INFORMATION TECHNOLOGY

E-Commerce

E-commerce (electronic commerce) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. These business transactions occur either as business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer or consumer-to-business. The terms e-commerce and e-business are often used interchangeably. The term e-tail is also sometimes used in reference to the transactional processes that make up online retail shopping. • In the last decade, widespread use of e-commerce platforms such as Amazon and eBay have contributed to substantial growth in online retail. In 2007, e-commerce accounted for 5.1% of total retail sales; in 2019, e-commerce made up 16.0%. E-Commerce • How does e-commerce work? • E-commerce is powered by the internet, where customers can access an online store to browse through, and place orders for products or services via their own devices. • As the order is placed, the customer's web browser will communicate back and forth with the server hosting the online store website. Data pertaining to the order will then be relayed to a central computer known as the order manager -- then forwarded to databases that manage inventory levels, a merchant system that manages payment information (using applications such as PayPal), and a bank computer -- before circling back to the order manager. This is to make sure that store inventory and customer funds are sufficient for the order to be processed. After the order is validated, the order manager will notify the store's web server, which will then display a message notifying the customer that their order has been successfully processed. The order manager will then send order data to the warehouse or fulfilment department, in order for the product or service to be successfully dispatched to the customer. At this point tangible and/or digital products may be shipped to a customer, or access to a service may be granted. • Platforms that host e-commerce transactions may include online marketplaces that sellers simply sign up for, such as Amazon.com; software as a service (SaaS) tool that allow customers to 'rent' online store infrastructures; or open-source tools for companies to use in-house development to manage. Introduction to Electronic Commerce • Types of e-commerce • Business-to-business (B2B) e-commerce refers to the electronic exchange of products, services or information between businesses rather than between businesses and consumers. Examples include online directories and product and supply exchange websites that allow businesses to search for products, services and information and to initiate transactions through e-procurement interfaces. • In 2017, Forrester Research predicted that the B2B e-commerce market will top $1.1 trillion in the U.S. by 2021, accounting for 13% of all B2B sales in the nation. • Business-to-consumer (B2C) is the retail part of e-commerce on the internet. It is when businesses sell products, services or information directly to consumers. The term was popular during the dot-com boom of the late 1990s, when online retailers and sellers of goods were a novelty. • Today, there are innumerable virtual stores and malls on the internet selling all types of consumer goods. The most recognized example of these sites is Amazon, which dominates the B2C market. Introduction to Electronic Commerce • Consumer-to-consumer (C2C) is a type of e-commerce in which consumers trade products, services and information with each other online. These transactions are generally conducted through a third party that provides an online platform on which the transactions are carried out. • Online auctions and classified advertisements are two examples of C2C platforms, with eBay and Craigslist being two of the most popular of these platforms. Because eBay is a business, this form of e-commerce could also be called C2B2C -- consumer-to-business-to-consumer. • Consumer-to-business (C2B) is a type of e-commerce in which consumers make their products and services available online for companies to bid on and purchase. This is the

opposite of the traditional commerce model of B2C. • A popular example of a C2B platform is a market that sells royalty-free photographs, images, media and design elements, such as iStock. Another example would be a job board. • Business-to-administration (B2A) refers to transactions conducted online between companies and public administration or government bodies. Many branches of government are dependent on e-services or products in one way or another, especially when it comes to legal documents, registers, social security, fiscals and employment. Businesses can supply these electronically. B2A services have grown considerably in recent years as investments have been made in e-government capabilities. Introduction to Electronic Commerce • Consumer-to-administration (C2A) refers to transactions conducted online between individual consumers and public administration or government bodies. The government rarely buys products or services from citizens, but individuals frequently use electronic means in the following areas: • Education. Disseminating information, distance learning/online lectures, etc. • Social security. Distributing information, making payments, etc. • Taxes. filing tax returns, making payments, etc. • Health. Making appointments, providing information about illnesses, making health services payments, etc. • Mobile e-commerce (M-commerce) is a type of e-commerce on the rise that features online sales transactions made using mobile devices, such as smartphones and tablets. M-commerce includes mobile shopping, mobile banking and mobile payments. Mobile chatbots also provide e-commerce opportunities to businesses, allowing consumers to complete transactions with companies via voice or text conversations. E-Commerce Framework • What is an e-commerce framework? • The term e-commerce framework is related to software frameworks for e-commerce applications. They offer an environment for building e-commerce applications quickly. • E-Commerce frameworks are flexible enough to adapt them to your specific requirements. As result, they are suitable for building virtually all kinds of online shops and e-commerce related (web) applications like the Aimers e-commerce framework does. • An e-commerce framework must • allow replacing all parts of the framework code • forbid changes in the framework code itself • contain bootstrap code to start the application • be extensible by user-written code E-Commerce Framework • E-Commerce frameworks should • define the general program flow • consist of reusable components • be organized in functional domains • Examples of e-commerce frameworks are • Aimers (Laravel, Symfony, TYPO3, SlimPHP, Flow) • Spryker (Symfony only) • Sylius (Symfony only) • They provide an overall structure for e-commerce related applications. Furthermore, they implement the general program flow e.g. how the checkout process works. Contrary to monolithic shop systems, existing program flow can not only be extended but completely changed according to your needs. E-Commerce Framework • Evolution of e-commerce systems • Since the beginning of (internet) e-commerce around 1995, a lot has changed on the technology side. The first generation of e-commerce systems evolved from existing ERP and related systems. This was followed by the 2. generation of standalone shop systems between 2004 and 2008. E-commerce frameworks are the latest generation of e-commerce systems and started around 2012. • Hybris, the shop system owned by SAP is one of the representatives of the 1. generation. It’s strongly connected to the SAP ERP system and Hybris is mainly a shop front-end for SAP. Customer relationship (CRM) and content management (CMS) tools are available in the ERP system but very limited. • The Magento shop system represents the 2. generation of standalone e-commerce systems. They usually contain CRM and CMS and some other functionality but also only at a very basic level. They might be enough for the smallest shops but are unusable for shop owners who run for real

profits. • Aimeos is one of the few real e-commerce frameworks that are currently available. These 3rd generation systems excel in their own domain: Present and sell products. For all other e-commerce related tasks, they connect to specialized systems and exchange data in both ways. Thus, shop owners can choose the best systems for their needs. E-Commerce Framework • E-Commerce framework architecture • E-commerce frameworks must be based on a strong architectural model. Usually, they make heavy use of interfaces and design patterns like • Dependency Injection (make components independent of used object implementation) • Factories (create objects at a central place that instantiates the actual implementation) • Decorators (dynamically add functionality to existing objects) • Publish/Subscribe model (notify listening objects about changes instead of polling for updates) • A “design pattern” is re-usable solution that solves similar software design problems in an elegant way. They require programming language templates which enforce public class methods and their signatures called “interfaces”. • The basic requirement is independent, side-effect free components that form the building blocks. One or more components care about the functionality of a business “domain”. Such a domain can be the HTML front-end, a JSON REST API and the administration interface. E-Commerce Framework • The vertical separation of code into business domains enables scaling out applications by deploying the application as a bunch of micro services. • Micro services are loosely coupled applications that offer their service over lightweight protocols like HTTP and JSON. They are easier to extend, maintain and especially deploy than monolithic applications. E-Commerce and media convergence • Media Convergence The electronic marketplace is turning into a reality as many companies are using their resources and talents through mergers with other companies. The term E-Commerce is now irreversibly linked with the idea of convergence of companies cantered on information like content, storage, networks, business applications, and consumer devices. • Convergence means merging of consumer electronics, publishing, television, computers, and telecommunications for the purpose of enabling new forms of information-based commerce. The concept may be confusing for the public as the popular press uses the terms multimedia and cross media interchangeably. Multimedia convergence refers to the conversion of data, voice, text, image, graphics, and full-motion video into digital content. Cross-media convergence applies to the integration of various industries, such as, entertainment, publication, and communication media based on multimedia content. The two types of convergence are closely related to each other. E-Commerce and media convergence • In the new era of interactive television, the lines between advertisements, entertainment, education, and services often become blurred. While watching a World Cup cricket match between India and Australia, you may develop an urge to know more about Australia. Instead of running to the local bookstore and purchasing a book, you can connect to an online database and search while not missing any part of the match. The information in these online databases is not limited to text but also provides photographs and digital videos (multimedia). • In other words, convergence requires removing the barriers between telecommunications, broadcasting, computing, movies, electronic games, and publishing industries to facilitate interoperability. E-Commerce and media convergence • Simple technological improvements driving the phenomenon of convergence are as follows: • 1. Convergence of Content: This helps to translate all types of information content, such as, books, business documents, videos, movies, and music into digital information. Once the content is converted into digital form, that information can easily be searched, encrypted, duplicated, and transmitted which suits today’s information

processing systems. • 2. Convergence of Transmission: This helps to compress and store digitized information so that it can be transmitted through existing phone and cable wiring. New techniques and other technological discoveries modify all types of information. Here, we can notice the convergence of communication systems that provide a medium to transmit voice, data image, and video without rewiring the neighbourhood. • 3. Convergence of Information: Some of the information access devices can function as both computers and televisions. For example, a telephone with internal fax machine, modem, and video monitor is capable of receiving fax, e-mail, and video E-Commerce and media convergence • Convergence is also being driven by certain market conditions including the following: • 1. The availability of low-cost, high-performance enabling component technologies, such as, semiconductors, storage and display devices, communications systems, and operating systems. • 2. Entrepreneurs' expectation of end-user demand for new applications—both products and services that rely on the above-mentioned enabling technologies. • 3. The regulatory actions that are creating competition in monopoly markets, such as, local and long-distance communications, telecommunication and cable equipment, and facilitating the rapid deployment of the new applications Anatomy of E-Commerce Applications • Anatomy of E-Commerce applications • •Multimedia Content for E-Commerce Applications • •Multimedia Storage Servers & E-Commerce Applications • I. Client-Server Architecture in Electronic Commerce • ii. Internal Processes of Multimedia Servers • iii. Video Servers & E-Commerce • •Information Delivery/Transport & E-Commerce Applications • •Consumer Access Devices • Multimedia Content for E-Commerce Applications • •Multimedia content can be considered both fuel and traffic for electronic commerce applications. • •The technical definition of multimedia is the use of digital data in more than one format, such as the combination of text, audio, video, images, graphics, numerical data, holograms, and animations in a computer file/document. See in Fig. • •Multimedia is associated with Hardware components in different networks. • •The Accessing of multimedia content depends on the hardware capabilities of the customer. Anatomy of E-Commerce Applications • Multimedia Storage Servers & E-Commerce Applications • •E-Commerce requires robust servers to store and distribute large amounts of digital content to consumers. • •These Multimedia storage servers are large information warehouses capable of handling various content, ranging from books, newspapers, advertisement catalogues, movies, games, & X-ray images. • •These servers, deriving their name because they serve information upon request, must handle large-scale distribution, guarantee security, & complete reliability • I. Client-Server Architecture in Electronic Commerce • •All e-commerce applications follow the client-server model • •Clients are devices plus software that request information from servers or interact known as message passing • •Mainframe computing , which meant for "dump" • •The client server model, allows client to interact with server through request-reply sequence governed by a paradigm known as message passing. • •The server manages application tasks, storage & security & provides scalability-ability to add more clients and client devices(like Personal digital assistants to Pc's. See in fig. Anatomy of E-Commerce Applications • ii. Internal Processes of Multimedia Servers • •The internal processes involved in the storage; retrieval & management of multimedia data objects are integral to e-commerce applications. • • •A multimedia server is a hardware & software combination that converts raw data into usable information & then dishes out. • • •It captures, processes, manages, & delivers text, images, audio & video. • • •It must do to handle thousands of simultaneous users. • •Include high-end symmetric multiprocessors, clustered architecture, and massive parallel systems. • Anatomy

