Computing &Communication –Intelligent Global Tool to Explain Evergreen Technology (C2 – IGT to E2T)

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Abstract— Computing and Communication are the field which are inter-related from a time when there was no life on the earth. They are soul mate. In other words Computing and communication are equilibrium for each other and gives the constant result which is known as Technology. When we discuss about Computing, Communication automatically involved in it and it updates itself as we update Computing strategies. Here my aim is to provide you details how these two global tools are evergreen to explain the lifetime technology which we get it from the time of life came into existence on the earth. Computing and Communication can be defined in different ways and in all the description they are very well interconnected. Computing means the use of operations in Computer and Communication means the exchanging of information between two or more systems or sources or materials etc. When these two terms combine it forms a valuable information like how much exchange of information to be done. What restrictions to be done through the use of operations in computer? When these two terms & conditions combine a protocol is set which is basic part of technology. Now a days Computer is not the only way for communication and computing, mobile phones, tablets, smart watches etc. have replaced them. In next decade you can see microscopic digital devices which can be used for the similar purpose. That's how technology improves when we calculate and communicate the experience at right time. At present, we can simply communicate through your mobile device and even it can be controlled that what to be sent and to whom? This updated version of technology display the relation of Computing and Communication. In the research paper I will discuss and prove how they are most valuable resources for the development of technology and how we can make them as Global tool which can be used by each individual at almost free of cost.

Key words: Computing and Communication, Cloud Computing, Evergreen Technology

I. INTRODUCTION

Computing is defined as "The process of utilizing computer technology to complete a task. Computing may involve computer hardware and/or software, but most involve some form of computer system. Most individuals use some form of computing every day whether they realize it or not. Swiping a debit card, sending an email, or using a cell phone can all be considered form of computing." Computing can also be defined as is any goal-oriented activity requiring, benefiting from, or creating a mathematical sequence of steps known as an algorithm. From the above two definitions we can easily find out that it is related to complete a task with a sequence of steps to get the desired result in minimum span of time.

Computing is a process which runs at every instant of time. Every action is an example of computing, typing through a keyboard, eating food, walking on a road, reading a book, everything is part of computing. But how measure it that's and important factor. There should be different strategies for it to categorize them.

E.g. If we need to find the roots of a quadratic equation

$$ax^2 + bx + c = 0,$$

then it should fulfill the criteria like $a \neq 0$, another criteria, if $b^2 - 4ac < 0$, then roots are imaginary, if $b^2 - 4ac = 0$, then roots are real and equal else roots are real and unequal.This example is very well self-explanatory how computing is done / require to solve any task or problem? This is a common example related to Mathematics.

Another example, two systems sending the same content of 1MB in different span of time, let's say 2 seconds and 2.5 seconds, here measurement is done in terms of time and size of a file and according to that configuration of devices can be understand.

Types of Computing:

- High Performance Computing
- Cloud Computing
- Grid Computing
- Utility Computing
- Distributed Computing

To understand the concept of computing various daily life examples can be used in terms of Marketing to traveling to making food to sleep. Types of computing will be discuss later in the heading General. Overall it is an effective toole which is directly proportional to the Technology.

Computing α Technology

which means as computing increases technology develops and Computing has direct impact on the technology. E.g. compare the cell phones of 1990's and 2016. You will easily make a difference between them, even their basic purpose is same i.e. to make and receive calls or send / receive messages.

Communication can be defined as "Duplex process of reaching common understanding, in which contributorsnot only exchange (encode – decode) information, opinions, update, knowledge and spirits but also generate and share meaning. In general, communication is a means of involving people or places. It can also be defined from the Latin word commūnicāre, which means "to share". Communication is the act of carryingenvisioned meanings from one unit or collection to another through the procedure of communallyunstated emblems and semiotic rubrics. Communication is a tool which is beneficial in all aspects. It is need of life. Through communication we interact with others and make them understand what we want or what they want? It is a tool which is required to complete a task. In terms of technology Operating system does the same work in Computer System, cell phone, calculator etc. If there is no answer then it simply returns 'don't know' type response. From here can we say Communication as an Operating system for our life? I am going to brief all in these points in detail now.

II. GENERAL

Before communication we were discussing about Computing and its type, now here first of all I will explain different types of computing and then will compare them and trying to find out which is one better. The first form of computing is:

High Performance Computingis the use of parallel processing for running advanced application programs efficiently, reliably and quickly. The term applies especially to systems that function above a teraflop or 10^{12} floating-point operations per second.

