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Obituary

S. Ramanathan

Fellow, CSI and Past Hon. Secretary (27th Jun 1951 – 24th Apr 2017)

Mr. Ramanathan, after his schooling from Kumbakonam, graduated in Chemistry from Vivekananda College, Chennai. He then did a course in Technology of Intermediates and Dyes from UDCT, Mumbai. After a short stint of employment, he joined the IIM Ahmedabad for his Post Graduate Diploma in Management (PGDM). He was also a certified Information Systems Auditor and Information Systems Security Professional.

He had over three decades of experience in manufacturing and information technology areas and had held profit centre head positions in the corporate world. A passionate academic, Mr. Ramanathan had been a visiting faculty in several prestigious management institutions including IIMs. He was running his own management consultancy firm advising firms in technology absorption and information security issues. He was a good communicator and writer and has written numerous articles in various journals including CSI Communications. He has also authored a book on "Software Project Management" which was launched at the CSI Chennai during Jun 2016.

During his three decades of association with CSI, he had held several positions including the Chairman at CSI Chennai and Hony. Secretary at the national level. He had played active role in organizing annual conventions, international and other conferences. He was also actively associated with Education Directorate in designing courses and conduct of examinations In recognition of his services, CSI has conferred fellowship on him during the Golden Jubilee Year Convention CSI-2014 at Hyderabad.

His sudden demise is a great loss to CSI and IT community. He leaves behind his wife and two daughters and grandchildren. CSI records its deep condolences and prays HIS ALMIGHTY to bless his soul to rest in peace and provide enough strength to his family members to bear this irrecoverable loss.

- an individual.
- 2 are friends.
- 3 is company.
- more than 3 makes a society. The arrangement of these elements makes the letter 'C' connoting 'Computer Society of India'.
- the space inside the letter 'C' connotes an arrow - the feeding-in of information or receiving information from a computer.

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Editorial

Dear Fellow CSI Members,

"Nanotechnology-based quantum computers would revolutionize computing and increase their computing power tremendously..."

– Bharat Ratna, Prof. C N R Rao

Prof. (Dr.) S. S. Agrawal
Chief Editor

Prof. Prashant R. Nair
Editor

The theme for the Computer Society of India (CSI) Communications (The Knowledge Digest for IT Community) May, 2017 issue is Nanocomputing. Computing at the nanoscale is poised to revolutionize computing and CSI is leading the way to showcase the advancements and research in this front. Nanocomputing will help technologists to meet the quest to pack power of computing into the smallest possible device without compromising on speed or accuracy.

In this issue, Cover Story article is " Perception on Nanocomputing and its application " by B Vandana, J K Das, S K Mohapatra and T M Behera. The authors have traced the evolution of various concepts as also the future direction of the technology.

In Research front, we have showcased two contributions. The first contribution is titled, "ROI Selection for medical image watermarking" by Chandrakant P. Pawar and Baisa L. Gunjal. Here, a novel technique to select ROI (Region of interest), an actual sensitive area of medical image processing is proposed. The second contribution is titled, "Big Data-based In-Memory Data Grid (IMDG) Technologies: challenges of implementation by analytics tools" by Abdo H Guroob and Manjaiah D.H. Here, the challenges and benefits of using the In-memory data grid for big data implementation and application is discussed.

Our regular contributors, KVN Rajesh and KVN Ramesh have contributed to Technical Trends through the article, "Artificial Intelligence – Fact or Fiction ", which provides a lucid narration on the evolution and status quo of this technology. Other Technical trends highlighted in this issue is "Developing Solutions with Big Data Technology" by Hardik Gohel and Himanshu Upadhyay and "Big Data Analytics meets Blockchain" by Anupam Tiwari

The Security Corner has Shilpi Charu and Santosh Kumar Gupta giving us new insights on the Importance of Secure Coding in Making "Digital India" Successful and Nilesh Advani asking a very pertinent question, "Is Internet Really Private ???"

Other nanocomputing articles provide us information on nanocomputing trends and applications. The contributors are Simran, and Richa Singh & Rakesh Ranjan

This issue also contains Crossword, CSI activity reports from chapters, student branches and Calendar of events. Major CSI event reports of participation in 'Global Exhibition on Services 2017' are also highlighted.

Two CSI veterans have left this earthly abode. We pay tribute to Mr. S. Ramanathan, Past Secretary & Fellow and Maj. Gen. (Dr.) R K Bagga, past Chairman of Special Interest group on eGovernance and Fellow.

Dr. V Rajaraman, a Bhishmacharya of Computer Science in India has contributed a touching tribute to Prof. Harry Huskey, a computing pioneer and founding father & Honorary Fellow of CSI. A Professor of Computer Science from Berkeley, on sabbatical to IIT Kanpur, he organized the first International Conference on Computing in India and it was at the end of this meeting, that a decision was taken to form our society, Computer Society of India

We are thankful to entire ExecCom for their continuous support in bringing this issue successfully.

We wish to express our sincere gratitude to all authors and reviewers for their contributions and support to this issue.

We would like to place our appreciation to the past editorial team of CSI Communications for their outstanding contributions. After a successful stint of 2 years as Chief Editor, Prof. A.K. Nayak will continue to mentor us in his new role as CSIC Publisher. We thank the past editors, Dr. Vipin Tyagi and Dr. Durgesh Mishra as well.

We look forward to receive constructive feedback and suggestions from our esteemed members and readers at csic@csi-india.org.

With kind regards,

Editorial Team, CSI Communications

President's Message

01 May, 2017

Season's Greetings!