of E-Commerce Applications • iii. Video Servers & E-Commerce • The electronic commerce applications related to digital video will include • 1. Telecommunicating and video conferencing • 2. Geographical information systems that require storage & • navigation over maps • 3. Corporate multimedia servers • 4. Postproduction studios • 5. shopping kiosks. • •Consumer applications will include video-on-demand. • •The figure which is of video–on demand consist video servers, is a link between the content providers (media) & transport providers (cable operators) • Anatomy of E-Commerce Applications • Information Delivery/Transport & E-Commerce Applications • •Transport providers are principally telecommunications, cable, & wireless industries. • • Information Transport Providers Information Delivery Methods • • •Telecommunication companies long-distance telephone lines; • local telephone lines • •Cable television companies Cable TV coaxial, fibre optic & • satellite lines • •Computer-based on-line servers Internet; commercial on-line • service providers • •Wireless communications Cellular & radio networks; • paging systems Anatomy of E-Commerce Applications • Consumer Access Devices • • Information Consumers Access Devices • • •Computers with audio & video Personal/desktop computing • capabilities Mobile computing • • •Telephonic devices Videophone • • •Consumer electronics Television + set-top box Game • systems • •Personal digital assistants (PDAs) Pen-based computing, voice- • driven computing E-Commerce Consumer and Organization Applications • E-Commerce Consumer and Organization Applications • People needs entertainment on demand including video, games, news OnDemand, electronic retailing via catalogues etc. • • Currently now we are taking the video on-demand. • • Why most companies betting heavily on this? • 1. 93 million homes have television • 2. Americans spend nearly half their free time watching television • 3. Every evening, more than one-third of the population is in front of a television • 4. Sight, sound, and motion combine to make television a powerful means of marketing E-Commerce Consumer and Organization Applications • 1. Consumer Applications and Social Interaction: • • Lessons from history indicate that the most successful technologies are those that make their mark social • • In 1945, in U.S no one had TV. By 1960 about 86percent of households did • • Now contrast with Telephone. Bell invented the telephone in 1876 and by1940, 40% of U.S. households and by 1980 about 95-98 percent of households connected • • Penetration was slower for Telephone than for TV because of the effort needed to set up the wiring infrastructure • The impact of both was good on business, social, consumer behaviour and entertainment habits • Radio began in 1960, and by 1989, almost 3 decades later, just 319 radio stations followed the news format • In 1994, their number exceeded 1000 E-Commerce Consumer and Organization Applications • What do Consumers really want? • 1. They want quality and cost of service • 2. If a new system requires more steps to do essentially the same things, consumers may resist it • 3. Some people fit that mold, but most of public prefers to lay back and just watch television and let someone else do the work of figuring out the sequence of television programming • What are Consumers willing to spend? • 1. According to the video on-demand, consumers get the cable bill at basic charge they will buy • 2. If it is doubled, they will not buy and at the service provider economics will increased then network operators might look to advertises to fill the gap E-Commerce Consumer and Organization Applications • Delivering products to Consumers • 1. Packing and distribution must be considered • 2. Blockbuster video collects the information and shows the typical consumer • 3. Spends $12 a month on home video expenditures • 4. Go to video store to select video on limited budget and has time to kill • 5. Only periodically expends a large sum of money The network Infrastructure for Electronic Commerce • Network infrastructure is required for e-

commerce to transport content. I-way is a high-capacity, interactive electronic pipeline used to transfer content in case of ecommerce. I-way can transfer any type of context like, text, graphics, audio, video. In other words, multimedia contents are easily transported through I-way. • Components of I-way: - Consumer access equipment. - Local on-ramps, and - Global information distribution networks. Consumer access equipment are devices used by consumers to access the multimedia interactive contents of e-commerce. In this segment, hardware and software vendors are also included. The network Infrastructure for Electronic Commerce • Local or access road, or on-ramps: This segment of I-way simplify linkages between businesses, universities, and homes to the communications backbone. There are four different types of providers of access ramps: - telecom-based - cable TV-based - wireless-based and - computer-based online information services. These providers link users and e-commerce application providers. • Global information distribution networks are the infrastructure that is connecting countries and continents. The network Infrastructure for Electronic Commerce • INFORMATION SUPERHIGHWAY (I-Way) Any successful E-commerce application will require the I-Way infrastructure in the same way that regular commerce needs the interstate highway network to carry goods from point to point. A myriad of computers, communications networks, and communication software forms the nascent Information Superhighway (I-Way). The I-Way is not a U.S phenomenon but a global one, as reflected by its various labels worldwide. For instance, it is also called the National Information Infrastructure (NII) in the United States, Data-Dori in Japan and Jaring, which is Malay for "net" in Malaysia. The I-Way and yet-to-be developed technologies will be key elements in the business transformation. And while earlier resulted in small the network Infrastructure for Electronic Commerce • gains in productivity and efficiency, integrating them into the I-Way will fundamentally change the way business is done. These new ideas demand radical changes in the design of the entire business process. I-Way is not one monolithic data highway designed according to long-standing, well-defined rules and regulations based on well-known needs. The I-Way will be a mesh of interconnected data highways of many forms: telephone wires, cable TV wires, radio-based wireless-cellular and satellite. The I-Way is quickly acquiring new onramps and even small highway systems. Market forces influencing the I-way • What are market forces? • Market forces are the factors that influence the price and availability of goods and services in a market economy, i.e. an economy with the minimum of government involvement. • Market forces push prices up when supply declines and demand rise, and drive them down when supply grows or demand contracts. When demand equals supply for a product or service, the market is said to have reached equilibrium. • To supply means to provide something that is wanted, i.e., to make it available. • Invisible hand • Adam's Smith's 'invisible hand' referred to market forces. • British moral philosopher and pioneer of political economy, Adam Smith (1723-1790), cited by many as the father of modern economics, wrote in his books about the 'invisible hand' that determined levels of supply, demand, the prices of goods and services, as well as wealth creation and distribution. Market forces influencing the I-way • The prices of goods and services are driven by the forces of supply and demand, i.e., market forces. This 'invisible hand' represented market forces – supply and demand – and how if left to its own devices, an economy could thrive. • Mr. Smith's influence spread across the world and is often quoted by economists who support the market economy. • Mr. Smith wrote: • "Every individual necessarily labours to render the annual revenue of the society as great as he can. He generally neither intends to promote the public interest, nor knows how much he is promoting

it … He intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for society that it was no part of his intention. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it. I have never known much good done by those who affected to trade for the public good." • In other words, the invisible hand is essentially a natural phenomenon that drives free markets through competition and scarce resources. • Market forces influencing the I-way • Market forces can push and pull either upwards and downwards or forwards and backwards. The push/pull forces on demand and supply regulate prices. In this context, backwards means the same as downwards, while forwards equal upwards. Examples of market forces • When a cold snap hits Florida, the price of orange juice across supermarkets in the United States rises. When the weather turns sunny and warm in northern USA, prices of hotel rooms in Cancun decline. • The price of gasoline across the world rises when major wars break out in the Middle East. Also, the sale of large gas-guzzling SUVs drops. • What do all these events have in common? They all show how market forces affect supply and demand. They also show that they ultimately affect the price of goods and services. • Market forces determine how much of each good we produce, and at what price they go on the market. • If anybody wants to know how an event or policy will affect the economy, they must think first about how it might affect supply and demand. Market forces influencing the I-way • Market vs. command economies • In so-called market economies, governments try not to intervene and allow market forces allocate resources. Prices bring supply and demand into equilibrium, and they guide decisions of producers and consumers. • In centralized or command economies, the government tries to supplant these decentralized decisions with its own. North Korea and Cuba, for example, are command economies. In command economies, the market does not set prices. • George Soros, a Hungarian-born American business magnate, investor, author, and philanthropist, said: • "If we care about universal principles such as freedom, democracy, and the rule of law, we cannot leave them to the care of market forces; we must establish some other institutions to safeguard them." Market forces influencing the I-way • Market forces influencing the I-Way: • Demands and Requirements of market participants. The failure and success of any product or service is a factor of market forces. To become a reality, Ecommerce needs a network infrastructure to transport the content also known as the electronic interactive or multimedia I-Way. The I-Way has become the leading word. • The principal drawback of existing communication infrastructure lies in its inabilities to provide integrated voice, data and video services. Thus a business user requiring voice , data and video conferencing services often had to use three separate networks such as voice network, data network and video conferencing network. This understanding is important because e-commerce applications are dependent on the underlying I-way. • Until recently the market place was fragmented into communication , entertainment and information sectors. the following two points worth considering are • Market forces influencing the I-way • 1. The boundaries among communication are not absolute. • Ex: Video is a part of Information, entertainment and communication. • 2. The boundaries among equipment are absolute. • Ex: Today technology exists to allow television sets and pcs to interact or exchange any sort of data. The emerging compatibility results in the flexibility needed to take advantage of new services. The expectations of I-way are on demand publishing, real time video conferencing, telemarketing, tele medicine, tele communication etc. • The cable industry wants to expand services from tv programming or paper view services such that the consumer can pay bills,

shop or check stock prices Components of I-way • Components of I-Way: The major components of I-way are 1.Consumer access equipment's. 2. Ramps 3. Global Information Distribution Network. • 1. Consumer Access Equipment : It is often ignored component of I-way but represent critical category. The absence of slow progress in which holding of up other segments of I-way. This segment of I-way includes hardware and software vendors who provide physical devices such as computer software platforms such as browsers and operating system • 2. Ramps: they simplify the leakages to schools and home to the communication backbone. This component is often called as last mile because they provide links. The providers of access ramps can be differentiated into four categories viz. telecom based , cable tv based, wireless based & computer based. Online information services. The backbone access provides links and uses e-commerce application providers. Components of I-way • 3.Global Information Distribution Networks: The development of new communication technologies and continued employment of fibre optic facilities has resulted in higher transmission speeds at significantly low cost. The end result is a seamless web called the I-way of communication network, computer digital libraries and compute electronics that will put vast amount of information at user's finger tips. The two major technologies under pinning high speed global information distribution networks are a) long distance networks b) satellite networks Components of I-way • a) Long distance network: Long distance connectivity is available through cable (coaxial) or (fibre) owned by long distance interchange carriers (Ixc) Submarine cables provide an attractive economic advantage for selected rules, where growth advantage for selected rules, where growth is in demand and communication capacity is high. The Ixc's also play a significant role in the local access market by teaming with firms in the wireless and cable tv business. Ixc's are exploring alternative arrangements that would lower the cost of using the local network. Uniform speed efficiency, levels of technology and cost of telecom services are necessary for both voice and data services. Fibre optics have emerged as technology of choice because it is capable of providing higher bandwidth than satellite also it is immune to electromagnetic interference. Long distance network infrastructure is now been deployed under seas to carry international traffic. Components of I-way • b) Satellite network: Satellite networks have advantages over terrestrial network and they are accessible from any point on the globe. Satellite networks can provide broadband digital services including voice, data and video to many points without the cost of wide installation. Wide range of services include broadcast radio, video and overseas telephone links. Thus communication satellites are the crucial part of the global communication and infrastructure. Network Access Equipment • The Ultimate Guide to Network Access Equipment • Long before the introduction of cell phones, we used to have the early telephones. For these phones to work, operators would sit in a room where they received calls then connect the calls to the respective recipients. This means that instead of one calling the other person directly, as we can now, the caller had to go through the central hub for them to reach the recipient. That is, they will call the central hub, tell them whom they want to speak to, and then the operators at the central hub would call the recipient and connect them with the caller. • With technological advancement, we no longer have to go through a central hub to connect. Our devices do all the connecting on their own. When these devices connect, they form a hub, much like the central hub during the first telephone. Nowadays, the hub is known as the network. By using network access equipment, you can connect your smart gadgets such as smartphones and computers. Network Access Equipment • What is network access equipment? • A network access equipment is applied in boosting,

switching, splitting, directing, or combining data via a telecommunications or computer network. The equipment includes switches, gateways, multiplexers, hubs, transceivers, firewalls, and routers. The equipment can also be in the form of a protocol such as Ethernet, an interface, or a port. The equipment enables users to connect to a particular network such as the internet. • Through this equipment, phones can communicate with each other when linked through the same central hub (network). Network Access Equipment • How Network Access Equipment Works • The most important function of the equipment in-network access is to enable data to be shared among the various devices connected to the network. In wired networks, the devices connect according to how they relate with the design as well as the structure of the network in question. The devices also have to be in line with the network topology. • A network topology refers to the way the nodes have been arranged and the connections of the network. Some of the most popular computer network topologies include ring, bus, tree, star, and mesh. When it comes to wireless networks, the network access equipment alk' to each other through radio waves, unlike in wired connections where wires are used, the wireless network requires no wires since the radio waves are sufficient for the communication between the various devices. Network Access Equipment • The network protocol is another critical factor to consider. Network protocols are important because they interpret the various rules that control network communication. It is their interpretation that enables users to communicate efficiently via the network. • Types of network access equipment • The following are some of network access equipment. • Hub • Bridge • Gateway • Router • Wireless Access Point (WAP) Network Access Equipment • Hub • This tiny, rectangular device sends all the signals it receives to the devices connected to the same network. Often made of plastic, the inexpensive device receives power from a regular wall outlet. Hub sends information packets to the various gadgets regardless of data packet's MAC address. • Bridge • Bridges centralize the administration of the network by interconnecting remote as well as local networks hence creating a bigger inter-network. Based on the MAC address of the data packets, bridges can either forward or reject the data packets. Network Access Equipment • Gateway • A gateway enables users to communicate. It is a crucial stopping point for data because it connects networks with various communication protocols. With the gateway, networks can connect regardless of their difference in the communication protocol. They make data transfer faster and efficient by regulating traffic between different networks. • Router • A router is a device that is dependent upon the protocol in connecting sub-networks as well as dividing a rather large network into rather small networks. Routers can forward data packets to their exact IP address via other routers, or the other pieces of the data equipment. Most of the time, routers are used to connect home computers to an internet connection via the home network. Network Access Equipment • Wireless Access Point (WAP) • WAP allows wireless gadgets to access as well as communicate with the network. Hence, it is a bridge between traditional network, wired as well as wireless devices. WAP also connects wireless devices to other WAPs where the devices are also linked. • Conclusion • Hopefully, the above information has answered the questions that you may have had concerning network access equipment. Be sure to share this information with your loved ones so that they too can get the knowledge. E-Commerce and World Wide Web • What is the World Wide Web? • Everyone is today well aware of ecommerce. Let's know about the World Wide Web or WWW as it is known. The WWW is a browser or web browser that lets users' access web pages and web programs. The browsers include Internet Explorer, Firefox, Opera, Safari, and Google Chrome. The first page displayed on a website is termed as the

