

LECTURE MATERIAL FOR INTERNET AND WEB TECHNOLOGIES [CTE 114]

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The Internet.

The internet is a globally connected network system facilitating worldwide communication and access to data resources through a vast collection of private, public, business, academic and government networks. It is governed by agencies like the Internet Assigned Numbers Authority (or IANA) that establish universal protocols.

The terms internet and World Wide Web are often used interchangeably, but they are not exactly the same thing; the internet refers to the global communication system, including hardware and infrastructure, while the web is one of the services communicated over the internet.

The internet originated with the U.S. government, which began building a computer network in the 1960s known as ARPANET (Advanced Research Projects Agency Network). In 1985, the U.S. National Science Foundation (NSF) commissioned the development of a university network backbone called NSFNET.

The system was replaced by new networks operated by commercial internet service providers in 1995. The internet was brought to the public on a larger scale at around this time.

Since then, the Internet has grown and evolved over time to facilitate services like:

- Email.
- Web-enabled audio/video conferencing services.
- Online movies and gaming.
- Data transfer/file-sharing, often through File Transfer Protocol (FTP).
- Instant messaging.
- Internet forums.
- Social networking.
- Online shopping.
- Financial services.

As a global network responsible for vast amounts of data transfer and process facilitation, the Internet is constantly evolving. For instance, an initial protocol called IPv4 distributing Internet Protocol (IP) addresses has largely been replaced by a new IPv6 model that will increase the number of addresses available for each continent around the globe.

The Internet has also expanded beyond the traditional workstation, as the “Internet of Things,” (IoT) as it's called, is born. There's still somewhat of a delineation between traditional Internet nodes, which use a classic web browser, and Internet-connected devices which will more commonly use reduced instruction set software, but the Internet of Things is blurring the line of where the Internet stops and the analog world begins.

In addition, there is a key framework that helps people to understand how the Internet is changing, and where it's likely to go in the future.

This is composed of three versions or iterations of the World Wide Web, as defined above.

- **Web 1.0** is the original incarnation of the Internet as a place where most data was read-only. Web 1.0 is often described by experts as an Internet where the most common kinds of activity are passive – reading, doing research, or learning about products and services before making a purchase over traditional media, for example, by telephone.
- **Web 2.0:** As engineers added things like Javascript applets and modules to the web, Web 2.0 emerged. Web 2.0 is the read/write web or the functional web, where web fields and forms have allowed users to participate in transactions, upload resources or post their own suggestions in active conversation. Web 2.0 is, by most people's assertions, the Internet that we now use. The problem of "stateless" web-delivered functionality as is Web 2.0, is largely solved by digital "cookies," trackers that save individual user data in the browser to enable things like saved passwords. The trade-off is that user activity is inherently tracked: when a user erases the cookies, that session data is gone, and the user will have to start over as a new guest in any future sessions.
- **Web 3.0** is the posited future Internet called the "semantic web," where Internet data will have evolved relationships, and mapping will help automate a lot of what we now do on the Internet manually. The semantic web, proponents suggest, will be a web that is in many ways automated by linking individual virtual objects and websites together in a seamless manner. With that in mind, Web 3.0 may help us to do away with the current model of using cookies for session data retrieval.

All of these changes show the general purpose nature of the Internet and its broad scope in human societies. Defining groups like the Internet Engineering Task Force (IETF) and World Wide Web Consortium (W3C) continue to work on standards and universal approaches.

A Brief History of the Internet

Sharing Resources

The Internet started in the 1960s as a way for government researchers to share information. Computers in the '60s were large and immobile and in order to make use of information stored in any one computer, one had to either travel to the site of the computer or have magnetic computer tapes sent through the conventional postal system.

Another catalyst in the formation of the Internet was the heating up of the Cold War. The Soviet Union's launch of the Sputnik satellite spurred the U.S. Defense Department to consider ways information could still be disseminated even after a nuclear attack. This eventually led to the formation of the ARPANET (Advanced Research Projects Agency Network), the network that ultimately evolved into what we now know as the Internet. ARPANET was a great success but membership was limited to certain academic and research organizations who had contracts with the Defense Department. In response to this, other networks were created to provide information sharing.

January 1, 1983 is considered the official birthday of the Internet. Prior to this, the various computer networks did not have a standard way to communicate with each other. A new communications protocol was established called Transfer Control Protocol/Internet Protocol (TCP/IP). This allowed different kinds of computers on different networks to "talk" to each other. ARPANET and the Defense Data Network officially changed to the TCP/IP standard on January 1, 1983, hence the birth of the Internet. All networks could now be connected by a universal language.

TYPES OF INTERNET PROTOCOLS

There's more to the Internet than the World Wide Web

When we think of the Internet we often think only of the World Wide Web. The Web is one of several ways to retrieve information from the Internet. These different types of Internet connections are known as protocols. You could use separate software applications to access the Internet with each of these protocols, though you probably wouldn't need to. Many Internet Web browsers allow users to access files using most of the protocols. Following are three categories of Internet services and examples of types of services in each category.

File Retrieval Protocols

This type of service was one of the earliest ways of retrieving information from computers connected to the Internet. You could view the names of the files stored on the serving computer, but you didn't have any type of graphics and sometimes no description of a file's content. You would need to have advanced knowledge of which files contained the information you sought.

FTP (File Transfer Protocol)

This was one of the first Internet services developed and it allows users to move files from one computer to another. Using the FTP program, a user can logon to a remote computer, browse through its files, and either download or upload files (if the remote computer allows). These can be any type of file, but the user is only allowed to see the file name; no description of the file content is included. You might encounter the FTP protocol if you try to download any software applications from the World Wide Web. Many sites that offer downloadable applications use the FTP protocol.

Telnet

You can connect to and use a remote computer program by using the telnet protocol. Generally you would telnet into a specific application housed on a serving computer that would allow you to use that application as if it were on your own computer. Again, using this protocol requires special software.

COMMUNICATIONS PROTOCOLS

email, newsgroups and chat

These are the messaging protocols that allow users to communicate both asynchronously (sender and receiver aren't required to both be connected to the Internet at the same time; e.g. email) and synchronously (as with chatting in "real time").

Email

This method of Internet communication has become the standard. A main computer acts as a "post office" by sending and receiving mail for those who have accounts. This mail can be retrieved through any number of email software applications (MS Outlook, Eudora, etc.) or from Web based email accounts (Yahoo, Hotmail). Email is an example of asynchronous Internet communication.

Usenet

Usenet is something like a bulletin board or an email list without the subscription. Anyone can post a message to or browse through a Usenet newsgroup. Usenet messages are retained on the serving computer only for a predetermined length of time and then are automatically deleted, whereas email list messages are retained on the serving computer until the account holder downloads them. Many email applications, as well as Web browsers, allow you to set up Usenet newsgroup accounts.

IRC (Internet Relay Chat)

This protocol allows for synchronous communication: users on different computers anywhere in the world can communicate in "real time" or simultaneously. You can instantly see a response to a typed message by several people at the same time. This protocol requires a special software application that can be downloaded from the Web, generally for free.

Multimedia Information Protocol

Hypertext transfer protocol — a.k.a. "The Web"

The World Wide Web is the new kid on the block having only been developed in the late 1980s by the European Lab for Particle Physics in Switzerland. This Internet protocol was quickly embraced by the public and has become the most popular way to provide and obtain information from the Internet. The Web offers not only access to files to download, but offers a way to jump from site to site through a series of connecting hyperlinks.

The most distinguishing feature of the Web is the way that text is formatted. A series of "tags" is used to encode and format text, graphics, animation, sound, and other types of files. These tags are called HTML (HyperText Markup Language). These HTML files appear on your computer screen as determined by the tags used in its coding. You can see the "source" HTML coding for any Web page by choosing to "View Source" from your browser's menu bar.

Most browsers allow for access through FTP, Gopher, telnet, and email as well as through the hypertext transfer protocol, although installation of helper applications may be required. These are programs that work with the browser and allow access to a variety of protocols and file types.

INTRANET AND INTERNET

Almost everyone knows what the internet is – the global computer network that provides information and communication facilities – not everyone is as familiar with the term 'intranet.'

This has led to some confusion, and often the assumption that both terms mean the same thing. But in fact, they stand for two different things. Not completely different though, many traits of an intranet borrow from the internet – something we'll go in to later. But before we list the similarities, let's break down what the difference is between an intranet and the internet.

4.3 billion people across the globe are connected to the internet, using it to help them with all aspects of their lives, from connecting with friends to keeping up to date with news, and from tracking their health to working more effectively.

And while intranet software similarly helps you to connect, learn and communicate, it's done so on a much smaller level. Intranet are like mini internets for business, where they can store relevant information, news and data online, but make it accessible only to those employed by the organization.

The main difference between an intranet and the internet is that the former is a closed network, and the latter is a public network. In short, the internet is for all; an intranet is for a select group of people.

An Ethernet: Ethernet is the most widely installed LAN technology world. Ethernet was originally developed by Xerox and later jointly developed by Xerox, DEC, and Intel. Ethernet generally uses coaxial cables and special twisted pairs. The most common Ethernet cable is 10BASE-T, which has a transmission rate of up to 10 Mbps.

An ethernet is a group of technologies that enable computers and other devices to transfer data among themselves. Computers connected via Ethernet are usually located in the same apartment or building or in close proximity to each other.

With modern technology and improvements in Ethernet cabling, the range of an Ethernet network can be extended to a maximum distance of 10 kilometers. However, since computers use cable meters to connect with each other, it is impractical in real to connect computers very far apart.

Both ethernet versus Internet are types of networks that are used to connect computers. However, the scope and range of these networks differ. Ethernet is a local area network (LAN) that connects computers on a local area network. There are hundreds and thousands of Ethernet networks.

The Internet, on the other hand, is a massive wide area network (WAN) to which remote computers can connect to access information. However, there is only one Internet. We can say that the Internet is a network of networks.

Ethernet versus Internet: 4 Factors

The Internet is a general term for computer networks, and Ethernet is a part of the Internet. Both are regarded as the network used to connect to the computer, but the scope is different.

1. Connection method

The Internet connection via ethernet is carried out as follows: a cable (***coaxial cables or special twisted pairs***) is connected from the provider's station to your PC, router, or modem, inserted into a specifically designated connector, and a certain configuration of the computer's network card is performed. On the other hand, the Internet establishes a wireless connection.

2. Network type

The Internet is a Wide Area Network (collection of many LANs), that spreads a big geographic area. Ethernet is a Local Area Network (LAN), that spread +a small geographic area.

3. Safety and Security

On Ethernet connections, external devices do not have access to the network. Ethernet networks are relatively secure because it is a closed network, meaning that people from the outside have limited or no access to the network. Thus, there are restrictions to prevent unauthorized access to the network.

On the other hand, the Internet provides open access to every user. Meaning that anyone can access data and information on the Internet. So, when connecting to the Internet, you must have to take extra precautions as you may expose yourself to security risks (hackers).

Almost anyone can access the Internet and launch attacks or release viruses and malware. This can cause more network security threats to devices. So you have to be careful while accessing. ***Many antivirus, anti-spyware, and malware programs have been developed for users.***

4. Control

Ethernet networks are managed by a single system or multiple system administrators. They manage and control the network components. In your home, it is you or an elder or a parent. In business, this could be any specific technical department.

However, the Internet is too large for administrators to control. There are agencies that deal with or operate certain aspects of the Internet; In short, they have no control over this.

Key Differences Internet vs Ethernet

1. Ethernet connects nearby equipment and can have hundreds of Ethernets within a local area distance. The corresponding ones are token ring,, *ATM, WLAN FDDI, Etc. LAN*. Ethernet specifies the network topology, access control method, transmission rate, etc. of the local area network.
2. The Internet is the global Internet including local area networks. It uses the TCP/IP protocol cluster as the communication method, and the system structure is divided into 4 layers: ***application layer, transport layer, network layer, and network interface layer***. Private, public, academic, commercial, or government networks can all be connected to each other through the Internet.
3. Generally speaking, Ethernet is a small network that works at the network interface layer, while the Internet is a large network that connects various small networks (**i.e collection of multiple LAN**).

WORKING PRINCIPLE OF THE INTERNET AND HOW DEVICES COMMUNICATE

The internet is a worldwide computer network that transmits a variety of data and media across interconnected devices. It works by using a packet routing network that follows Internet Protocol (IP) and Transport Control Protocol (TCP).

TCP and IP work together to ensure that data transmission across the internet is consistent and reliable, no matter which device you're using or where you're using it.

When data is transferred over the internet, it's delivered in messages and packets. Data sent over the internet is called a message, but before messages get sent, they're broken up into tinier parts called packets.

These messages and packets travel from one source to the next using Internet Protocol (IP) and Transport Control Protocol (TCP). IP is a system of rules that govern how information is sent from one computer to another computer over an internet connection.

Using a numerical address (IP Address) the IP system receives further instructions on how the data should be transferred.

The Transport Control Protocol (TCP) works with IP to ensure transfer of data is dependable and reliable. This helps to make sure that no packets are lost, packets are reassembled in proper sequence, and there's no delay negatively affecting the data quality. Above the principle stated above, a typical computer network works on certain topologies listed below:

NETWORK TOPOLOGIES

The configuration, or topology, of a network is key to determining its performance. Network topology is the way a network is arranged, including the physical or logical description of how links and nodes are set up to relate to each other.

There are numerous ways a network can be arranged, all with different pros and cons, and some are more useful in certain circumstances than others. Admins have a range of options when it comes to choosing a network topology, and this decision must account for the size and scale of their business, its goals, and budget. Several tasks go into effective network topology management, including configuration management, visual mapping, and general performance monitoring. The key is to understand your objectives and requirements to create and manage the network topology in the right way for your business.

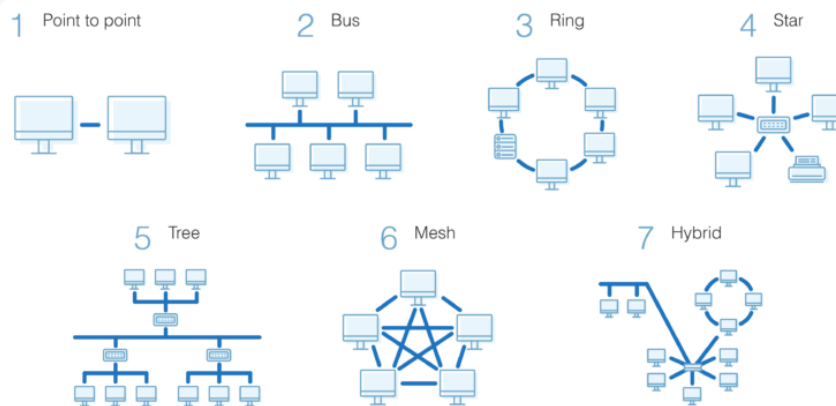
Network Topology

Network topology refers to how various nodes, devices, and connections on your network are physically or logically arranged in relation to each other. Think of your network as a city, and the topology as the road map. Just as there are many ways to arrange and maintain a city—such as making sure the avenues and boulevards can facilitate passage between the parts of town getting the most traffic—there are several ways to arrange a network. Each has advantages and disadvantages and depending on the needs of your company, certain arrangements can give you a greater degree of connectivity and security.