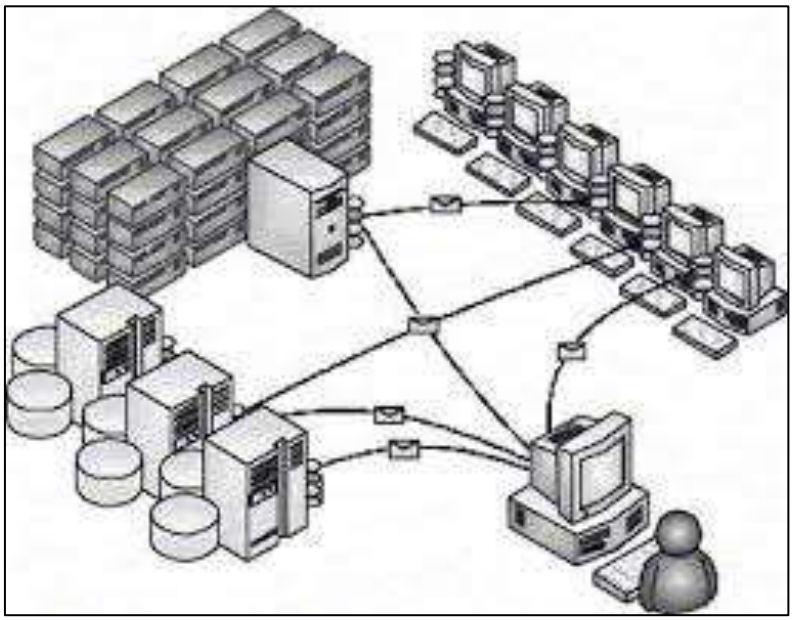

Fig. 1:

The term HPC is occasionally used as a synonym for supercomputing, although technically a supercomputer is a system that performs at or near the currently highest operational rate for computers. Some supercomputers work at more than a petaflop or 10^{15} floating-point operations per second.

Cloud Computing is a type of Internet-based computing that provides shared computer processing resources and data to computers and other devices on demand. It is a model for enabling ubiquitous, on-demand access to a shared pool of configurable computing resources (e.g., computer networks, servers, storage, applications and services)which can be rapidly provisioned and released with minimal management effort. Cloud computing and storage solutions provide users and enterprises with various capabilities to store and process their data in third-party data centersthat may be located far from the user–ranging in distance from across a city to across the world. Cloud computing relies on sharing of resources to achieve coherence and economy of scale, similar to a utility (like the electricity grid) over an electricity network.

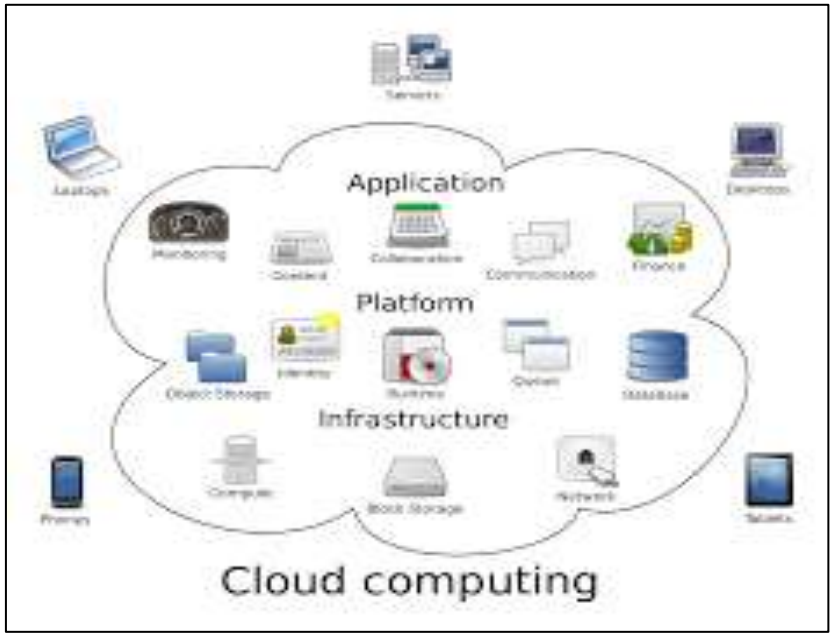

Fig. 2: Cloud Computing

Grid Computingis the collection of computer resources from multiple locations to reach a common goal. The grid can be thought of as a distributed system with non-interactive workloads that involve a large number of files. Grid computing is distinguished from conventional high performance computing systems such as cluster computing in that grid computers have each node set to perform a different task/application.

