MANAGEMENT INFORMATION SYSTEM (MIS) and E-COMMERCE

UNIT-IV

INTERNET CLIENT SERVER APPLICATION

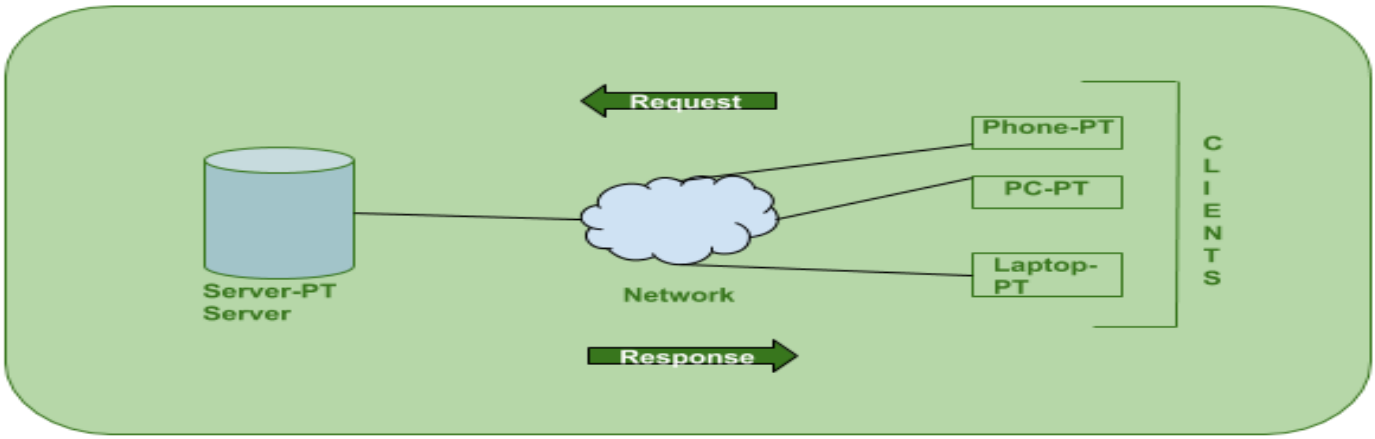
The Client-server model is a distributed application structure that partitions task or workload between the providers of a resource or service, called servers, and service requesters called clients. In the client-server architecture, when the client computer sends a request for data to the server through the internet, the server accepts the requested process and deliver the data packets requested back to the client. Clients do not share any of their resources. Examples of Client-Server Model are Email, World Wide Web, etc.

How the Client-Server Model works ?

In this article we are going to take a dive into the **Client-Server** model and have a look at how the **Internet** works via, web browsers. This article will help us in having a solid foundation of the WEB and help in working with WEB technologies with ease.

- **Client:** When we talk the word **Client**, it mean to talk of a person or an organization using a particular service. Similarly in the digital world a **Client** is a computer (**Host**) i.e. capable of receiving information or using a particular service from the service providers (**Servers**).
- **Servers:** Similarly, when we talk the word **Servers**, It mean a person or medium that serves something. Similarly in this digital world a **Server** is a remote computer which provides information (data) or access to particular services.

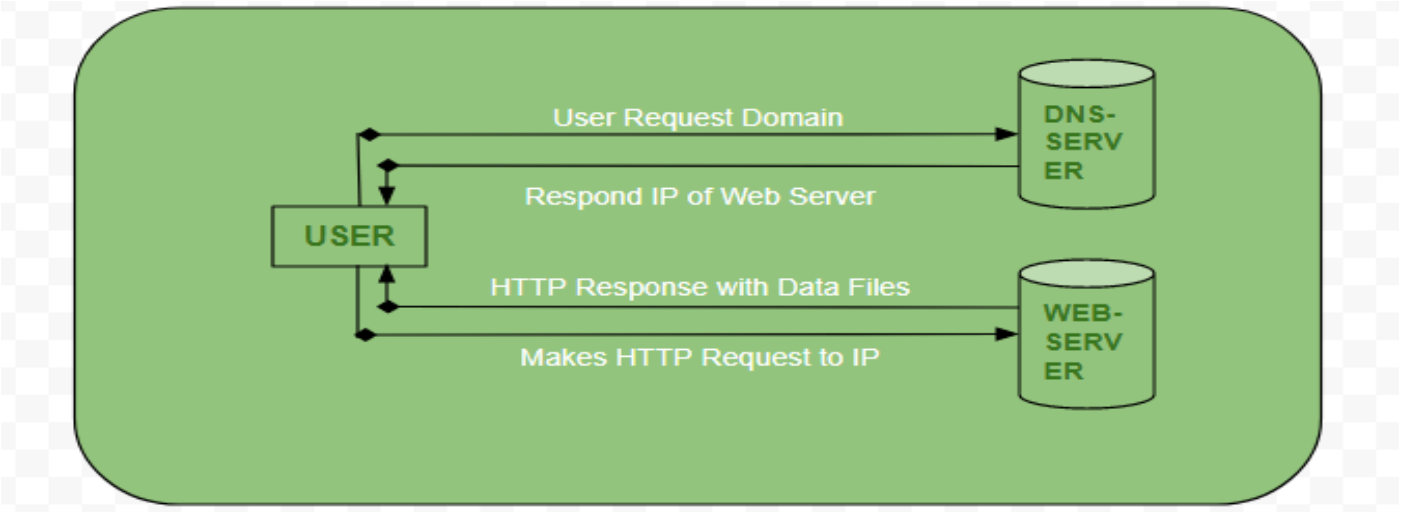
So, its basically the **Client** requesting something and the **Server** serving it as long as its present in the database.



How the browser interacts with the servers ?

There are few steps to follow to interacts with the servers a client.

- User enters the **URL**(Uniform Resource Locator) of the website or file. The Browser then requests the **DNS**(DOMAIN NAME SYSTEM) Server.
- **DNS Server** lookup for the address of the **WEB Server**.
- **DNS Server** responds with the **IP address** of the **WEB Server**.
- Browser sends over an **HTTP/HTTPS** request to **WEB Server's IP** (provided by **DNS server**).
- Server sends over the necessary files of the website.
- Browser then renders the files and the website is displayed. This rendering is done with the help of **DOM** (Document Object Model) interpreter, **CSS** interpreter and **JS Engine** collectively known as the **JIT** or (Just in Time) Compilers.



Advantages of Client-Server model:

- Centralized system with all data in a single place.
- Cost efficient requires less maintenance cost and Data recovery is possible.
- The capacity of the Client and Servers can be changed separately.

Disadvantages of Client-Server model:

- Clients are prone to viruses, Trojans and worms if present in the Server or uploaded into the Server.
- Server are prone to Denial of Service (DOS) attacks.
- Data packets may be spoofed or modified during transmission.
- Phishing or capturing login credentials or other useful information of the user are common and MITM(Man in the Middle) attacks are common.

UNIFORM RESOURCE LOCATOR (URL)

A URL is a type of uniform resource identifier and is address of a resource on the World Wide Web and the protocol used to access it. It is used to indicate the location of a web resource to access the web pages. For example, to visit the javatpoint website, you will go to the URL www.javatpoint.com, which is the URL for the javatpoint website.

The URL sends users to a specific resource online such as video, webpage, or other resources. When you search any query on Google, it will display the multiple URLs of the resource that are all related to your search query. The displayed URLs are the hyperlink to access the webpages.

A URL (Uniform Resource Locator) contains the information, which is as follows:

- The port number on the server, which is optional.
- It contains a protocol that is used to access the resource.
- The location of the server
- A fragment identifier
- In the directory structure of the server, it contains the location of the resource.

The additional information about the URL is described below with the help of an example:

Let's take an example: https://www.javatpoint.com/jtp.htm, it indicates the jtp.htm is a file located on the server with the address of javatpoint.com.

http:// or https://

The http is a protocol that stands for Hypertext Transfer Protocol. It tells the browser to which protocol will be preferred to use for accessing the information that is specified in the domain.

The https (Hypertext Transfer Protocol Secure) is an enhanced protocol as compared to http as it concerned with security. It provides the surety that the information, which is transmitted over HTTP is secure and encrypted. The colon (:) and two forward slashes (//) are used to separate the protocol from the rest of the part of the URL.

www.

The www is used to distinguish the content, which stands for World Wide Web. This portion of the URL can be left out many times, as it is not required. For instance, if you type "http://javatpoint.com," you will still get the javatpoint website. For an important subpage, this portion can also be substituted, which is known as a subdomain.

javatpoint.com

The javatpoint.com is the domain name for the website, and the .com is called TLD or suffix. It helps to identify the location or type of the website. For example, ".org" stands for an organization, ".co.uk" stands for the United Kingdom, and ".com" is for commercial. There are various types of domain suffixes available; you are required to register the name through a domain registrar to get a domain.

jtp.htm

The jtp.htm is the name of the web page, and the .htm is the file extension of the web page, which describes the file is an HTML file. There are many other file extensions available on the internet such as .php, .html, .xml, .jpg, .gif, .asp, .cgi, etc.

Where is the URL located?

A URL is located in the address bar or search bar at the top of the browser window. The URL is always visible in the desktop computers and laptop unless your browser is being displayed in full screen. In most of the smartphones and tablets, when you scroll down the page, the URL will disappear and only show the domain when visible. To visible the address bar, you need to scroll up the page. And, if only the domain is shown and you want to see full address, tapping on the address bar to show the full address.