There are two approaches to network topology: *physical and logical*.

1. **Physical** – The physical network topology refers to the actual connections (wires, cables, etc.) of how the network is arranged. Setup, maintenance, and provisioning tasks require insight into the physical network.
2. **Logical** – The logical network topology is a higher-level *idea* of how the network is set up, including which nodes connect to each other and in which ways, as well as how data is transmitted through the network. Logical network topology includes any virtual and cloud resources.

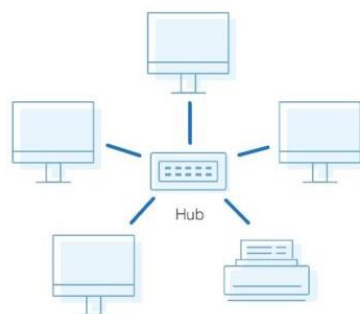
Network Topology Types



Star Topology

A star topology, the most common network topology, is laid out so every node in the network is directly connected to one central hub via coaxial, twisted-pair, or fiber-optic cable. Acting as a server, this central node manages data transmission—as information sent from any node on the network has to pass through the central one to reach its destination—and functions as a repeater, which helps prevent data loss.

Star Topology



Advantages of Star Topology

Star topologies are common since they allow you to conveniently manage your entire network from a single location. Because each of the nodes is independently connected to the central hub, should one go down, the rest of the network will continue functioning unaffected, making the star topology a stable and secure network layout.

Additionally, devices can be added, removed, and modified without taking the entire network offline.

On the physical side of things, the structure of the star topology uses relatively little cabling to fully connect the network, which allows for both straightforward setup and management over time as the network expands or contracts. The simplicity of the network design makes life easier for administrators, too, because it's easy to identify where errors or performance issues are occurring.

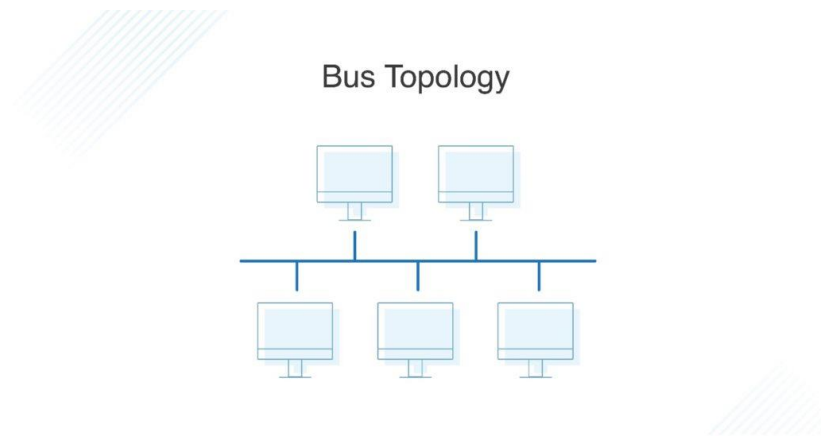
Disadvantages of Star Topology

On the flipside, if the central hub goes down, the rest of the network can't function. But if the central hub is properly managed and kept in good health, administrators shouldn't have too many issues.

The overall bandwidth and performance of the network are also limited by the central node's configurations and technical specifications, making star topologies expensive to set up and operate.

Bus Topology

A bus topology orients all the devices on a network along a single cable running in a single direction from one end of the network to the other—which is why it's sometimes called a “line topology” or “backbone topology.” Data flow on the network also follows the route of the cable, moving in one direction.



Advantages of Bus Topology

Bus topologies are a good, cost-effective choice for smaller networks because the layout is simple, allowing all devices to be connected via a single coaxial or RJ45 cable. If needed, more nodes can be easily added to the network by joining additional cables.

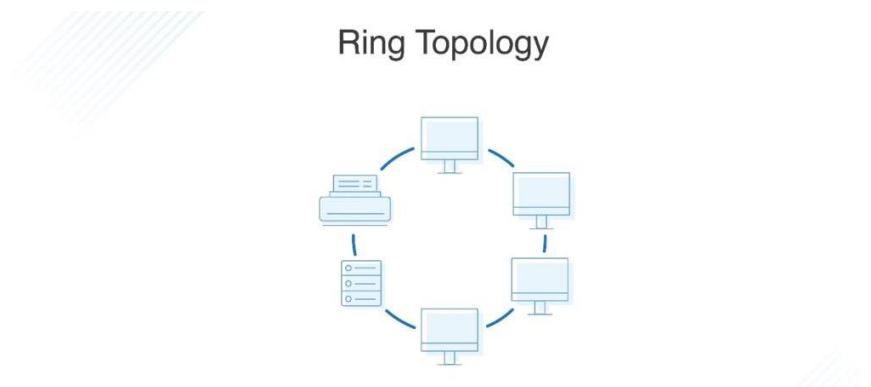
Disadvantages of Bus Topology

However, because bus topologies use a single cable to transmit data, they're somewhat vulnerable. If the cable experiences a failure, the whole network goes down, which can be time-consuming and expensive to restore, which can be less of an issue with smaller networks.

Bus topologies are best suited for small networks because there's only so much bandwidth, and every additional node will slow transmission speeds.

Ring Topology

Ring topology is where nodes are arranged in a circle (or ring). The data can travel through the ring network in either one direction or both directions, with each device having exactly two neighbors.



Pros of Ring Topology

Since each device is only connected to the ones on either side, when data is transmitted, the packets also travel along the circle, moving through each of the intermediate nodes until they arrive at their destination. If a large network is arranged in a ring topology, repeaters can be used to ensure packets arrive correctly and without data loss.

Only one station on the network is permitted to send data at a time, which greatly reduces the risk of packet collisions, making ring topologies efficient at transmitting data without errors.

By and large, ring topologies are cost-effective and inexpensive to install, and the intricate point-to-point connectivity of the nodes makes it relatively easy to identify issues or misconfigurations on the network.

Cons of Ring Topology

Even though it's popular, a ring topology is still vulnerable to failure without proper network management. Since the flow of data transmission moves unidirectionally between nodes along each ring, if one node goes down, it can take the entire network with it. That's why it's imperative for each of the nodes to be monitored and kept in good health. Nevertheless, even if you're vigilant and attentive to node performance, your network can still be taken down by a transmission line failure.

The question of scalability should also be taken into consideration. In a ring topology, all the devices on the network share bandwidth, so the addition of more devices can contribute to overall communication delays. Network administrators need to be mindful of the devices added to the topology to avoid overburdening the network's resources and capacity.

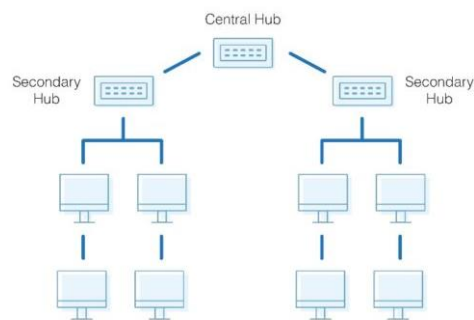
Additionally, the entire network must be taken offline to reconfigure, add, or remove nodes. And while that's not the end of the world, scheduling downtime for the network can be inconvenient and costly.

Tree Topology

The tree topology structure gets its name from how the central node functions as a sort of trunk for the network, with nodes extending outward in a branch-like fashion. However, where each node in a star topology is directly connected to the central hub, a tree topology has a parent-child hierarchy to how the nodes are connected. Those connected to the central hub are connected linearly to other nodes, so two connected nodes only share one

mutual connection. Because the tree topology structure is both extremely flexible and scalable, it's often used for wide area networks to support many spread-out devices.

Tree Topology



Pros of Tree Topology

Combining elements of the star and bus topologies allows for the easy addition of nodes and network expansion. Troubleshooting errors on the network is also a straightforward process, as each of the branches can be individually assessed for performance issues.

Cons of Tree Topology

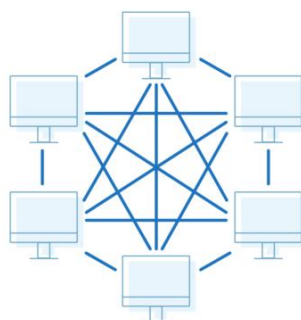
As with the star topology, the entire network depends on the health of the root node in a tree topology structure. Should the central hub fail, the various node branches will become disconnected, though connectivity within—but not between—branch systems will remain.

Because of the hierarchical complexity and linear structure of the network layout, adding more nodes to a tree topology can quickly make proper management an unwieldy, not to mention costly, experience. Tree topologies are expensive because of the sheer amount of cabling required to connect each device to the next within the hierarchical layout.

Mesh Topology

A mesh topology is an intricate and elaborate structure of point-to-point connections where the nodes are interconnected. Mesh networks can be full or partial mesh. Partial mesh topologies are mostly interconnected, with a few nodes with only two or three connections, while full-mesh topologies are—surprise!—fully interconnected.

Mesh Topology



The web-like structure of mesh topologies offers two different methods of data transmission: routing and flooding. When data is routed, the nodes use logic to determine the shortest distance from the source to destination, and when data is flooded, the information is sent to all nodes within the network without the need for routing logic.

Advantages of Mesh Topology

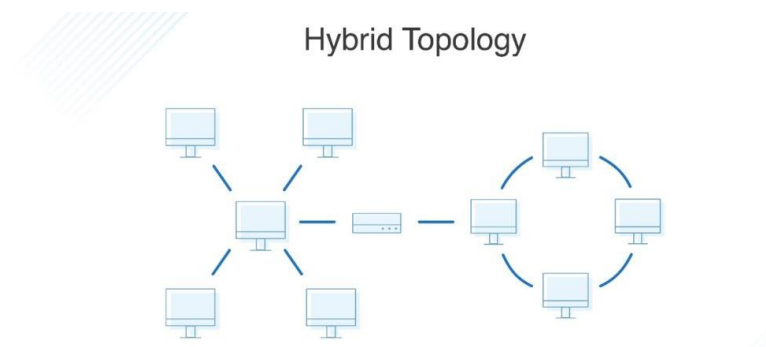
Mesh topologies are reliable and stable, and the complex degree of interconnectivity between nodes makes the network resistant to failure. For instance, no single device going down can bring the network offline.

Disadvantages of Mesh Topology

Mesh topologies are incredibly labor-intensive. Each interconnection between nodes requires a cable and configuration once deployed, so it can also be time-consuming to set up. As with other topology structures, the cost of cabling adds up fast, and to say mesh networks require a lot of cabling is an understatement.

Hybrid Topology

Hybrid topologies combine two or more different topology structures—the tree topology is a good example, integrating the bus and star layouts. Hybrid structures are most commonly found in larger companies where individual departments have personalized network topologies adapted to suit their needs and network usage.



Advantages of Hybrid Topology

The main advantage of hybrid structures is the degree of flexibility they provide, as there are few limitations on the network structure itself that a hybrid setup can't accommodate.

Disadvantages of Hybrid Topology

However, each type of network topology comes with its own disadvantages, and as a network grows in complexity, so too does the experience and know-how required on the part of the admins to keep everything functioning optimally. There's also the monetary cost to consider when creating a hybrid network topology.

OSI REFERENCE MODEL

The Open Systems Interconnect (OSI) model is a conceptual framework that describes networking or telecommunications systems as seven layers, each with its own function.

The layers help network pros visualize what is going on within their networks and can help network managers narrow down problems (Is it a physical issue or something with the application?), as well as computer

programmers (when developing an application, which other layers does it need to work with?). Tech vendors selling new products will often refer to the OSI model to help customers understand which layer their products work with or whether it works “across the stack”.

The layers are: Layer 1—Physical; Layer 2—Data Link; Layer 3—Network; Layer 4—Transport; Layer 5—Session; Layer 6—Presentation; Layer 7—Application.

It wasn't always this way. Conceived in the 1970s when computer networking was taking off, two separate models were merged in 1983 and published in 1984 to create the OSI model that most people are familiar with today. Most descriptions of the OSI model go from top to bottom, with the numbers going from Layer 7 down to Layer 1. The layers, and what they represent, are as follows:

Layer 7 - Application

The Application Layer in the OSI model is the layer that is the “closest to the end user”. It receives information directly from users and displays incoming data to the user. Oddly enough, applications themselves do not reside at the application layer. Instead the layer facilitates communication through lower layers in order to establish connections with applications at the other end. Web browsers (Google Chrome, Firefox, Safari, etc.) TelNet, and FTP, are examples of communications that rely on Layer 7.

Layer 6 - Presentation

The Presentation Layer represents the area that is independent of data representation at the application layer. In general, it represents the preparation or translation of application format to network format, or from network formatting to application format. In other words, the layer “presents” data for the application or the network. A good example of this is encryption and decryption of data for secure transmission; this happens at Layer 6.

Layer 5 - Session

When two computers or other networked devices need to speak with one another, a session needs to be created, and this is done at the Session Layer. Functions at this layer involve setup, coordination (how long should a system wait for a response, for example) and termination between the applications at each end of the session.

Layer 4 – Transport

The Transport Layer deals with the coordination of the data transfer between end systems and hosts. How much data to send, at what rate, where it goes, etc. The best known example of the Transport Layer is the Transmission Control Protocol (TCP), which is built on top of the Internet Protocol (IP), commonly known as TCP/IP. TCP and UDP port numbers work at Layer 4, while IP addresses work at Layer 3, the Network Layer.

Layer 3 - Network

Here at the Network Layer is where you'll find most of the router functionality that most networking professionals care about and love. In its most basic sense, this layer is responsible for packet forwarding, including routing through different routers. You might know that your Boston computer wants to connect to a server in California, but there are millions of different paths to take. Routers at this layer help do this efficiently.

Layer 2 – Data Link

The Data Link Layer provides node-to-node data transfer (between two directly connected nodes), and also handles error correction from the physical layer. Two sublayers exist here as well--the Media Access Control (MAC) layer and the Logical Link Control (LLC) layer. In the networking world, most switches operate at Layer 2. But it's

not that simple. Some switches also operate at Layer 3 in order to support virtual LANs that may span more than one switch subnet, which requires routing capabilities.

Layer 1 - Physical

At the bottom of our OSI model we have the Physical Layer, which represents the electrical and physical representation of the system. This can include everything from the cable type, radio frequency link (as in a Wi-Fi network), as well as the layout of pins, voltages, and other physical requirements. When a networking problem occurs, many networking pros go right to the physical layer to check that all of the cables are properly connected and that the power plug hasn't been pulled from the router, switch or computer, for example.