Fig. 3:

Grid computers also tend to be more heterogeneous and geographically dispersed (thus not physically coupled) than cluster computers.Although a single grid can be dedicated to a particular application, commonly a grid is used for a variety of purposes. Grids are often constructed with general-purpose grid middleware software libraries. Grid sizes can be quite large.Grids are a form of distributed computing whereby a "super virtual computer" is composed of many networked loosely coupled computers acting together to perform large tasks. For certain applications, distributed or grid computing can be seen as a special type of parallel computing that relies on complete computers (with onboard CPUs, storage, power supplies, network interfaces, etc.) connected to a computer network (private or public) by a conventional network interface, such as Ethernet. This is in contrast to the traditional notion of a supercomputer, which has many processors connected by a local high-speed computer bus.

Distributed Computing is a field of computer science that studiesdistributed systems. A distributed system is a model in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal.

Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components.Examples of distributed systems vary from SOA-based systems to massively multiplayer online games to peer-to-peer applications.

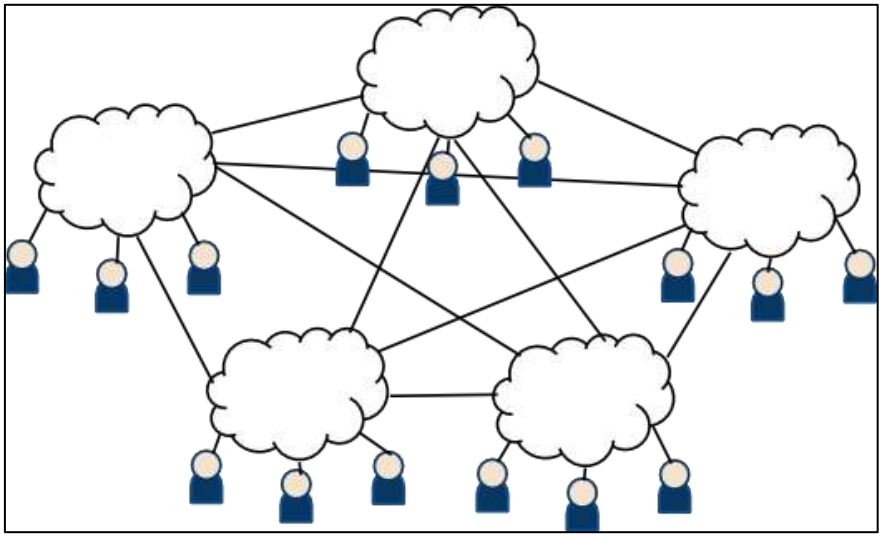

Fig. 4:

A computer program that runs in a distributed system is called a distributed program, and distributed programming is the process of writing such programs. There are many alternatives for the message passing mechanism, including pure HTTP, RPC-like connectors and message queues.

A goal and challenge pursued by some computer scientists and practitioners in distributed systems is location transparency; however, this goal has fallen out of favour in industry, as distributed systems are different from conventional non-distributed systems, and the differences, such as network partitions, partial system failures, and partial upgrades, cannot simply be "papered over" by attempts at "transparency" (see CAP theorem).

Distributed computing also refers to the use of distributed systems to solve computational problems. In *distributed computing*, a problem is divided into many tasks, each of which is solved by one or more computers, which communicate with each other by message passing.

A. CAP Theorem

In theoretical computer science, the CAP theorem, also named Brewer's theorem after computer scientist Eric Brewer, states that it is impossible for a distributed computer system to simultaneously provide all three of the following guarantees.

