. Personal finance and home banking management:-

It Includes all the banking or finance related solutions provided by banking or finance institutions through which a consumer can enjoy the banking features at his/her pocket. Customer's interest in home banking has resumed, fueled by growing comfort – or at least familiarity – with electronics and technology. Home banking services are often classified as

1.Basic services: it is related to personal finance i.e. checking savings account statement around the clock, banking with ATM's (Automated Teller Machines). Bill payment, balancing cheque book status of pay mentor stock payment requested etc.

2.Intermediate services: it includes a broader array of financial management services which include non-banking activities like utility payments, merchant payments, mobile top-ups etc.

3.Advanced services: it includes stock and mutual funds brokerage or trading services such as currency trading and credit card or debit card management.

2. Micro transactions of Information: To serve the information needs of the consumer, services providers whose product is information delivered over the I-way are creating an entirely new industry. Most sell any form of digital information and can be sent down the network of one sort or another such as data, picture, images, sounds, computer programs and services. A few sell products such as music books, clothing etc through on-line catalogues. One significant change in the traditional business forced by is online information. Business is the creation of new transaction catalogues called small fee transactions for micro services. Microtransaction is a business model

where users can purchase virtual goods via micropayments. Microtransactions are often used in free-to-play games to provide a revenue source for the developers.

3. Entertainment:-

It is another application area of E-commerce, the most important services provided under. These are movies on demand, interactive games. The online gaming industry in turn parallels the TV industry where the customer is primarily interested in good quality programming & is not faithful to any one network.

The entertainment which is gained is of very low cost but it gives a great enjoyment or fun to the user by the utilization of these features.

4. Home shopping:-

One of the examples often sighted about e-commerce is home shopping which is widely used and had generated substantial revenue for many companies racing to develop online malls. The malls will enable a customer to enter an online store to look at products, try on computerized clothes, and see a reflection in a digital mirror and purchase with overnight delivery against credit card billing.

Mercantile Process Models:

It defines the interaction between the consumer and the merchant for online commerce. This is necessary to buy and sell goods where a buyer, a seller and other parties must interact in ways that represent standard business process. A well established standard process for processing credit card purchasers has contributed to the wide spread dissemination of credit cards. The establishment of common mercantile process model is expected to increase the convenience for consumers.

Mercantile models from the Consumers Perspective:

The online consumer expects quality and convenience, value, low price etc. to meet their expectations and understand the behavior of online shopper there is a need for the business process models that provides the standard product / service purchasing process. The process model for a consumer point of view consists of seven activities that can be grouped into three phases.

They are 1.Pre phase 2.Purchase consumption 3.Post purchase interaction phase.

Pre purchase Determination: This phase includes search and discovery for a set of products in the larger information space applicable of meeting customers Product or service search and discovery in the information space Comparison shopping and product selection based on various attributes Negotiation of terms E.G Price , Delivery time, Placement of order, Authorization of Payment, Receipt of Product Customer service and support and product selection from the smaller set of products based on attribute comparison.

Purchase Consumption: This phase includes mercantile protocols that specify the flow of information and documents associated with purchasing and negotiation with merchants for suitable terms such as price availability and delivery dates. After identifying the product to be purchased by the buyer and the seller must interact in some way (e-mail, on-line) to carry out the mercantile transactions. The mercantile transaction is defined as the exchange of information between the buyer and seller followed by necessary payment depending upon the payment model mutually agreed on, they may interact by exchanging currently i.e. backed by the third party such as the central bank, master card, visa card etc.

Post Purchase interaction: This phase includes customer service and support to addresses customers complaints, product returns & product defects.

As long as there is payment for services there will be references, disputes, other customer service issues that need to be considered. Returns and claims are an important part of purchasing process that impact the administrative costs and transportation expenses and customers relations.

Mercantile models from the business Perspective:

From the prospect of retailer, an order management cycle may involve the following distinct phases:

1. Planning phase:

During this phase, a forecast is prepared by amassing the valuable information from the customer. Manufacturing team would draft the capacity plot. The production team would provide the final outline. Planning phase is regarded as the crucial phase, as this lead towards order generation. The team to generate orders may undergo cold calls or perform direct marketing. Software supports have made the entire procedure simpler. In an online business customers are attracted towards the product using eMarketing tools.

2. Costing and Pricing Phase:

Pricing decisions must be undertaken after careful analysis. A passable data analysis followed by price elasticity would definitely yield accurate estimation. Moreover, each division of the organization must outline the possible cost involved in product development and hence, set off the final pricing accordingly. Availability of tools for tracking, trend analysis, customer tracking has made the entire procedure more effective.