I start this message with a heavy heart as we lost our Past Hon Secretary & Fellow Mr. S Ramanathan on the evening of 24th April 2017. Sri Ramanathan's loss will be deeply mourned by all who knew him. His leadership and his accomplishments in CSI will be remembered for long for which he worked so hard. All our members will remember the free and fair election that we had in March 2017 and Mr. Ramanathan played a crucial role in cleaning the database of our members, which was long overdue. I have seen him working very closely as Hony. Secretary during 2014-16 and as Chairman of Database Cleaning Committee in Feb-March this year. As he breathed his last in Bangalore, our Immediate Past President Dr. Anirban Basu rushed to offer our heartfelt condolences to his near and dear ones.

I want to appraise our Members of that, Hony. Fellow and one of the pioneers in the field of computers, Prof. Harry Douglas Huskey passed away on April 9, 2017 in California. Huskey's work spanned all that an academician, an engineer and a scientist can aspire for: from building innovative hardware, novel software, to educating computer scientists. With his demise CSI has lost a close friend and a well wisher.

We pray for the departed souls.

Our focus has been on providing opportunities to our student members. My request to all educational institutions who are shaping the future of India, is to involve more and more students in CSI activities and organize more number of events for the students.

CSI will continue to meet the expectations of our stakeholders by improving sustainability and on increasing our corporate value. We are working on increasing the number of activities at Chapter level, Regional Level & National level. We are working on increasing our membership and supporting different research related activities etc..

The strength of any society is its members. My sincere appeal to each one of you is to help the society in its expansion by increasing its membership base. I would like to request all RVPs, Divisional chairpersons to connect to members, Chapters, Student branches of their regions and provide all possible support in organising events.

We are revamping CSI Publications. Editorial Boards of the CSI publications are being recast. We are going to regularize publication of CSI's Journal of Computing and CSI Adhyayan from May/June 2017. We have received encouraging response to our call for Student Coordinators and the selection will be made soon.

The efforts of our IPP Dr. Anirban Basu to increase global presence are bearing fruits. We are in the process of signing an MOU with Myanmar Computer Professionals Association. He also participated in several CSI events and inaugurated CSI Student Branches in institutions. Thanks to our persistent efforts led by IPP, CSI has become Registered Education Provider of PMI (Project Management Institute). CSI Chapters are urged to offer PMP courses in their chapters.

SIG Big Data Analytics has launched its first volume of its news letter "Vishleshana" (link www.csi-sig-bda.org) . Thanks to **Chief Editor and Publisher** Chandra Sekhar Dasaka, **Editor** Vishnu S. Pendyala and **Editorial Committee** B.L.S. Prakasa Rao, S.B. Rao, Krishna Kumar**,** Shankar Khambhampati and Saumyadipta Pyne for contributing a lot for publication of "Vishleshana".

CSI Hon. Secretary & Fellow Dr. A K Nayak graced GES Ribbon Cutting & Special Plenary Session at India Expo Centre & Mart, Greater Noida, India and inaugurated CSI Stall at All India ExpoCenter and Mart at Greater Noida. Prof. Nayak also organised a Networking meeting of NCR Chapter MC's and Fellows at IIC on 16th April 2017. Brig. SVS Choudhury presided over the Networking meeting at IIC, New Delhi and a number of our members participated the event.

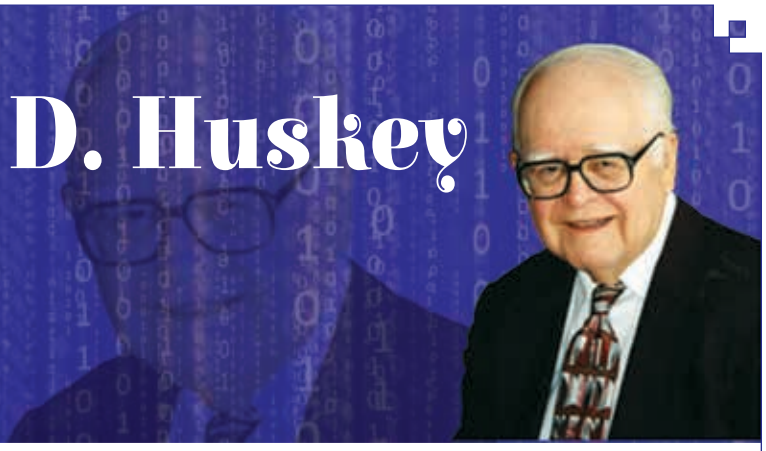
For feedback & suggestions please write to - president@csi-india.org.

With kind regards

Sanjay Mohapatra
President, CSI

Sanjay Mohapatra, Bhubaneswar, president@csi-india.org

Prof. Harry D. Huskey - A Tribute



Dr. V. Rajaraman

Professor Harry D. Huskey

Professor Harry D Huskey, an Honorary Fellow of the Computer Society of India, passed away on April 9, 2017, at the age of 101 at Santa Cruz, California. I came to know him in 1963 when he was visiting IIT, Kanpur. At that time, he was a Professor of Electrical Engineering at the University of California at Berkeley. Kanpur Indo-American Programme (a contractor of the United States Agency for International Development - USAID) that had the task of assisting India to set up an Institute of Technology at Kanpur requested Professor Huskey to lead a team to establish a computer centre at IIT/Kanpur. He along with Professors Forman Acton and Irving Rabinowitz of Princeton University formed the team. USAID bought an IBM 1620, a transistorised computer that was popular in U.S. educational institutions, to be installed at IIT/Kanpur. In August 1963, the IBM 1620 arrived on campus and was very quickly installed by IBM engineers and the computer started running. Professor Huskey and his team installed the system and applications software, including FORGO a load and go version of FORTRAN II compiler that had been developed at the University of Wisconsin at Madison, U.S.A.