What is URL Redirect?

A URL redirect is a web server function that takes your URL and points it to another. For example, consider, you had the old URL "myvlogsite.com," and you wanted to visitors' access directly to the new URL *"javatpoint.com."* Redirect is the best solution for it; when anyone type "myvlogsite.com" in the browser would be redirected to the new URL *"javatpoint.com."* There are various kinds of redirects for web developers, such as HTTP 3xx series status codes, manual redirects, JavaScript, metatag refreshes, server-side scripts, frame redirects, and more. Furthermore, the URL redirect may also be known as URL forwarding, domain forwarding, HTTP code 3xx redirect, and domain redirection.

There are many reasons for web users may be redirected from one URL to another, such are as follows:

- Merging of two websites
- Change of business name
- To direct content to a recently updated domain name
- Landing page-split testing for marketing tests
- To direct traffic toward recently updated content

A URL redirect is also used to cause problems for users and their computers through illegal activities like phishing. Additionally, it can be used to remove the search results of web browsers, but nowadays, most of the search engines are capable of detecting these types of fraud attempts. Redirect a web page, the several HTTP protocol 3xx series codes are the most common way. The members of this series have various attributes, such are as follows:

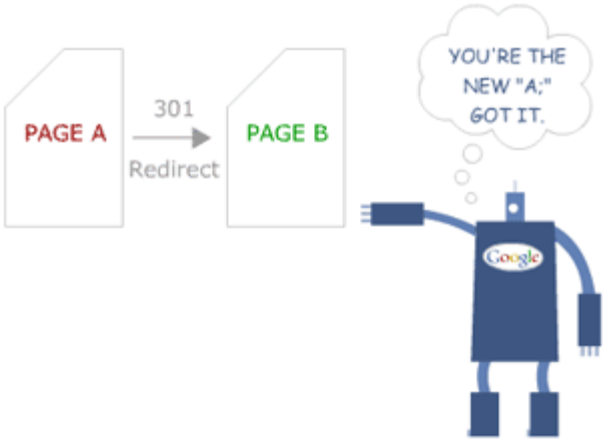
- The number 300 provides various redirect choices. For instance, an option to select alternative languages.
- The number 301 indicates when a site is moved permanently. For example, when the name of a business has changed.
- The number 302 is used for an unspecified redirect.
- 303 display the output of CGI (common gateway interface) scripts.
- 307 is used, when a site is to be redesigned.

The website address obtains a new URL when a website visitor is redirected to a newly named website URL. Businesses often change their website's homepage into a redirect page. They transform page with a concurrent message briefly describing the redirect. A meta tag is embedded into the website's source code behind the scenes. The regular visitors of the website will receive an error message "404 - Not Found" without a redirect.

Different types of redirects

1. 301 Redirect

It is a permanent type of unmasked redirect that instructs web browsers to move from one site destination to another automatically. It is one of the most common and searches engine-friendly method for implementing redirects. It should be used when your website was permanently moved to the new address.



2. The redirect can also be used in some programming languages like PHP; programmers can use a canonical 301 redirect to perform a change for many pages in a domain. Furthermore, the 301 redirect passes over 90% of the link juice; thus, it is also beneficial for SEO purposes.

3. 302 Redirect

It is a temporary type of unmasked redirect and not widely used. It is a name for an HTTP status code that is used when a certain URL has been changed temporarily to a different address. Search engines will not index the destination URL, index the original URL, and display it in search results. The browser is redirected from one URL to another with the help of 302 redirects. Additionally, it is characterized as a permanent redirect and based on a different HTTP status code. In many cases, it can return a cleaner and simpler URL for users. To use 302 redirects, other technologies and different search engines have their own specific strategies.

4. 303 Redirect

A 303 redirect is also known as HTTP 303 that is a response to an HTTP status code. It is a specific type of redirect as a response to a request for a URI (Unified Resource Identifier). It also has its own syntax; the W3C specifies to use a GET method to access the desired destination if a request for a different URI.

When should be used a redirect?

1. You have duplicate content

Duplicate content is that it appears more than once on the page. There are multiple pages on Google that contain duplicate content. In this situation, it is difficult for Google to understand which page is the correct one. You can use a 301 redirect on the duplicate piece of content to direct to the original page. It will create a better experience for your users and help to improve your search engine rankings.

2. You have changed your domain

The use of redirect is useful when you are making change your domain name and probably do not want to lose any built links.

3. You have multiple domains

To protect the online brand, some people purchase multiple domain names. So, they will need to redirect any of the old domain to the new domain. Many companies do this to gain additional traffic from common misspellings. Also, they can prevent competitors from buying a similar domain and can redirect them to their own site.

SEARCH ENGINES

1. You.com

You.com is an AI-powered search engine founded by Richard Socher, a prominent natural language processing (NLP) researcher and former chief scientist of Salesforce.

The site operates in two modes: a personal mode and a private mode.

In personal mode, users can configure their own source preferences. While in private mode, they enjoy a completely untraceable experience; no telemetry data is recorded.

The company also offers YouCode, an AI-powered coding assistant, and YouWrite, an AI writing assistant.

The open search platform encourages developers to build apps and contribute to a more open and collaborative internet.

A Revenue-Sharing Search Engine

2. Yep.com

Yep.com (by Ahrefs) promotes itself as being a search engine with a difference.

It is designed to directly reward and compensate content creators by using a 90/10 revenue share business model.

This means that 90% of all advertising revenue goes directly to the creators of content, allowing them to earn money for their work.

In addition, this business model allows users to directly support their favorite content creators and ensures that content creators are fairly compensated.

A Copyright-Free Search Engine

3. Openverse

Openverse should be your first stop on the hunt for nearly any type of copyright-free content.
This search engine is perfect if you need music for a video, an image for a blog post, or anything else without worrying about angry artists coming after you for ripping off their work.

Mainstream Search Engines

Mainstream search engines are the Google alternatives that have managed to maintain a modest market share over the past several years.
They may also be in the best position to regain lost market share for the first time in years – but only **if** they played the AI card better than Google.

4. Bing.com

As of January 2022, Microsoft sites handled a quarter of all search queries in the United States.
One could argue that Bing outperforms Google in certain respects.
For starters, Bing has a rewards program that allows one to accumulate points while searching. These points are redeemable at the Microsoft and Windows stores, which is a nice perk.
In my view, the Bing visual search API is superior to its rivals and much more intuitive.
Bing carries that same clean user experience to video, making it the go-to source for video searches without a YouTube bias.
On February 7, 2023, Bing announced an all-new, AI-powered version of its search engine and Edge browser. The stated goal is to "deliver better search, more complete answers, a new chat experience, and the ability to generate content."
According to Satya Nadella, chairman and CEO of Microsoft, there are 5 billion search queries a day that go unanswered. Bing is looking to fill that void.

5. Yahoo.com

As of January 2022, Yahoo.com (Verizon Media) had a search market share of 11.2%.
Yahoo's strength is in diversification by offering services like email, news, finance, and more in addition to search.
Yahoo has been innovating and evolving for more than two decades.
It made a cryptic tweet on January 20 about making search cool again, but did not take me up on my request to explain what that means.

Privacy-Focused Search Engines

Privacy is an increasingly important issue among internet users.

Privacy-focused search engines prioritize users' privacy, and their appeal is that they do not track users' activities or collect personal data.

Some of the most popular include:

6. DuckDuckGo

DuckDuckGo is a search engine that could also fit into the mainstream category, but the primary "selling feature" is that it doesn't collect or store any of your personal information.

That means you can run your searches in peace without having to worry about the boogeyman watching you through your computer screen.

DuckDuckGo is the perfect choice for those who wish to keep their browsing habits and personal information private.

DuckDuckGo Lite is the mobile version.

7. Startpage

Startpage serves up answers from Google.

It's the perfect choice for those who prefer Google's search results but aren't keen on having their search history tracked and stored.

It also includes a URL generator, proxy service, and HTTPS support.

The URL generator is especially useful because it eliminates the need to collect cookies. Instead, it remembers your settings in a way that promotes privacy.

8. Swisscows

Swisscows is a unique option on this list, billing itself as a family-friendly semantic search engine.

It also prides itself on respecting users' privacy, never collecting, storing, or tracking data.

It uses artificial intelligence to determine the context of a user's query.

Over time, Swisscows promises to answer your questions with surprising accuracy.

9. Gibiru

According to its website, Gibiru features “Uncensored Private Search” with no retargeting and no selling of private data.
It claims its search results are sourced from a modified Google algorithm, so users are able to query the information they seek without worrying about Google’s tracking activities.
Because Gibiru doesn’t install tracking cookies on your computer, it purports to be faster than “NSA (National Security Agency) Search Engines.”
Knowledge-Based Search Engines

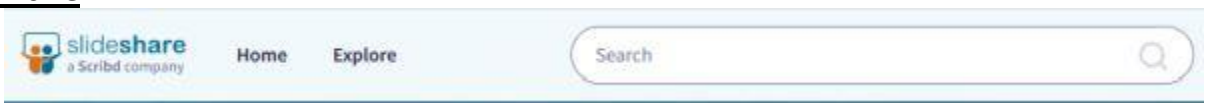
10. Wiki.com

Wiki.com pulls its results from thousands of wikis on the net.
It is the perfect search engine for those who appreciate community-led information, as found on sites like Wikipedia.