- Consistency (every read receives the most recent write or an error)
- Availability (every request receives a response, without guarantee that it contains the most recent version of the information)
- Partition tolerance (the system continues to operate despite arbitrary partitioning due to network failures)

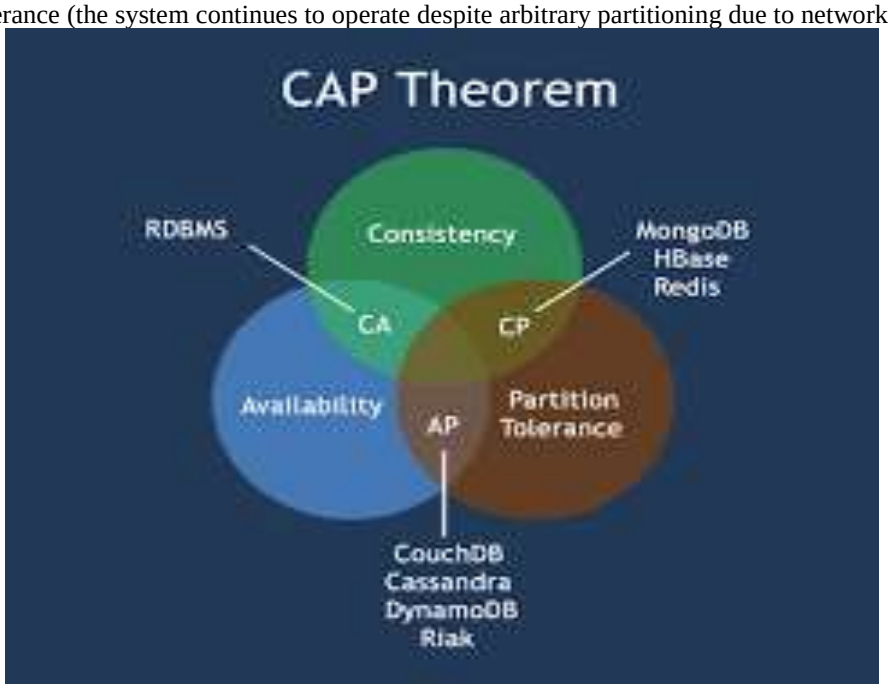

Fig. 5:

In other words, the CAP theorem states that in the presence of a network partition, one has to choose between consistency and availability.

1) Differences between Distributed Computing and Grid Computing

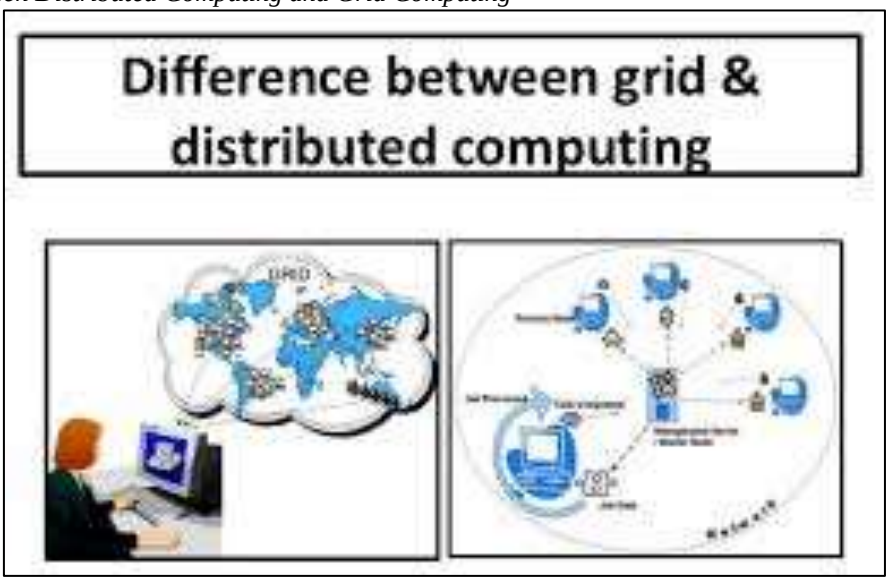

Fig. 6:

Since 1980, two advances in technology has made distributed computing a more practical idea, computer CPU power and communication bandwidth. The result of these technologies is not only feasible but easy to put together large number of computer systems for solving complex computational power or storage requirements. But the numbers of real distributable applications are still somewhat limited, and the challenges are still significant (standardization, interoperability etc.).

As it is clear from the definition, traditional distributed computing can be characterized as a subset of grid computing. Some of the differences between these two are

1) Distributed Computing normally refers to managing or pooling the hundreds or thousands of computer systems which individually are more limited in their memory and processing power. On the other hand, grid computing has some extra characteristics. It is concerned to efficient utilization of a pool of heterogeneous systems with optimal workload management utilizing an enterprise's entire computational resources(servers, networks, storage, and information) acting together to create one or more large pools of computing resources. There is no limitation of users, departments or originations in grid computing.
2) Grid computing is focused on the ability to support computation across multiple administrative domains that sets it apart from traditional distributed computing. Grids offer a way of using the information technology resources optimally inside an organization involving virtualization of computing resources. Its concept of support for multiple administrative policies and security authentication and authorization mechanisms enables it to be distributed over a local, metropolitan, or wide-area network.