Professor Harry Huskey was a pioneer in computing. He was earlier a member of the ENIAC team that built one of the first computers in the World. He had also worked with Alan Turing at the National Physical Laboratory in U.K. in building the ACE computer. Besides these he designed and built one of the first computers with a magnetic drum, Bendix G15 (See Wikipedia). He was a versatile computer scientist who had the breadth of knowledge, not only to build computers but also to develop complex systems software. He designed a version of Algol called NELIAC (Naval Electronics Laboratory version of the International Algorithmic Language) while at Berkeley (See Wikipedia). His PhD student Nicklaus Wirth who worked on compilers for his doctoral work later on designed Pascal. Professor Huskey was one of the early Presidents of ACM, U.S.A. and a Fellow of ACM.

IBM 1620 was the first computer in an educational institution in India and also the first computer with a high-level programming language, FORGO. Professor Huskey as the leader of the American group designed what he called the "Ten-day intensive course on Computation", intended for the faculty of IIT and also scientists and engineers from other Universities and research establishments in India. The course consisted of Programming using FORGO, basic numerical methods, and computer logic. An important part of the course was a three hours laboratory session in which all the participants of the course wrote and executed programs they wrote using FORGO. During his stay at Kanpur the course was given four times, once every three months. There were about 50 participants in each course. The course was very popular and after he left, the faculty at IIT, Kanpur, whom he had trained continued giving the course. This course was instrumental in rapidly spreading computer education in India. He also initiated the formation of IBM users' group with representatives of all IBM computers that were then in India, most of them IBM 1401s. The first meeting was held at the IBM education centre at Faridabad. This meeting was the forerunner of the formation of the Computer Society of India. In early 1964 he organized the first International Conference on Computing to be held in India at IIT, Kanpur. It was at the end of this meeting, that a decision was taken to form the Computer Society of India (See CSI Communications, Volume 38, September 2014, page 8). Professor Harry Huskey had a missionary zeal to spread computer education throughout the developing world. He spent a year in Burma (now Myanmar) in the late 60s and visited India again to assist Delhi University to set up their Computer Centre (Delhi University had bought an IBM 1620) in the seventies. He also assisted an African country to set up a computer centre.

He invited me to come to the University of California in Berkeley and I spent 1965-66 as a Visiting Assistant Professor in the Electrical Engineering department. It was there that I came to know him and his family better. He was a great teacher and I attended many of his lectures and learnt a lot from him. He left Berkeley to set up a new (now excellent) Department of Computer Science at the University of California at Santa Cruz. He retired, when he was 80 and was very active even after retirement.

In his passing away our profession has lost a pioneer and the Computer Society of India one of its best friends.

Obituary

Maj. Gen. (Dr.) R K Bagga

AVSM (Retd)

Fellow, CSI, Past Chairman of Special Interest group on eGovernance – Head, Research Center for eGovernance (RCeG), IIIT Hyderabad

Maj. Gen. (Dr) R K Bagga, Fellow of Computer Society of India and past Chairman of Special Interest group on eGovernance, passed away on 23rd March 2017 in Hyderabad at the age of 79.

Gen Bagga has over Four decades of service in Army (EME), including distinguished stint with DRDL, a DRDO lab, where he spearheaded Computer activities in the Integrated Guided Missile Development Programme (IGMDP).

A recipient of Ati Vishisht Seva Medal (AVSM) for distinguished service of exceptional order in providing computing facilities and for software development, Gen Bagga has played key role in several defence sector initiatives.

He has contributed significantly to activities of Computer Society of India both at local (Hyderabad) level and at National level, over the years. As Convener of the CSI-SIGeGov group he spearheaded promotion of CSI Nihilent eGovernance awards, successfully.

A dedicated Computer Professional, he was Chairman of India Council of IEEE 1997 & 98. He was also a Fellow of Institution of Electronics and Telecommunication Engineers (India) and Institution of Engineers (India).

Dr Bagga was associated with IIIT, Hyderabad since 2004 as part of their 'Outreach Division' and later with the the 'Research Centre for eGovernance (RCeG)'. Earlier (1998-2003) he worked at Administrative Staff College of India (ASCI) as CMC Chair and Professor. Apart from serving as a Consultant / Advisor to a number of leading Software Companies, he was on Advisory Board for several educational institutions in and around Hyderabad.

Dr Bagga is survived by his wife Veena Bagga and, two well settled sons Samir and Amit.

CSI and members of CSI-SIGeGov deeply mourns his demise and conveys condolence to the bereaved members of his family and friends.

May his soul rest in peace.

CSI Participates in 'Global Exhibition on Services 2017'

CSI participated in '**Global Exhibition on Services**' (GES) organized by CII during 17th – 20th April 2017 at India Expo Mart, Greater Noida. CSI was a partner association in this year's edition of GES (http://www.gesdelhi.in). GES-2017 was a global platform for increasing trade in services, enhancing strategic cooperation and strengthening multilateral relationships between all stakeholders. It is a platform for service sector Industry to Interface with world statesmen, business leaders, academia, policy makers and media leaders. Exhibition was inaugurated by President Mr. Pranab Mukherjee at Rashtrapati Bhavan and Smt Nirmala Sitharaman, MoS (I/C) for Commerce & Industry. CSI's participation in GES was managed by all NCR chapters led by Ghaziabad chapter. Hony Secretary Prof. A K Nayak inaugurated CSI's booth at the exhibition along with, Mr. Saurabh Agrawal, Past RSC-1 & office bearers of Ghaziabad chapter were also present.