11. Twitter

Twitter is hard to beat as a real-time search engine.
It’s the perfect place to go for minute-by-minute updates in case of an emergency.
Google will catch up eventually, but nothing beats a tweet in the heat of the moment.
To make the most of it, check out our guide to Twitter Advanced Search.

12. SlideShare

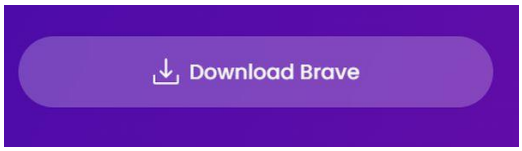


SlideShare allows you to search for documented slideshow presentations.
You can also search for ebooks and PDFs, making it an excellent tool if you have a business presentation to prepare for.
SlideShare also allows you to save slides and even download the entire slideshow for use on your local computer.

13. Wayback Machine

Internet Archive, a.k.a. the Wayback Machine, is great for researching old websites, but it’s so much more.
As the name implies, this search engine queries a massive collection of documented material, including millions of free videos, books, music, and software.
Essentially, the Internet Archive is a vast online library where you can access just about anything you could imagine.
Browser-Based Search

14. Brave



Brave is a privacy-focused web browser that blocks trackers and ads and provides private search and browsing by default.
It features free video calls, offline playlists, and a customizable news feed.
Advanced security features like IPFS integration, Tor (Onion Routing), and a crypto wallet are also available.
Brave offers rewards for opting into privacy-preserving ads. It claims over 50 million people use its browser for a faster and safer web experience.

15. Neeva

Neeva offers a browser extension that provides a private, ad-free, and customizable experience.
It allows users to customize their search results by choosing preferred retailers and news sources and provides expert-recommended shopping results.
Neeva even provides recipe results with filters for cook time, ingredients, and reviews.
Neeva says it never sells or shares users' data.

SOFTWARE AGENTS

Meaning of software agent

Nwana, (1996) and Schermer, (2007), defined software agent as a computer program that acts for a user or other program in a relationship of agency, which derives from the Latin agere (to do): an agreement to act on one's behalf. Such "action on behalf of" implies the authority to decide which, if any, action is appropriate.
Although the theory of agents stated that agent is given a very famous with the growth of internet. Software agents are a piece of software which works for the user. However software agent is not just a program. An agent is a system situated within and a part of an environment that senses that environment and acts on it. Over time in pursuit of its own agenda and so as to affect what it senses in the future, Stan and Art (1996). Important use of agent concept is, as the tool for analysis not as dosage. As the system changes, one can understand it.

Characteristics of software agent

Software agents are like guards and locomotives of most E-Commerce. They however differ from traditional software.
The following are very few characteristics:

- Software agents can do their task without any outsource intervention.
- Social interaction with other software agents and human.
- Software agents are specific in their goals.
- Good software agent is the one which has the attitude to receive and adopt changes Loannis and Dimitris programmed in a powerful language so as to express the rules.
- Safety of the information must be promised by the agent.
- Effective usage of the existing resources.
- Agent must be a good sailor.

- Software agents have the ability to personalize.
- Software agents have the ability to be adaptive and proactive

Agents must be very careful in handling unauthorized users. The same information must be accessed by the user to which they have right.

Types of software agent Agents are classified into different types based on the characteristics they posses. In order to possess the above properties agents must have distinct features such as locomotion, integration, co-operation, information, stimulation, etc. For the same sake software agents are classified into 8 agents.

- **COLLABORATIVE AGENTS:**collaborative agent is a software program that helps users solve problem, especially in complex or unfamiliar domains by correcting errors, suggesting what to do next, and taking care of low level details. Collaborative agents are also refereed as collagen. In spite of their behavior of autonomy, co-operation, and learning, collagen punctuate the first two behaviors. In order to perform these they have to agree on acceptable protocols.
- **INTERFACE AGENTS:** Interface agents are computer programs that employ machine learning techniques in order to provide assistance to a user dealing with a particular application (Maes, 1994b). These agents take sufficient amount of time to understand and learn human behavior before they are onto work. In spite of their artificial learning thoughts they are limited co-operative with other agents Hyacinth and Divine (2003).
- **MOBILE AGENTS:** A mobile agent is an executing program that can migrate during execution from one machine to another in a heterogeneous network, (Brian etal 1993). Mobile agents are used to solve many problem of network computing with minimum bandwidth and connectivity, Holger (1997). The theme behind these agents is, 'give program the ability to move'. The main advantage of mobile agent over stationery agent are: (a).This is not bound to the system where it begins execution. (b) Can move from one system to another within the network. (c) Both the state and code is transported.
- **INFORMATION/INTERNET AGENTS:** The intelligent part of software which can automatically search for information on the website is termed as information agents. Information system can be considered as knowledge base system. These agents are defined by what they do unlike collaborative agents or interface agents which are defined by what they are. Hyacinth and Divine (2003).
- **REACTIVE AGENTS:** These agents are responsible for stimulating the response to the present state of the environment in which they are embedded. These agents interact with other agents in a very simple and basic way. The important things which support reactive agents.(maes 1991 a). There is no prior specification of the behavior of these agents set since the dynamic interaction leads to the emergent complexity. (b) Reactive agents are responsible for collection of modules which operate autonomously. (c) Reactive agents tend to operate on representations which are close to raw sensor data, Hyacinth and Divine (2003). (d) Intelligent behavior is the interaction of these agents with their environment.
- **HYBRID AGENTS:** Combining two or more of the previous mentioned agent philosophies will yield a better functioning agent. E.g.: Synergy of reactive and collaborative model. The expectation is that this hypothesis will come true.

- **HETEROGENEOUS AGENTS:** These agent systems unlike hybrid, refers to an integrated set up of at least two or more agents which belong to two or more different agent classes. These may also contain two or more hybrid agents, Hyacinth and Divine (2003)
- **SMARTS AGENTS:** The smart agents are the new form of software agents that interface with other agents forming an artificial intelligence. SMART stands for

System for Managing Agents for Real Time. The key concept lies here is not the entire individual agent need be intelligent. But by working together in a smart way the agents form a type of emergent intelligence that may appears to exhibit intelligence.

Examples of Software Agents:

Buying agents: Also know as shopping bots. These bots helps the users to surf while finding the products and services they are searching for. For example, when a person surfs for an item on eBay, at the bottom of the page there is a list of similar products that other customers who did the same search looked at. This is because it is assumed the user tastes are relatively similar and they will be interested in the same products.

User agents: Also known as personal agents. These agents carry out user tasks automatically. For example, some bots sort emails according to the user's order of preference, assemble customized news reports, or fill out webpage forms with the user's stored information.

Monitoring and Surveillance agents: Also known as predictive agents. For example, the agents keep track of company inventory levels, observe competitor's prices and report them back to the company, watch stock manipulation by insider trading and rumors, etc.

Data-mining agents: This agent uses information technology to find out the modern fashion in information from many different sources. For example, the agent that detects market conditions and changes and relays them back to a user/company so that the user/company can make decisions accordingly. The others

examples are User agent, Mail Transfer agent, SNMP agent, DAML (Defense Agent Markup Language), 3APL (Artificial Autonomous Agent Programming Language), OWL (Web Ontology Language), Management agents, etc.

INTERNET SERVICE PROVIDERS (ISP)

An internet service provider (ISP) is a company that provides access to the internet. ISPs can provide this access through multiple means, including dial-up, DSL, cable, wireless and fiber-optic connections.

A variety of companies serve as ISPs, including cable providers, mobile carriers, and telephone companies. In some cases, a single company may offer multiple types of service (e.g., cable and wireless), while in other cases, a company may focus on just one type of service (e.g., fiber-optic). Without an ISP, individuals and businesses could not reach the internet and the opportunities it provides.

Typical services offered by ISPs

Internet access is the primary service offered by ISPs, but there are a variety of other services they may provide. These can include:

- **Equipment rental**: Many ISPs will rent equipment like modems and routers to their customers. This can be a convenient option for those who do not want to purchase their own equipment or do not need the latest and greatest technology.

- **Tech support**: Many ISPs offer tech support to their customers. This can be a valuable service for those unfamiliar with setting up or troubleshooting internet connections.
- **Email access**: Some ISPs offer email services to their customers. This can be a convenient way to have an email address linked to your ISP account.
- **Tiered connection plans**: ISPs typically offer different tiers of service, with different speeds and data allowances. This is a good option for those who want to pay for a higher-speed connection or who need more data than what is included in the basic package.

As a leading provider of internet service, Verizon offers a variety of services to consumers, including:

- **Fios Internet**: Fios Internet is a 100% fiber-optic network that delivers some of the fastest internet speeds to millions of homes in the mid-Atlantic and New England.
- **5G Home Internet**: 5G Home Internet is a wireless home internet service utilizing 5G Ultra Wideband technology that provides the network performance and speed you want to stream, game or work flexibly.
- **LTE Home Internet**: Verizon LTE Home is a wireless internet service that offers download speeds of 25-50 Mbps, with typical upload speeds of 4 Mbps.