Home Page. The web pages provide links of other web pages which is known as surfing or browsing. A web page owns a unique address known as the Web Address or URL. The tabbed browsing lets you open and accesses multiple Web Pages in a single browser. There are two types of search tools, Subject Directory that classifies the Web Pages in different categories, and Search Engine that searches information regarding a specific topic. • Refreshing the meaning of ecommerce; it is a business transaction that occurs on the electronic network. An email or electronic mail is the transfer of information using the network. You can compose, send, receive, forward, save, print, and delete your emails. This email communication is facilitated by the World Wide Web E-Commerce and World Wide Web • The history of the WWW and Ecommerce • When the internet was first invented during the 20th century, its use was limited to government organizations, researchers, and universities for a long time. The hidden commands were what restricted and unsuited for businesses to use the internet. With the invention of electronic mails or e-mails, organizations started using the internet. Earlier organizations employed the internet for internal as well as external communication in the company. In the year 1989, an easier way to communicate and share information through a network known as the World Wide Web was invented in the CERN laboratories by Tim Berners-Lee. This was when businesses started using the internet as a way of business by sharing information for their growth. E-Commerce and World Wide Web • With the trend of internet connection and web browsers becoming the new normal, businesses started purchasing domain names and aimed at creating a website. In 1991, the restrictions on the commercial use of the internet were lifted by the National Science Foundation. Two of the most successful ecommerce giants today, Amazon and eBay, were established back in the year 1994. In the late 1900s, the rush in the ecommerce business investment led to the dot-com bubble and in the early 2000s, the dot-com bubble busted. Although the dot-com bubble had a few drawbacks, it helped in internet connections were laid around the globe for thousands of miles during the time. After this was the beginning of the globalization era. With the emergence of the digital world, the threats imposed by worms and viruses through sharing increased at a dreadful pace. Later, a whole new industry of internet security and the computer emerged. Architectural framework of E-Commerce • ARCHITECTURAL FRAMEWORK OF E COMMERCE • The software framework necessary for building electronic commerce applications is little understood in existing literature. • In general a framework is intended to define and create tools that integrate the information found in today's closed systems and allow the development of e-commerce applications. • It is important to understand that the aim of the architectural frame-work itself is not to build new database management systems, data repository, computer languages, software agent based transaction monitors, or communication protocols Rather, the architecture should focus on synthesizing the diverse resources already in place in corporations to facilitate the integration of data and software for better applications. Architectural framework of E-Commerce • The electronic commerce application architecture consists of six layers of functionality, or services: • (1) Applications; • (2) Brokerage services, data or transaction management; • (3) Interface, and; support layers" • (4) Secure messaging, security and electronic document Interchange; • (5) Middle ware and structured document interchange; and • (6) Network infrastructure and basic communications services • These layers cooperate to provide a seamless transition between today's computing resources and those of tomorrow by transparently integrating information access and exchange within the context of the chosen application. As seen in table above, electronic commerce

applications are based on several elegant technologies. But only when they are integrated do, they provide uniquely powerful solutions. Architectural framework of E-Commerce Application services Customer- to- business Business- to- business Intra-organizational Brokerage and data management Order processing Payment advances-electronic cash Virtual mail Interface layer Interactive catalogues Directory support functions Software agents Secure messaging Encrypted e-mail, EDI Remote programming Middle ware services Structured documents (SCML,HTML) Compound documents Network infrastructure Wireless - cellular, radio, PCs Wire line – POTS, coaxial, fibre optic WWW and its architecture • The World Wide Web abbreviated as WWW and commonly known as the web. The WWW was initiated by CERN (European library for Nuclear Research) in 1989. • History: It is a project created, by Timothy Berner's Lee in 1989, for researchers to work together effectively at CERN. is an organisation, named World Wide Web Consortium (W3C), was developed for further development in web. This organisation is directed by Tim Berner's Lee, aka father of web. WWW and its architecture • System Architecture: From user's point of view, the web consists of a vast, worldwide connection of documents or web pages. • Each page may contain links to other pages anywhere in the world. • The pages can be retrieved and viewed by using browsers of which internet explorer, Netscape Navigator, Google, Chrome, etc are the popular ones. • The browser fetches the page requested interprets the text and formatting commands on it, and displays the page, properly formatted, on the screen. • The basic model of how the web works is shown . • Here the browser is displaying a web page on the client machine. When the user clicks on a line of text that is linked to a page on the abd.com server, the browser follows the hyperlink by sending a message to the abd.com server asking it for the page hypertext publishing • Hypertext is an approach to information management where the data is stored in network of documents and these documents are connected by links. • Here the documents are taken as nodes and links represent the relationship between the documents and nodes. • As the documents are known as nodes similarly the links are known as the pointers. • The nodes or documents may contain text, graphic, animation, audio video, images or programs. • In same system the nodes and system network itself is viewed through browsers and are manipulated, edited with the help of structure editor. • We see that different nodes are connected by links or pointers. The node from which the link gets started is known as reference or anchor and the node at which it ends is called referent. • The movement between nodes is made possible by activating links which connect related concepts or nodes. Links can be of bi directional providing backward traversals, referential, hierarchical. • In some browser's hypertext is a very simple context lies in its ability to produce large, complex, richly connected and cross referenced bodies of information. hypertext publishing • protocols are defined as agreed upon rules to be followed upon between two applications. These can also be defined as agreed upon format for transmitting data between two devices. The protocol determines the following. a. The type of error checking to be used. b. Data compression method if any. c. How the sender device indicate that it is sending the data. d. How the receiver device indicate that it is receiving the data. The protocol can be implemented either in hardware or in software. The different types of protocols. 1. top/ip transmission control protocol or internet protocol 2. Http Hypertext transfer protocol 3. Smtp Simple mail transport protocol hypertext publishing • Hypertext Publishing Web provides a functionality necessary for e-commerce. • The web has become an umbrella for wide range of concepts and technology that differ markedly in purpose and scope which include hypertext publishing concept, the universal reader concept and the client

server concept. • Hypertext publishing promotes the idea of seamless information world in which all online information can be accessed and retrieved. In a constant and simple way hypertext publishing is a primary application of web interest in hypermedia. • On the internet (called distributed or global hypermedia). • As accelerated shortly following the success of web media and browser. • This success has been aided by more powerful work station high resolution graphic display faster network communication and decreased cost for large online service. Technology behind the web • Information providers (publishers) run programs called servers from which the browsers can obtain information. These programs can either be web servers that understand the hypertext transfer protocol (HTTP) , “gateway” programs that convert an existing information format to hypertext, or a non-HTTP server that web browsers can access i.e. FTP or Gopher servers. • Web servers are composed of two major parts. • 1. the hypertext transfer protocol (HTTP) for transmitting documents between servers and clients . • 2. HTML format for documents. The link between HTML files & HTTP server is provided by Uniform Resource Locator (URL). Security and the Web • What is Web Security? • Web security is also known as “Cybersecurity”. It basically means protecting a website or web application by detecting, preventing and responding to cyber threats. • Websites and web applications are just as prone to security breaches as physical homes, stores, and government locations. Unfortunately, cybercrime happens every day, and great web security measures are needed to protect websites and web applications from becoming compromised. • That’s exactly what web security does – it is a system of protection measures and protocols that can protect your website or web application from being hacked or entered by unauthorized personnel. This integral division of Information Security is vital to the protection of websites, web applications, and web services. Anything that is applied over the Internet should have some form of web security to protect it. Security and the Web • Details of Web Security • There are a lot of factors that go into web security and web protection. Any website or application that is secure is surely backed by different types of checkpoints and techniques for keeping it safe. • There are a variety of security standards that must be followed at all times, and these standards are implemented and highlighted by the OWASP. Most experienced web developers from top cybersecurity companies will follow the standards of the OWASP as well as keep a close eye on the Web Hacking Incident Database to see when, how, and why different people are hacking different websites and services. Security and the Web • Essential steps in protecting web apps from attacks include applying up-to-date encryption, setting proper authentication, continuously patching discovered vulnerabilities, avoiding data theft by having secure software development practices. The reality is that clever attackers may be competent enough to find flaws even in a fairly robust secured environment, and so a holistic security strategy is advised. • Available Technology • There are different types of technologies available for maintaining the best security standards. Some popular technical solutions for testing, building, and preventing threats include: • Black box testing tools • Fuzzing tools • White box testing tools • Web application firewalls (WAF) • Security or vulnerability scanners • Password cracking tools Support Systems • Management support • A large category of information systems comprises those designed to support the management of an organization. These systems rely on the data obtained by transaction processing systems, as well as on data and information acquired outside the organization (on the Web, for example) and provided by business partners, suppliers, and customers. • Management reporting systems • Information systems support all levels of management, from those in charge of short-term schedules and

budgets for small work groups to those concerned with long-term plans and budgets for the entire organization. Management reporting systems provide routine, detailed, and voluminous information reports specific to each manager's areas of responsibility. These systems are typically used by first-level supervisors. Generally, such reports focus on past and present activities, rather than projecting future performance. To prevent information overload, reports may be automatically sent only under exceptional circumstances or at the specific request of a manager. Support Systems • Decision support systems and business intelligence • All information systems support decision making, however indirectly, but decision support systems are expressly designed for this purpose. As these systems are increasingly being developed to analyse massive collections of data (known as big data), they are becoming known as business intelligence, or business analytics, applications. The two principal varieties of decision support systems are model-driven and data-driven. • In a model-driven decision support system, a preprogramed model is applied to a relatively limited data set, such as a sales database for the present quarter. During a typical session, an analyst or sales manager will conduct a dialog with this decision support system by specifying a number of what-if scenarios. For example, in order to establish a selling price for a new product, the sales manager may use a marketing decision support system. It contains a model relating various factors—the price of the product, the cost of goods, and the promotion expense in various media—to the projected sales volume over the first five years on the market. By supplying different product prices to the model, the manager can compare predicted results and select the most profitable selling price.

Management Information System

• A management information system (MIS) is an information system used for decision-making, and for the coordination, control, analysis, and visualization of information in an organization.

• The study of the management information systems involves people, processes and technology in an organizational context.

• In a corporate setting, the ultimate goal of the use of a management information system is to increase the value and profits of the business. This is done by providing managers with timely and appropriate information allowing them to make effective decisions within a shorter period of time Management Information System (MIS)

• What is MIS? Introduction & Definition

What is MIS? MIS is the use of information technology, people, and business processes to record, store and process data to produce information that decision makers can use to make day to day decisions. The full form of MIS is Management Information Systems. The purpose of MIS is to extract data from varied sources and derive insights that drive business growth. Management Information System (MIS)

The need for MIS - The following are some of the justifications for having an MIS system

• Decision makers need information to make effective decisions. Management Information Systems (MIS) make this possible.

• MIS systems facilitate communication within and outside the organization – employees within the organization are able to easily access the required information for the day to day operations. Facilitates such as Short Message Service (SMS) & Email make it possible to communicate with customers and suppliers from within the MIS system that an organization is using.

• Record keeping – management information systems record all business transactions of an organization and provide a reference point for the transactions. Role and Impact of MIS

• IMPACT OF THE MANAGEMENT INFORMATION SYSTEM

• MIS plays a very important role in the organization; it creates an impact on the organization’s functions, performance and productivity.

The impact of MIS on the functions is in its management with a good MIS supports the management of marketing, finance, production and personnel becomes more efficient. The tracking and monitoring of the functional targets become easy. The functional managers are informed about the progress, achievements and shortfalls in the activity and the targets. The manager is kept alert by providing certain information indicating and probable trends in the various aspects of business. This helps in forecasting and long-term perspective planning. The manager’s attention is bought to a situation which is expected in nature, inducing him to take an action or a decision in the matter. Disciplined information reporting system creates structure database and a knowledge base for all the people in the organization. Role and Impact of MIS • The information is available in such a form that it can be used straight away by blending and analysis, saving the manager’s valuable time.

• The MIS creates another impact in the organization which relates to the understanding of the business itself. The MIS begins with the definition of data, entity and its attributes. It uses a dictionary of data, entity and attributes, respectively, designed for information generation in the organization. Since all the information systems use the dictionary, there is common understanding of terms and terminology in the organization bringing clarity in the communication and a similar understanding of an event in the organization.

Role and Impact of MIS • The MIS calls for a systematization of the business operations for an effective system design. This leads to streaming of the operations which complicates the system design. It improves the administration of the business by bringing a discipline in its operations as everybody is required to follow and use systems and procedures. This process brings a high degree of professionalism in the business operations.

• The goals and objectives of the MIS are the products of business goals and objectives. It helps indirectly to pull the entire organization in one direction towards the corporate goals and objectives by providing the relevant information to the organization. A well designed system with a focus on the manager makes an impact on the managerial efficiency. The fund of information motivates an enlightened manager to use a variety of tools of the management

• It helps him to resort to such exercises as experimentation and modelling. The use of computers enables him to use the tools and techniques which are impossible to use manually. The ready-made packages make this task simple. The impact is on the managerial ability to perform. It improves decision-making ability considerably high. Since, the MIS work on the basic system such as transaction processing and database, the drudgery of the clerical work is transferred to the computerized system, relieving the human mind for better work. It will be observed that lot of manpower is engaged in this activity in the organization. Seventy (70) percent of the time is spent in recording, searching, processing and communicating. This MIS has a direct impact on this overhead. It creates information –based working culture in the organization.