Testimonials to Mr. S Ramanathan

- *Ramanathan was at the prime of his life at the time of his sad passing away. As an IIM Ahmedabad graduate, he brought a critical mind to everything. He was one of the best IT Managers that I had come across. He was a great example of someone who, being an excellent technologist provided the bridge to management as they transformed the company through automation. With his expertise in Computers and management of computerisation, with his active involvement in CSI in its activities in Chapters and at the National Level and with his ability to work in teams to collectively achieve what would be impossible individually, he was what I would term a complete professional.* **– S. Mahalingam, CSI Fellow & PP.**
- *I am deeply saddened to hear the news. I remember him from our school days. Helped me a lot during my Presidency. Great guy. RIP.* – **Prof. S V Raghavan, CSI Fellow & PP.**
- *I worked very closely with Shri. Ramanathan, during database cleaning in Feb 2017 and interacted on a daily basis for CSI activities. Shri Ramanathan's dedication for growth of CSI is a mile stone and a good heart has stopped beating, a good soul ascended to heaven. Sri Ramanathan was truly a blessing for growth of CSI and I will miss him.* – **Sanjay Mohapatra, CSI President.**
- *He had countless contribution towards the growth of CSI. Recently he contributed significantly as the Chairman of Data base cleaning Committee for making our election system transparent. CSI has lost a very dynamic, dedicated, devotional and determined personality for ever.* – **Prof. A K Nayak, CSI Fellow & Hony. Secretary.**
- *How shocking. Difficult to believe. Never expected to lose him at this age. Interacted with him closely during CSI elections in Feb-March. I visited Mr Ramanathan's house in Bangalore and met his relatives and on behalf of CSI have conveyed our deep condolences.* – **Dr. Anirban Basu, Immd. Past President.**
- *Mr. Ramanathan was known to me from mid 1980s. We were together at the CSI Chennai along with Mr Mahalingam. From the end user IT, he moved to IT & Management Consulting. He is a go-getter, team player, good speaker and teacher. His contributions to CSI at Chennai chapter and at the national level as RVP-7 and Secretary are commendable. His demise is a loss to CSI & IT fraternity.* – **H. R. Mohan, CSI Fellow & PP.**
- *He had lot of clarity of thoughts and he was progressive.* – **Gautam Mahapatra, CSI Vice President & President Elect.**
- *A straight forward, fearless and a noble person. An expert in IT and auditing. He used to speak with authority. CSI fraternity has lost a true champion of IT and a worthy Fellow* – **Dr. D D Sarma, CSI Fellow & LTAA**
- *I had the opportunity and privilege of knowing him personally during eighties and was highly impressed with as well as benefitted from his depth and breadth of knowledge in IT. he popularized enterprise wide, integrated software development and implementations. He had a truly charming personality.* – **Sib Daspal, CSI Fellow.**
- *Whatever little interaction I had with him, I remember his sincerity and commitment.* – **Anil Srivastava, CSI Fellow.**
- *I had privilege to work with him as our Hon. Secretary, most committed and technically sound person, highly respectable in CSI fraternity and in education circle. His death us great loss to CSI.* – **M. D. Agrawal, CSI fellow & Past President.**
- *I had many interactions with him, and I found him to totally open for other's views.* – **D.B.V. Sarma, CSI Fellow.**
- *I have been talking to him on our database problems over the last one year and more recently at Coimbatore and Bangalore; I can not believe he is no more.* – **Lalit Sawhney, CSI Fellow & Past President.**
- *It is real shoking to learn about the news of sad demise of our very close friend. It is a big loss to his family, his friends & CSI community.* – **Rattan Datta, CSI Fellow, PP & LTAA.**
- *I am very sad to learn about sudden passing away of Mr S Ramanathan, a very sincere and hardworking professional. I had interacted with him during my posting at CMC Chennai.* – **Prof. (Dr.) M L Goyal, CSI Fellow, Past President & LTAA.**
- *He was one of the assets in CSI. I met him several times and discussed about CSI. Only a few days ago, I spoke to him on CSI Constitution and CSI Election. His contribution to CSI will be remembered for a long time.* – **Subimal Kundu, CSI Fellow.**
- *I had known him for long and he was a learned man. He had firm conviction and stood by that always. His interaction during CSI-2016 and later to build CSI better is very vivid in my mind.* – **P R Rangaswami, CSI Fellow.**
- *Popularly known as Ram, always found him jovial and supportive to all including CSI members and staff. His untimely demise is a great loss to CSI and academic community.* – **Bipin V Mehta, CSI Fellow & Past President.**
- *I had known him for more than 15 years and worked with him in CSI execcom for four years. He had excellent technical, managerial and oratory skills that was ever evident to anyone even in a brief interaction with.* – **H. R. Vishwakarma, CSI Fellow.**
- *I have known him for about 15 years. We have worked*

together and interacted in the EXECOM. He has contributed a great deal to CSI. He was friendly, hardworking and committed. Also, very knowledgeable, especially in Management Sciences in which he has written a book. His passing away is a great loss to CSI. – **Swarnalatha Rao, CSI Fellow.**