It's important to note that there is a difference between Mbps and Kbps. Mbps stands for megabits per second, while Kbps stands for kilobits per second — one megabit is the equivalent of 1,000 kilobits.

Evolution of internet service providers

Internet service providers have come a long way since their early days of offering dial-up internet service. In the past, dial-up was the only option for those who wanted to access the internet. This meant that users had to connect their computer to a phone line and use a modem to connect to the internet. The speeds were slow (usually around 56 kbps), and the connection was often unreliable.

As technology progressed, ISPs began offering higher-speed connections using DSL or cable. These connections were much faster than dial-up (usually around 1 Mbps), but they were still slower than what is available today.

Now, ISPs are offering high-speed fiber-optic connections and unlimited data plans. As technology progresses, we are beginning to see new services like high-speed 5G home internet becoming much more widely available.

Why do I need an ISP?

An ISP is required in order to connect to the internet via a modem in your home or business. Without an ISP, you would not be able to access the wealth of information available online. An ISP can provide you with a fast and reliable connection.

That said, there’s some leeway for those who are interested in using a mobile data plan and hotspot to connect to the internet, instead of paying for a plan from an ISP that doesn’t offer mobile connectivity. With a mobile data plan, you pay for a certain number of gigabytes per month, and you’re able to share data and get internet on multiple devices via hotspot.

A mobile data plan can give you fast, reliable internet —although a data cap may be an issue with some plans. If you're considering a prepaid mobile plan but are worried that you might need more data than it offers, many ISPs offer unlimited data plan options.

Other benefits of using an ISP include:

- ISPs offer a variety of plans, so you can choose the one that is best for your needs.
- ISPs offer discounts or promotions from time to time, so you may be able to get a lower price on your service.
- ISPs often include additional services like email or web hosting.
- ISPs are regulated by the government, so you can be sure they will provide a certain level of service.

If you want a fast and reliable internet connection, you need an ISP. ISPs offer a variety of services that can meet your needs, whether you are a business or a consumer. In addition, ISPs are constantly evolving to offer even higher speeds and unlimited data plans.

BROADBAND TECHNOLOGIES

A large range of communication technologies with different technical capacities are capable of providing high-speed internet to households. Wired technologies include copper cable (xDSL), coaxial cable (e.g. HFC), broadband over power lines (BPL) and optical fibre cable (FTTx).

Copper wires

Copper wires are defined as 'legacy telephone unshielded copper twisted pair', providing broadband connections by using xDSL-technologies, such as ADSL/ADSL2+ (max. 24/3 Mbps down-/upstream rate within max. 0,3 km efficiency range) or VDSL/VDSL2/VDSL2-Vplus/VDSL2 vectoring/G.fast (with vectoring max. 300/100 Mbps down-/upstream rate within 0,2 km efficiency range).

- **Pros:** They require relatively low investment needed for passive infrastructure (a copper telephone line is already present in most households) and are least disruptive for the end users.
- **Cons:** The high (download) speeds depend on the length of copper line. The xDSL technology is heavily asymmetrical: upload speeds are generally much lower than download speeds; this may hamper new services (e.g. cloud computing, videoconferencing, teleworking, tele-presence). Higher investment is needed in active equipment (with a life-time of 5-10 years). This may be an interim solution, yet the investment in fibre infrastructure would most likely only be postponed by 10-15 years.
- **Sustainability:** Newer copper-based technologies (e.g.: Vectoring, G.fast) can deliver higher speeds, but suffer from the same limitations. They demonstrate bridging technologies towards complete fibre optic cable infrastructures.

Coaxial cables

The classical cable connection would be the two wires of a telephone line (‘twisted pair’), most prone to disturbance effects such as interferences. Broadband internet via coaxial cable is usually offered to customers via the existing cable TV (CATV) network. The coaxial cable consists of a copper core and a copper-shielding coat. The TV cable networks are therefore much more efficient than the traditional telephone networks.

- **Pros:** This requires relatively low investment needed for passive infrastructure and is also least disruptive for the end users. This infrastructure offers slightly more opportunities to deliver higher broadband speeds than on telephone lines. Ultra-fast speeds are possible, if the infrastructure is properly upgraded and distances are kept short.
- **Cons:** The bandwidth is shared among several users reducing its availability during peak traffic periods of the day. The impossibility of unbundling makes service competition basically absent in the cable market; seldom present in the digital-divide areas. An interim solution to invest in fibre infrastructure would most likely only be postponed by 10-15 years as with copper wires.
- **Sustainability:** The implementation of new standards (DOCSIS 3.1, 3.1 full duplex) allows for higher bandwidths to end-users of up to 10 Gbps.

Broadband over power line (BPL)

Broadband can be delivered over existing low and medium voltage electric power distribution networks. BPL speeds are comparable to those of xDSL and coaxial cables.

- **Pros:** It is not necessary to deploy new infrastructure as existing power lines can be used. BPL has great future potential as power lines exist nearly everywhere.

- **Cons:** In low populated areas, the technology is only economically viable for the end user if 4 to 6 homes are equipped with transformers to make broadband available over power lines. Otherwise, end user prices for internet access surpass those for xDSL and coaxial cable solutions. There are technical challenges due to power lines being a very "noisy" environment and interference with high frequency radio communications and broadcasting.

Optical fibre

Optical fibre lines consist of cables of glass fibre connected to end-users' homes (FTTH), buildings (FTTB) or street cabinets (FTTC). They allow for very high transmission rates of 100 Gbps and more within very wide (10-60 km) efficiency range. This is the most future-oriented solution, but requires high investment in passive infrastructure.

- **Pros:** Extremely high level of transmission rates and symmetry (Gbps and Tbps bandwidths possible), less susceptible to interference and hardly any power drop at larger distances to the distributor unlike DSL or VDSL and enough power reserves also for demanding multi-person households.
- **Cons:** High investment costs in passive infrastructure due to the high costs of civil engineering for excavation and piping; deployed infrastructure is not locatable and requires exact documentation.
- **Sustainability:** Next generation technology with capacities to meet high bandwidth demands expected in the near future.

Deployment methods

Wired broadband infrastructure deployment is a cost and resource intensive option. Reducing the costs will encourage investments in broadband roll-out and lower the threshold for market entry. This can be facilitated by accessing alternative infrastructures and utility networks and by using low-impact deployment strategies (e.g. trenching).

Installation in the ground (by trencher)

The open trench construction is a method for the deployment of supply and disposal pipes. The earth's surface is opened and a trench is excavated. For the laying of telecommunication lines, manual digging as well as construction equipment are used.

- **Pros:** The open trench construction is used in all topological scenarios and is generally feasible for all types of surfaces. The durability is very high and there is no restriction for the use of pipes and components. Potential costs can be saved deviating from the regular depth, deploying in walking or cycling paths or using a trencher.
- **Cons:** Deviating from the normal depth increases the risk of possible cable damage in the course of construction and repair work of adjacent or overlapping infrastructures. The restoration of the surfaces is rather complex and the building environment is impaired by noise pollution and traffic disturbances. The method is costly and shows long construction times.

Trenching

A slit is milled into a road cover, an asphalt walkway or cycle path, in which microtubes are inserted and then immediately afterwards closed with a filling. A distinction is made between nanotrenching (up to 2 cm), micro-(8 cm to 12 cm), mini-(12 cm to 20 cm) or macrotrenching (20 cm to 30 cm) and the used cutting or milling technique.

- **Pros:** Trenching promises short building times and significantly lower construction costs. The process has a high construction output of approx. 600 m per day and leads to very little traffic impairments due to the rapid refilling of the road body.
- **Cons:** The milled slits can lead to damage in the asphalt surface in the form of cracks, settling or frost damage. The additional laying level in the road can make subsequent civil engineering work - particularly in the inner city area - more difficult and lead to longer and more costly constructions.

Horizontal directional drilling

The directional drilling technique allows laying trenchless cable protection pipes, e.g. used for crossing obstacles such as river, avenues (tree protection) and railways. A controllable pilot hole is carried out between two excavation pits. The effect of rotation, stroke and impact movements and liquefaction enables a propulsion at a wide variety of soil conditions. By means of a bentonite drilling fluid (drilling suspension), the soil is loosened and extracted (rinsed). After that, the drill head expands the existing channel.

- **Pros:** The method offers an alternative when open trenching is not possible (e.g. crossing of obstacles such as railways or rivers) or economically feasible.
- **Cons:** At low depth and loose grounds, the drilling suspension can escape at the surface during the drilling process (blow-out). Furthermore, control inaccuracies can cause deviations in the longitudinal gradient.

Drilling

This technology is a ground displacement process in which a pneumatically driven ground displacement hammer (rocket) is driven through the soil by compressed air. A protective tube is pulled into the created ground tube in the same operation. The technology is especially used for connecting buildings.

- **Pros:** Costs of excavation and restoration are saved, traffic restrictions or road barriers are often not necessary. The method saves time as pipes are fed directly with the rocket. It can be used even in extreme soils and at longer distances.
- **Cons:** The deployment depth must be at least tenfold the diameter of the rocket in order to avoid bulging of the terrain surface. It is suitable only for relatively short distances and cannot be used in bogs or very rocky soils.