B. Difference between All types of Computing

Cloud computing is rapidly growing as an alternative to conventional computing. However, it is based on models like cluster computing, distributed computing, utility computing and grid computing in general. This paper presents an end-to-end comparison between Cluster Computing, Grid Computing and Cloud Computing, along with the challenges they face. This could help in better understanding these models and to know how they differ from its related concepts, all in one go. It also discusses the ongoing projects and different applications that use these computing models as a platform for execution. An insight into some of the tools which can be used in the three computing models to design and develop applications is given. This could help in bringing out the innovative ideas in the field and can be explored to the needs in the computing world.

1) Communication and types of Communication

Communication is an important tool for interaction. It is the basic requirement through which entities knows each other and can share thoughts, resources and many more things. There are different types of communication and they are described in details now.

2) Types of Communication (In General)

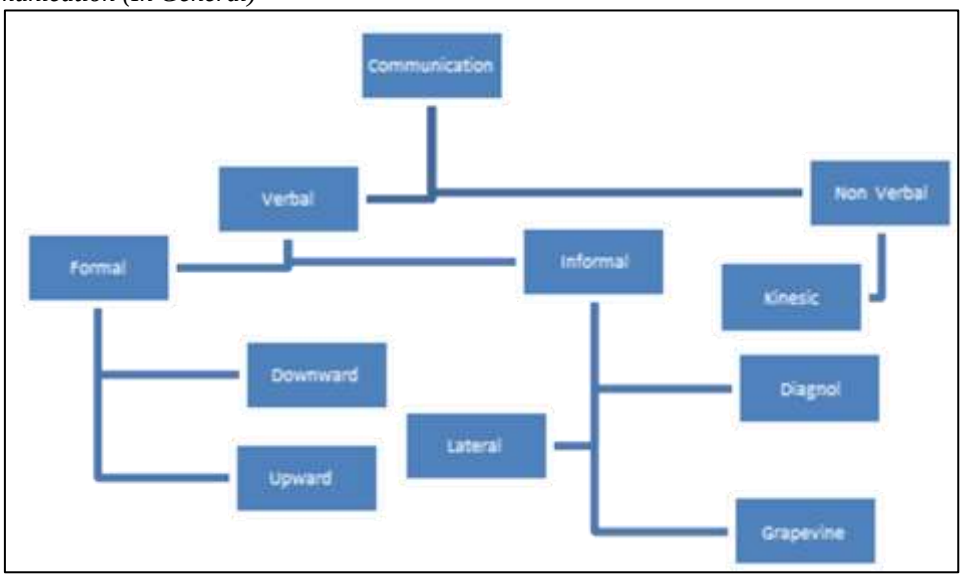

Fig. 7: above shows you two different types of communication. These are Verbal and Non Verbal

Non – Verbal communication is based through Signs, symbols and it can go without verbal communication. Verbal Communication can't go without non-verbal communication. From here we can directly say that Non Verbal communication is independent while verbal communication is dependent on Non – Verbal communication. Verbal communication is categorized in two forms Formal Communication and Informal Communication..

Formal Communication means in which each and everything is very well formatted and specified. Each and every instruction is clearly mentioned and followed as per the protocols. Example is Social Gathering, Office communication, meetings, Legal Documents etc.

In formal communication we have two sub types first is downward communication in which higher designation is communicating to lower designation official, e.g. Boss is ordered to a worker, and in this case communication is very much in downward direction.

Second subtype is upward communication in lower designation is communicating to higher designation, e.g. Worker requests his boss, here the effect is less than downward direction.

There is another type of communication in this term i.e. horizontal communication and vertical communication, which means Team Leader is communicating with team members and department members and subordinates, it's vertical communication (different level communication) while communication between different team members and other department members will be considered as horizontal communication as they are of same level.

While non – verbal communication is used to convey messages, its main aim to send the message by any way. There is no format or specification or set of protocols. It is generally we use while talking to each other at different places like restaurants, cell phone school, colleges, canteen etc.