- *It is shocking. I cannot believe this and I wish his is not true. What a loss to computing community?* – **S. Srinivasan, CSI Fellow.**
- *One can even go through his emails now, over the past few years, to know his concerns and position on the recent happenings in and around CSI. He was critical on many occasions, but at the same time he could rise to the occasions wherever and whenever CSI was in crisis. His presence was felt and voices were heard in all Conventions, particularly in recent times. We will miss him.* – **Devaprasanna Sinha, CSI Fellow & RVP-2**
- *Too difficult to digest. Still cannot believe. I recollect our association over so many years. Never in my wildest dream. I thought he'd pass away so soon.* **– Latha Ramesh, Past Chair, CSI Chennai.**
- *It is a very shocking news ; it is a great loss to CSI. It is a personal loss to me as well* – **T. R. Vasudeva rao, Chairman, CSI Chennai**
- *A good person. Very sharp mind. Practical experience in IT management and implementation. Theoretical knowledge too. Sense of humor. Too young to go. Big loss to CSI.* – **Anantha Padmanabhan, CSI Chennai**
- *Shocking. He has been one of my good friends since the Indolan 1990 days. We remained good friends with independent views on certain aspects. I am sure we will keep seeing him through his book that reflects his academic thoughts.* – **Dr. T V Gopal, CSI Chennai.**
- *I had met him on a few occasions during my tenure as Director in CSI, Chennai. It is a bit too early that nature has suddenly recalled him back, which is a great loss to the computer fraternity and CSI* — **Dr. S. Sudharssanam, Past CSI ED.**
- *Horrific News, received with shock and Disbelief! .....he was dynamic, cheerful, witty, vivacious, scintillating.* – **Ramesh Narasimhan, CSI Chennai.**

CSI Adhyayan

a tri-monthly publication for students

Articles are invited for first issue of CSI Adhyayan 2017 from student members authored as original text. Plagiarism is strictly prohibited. Besides, the other contents of the magazine shall be Cross word, Brain Teaser, Programming Tips, News Items related to IT etc. Please note that CSI Adhyayan is a magazine for student members at large and not a research journal for publishing full-fledged research papers. Therefore, we expect articles should be written for the Bachelor and Master level students of Computer Science and IT and other related areas. Include a brief biography of Four to Five lines, indicating CSI Membership no., and for each author a high resolution photograph.

Please send your article to csi.adhyayan@csi-india.org.

On behalf of CSI Publication Committee

Perception on Nano Computing and its Application

B Vandana, J K Das, S K Mohapatra & T M Behera
School of Electronics Engineering, KIIT University, Bhubaneswar, Odisha.

With the ease of technology, when materials tuning done towards the atomic scale, the properties differ significantly from those at a larger scale. The technology of small scale (in the range of nano meter) know as Nanotechnology proposed by physicist Richard Feynman over a talk entitled "There's Plenty of Room at the Bottom". Computing includes designing, developing, processing, doing scientific research on and with computers in a systematic manner on an emerging issue and providing valuable solutions. So, it can be infered that Nano computing is the use of technology on an extremely small, especially ranging from 0.1 to 100 nm for application towards Internet of Things (IoT).

It is important to study the Nano-electronic devices and their fabrication, architecture and their inherent electrical properties, which helps the integrated circuits (ICs) industry to determine very small electronic circuit application suitable for Nano computing.

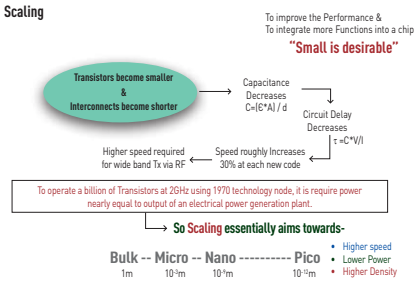


Fig. 1 : Small is desirable achieved by Scaling.

The art of making small or reduction in scale (Scaling shown in Fig. 1), as per observed and predicted by Gordon E. Moore, co-founder of the Intel Corporation has been a constant challenge to improve the performance and complexity of the device. With the continuous innovations in the fabrication process, the semiconductor foundries (like Intel, ST Microelectronics, Global Foundries, SMIC, CEA-Leti etc.) have put a step ahead from bulk to Micro and proceeded to Nano electronics to fulfill the desired products as given an example in Fig. 2.

Fig. 2 : Product based on Nano electronics.

The outcome of Nano computing provides smaller manufacturing, faster and more reliable as compared to micro technology in Fig. 3 and further exposed it to Nano-Electronics Mechanical Systems (NEMS).

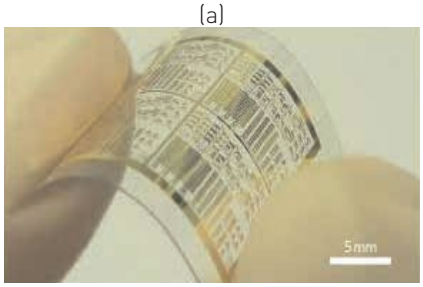
Fig. 3 : Nanotechnology in computers, manufacturing a smaller, faster and a more reliable computer [1].

Semiconductor devices like CMOS structure are scaled within the nanometer range, Due to its fast switching operation, fewer electrons are available to create the large voltage swings. The research and development on nano-devices aimed at learning the physical properties of very small structures determining how these can be used and perform on a computing platform [3]. Semiconductor quantum dots, single electron structures are an important area to be investigated for the nano-computing applications [4].

In 2000's the IC industries begin with the commercial development and manufacture of electronic devices, and else reserved a tag for the devices with feature size less than 50 nm to even the size of individual molecules. The IC industry, determine the smallest electronic devices within the limits of computing technology. By reducing the diameter of the nanowires, researchers believe memristor memory chips can achieve higher memory density than flash memory chips. Magnetic nanowire is an alloy of iron and nickel used to create dense memory devices [2]. The devices are connected using One potential architecture cellular neural networks (CNN) to neighbors. The extension of the CNN concept is that of quantum-dot cellular automata (QCA) is implemented in the course of nano computing. This architecture is the arrangements of single electrons over large arrays, which communicate with each other by Coulomb repulsion. The crossbar switching architecture is the alternative, which provides computing functionality where molecules make coupling between wires.

