

# Computer Technology in India

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## Introduction

Since its invention in 1948, electronic computers have changed the way world works. It is undoubtedly one of the top ten greatest inventions of mankind. Today we cannot even think to live without computers. Originally designed for defence purposes during World War II, the machine called computer has become an indispensable part of our daily lives, and its uses are almost beyond comprehension itself. Present day computers are used to work, to play, to have fun, to shop, to study, to talk, to date and to generally do anything one can think about. Computers have replaced human beings in so many fields that it is easy to list those tasks where it has failed to replace humans till date. Thankfully computers cannot replace humans in those fields where feelings, taste, experience, judgment and creativity are required. However efforts are on to add these attributes as well to computer.

## First computer in India

Even though the world got introduced to the computer technology in late forties, India bought its first computer in 1956 for a princely sum of Rs 10 lakh. It was called HEC-2M and was installed at Calcutta's Indian Statistical Institute. It was nothing more than a number crunching machine and was huge in size. The dimensions of this monster were 10 ft in length, 7 ft in breadth and 6 ft in height. It played a critical role in formulating annual and five-year plans by the planning commission, and in top-secret projects of India's nuclear program. Moreover, it went on to turn out India's first generation of computer professionals. It was at least ten thousand times slower in solving even simple problems than today's machines. But it set the stage for the development of computers in India.

The HEC-2M also played a pivotal role in the statistical data processing that formed the bedrock of the five-year plans. India's weather forecasting model, too, based on statistical analysis of meteorological data, was developed on it. Most importantly, the same machine was used to design the next generation of computers, including India's first indigenous computer, the 'TIFRAC' (or Tata Institute of Fundamental Research Automatic Computer), in 1962.

From that point in time, today India has come a long way. Today almost every office desk in India has a PC and government's computer policies shows its sincere efforts to reach out to every village in the country. For a nation like India which is geographically big and culturally and linguistically so varied, computer technology has proved to be a great tool of overall development. Successful efforts are made at government as well as non-government level to use this technology for the benefit of the Indian society.

## Supercomputers

Let us consider the field of supercomputers for instance. Supercomputers are used for highly calculation-intensive tasks such as problems involving quantum physics, weather forecasting, climate research, molecular modelling (computing the structures and properties of chemical compounds, biological macromolecules, polymers, and crystals), physical simulations (such as simulation of airplanes in wind tunnels, simulation of the detonation of nuclear weapons, and research into nuclear fusion).

### **India's First Supercomputer**

India's First Supercomputer was PARAM 8000. PARAM stood for Parallel Machine. This computer was developed by the government run Centre for Development of Advanced Computing (C-DAC) in 1991. The PARAM 8000 had a rating of 1 Gigaflop (billion floating point operations per second). All the chips and other elements that were used in making of PARAM were bought from the open domestic market. The major applications of PARAM Supercomputer are in long-range weather forecasting, remote sensing, drug design and molecular modelling.

### **India's current status in the field of supercomputers**

Today India is certainly giving the western countries a run for their money where supercomputing is concerned. India has been ranked number four in the world, in a global list of countries with the most powerful supercomputers. Only the US, China and Germany are ahead of India in the first, second and third slots.

Today the supercomputer facility at Computational Research Laboratories (CRL) has been ranked as the 4th fastest supercomputer in the world and fastest supercomputer in Asia. Called EKA (the Sanskrit name for number one), the supercomputer built at the CRL facility at Pune, India, marks a milestone in India's effort to build an indigenous high performance computing solution. In the supercomputer segment (The performance criteria is minimum of 1.71 TFlops) India can boast of fifteen such machines of which five systems are from Centre for Development of Advance Computing (CDAC), proving its status as a leading high performance computing centre in the nation.