It is further subdivided into three subgroups, first is Lateral communication in which workers working at same level communicates and there is no issue barrier of subordinates or Boss. It is most effective form of communication.

Second is Diagonal communication, the path is mixture of vertical and horizontal movement. In large communications various departments need communication support from each other.

Third is Grapevine Communication, it is also called as Backbiting or backstabbing. A backbiter or backstabber is a colleague or an employee who acts like a friend in public but badmouth you in private. One of ugliest tool of communication but very effective, dangerous and it can suddenly change the image of any organization / society. It's like a virus which infects everyone without knowing them and harms them deeply.There is no cure of it because you will find people who are habitual of it and people are there who entertains it.

Then we have another communication type i.e. termed as Face to Face communication (F2F). In this type of communication the way your message is conveyed through 50% of your body language, 40% of tone of voice and 10% of Words which you are using. Now a days face to face communication done in different ways like Physically face to face communication, Video Conferencing, Software available to communicate globally across the world at any time and any corner of the world.

III. BENEFITS

On combining computing and communication we conclude to the term called technology which is an effective, important, updated, one of the best tool for the globalization of any field. Whether its Education or Industries or Govt office everybody has their requirements to reduce the workload. Once the workload reduces, then efficiency level increases and better product can be made. Technology does the same thing it reduces the work without affecting its importance. It reduces it terms of man power, time and money. When people are free then can devote more time to improve the quality of work. Here again technology

requirement, person should be well be versed with requirement and also he needs to explain it why and when it has to be implemented?Communication should always be simple, straightforward and easy to understand. If you know the constraints and estimation then technology is updated as per the requirement. Clear explanations on complex topics to understand the benefit options and make the right decisions. It also explains how to put the knowledge into action. Focus on personal needs and working within company's brand. Attractive design, friendly, and engaging imagery for communication material. Use of all media to reach the targeted audiences.One of the basic example we can see that like Operating System (Microsoft Windows) different versions from Win3.1 to Windows10. Another example is Browser i.e. Internet Explorer to Netscape Navigator to Google Chrome to Torch and Many more with new facilities. The term facility is related to technology here. Everyday new technologies are developing and coming to the market for the ease of people. People use the software / material available in the market and from the feedback of users, developers update the software / material as per the need / demanded by the users. That's why we can see version of software like XYZ 1.0 then XYZ1.2 and so on. Updating a software or modifying versions are steps of System Development Life Cycle (SDLC) and Software Modelling. These are essential steps which are part of maintenance module. Benefits of this module is to get proper feedback and update as and when required. There is no additional cost to it. It takes time to update the technology but modified version is always considered as the best version from its previous version. This fact is not 100% correct, in some cases it has been seen that the previous version were much better than the new one. Here I am not mentioning any name but it was very case of one popular Operating System which was launched and failed to succeed due to its complex appearance. Then the software company designed that operating system again and launched, at that time it was a big boom in the market. Re-launching of that operating system with different name and updated version gave it a success in a big form. People accepted it with great respect because it was designed as per their requirement and need. Another case is one of the popular social networking website which was first launched before 2005 and it was big flop because another famous social networking site which was a part of famous search engine of that time. People doesn't like new social networking site at all because of its complicated steps in comparison to the existing site. They had around 200,000 accounts in two years which was a major loss for them whereas the competitive site had 2,50,00,000 accounts. Then the owner reorganized the team and updated the site with the help of public with survey, feedback, demand and many other ways and re-launched it in around 2007. This time it was a big boom and within six months they around 1,00,00,000 accounts. It was a major setback for existed popular siteand that site was shut down in next 2 years. Now a days this new launched site has 39% of world's population accounts on it which is appreciable. These two examples clearly mention that technology (Computing + Communication) always benefit the society. Global tools are always effective and able to explain each and every technology. The chart below explains it in a very simple manner.