MIS and Users

• Every person in the Organization is a user of the MIS. The people in the organization operate at all levels in the hierarchy. A typical user is a clerk, an assistant, an officer, an executive or a manager. Each of them has a specific task and a role play in the management of business. The MIS caters to the needs of all persons. The main task of a clerk is to search the data, make a statement and submit it to the higher level. A clerk can use the MIS for a quick search and reporting the same to higher level. An assistant has the task of collecting and organizing the data, and conducting a rudimentary analysis of it. The MIS offers the user tools to perform these tasks. An officer has a role of integrating the data from different systems and disciplines to analyse it and make a critical comment if anything adverse is found.

• In MIS offers the methods and facilities to integrate the data and report the same in a proper format. An executive plays the role of a decision maker. He is in a position of responsibility and accountability; a position of a planner and a decision maker. He is responsible for achieving the targets and goals of the organization. The MIS provides facilities to analyse the data and offers the decision support systems to perform the task of execution. The MIS provides action-oriented information.

MIS and Users • The manager has a position of responsibility and accountability for the business results. His management role expands beyond his management function. The MIS provides information in a structured or unstructured format for him to react. The MIS caters to his constant changing needs of information. The user of the MIS is expected to be a rational person and the design of the MIS is based on this assumption.

• However, in reality the impact created on individuals by MIS is difficult to explain. The recent major technological advances in communication such as Multimedia, Imaging, Graphical User Interface (GUI) etc and the ability to access the data stored at different locations on the variety hardware of platforms would make MIS more attractive and efficient proposition. An intelligent user of information can demonstrate the ability of decision making, since his manipulative capability is considerably increased, with the information now being available on his desktop. Through the MIS, the information can be used as a strategic weapon to counter the threats to business, make businesses more competitive, and bring about the organizational transformation through integration. A good MIS also make an organization seamless by removing all the communication barriers. MIS as a Control System

• MIS AND CONTROL - Information is required at every level either to set up standards, to know the actual performance, to compare the results, find out deviations and to take corrective action, hence there is a need of a management information system. It also involves interactive control i.e. communicating with the employees directly and hence information systems play a significant role.

• With the coming of the computer age, management information system [i.e. MIS) is becoming popular in the corporate circle for giving quick information to the management. The purpose of MIS is reporting and is to provide the necessary information to the managers and supervisors at various levels to help them to discharge their functions of organising, planning, control and decision making. MIS as a Control System

• RELATION OF MIS AND BPM

• Concept of business performance management is based upon management control systems. MIS satisfies diversifies diverse needs through a variety of systems such as query analysis, modelling system, analysis system and decision support system. Management as a control system Planning, organizing, staffing, coordinating, directing and controlling are the various steps in a management process. All the steps prior to a control are necessary but are not necessarily self-assuring the results unless it is followed by strong control mechanism. The management experts have viewed these steps as `Management Control System'. They postulate the hypothesis that unless a control is exercised on the process, the goals will not be achieved. They advocate a system of effective control to ensure the achievement of the business objectives.

• MIS as a Control System

• A definition of control is the process through which managers assure that actual activities conform to the planned activities, leading to the achievement of the stated common goals. The control process measures a progress towards those goals, and enables the manager to detect the deviations from the original plan in time to take corrective actions before it is too late. Rober J Mockler defines and points out the essential elements of the control process. The management is a systematic effort to set the performance standards in line with the

performance objectives, to design the information feedback systems, to compare the actual performance with these predetermined standards, to identify the deviations from the standards, to measure its significance and to take corrective actions in case of significant deviations. This systematic effort is undertaken through the management control system. The control system is essential to meet the environmental changes discussed earlier, to meet the complexity of today's business, to correct this mistakes made by the people, and to effectively monitor the delegation process. A reliable and effective control system has the following features.

MIS –a support to the Management

• The management process is executed through a variety of decisions taken at each step of planning, organizing, staffing, directing coordinating and control. If the management is able to spell out the decisions required to be taken, the MIS can be designed suitably. The decisions required to be taken in these steps are tabulated in Table below.

• The objective of the MIS is to provide information for a decision support in the process of management. It should help in such a way that the business goals are achieved in the most efficient manner. Since the decision making is not restricted to a particular level, the MIS is expected to support all the levels of the management in conducting the business operations. Unless the MIS becomes a management aid, it is not useful to the organization.

• Table: Decisions in Management MIS –a support to the Management Steps in Management Decision Planning A selection from various alternatives - strategies, resources, methods, etc. Organization A selection of a combination out of several combinations of the goals, people, resources, method and authority. Staffing Providing a proper manpower complement. Directing Choosing a method from the various methods of directing the efforts in the organization. Coordinating Choice of the tools and the techniques for coordinating the efforts for optimum results. Controlling A selection of the exceptional conditions and the decision guidelines MIS –a support to the Management

• MIS: Support to Management The management process is executed through different decisions taken at each step of management. Steps in Management Planning Organization Staffing Directing Coordinating Controlling Decision A selection from various alternatives like strategies, resources, methods A selection for goals, people, resources, methods Providing manpower Choosing methods from various methods Choice of tools and techniques for coordinating efforts A selection of exceptional conditions and he decision guidelines

• Support to Management Environment Management Goal Setting Planning Organizing Staffing Directing Coordinating Controlling Information Support MIS Management Effectiveness and MIS

• Essential characteristics of an effective management information system are

1. MIS is management oriented

2. MIS is developed under the direction of management

3. MIS is an integrated system

4. common data flows

5. MIS is based upon future needs of the business

6. MIS is composed of sub-systems

7. MIS requires flexibility

8. distributed data processing and

9. MIS is mostly computerized. Management Effectiveness and MIS

Management Information System is established in an organization to provide relevant information to the managers to operate effectively and efficiently.

1. MIS is management oriented:
   The design of MIS starts with an appraisal of the information needs of the management. The system is usually designed from top to bottom. However, this does not mean that MIS fulfils the information needs of top management only.
   2. MIS is developed under the direction of management: Because of management orientation of MIS, it is imperative that, management of an organisation actively directs the development and establishment of the MIS in an organisation. It is rare to find an MIS where the manager himself, or a high level representative of his department, is not spending a good deal of time in the system design. Management Effectiveness and MIS
   3. MIS is an integrated system: MIS is an integrated system which blends information from several operational areas to serve the information needs of the management more effectively. It takes a comprehensive view of the interlocking sub-systems which operate within an organisation.
   4. Common data flows: MIS seeks to avoid duplication and redundancy in data collection, storage and dissemination of information. The designers of MIS are aware that a few key source documents account for much of the information flow and affect many functional areas. Organization as a System Organizations and their members are usefully conceptualized as systems designed to accomplish predetermined goals and objectives through people and other resources that they employ. Organizations are composed of smaller, interrelated systems (departments, units, divisions, etc.) serving specialized functions. Typical functions include accounting, marketing, production, data processing, and management. Specialized functions (smaller systems) are eventually reintegrated through various ways to form an effective organizational whole.
   • MIS: Organization Effectiveness A key measure of the effectiveness of an MIS is the accuracy and reliability of its information. The accuracy of the data it uses and the calculations it applies generally determine the effectiveness of the resulting information. However, not all data needs to be equally accurate. MIS: Organization Effectiveness • Relevance of Information
   • The information a manager receives from an MIS has to relate to the decisions the manager has to make. An effective MIS takes data that originates in the areas of activity that concern the manager at any given time, and organizes it into forms that are meaningful for making decisions. If a manager has to make pricing decisions, for

example, an MIS may take sales data from the past five years, and display sales volume and profit projections for various pricing scenarios.

• Usefulness of Information The information a manager receives from an MIS may be relevant and accurate, but it is only useful if it helps him with the particular decisions he has to make. For example, if a manager has to make decisions on which employees to cut due to staff reductions, information on resulting cost savings is relevant, but information on the performance of the employees in question is more useful. The MIS has to make useful information easily accessible. Organization as a System

• The significance of conceptualizing organizations as complex systems is that systems principles allow insight into how organizations work. To ascertain information requirements properly and to design appropriate information systems, it is of primary importance to understand the organization as a whole. All systems are composed of subsystems (which include information systems); therefore, when studying an organization, we also examine how smaller systems are involved and how they function.

• Organizations exist and operate in a competitive environment, and can seem complex and highly confusing amorphous mess that is very had to comprehend and analyse. The notion of "Organization as Systems" refers to an approach to conceptualizing organizations as systems based on systems thinking and theory, in order to give clarity and perspective to study and analyse the organization. A system is defined by its boundaries - the limits that identify its components, processes, and interrelationships when it interfaces with another system. Enterprise Resource Planning(ERP) - What Is Enterprise Resource Planning (ERP)?

Enterprise resource planning (ERP) is a process used by companies to manage and integrate the important parts of their businesses. Many ERP software applications are important to companies because they help them implement resource planning by integrating all of the processes needed to run their companies with a single system. An ERP software system can also integrate planning, purchasing inventory, sales, marketing, finance, human resources, and more.

• Need of ERP

1) Standardization of Software

• With an unmanaged system, various business processes within an organization utilize disparate applications to manage similar operations. This can lead to chaotic data transfer, time-consuming processes, and security gaps. Need of ERP

2) Better Accounting and Financial Reporting Keeping track of your financials is a critical factor in determining your success through a growth phase, but as your company grows the complexity of transactions may seem overwhelming without an efficient centralized system. 3) Faster Response Times As you start gaining traction in the market and your reputation increases, your ability to improve your service delivery could act as a key differentiator from your competition. To deliver better customer service, your front-line executives and sales team need maximum access to all information across all departments, the systems need to be integrated into one centralized unit.

4) Regulatory Compliance and Security Integrated ERP software can help you ensure that back-office operations are in sync with the regulatory rules of the

manufacturing industry. Most ERP solution providers monitor compliance and regulatory changes and keep updating their features to help you meet the new requirements. Not only does Enterprise Resource Planning (ERP) software simplify data processing and streamline your internal processes, they also enhance your security with features like regulated data access and in-built firewall systems. The integration of multiple processes into one unified system, also makes it easier for your system administrators to control and monitor the security of your software. Need of ERP

5) Mobility and Flexibility -Through ERP software, data from various departments of an organization is streamlined into a unified platform. As modern workplace trends like BYOD become more popular, the need for flexibility in enterprise software is an essential factor when making software investment choices. ERP solutions today can process multiple functions by leveraging a centralized database to provide accurate information to any user, anywhere in the world, on any device. Remote access to the database and critical numbers saves time and effort, and ensures the delivery of quality work within deadlines. As your company grows, you will need to leverage technology to maintain control over things and stay ahead of the competition. IFS's ERP solution, ranked as a “Leader” in the Gartner Magic Quadrant, can help you move on from age-old silos towards the digital transformation you will need for the future.

ProV is an award-winning and trusted partner for IFS solutions, and provides Enterprise Resource Planning (ERP), Enterprise Service Management (ESM), Field Service Management (FSM) and Enterprise Operation Intelligence (EOI) services. For more details on how to get the most out of your ERP investment, drop a comment below or contact us today. Enterprise Resource Planning(ERP)

KEY TAKEAWAYS

ERP software can integrate all of the processes needed to run a company.

• ERP solutions have evolved over the years, and many are now typically web-based applications that users can access remotely.

• Some benefits of ERP include the free flow of communication between business areas, a single source of information, and accurate, real-time data reporting.

• An ERP system can be ineffective if a company doesn't implement it carefully.

• Understanding Enterprise Resource Planning You can think of an enterprise resource planning system as the glue that binds together the different computer systems for a large organization. Without an ERP application, each department would have its system optimized for its specific tasks. With ERP software, each department still has its system, but all of the systems can be accessed through one application with one interface. History of ERP

• Enterprise resource planning (ERP) is the integrated management of main business processes, often in real time and mediated by software and technology. ERP is usually referred to as a category of business management software—typically a suite of integrated applications—that an organization can use to collect, store, manage, and interpret data from many business activities. ERP Systems can be local based or Cloud-based. Cloud based applications are growing in recent days due to information being readily available from any location with internet access.