3. Order Acknowledgement Phase:

An interface for order receipt is an indispensable requirement. Such an interface would enable the direct assignment of the product to the customer, overcoming the competitor. Its due maintenance is also essential facilitating ease of tracking of shipment. Further, such interface when occupied with the database, would direct customer's order over to the representative who will ensure order verification in order for its completion.

4. Scheduling Phase:

Different orders are first prioritized and hence scheduled. Entire organizational departments are involved to manage the schedules. Hence, sync among the various functional units is a mandate. Production team tend to minimize switch-over's, customer representatives may demand distinctive offerings to elite customers. Effective communication may deliver commitments.

5. Order Accomplishment Phase:

Several times, different components of a product may be manufactured at different plant locations or produced at one location and hidden at the other. So it is important to complete the orders as soon as possible to gain more attention from customers.

6. Billing:

After the order accomplishment phase, finance department will dish up bill for the customer. Normally such bills are structured in accordance to the organizational expediency

ELECTRONIC PAYMENT SYSTEMS

Electronic Payment System (e-Payment) is a type of payment conducted via electronic or online mediums. Online payment systems eliminate the need for cash or cheque payments. It is a unique

payment method that allows you to conduct online transactions via digital wallets, bank cards and internet banking systems.

Types of Electronic Payment Systems

- Electronic payment systems are proliferating in banking, retail, health care, on-line markets, and even government—in fact, anywhere money needs to change hands.
- The emerging electronic payment technology labeled electronic funds transfer (EFT).
- EFT is defined as “any transfer of funds initiated through an electronic terminal, so as to order, instruct, or authorize a financial institution.

EFT can be segmented into three broad categories:

• Banking and financial payments

- Large-scale or wholesale payments (e.g., bank-to-bank transfer)
- Small-scale or retail payments (e.g., automated teller machines)
- Home banking (e.g., bill payment)

• Retailing payments

- **Credit Cards** (e.g., VISA or MasterCard): A credit card is an electronic, plastic card issued by a financial institution that lets an individual borrows money at the point of sale (i.e. checkout) to complete a purchase.

The cardholder (i.e. borrower) must repay the bank for what they've purchased, sometimes along with interest charges if they carry a balance on the card. A credit card balance is the amount the card holder owes for unpaid purchases.

- **Private label credit/debit cards** (e.g., J.C. Penney Card) : A card allowing the holder to transfer money electronically from their bank account when making a purchase.

- **Charge Cards** (e.g., American Express): A credit card for use with an account which must be paid in full, when a statement is issued.

A charge card is a type of electronic payment card that charges no interest but requires the user to pay his/her balance in full upon receipt of the statement, usually on a monthly basis. Charge cards are offered by a limited number of issuers. They can include an uncapped spending limit with generous reward benefits for the cardholder.

• On-line electronic commerce payments

1. Token-based payment systems

- Electronic cash (e.g., DigiCash)
- Electronic checks (e.g., NetCheque)

- Smart cards or debit cards

2. Credit card-based payments systems

- Encrypted Credit Cards (e.g., World Wide Web form-based encryption)
- Third-party Processors (e.g., First Virtual)

1.Digital Token-Based Electronic Payment Systems

Electronic tokens are three types:

- Cash or Real-time

- Transactions are settled with exchange of electronic currency.
- Ex: on-line currency exchange is electronic cash (e-cash).

- Debit or Prepaid

- Users pay in advance for the privilege of getting information.
- Ex: prepaid payment mechanisms are stored in smart cards and electronic purses that store electronic money.

- Credit or Postpaid

- The server authenticates the customers and verifies with the bank that funds are adequate before purchase.
- Ex: postpaid mechanisms are credit/debit cards and electronic checks.

(i) E- Cash:

(a) Properties of Electronic Cash:

- There are many ways that exist for implementing an e-cash system, all must incorporate a few common features.
- Specifically, e-cash must have the following four properties:
 1. Monetary value
 2. Interoperability
 3. Retrievability
 4. Security

(b) Electronic Cash in Action

- Electronic Cash is based on cryptographic systems called “digital signatures”.
- This method involves a pair of numeric keys: one for locking (encoding) and the other for unlocking (decoding). (Through public key and private key).

(c) Purchasing E-cash from Currency Servers

The purchase of e-cash from an on-line currency server (or bank) involves two steps:

- Establishment of an account and

- Maintaining enough money in the account.

Some customers might prefer to purchase e-cash with paper currency, either to maintain anonymity or because they don't have a bank account.

(d) Using the Digital Currency

- Once the tokens are purchased, the e-cash software on the customer's PC stores digital money undersigned by a bank.
- The users can spend the digital money at any shop accepting e-cash, without having to open an account there or having to transmit credit card numbers.
- As soon as the customer wants to make a payment, the software collects the necessary amount from the stored tokens.