Such computing facilities are essential for any country's growth in fields like defense, meteorology, remote sensing, statistical analysis etc. it offers a centralized facility for large computational requirement. Strategic analysis essential for the defense of the country is not possible without the help of supercomputers. Computers are very helpful to meteorologists because they provide images and maps which help in weather prediction. Computers also help meteorologists build numerical weather models that can predict future weather patterns. Computers take all the information from weather stations, satellites, and weather balloons and convert it into weather maps. Image analysis of the maps obtained from remote sensing requires very high computing capability. Supercomputers are also helpful for policy makers and statisticians who can get their enormous data analyzed to suit their requirements.

## **Computers and Indian society:**

Facilities like supercomputers are for the disposal of elite intellectuals like scientists, engineers and policy makers and makes indirect impact on the population in general. Indian society also in general has awakened to this computer revolution and technological advances are also being made taking into consideration the requirement of different segments of the Indian society.

## **The nature of Indian Society**

India is a developing nation which is geographically big and culturally and linguistically varied. Due to these characteristics it has its own difficulties. For a country with large population and scarce resources, computer technology comes as a great tool of social transformation. It has already revolutionalised the field of communication and in convergence with mobile and internet technology is changing the way India communicates.

## **E-governance**

E-Government (short for electronic government, also known as e-gov, digital government, online government or transformational government) is creating a comfortable, transparent, and cheap interaction between government and citizens. Computing technology today is recognized as an effective tool for catalyzing the economic activity in efficient governance and in developing human resource. As the era of Digital Economy evolves, the concept of good Governance assumes a greater significance. It is expected that in this context the Electronic Governance will result in improved transparency, speedy information dissemination, higher administrative efficiency and improved public services in sectors including transportation, education, power, health, water, security and the state administration and municipal services.

## **National e-Governance Plan**

The National e-Governance Plan of Indian Government seeks to lay the foundation and provide the impetus for long-term growth of e-Governance within the country. The plan seeks to create the right governance and institutional mechanisms, set up the core infrastructure and policies and implement a number of Mission Mode Projects at the centre, state and integrated service levels to create a citizen-centric and business-centric environment for governance.

Online Services under National e-Governance Plan covers Income Tax, Passport/VISA, Company Affairs, Central Excise, Pensions, Land Records, Road Transport, Property Registration, Agriculture, Municipalities, Gram Panchayats (Rural), Police, Employment Exchange, E-Courts, etc.

All this will make interaction between government and citizens much better and in turn will also eradicate menaces like corruption and red tape.

## **Development of multilingual software**

India is divided into states on the basis of language. Even though the Indian government works officially in English and Hindi, the language of administration differs from state to state. The Eighth Schedule to the Indian Constitution contains a list of 22 scheduled languages. Due to British rule, English is understood in all the states and is therefore works as a common thread of communication between all the states. Hence when computer was introduced in India, English became the language of communication with computer as well. But general public's inability to understand English became the biggest block in reaching out to masses.

An effort was required to customize this great machine for Indian languages. Many efforts were made at government as well as in private sector to achieve this. These organizations tried to put Indian Languages on the map of digital computing. A new field of Indian Language Technology got developed. New software and hardware technologies enriched this field.

CDAC developed a GIST technology which has to its credit several innovative products and cutting edge technology which have revolutionized computing and made GIST synonymous with Indian Language Computing. Its areas of Research are impressive and cover the full gamut of computing: Natural Language Processing tools (such as spell and grammar checkers, natural query), Search plug-ins, Semantic Web, Video Technologies, fonts technology, expert writing systems, image processing (Optical Character and Handwritten character Recognition), Speech Processing, Embedded and Mobile Computing to name only a few.

Today GIST technologies forms an integral part of mission critical activities of various organizations. Mindful of the social function of computing the GIST technologies also powers the National initiatives especially meant for masses in the areas of e-Governance, education, agriculture, health, banking and communication and so on.

### **Google's transliteration effort**

The latest to contribute to the development of software offering uniform platform to Indian languages is the software giant Google. Transliteration is the method to enable users to enter text in one of the supported languages using a roman keyboard. Users can type a word the way it sounds using Latin characters and transliteration script will convert the word to its native script. Till recently this service was offered online only ó means you need an internet connection for transliteration. Now Google has launched the new transliteration software ó "Google Transliteration IME" which enables offline transliteration also.