• Benefits of ERP

Enhanced Business Reporting: • Better reporting tools with real-time information • A single source of truth – one integrated database for all business processes Benefits of ERP • Better customer service: • Better access to customer information • Faster response times • Improved on-time delivery • Improved order accuracy ERP applications and Emerging trends • #1 CRM is at the top • With various consumer based companies performing poorly due to the escalating recession, companies have realized the importance of using customer data to their advantage. Hence the leading purchases in ERP tend to be for a CRM system.
#2 Need based ERP purchases • One aspect of ERP which stymied its usage in SMBs was that small organizations required only some of the functionalities offered by a full-fledged ERP software. Except the core functions, others remained idle, which reduced the overall productivity of the purchase. The current trend is need based sales of the ERP software. History of ERP • The Gartner Group first used the acronym ERP in the 1990s to include the capabilities of material requirements planning (MRP), and the later manufacturing resource planning (MRP II), as well as computer-integrated manufacturing. Without replacing these terms, ERP came to represent a larger whole that reflected the evolution of application integration beyond manufacturing. • Not all ERP packages are developed from a manufacturing core; ERP vendors variously began assembling their packages with finance-and-accounting, maintenance, and human-resource components. By the mid-1990s ERP systems addressed all core enterprise functions. Governments and non–profit organizations also began to use ERP systems. An "ERP system selection methodology" is a formal process for selecting an enterprise resource planning (ERP) system. Existing methodologies. Benefits of ERP • Improved Inventory Costs: • Only carry as much inventory as needed, avoid these common issues • Too much inventory, and higher overhead costs • Too little inventory, and longer customer fulfilment times • Boosted Cash Flow: • Better invoicing and better collections tools to bring cash in faster • Faster cash means more cash on-hand for the business • Cost Savings: • Improved inventory planning • Better procurement management • Better customer service • Improved vendor relationship management ERP –A Subset of Enterprise Applications • Enterprise software, also known as enterprise application software (EAS), is computer software used to satisfy the needs of an organization rather than individual users. Such organizations include businesses, schools, interest-based user groups, clubs, charities, and governments. Enterprise software is an integral part of a (computer-based) information system; a collection of such software is called an enterprise system. These systems handle a chunk of operations in an organization with the aim of enhancing the business and management reporting tasks. The systems must process the information at a relatively high speed and can be deployed across a variety of networks. ERP –A Subset of Enterprise Applications • Although the difference between ERP and enterprise systems is obvious, many people confuse these two notions. Probably, it’s because both terms contain the same word. Enterprise software vs ERP Here, what things differ these IT products and what value they are able to add to your business. • ERP is an acronym which means enterprise resource planning. Here is a concept of ERP: • ES is another common acronym to denote enterprise systems. • ERP is typically one application that is a set of modules. This software is focused on several back-office functions of a business like finance processing,

manufacturing, and inventory control. It relates to the planning resources for the enterprise. E-CRM • The eCRM or electronic customer relationship management coined by Oscar Gomes encompasses all standard CRM functions with the use of the net environment i.e., intranet, extranet and internet. Electronic CRM concerns all forms of managing relationships with customers through the use of information technology (IT). • Customer relationship management (CRM) is a process in which a business or other organization administers its interactions with customers, typically using data analysis to study large amounts of information. • From RM to CRM • The concept of relationship marketing (RM) was established by marketing professor Leonard Berry in 1983. He considered it to consist of attracting, maintaining and enhancing customer relationships within organizations. In the years that followed, companies were engaging more and more in a meaningful dialogue with individual customers. In doing so, new organizational forms as well as technologies were used, eventually resulting in what we know as customer relationship management.

E-CRM • The main difference between CRM and e-CRM is that the first does not acknowledge the use of technology, where the latter uses information technology (IT) in implementing RM strategies. • CRM systems compile data from a range of different communication channels, including a company's website, telephone, email, live chat, marketing materials and more recently, social media. They allow businesses to learn more about their target audiences and how to best cater for their needs, thus retaining customers and driving sales growth. CRM may be used with past, present or potential customers. The concepts, procedures, and rules that a corporation follows when communicating with its consumers are referred to as customer relationship management (CRM). This complete connection covers direct contact with customers, such as sales and service-related operations, forecasting, and the analysis of consumer patterns and behaviours, from the perspective of the company. Typical Business Touchpoints

• These touchpoints include advertising, promotions, social media, word of mouth among others which allow consumers to interact with the brand before entering the store

• Traditional brand touchpoints have been utilised for many years such as, ad campaigns, media advertising, promotions and events.

the definition of a touchpoint is:

• Touchpoint (also touch point, contact point, point of contact) is business jargon for any encounter where customers and business engage to exchange information, provide service, or handle transactions. Typical Business Touchpoints

• Company-created touchpoints Touchpoints allow marketers to deliver brand messages, increase consumer's knowledge of the brand and strengthen the company's customer-brand relationship, while adding value to the brand or product. When planning marketing touchpoints, marketers focus their attention on creating touchpoints that are most critical in forming and maintaining consumer relationships with the brand. Each company has communication objectives they look to achieve through having effective communication with their consumers through persuasion, influencing the brand voice and personality, creating a positive feeling towards the brand and driving sales.

Orbitz

• Orbitz.com is a travel fare aggregator website and travel metasearch engine. The website is owned by Orbitz Worldwide, Inc., a subsidiary of Expedia Group. It is headquartered in the Citigroup Centre, Chicago, Illinois • Orbitz competes in an industry that moves at Internet speed, but several years ago, they weren't making the most of cloud technology to work smart and fast. Peggy Bianco, GVP of Global Hotel Services, decided it was time to make a change—by putting Salesforce and business apps from the AppExchange at the heart of their sales process in order to accelerate sales and centralize data.

• Maximizing CRM as a tool

• One thing VanDyke was faced with in her new role was 250 people using Salesforce CRM, but not in the best way. They were managing contacts as if it was a spreadsheet only and not doing much more. There was also a huge amount of duplicate information. VanDyke took the time to work with different departments to get to know what they do specifically and their major pain points, before suggesting a fix. • Peer Tip: "Understand what problem you're trying to solve first. This will help you determine the solution," says Bianco.

E – PAYMENTS

An e-commerce payment system (or an electronic payment system) facilitates the acceptance of electronic payment for online transactions. Also known as a subcomponent of electronic data interchange (EDI), e-commerce payment systems have become increasingly popular due to the widespread use of the internet-based shopping and banking. Credit cards remain the most common forms of payment for e-commerce transactions. As of 2008, in North America almost 90% of online retail transactions were made with this payment type.

It is difficult for an online retailer to operate without supporting credit and debit cards due to their widespread use.

Online merchants must comply with stringent rules stipulated by the credit and debit card issuers (e.g. Visa and Mastercard) in accordance with bank and financial regulation in the countries where the debit/credit service conducts business.

For the vast majority of payment systems accessible on the public Internet, baseline authentication (of the financial institution on the receiving end), data integrity, and confidentiality of the electronic information exchanged over the public network involves obtaining a certificate from an authorized certificate authority (CA) who provides public-key infrastructure (PKI).

Even with transport layer security (TLS) in place to safeguard the portion of the transaction conducted over public networks—especially with payment systems—the customer-facing website itself must be coded with great care, so as not to leak credentials and expose customers to subsequent identity theft.

Despite widespread use in North America, there are still many countries such as China and India that have some problems to overcome in regard to credit card security.

Increased security measures include use of the card verification number (CVN) which detects fraud by comparing the verification number printed on the signature strip on the back of the card with the information on file with the cardholder's issuing bank.

There are companies that specialize in financial transaction over the Internet, such as Stripe for credit cards processing, Smart pay for direct online bank payments and PayPal for alternative payment methods at checkout.

Many of the mediaries permit consumers to establish an account quickly, and to transfer funds between their on-line accounts and traditional bank accounts, typically via automated clearing house (ACH) transactions.

The inherent information asymmetry of large financial institutions maintaining information safeguards provides the end-user with little insight into the system when the system mishandles funds, leaving disgruntled users frequently accusing the mediaries of sloppy or wrongful behaviour; trust between the public and the banking corporations is not improved when large financial institutions are revealed to have taken flagrant advantage of their asymmetric power, such as the 2016 Wells Fargo account fraud scandal.

An e-payment system is a way of making transactions or paying for goods and services through an electronic medium, without the use of checks or cash. It's also called an electronic payment system or online payment system.

The electronic payment system has grown increasingly over the last decades due to the growing spread of internet-based banking and shopping.

As the world advances more with technology development, we can see the rise of electronic payment systems and payment processing devices. As these increase, improve, and provide ever more secure online payment transactions the percentage of check and cash transactions will decrease.

Electronic Payment Methods

One of the most popular payment forms online are credit and debit cards. Besides them, there are also alternative payment methods, such as bank transfers, electronic wallets, smart cards or bitcoin wallet (bitcoin is the most popular cryptocurrency).

E-payment methods could be classified into two areas, credit payment systems and cash payment systems.

1. Credit Payment System
   Credit Card — A form of the e-payment system which requires the use of the card issued by a financial institute to the cardholder for making payments online or through an electronic device, without the use of cash.
   E-wallet — A form of prepaid account that stores user's financial data, like debit and credit card information to make an online transaction easier.
   Smart card — A plastic card with a microprocessor that can be loaded with funds to make transactions; also known as a chip card.
2. Cash Payment System

Direct debit — A financial transaction in which the account holder instructs the bank to collect a specific amount of money from his account electronically to pay for goods or services.

E-check — A digital version of an old paper check. It's an electronic transfer of money from a bank account, usually checking account, without the use of the paper check.

E-cash is a form of an electronic payment system, where a certain amount of money is stored on a client's device and made accessible for online transactions.

Stored-value card — A card with a certain amount of money that can be used to perform the transaction in the issuer store. A typical example of stored-value cards are gift cards.

E- payment system- an overview

Understanding e-Payment System

Every one of us, at least once, has indulged in purchasing goods and services online and paid for them electronically or through an e-payment mode, where the transaction takes place electronically and not through cheques or cash. Sprouting under several names, e-payment or

online payment system comes with multiple payment methods like Credit and Debit Cards, Net banking or IMPS.

The evolution and growth of the electronic payment system has sprung in the last decade and can be attributed to the developing internet speed and technology which has indefinitely pushed the consumers towards online shopping and internet-based banking services thereby, reducing the overall usage of cash.

With the constant rise in the number of consumers preferring to pay via online transfers and retailers selling over the internet, eliminating cash payments, will sure propel us into the future of globalization, where cash would be a thing of the past.

How does e-payment system work?

Electronic payments are instant and therefore convenient, saving a lot of time. How simply, with a click of a button, you successfully pay for your favourite dress, or order groceries or make an online booking. Even though all of this happens in a span of seconds, the process behind this is quite comprehensive.

Customer Action: The journey of an electronic payment begins with a customer visit a merchant's site, add products or services they want to the cart and clicks on the checkout button. Post this, the customer chooses his preferred form of payment option and proceeds towards filling in the banking or card details. The customer then, is redirected to the bank's page to proceed with the payment.

Payment Authentication and Authorization by the Operator: Once the customer proceeds with the payment, the payment gateway along with various parties involved, authenticates if the payment information entered is valid. Upon entering valid information, a successful transaction message is reported back by the payment gateway, informing the customer about the payment confirmation on real-time basis.

Payment Settlement in Merchant's Account: On fulfilling the transaction, the Online payment provider receives payment from the customer's bank account and transfers the same into the Merchants account.

B2C Payments-

B2C payments are transactions made by a business to a consumer, which could either be an individual or small business.

One-time payments, like rebates and refunds, come to mind as key examples.

Paying employees their wages is also a B2C payment, as well as claims disbursements from an insurance company to its policy holders or payments from a larger company to an individually-owned small business supplier.

This article discusses how instant payments may be able to improve the payment experience for businesses, their customers, employees and suppliers.

B2B payment-

The definition of business-to-business payments or B2B payments is the transfer of value denominated in currency from buyer to supplier for good or services supplied.

B2B payments can be a one time or recurring transaction depending on the contractual agreement made between the buyer and supplier.

B2B payments are more complex than business-to-consumer or B2C payments, since B2B payment processing requires more time to approve and settle the transaction which can take days or weeks. Whereas in B2C payment processing, the transaction is typically settled on the spot.

Types of E- payment systems

Credit Card

The most popular form of payment for e-commerce transactions is through credit cards.

It is simple to use; the customer has to just enter their credit card number and date of expiry in the appropriate area on the seller's web page.

To improve the security system, increased security measures, such as the use of a card verification number (CVN), have been introduced to on-line credit card payments.

The CVN system helps detect fraud by comparing the CVN number with the cardholder's information.

DEBIT CARDS-

Debit cards are the second largest e-commerce payment medium in India. Customers who want to spend online within their financial limits prefer to pay with their Debit cards. With the debit card, the customer can only pay for purchased goods with the money that is already there in his/her bank account as opposed to the credit card where the amounts that the buyer spends are billed to him/her and payments are made at the end of the billing period.

Digital accumulating balance payment systems are more like utility bills. This system allows users to make multiple purchases, which will be totalled up and billed for at the end of a time period. This is ideal for micro-transactions heavy websites, where numerous cheap items are purchased frequently. The micro-payment system uses a technology similar to the digital wallet, where the customer transfers some money into the online stored value system and uses it to pay for digital products.

ONINE STORED VALUE PAYMENT SYSTEM-

Stored value systems are a form of electronic payment technology. They coexist with credit and debit technology and principally target the low value transactions. Online stored value systems have very low transaction cost. Stored value systems are based on creating a form of electronic value, for example on smart cards or as computer files. The value can be bought (withdrawn) anytime and spent in optional parts at a later date.

DIGITAL CASH-

Digital cash is a system of purchasing cash credits in relatively small amounts, storing the credits in your computer, and then spending them when making electronic purchases over the Internet. Theoretically, digital cash could be spent in very small increments, such as tenths of a cent (U.S.) or less. Most merchants accepting digital cash so far, however, use it as an alternative to other forms of payment for somewhat higher price purchases. There are several

commercial approaches to digital cash on the Web. Among these are encash from Digi Cash and Cybercast.

Digital (electronic) cards-

A digital wallet, also known as e-wallet, is an electronic device, online service, or software program that allows one party to make electronic transactions with another party bartering digital currency units for goods and services.

Users might also have their driver's license, health care, loyalty card(s) and other ID documents stored within the wallet.