Ploughing techniques

During the ploughing process, a deployment plough is pulled through the spoil with the help of a tractor. A flexible conduit (micro cable compounds) is laid in the resulting furrow, particularly suitable for direct ploughing.

- **Pros:** The procedure is comparatively inexpensive and allows the routing of long distances with little effort.
- **Cons:** It can only be used on unsealed surfaces and is therefore not suitable for asphalt roads.

ELECTRONIC DATA INTERCHANGE (EDI)

Electronic Data Interchange (EDI) is a computer-to-computer exchange of business documents in a standard electronic format between two or more trading partners. It enables companies to exchange information electronically in a structured format, eliminating the need for manual data entry and reducing the cost and time associated with paper-based transactions.

EDI was first introduced in the 1960s as a way for companies to exchange business documents electronically. Over time, the standardization of EDI formats and protocols has enabled businesses to integrate their internal systems with those of their trading partners, improving efficiency and reducing errors.

EDI transactions can include purchase orders, invoices, shipping notices, and other business documents. The EDI standard defines the format and content of these documents, ensuring that they are easily interpreted by both the sender and the receiver.

EDI has become an important part of many businesses, particularly those in the supply chain and logistics industries. It allows for faster and more accurate processing of transactions, leading to improved customer satisfaction and increased profits.

Imagine writing a letter to your friend while communicating every time, Can not imagine right? Since today humans live in an era where they can very easily communicate through the internet. Now, imagine the same case with businesses, where communication and exchange of very important documents are constantly required, doing this the old way, it will take forever for the messages to reach the other party, but also the documents will pile up as there is a lot of information that is needed to be stored and kept. It is a tedious and cumbersome process indeed, this is where EDI plays its role.

Electronic Data Exchange is the direct exchange of data and important business documents through the Internet and in a very professional manner. Two different companies sitting at the extreme corners of the world can very easily interchange information or documents (like sales orders, shipping notices, invoices, etc) with the help of EDI.

EDI Documents:

The most common documents exchanged via EDI are:

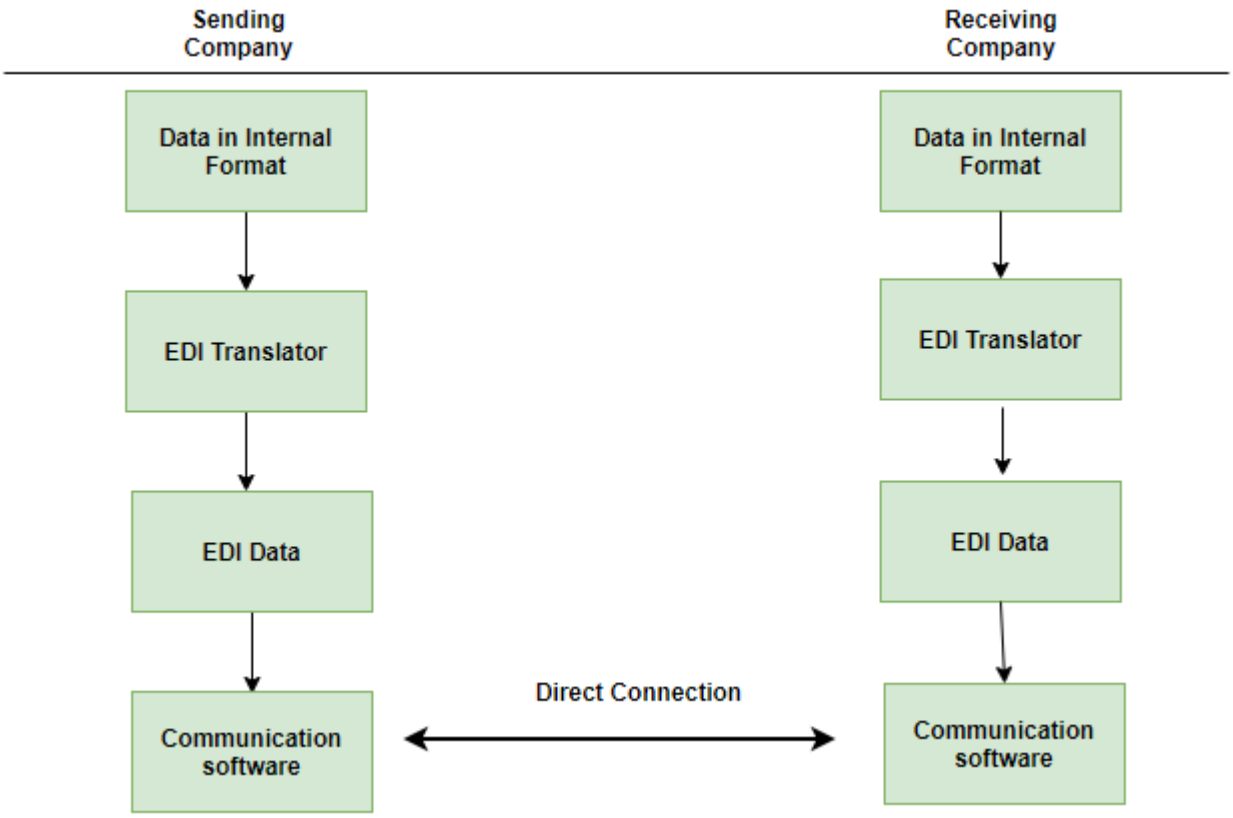
- Invoices
- Purchase Orders
- Financial Information letters
- Transaction Bills
- Shipping requests and notifications
- Acknowledgment and feedback
- Transcripts
- Claims
- Business Correspondence letters

EDI Users:

- Central and state government agencies
- Industry
- Banking
- Retailing
- Manufacturing
- Insurance
- Healthcare
- Automotive
- Electronics
- Grocery
- Transportation

How EDI works?

The data or the information that one company sends the other first gets prepared to be sent, then the information/document is translated into EDI format. The document is then connected and transmitted to the other business, the connection is direct and point to point.



Uses of EDI :

EDI is widely used in various industries for exchanging business documents electronically. Some of the common uses of EDI are:

- **Order Processing:** EDI allows companies to exchange purchase orders and sales orders electronically, eliminating the need for manual data entry and reducing errors.
- **Invoicing:** EDI can be used to exchange invoices electronically, reducing the time and cost associated with paper-based invoicing.
- **Shipping and Receiving:** EDI can be used to exchange shipping notices and receiving documents, enabling companies to track the movement of goods in real-time.
- **Inventory Management:** EDI can be used to exchange inventory information, enabling companies to manage their inventory levels more effectively.
- **Supply Chain Management:** EDI is used extensively in the supply chain management process, enabling companies to exchange information with their suppliers, distributors, and customers.
- **Healthcare:** EDI is used in the healthcare industry to exchange patient data, claims, and other healthcare-related information between healthcare providers, insurance companies, and government agencies.
- **Financial Transactions:** EDI can be used to exchange financial transactions such as payment advice and remittance advice, reducing the time and cost associated with manual payment processing.

Advantages of EDI:

There are several advantages to Electronic Data Interchange:

- **The paper usage reduced:** The expense of storing, printing, recycling, reduces up to the maximum amount due to the EDI.
- **Improved quality of Data:** The data entry errors are reduced due to EDI.
- **Speed Increases:** The best advantage is the increase in the speed of the data interchange. With everything going online, the speed of the information transfer increases exponentially.

- **Security:** By following the Protocols and the standard rules, the security of all the important documents is always secure and safe.
- **Information accuracy:** Since the information exchanged is based on standards agreed by the sender and receiver both, the correct information is always transferred regardless of where they belong to.
- **Less Cost:** With very less errors, fast response time, every thing becoming automated, and no use of paper, the cost automatically reduces.

Disadvantages of EDI:

- The initial setup of the EDI is very Time-consuming.
- EDI standards keep on changing after some amount of time.
- A very systematic and proper back up is required as the entire data relies on EDI.
- The setup and maintenance of the EDI is very Expensive.

TOKEN BASED SYSTEM

Digital transformation brings security concerns for users to protect their identity from bogus eyes. According to US Norton, on average 8 lakh accounts are being hacked every year. There is a demand for high-security systems and cybersecurity regulations for authentication.

Traditional methods rely on single-level authentication with username and password to grant access to the web resources. Users tend to keep easy passwords or reuse the same password on multiple platforms for their convenience. The fact is, there is always a wrong eye on your web activities to take unfair advantage in the future.

Due to the rising security load, two-factor authentication (2FA) come into the picture and introduced Token-based authentication. This process reduces the reliance on password systems and added a second layer to security. Let's straight jump on to the mechanism.

But first of all, let's meet the main driver of the process: a T-O-K-E-N !!!

What is an Authentication Token?

A Token is a computer-generated code that acts as a digitally encoded signature of a user. They are used to authenticate the identity of a user to access any website or application network.

A token is classified into two types: A Physical token and a Web token. Let's understand them and how they play an important role in security.

- **Physical token**: A Physical token use a tangible device to store the information of a user. Here, the secret key is a physical device that can be used to prove the user's identity. Two elements of physical tokens are hard tokens and soft tokens. Hard tokens use smart cards and USB to grant access to the restricted network like the one used in corporate offices to access the employees. Soft tokens use mobile or computer to send the encrypted code (like OTP) via authorized app or SMS.
- **Web token**: The authentication via web token is a fully digital process. Here, the server and the client interface interact upon the user's request. The client sends the user credentials to the server and the server verifies them, generates the digital signature, and sends it back to the client. Web tokens are popularly known as JSON Web Token (JWT), a standard for creating digitally signed tokens.