How to remember the OSI Model 7 layers – 8 mnemonic tricks

From Application to Physical (Layer 7 to Layer 1):

All People Seem To Need Data Processing

From Physical to Application (Layer 1 to Layer 7):

Please Do Not Throw Sausage Pizza Away

DOMAIN NAME SERVER

Domain Name Server (DNS) is a standard protocol that helps Internet users discover websites using human readable addresses. Like a phonebook which lets you look up the name of a person and discover their number, DNS lets you type the address of a website and automatically discover the Internet Protocol (IP) address for that website. It is the system that is used to translate human-memorable domain names like namecheap.com and hostnames like support.namecheap.com into the corresponding numeric Internet Protocol (IP) addresses as well as to identify and locate computer systems and resources on the Internet.

Without DNS, the Internet would collapse - it would be impossible for people and machines to access Internet servers via the friendly URLs they have come to know.

For example, the domain name www.ns1.com you are viewing now, translates to the IP address 104.20.48.182 (in the old IPv4 format) or 2002:6814:30b6:0:0:0:0:0 (in the newer IPv6 format).

Different Types of Domains Available

Now that you have a better understanding of what domain names are and how they work, let's dive into the types of domain names that are available for you to register.

When most people think of a website, they usually think of the standard '.com.' Even though this is the most common extension, there are multiple different types of extensions available.

In fact, there are five different types of domains available to you. Some won't be available to you unless you're running a particular kind of website, but we cover this in detail below.

1. Top-Level Domains

Top-level domains are at the top of the internet hierarchy of domain names. You'll see these commonly referred to as TLDs. There are over thousands of different TLDs available. In recent years ICANN opened up new TLD registration and approval, so companies and individuals could pitch and register unique TLDs. This sent the number of TLDs available soaring.

Here's a full list of the top-level TLDs currently available to register, and here's just a few of the ones we offer for registration here at HostGator:

Treat yourself to the most popular top level domains.

When it comes to domain name availability, we've got you covered.

.com Introductory offer \$12.95/yr Renews at \$15.00/yr	.website Introductory offer \$9.95/yr Renews at \$15.00/yr	.info Introductory offer \$12.95/yr Renews at \$15.00/yr	.club Introductory offer \$9.95/yr Renews at \$15.00/yr
.org Introductory offer \$12.95/yr Renews at \$15.00/yr	.host Introductory offer \$39.95/yr Renews at \$45.00/yr	.co Introductory offer \$12.95/yr Renews at \$35.00/yr	.net Introductory offer \$9.95/yr Renews at \$16.00/yr
.online Introductory offer \$1.95/yr Renews at \$15.00/yr	.space Introductory offer \$9.95/yr Renews at \$15.00/yr	.me Introductory offer \$15.00/yr Renews at \$19.95/yr	.site Introductory offer \$0.95/yr Renews at \$15.00/yr

Keep in mind that when you're choosing a top-level domain for your domain, you'll want to choose one that's in alignment with, or enhances, your brand and overall domain. Just because a particular TLD is available, it doesn't mean you should register it. A lot of TLDs are more like vanity extensions vs. something you should use for the foundation of your site.

2. Country Code Top Level Domains

Next, on the list, we have country code top-level domains (ccTLD). As the name suggests, these are technically tied to different countries. Each country has its own ccTLD, but you don't have to use one, just because you live in a specific country.

For example, the ccTLD .co is technically for websites based out of Colombia, but it's commonly used by internet startups, like AND.CO.

These domain extensions can be useful if you're building a website in a specific country and want to signal to your visitors that they've come to the right place. For example, websites based out of the US can use the '.us' extension, while companies from Japan can use the '.jp' extension.

3. Generic Top-Level Domains

Next, we've got generic top-level domains (gTLDs). This is more of a definition than an actual type of domain. As the description suggests, it's just a different variation of a TLD. So, you could technically classify this type of domain as a TLD as well.

The generic aspect of this domain extension refers to the types of use-cases that these domains are intended for.

Let's look at an example. Military organizations can use the '.mil' extension, while educational institutions can use the '.edu,' and '.org' is intended for use by non-profit organizations.

A lot of gTLDs can be registered even if you don't satisfy the requirements, but for some like '.mil' and '.edu' you must fit the requirements.

Here's a full list of the current gTLDs that are available to register.

4. Second-Level Domains

Second-level domains are below the TLDs highlighted above in terms of hierarchy. This doesn't mean they're any less authoritative, or valuable. Rather, this describes the second piece of the domain name, such as the 'hostgator' in 'www.hostgator.com.'

There are also country code second-level domains, which might look like the following:

- .co.uk – Companies in the United Kingdom commonly use this.
- .gov.uk – This is used by government agencies throughout the United Kingdom.
- .gov.au – Government agencies across Australia use this.

5. Third Level Domains

Third level domains are below second-level domains in the domain name hierarchy. They aren't a full domain name in and of themselves, but merely a portion of a domain name.

For example, in the domain name "www.hostgator.com," 'www' would be the third level domain. Or, if you're using a subdomain to build an additional section of your site, this would be a third-level domain as well.

To have a fully functional domain name you don't need to have a third-level domain name. For example, 'hostgator.com' would function just perfectly. Even the 'www' that used to be a requirement of domain names is no longer necessary.

The only real reason you'll be using a third-level domain is when you're adding a subdomain to your existing domain. Subdomains can be used for a variety of purposes, but here are some of the most common:

- **Adding a blog.** You can host your blog on a subdomain like 'blog.mysite.com,' to create a separate content hub.
- **Creating a resource section.** If you have a resource, tutorial, or support section, you can host this on a subdomain like 'support.mysite.com.'
- **Hosting an app.** If you have a web-based app, you can use a subdomain like 'app.mysite.com.'
- **Creating an online store.** Online stores require different software, programs, and security protocols. Instead of applying this to your entire site, you can use a subdomain like 'store.mysite.com' to run your storefront.

KEY FACTORS TO CHOOSING A DOMAIN

1. It Should Align With Website Goals

Different domain name extensions cater to different types of websites. For example, you wouldn't try to choose the '.mil' extension if you're creating a blog about cats. Or, if you have a website based in the US, you wouldn't want to go with the '.co.uk' extension either.

Think about what kind of website you're building and choose an extension that aligns with your topic and overall goals. See what other sites that are in your niche are using for their domain name extensions.

2. Go for Something Common First, Fun Second

If you're busy exploring the entire list of TLDs available, you're probably overwhelmed with options. Even though some might be a perfect fit for your site, it's not always the best option to go with a unique extension.

If this is your first site, it's usually better to go with a common domain name extension, rather than one that's more niche.

Think about it this way, if someone can remember your domain, but not your extension, they'll probably try common ones like, '.com,' '.net', '.org', or even' .co. If you have a crazy extension, they might not ever make it to your site.

You can always pick up different extensions later, or even migrate your site to a new extension once you're established and have an existing audience.

3. Pick Up Related Extensions

Let's say you found the perfect domain name with the '.com' extension. You can register this domain and also pick up all of the related extensions. Then, forward all of the different extensions to your primary domain.

That way if someone guesses the wrong extension they'll still be taken to your website. Plus, you make it impossible for any competitors to swoop in and pick up your domain under a different extension.

The best way to find the perfect domain name is to come up with a list of potential options, and run them through a domain name checker to see if any are available. There's nothing worse than getting excited about your dream domain, only to find out later that it's not available.

DOMAIN SUFFIX

The term "dot.com" has become a ubiquitous phrase in the English language. The "dot.com" really refers to the domain of a Web site. Sites on the Web are grouped by their URLs according to the type of organization providing the information on the site. For example, any commercial enterprise or corporation that has a Web site will have a domain suffix of .com, which means it is a commercial entity.

The domain suffix provides you with a clue about the purpose or audience of a Web site. The domain suffix might also give you a clue about the geographic origin of a Web site. Many sites from the United Kingdom will have a domain suffix of .uk.

Here follows a list of the most common domain suffixes and the types of organizations that would use them.

.com

Commercial site. The information provided by commercial interests is generally going to shed a positive light on the product it promotes. While this information might not necessarily be false, you might be getting only part of the picture. Remember, there's a monetary incentive behind every commercial site in providing you with information, whether it is for good public relations or to sell you a product outright.

.edu

Educational institution. Sites using this domain name are schools ranging from kindergarten to higher education. If you take a look at your school's URL you'll notice that it ends with the domain .edu. Information from sites within this domain must be examined very carefully. If it is from a department or research center at a educational

institution, it can generally be taken as credible. However, students' personal Web sites are not usually monitored by the school even though they are on the school's server and use the .edu domain.

.gov

Government. If you come across a site with this domain, then you're viewing a federal government site. All branches of the United States federal government use this domain. Information such as Census statistics, Congressional hearings, and Supreme Court rulings would be included in sites with this domain. The information is considered to be from a credible source.

.org

Traditionally a non-profit organization. Organizations such as the American Red Cross or PBS (Public Broadcasting System) use this domain suffix. Generally, the information in these types of sites is credible and unbiased, but there are examples of organizations that strongly advocate specific points of view over others, such as the National Right to Life Committee and Planned Parenthood. You probably want to give this domain a closer scrutiny these days. Some commercial interests might be the ultimate sponsors of a site with this suffix.

.mil

Military. This domain suffix is used by the various branches of the Armed Forces of the United States.

.net

Network. You might find any kind of site under this domain suffix. It acts as a catch-all for sites that don't fit into any of the preceding domain suffixes. Information from these sites should be given careful scrutiny.

Country domain suffixes	
.au	Australia
.in	India
.br	Brazil
.it	Italy
.ca	Canada
.mx	Mexico
.fr	France
.tw	Taiwan
.il	Israel
.uk	United Kingdom

THE WORLD WIDE WEB

World Wide Web (WWW), byname **the Web**, the leading information retrieval service of the Internet (the worldwide computer network). The Web gives users access to a vast array of documents that are connected to each other by means of hypertext or hypermedia links—i.e., hyperlinks, electronic connections that link related pieces of information in order to allow a user easy access to them. Hypertext allows the user to select a word or phrase from text and thereby access other documents that contain additional information pertaining to that word or phrase. Hypermedia documents feature links to images, sounds, animations, and movies. The Web operates within the Internet's basic client-server format; servers are computer programs that store and transmit documents to other computers on the network when asked to, while clients are programs that request documents from a server as the user asks for them. Browser software allows users to view the retrieved documents.

A hypertext document with its corresponding text and hyperlinks is written in HyperText Markup Language (HTML) and is assigned an online address called a Uniform Resource Locator (URL).

Working of WWW

The World Wide Web is based on several different technologies: Web browsers, Hypertext Markup Language (HTML) and Hypertext Transfer Protocol (HTTP).

A Web browser is used to access webpages. Web browsers can be defined as programs which display text, data, pictures, animation and video on the Internet. Hyperlinked resources on the World Wide Web can be accessed using software interface provided by Web browsers. Initially Web browsers were used only for surfing the Web but now they have become more universal. Web browsers can be used for several tasks including conducting searches, mailing, transferring files, and much more. Some of the commonly used browsers are Internet Explorer, Opera Mini, Google Chrome.

Features of WWW:

- HyperText Information System
- Cross-Platform
- Distributed
- Open Standards and Open Source
- Uses Web Browsers to provide a single interface for many services
- Dynamic, Interactive and Evolving.

Components of the WEB

There are 3 basic components of the web

1. Uniform Resource Locator (URL): serves as system for resources on web.
2. HyperText Transfer Protocol (HTTP): specifies communication of browser and server.
3. Hyper Text Markup Language (HTML): defines structure, organisation and content of webpage.

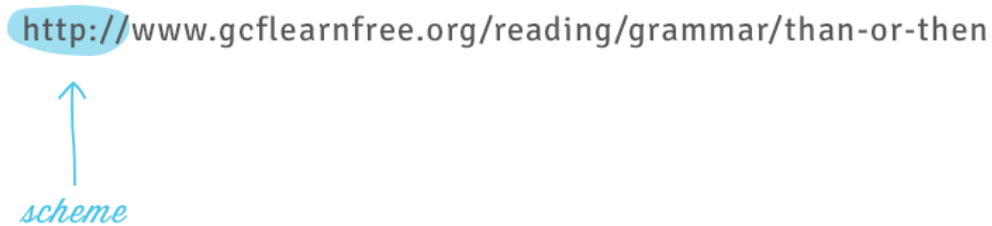
UNDERSTANDING URLS

Every time you click a link on a website or type a web address into your browser, it's a **URL**. URL stands for Uniform Resource Locator. Think of it like a street address, with each portion of the URL as different parts of the address,

and each giving you different information. Let's examine each component of a URL and what we can learn from it.

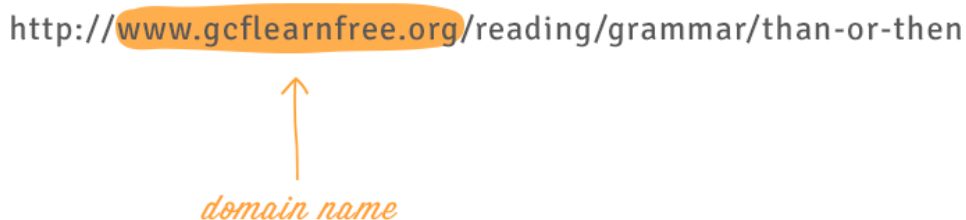
Scheme

Every **URL** begins with the **scheme**. This tells your browser what type of address it is so the browser connects to it correctly. There are many types of schemes, but for typical web browsing you will mostly see **http** and **https**. Your browser usually won't show the scheme in the address bar, and usually you don't need to type the scheme when typing a web address; instead, you can just begin with the **domain name**. The scheme is still always part of the URL; it just isn't being displayed.

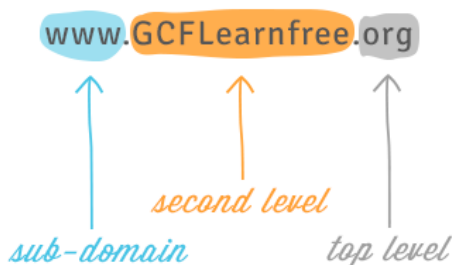


Domain name

The domain name is the most prominent part of a web address. Typically, different pages on the same site will continue to use the same domain name. For example, all pages on this site share the GCFLearnFree.org domain name.



Each segment of the domain name separated by a period is called a domain. The domain on the right is called a top-level domain, with the domain to the left of it called the second-level domain, then third-level domain, and so on.



You can often learn something about the site from the domains. One of the domains usually identifies the organization, while the top-level domain may give you more general information on what kind of site it is. For

example, in the domain name nc.gov, the .gov domain means it is a government website in the United States, the nc domain identifies it as the website of North Carolina.

In most URLs, the www domain can be omitted. Google.com and www.google.com lead to the same page. However, other subdomains cannot be omitted. For example, all pages under news.google.com require the news subdomain in the URL.