Money can be deposited in the digital wallet prior to any transactions or, in other cases, an individual's bank account can be linked to the digital wallet.

For example, a digital wallet could verify the age of the buyer to the store while purchasing alcohol.

AGILE WALLET-

How to implement an agile payment system?

An agile payment system is the best way to deal with the multiple financial transactions made by online buyers on online stores or marketplace, and to increase their loyalty. Limonetik offers them possibility to efficiently manage the combination of multiple means of payment used by the users.

SMART CARDS-

A smart card, chip card, or integrated circuit card (ICC or IC card) is a physical electronic authorization device, used to control access to a resource. It is typically a plastic credit card-sized card with an embedded integrated circuit (IC) chip.

Applications include identification, financial, mobile phones (SIM), public transit, computer security, schools, and healthcare. Smart cards may provide strong security authentication for single sign-on (SSO) within organizations.

DIGITAL CHECKS-

ICICI Bank offers cheque printing facility at your premises or at your branches, based on information uploaded through Corporate Internet Banking.

File can be upload and approved by clients from remote location

Increased security owing to payment file upload through Corporate Internet Banking.

PLASTIC MONEY-

Plastic money refers to the hard plastic cards we use every day in place of actual bank notes. For example ATM cards like credit card and debit card are electronic generated card that acts as plastic money at the time of buying of goods and services. Debit card is used to withdraw money from your bank account at the time of payment for something and credit card is used to generate credit in the name of your bank account for the purpose of electronic payment.

Secure Electronic Transaction (SET) Protocol

Secure Electronic Transaction (SET) is a communications protocol standard for securing credit card transactions over networks, specifically, the Internet. SET was not itself a payment system, but rather a set of security protocols and formats that enabled users to employ the existing credit card payment infrastructure on an open network in a secure fashion. However, it failed to gain attraction in the market. Visa now promotes the 3-D Secure scheme.

MS-Office

Microsoft Office, or simply Office, is a family of client software, server software, and services developed by Microsoft. • It was first announced by Bill Gates on August 1, 1988, at COMDEX in Las Vegas. Initially a marketing term for an office suite (bundled set of productivity applications), the first version of Office contained Microsoft Word, Microsoft Excel, and Microsoft PowerPoint.

• Over the years, Office applications have grown substantially closer with shared features such as a common spell checker, OLE data integration and Visual Basic for Applications scripting language.

• Microsoft also positions Office as a development platform for line-of-business software under the Office Business Applications brand.

• On July 10, 2012, Softpedia reported that Office was being used by over a billion people worldwide.

• Office is produced in several versions targeted towards different end-users and computing environments.

• The original, and most widely used version, is the desktop version, available for PCs running the Windows and macOS operating systems. Microsoft also maintains mobile apps for Android and iOS. • Office on the web is a version of the software that runs within a web browser MS-Office

• Since Office 2013, Microsoft has promoted Office 365 as the primary means of obtaining Microsoft Office: it allows the use of the software and other services on a subscription business model, and users receive feature updates to the software for the lifetime of the subscription, including new features and cloud computing integration that are not necessarily included in the "on-premises" releases of Office sold under conventional license terms.

• In 2017, revenue from Office 365 overtook conventional license sales.

• Microsoft also rebranded most of their standard Office 365 editions into Microsoft 365 to emphasize their current inclusion of products and services.

• The current on-premises, desktop version of Office is Office 2019, released on September 24, 2018. Ms-Word • Microsoft Word is a word processor developed by Microsoft. It was first released on October 25, 1983, under the name Multi-Tool Word for Xenix systems

• Subsequent versions were later written for several other platforms including IBM PCs running DOS (1983), Apple Macintosh running the Classic Mac OS (1985), AT&T UNIX PC (1985), Atari ST (1988), OS/2 (1989), Microsoft Windows (1989), SCO Unix (1990), and macOS (2001).

• Commercial versions of Word are licensed as a standalone product or as a component of Microsoft Office 365, or Microsoft 365 Premium subscription, Windows RT or the discontinued Microsoft Works suite. Ms-Word

• In 1981, Microsoft hired Charles Simonyi, the primary developer of Bravo, the first GUI word processor, which was developed at Xerox PARC. Simonyi started work on a word processor called Multi-Tool Word and soon hired Richard Brodie, a former Xerox intern, who became the primary software engineer.

• Microsoft announced Multi-Tool Word for Xenix and MS-DOS in 1983. • Its name was soon simplified to Microsoft Word.

• Free demonstration copies of the application were bundled with the November 1983 issue of PC World, making it the first to be distributed on-disk with a magazine.

• That year Microsoft demonstrated Word running on Windows Usage of smart art tools • Create a SmartArt graphic to quickly and easily make a visual representation of your information. You can choose from among many different layouts, to effectively communicate your message or ideas. SmartArt graphics can be created in Excel, Outlook, PowerPoint, and Word, and they can be used throughout Office. • For an overview of SmartArt graphics, including considerations for choosing the best graphic and layout type to display your data or convey a concept Usage of smart art tools • Insert a SmartArt graphic and add text to it

• On the Insert tab, in the Illustrations group, click SmartArt.

• In the Choose a SmartArt Graphic dialog box, click the type and layout that you want. • Enter your text by doing one of the following:

• Click [Text] in the Text pane, and then type your text. Copy text from another location or program, click [Text] in the Text pane, and then paste your text.

• Notes: • If the Text pane is not visible, click the arrow control on the left side of the SmartArt graphic. • To add text, like a title, in an arbitrary position close to or on top of your SmartArt graphic, on the Insert tab, in the Text group, click Text Box to insert a text box. If you want only the text in your text box to appear, right-click your text box, click Format Shape or Format Text Box, and then set the text box to have no background colour and no border.

• Click in a box in the SmartArt graphic, and then type your text. For best results, use this option after you add all of the boxes that you want. Usage of smart art tools • Apply a SmartArt Style to a SmartArt graphic

• A SmartArt Style is a combination of various effects, such as line style, bevel, or 3-D, that you can apply to the shapes in your SmartArt graphic to create a unique and professionally designed look.

• Click your SmartArt graphic.

• Under SmartArt Tools, on the Design tab, in the SmartArt Styles group, click the SmartArt Style that you want.

• To see more SmartArt Styles, click the More button .

• Tips • To resize your entire SmartArt graphic, click the border of your SmartArt graphic, and then drag the sizing handles in or out until your SmartArt graphic is the size that you want. :Usage of smart art tools

• Add or delete shapes in your SmartArt graphic

• Click the SmartArt graphic that you want to add another shape to.

• Click the existing shape that is located closest to where you want to add the new shape. • Under SmartArt Tools, on the Design tab, in the Create Graphic group, click the arrow next to Add Shape.

• If you don't see the SmartArt Tools or Design tabs, make sure that you've selected the SmartArt graphic. You may have to double-click the SmartArt graphic to open the Design tab. • Do one of the following: • To insert a shape after the selected shape, click Add Shape After.

• To insert a shape before the selected shape, click Add Shape Before.

• Notes: • To add a shape from the Text pane, click an existing shape, move your cursor before or after the text where you want to add the shape, and then press ENTER.

• To delete a shape from your SmartArt graphic, click the shape you want to delete, and then press DELETE. To delete your entire SmartArt graphic, click the border of your SmartArt graphic, and then press DELETE.

• To add a shape like a callout or a line, see Add shapes. Usage of smart art tools • Change the colours of an entire SmartArt graphic • You can apply colour variations that are derived from the theme colours to the shapes in your SmartArt graphic.

• Click your SmartArt graphic.

• Under SmartArt Tools, on the Design tab, in the SmartArt Styles group, click Change Colours.

• If you don't see the SmartArt Tools or Design tabs, make sure that you've selected a SmartArt graphic. You may have to double-click the SmartArt graphic to open the Design tab. • Click the colour variation that you want. Bookmark

• A bookmark in Word works like a bookmark you might place in a book: it marks a place that you want to find again easily. You can enter as many bookmarks as you want in your document or Outlook message, and you can give each one a unique name so they’re easy to identify.

• To add a bookmark, you first mark the bookmark location in your document. After that, you can jump to the location or add links to it within your document or Outlook message. You can also delete bookmarks from a document or Outlook message.

• Bookmark the location • Select text, a picture, or a place in your document where you want to insert a bookmark. • Click Insert > Bookmark

. • Under Bookmark name, type a name and click Add.

\• Note: Bookmark names need to begin with a letter. They can include both numbers and letters, but not spaces. If you need to separate words, you can use an underscore (_)—for example, First heading. bookmark • Go to the bookmarked location

• After creating your bookmarks, you can add links to them within your document or jump to them at any time. • Jump to a bookmark

• Type CTRL to open the Go To tab in the Find and Replace box. Under Go to what, click Bookmark. Enter or select the bookmark name, and then click Go To.

• Link to a bookmark • You can also add hyperlinks that will take you to a bookmarked location in the same document. • Select the text or object you want to use as a hyperlink.

• Right-click and then click Hyperlink . • Under Link to, click Place in This Document. • In the list, select the heading or bookmark that you want to link to.

• Note: To customize the Screen Tip that appears when you rest the pointer over the hyperlink, click ScreenTip, and then type the text that you want. • Click OK. • If you're having any issues or problems with bookmarks, read about the various techniques to troubleshoot bookmarks. bookmark

• Delete a bookmark • Click Insert > Bookmark. • Click either Name or Location to sort the list of bookmarks in the document.

• Click the name of the bookmark you want to delete, and then click Delete.

• If you have inserted a hyperlink to the deleted bookmark, right-click the linked text and then click Remove Hyperlink.

• Note: To delete both the bookmark and the bookmarked item (such as a block of text or other element), select the item, and then press Delete. cross-reference

• A cross-reference allows you to link to other parts of the same document. For example, you might use a cross-reference to link to a chart or graphic that appears elsewhere in the document. The cross-reference appears as a link that takes the reader to the referenced item.

• If you want to link to a separate document you can create a hyperlink.

\ • Create the item you're cross-referencing first • You can't cross-reference something that doesn't exist, so be sure to create the chart, heading, page number, etc., before you try to link to it. When you insert the cross-reference, you'll see a dialog box that lists everything that's available to link to. Here's an example. cross-reference • Insert the cross-reference

• In the document, type the text that begins the cross-reference. On the Insert tab, click Cross-reference. • In the Reference type box, click the drop-down list to pick what you want to link to. The list of what's available depends on the type of item (heading, page number, etc.) you're linking to.

• In the Insert reference to box, click the information you want inserted in the document. Choices depend on what you chose in step 3.

• In the For which box, click the specific item you want to refer to, such as "Insert the cross-reference." • To allow users to jump to the referenced item, select the Insert as hyperlink check box. • If they Include above/below check box is available, check it to include specify the relative position of the referenced item.• Click Insert. cross-reference

• Cross-references are inserted as fields

• Cross-references are inserted into your document as fields. A field is a set of information that instructs Word to insert text, graphics, page numbers, and other material into a document

automatically. For example, the DATE field inserts the current date. The advantage of using fields is that the content being inserted--date, page number, graphics, etc.--gets updated for you whenever there's a change. For example, if you're writing a document over a period of days, the date will change each day when you open and save the document. Similarly, if you update a graphic that's stored elsewhere but referenced in the field, the update will get picked up automatically without you having to re-insert the graphic.

• If you've inserted a cross-reference and it looks similar to {REF _Ref249586 * MERGEFORMAT}, then Word is displaying field codes instead of field results. When you print the document or hide field codes, the field results replace the field codes. To see the field results instead of field codes, press ALT+F9, or right-click the field code, and then click Toggle Field Codes on the shortcut menu. cross-reference

• Use a master document

• If you want to cross-reference items that reside in a separate document but don't want to use hyperlinks, you'll have to first combine the documents into one master document and then insert the cross-references. A master document is a container for a set of separate files (or subdocuments). You can use a master document to set up and manage a multi-part document, such as a book with several chapters. Hyperlink

• Create or edit a hyperlink The fastest way to create a basic hyperlink in an Office document is to press ENTER or the SPACEBAR after you type the address of an existing webpage, such as http://www.contoso.com. Office automatically converts the address into a link. • In addition to webpages, you can create links to existing or new files on your computer, to email addresses, and to specific locations in a document. You can also edit the address, display text, and font style or colour of a hyperlink.

• Notes: • If you want to remove links or stop Office from automatically adding hyperlinks, see Remove or turn off hyperlinks.

• This article applies to desktop versions of Word, Excel, Outlook, and PowerPoint. A simplified set of hyperlink features is offered in Office Online. If you have a desktop version of Office, you can edit your document there for more advanced hyperlink features, or you can try or buy the latest version of Office. mail merge utility • How to Use Mail Merge in Microsoft Word

• Mail Merge is most often used to print or email form letters to multiple recipients. Using Mail Merge, you can easily customize form letters for individual recipients. Mail merge is also used to create envelopes or labels in bulk. • This feature works the same in all modern versions of Microsoft Word: 2010, 2013, and 2016. • In a blank Microsoft Word document, click on the Mailings tab, and in the Start Mail Merge group, click Start Mail Merge.

• Click Step-by-Step Mail Merge Wizard. • Select your document type. In this we will select Letters. Click Next: Starting document. mail merge utility

• Select the starting document. In this demo we will use the current (blank) document. Select Use the current document and then click Next: Select recipients.