A token is a popular word used in today's digital climate. It is based on decentralized cryptography. Some other token-associated terms are Defi tokens, governance tokens, Non

Fungible tokens, and security tokens. Tokens are purely based on encryption which is difficult to hack.

What is a Token-based Authentication?

Token-based authentication is a two-step authentication strategy to enhance the security mechanism for users to access a network. The users once register their credentials, receive a unique encrypted token that is valid for a specified session time. During this session, users can directly access the website or application without login requirements. It enhances the user experience by saving time and security by adding a layer to the password system.

A token is stateless as it does not save information about the user in the database. This system is based on cryptography where once the session is complete the token gets destroyed. So, it gets the advantage against hackers to access resources using passwords.

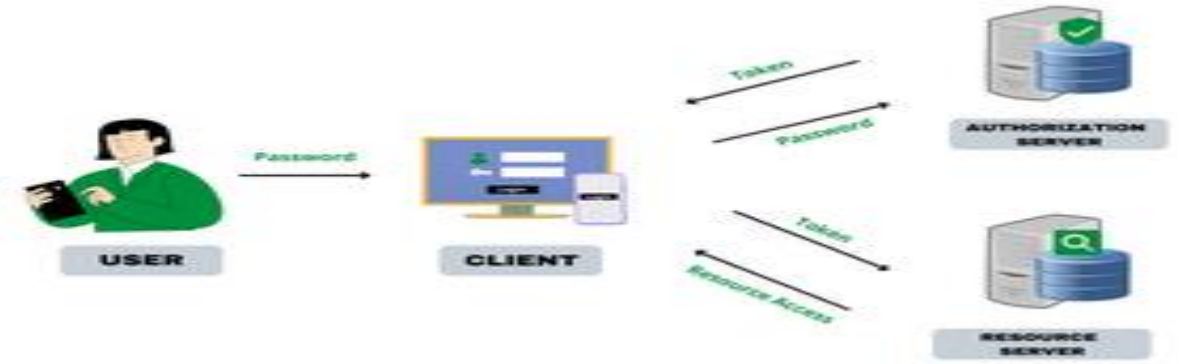
The most friendly example of the token is OTP (One Time password) which is used to verify the identity of the right user to get network entry and is valid for 30-60 seconds. During the session time, the token gets stored in the organization's database and vanishes when the session expired.

Let's understand some important drivers of token-based authentication-

- **User**: A person who intends to access the network carrying his/her username & password.
- **Client-server**: A client is a front-end login interface where the user first interacts to enroll for the restricted resource.
- **Authorization server**: A backend unit handling the task of verifying the credentials, generating tokens, and send to the user.
- **Resource server**: It is the entry point where the user enters the access token. If verified, the network greets users with a welcome note.

How does Token-based Authentication work?

Token-based authentication has become a widely used security mechanism used by internet service providers to offer a quick experience to users while not compromising the security of their data. Let's understand how this mechanism works with 4 steps that are easy to grasp.



How Token-based Authentication works?

1. Request: The user intends to enter the service with login credentials on the application or the website interface. The credentials involve a username, password, smartcard, or biometrics

2. Verification: The login information from the client-server is sent to the authentication server for verification of valid users trying to enter the restricted resource. If the credentials pass the verification the server generates a secret digital key to the user via HTTP in the form of a code. The token is sent in a JWT open standard format which includes-

- **Header**: It specifies the type of token and the signing algorithm.
- **Payload**: It contains information about the user and other data
- **Signature**: It verifies the authenticity of the user and the messages transmitted.

3. Token validation: The user receives the token code and enters it into the resource server to grant access to the network. The access token has a validity of 30-60 seconds and if the user fails to apply it can request the Refresh token from the authentication server. There's a limit on the number of attempts a user can make to get access. This prevents brute force attacks that are based on trial and error methods.

4. Storage: Once the resource server validated the token and grants access to the user, it stores the token in a database for the session time you define. The session time is different for every website or app. For example, Bank applications have the shortest session time of about a few minutes only.

So, here are the steps that clearly explain how token-based authentication works and what are the main drivers driving the whole security process.

CARD BASED SYSTEM

Card Based Payments Systems

Payment cards are plastic cards that enable cashless payments. They are simple embossed plastic card that authenticates the card holder on behalf of card issuing company, which allows the user to make use of various financial services. More than 90% of online payments are card based payments, at the same time other e-payment methods are also gaining importance now-a-days.

Based on the transaction settlement method there are three widely used card based payment systems. They are

1. Credit card based payment systems (pay later)
2. Debit card based payment systems (pay now)
3. Stored value card based payment systems (pay before)

1. Credit Card

Credit card is an electronic payment system normally used for retail transactions. A credit card enables the bearer to buy goods or services from a vendor, based on the cardholder's promise to the card issuer to payback the value later with an agreed interest. Every credit card account has a purchase limit set by the issuing bank or the firm. A credit card is different from a debit card where the credit card issuer lends money to customer instead of deducting it from customer's bank account instantly.

The term credit card was first mentioned in 1887 in the sci -fi novel "Looking Backward" by Edward Bellamy. The modern credit cards concept was born in the U.S.A, in the 1920s, when private companies began to issue cards to enable their customers to purchase goods on credit within their own premises.

In February 1950, Frank McNamara and Ralph Schneider created The Diners Club card which was made of paper-cardboard. Initially The card was accepted in only 27 restaurants and was used only by friends and acquaintances of the two founders (approximately 200 people). Later it was enhanced and accepted worldwide. From 1955, the card was made of plastic. The Diners Club still exists today under the name Diners Club International.

Advantages of credit card

- Most credit cards are accepted worldwide.
- It is not necessary to pay physical money at the time of purchase. The customer gets an extra period to pay the purchase.
- Depending on the card, there is no need to pay annuity.
- Allows purchases over the Internet in installments.
- Some issuers allows "round up" the purchase price and pay the difference in cash to make the transactions easy.

Key players in operations of credit card

1. **Bearer:** The holder of the credit card account who is responsible for payment of invoices in full (transactor) or a portion of the balance (revolver) the rest accrues interest and carried forward.
2. **Merchant:** Storekeeper or vendor who sell or providing service, receiving payment made by its customers through the credit card.
3. **Acquirer:** Merchant's bank that is responsible for receiving payment on behalf of merchant send authorization requests to the issuing bank through the appropriate channels.
4. **Credit Card Network:** It acts as the intermediate between the banks. The Company responsible for communicating the transaction between the acquirer and the credit card issuer. These entities operate the networks that process credit card payments worldwide and levy interchange fees. E.g. Visa, MasterCard, Rupay
5. **Issuer:** Bearer's bank, that issue the credit card, set limit of purchases, decides the approval of transactions, issue invoices for payment, charges the holders in case of default and offer card-linked products such as insurance, additional cards and rewards plan. See Figure 16.2

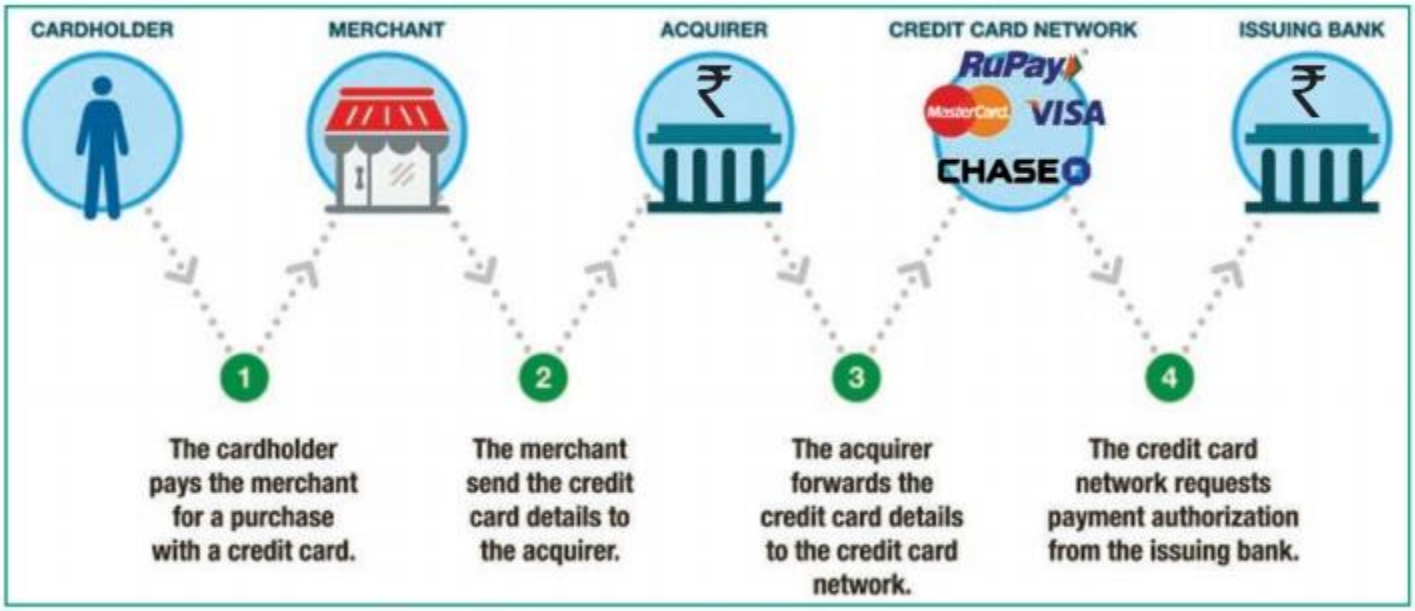


Figure 16.2 Key players of Credit card transaction

Anatomy of a credit card

All Payment cards (including debit card) are usually plastic cards of size 85.60 mm width × 53.98 mm height, rounded corners with a radius of 2.88 mm to 3.48 mm and thickness of 0.76 mm. These standards dimensions are maintained universally in accordance with ISO/IEC 7810#ID-1. See Figure 16.3

1. **Publisher:** Emblem of the issuing bank (along with the sub category or scheme if any)
2. **Credit card number:** The modern credit card number has 16-digit unique identification number.