File path

The file path—often just called the path—tells your browser to load a specific page. If you don't specify a path and only enter a domain name, your browser is still loading a specific page; it's just loading a default page, which usually will help you navigate to other pages.

<http://www.gcflearnfree.org/reading/grammar/than-or-then>



URLs that end with the domain name without a file path usually will load a homepage or an index page that's designed to help you navigate to specific pages on the site. Often, if you can't remember the file path for a specific page, you can go to the homepage and search for it.

Parameters

Some URLs include a string of characters after the path—beginning with a question mark—called the parameter string. You have probably noticed this part of a URL appear in your address bar after performing a search on Google or YouTube. The parameter string can be clear or confusing to a human user, but it is critical information for the server.

www.youtube.com/watch?v=dQw4w9WgXcQ



Anchor

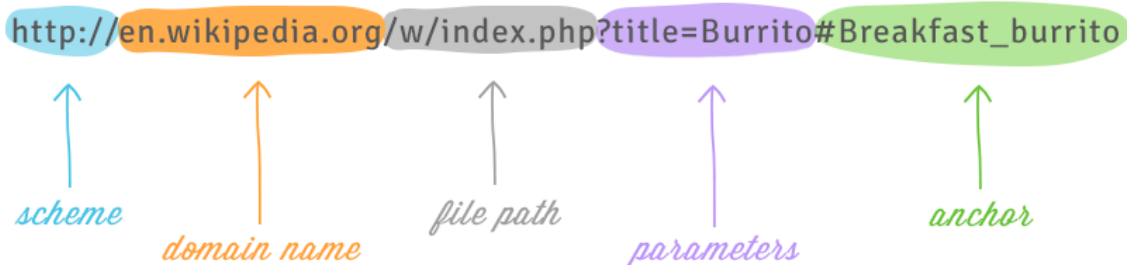
Also appearing after the path, the anchor tells your browser to scroll to or load a specific part of the page. Usually the anchor begins with a hashtag and is used to direct your browser to a specific part of a very long page, much like a bookmark. Different anchors don't load different pages; they simply tell the browser to display different parts of the page.

tolkiengateway.net/wiki/J.R.R._Tolkien#Writing



A whole URL

When combined, these elements make up a URL, although not all URLs will have all five parts.



Using what we learned in this tutorial, we can tell from the domain name of this URL that it's on Wikipedia, from the parameters that the page is probably about burritos, and from the anchor that we'll be looking at the section on burritos for breakfast.

Keep in mind that these are the most common components of a URL. There are many other parts, but these are the five you will see most often and that can usually give you the most information.

SEARCHING THE INTERNET

1. Vary Your Search Engine

Search engines sort through about 625 million active websites to provide you with content. You may favor one, but don't let habit restrict you. No search engine is perfect, and they all have different blind spots. The most widely used search engines are Google®, Bing® and Yahoo®.

- Google usually returns the greatest variety of results, and has by far the largest catalog of pages.
- Bing, however, has more extensive autocomplete results (where the search engine tries to narrow the search for you).
- Yahoo offers search as part of a wider range of services that includes news and shopping. Other engines such as DuckDuckGo® and Dogpile® also have their devotees.

2. Use Specific Keywords

Keywords are the terms that you use to find content on the internet. Making your keywords as specific as possible will help your search engine to track down the information that you want.

Say, for example, that you want to find a local supplier that can design an exhibition stand for your company. If you type stand design into your search engine, the results will include many pages about other types of stand, whereas typing exhibition stand designer will return a more concise range of companies.

You can further refine your search by including other specific keywords. If you add your location, for example, you'll likely find someone local.

3. Simplify Your Search Terms

Some engines include stop words in their searches. These are frequently used words such as prepositions (in, of, on), conjunctions (and, but) and articles (a, the), which mean that you'll end up with more pages in your search results than you need.

So, it's usually best to eliminate stop words from your internet searches. The main exception is if you're looking for a specific title or name that includes them.

Also, use the simplest form of the keywords that you're looking for, by avoiding plurals and verb forms with suffixes such as -ing, -s or -ed. For example, you would improve the quality of your search results by searching for service rather than services, or finance rather than financed or financing.

4. Use Quotation Marks

Enclosing a search term within quotation marks prompts the search engine to search for that specific word or phrase.

If the term is a single word, using quotation marks will cut out stemmed variations of it. For example, if you search for the word director, you'll likely receive a lot of results for direct, direction, directions, and so on, too. Typing "director" (with quotation marks), however, will ensure that you only get results for that stem word.

If the search term is a phrase, your search will be for that specific phrase, rather than for all the component words as individual items. So, for example, if you search for the phrase director of human resources, without quotation marks, your search will return results based on all of the words in the phrase (except of, which is a stop word.) Surrounding the term with quotation marks, however, will generate results that feature this specific term.

5. Remove Unhelpful Words

Inserting a hyphen/small dash/minus sign immediately before a word excludes it from a search.

So imagine, for example, that you're looking to find out more about marketing. However, you want to concentrate on traditional marketing techniques, whereas the internet appears to be full of references to digital and social media marketing, all of which are appearing in your search.

Typing in marketing -digital will exclude digital from the search, making it easier for you to find the information you're looking for. Typing marketing -digital -social would allow you to get rid of even more clutter.

6. Refine Your Search Using Operators

Other characters or terms, known as operators, allow you to narrow down your internet search in more targeted ways. We explore a few, below:

- **Wildcard Searches:** use the * symbol as a placeholder for another word. For example, searching for * **man in the world** returns results for the richest man in the world, the tallest, the oldest, and so on. Wildcard searches are also useful when, for example, you don't know the full text of a quote.

- **Combination Searches:** the OR operator enables you to search for two or more terms simultaneously, and is most useful when those terms are very similar. Typing **selling OR retailing**, for example, will return pages where either of the terms is used, without both needing to be present.

Another way to combine searches is to use AND. This operator ensures that you receive only search results that include two or more terms. For example, the search "**Smee Computers**" AND "**Devlin Corporation**" would only deliver search results that include the names of both companies.

- **Search a Specific Site:** when you type site: followed by the URL of the website that you wish to search and a search term, you limit your search to a single website. So, site:mindtools.com "human resources" will return all the pages from MindTools.com that feature the term "human resources."
- **Finding Related Sites:** another useful operator is related: Typing this in front of a web address that you already know – as in related:xyz.com – your search results will deliver a range of websites that are similar to xyz.com.

7. Avoid Search Pitfalls

When searching online, it's important to bear in mind that many companies now have staff who are dedicated to improving their visibility online. They constantly tweak the wording of their websites to match the most commonly used keywords – a process known as Search Engine Optimization (SEO).

As a result, the sites listed at the top of your search results may have very good SEO, but it doesn't necessarily follow that they'll have the best content. So, even when you've put in the best search terms you can, it's often worth digging down through your search results to find the best information.

With so much information now at your disposal, you need to be savvy about what is authoritative, and what is merely opinionated. Some blogs, for example, rank highly without actually being written by accredited experts. So, check carefully that the author of any information you use is well-regarded, and preferably associated with an academic institution, a professional body, or a reputable news organization.

It's also worth being aware of paid advertisements, which can appear at the top of search engine listings because companies have paid for them to do so. These are simply designed to sell to you, which is fine if you're looking to buy, but can be a hindrance to general search.

Key Points

The internet is vast and often confusing, and in order to find what you want, you need to take some basic steps to make your search as focused and rewarding as possible. Strategies for pinpointing the best, most relevant content include the following:

- **Vary your search engine:** in fact, get used to using several, as they have different strengths.
- **Use specific keywords:** be as specific as you can in your wording.
- **Simplify your search terms:** strip out unnecessary stop words and avoid suffixes.
- **Use quotation marks:** this narrows searches down to particular words and phrases.
- **Remove unhelpful words:** remove confusing or misdirecting terms from your searches with the - (minus) operator.
- **Refine your search using operators:** use operators to search specific sites, related sites, and particular combinations of terms.
- **Avoid search pitfalls:** the internet is a selling tool as well as a fantastic resource. Be sure that you only view advertisements if you want to.

THE BROWSER

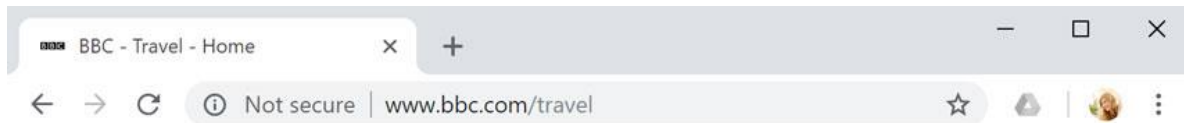
A web browser is a type of software that allows you to find and view websites on the Internet. Even if you didn't know it, you're using a web browser right now to read this page! There are many different web browsers, but some of the most common ones include Google Chrome, Internet Explorer, Safari, Microsoft Edge, and Mozilla Firefox.

BROWSER RESOURCES

1. URLs and the address bar

Each website has a unique address, called a **URL** (short for **Uniform Resource Locator**). It's like a street address that tells your browser where to go on the Internet. When you type a URL into the browser's address bar and press Enter on your keyboard, the browser will load the page associated with that URL.

In the example below, we've typed **www.bbc.com/travel** into the address bar.

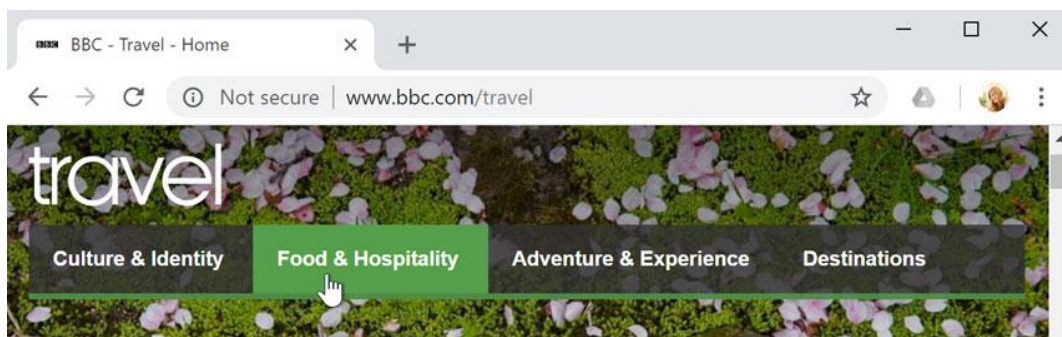


2. Links

Whenever you see a word or phrase on a website that's blue or underlined in blue, it's probably a hyperlink, or link for short. You might already know how links work, even if you've never thought about them much before. For example, try clicking the link below.

Hey, I'm a link! Click me!

Links are used to navigate the Web. When you click a link, it will usually take you to a different webpage. You may also notice that your cursor changes into a hand icon whenever you hover over a link.



If you see this icon, it means you've found a link. You'll find other types of links this way too. For example, many websites actually use images as links, so you can just click the image to navigate to another page.

3. Navigation buttons

The Back and Forward buttons allow you to move through websites you've recently viewed. You can also click and hold either button to see your recent history.

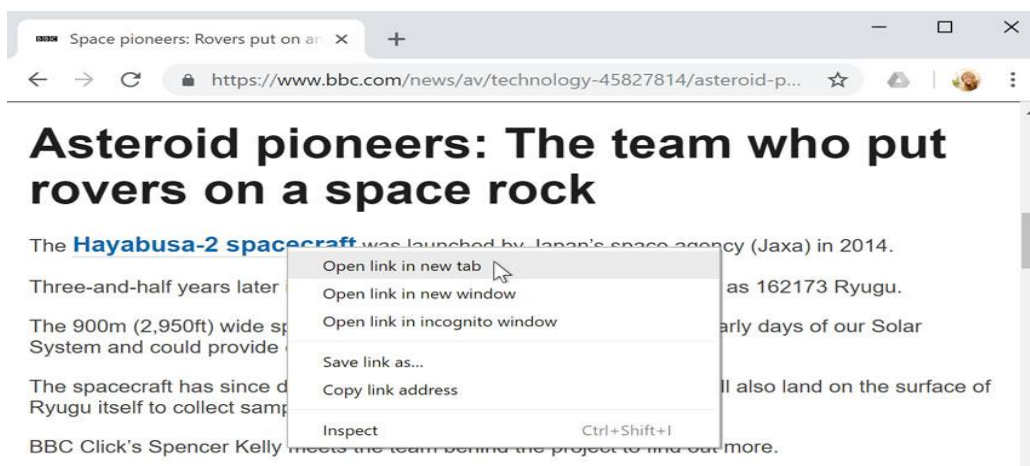


The Refresh button will reload the current page. If a website stops working, try using the Refresh button.

4. Tabbed browsing

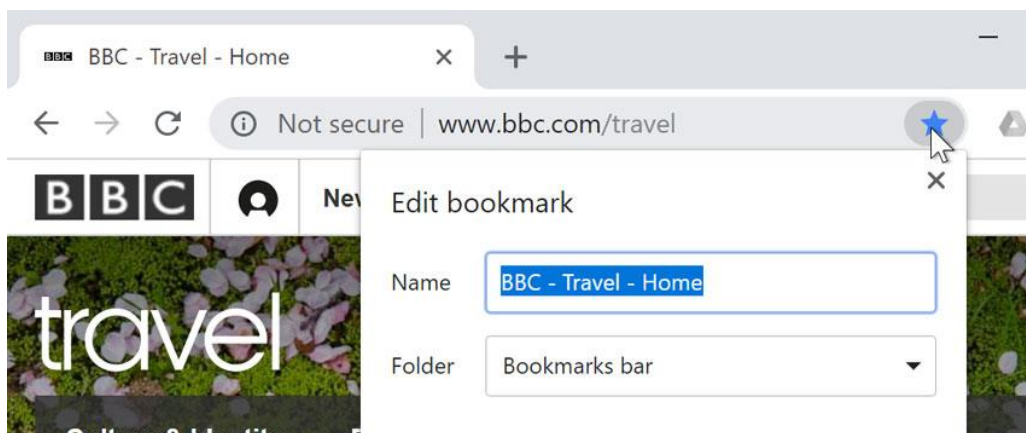
Many browsers allow you to open links in a new tab. You can open as many links as you want, and they'll stay in the same browser window instead of cluttering your screen with multiple windows.

To open a link in a new tab, right-click the link and select Open link in new tab (the exact wording may vary from browser to browser).



5. Bookmarks and history

If you find a website you want to view later, it can be hard to memorize the exact web address. Bookmarks, also known as favorites, are a great way to save and organize specific websites so you can revisit them again and again. Simply locate and select the Star icon to bookmark the current website.