The critical investigation is required during the prefabrication process of ICs as the Atomic resolution can be achieved by a process called scanning probe lithography, which is time-consuming and costly. Shortly the silicon transistors used in computers are replaced by carbon nanotube with 5 mm thickness in which billions of transistors are incorporated into a thin film Fig. 3 (a). Before the micro world, the size of the transistor was in few micrometer which makes circuit complexity Fig. 3 (b), therefore a rapid improvement in technology was undertaken by semiconductors industries and came up with the exposer of the nanoworld.

(a)



(b)

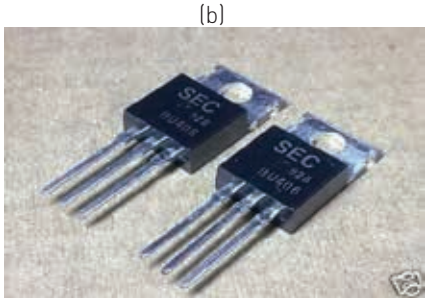


Fig. 3 : (a) The silicon transistors in your computer may be replaced in ten years by transistors based on carbon nanotubes, (b) In 1990 the basic transistor's used to incorporate on a PCB [1]

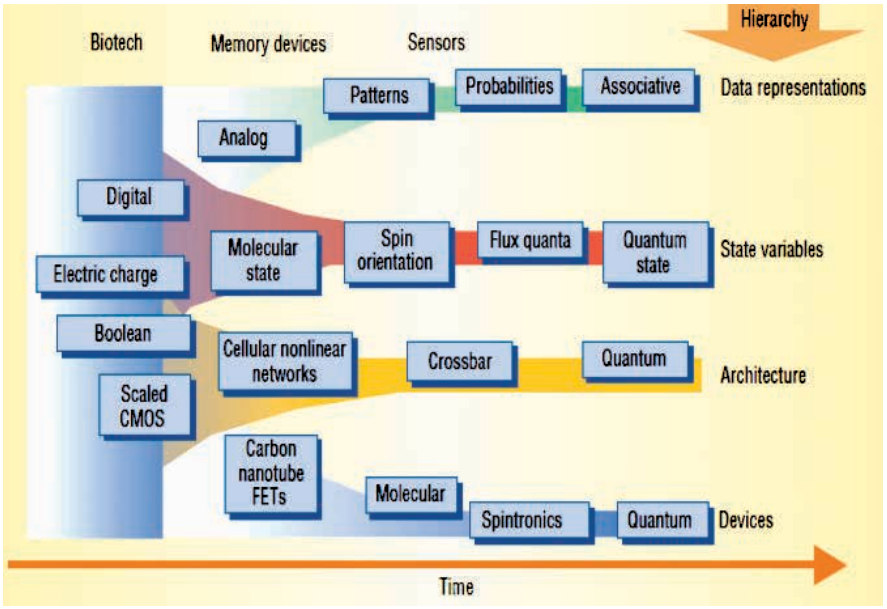


Fig. 4 : The taxonomy consists of a four-level hierarchy with several prototypical devices [6].

Nano computing and Future

The semiconductor research organization has spread a vast research development using existing devices and need to provide a growing field to other organizations. The working groups came up with the proposal of hierarchy consisting of four levels shown in Fig. 4 electronic devices, their structural dimensions representation, state variables, and data representations. These categories cultivate its position in emerging the alternative technologies. The electronic devices include carbon nanotubes, silicon nanowires, and other novel devices; the structural design includes the 3D representation using dimensions within the nanoscale regime like 3D heterogeneous integration, quantum cellular automates, defect-tolerant architecture, phase logic and quantum computing [6].

The idea is that there are numerous ways to store computational information or state to manipulate and store it. The earliest example of a finite-state storage device was the abacus, which represents numerical data by the position of beads on a string. This includes the molecular state, spin orientation, electric dipole orientation, photon intensity or polarization, quantum state, phase state, and mechanical state. The concept of alternative state variables is a generalization of this concept that can be applied effectively to feature recognition, hierarchical data reductions, etc.. As such, it constitutes the fourth and most abstract category in the proposed Nano computing taxonomy [6].

Advantages

- Reduced energy use
- Better medical treatment
- Lower costs for computing
- Less pollution
- Low production cost
- Mass production of food & consumables
- Technology itself
- War
- Electricity

Disadvantages

- Environmental risks
- Privacy risks
- Health
- Mass production
- War

Implications of Nanotechnology

Health and safety issues

- Nanoparticles can cause serious illness or damage the human body.
- Untraceable destructive weapons of mass destruction

Environmental issues

- Nanopollution is created by toxic wastes from nanomaterial manufacturing
- Enhances Global warming in the long run

"Grey-goo"

It is a hypothetical situation where self-replicating nanobots go out of control, and consume all matter on earth.

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Prospective Contributors of CSI Communications

Please note that Cover Theme for **June 2017 issue is ICT in Education**. Articles may be submitted in the categories such as: Cover Story, Research Front, Technical Trends, Security Corner and Article. Please send your contributions by 20th May, 2017.

The articles should be authored in as original text. Plagiarism is strictly prohibited.

Please note that CSI Communications is a magazine for members at large and not a research journal for publishing full-fledged research papers. Therefore, we expect articles written at the level of general audience of varied member categories. Equations and mathematical expressions within articles are not recommended and, if absolutely necessary, should be minimum. Include a brief biography of four to six lines, indicating CSI Membership no., for each author with high resolution author photograph.