● The first digit of the credit card number is Major Industry Identifier (MII). It identifies the issuer category. e.g. 1 – Airlines, 4 – Banks

● The next 5 digits uniquely identifies the issuing organization.

● The first 6 digits together called as Issuer Identifier number (IIN) or Bank Identification number (BIN)

● The next 9 digits are the account number.

● The last digit is a check digit (based to the Luhn algorithm).

3. **Name of the cardholder:** It is visibly embossed on the front side (additionally stored on the magnetic stripe) some cards like gift cards do not hold any name.

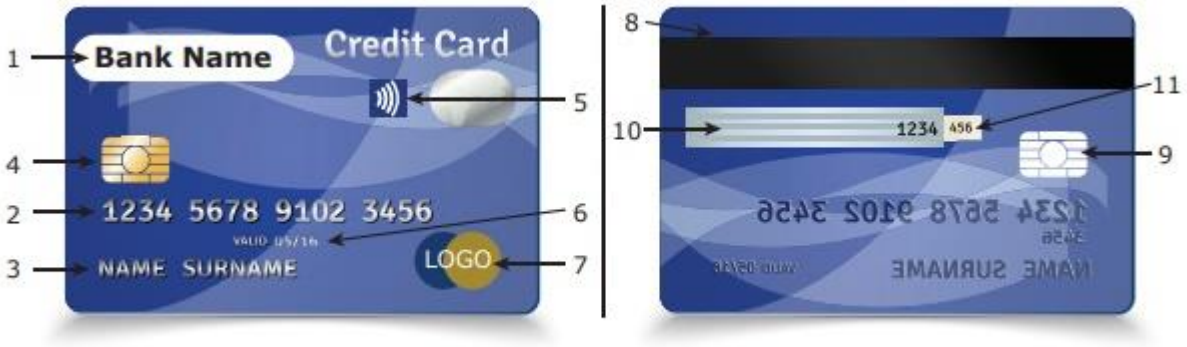


Figure 16.3 Credit Card

4. **EMV chip:** It is integrated chip in addition to magnetic stripe to store cardholder's information. EMV stands for Europay, MasterCard, Visa. These three names correspond to the names of the

companies which are responsible to develop this technology. It is categorized into Chip-and-Signature and Chip-and-PIN.

5. **RFID symbol:** It is four curved lines radiating rightwards similar to a tilted Wi-Fi symbol. It indicates that it is a contactless smartcard.
6. **Expiration month and year:** It is visible on the front side (also stored on the magnetic stripe or chip). The card is valid until the last day of the month printed on it.
7. **Card brand logo:** It is the name of the credit card network company. Visa and MasterCard are leading credit card network companies. Rupay is Indian domestic open loop card launched in 2012.
8. **Magnetic stripe:** It is an iron based magnetic material containing encrypted data about the card holder and account number.
9. **Hologram:** Hologram is a security feature that prevents duplication. It is a 3-dimentional image formed by interference of light beams.
10. **Signature:** It is cardholder's signature at the back of the card, used as an attempt to identify cardholder's identity. It also holds the last 4 digits of card number.
11. **CVC/CVV:** Card Verification code/ value is a 3 digit code usually printed to the left of signature pane validates the card. CVC2 is used in contact less transactions.

Apart from the these mentioned each credit card may also holds issuer's disclaimer, address and phone number.

2. Debit Card

Debit Card is an electronic payment card where the transaction amount is deducted directly from the card holder's bank account upon authorization. Generally, debit cards function as ATM cards and act as a substitute for cash The way of using debit cards and credit cards is generally the same but unlike credit cards, payments using a debit card are immediately transferred from the cardholder's designated bank account, instead of them paying the money back at a later with added interest. In modern era the use of debit cards has become so widespread.

The debit card and credit card are identical in their physical properties. It is difficult to differentiate two by their appearance unless they have the term credit or debit imprinted.

Currently there are three ways of processing debit card transactions:

1. EFTPOS (also known as online debit or PIN debit)
2. Offline debit (also known as signature debit)
3. Electronic Purse Card System

3. Stored value cards

Stored value card is a type of debit card that is pre-loaded with certain amount(value), with which a payment is made. It is a card that has default monetary value onto it. The card may be disposed when the value is used, or recharged to use it again. The major advantage of stored value card is that customers don't need to have a bank account to get prepaid cards. See Figure 16.4

Figure 16.4 Stored value card

Like a credit card or debit card it is a plastic and has a magnetic strip on its back. The magnetic strip stores the monetary value of the card. Stored value cards may not have the card holder's name always. It is also indistinguishable from a regular credit or debit card in appearance. What look like a credit card or debit card act like a credit or debit card. It is used to make purchases offline and online in the same way as in credit card or debit card.
There are two varieties for stored value card.

1. Closed loop (single purpose)
In closed loop cards, money is metaphorically stored on the card in the form of binary-coded data. Closed loop cards are issued by a specific merchant or merchant group and can only be used to make purchases from specific place. e.g. chennai metro rail travel card.

2. Open loop (multipurpose)
Open loop cards can be used to make debit transaction at variety of retailers. It is also called as prepaid-debit cards. It can be used anywhere the branded cards are accepted. e.g. Visa gift cards.
In some countries it is legal for anyone to enter or leave the country with money that is stored on cards, unlike carrying cash in high amounts which is believed a form of money laundering.

4. Smart card
The modern version of card based payment is smart cards. Smart cards along with the regular features of any card based payment system holds a EMV chip. This chip is similar to well-known sim card in appearance but differ in its functionalities. The advantage of Smart cards is that it can provide identification, authentication, data storage and application processing. Smart cards can be classified into Contact smart cards and Contactless smart cards. See Figure 16.5

Figure 16.5 Contact Smart card & POS

1. Contact smart cards

Contact smart cards have a contact area of approximately 1 square centimeter, comprising several gold-plated contact pads. These pads provide electrical connectivity only when inserted into a reader, which is also used as a communications medium between the smart card and a host. e.g. a point of sale terminal(POS).

2. Contactless smart cards Contactless smart card is empowered by RF induction technology. Unlike contact smart cards, these cards require only near proximity to an antenna to communicate. Smart cards, whether they are contact or contactless cards do not have an internal power source. Instead, they use an inductor to capture some of the interrupting radio-frequency signal, rectify it and power the card's processes. See Figure 16.6

Figure 16.6 Contactless smart card

E-CASH

eCash is known as Electronic Cash which is a digital currency technique from which transactions can be achieved anywhere through the internet. It is an easier form of payment, it is based on the principles of blockchain technology (Digital Signatures) among the Peer-to-Peer network. All transactions and dealings are stored in specific digital databases. It is the alternate payment system to pay for bills, products, and services without the use of paper or coin currency. Applications of electronic or digital cash are digital cash, debit cards, electronic cases, electronic check, and credit cards.

Features of Electronic Cash:

- **Decentralized:** This shows that it is managed by a centralized organization by distributed ledgers. It reduces the trust issues as the user may not need to trust anybody. It improves performance and consistency. It makes transactions irreversible.
- **Transparency:** This means that all transactions are visible and clear, and nothing will be hidden from the participants. This enhances the trust and faith in electronic cash.

History of eCash

- In 1983 the eCash was introduced by David Lee Chaum with the cryptography technology and established a company called Digicash in 1998.
- In June 1998, the eCash was available through different banks such as Credit Suisse, Deutsche Bank, Bank Austria, and Den Norske Bank of Switzerland, Germany, Austria, and Norway respectively.
- As it spread widely in the world rapidly but it went bankrupt in 1998 and the company was sold to eCash technologies including the eCash credits.
- In 2000 eCash Technologies went bankrupt during the duration of the court case regarding the ownership of the domain name and in 2002 eCash was obtained by Blucora earlier was InfoSpace.

Examples of eCash

Famous cryptocurrencies Bitcoin and Ethereum are based on the principles of cryptography and blockchain, making them decentralized, and secure, and removing the third party from involvement with transactions. They are not authorized/backed by any organization properly or legally.