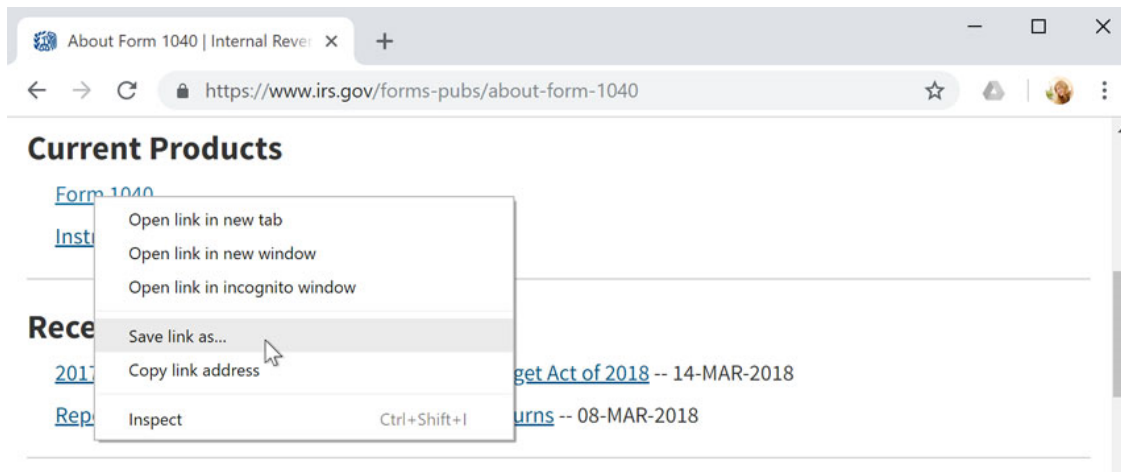


Your browser will also keep a history of every site you visit. This is another good way to find a site you visited previously. To view your history, open your browser settings—usually by clicking the icon in the upper-right corner—and select History.

6. Downloading files

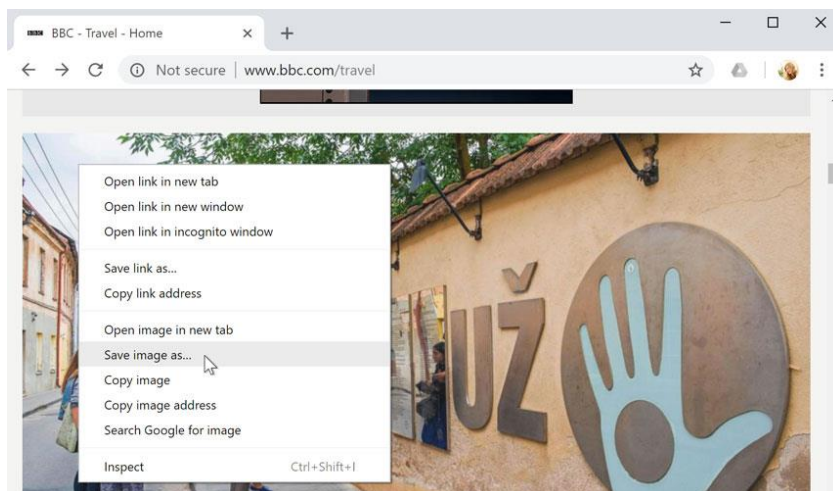
Links don't always go to another website. In some cases, they point to a file that can be downloaded, or saved, to your computer.

If you click a link to a file, it may download automatically, but sometimes it just opens within your browser instead of downloading. To prevent it from opening in the browser, you can right-click the link and select Save link as (different browsers may use slightly different wording, like Save target as).



7. Saving images

Sometimes you may want to save an image from a website to your computer. To do this, right-click the image and select Save image as (or Save picture as).



8. Plug-ins and Adons

Plug-in is the term that is usually used when referring to third party software that is meant to interact with a certain program. Take for example your web browser; you would need to install a plug-in called flash player in order to play videos. Flash player is not native to any browser but is made by a separate company altogether. It is also compatible with all of the popular web browsers like IE, Firefox, and Opera.

An Add-on also extends the functionality of a certain program but they are usually meant to function on a certain program. Taking the web browser for comparison, add-ons that are meant for Firefox would only work with Firefox and so would for other browsers. These are usually not full blown software but are simply pieces of code

that you can use to modify the interface. The most common add-ons for browsers are toolbars which take a little bit more space and give you instant shortcuts to certain online services. Add-ons are also very prominent in online games like World of Warcraft, where players who have a little know-how can create their own add-ons to help other players.

IP ADDRESSING

An IP address is an address used in order to uniquely identify a device on an IP network. The address is made up of 32 binary bits, which can be divisible into a network portion and host portion with the help of a subnet mask. The 32 binary bits are broken into four octets (1 octet = 8 bits). Each octet is converted to decimal and separated by a period (dot). For this reason, an IP address is said to be expressed in dotted decimal format (for example, 172.16.81.100). The value in each octet ranges from 0 to 255 decimal, or 00000000 - 11111111 binary.

This sample shows an IP address represented in both binary and decimal.

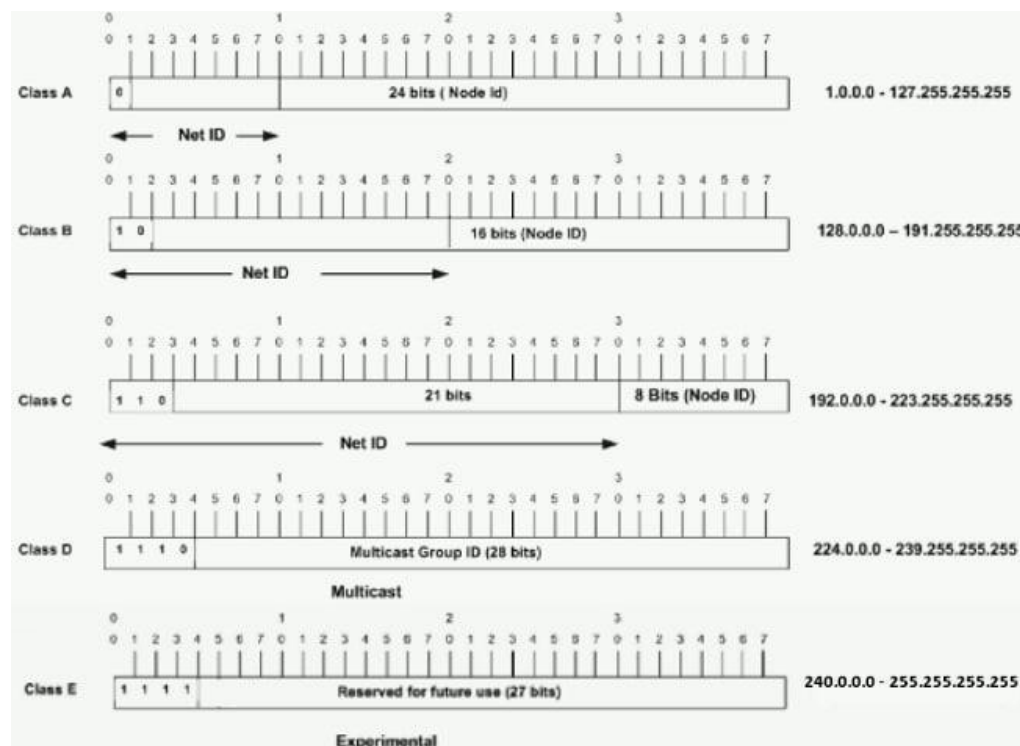
10. 1. 23. 19 (decimal)

00001010.00000001.00010111.00010011 (binary)

These octets are broken down to provide an addressing scheme that can accommodate large and small networks. There are five different classes of networks, A to E. This document focuses on classes A to C, since classes D and E are reserved and discussion of them is beyond the scope of this document.

Given an IP address, its class can be determined from the three high-order bits (the three left-most bits in the first octet). Figure 1 shows the significance in the three high order bits and the range of addresses that fall into each class. For informational purposes, Class D and Class E addresses are also shown.

Figure 1



In a Class A address, the first octet is the network portion, so the Class A example in Figure 1 has a major network address of 1.0.0.0 - 127.255.255.255. Octets 2, 3, and 4 (the next 24 bits) are for the network manager to divide into subnets and hosts as he/she sees fit. Class A addresses are used for networks that have more than 65,536 hosts (actually, up to 16777214 hosts!).

In a Class B address, the first two octets are the network portion, so the Class B example in Figure 1 has a major network address of 128.0.0.0 - 191.255.255.255. Octets 3 and 4 (16 bits) are for local subnets and hosts. Class B addresses are used for networks that have between 256 and 65534 hosts.

In a Class C address, the first three octets are the network portion. The Class C example in Figure 1 has a major network address of 192.0.0.0 - 223.255.255.255. Octet 4 (8 bits) is for local subnets and hosts - perfect for networks with less than 254 hosts.

IPv4 and IPv6

The Internet Protocol version 4 (IPv4) is a protocol for use on packet-switched Link Layer networks (e.g. Ethernet). IPv4 provides an addressing capability of approximately 4.3 billion addresses.

The Internet Protocol version 6 (IPv6) is more advanced and has better features compared to IPv4. It has the capability to provide an infinite number of addresses. It is replacing IPv4 to accommodate the growing number of networks worldwide and help solve the IP address exhaustion problem.

One of the differences between IPv4 and IPv6 is the appearance of the IP addresses. IPv4 uses four 1 byte decimal numbers, separated by a dot (i.e. 192.168.1.1), while IPv6 uses hexadecimal numbers that are separated by colons (i.e. fe80::d4a8:6435:d2d8:d9f3b11).

Table of Comparison

	IPv4	IPv6
No. of bits on IP Address	32	128
Format	decimal	hexadecimal
Capable of Addresses	4.3 billion	infinite number
How to ping	ping XXX.XXX.XXX	ping6

Network Masks

A network mask helps you know which portion of the address identifies the network and which portion of the address identifies the node. Class A, B, and C networks have default masks, also known as natural masks, as shown here:

Class A: 255.0.0.0

Class B: 255.255.0.0

Class C: 255.255.255.0

An IP address on a Class A network that has not been subnetted would have an address/mask pair similar to: 8.20.15.1 255.0.0.0. In order to see how the mask helps you identify the network and node parts of the address, convert the address and mask to binary numbers.

8.20.15.1 = 00001000.00010100.00001111.00000001

255.0.0.0 = 11111111.00000000.00000000.00000000

Once you have the address and the mask represented in binary, then identification of the network and host ID is easier. Any address bits which have corresponding mask bits set to 1 represent the network ID. Any address bits that have corresponding mask bits set to 0 represent the node ID.

8.20.15.1 = 00001000.00010100.00001111.00000001

255.0.0.0 = 11111111.00000000.00000000.00000000

net id | host id

BANDWIDTH

Network bandwidth is a measurement indicating the maximum capacity of a wired or wireless communications link to transmit data over a network connection in a given amount of time. Typically, bandwidth is represented in the number of bits, kilobits, megabits or gigabits that can be transmitted in 1 second. Synonymous with capacity, bandwidth describes data transfer rate. Bandwidth is not a measure of network speed -- a common misconception.

How does bandwidth work?

The more bandwidth a data connection has, the more data it can send and receive at one time. In concept, bandwidth can be compared to the volume of water that can flow through a pipe. The wider the pipe's diameter, the more water can flow through it at one time. Bandwidth works on the same principle. The higher the capacity of the communication link, the more data can flow through it per second.

The cost of a network connection goes up as bandwidth increases. Thus, a 1 gigabit per second (Gbps) Dedicated Internet Access (DIA) link will be more expensive than one that can handle 250 megabits per second (Mbps) of throughput.

Bandwidth vs. speed

The terms *bandwidth* and *speed* are often used interchangeably but not correctly. The cause of the confusion may be due, in part, to advertisements by internet service providers (ISPs) that conflate the two by referring to greater *speeds* when they truly mean *bandwidth*.

Essentially, *speed* refers to the rate at which data can be transmitted, while the definition of *bandwidth* is the capacity for that speed. To use the water metaphor again, *speed* refers to how quickly water can be pushed through a pipe; *bandwidth* refers to the quantity of water that can be moved through the pipe over a set time frame.

How to measure bandwidth

While bandwidth is traditionally expressed in bits per second (bps), modern network links now have far greater capacity, which is why bandwidth is now more often expressed as Mbps or Gbps.

Bandwidth connections can be symmetrical, which means the data capacity is the same in both directions -- upload and download -- or asymmetrical, which means download and upload capacity are not equal. In asymmetrical connections, upload capacity is typically smaller than download capacity; this is common in consumer-grade internet broadband connections. Enterprise-grade WAN and DIA (Document Interchange Architecture) links more commonly have symmetrical bandwidth.

INTELLECTUAL PROPERTY

Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.

IP is protected in law by, for example, patents, copyright and trademarks, which enable people to earn recognition or financial benefit from what they invent or create. By striking the right balance between the interests of innovators and the wider public interest, the IP system aims to foster an environment in which creativity and innovation can flourish.

Types of intellectual property

COPYRIGHT

Copyright is a legal term used to describe the rights that creators have over their literary and artistic works. Works covered by copyright range from books, music, paintings, sculpture and films, to computer programs, databases, advertisements, maps and technical drawings.

Patents

A patent is an exclusive right granted for an invention. Generally speaking, a patent provides the patent owner with the right to decide how - or whether - the invention can be used by others. In exchange for this right, the patent owner makes technical information about the invention publicly available in the published patent document.

Trademarks

A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. Trademarks date back to ancient times when artisans used to put their signature or "mark" on their products.

Plagiarism

Plagiarism means using someone else's work without giving them proper credit. In academic writing, plagiarizing involves using words, ideas, or information from a source without citing it correctly.

Plagiarism can occur in many different contexts. While often associated with school assignments, it can also happen in professional settings, such as the arts, academia, and the business world.

Types of plagiarism

Plagiarism can involve **copying words** or images directly, **paraphrasing** sentences or passages, or co-opting someone else's **ideas** without citing the original work.

In academic writing, there are various types of plagiarism you might encounter:

- **Global plagiarism** means plagiarizing an entire text. This includes purchasing an essay or turning in an assignment completed by someone else.
- **Patchwork** or **mosaic plagiarism** means copying phrases, passages, and ideas from different sources and compiling them into a new text.
- **Incremental plagiarism** means inserting a small amount of plagiarized content in a mostly original text.
- **Self-plagiarism** means recycling your own previous work that you've already submitted or published.

FOR STUDENTS AND ACADEMICS

Plagiarism is a form of academic dishonesty. Whether you're a student submitting a paper for a class or a researcher submitting to a journal, it's expected that the work you submit is your own. Getting credit for work you haven't done impacts your learning and misleads your readers.

That doesn't mean you can't use others' work. Drawing on existing ideas and research is a key part of academic writing. But it's important to clearly distinguish your own words and ideas from those of your sources.

This not only gives proper credit to the works you referenced, but also helps your readers track where your ideas came from and verify the evidence for themselves.

Consequences of plagiarism

Depending on the context, the consequences of plagiarism range from failing an assignment to serious legal trouble.

If you're a student submitting work that you don't intend to publish, there likely will not be legal ramifications for plagiarism. However, it can have serious consequences for your education, from a failing grade to academic probation or expulsion.