• Note that selecting Start from existing document (which we are not doing in this demo) changes the view and gives you the option to choose your document. After you choose it, the Mail Merge Wizard reverts to Use the current document.

• Select recipients. In this demo we will create a new list, so select Type a new list and then click Create • Create a list by adding data in the New Address List dialog box and clicking OK

• Save the list. • Note that now that a list has been created, the Mail Merge Wizard reverts to Use an existing list and you have the option to edit the recipient list. mail merge utility • Selecting Edit recipient list opens up the Mail Merge Recipients dialog box, where you can edit the list and select or unselect records. Click OK to accept the list as is.

• Click Next: Write your letter • Write the letter and add custom fields. Click Address block to add the recipients' addresses at the top of the document • In the Insert Address Block dialog box, check or uncheck boxes and select options on the left until the address appears the way you want it to.

• Note that you can use Match Fields to correct any problems. Clicking Match Fields opens up the Match Fields dialog box, in which you can associate the fields from your list with the fields required by the wizard.

• Press Enter on your keyboard and click Greeting line... to enter a greeting. mail merge utility • In the Insert Greeting Line dialog box, choose the greeting line format by clicking the drop-down arrows and selecting the options of your choice, and then click OK

• Note that the address block and greeting line are surrounded by chevrons (« »). Write a short letter and click Next: Preview your letters. • Preview your letter and click Next: Complete the merge. • Click Print to print your letters or Edit individual letters to further personalize some or all of the letters. converting word as PDF files

• Save a PDF of your file on your mobile device • You can use the Print option to save your Word documents, Excel workbooks, and PowerPoint presentations as PDF files. • Open the file that you want to save as a PDF, and then tap File on your tablet or tap the File icon on your phone. • On the File tab, tap Print.

• If not already selected, tap Save as PDF on the drop-down list, and then tap Save.

• Tap Save. • Choose a location for your PDF, enter a new name (optional), and then tap Save. Ms-Excel

• Microsoft Excel is a spreadsheet developed by Microsoft for Windows, macOS, Android and iOS. It features calculation, graphing tools, pivot tables, and a macro programming language called Visual Basic for Applications (VBA). It has been a very widely applied spreadsheet for these platforms, especially since version 5 in 1993, and it has replaced Lotus 1-2-3 as the industry standard for spreadsheets. Excel forms part of the Microsoft Office suite of software. Ms-Excel: Manipulating data • Excel Data Manipulation Tips & Techniques for HMIS

• Database conversions are not a “flip of the switch” process and require some work to get the data from the source database into the target database.

• This walkthrough will outline tips and techniques used in Microsoft Excel to prepare data for loading into a target database or for performing offline data cleansing. • General Rules • Save your work in versions so you can revert back if necessary

• Any new data added to the system post-export may have to be re-cleansed so you might want to freeze your database • Work with the Excel file only in a secured and control environment • Excel does have its limitations. 65536 rows to be exact

• Audit your work. Working with charts

• Create a chart (graph) that is recommended for your data, almost as fast as using the chart wizard that is no longer available. • Create a chart • Select the data for which you want to create a chart. • Click INSERT > Recommended Charts. • On the Recommended Charts tab, scroll through the list of charts that Excel recommends for your data, and click any chart to see how your data will look. • If you don't see a chart you like, click All Charts to see all the available chart types.

• When you find the chart you like, click it > OK.

• Use the Chart Elements, Chart Styles, and Chart Filters buttons, next to the upper-right corner of the chart to add chart elements like axis titles or data labels, customize the look of your chart, or change the data that is shown in the chart.

• To access additional design and formatting features, click anywhere in the chart to add the CHART TOOLS to the ribbon, and then click the options you want on the DESIGN and FORMAT tabs. Working with PIVOT table • A PivotTable is a powerful tool to calculate, summarize, and analyse data that lets you see comparisons, patterns, and trends in your data.

• PivotTables work a little bit differently depending on what platform you are using to run Excel.

• Create a PivotTable in Excel for Windows • Select the cells you want to create a PivotTable from.

• Note: Your data shouldn't have any empty rows or columns. It must have only a single-row heading. • Select Insert > PivotTable.

• Under Choose the data that you want to analyse, select Select a table or range. Working with PIVOT table

• In Table/Range, verify the cell range.

• Under Choose where you want the PivotTable report to be placed, select New worksheet to place the PivotTable in a new worksheet or Existing worksheet and then select the location you want the PivotTable to appear. • Select OK.

• Building out your PivotTable • To add a field to your PivotTable, select the field name checkbox in the PivotTables Fields pane.

• Note: Selected fields are added to their default areas: non-numeric fields are added to Rows, date and time hierarchies are added to Columns, and numeric fields are added to Values. • To move a field from one area to another, drag the field to the target area. what-if

analysis • By using What-If Analysis tools in Excel, you can use several different sets of values in one or more formulas to explore all the various results.

• For example, you can do What-If Analysis to build two budgets that each assumes a certain level of revenue. Or, you can specify a result that you want a formula to produce, and then determine what sets of values will produce that result. Excel provides several different tools to help you perform the type of analysis that fits your needs. Advanced excel functions-VLOOKUP()

• Tip: Try using the new XLOOKUP function, an improved version of VLOOKUP that works in any direction and returns exact matches by default, making it easier and more convenient to use than its predecessor. • Use VLOOKUP when you need to find things in a table or a range by row. For example, look up a price of an automotive part by the part number, or find an employee name based on their employee ID.

• In its simplest form, the VLOOKUP function says: • =VLOOKUP(What you want to look up, where you want to look for it, the column number in the range containing the value to return, return an Approximate or Exact match – indicated as 1/TRUE, or 0/FALSE).

• Tip: The secret to VLOOKUP is to organize your data so that the value you look up (Fruit) is to the left of the return value (Amount) you want to find. Advanced excel functions-VLOOKUP() • How to get started • There are four pieces of information that you will need in order to build the VLOOKUP syntax: • The value you want to look up, also called the lookup value.

• The range where the lookup value is located. Remember that the lookup value should always be in the first column in the range for VLOOKUP to work correctly. For example, if your lookup value is in cell C2 then your range should start with C.

• The column number in the range that contains the return value. For example, if you specify B2:D11 as the range, you should count B as the first column, C as the second, and so on.

• Optionally, you can specify TRUE if you want an approximate match or FALSE if you want an exact match of the return value. If you don't specify anything, the default value will always be TRUE or approximate match. • Now put all of the above together as follows:

• =VLOOKUP(lookup value, range containing the lookup value, the column number in the range containing the return value, Approximate match (TRUE) or Exact match (FALSE)).

• Examples hlookup() • Searches for a value in the top row of a table or an array of values, and then returns a value in the same column from a row you specify in the table or array. Use HLOOKUP when your comparison values are located in a row across the top of a table of data, and you want to look down a specified number of rows. Use VLOOKUP when your comparison values are located in a column to the left of the data you want to find. • The H in HLOOKUP stands for "Horizontal." • Syntax • HLOOKUP(lookup value, table array, row_index_num, [range lookup])

• The HLOOKUP function syntax has the following arguments:

• Lookup value Required. The value to be found in the first row of the table. Lookup value can be a value, a reference, or a text string. • Table array Required. A table of information in which data is looked up. Use a reference to a range or a range name.

• The values in the first row of table array can be text, numbers, or logical values.

• If range lookup is TRUE, the values in the first row of table array must be placed in ascending order: ...-2, -1, 0, 1, 2,... , A-Z, FALSE, TRUE; otherwise, HLOOKUP may not give the correct value. If range lookup is FALSE, table array does not need to be sorted. hlookup()

• Uppercase and lowercase text are equivalent.

• Sort the values in ascending order, left to right. For more information, see Sort data in a range or table . • Row_index_num Required. The row number in table array from which the matching value will be returned. A row_index_num of 1 returns the first row value in table array, a row_index_num of 2 returns the second row value in table array, and so on. If row_index_num is less than 1, HLOOKUP returns the #VALUE! error value; if row_index_num is greater than the number of rows on table array, HLOOKUP returns the #REF! error value

• Range lookup Optional. A logical value that specifies whether you want HLOOKUP to find an exact match or an approximate match. If TRUE or omitted, an approximate match is returned. In other words, if an exact match is not found, the next largest value that is less than lookup value is returned. If FALSE, HLOOKUP will find an exact match. If one is not found, the error value #N/A is returned. • Remark • If HLOOKUP can't find lookup value, and range lookup is TRUE, it uses the largest value that is less than lookup value.

• If lookup value is smaller than the smallest value in the first row of table array, HLOOKUP returns the #N/A error value.

• If range lookup is FALSE and lookup value is text, you can use the wildcard characters, question mark (?) and asterisk (*), in lookup value. A question mark matches any single character; an asterisk matches any sequence of characters. If you want to find an actual question mark or asterisk, type a tilde (~) before the character. pv()

• PV, one of the financial functions, calculates the present value of a loan or an investment, based on a constant interest rate. You can use PV with either periodic, constant payments (such as a mortgage or other loan), or a future value that's your investment goal.

• Use the Excel Formula Coach to find the present value (loan amount) you can afford, based on a set monthly payment. At the same time, you'll learn how to use the PV function in a formula.

• Or, use the Excel Formula Coach to find the present value of your financial investment goal. pv()

• Syntax • PV(rate, nper, pmt, [fv], [type]) • The PV function syntax has the following arguments:

• Rate Required. The interest rate per period. For example, if you obtain an automobile loan at a 10 percent annual interest rate and make monthly payments, your interest rate per month

is 10%/12, or 0.83%. You would enter 10%/12, or 0.83%, or 0.0083, into the formula as the rate.

• Nper Required. The total number of payment periods in an annuity. For example, if you get a four-year car loan and make monthly payments, your loan has 4*12 (or 48) periods. You would enter 48 into the formula for nper.

• Pmt Required. The payment made each period and cannot change over the life of the annuity. Typically, pmt includes principal and interest but no other fees or taxes. For example, the monthly payments on a $10,000, four-year car loan at 12 percent are $263.33. You would enter -263.33 into the formula as the pmt. If pmt is omitted, you must include the fv argument. • Fv Optional. The future value, or a cash balance you want to attain after the last payment is made. If fv is omitted, it is assumed to be 0 (the future value of a loan, for example, is 0). For example, if you want to save $50,000 to pay for a special project in 18 years, then $50,000 is the future value. You could then make a conservative guess at an interest rate and determine how much you must save each month. If fv is omitted, you must include the pmt argument.

• Type Optional. The number 0 or 1 and indicates when payments are due. fv()

• FV, one of the financial functions, calculates the future value of an investment based on a constant interest rate. You can use FV with either periodic, constant payments, or a single lump sum payment. • Use the Excel Formula Coach to find the future value of a series of payments. At the same time, you'll learn how to use the FV function in a formula.

• Or, use the Excel Formula Coach to find the future value of a single, lump sum payment. fv()

• Syntax • FV(rate,nper,pmt,[pv],[type]) • For a more complete description of the arguments in FV and for more information on annuity functions, see PV.

• The FV function syntax has the following arguments: • Rate Required. The interest rate per period. • Nper Required. The total number of payment periods in an annuity.

• Pmt Required. The payment made each period; it cannot change over the life of the annuity. Typically, pmt contains principal and interest but no other fees or taxes. If pmt is omitted, you must include the pv argument.

• Pv Optional. The present value, or the lump-sum amount that a series of future payments is worth right now. If pv is omitted, it is assumed to be 0 (zero), and you must include the pmt argument.

• Type Optional. The number 0 or 1 and indicates when payments are due. If type is omitted, it is assumed to be 0. schedule()

• Returns the future value of an initial principal after applying a series of compound interest rates. Use FVSCHEDULE to calculate the future value of an investment with a variable or adjustable rate.

• Syntax • FVSCHEDULE(principal, schedule)

• The FVSCHEDULE function syntax has the following arguments: • Principal Required. The present value. • Schedule Required. An array of interest rates to apply.

• Remarks • The values in schedule can be numbers or blank cells; any other value produces the #VALUE! error value for FVSCHEDULE. Blank cells are taken as zeros (no interest). goal seek() • Goal Seek is a built-in Excel tool that allows you to see how one data item in a formula impacts another. You might look at these as "cause and effect" scenarios. It's useful to answer "what if" type questions because you can adjust one cell entry to see how the results change. The tool is often used in finance, sales, and forecasting scenarios, but there are other uses.

• Needs approval from 2/3 of the voters

• In our example, the YES votes are a majority but shy of the required 2/3 approval to win the election. People quickly realize they were close, but which item do they change to find out how close. What would've made a difference?

• Using Goal Seek, we can change the value of one variable and see how the results change. This would allow you to answer these types of questions. • How many more YES votes were needed to win the election?

• If 500 more people voted, could the YES team have won? • In each of these questions, the goal is to change one data value to see if the YES percentage went over that two-thirds mark or 67%. Then, rather than haphazardly changing cell values to see the results, Goal Seek can find the answers. goal seek() • How to Use Excel Goal Seek • Time needed: 5 minutes. • Create a spreadsheet in Excel that has your data. In the example below, the green cells have formulas to calculate the percentage and sum totals. Pin • Click the cell you want to change. This is called the "Set cell." In my example, this will be D4. • From the Data tab, select the What if Analysis… button.