This is available today for 14 different Indian languages ó Arabic, Bengali, Farsi (Persian), Greek, Gujarati, Hindi, Kannada, Malayalam, Marathi, Nepali, Punjabi, Tamil, Telugu and Urdu.

### **Education**

By world standards, India is far behind in the field of literacy. In spite of consistent efforts from central and state governments, the literacy rate has not risen to

acceptable levels. There are many factors responsible for the same. Huge population and lack of good teachers to reach out to this population are two major factors in addition to scarcity of resources. Computing technology comes handy to solve such problems.

### **K-Yan: The Compact Media Centre**

New generation communication technologies allow creation of novel media products that can serve the community at large. Such products must be robust, and possess simple and universal interfaces. Prof Kirti Trivedi of IDC has developed K-Yan, such a compact media product for community use. It combines the functions of: a multimedia and internet enabled PC, large format television, DVD/VCD/CD player, CD writer, video-conference device, LCD data projector, and an audio system that facilitates shared viewing and participation by users. Launched in March 2004, K-Yan has been demonstrated to several Chief Ministers, and senior state and central government officials. K-Yan is easy to use, has multilingual facilities, and eliminates the need for investing in other media hardware. A single unit can cater to the teaching needs of an entire class, and substantially reduce the cost of computerizing schools. The integration of various functions not only allows students to learn how to use a computer, but also other subjects, and crafts. The product will also be useful in other group learning or information dissemination programs like healthcare, family planning, agricultural practices, and civic awareness drives.

K-Yan is equipped with extra solar energy-based portable power supply to enable use in areas with no electricity. Mounted on a van, it can also function as a mobile communication centre from remote locations. With an internet connection and a web-camera, it would allow low cost web-conferencing from any location making it useful in disaster management or project progress monitoring. The web-conferencing feature will also be useful in e-governance, as it will facilitate direct communication between various agencies and the administration. K-Yan has evoked enthusiastic response and is on the way to becoming a major commercial success.

### **Indians who made the difference**

Many individuals like Dr. Vijay Bhatkar and Dr. Ramani working in government organizations, and individuals like NR Narayana Murthy of Infosys, Azim Premji of Wipro and Atul Nishar of Aptech and Hexaware have put India at the forefront of computing revolution.

### **Indians on international computing scene**

International computing scene is also enriched by many Indians and persons of Indian origin. Former GM of Hewlett Packard Rajiv Gupta, founder and creator of worlds' No.1 web based email program Hotmail Sabeer Bhatia, Ex-president of AT & T-Bell Labs (AT & T-Bell Labs is the creator of program languages such as C, C++, Unix to name a few) Arun Netravalli, the new MTD (Microsoft Testing Director) of Windows 2000, responsible to iron out all initial problems, Sanjay Tejwrika, the creator of Pentium

chip (needs no introduction as 90% of the today's computers run on it), Vinod Dham are just a few names to prove this point. It is said that 34% of Microsoft employees are Indians, 28% of IBM employees are Indians, 17% of INTEL scientists are Indians, which shows Indian domination in international computing field.

### **Future in computing – An Indian's Sixth Sense**

A 28 year student of PhD student at MIT, Pranav Mistry, a person of Indian origin is the mastermind behind a revolutionary technology called "Sixth Sense". He invented "Sixth Sense / WUW ( Wear UR World)" which is a wearable gestural, user friendly interface which links the physical world around us with digital information and uses hand gestures to interact with them. The device sees what we see but it lets out information that we want to know while viewing the object. It can project information on any surface, be it a wall, table or any other object and uses hand / arm movements to help us interact with the projected information. The device brings us closer to reality and assists us in making right decisions by providing the relevant information, thereby, making the entire world a computer. Still more work is being done on the device and when fully developed, it will definitely revolutionize the world. Thus Indians all over the world have used the tool called computers not only to help the country to develop but also to change the way the world thinks.

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