If you are seeking to publish your work, plagiarism can damage your reputation and land you in legal hot water. Not giving the original artist or creator credit could lead to loss of gainful income or other financial ramifications for them. Stealing intellectual property is against the law if it's copyrighted, and often has legal implications even if it isn't.

Avoid plagiarism by quoting, paraphrasing, and citing

The most surefire way to avoid plagiarism is to always cite your sources. But you also need to make sure to properly integrate them into your text by either quoting or paraphrasing.

Let's say you're writing a research paper on human evolution and the origins of play. You've found a great article in *Smithsonian Magazine*, "Five Ways Humans Evolved to Be Athletes," and you want to cite evidence from a specific paragraph of the article. How you can use this source without accidentally plagiarizing?

Avoiding plagiarism when paraphrasing

When you want to express an idea or information from a source, paraphrase or summarize it.

Original text "The generally accepted theory for the evolutionary origins of play is that it allows children to learn actions and tasks that they will need to master as adults. In hunter-gatherer populations, games that help children develop accuracy, power, and hand-eye coordination are useful practice for hunting." (Goldfield, 2021)

Simply changing a few words or using a synonym tool is not correct paraphrasing. In fact, you may unintentionally change the meaning of the source. To show you've fully understood the material, explain the author's key point entirely in your own words, and make sure to cite the source.

Avoiding plagiarism when quoting

When you want to include an exact phrase, sentence or passage from a source, use a quotation.

That means you need to place quotation marks around any text that is copied directly from the source. Be sure to introduce each quote in your own words, and avoid using standalone quotations as full sentences.

How is plagiarism detected?

Your professor or audience may be able to detect plagiarism if the formatting, style, or tone of your content changes abruptly or seems inconsistent. If your content looks or sounds familiar, a simple Google search may be all it takes.

Most academic institutions utilize some sort of plagiarism checker tool to make sure submitted content is original. If your content is too similar to content found by the checker, you may be suspected of plagiarism.

If you're worried about accidental plagiarism, consider running your content through a plagiarism checker yourself prior to submission.

How plagiarism checkers work

Online plagiarism checkers work in a similar way to the ones that universities use. You upload your document and the checker scans it, checking for any similarities to websites, journals, or other published sources within their database.

After the scan is complete, the checker shows you similarities it found between your text and the content in its database, often in the form of a percentage. You can then scroll through, adding quotations or citations if needed.

The accuracy of the results depend on the size of the database and the technology's capabilities.

Choosing an online plagiarism checker

There are many plagiarism checker tools on the market, and they vary in service provision and quality. The biggest differentiating factor between plagiarism checkers is the free, "freemium", and paid versions.

- Most **free** checkers will only detect directly copied-and-pasted content. If plagiarized content has even been slightly tweaked, these checkers will likely not detect it.
- **"Freemium"** checkers appear to be free at first glance, but have a lot of add-ons and features that are paid, making it unlikely that you will get everything you need for free.
- **Paid** checkers have access to larger databases, and often have the ability to detect similarities in paraphrased content as well. Some paid checkers are subscription models, but there are also pay-per-use options that give you more flexibility.

Internet Censorship

Internet censorship is the practice of prohibiting or suppressing certain online content. The content to be blocked can be anything typically including

- Porn
- Torrenting
- Social media
- News media
- Foreign websites

Censorship doesn't just take place at the government level, with countries like China banning foreign websites under the Great Firewall. It can also happen at home, at work, and with the original source, your Internet Service Provider. However, depending on where it comes from, internet censorship can look any number of ways.

At Home: Home censorship typically comes in the form of parental controls, in which parents use blacklists and keyword blocking to keep their kids safe online. Blacklists are lists of websites that are filtered out; these databases are constantly being updated for the latest inappropriate web content. Keyword blocking, on the other hand,

hides pages with certain keywords from view, controlling what kids see online. Parents can also use firewalls to hide content, which can be in the form of hardware or software.

At Work: Have you ever used the internet for personal reasons at work? If so, you're part of 43 percent of workers who exaggerate their actual time working.¹ That's why businesses often take it upon themselves to censor the internet, not only to block inappropriate content but also to increase productivity. Many businesses use firewalls to block either particular web pages or entire domains.

Internet Service Providers: Finally, censorship can also occur at the ground level, the Internet Service Providers themselves, otherwise known as ISPs. Theoretically, ISPs can block certain websites from view. However, net neutrality would mandate that ISPs can't favor any particular company or website in the U.S. Without net neutrality, ISPs could charge a fee for usage of bandwidth, meaning that those websites will load faster. However, some people argue that this is a form of censorship, and it's a topic widely debated in the U.S, but more on that a bit later.

How to Censor the Internet

Blocking of IP Addresses

A common method of internet censorship is the blocking of IP addresses, the code of numbers which tell your computer where to actually go when you type in a domain name. Certain IP addresses can be blocked on an ad-hoc basis, or through region, typically referred to as geo-location or geo-blocking.

Filtering Keywords

Commonly used in parental controls, keyword filters block, you guessed it, certain keywords, either automatically or manually.

Filtering Packets

Rather than filtering by domain names or keywords, some firewalls make their processing decisions based on:

- Protocols
- Ports
- Network addresses
- Source IP address
- Destination IP address

Instead of the firewall filtering for malicious traffic, as it typically does with most antivirus software, these filters are solely based on the source and destination IP addresses. Access will be given to known IP addresses, and vice versa.

How To Avoid Internet Censorship

If you are being censored at home, at work, by your ISP or by your country, there are a number of workarounds you can use to gain more freedom online. Some are free, some are paid, but all of them will only take a few minutes to set up and will greatly increase your protection from censorship.

VPNs

VPNs are Virtual Private Networks you can connect to that will encrypt your websites visited and device IP addresses. By hiding your web activity in a tunnel, you'll be able to get around website restrictions.

Secure Browser

Secure browsers like Tor essentially do the same thing as VPNs, hide your IP address and clear your cookies just as soon as you close website tabs. All of your activity will be encrypted three times, ensuring that you'll be safe even if you've visited restricted websites.

Don't Use Incognito Mode

Many people think that Incognito Mode will automatically erase all of their web history, but that's not the case. While the data will be deleted locally, your ISP will still be able to see your activities online, if there's no other security measure in place like a VPN. So while Incognito Mode can be useful from hiding your web activity from the people you share devices with, it's not a good choice for those that want privacy from their ISP.

Legality and appropriateness of companies blocking sites such as facebook

"The widespread use of social media has struck fear into some employers about decreased productivity, unwanted publicity, and a general increase in exposure for various work-related claims,"

Employee misuse of social networking sites can have a potentially costly impact on business. Business leaders have expressed rising concerns about risks such as:

- Misuse of confidential information (80%)
- Misrepresenting the views of the business (71%)
- Inappropriate non-business use (67%)
- Disparaging remarks about the business or employees (64%)
- Harassment (64%)

Social Media is Linked to a Drop in Productivity

More than half of employees waste an hour or more at work every day, and social media has become their second-biggest time waster (after news sites). One-third of the U.S. workforce uses social media for at least an hour each workday.

Social media can also disrupt workflow. Nearly half of all employees get interrupted at least every 15 minutes, and almost 60 percent of these interruptions involve digital tools such as social networks or switching back and forth between windows.

On average, a single wasted hour each day can cost companies \$10,375 in lost productivity per person each year and for businesses with 1,000 employees, the cost of interruptions can exceed \$10 million per year.

"The very tools we rely on to do our jobs are also interfering with that mission. We're clearly seeing what psychologists call 'online compulsive disorder' spillover from our personal lives to the work environment," said Yaacov Cohen, co-founder and CEO of harmon.ie.

WEB BASED EMAIL

Even today, in the era of instant messaging and high-definition video conferencing, email remains one of the most popular means of communication in the world. That's why we've rounded up the most popular web based email services, making it easy for you to get a new free webmail email address.

Webmail is a service that allows access to your account email through a web page using a browser without downloading messages to the computer.

Advantages

- Messages can be read, written, and sent from anywhere with a browser and Internet connection.
- You do not have to download messages to the computer.
- It easily creates email accounts, allowing you to create accounts for anonymous use.

Disadvantages

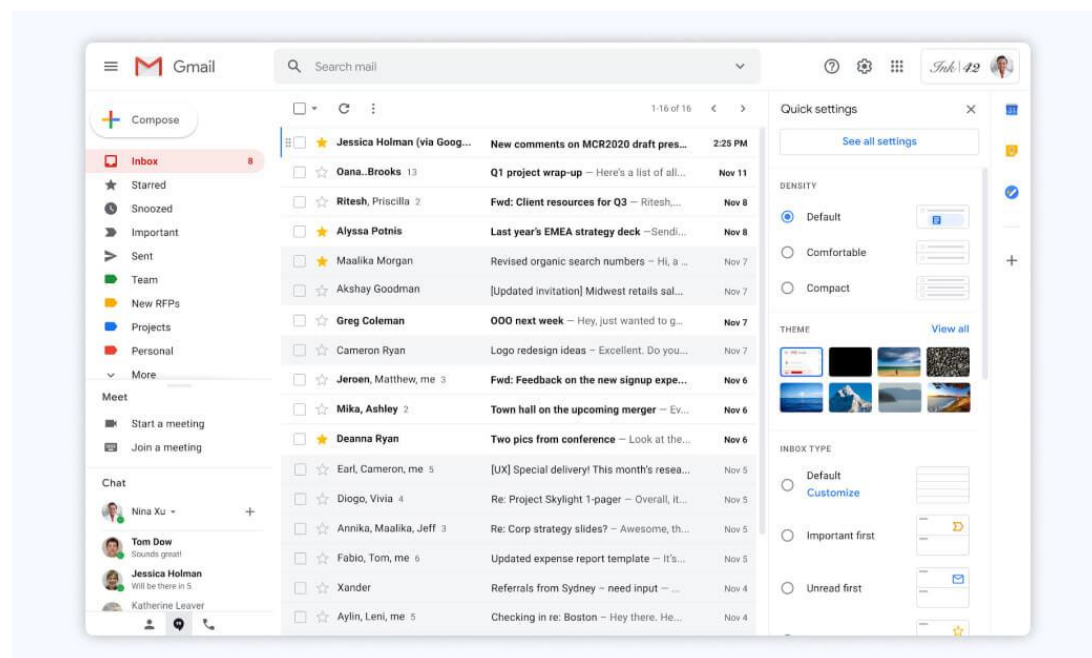
- The user must connect to the Internet while reading and writing the messages.
- Commercial webmail servers typically offer limited space for message storage and display message propaganda. It cannot save messages to a hard drive.
- When the Internet connection is slow, it can be difficult to send messages.
- Messages sent using webmail are about twenty times larger, since the message wrap in HTML code, so it slows its use.

Top 3 Best Free Webmail Providers

Choosing a free webmail provider can be difficult because there are so many to choose from, and some offer far more storage space and far better features and security than others.

1. Gmail

Gmail was released in 2004, and it didn't take a long time for it to become the best web based email service in the world. Its intuitive user interface is both inviting and functional, exposing Gmail's plethora of features without overwhelming users. All Gmail users get 15 GB of storage space for free, but it's important to note that this storage space is shared between all Google services.



Unlike most other web based email services, Gmail organizes email messages using labels instead of folders. Arguably the biggest advantage of labels is the fact that a single email message can have several of them at once. This allows for more granular email organization and easier email filtering.

👍 Pros:

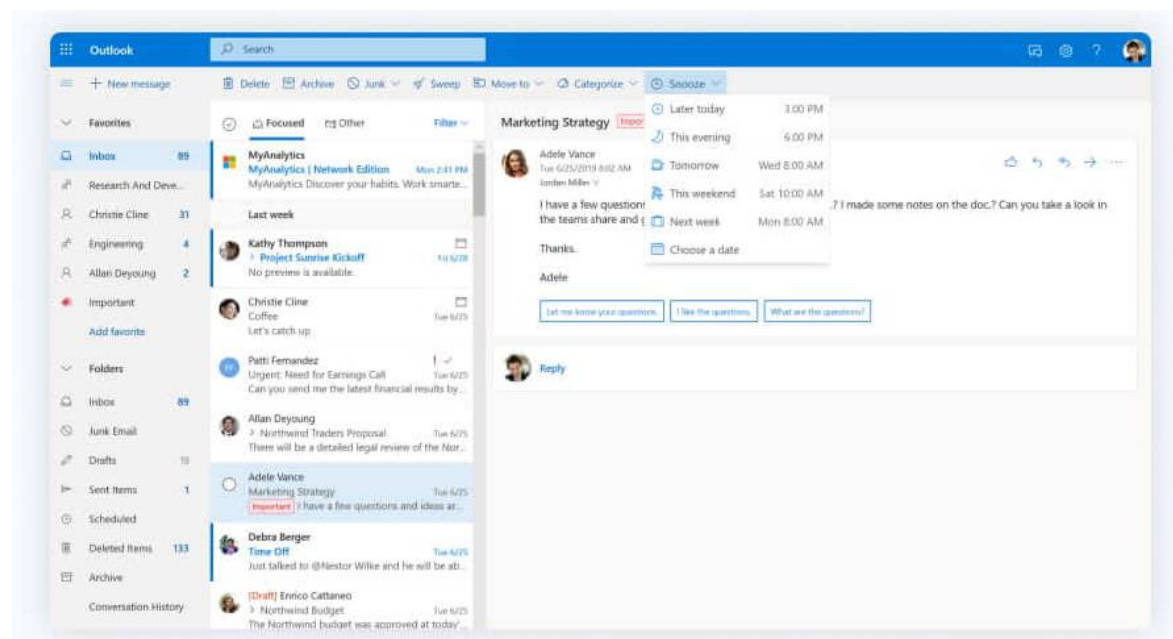
- Plenty of email storage space.
- Thorough malware and virus checking.
- Seamless access to other Google services.
- Fantastic reliability.

🗉 Cons:

- Most attractive email addresses are already taken.
- Storage space shared between all Google services.

2. Outlook.com

Outlook.com is the best free webmail for those who are heavily invested in Microsoft's ecosystem of products and services. Office 365 subscribers get an ad-free inbox with 50 GB of storage space, while all other users get 15 GB. Webmail Outlook.com is in many ways far more modern than its desktop counterpart, which is great news for those who have found Outlook on desktop to be difficult to use.



Because Outlook.com hasn't been around for nearly as long as Gmail, it's still relatively easy to find attractive domain names that haven't been registered by someone else. Just know that Outlook.com is infamous for marking legitimate emails as spam, so take advantage of its whitelist feature to prevent this from happening too often.

👍 Pros:

- Integrates well with other Microsoft services.
- Easy-to-use interface.