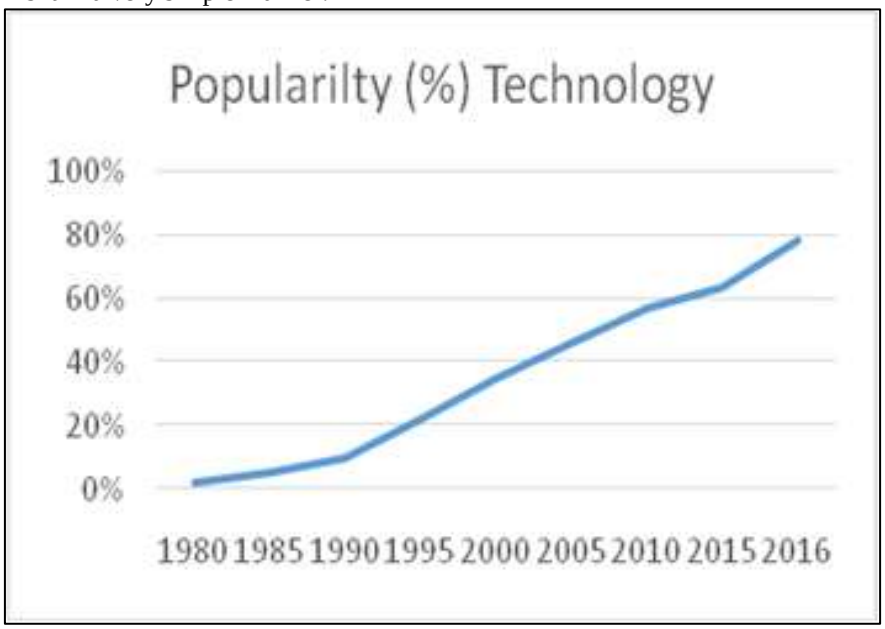

Fig. 8:

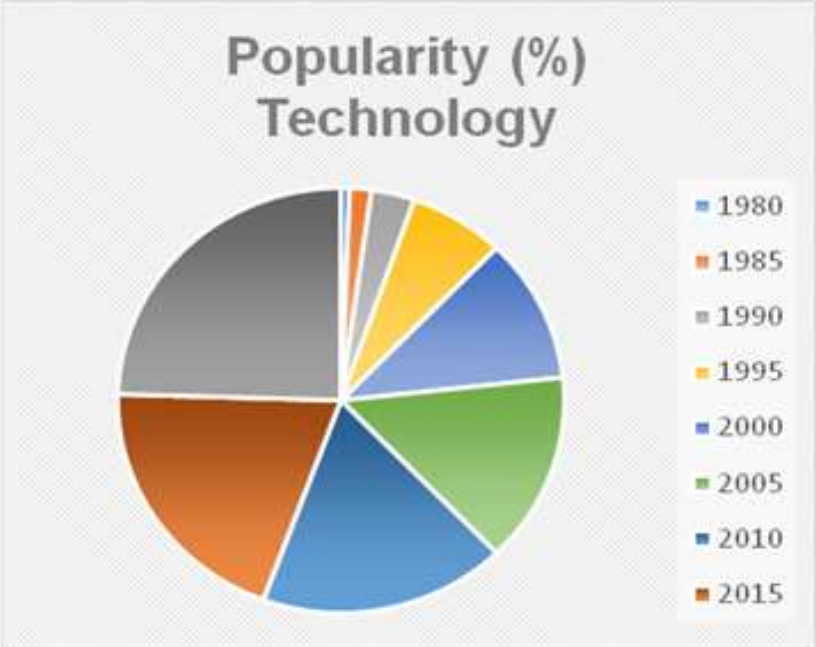

Fig. 9:

The first chart displays popularity (%) of technology year-wise. In this chart it is clearly seen that in the span of 36 years technology popularity is increased from 2% to 78%. The second chart display increment of popularity every five years. The pie chart is self-explanatory and it shows how popularity increased percentagewise in every five years. If in this rate technology will popular then by 2040 whole world will be almost 95% technology savvy.

IV. CONCLUSION

Computing and Communication both follows set of rules and these rules are termed as protocols. Protocols can be defined as a set of rules governing the format and meaning of frames, packets, or messages that are exchanged by peer entities within a layer. Protocol are used for communications between entities in a systems. Entities use protocols in order to implement their service definitions. The key elements of a protocol are:

Syntax: Include Time data formats and signal levels Semantics: Includes control information and error handling.The whole research article is presenting here that Computing and Communication are global tools which can explain technology. They are known as global tool because they are available at all places and need not require resources. They are robust in nature and develops technology itself. They learn from itself (self – evaluate) and modifies themselves. They are not dependent on language, land, region or any specific criteria. They just need correct information and channel to spread the techniques. It can conclude as an open ended discussion that we can't categorize or evaluate either Computing or Communication that which one is better for the technology upgrade. They are independent entities but extremely important factor for technology update.

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