- **Cryptocurrencies:** It is referred to as the digital currency which is developed using cryptography technology and is very much decentralized by its properties. The main advantage of cryptocurrency is it is a faster money transfer and is secured with transparency. But the cost of mining is higher and the fluctuations in cryptocurrency are quite unstable.
- **Central Bank Digital Currencies:** It is referred to as fiat currency which is fully authorized by the legal party. It doesn't hide the transactions of payment like other digital currencies do. It is directly proportional to the country's financial economy.
- **Stablecoins:** Stablecoins are the coins that are totally stable according to the currency rate of a specific country, such as Tether, TrueUSD, Binance USD, Dai, etc. Its currency rate is fixed to the fiat currency of a country like the USA. Its main demand is in the time of high investments as it is very much safe.

Advantages of Digital Money

Below are some of the advantages of eCash:

- **Higher Flexibility and ability:** Transaction through eCash can be done flexibly from anywhere around the globe easily. It removes all the difficulties which take place during transactions through the ordinary method.
- **High Security:** It is highly secured as it is traveling in the peer-to-peer network which involves cryptography keys. It is fully encrypted and can't be modified without a decryption algorithm.
- **Time Efficient:** It saves the user time in the procedure of payment, the user can easily make payments with just a single click from its mobile or PC, just requiring internet service.
- **No hard copy is required:** No hard copy is required as the medium or as the prop it digitally travels from one system to another system.

Risk of Digital Money

The risk of using eCash is as follows:

- **Higher Cyber Attacks:** The probability of cyber-attacks and scams is more as it entirely depends on the internet, various attacks such as Phishing, Man-In-the-Middle attack, etc can easily occur.
- **Space for infrastructure and databases is required:** The transactions data are stored in databases so it requires big space and hardware infrastructure to keep the ledger data.

- **Network issues can lead to unsuccessful transactions:** Minor network issues can lead to the failure of the payment and sometimes the payment is deducted from one's account but not received by the receiver accounts.

Hard vs Soft Digital Currency

S No.	Hard Digital Currency	Soft Digital Currency
1.	It refers to the currency whose transactions can't be reversed or changed once done.	It refers to the currency whose transactions can be reversed or changed once done.
2.	It is quite similar to a hard copy cash payment system.	It is totally the opposite of hard digital currency.
3.	It is more secure and less friendly in nature.	It is more user-friendly.
4.	The transactions are drawn through the banks.	Users can also manage the transactions after the payment had been done such as inc/dec in payment amount or cancel the procedure.
5.	An example of hard digital currency is Bitcoin.	An example of soft digital currency is dealings through PayPal, Paytm, etc.

E-CHEQUE

What Is an eCheque?

eCheque is short for an electronic cheque. It's a method of payment between two parties that mimics a cheque – only it's digital.

It's a way to send money from a sender's current account directly to the recipient. It contains the information that a paper cheque would. Only it's digital.

Normally, an e-cheque is processed as a payment request that the sender makes to their bank. They include the payment amount and account details of the recipient. They then authorize the payment via an e-signature. Each bank has a different way of doing this. It could be a special code, telephone line or biometric signature.

E-cheques are governed by the same banking laws as paper cheques. Therefore, you can use e-cheque payments anywhere they're accepted. They use the same sending system as traditional bank transfers so they're much faster than their feeble paper equivalents.

Generally, businesses use e-cheques to send large payments.

What Are The Benefits of eCheques?

eCheques Save Money

Consider the hassle involved with sending a paper cheque to a business. A customer has to get an envelope, pay for postage and mail the cheque to the recipient. That doesn't just cost money. That costs time which is more important in some ways.

Physical cheques are costly for the business receiving the cheque too. It adds labour hours to pay someone to take the physical cheque to the bank for processing. These things are never done quickly. Imagine those mounting hours! Even if you're taking the cheque to the bank yourself, it's wasting your previous money-making time too.

eCheques Save Time

We mentioned time with regards to wasting money for labour hours. What about the waiting time for a cheque to clear?

It's important to note that e-cheques are much faster than paper cheques. They do still carry a delay in processing. A paper cheque may take 3-5 business days for the funds to clear and appear in the recipient's account. This could delay the start of a project or delivery of a service.

An e-cheque could still take a couple of days to process. The general window is 2 working days. For an online transaction, this is a little slower than other payment processing methods. However, when compared to paper cheques, it's lightning speed.

Even better, the sender usually receives a receipt of payment as soon as the e-cheque sends. This cuts down on any project delays.

eCheques Are Cheaper Than Other Payment Processors

When looking at incredibly speedy payment processors like PayPal, you may start to see a flaw in the e-cheque lifestyle. And we agree with you – online processors are faster and give your customer more flexibility in how they pay. They could pay via credit card or debit card for example.

However, as a business, you pay much higher fees to use these services than to receive an e-cheque. E-cheques are typically free to send and free to receive.

How Do eCheques Work?

eCheques work using an online payment programme. Sometimes banks have their own portals for e-cheques. Accounting software like ours has the capability to accept e-cheques too.

With FreshBooks, all you need to do is send an invoice and the customer has a range of ways to pay you. You can customize those methods. If e-cheques are the one for them, the system will prompt them to fill in their payment information. They'll need to sign off with a secure signature.

Once the system accepts the cheque, we send it to their bank to request the payment. Both the payer's bank and the payee's bank need to authorize the payment for the funds to clear. This is why there's always a delay for processing cheques.

Are eCheques Safe?

For banks to authorize e-cheque payments, the system used must be secure.

There's always a slight level of risk with any online transaction. However. Compare that to the comedy of errors your could face accepting paper cheques. Paper cheques can get lost, stolen, damaged, weather-beaten. They could have errors on them or arrive with eligible handwriting.

None of these are risk factors with e-cheques.

What Is the Difference Between an eCheque and a Bank Transfer?

1. You can cash an e-cheque as you would a paper cheque. You have to go to certain banking locations to do this but it is possible. With bank transfers, you will need to access your funds using an ATM. It won't be the exact amount of the cheque in question.

2. The payer doesn't need the recipient's bank details to send an e-cheque It's a one-sided transaction. They only need the recipient's business name to send funds.
3. eCheques can still bounce, just like paper cheques. Because of the delay in processing the funds, there's still the risk of the cheque bouncing when the funds are ready to send.

Key Takeaways

Paper cheques are a relic of the past. Don't burden yourself with the time-consuming process of cashing a cheque at a bank and waiting for funds to clear. An e-cheque can streamline your payment process immeasurably.

E-BANKING

e-banking is the result of the internet and e-commerce. e-Banking is a service provided by the banks, in which a customer is allowed to conduct transactions using the internet. It is an electronic payment system that allows users(customers) of any financial institutions(banks, insurance companies, brokerage firms, etc.) to perform financial transactions using the internet.

Usually, this service is offered by banks which gives their customers the facilities of online banking through which they can have access to their accounts within a few seconds and click. Online Banking includes the facilities such as Account Statements, Fund transfers, Account Opening, Financial Product Information, etc. There is no need for any human operator to respond to the customers. The banks have a centralized database and everything is automated. It lowers the banking cost and strengthens the banking relationship by adding value to the service. It provides banking services via the internet and it is end-to-end encrypted, which means it is completely safe and secure. It also promotes paperless/cashless financial transactions.

Given below are a few common e-banking services:

- **Electronic Fund Transfer (EFT):** When a fund(money) is transferred from one bank to another bank electronically, it is called an electronic fund transfer. For example- Direct deposit/debit, Wire transfer, NEFT, RTGS, IMPS, etc.
- **POS – Point Of Sale:** As the name suggests, Point Of Sale usually refers to a **POINT**(Retail Outlet) in terms of date, time, and place where a customer can make payment using plastic cards for the purchase of goods & services.
- **Credit Card:** Credit cards are used for online and POS outlet payments, and it is issued by the banks to their customer at their request, after checking their credit scores. This provides the customers to borrow funds to a certain limit and make transactions. The cardholders are required to pay their debt within a time period with some charges.
- **ATM:** ATM stands for Automated Teller Machine. It is one of the oldest and most common e-banking services. They provide 24×7 banking at all major locations. ATMs are not only used to withdraw cash whenever required, they can also be used to check your account statements, fund transfers, PIN and mobile number, etc.
- **Electronic Data Interchange (EDI):** EDI is used in the banking industry to improve operational efficiency and reduce the cost of banking services. It also helps in efficient and faster process management.

Benefits of e-banking:

e-banking is beneficial for both customers and banks. The benefits of e-banking are as follows:

Benefits of e-Banking to customers

- e-banking covers digital payments, which have transparency.

- It usually supports 24×7 access to banking services. So customers can avail services as per their time.
- It is a very convenient and easy to use service for customers as they do not have to visit the bank branches every time.
- It provides the best features, such as notification services which inform customers of anything and everything happening with their banking services.
- Financial discipline is inculcated as each and every transaction is recorded.

Benefits of e-Banking to banks

- It reduces banks' transaction costs. Operation cost per unit service decreases.
- It is completely electronically managed, which reduces the chance of mistakes in the transaction.
- Banks can easily attract customers for various offers via phone calls, emails and apps, as the customer doesn't have to visit the branches anymore for any product specific information.
- Banks have to hire less people and also it will reduce the branch size and area, which helps in overall revenue growth.
- It provides a competitive advantage to the banks.
- With the help of e-banking, banks have a wider coverage area as banks are now not limited to the number of branches.
- Loads of branches are reduced as a centralized database is present.