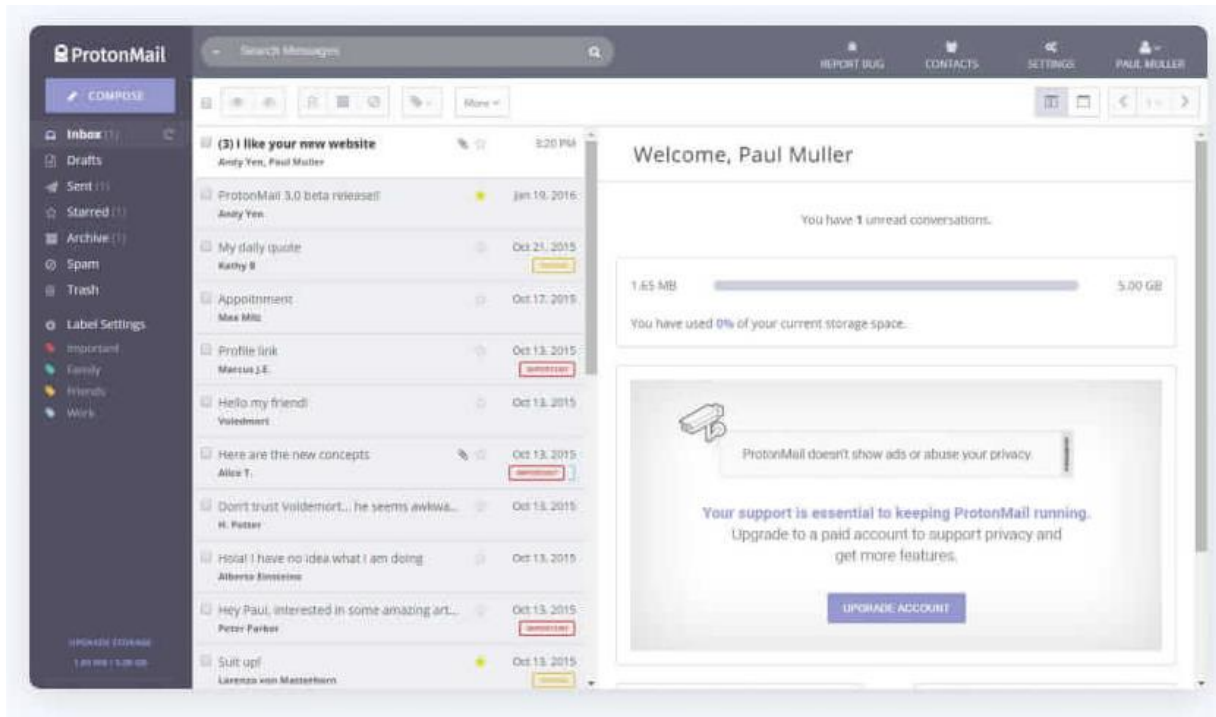
- Support for large attachments.
- Great for Office 365 subscribers.

Cons:

- Legitimate emails sometimes end up in the spam folder.

3. ProtonMail

Many free web based email services sell anonymized information about their users to advertisers and other third parties, but not ProtonMail. This privacy-oriented email provider offers exceptional levels of privacy and security, making it ideal for those who would like to keep their data to themselves.



ProtonMail is based in Switzerland, and it automatically encrypts all email messages with strong end-to-end encryption. Because its code is published online, cybersecurity experts can look at it and verify that ProtonMail really delivers on its promises. So far, the service has passed all audits with flying colors.

Pros:

- Servers located in Switzerland.
- Polished mobile applications available.
- Truly free secure webmail service.

Cons:

- No POP3 support.
- IMAP access only with the ProtonMail Bridge.

DIGITAL IDENTITIES

Digital identity is a dynamic map based on the information available on the internet about a person or a brand (digital footprint), as well as the perceptions this information generates in third parties (digital reputation).

The definition of identity is not only shaped by the users with what they say about themselves (on profiles and biographies), but also with what they do (the content and style of what they share, and the users and groups with whom they interact).

In addition, digital identity is also established by other users, in terms of reputation, and search engines in terms of visibility.

You are what you share

The users of the network design an image of themselves with the choice of their nickname, the photograph of their avatar and the text of their biographical profile, but the image they really project is derived from what they publish, from the style and content of what they share on a regular basis.

Thus, the digital identity is what the users do on the networks: the words and images they use, the texts and videos they share, the opinions they express and also, the jokes they make.

Digital footprint generated by the actions of the user and the perceptions of their communities of reference is tracked in real time by Google.

In the results of a search limited to the name and last name of the user, in quotation marks, the dynamic map of the digital identity is drawn, a map increasingly used in the processes of selection of people (before, during or after job interviews).

Guide for Digital Identity

Four basic tips to optimize the management of your personal brand in social networks:

1. Think before sharing

Remember that everything published is public and, in addition, it leaves a fingerprint that can be traced. Therefore, before sharing any content you have to think twice about how it could impact your personal brand: does it improve it or damage it?

Never share content that makes you vulnerable (especially intimate photographs), and be aware of the language and tone you use to refer publicly to third parties.

2. Choose where and with whom you share

It is advisable to design a content strategy and use each social network for different purposes. Apart from the content that should never be published, it is necessary to discriminate what is shared in private and public profiles, but also in direct messages to a single user and public messages to a group.

3. Add value to differentiate you and to be memorable

The management of digital identity should not only focus on a preventive sense but also must be faced positively: what identity I am going to build, what personal brand I want to resonate, and what reputation I aspire to earn.

In this sense, content sharing and visibility obtained are resources that can be used to strategically manage the personal brand.

To the extent that social networking platforms are available to millions of users, the only way to excel, to become visible and memorable is by adding value. Adding value means sharing content that interests someone more than your closest circle of friends, colleagues and family. Content that holds interest and is useful to users who do not know you.

4. Monitor your personal brand

To finish, keep an eye on your personal brand by frequently searching for your name and last name in Google, or create with that search an alert to receive notifications by email.

Check the search results for Web, but also for images and videos. Eliminate the contents that you have uploaded, and that you prefer to stop being visible, and untag yourself, whenever possible, in posts and photos that may generate negative perceptions.

SOCIAL NETWORKS

The term social networking refers to the use of internet-based social media sites to stay connected with friends, family, colleagues, customers, or clients. Social networking can have a social purpose, a business purpose, or both, through sites like Facebook, Twitter, LinkedIn, and Instagram. Social networking is also a significant base for marketers seeking to engage customers. Facebook remains the largest and most popular social network, with 2.8 billion people using the platform on a monthly basis, as of Dec. 31, 2020.

Pros and Cons of Social Networks

Pros

- Allows people to connect with others, including friends and family
- Companies can reach new and existing clients as well as build and improve their brand name
- Corporations can demonstrate their customer service

Cons

- Helps spread misinformation
- Complaints about companies can spread and create public relations issues
- Costs to advertise and develop corporate profile can be high

Blogs

A blog (a shortened version of “weblog”) is an online journal or informational website displaying information in reverse chronological order, with the latest posts appearing first, at the top. It is a platform where a writer or a group of writers share their views on an individual subject. Hence, Blogging is a collection of skills that one needs to run and supervise a blog. This entails equipping a web page with tools to make the process of writing, posting, linking, and sharing content easier on the internet.

Blog structure

The appearance of blogs has changed over time, and these days blogs include a wide variety of items and widgets. However, most blogs still include some standard features and structures.

Here are common features that a typical blog will include:

- Header with the menu or navigation bar.
- Main content area with highlighted or latest blog posts.
- Sidebar with social profiles, favorite content, or call-to-action.
- Footer with relevant links like a disclaimer, privacy policy, contact page, etc.

WIKIS

A wiki is a website that allows the site visitors to add and edit content. Generally, site visitors use their browser to edit text without requiring HTML code. Additionally, some Wikis allow adding and editing of graphics, tables and interactive components.

A blog site, by contrast, does allow visitors to add content, but does not usually allow them to change or edit previous comments from others.

The work “wiki” actually means “quick” or “fast” in Hawaiian. It was first used in 1994 by Ward Cunningham in Portland, Oregon. He developed his “WikiWikiWeb” after being inspired at Honolulu International Airport by an airport employee advising him to take the “Wiki Wiki Shuttle” between terminals; it was an alternative to “quick,” as he wanted to avoid the phrase “quick-web.”

The main characteristic of a Wiki is the ease with which a web page, called a “wiki page,” can be created and edited, often accepted without review or modification. Many wikis are open to the public and require no registration. Some do recommend logging in to provide for a “wiki signature cookie” to automatically sign edits. However, edits often appear in real-time. Private wiki systems may require registration and user authentication to edit, or even read, the content.

Some wikis automatically make copies of past pages; if an error or malicious editing occurs, a previous version can quickly replace the edited content. Many wikis encourage editors to fill out an “edit summary”; this is not published but allows editors to briefly summarize the changes and reason(s) for them.

Wikis may utilize a number of techniques to control changes. A revision history may be available to editors reviewing previous versions of a page or section. A recent changes page may also be consulted. Some regular content viewers may willingly and regularly review page content and be automatically notified of changes.

The open philosophy does sometimes invite malicious changes. However, most wikis approach this problem by making such changes easily deleted or edited out, as opposed to attempting to prevent such malicious editing. Other wikis require a short registration or give extra privileges or editing functions to users with a history of valid editing.

FORUM

A Web forum is a website or section of a website that allows visitors to communicate with each other by posting messages. Most forums allow anonymous visitors to view forum postings, but require you to create an account in order to post messages in the forum. When posting in a forum, you can create new topics (or “threads”) or post replies within existing threads.

Web forums are available for all kinds of topics. Examples include software support, help for webmasters, and programming discussions. While lots of Web forums focus on IT topics, they are not limited to information technology. There are forums related to health, fitness, cars, houses, teaching, parenting, and thousands of other topics. Some forums are general, like a fitness forum, while others are more specific, such as a forum for yoga instructors.

Since Web forums are comprised of user-generated content (UGC), they continue to grow as long as users visit the site and post messages. The webmaster of a Web forum simply needs to manage the forum, which may require moving, combining, and archiving threads. It may also involve monitoring postings and removing ones that are inappropriate. While this can be a large task for popular forums, most forum software, like vBulletin and phpBB, can filter out inappropriate content.

CYBERBULLYING

Cyberbullying is bullying with the use of digital technologies. It can take place on social media, messaging platforms, gaming platforms and mobile phones. It is repeated behaviour, aimed at scaring, angering or shaming those who are targeted. Examples include:

- spreading lies about or posting embarrassing photos of someone on social media
- sending hurtful messages or threats via messaging platforms
- impersonating someone and sending mean messages to others on their behalf.

Face-to-face bullying and cyberbullying can often happen alongside each other. But cyberbullying leaves a digital footprint – a record that can prove useful and provide evidence to help stop the abuse.

For bullying to stop, it needs to be identified and reporting it is key.

INTERNET COMMUNICATION TECHNOLOGIES

Email: A system for sending messages to one or more recipients via telecommunications links between computers using dedicated software or a web-based service:

Advantage:

Availability and Portability

The increased use of email has resulted in business people receiving hundreds of emails everyday. Yet, thousands of email messages can be archived into folders on your computer or handheld communication device such as a cell phone to be retrieved when you need them. The convenience of email prevents you from having to keep file folders filled with papers. It also makes your important correspondence easily portable without lugging around unwieldy file folders.

Reduces Shipping and Mailing Costs

Aside from the cost of your internet connection, email is free. One of the benefits of email communication is that you can send as many messages, files, videos, documents and presentations as you want without having to pay anything. It significantly reduces your company's shipping and postage costs as well as the time – and the cost of that time – you or a co-worker spend packaging documents for mailing, addressing them and getting them in the mail.

Disadvantages:

Accessible to Others

When someone hands you a business letter, you are the only person that receives that letter. Never consider your emails to be private. Since email is sent over networks, it's possible that others could gain access to them or receive them by mistake. An email can be intercepted by a hacker or go to an incorrect email address and wind

up in someone else's inbox. Therefore, be careful what information you send in an email. If it's private information that you don't want anyone else to see, email may not be the best communication method to use. Your sensitive information and messages are very accessible to hackers and even unsuspecting recipients when you use email.

Difficult to Interpret Emotions

A disadvantage of email is that people tend to treat it like a conversation because email can happen so quickly. They begin to use slang terms and try to carry on conversations via email. However, since email recipients cannot see each other, the emails do not have any voice inflection or emotion that can help with proper interpretation. This can and does cause misinterpretations of the emotion behind the email, leading to hurt feelings, anger, resentment and many more emotions. It's a good idea to reread your emails before sending them and look for wording that could be taken in a negative light.

INSTANT MESSAGING: Instant messaging (IM), form of text-based communication in which two persons participate in a single conversation over their computers or mobile devices within an Internet-based chatroom. I

Advantages:

- Ability to keep in contact with family and friends when not in the same city, state, or country.
- Ability to make new friends from all around the world.
- Sending messages to co-workers or employees as short messages in the workplace.
- Ability to speak to multiple people online at the same time either through several IM windows or inviting people to a chat room.

Disadvantages

- Inability to gauge emotional well being through IM.
- Uncertainty that the person you are talking to is the person you are talking to. This can be dangerous, especially for teens, as there's no guarantee of knowing who the person is or how old they are.
- Possibility of **getting viruses** from people you don't know.
- Likelihood of miscommunication. Because a screen separates people, some individuals may not feel the need to use **the appropriate netiquette**.
- Potential for misuse. Workplaces now have certain rules when it comes to using IMs, which if ignore, could lead to loss of employment.

VOICE OVER INTERNET PROTOCOL (VOIP): Voice-over-Internet Protocol (VoIP) is communications technology that allows users to interact by audio through an Internet connection, rather than through an analog connection. Voice-over-Internet Protocol converts the voice signal used in traditional phone technology into a digital signal that travels through the Internet instead of through analog telephone lines.

Pros of VOIP

- **Cost savings** - with VoIP, you pay only for your internet connection. Calls between individuals with VoIP equipment - even international calls - are free.
- **Rich features** - VoIP offers a wide range of features: from call forwarding, blocking, caller ID and voicemail, to remote management, automatic call distribution and interactive voice recognition.

- **Collaboration** - VoIP integrates easily with other systems and helps staff collaborate through voice, video, web conferencing or instant messaging, usually from a single user interface.
- **Improved productivity** - staff can use your communication system remotely and flexibly, with access to your data and network whenever and wherever they need it.

Cons of VOIP

- **Audio quality** - depending on your broadband, hardware and services, quality and reliability of VoIP connections may not be as good as the standard phone connections. Common issues that can happen during calls are delays, noise and echo.
- **Bandwidth dependency** - VoIP depends on your internet connection. If your connection goes down, so does your phone line. Similarly, insufficient bandwidth will likely cause quality issues with the service.
- **Security** - as with other internet technologies, security is a major consideration with VoIP. Possible threats include identity and service theft, phishing, viruses and malware, spamming over internet telephony, call tempering and denial of service attacks.
- **Extra costs** - if you use VoIP to phone someone without VoIP capabilities, you can incur additional costs.