Please send your article in MS-Word format to to Editor, **Prof. Prashant R. Nair** in the email ids **csic@csi-india.org** with cc to **prashant@amrita.edu**

(Issued on the behalf of Editorial Board CSI Communications)

Dr. S S Agrawal
Chief Editor

Artificial Intelligence – Fact or Fiction

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Artificial Intelligence (AI in short) has long fascinated humans and is a recurring theme in fiction novels and movies. Many Hollywood movies like Terminator Series, Transformers Series, Matrix Series, Chappie, Transcendence and Stealth have Intelligent Machines and AI as a central theme of their plot.

Now-a-days, there is a lot of buzz about AI. Some of the AI related news which were seen in recent times are:

- AI and robots threaten to unleash mass unemployment, scientists warn (News article in Financial Times dated 14-Feb-2016)
- AlphaGo beats human Go champ in milestone for artificial intelligence (News article in Los Angeles Times dated 12-Mar-2016)
- Microsoft takes artificial intelligence bot 'Tay' offline after racist tweets (News article in Times of India dated 25-Mar-2016)
- IBM Researcher: Fears Over Artificial Intelligence Are 'Overblown (News article in Time dated 12-May-2016)

This is just a small grab of news about AI that we are seeing lately. It can be seen that the news related to AI, range from the heights of optimism to the depths of pessimism. Fears range from 'huge jobs losses due to AI' to 'AI going out of control'. Whether we like it or not, AI has already started getting used in many aspects of technology than we actually know. Its usage is going to increase exponentially in the years to come. All top technology companies like IBM, Google, Microsoft, Apple and Facebook are embracing AI in a big way. This paper discusses various aspects related to AI in detail.

Scope of AI

AI is an interdisciplinary field involving various areas like computer science, mathematics, statistics, linguistics and neuroscience.

Artificial Intelligence as a term was first coined in the Dartmouth Conference of 1956 by John McCarthy. This conference was held at Dartmouth College in Hanover, New Hampshire, United States. This was held as a summer research project based on a proposal authored by John McCarthy along with other AI and computer science pioneers like Marvin L. Minsky, Nathaniel Rochester and Claude E. Shannon.

AI is a field of study involved in development of systems, methods, software and machines that are capable of intelligent behavior like those which are exhibited by humans and animals with an ability to perceive, reason and act. The goals of AI include automating intelligent behavior and solving complex problems.

Some of the terms which are frequently heard in context of AI are Machine Learning, Natural Language Processing, Artificial Neural Networks, Cognitive Science, Fuzzy Logic and Bayesian networks.

Machine Learning is a field related to AI which involves study and creation of methods and algorithms which have the ability to learn from data and get better in providing insights and in making decisions, without being explicitly programmed. Predictive/Supervised learning and Descriptive/Unsupervised learning are two main types of machine learning. In predictive or supervised learning, a set of training examples are provided. In descriptive or unsupervised learning, only inputs are provided with a goal to find interesting patterns in it based on statistical methods.

Natural Language Processing (NLP) is field of AI related to methods, systems and software to process, understand, use and interact in natural human languages such as English. Machine translation from one language to another, was one of the first explored problems of NLP. Areas such as Optical character recognition and Speech recognition are some of the real world applications of NLP.

Artificial Neural Networks (ANN) are a set of computational models and computer programs (for processing information) that are inspired by and modeled similar to human brains and biological neural networks, by the way of interconnected processing elements/ artificial neurons. ANN has found applications in complex areas such as Cancer diagnosis and detection.

Cognitive science is study of cognition in intelligent beings like humans and other animals. Cognition includes the process of perception, acquisition of knowledge, understanding, thinking and learning. It is interdisciplinary area which involves areas such as Linguistics, Neuroscience, Computer Science and Psychology. Developing intelligent devices and systems based on the knowledge of cognition in intelligent beings, is one of the goals of Cognitive science.

Computers use Boolean logic to perform their functions, but the real world is not as simple as black and white. It has many shades of gray. Fuzzy Logic is the computational approach based on multi-valued logic and allows for intermediate values between 0 and 1. Fuzzy logic finds great application in control systems. Many home appliances from rice cookers to washing machines using Fuzzy Logic, are available. Japan is a pioneer in creating applications which use Fuzzy logic.

Bayesian networks also known as Bayes networks, Belief networks, Causal networks are graphical models which are a representation of a joint probability distribution of a set of random variables of interest and their conditional dependencies. Bayesian networks are used for reasoning under uncertainty and in very complex decision scenarios.

Topics such as Heuristic search, k-means clustering, A* search algorithm, will interest those who study

and work in AI.

Pioneers and Awards in AI

One way to study and understand a subject is to study about pioneers and highly awarded people and their contributions. A number of awards are constituted to recognize the individuals who make major and highly impactful contributions in AI. The A.M.Turing award is the topmost award in computer science and is being given annually by Association of Computer Machinery (ACM) since 1966. It is considered equivalent to Nobel Prize in the field of computing. This award is named after Alan Mathison Turing who himself is considered as the father of theoretical computer science and AI. The very famous Turing test was proposed by Turing in his paper titled Computing Machinery & Intelligence in Oct-1950 in British academic journal named Mind. This is considered to be one of the first papers on AI. Turing test was designed to test if a machine is able to exhibit intelligent behavior or not. It is done by comparing its performance against human. Conversations are made with a computer and a human simultaneously. If the responses of the computer are indistinguishable from that of the human, then computer is said to have passed the Turing test and the computer can be assumed to be intelligent. This test is also one of the first introductions to the field of NLP where the computers can converse with humans.