• Select Goal seek… from the drop-down menu.

• In the Goal Seek dialog, enter the new "what if" amount in the To value: text box. Pin In this example, we're asking Excel to replace the contents of cell D4, which is 0.64 with 0.67. This is the percentage needed to win the election. Technically, we need 66.7% to win, but since Goal Seek has an approximation algorithm, I don't want to run the risk of Excel rounding down.

• We also need to tell Excel which cell to change. Since we wanted to know the number of YES votes, we'll click C4.Pin • Click OK. Excel will overwrite the previous cell value with the new one. Pin

• If you wish to accept the new value, click OK confidence() • Returns the confidence interval for a population mean, using a normal distribution. • The confidence interval is a range of values. • Your sample mean, x, is at the centre of this range and the range is x ± CONFIDENCE.

• For example, if x is the sample mean of delivery times for products ordered through the mail, x ± CONFIDENCE is a range of population means. • For any population mean, μ0, in this range, the probability of obtaining a sample mean further from μ0 than x is greater than

alpha; for any population mean, μ0, not in this range, the probability of obtaining a sample mean further from μ0 than x is less than alpha.

• In other words, assume that we use x, standard, and size to construct a two-tailed test at significance level alpha of the hypothesis that the population mean is μ0. • Then we will not reject that hypothesis if μ0 is in the confidence interval and will reject that hypothesis if μ0 is not in the confidence interval. • The confidence interval does not allow us to infer that there is probability 1 – alpha that our next package will take a delivery time that is in the confidence interval. confidence()

• Important: This function has been replaced with one or more new functions that may provide improved accuracy and whose names better reflect their usage.

• Although this function is still available for backward compatibility, you should consider using the new functions from now on, because this function may not be available in future versions of Excel.

• For more information about the new functions, see CONFIDENCE.NORM function and CONFIDENCE.T function. confidence() • Syntax • CONFIDENCE(alpha,standard_dev,size)

• The CONFIDENCE function syntax has the following arguments: • Alpha Required. The significance level used to compute the confidence level. The confidence level equals 100*(1 - alpha)%, or in other words, an alpha of 0.05 indicates a 95 percent confidence level.

• Standard Required. The population standard deviation for the data range and is assumed to be known. • Size Required. The sample size. • Remarks • If any argument is non-numeric, CONFIDENCE returns the #VALUE! error value. • If Alpha is ≤ 0 or ≥ 1, CONFIDENCE returns the #NUM! error value. • If Standard ≤ 0, CONFIDENCE returns the #NUM! error value.

• If Size is not an integer, it is truncated. • If Size < 1, CONFIDENCE returns the #NUM! error value.

• If we assume Alpha equals 0.05, we need to calculate the area under the standard normal curve that equals (1 - alpha), or 95 percent. This value is ± 1.96. The confidence interval is therefore: AVERAGE() • Returns the average (arithmetic mean) of the arguments. For example, if the range A1:A20 contains numbers, the formula =AVERAGE(A1:A20) returns the average of those numbers.

• Syntax • AVERAGE(number1, [number2], ...)

• The AVERAGE function syntax has the following arguments:

• Number1 Required. The first number, cell reference, or range for which you want the average.

• Number2, ... Optional. Additional numbers, cell references or ranges for which you want the average, up to a maximum of 255. AVERAGE() • Remarks

• Arguments can either be numbers or names, ranges, or cell references that contain numbers. • Logical values and text representations of numbers that you type directly into the list of arguments are not counted. • If a range or cell reference argument contains text, logical

values, or empty cells, those values are ignored; however, cells with the value zero are included.

• Arguments that are error values or text that cannot be translated into numbers cause errors. • If you want to include logical values and text representations of numbers in a reference as part of the calculation, use the AVERAGEA function.

• If you want to calculate the average of only the values that meet certain criteria, use the AVERAGEIF function or the AVERAGEIFS function. AVERAGE()

• Note: The AVERAGE function measures central tendency, which is the location of the centre of a group of numbers in a statistical distribution. The three most common measures of central tendency are: • Average, which is the arithmetic mean, and is calculated by adding a group of numbers and then dividing by the count of those numbers. For example, the average of 2, 3, 3, 5, 7, and 10 is 30 divided by 6, which is 5.

• Median, which is the middle number of a group of numbers; that is, half the numbers have values that are greater than the median, and half the numbers have values that are less than the median. For example, the median of 2, 3, 3, 5, 7, and 10 is 4. • Mode, which is the most frequently occurring number in a group of numbers. For example, the mode of 2, 3, 3, 5, 7, and 10 is 3. AVERAGE() • For a symmetrical distribution of a group of numbers, these three measures of central tendency are all the same. For a skewed distribution of a group of numbers, they can be different. • Tip: When you average cells, keep in mind the difference between empty cells and those containing the value zero, especially if you have cleared the Show a zero in cells that have a zero value check box in the Excel Options dialog box in the Excel desktop application. When this option is selected, empty cells are not counted, but zero values are. • To locate the Show a zero in cells that have a zero value check box: • On the File tab, click Options, and then, in the Advanced category, look under Display options for this worksheet. average() • Calculates the average (arithmetic mean) of the values in the list of arguments.

• Syntax • AVERAGEA(value1, [value2], ...) • The AVERAGEA function syntax has the following arguments:

• Value1, value2, ... Value1 is required, subsequent values are optional. 1 to 255 cells, ranges of cells, or values for which you want the average. average if() • Returns the average (arithmetic mean) of all the cells in a range that meet a given criteria.

• Syntax • AVERAGEIF(range, criteria, [average range]) • The AVERAGEIF function syntax has the following arguments: • Range Required. One or more cells to average, including numbers or names, arrays, or references that contain numbers. • Criteria Required. The criteria in the form of a number, expression, cell reference, or text that defines which cells are averaged. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4.

• Average range Optional. The actual set of cells to average. If omitted, range is used. averages() • Returns the average (arithmetic mean) of all cells that meet multiple criteria. • Syntax • AVERAGEIFS(average range, criteria_range1, criteria1, [criteria_range2, criteria2], ...) • The AVERAGEIFS function syntax has the following arguments:

• Average range Required. One or more cells to average, including numbers or names, arrays, or references that contain numbers. • Criteria_range1, criteria_range2, … Criteria_range1 is required, subsequent criteria ranges are optional. 1 to 127 ranges in which to evaluate the associated criteria. • Criteria1, criteria2, ... Criteria1 is required, subsequent criteria are optional. 1 to 127 criteria in the form of a number, expression, cell reference, or text that define which cells will be averaged. For example, criteria can be expressed as 32, "32", ">32", "apples", or B4. MIN() • Returns the smallest number in a set of values.

• Syntax • MIN(number1, [number2], ...)

• The MIN function syntax has the following arguments: • Number1, number2, ... Number1 is optional, subsequent numbers are optional. 1 to 255 numbers for which you want to find the minimum value. MAX() • Returns the largest value in a set of values. • Syntax • MAX(number1, [number2], ...)

• The MAX function syntax has the following arguments: • Number1, number2, ... Number1 is required, subsequent numbers are optional. 1 to 255 numbers for which you want to find the maximum value. COUNT() • The COUNT function counts the number of cells that contain numbers, and counts numbers within the list of arguments. Use the COUNT function to get the number of entries in a number field that is in a range or array of numbers. For example, you can enter the following formula to count the numbers in the range A1:A20: =COUNT(A1:A20). In this example, if five of the cells in the range contain numbers, the result is 5.

• Syntax • COUNT(value1, [value2], ...) The COUNT function syntax has the following arguments:

• value1 Required. The first item, cell reference, or range within which you want to count numbers. • value2, ... Optional. Up to 255 additional items, cell references, or ranges within which you want to count numbers. • Note: The arguments can contain or refer to a variety of different types of data, but only numbers are counted. COUNTA()

• The COUNTA function counts the number of cells that are not empty in a range. • Syntax • COUNTA(value1, [value2], ...)

• The COUNTA function syntax has the following arguments: • value1 Required. The first argument representing the values that you want to count. • value2, ... Optional. Additional arguments representing the values that you want to count, up to a maximum of 255 arguments. count if() • Use COUNTIF, one of the statistical functions, to count the number of cells that meet a criterion; for example, to count the number of times a particular city appears in a customer list. • In its simplest form, COUNTIF says: • =COUNTIF(Where do you want to look?, What do you want to look for?) • For example: • =COUNTIF(A2:A5,"London")

• =COUNTIF(A2:A5,A4) countifs() • The COUNTIFS function applies criteria to cells across multiple ranges and counts the number of times all criteria are met. • COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]…)

• The COUNTIFS function syntax has the following arguments: • criteria_range1 Required. The first range in which to evaluate the associated criteria. • criteria1 Required. The criteria in the form of a number, expression, cell reference, or text that define which cells will be

counted. For example, criteria can be expressed as 32, ">32", B4, "apples", or "32". • criteria_range2, criteria2, ... Optional. Additional ranges and their associated criteria. Up to 127 range/criteria pairs are allowed.

• Important: Each additional range must have the same number of rows and columns as the criteria_range1 argument. The ranges do not have to be adjacent to each other. ROUND()

• The ROUND function rounds a number to a specified number of digits. For example, if cell A1 contains 23.7825, and you want to round that value to two decimal places, you can use the following formula: • =ROUND(A1, 2) • The result of this function is 23.78. • Syntax • ROUND(number, num_digits) • The ROUND function syntax has the following arguments: • number Required. The number that you want to round. • num_digits Required. The number of digits to which you want to round the number argument. INT() • Rounds a number down to the nearest integer.
• Syntax • INT(number) • The INT function syntax has the following arguments:

• Number Required. The real number you want to round down to an integer.

• Returns the average of the absolute deviations of data points from their mean. AVEDEV is a measure of the variability in a data set. • Syntax • AVEDEV(number1, [number2], ...)

• The AVEDEV function syntax has the following arguments: • Number1, number2, ... Number1 is required, subsequent numbers are optional. 1 to 255 arguments for which you want the average of the absolute deviations. You can also use a single array or a reference to an array instead of arguments separated by commas. nested functions • Using a function as one of the arguments in a formula that uses a function is called nesting, and we'll refer to that function as a nested function. For example, by nesting the AVERAGE and SUM function in the arguments of the IF function, the following formula sums a set of numbers (G2:G5) only if the average of another set of numbers (F2:F5) is greater than 50. Otherwise, it returns 0.

• The AVERAGE and SUM functions are nested within the IF function. • You can nest up to 64 levels of functions in a formula. name ,cells/ranges/constants

• By using names, you can make your formulas much easier to understand and maintain. You can define a name for a cell range, function, constant, or table. Once you adopt the practice of using names in your workbook, you can easily update, audit, and manage these names. • Name a cell • Select a cell. • In the Name Box, type a name.

• Press Enter. • There are two types of cell references: relative and absolute. Relative and absolute references behave differently when copied and filled to other cells. Relative references change when a formula is copied to another cell. Absolute references, on the other hand, remain constant no matter where they are copied. Relative references

• Relative references • By default, all cell references are relative references. When copied across multiple cells, they change based on the relative position of rows and columns. For example, if you copy the formula =A1+B1 from row 1 to row 2, the formula will become =A2+B2. Relative references are especially convenient whenever you need to repeat the same calculation across multiple rows or columns. absolute relative mixed cell reference excel

• Absolute references • There may be times when you do not want a cell reference to change when filling cells. Unlike relative references, absolute references do not change when copied or filled. You can use an absolute reference to keep a row and/or column constant.

• An absolute reference is designated in a formula by the addition of a dollar sign ($) before the column and row. If it precedes the column or row (but not both), it's known as a mixed reference.

• You will use the relative (A2) and absolute (A2) formats in most formulas. Mixed references are used less frequently. • When writing a formula in Microsoft Excel, you can press the F4 key on your keyboard to switch between relative, absolute, and mixed cell references, as shown in the video below. This is an easy way to quickly insert an absolute reference. >, Module from the context menu. • Copy the VBA code (from a web-page etc.) and paste it to the right pane of the VBA editor ("Module1" window)

. • Tip: Speed up macro execution If the code of your VBA macro does not contain the following lines in the beginning:

• Application.ScreenUpdating = False Application. Calculation = xlCalculationManual Creating and executing VBA macros embedded in an excel sheet • Then add the following lines to get your macro to work faster (see the screenshots above): • To the very beginning of the code, after all code lines that start with Dim (if there are no "Dim" lines, then add them right after the Sub line): Application.ScreenUpdating = False Application. Calculation = xlCalculationManual • To the very of the code, before End Sub: Application.ScreenUpdating = True Application. Calculation = xlCalculationAutomatic • These lines, as their names suggest, turn off screen refresh and recalculating the workbook's formulas before running the macro. Creating and executing VBA macros embedded in an excel sheet

• After the code is executed, everything is turned back on. As a result, the performance is increased from 10% to 500% (aha, the macro works 5 times faster if it continuously manipulates the cells' contents).

• Save your workbook as "Excel macro-enabled workbook”. Press CTRL + S, then click the "No" button in the "The following features cannot be saved in macro-free workbook" warning dialog.

• The "Save as" dialog will open. Choose "Excel macro-enabled workbook" from the "Save as type" drop-down list and click the Save button.

• Press Alt + Q to close the Editor window and switch back to your workbook.