E-Learning: E-Learning is the process of sharing knowledge through various channels such as e-books, CDs, webinars and more.

It has revolutionized the conventional method of chalk and board style of learning imparted to the students.

Unlike this, **e-Learning education** makes giving and receiving simpler, prolific, and productive. Tutors apply the method of teaching purely through the latest technology.

We define E-Learning as Courses which are specifically delivered through the internet everywhere other than the traditional classroom where the teacher is teaching.

Thus, teaching and learning both become simpler, easier, and more effective.

Importance of e-learning

- E-learning has been introduced to empower learners to get basic schooling and enhance skills. Also, they can obtain a degree certificate, without actually attending school or university or any other institution.
- For tutors, it is a great source of earning, wherein they can teach from anywhere in their preferred time.
- Applying e-learning to all levels of schooling helped to ensure students grasp the lessons adequately at a faster pace.
- According to psychology, the audio-visual method of teaching leads to a disciplined learning environment. There are an effective tutor and student engagements.
- One of the importance of e-learning in education is that tutors and participants both can develop advanced learning skills. For example, creating and selling ebooks is one such advancement.
- E-learning has worked towards bringing learners, tutors, experts, practitioners, and other interest groups to one place. Thus, there is a good practice of knowledge sharing followed through different online platforms. This is important in current times as competition is rising and the world is also growing. Hence, quick information helps in the better growth of an individual.

Benefits of E-Learning For Students

Unlike the traditional method of teaching with board and chalk, E-learning is fulfilled with the online mode of learning as the students can learn at their comfort and requirements. Let's have a look at the advantages of E-Learning to the students:

- You can access the study material unlimited times.
- You can study your Courses anytime and anywhere.
- Students can access updated content when they want.
- Unlike the traditional method of teaching, e-learning has a quick mode of delivery. This indicates that learning time is reduced.
- E-Learning provides scalability which helps in providing training.
- All students can receive the same type of syllabus, study materials and train through E-Learning.
- Through E-Learning, you can save time, money and reduced transportation cost. so, E-Learning is cost-effective compared to traditional learning.

VIDEO CONFERENCING: Video conferencing is an online technology that allows users in different locations to hold face-to-face meetings without having to move to a single location together. This technology is particularly convenient for business users in different cities or even different countries because it saves time, expenses, and hassles associated with business travel. Uses for video conferencing include holding routine meetings, negotiating business deals, and interviewing job candidates. Example of such platforms include Zoom, Skype, Microsoft teams, GoToMeeting, Jabber etc

STREAMING: Streaming refers to any media content – live or recorded – delivered to computers and mobile devices via the internet and played back in real time. Podcasts, webcasts, movies, TV shows and music videos are common forms of streaming content.

Live Streaming

Live streaming is the same as the streaming discussed above, but it's specifically used for internet content delivered in real-time as it happens. Live streaming is popular with live television shows, gaming broadcasts, and special one-time events or sports.

ETHICAL BEHAVIOR

- Ethics are a set of moral principles that govern an individual or a group on what is acceptable behaviour while using a computer. Computer ethics is a set of moral principles that govern the usage of computers. One of the common issues of computer ethics is violation of copyright issues.
- Duplicating copyrighted content without the author's approval, accessing personal information of others are some of the examples that violate ethical principles. Internet ethics means acceptable behaviour for using Internet. We should be honest, respect the rights and property of others on the Internet.

Ethical rules for computer users

- Do not use computers to harm other users.
- Do not use computers to steal others information.
- Do not access files without the permission of the owner.
- Do not copy copyrighted software without the author's permission.
- Always respect copyright laws and policies.

- Respect the privacy of others, just as you expect the same from others.
- Do not use other user's computer resources without their permission.
- Use Internet ethically.
- Complain about illegal communication and activities, if found, to Internet service Providers and local law enforcement authorities.
- Users are responsible for safeguarding their User Id and Passwords. They should not write them on paper or anywhere else for remembrance.
- Users should not intentionally use the computers to retrieve or modify the information of others, which may include password information, files, etc..

ONLINE IDENTITY MANAGEMENT

Online identity management is a collection of techniques used to create, promote, and protect the way a person or company is portrayed on the internet. Online identity management (OIM) often works as part of a branding or reputation management campaign to improve the quality and accuracy of the information that comprises your online identity.

An online identity is a distinct identity that is established by engaging in activities online. This includes:

- Creating a website
- Blogging
- Engaging on social media
- Posting comments or reviews

Every time you post to a social media account, create a new about page on a blog or website, comment on a review site or forum, or even play online games, you are shaping the way your online identity is managed.

By focusing on your online identity management strategy, you will be more likely to create an online identity that expresses how you'd like to be portrayed online. This includes using different personas for different online activities in an attempt to mask personal identity exposure. It can also be used to create a distinguished presence of your true persona online, which can grow a following and rise in search engine results.

DIGITAL FOOTPRINT

A digital footprint is the impression you create on the internet through your online activity, which includes browsing, interactions with others, and publication of content. In other words, it is the trail of data – intentional and unintentional - you leave behind while surfing the internet.

When people think of a digital footprint they usually think "cookie". When a site you visit drops a "cookie" in your browser, it contributes to your digital footprint because it allows marketers, and others, to follow you around. But a digital footprint can include much more.

Digital footprint examples include the following:

- The type of browser you are using (Chrome, Safari, Firefox, etc.)
- Your screen resolution
- Your IP address
- The kind of computer you are using

- Your operating system
- and more

CREATING AN ONLINE IDENTITY

1. Make self-Googleing a routine practice.

Track how many results come up for you when you search your name and what they say about you. Is someone else with the same name in the top results?

Are the results about you accurate and consistent with what you want people to know about you? Is there anything unsavory about you that is likely to discredit you and jeopardize the impression you will make on decision-makers? If you find “dirt”, start working to bring positive, on-brand results to the forefront, pushing negative results down to the bottom where they’ll be less visible.

Your search results can literally change overnight. Whether you have reached online identity nirvana or have an online image problem, it’s wise to get into the routine of monitoring results at least once a week. As you incorporate the suggestions below, check to see how quickly your actions yield search results and where they land in your list of results. This will help you determine whether your efforts are on target.

2. Set up a Google Alerts (<http://www.google.com/alerts>) account for “your name”.

This free service lets you know when people say something about you online. Once you set up an account, Google Alerts will send you an email whenever a search term you’ve provided (“your name” or whatever other words you want) is published on the Internet.

Build a Consistently Branded Web Presence.

3. Claim your name by purchasing the domain name “yourname.com” (example, “johnsmith.com”).

Your personal URL is the perfect address for your website and/or blog. But even if you don’t plan to launch a website or blog (see advice below) or don’t know what to do with your personal URL, secure it (or a viable option) before someone else does. At some point in the near future, a single Internet destination for all your career marketing documents will be the norm. Many registrars offer domain names for as little as \$7 a year.

4. Create a brand-charged E-Signature for email communications.

Along with your contact information, include a personal brand tagline. Add links to your personal blog, website/career portfolio, and/or online social networking profile (see advice below). Make it easy for people to get to accurate online information about you.

5. Join and participate in online social/business networking groups.

Choose appropriate sites whose members are people you need to get in front of and connect with (LinkedIn, Facebook, Twitter, Google+, ZoomInfo, Ecademy, and many others). Your online profile is a powerful opportunity for personal branding, attracting your target market, networking, and sending the right message about yourself.

Tips for building a branded LinkedIn profile:

- Add a branded tagline right under your name.
- Edit your public profile URL to include your name (example: “<http://www.linkedin.com/in/johnsmith>”)
- Lead the summary with a brand statement.

- Working from your branded resume, copy and paste chunks of information into the appropriate places in your profile.

Start connecting with people who can help you gain access to current job openings and the hidden job market. Be sure to set your profile as “public” so it will appear in search results. Even if you do nothing more than post your branded profile, you’ll be taking advantage of the groups’ already strong web presence to build top-ranking, accurate search results for yourself.

6. Get involved in blogging.

Search engines love blogs because the content is relevant and constantly updated. Comment and guest blog on relevant blogs and/or consider starting your own blog. Blogging is a great way to share your expertise, build community, and position yourself as a niche expert. It is probably the best way to build credibility and will exponentially increase your search results and visibility.

In any blogging activities, offer useful information. Avoid blatant self-promotion and negative or off-color remarks. Remember that anything you post will become part of the blogosphere. Don’t write anything you may regret later. As a guest blogger, be sure to post an on-brand profile of yourself.

Starting and keeping up with your own blog is a commitment. A successful blog requires the investment of at least several posts each month, but 3-5 posts per week works the best. If you go with your own blog, regularly refer to other relevant blogs in your posts and link to them. Continue to build visibility and support your brand by commenting on other blogs too.

7. Launch your own website and online career portfolio.

Establish a single destination for all your career and achievement activity. Working from your branded resume and other career marketing documents (cover letter, achievement summary, case studies summary, career biography, reference dossier, etc.), create a vivid comprehensive package illuminating your career history, strengths, passions, brand attributes, and value proposition. Hiring decision makers can easily gain access to everything they need to know about you in one place, with one click.

8. Write reviews of relevant books for online booksellers.

Set up an account and personal profile with top booksellers (Amazon, Barnes and Noble, etc.). Review books that are relevant to your field and areas of expertise. Your reviews and profile will rank high in your search results. Your reviews will also be picked up and published on many other bookseller sites, greatly increasing your search results.

9. Join and participate in professional associations.

10. Share your expertise on online forums.

HTML PROPER

The Web Page

A web page is a simple text file which also contains markup tags that describe how the text should be formatted on screen. The web page is stored on a computer known as a web server (server, for short). In order for the web page to be displayed on that computer or another computer, it must be accessed and interpreted by a specially designed program called the client software (client, for short). If the client software is on a computer other than the server, that computer is often also called the client. A web browser is a type of client software that is able to request web page code from a server over the internet, interpret the markup, and display it on the screen.

In order to request a web page, a browser must follow a network protocol, a set of rules for how data should be transferred. One of the easiest network protocols to understand is File Transfer Protocol (FTP). In practical terms, an FTP client requests from the server an exact copy of a file and saves it on the client (or vice versa). Although not used for directly accessing the markup of web pages, FTP programs are important parts of web publishing since web pages which may be designed on a PC must be placed on a web server to be accessible to the internet.

Web browsers use a different network protocol called Hypertext Transfer Protocol (HTTP). To see how browsers request resources from servers, it is easiest to use a concrete example. Most browsers have a bar at the top of the screen which is called something like the "address bar". You enter the address of the network resource you are requesting in this bar. The address must be formatted in a certain way. It begins with an identification of the protocol being used (HTTP), followed by the location of the server (called the domain name), then location on the server where the web page is stored, and finally the name of the web page itself. The address, given in this format, is known as Uniform Resource Locator, or URL. Let's look at the URL of this page as an example, using colour coding to help identify the various parts of the URL:

protocol://domain/server-location/filename

MARKUP LANGUAGE (HTML)

Markup languages are the road signs of a web page. They are sets of directions that tell the browser software how to display and manage a web document, much like written music scores are instructions that tell a musician how to play a particular song. These instructions (called *tags* or *markups*) are embedded in the source document that creates the web page.

ELEMENTS AND FUNCTIONS OF AN HTML

HTML is a tag-based language used for development of web pages. HTML tags are keywords (tag names) surrounded by angle brackets

<tagname>content</tagname>

- HTML tags normally come in **pairs** like <p> and </p>
- The first tag in a pair is the **start tag**(often called the **opening tag**), the second tag is the **end tag** (often called the **closing tag**)
- The end tag is written like the start tag, but with a **slash** before the tag name

Basic HTML Structure

<!DOCTYPE html>	tells version of HTML
<html>	HTML root element
<head>	Used to contain page HTML metadata

<code><title>page</title></code>	title of HTML page
<code></head></code>	
<code><body></code>	hold content of HTML
<code><h1>Heading Content</h1></code>	HTML heading tag
<code><p>Paragraph Content</p></code>	HTML Paragraph tag
<code></body></code>	
<code></html></code>	

Other Important HTML Elements

- A **heading element** implies all the font changes, paragraph breaks before and after, and any white space necessary to render the heading. The heading elements are `<h1>`, `<h2>`, `<h3>`, `<h4>`, `<h5>`, `<h6>` with `<h1>` being the highest (or most important) level and `<h6>` the least.
- The `<p>` **element** represents a **paragraph**. A paragraph always starts on a new line, and is usually a block of text.
- The `<hr>` **element** defines a thematic break in an html page (e.g. a shift of topic). The `hr` element is most often displayed as a horizontal rule that is used to separate content (or define a change) in an html page.
- The `
` **element** is used to insert a line break or carriage-return within a parent element such as a paragraph `<p>` without breaking out of the parent container. The `
` **tag** is an empty tag which means that it has no end tag
- The `<a>` **element** defines a hyperlink, which is used to link from one page to another. The most important attribute of the `<a>` element is the **href** attribute, which indicates the link's destination.
- The `<link>` **element** defines the relationship between the current document and an external resource. The `<link>` tag is most often used to link to external style sheets. The `<link>` element is an empty element, it contains attributes only.
- The `` **element** is used to represent an item in a list. It must be contained in a **parent element**: an ordered list (``), an unordered list (``). In unordered lists, list items are usually displayed using bullet points. In ordered lists, list items are displayed using numbers or alphabets.
- The `` **element** is used to embed an image in a web page. The `` **tag** is empty, it contains attributes only, and does not have a **closing tag**.
- The `<video>` **element** is used to embed video content in a document, such as a movie clip or other video streams.
- The html `<form>` **element** is used for creating a form for user input. A **form** can contain textfields, checkboxes, radio-buttons and more. **Forms** are used to pass user-data to a specified URL.
- The `<input>` **element** specifies an **input** field where the user can enter data. The input element is the most important **form element**. The input element can be displayed in several ways, depending on the type attribute.
- The `<section>` element is a structural html element used to group together related elements. The `<section>` element defines sections in a document, such as chapters, headers, footers, or any other sections of the document

- The **<div> element** is used as a container for html elements . Any sort of content can be put inside the **<div> tag!**
- **<aside> element** represents a portion of a document whose content is only indirectly related to the document's main content. Asides are frequently presented as sidebars or call-out boxes.
- The ** element** is a generic inline container for inline elements and content. It used to group elements for styling purposes (by using the class or id attributes).
- The **<nav> element** represents a section of a page whose purpose is to provide **navigation** links, either within the current document or to other documents. Common examples of navigation sections are menus, tables of contents, and indexes.
- The **<header> element** represents introductory content, typically a group of introductory or navigational aids. It may contain some **heading** elements but also a logo, a search form, an author name, and other elements.
- The **<footer> element** defines a footer for a document or section. A footer element typically contains: authorship information, copyright information, contact information, back to top links, related documents