📄 Transactions involving three party (seller, buyer, and bank), whereby the notes are sent to the merchant, who immediately sends them directly to the digitalbank.

📄 The bank verifies the validity of the 'notes' that they have not been spent before. In this case, every note can be used only once.

📄 In many business transactions, the chance of 'double spending' occurs, which is equivalent to bouncing a check.

📄 To uncover double spending, banks must compare the note passed to it by the merchant against a database of spent notes. Just as paper currency is identified with a unique serial number, digital cash can also be protected.

(ii) Electronic Checks

- It is another form of electronic tokens.
- In the given model shown in fig, buyers must register with third-party account server before they are able to write electronic checks.
- The account server acts as a billing service.

The advantages are:

- 🌐 They work in the same way as traditional checks.
- 🌐 These are suited for clearing micropayments
- 🌐 They create float & availability of float is an important for commerce
- 🌐 Financial risk is assumed by the accounting server & may result in easier acceptance.

(iii) Smart Cards & Electronic Payment Systems

- Smart cards have been in existence since the early 1980s and hold promise for secure transactions using existing infrastructure.
- Smart cards are credit and debit cards and other card products enhanced with

microprocessors capable of holding more information than the traditional magnetic stripe. The smart card technology is widely used in countries such as France, Germany, Japan, and Singapore to pay for public phone calls, transportation, and shopper loyalty programs. Smart cards are basically two types:

- (a) Relationship-Based Smart Credit Cards
- (b) Electronic Purses.

(a) Relationship-Based Smart Credit Cards:

■ It is an enhancement of existing cards services &/ or the addition of new services that a financial institution delivers to its customers via a chip-based card or other device

■ These services include access to multiple financial accounts, value-added marketing programs, or other information card holders may want to store on their card

■ It includes access to multiple accounts, such as debit, credit, cash access, bill payment & multiple access options at multiple locations

(b) Electronic Purses:

- To replace cash and place a financial instrument are racing to introduce “electronic purses”, wallet-sized smart cards embedded with programmable microchips that store sums of money for people to use instead of cash for everything
- The electronic purse works in the following manner:
 1. After purse is loaded with money at an ATM, it can be used to pay for candy in a vending machine with a card reader.
 2. It verifies card is authentic & it has enough money, the value is deducted from balance on the card & added to an e-cash & remaining balance is displayed by the vending machine.

2. Credit Card-Based Electronic Payment Systems

There are 2 types of credit card based payment systems:

- (a) Encrypted credit cards
- (b) Third party processors
- (a) Encrypted Credit Cards:

■ Encryption is instantiated when credit card information is entered into a browser or other electronic commerce device and sent securely over the network from buyer to seller as an encrypted message.

Advantages:

- Payment cards provide fraud protection.
- They have worldwide acceptance (nearly!).

- They are good for online transactions.

Disadvantages:

- Payment card service companies charge merchants per-transaction fees and monthly processing fees.

(b) Third party processors:

In third party processing, consumers register with a third party on the internet to verify electronic transactions.

Ex: Companies that already provide Online Third Party Processors (OTPP) are

FirstVirtual(www.fv.com), OpenMarket(www.openmarket.com)

Electronic Cash Storage:

- Two methods

(a) On-line

- Individual does not have possession personally of electronic cash
- Trusted third party, e.g. e-banking, bank holds customers' cash accounts

(b) Off-line

- Customer holds cash on smart card or electronic wallet
- Fraud and double spending require tamper-proof encryption

Risks in Electronic Payment systems:**• Customer's risks**

- (a) Stolen credentials or password
- (b) Dishonest merchant
- (c) Disputes over transaction
- (d) Inappropriate use of transaction details

• Merchant's risks

- (a) Forged or copied instruments
- (b) Disputed charges
- (c) Insufficient funds in customer's account
- (d) Unauthorized redistribution of purchased items

Electronic payments Issues:

- Secure transfer across internet
- High reliability: no single failure point
- Atomic transactions
- Anonymity of buyer

- Economic and computational efficiency: Allows micropayments
- Flexibility across different methods
- Scalability in number of servers and users

Designing Electronic Payment systems:

It includes several factors:

- **Privacy:** A user expects to trust in a secure system
- **Security:** A secure system verifies the identity of two-party transactions through “user authentication” & reserves flexibility to restrict information/services through access control
- **Intuitive interfaces:** The payment interface must be as easy to use and access.
- **Database integration:** With home banking, ex. a customer wants to play with all his accounts.
- **Brokers:** A “network banker”-someone to broker goods & services, settle conflicts, & financial transactions electronically.
- **Pricing:** One fundamental issue is how to price payment system services. For e.g., from cash to bank payments, from paper-based to e-cash. The problem is potential waste of resources.
- **Standards:** Without standards, the welding of different payment users into different networks & different systems is impossible.