A number of Turing awards were given to individuals who made significant contributions in AI. The first Turing award to be awarded for AI, was in 1969 to Marvin Minsky for his central role in creating and advancing the field of AI.

The 1971 Turing award was awarded to John McCarthy for his highly recognized work in field of AI. As already mentioned, he was the person who coined the term Artificial Intelligence in 1956. He also created the LISP language which is still widely used in AI.

The 1975 Turing award was given to Allen Newell and Herbert A. Simon for their basic contributions to AI and the psychology of human cognition. Both of them had created the first AI programs named Logic Theory Machine in 1955-56 and General Problem Solver in 1957. Logic Theory Machine was devised to learn to solve complex problems such as proving mathematical theorems and playing chess. It is called the first AI program. Newell and Simon along with J.C.Shaw created General Problem Solver which is an AI program to imitate the problem-solving skills of humans. Herbert A. Simon also won the Nobel Prize in Economics.

Edward A Feigenbaum and Dabbala Rajagopal Reddy won the Turing award in 1994 for design and construction of large scale AI systems. Raj Reddy is the only person of Indian Origin to have won the Turing award.

Judea Pearl won the Turing award in 2011 for his contributions to AI by developing calculus related to probabilistic and causal reasoning. Judea Pearl is pioneer of Bayesian networks and is credited as its inventor.

Loebner Prize is a yearly competition being held since 1991 and is given to the most human like computer program/chatterbot based on the Turing test. The most human- like among the entries for the respective year is given the prize. There is also a one-time $100,000 prize for a computer which passes the Turing test. It is yet to be won.

Arthur Samuel Lee is another Pioneer in AI and Machine Learning. In 1959, he developed the first self-learning program which could play the board game of Draughts or Checkers. He developed this program on IBM 701 which was IBM's first commercial scientific computer.

Joseph Weizenbaum is another pioneer in AI and NLP, who had developed the famed ELIZA program. ELIZA is a conversational computer program and is one of the first chatterbots capable of conversation with humans. The Weizenbaum Award given by the International Society for Ethics and Information Technology, is named after him.

Warren McCulloch and Walter Pitts proposed the first mathematical model of neural network in 1943 in their paper titled "A Logical Calculus of Ideas Immanent in Nervous Activity". Donald O. Hebb did studies on function of neurons in the process of learning based on a mechanism called as synaptic plasticity. He is described as the father of neural networks.

Lotfi Aliasker Zadeh, a computer science professor at University of California, Berkeley, introduced Fuzzy Logic in 1965 in his paper outlining the theory of Fuzzy Sets.

AI Winter

In the early decades of AI, there were periods of reduced funding and loss of interest in AI. This was during the 1970s, 1980s and 1990s. These periods are known as AI winter. This was due to slow progress in AI with not much results to show. AI solutions that could generate big revenue for the corporates, did not get developed. Some of the contributors to AI winter were

- failure of projects related to machine translation in reaching their objectives
- the Lighthill report in 1973 in United Kingdom portrayed a pessimistic view of AI
- cuts in funding for AI by Defense Advanced Research Projects Agency in USA.

AI has now come out this phase and there in renewed interest and great enthusiasm for applications of AI in the Industry.

AI and Industry

In this decade, technology industry is investing in AI like never before. AI startup companies are being acquired by the technology giants and the specialized AI skillsets are much sought after by headhunters. According to a market research report by marketsandmarkets, AI market is estimated to grow to USD 5.05 billion by 2020. According to market research report by another consulting firm named Stratistics market research consulting, AI market is poised to grow to USD 40 billion by 2022. Bank of America Merrill Lynch expects the combined AI and Robotics market to grow to USD 153 billion by 2020. In this USD 153 billion, USD 83 billion is for robots and USD 70 billion is for AI-based systems. The AI market estimates may vary by consulting firm, based on what they consider in scope of AI and the methods that they use for estimations. But all of these reports confirm one thing that

AI is thriving and its market is going to grow at an enormous rate.

IBM has been involved in AI research from 1950s itself. As already mentioned, Arthur Samuel Lee developed the Checkers-playing Program on IBM 701. He did this while working at IBM Poughkeepsie Laboratory. Everybody knows about IBM Deep Blue, the chess-playing computer, which beat the world chess champion Garry Kasparov in 1997 in a six-game match. IBM Watson is a technology platform and question answering computer which uses NLP and machine learning. It can understand complex questions and provide answers and solutions by analyzing the huge amount of structured and unstructured data to which it has access. In 2011, IBM Watson beat two formers winners of American television quiz show named Jeopardy!. IBM Watson for Oncology is one of the IBM's commercial AI offerings which aid oncologists in making decisions about cancer treatment.

Google is a company which is betting big and going all out on AI. It is working big time in areas of NLP, Machine Intelligence, Machine Translation, Speech processing, Machine Perception and has a big number of publications in these areas. On 18-May-2016, at its annual I/O developer conference, Google unveiled a number of new products like Google Assistant, Google Home based on its competency of search and machine intelligence. In 2014, Google acquired a British AI company named DeepMind Technologies for around $500 million and renamed it as Google DeepMind. AlphaGo, a machine learning and ANN based computer program developed by Google DeepMind, beat the professional Go champion players named Fan Hui and Lee Sedol in Oct-2015 and Mar-2016 respectively. Go is an abstract strategy board game which originated in China. Self-driving cars developed by Google are controlled by AI systems. These AI systems have been accepted as Legal Driver under Federal law by National Highway Transportation and safety Administration of USA.

Microsoft research has its own Artificial Intelligence Group. Microsoft AI products include Cortana, an intelligent personal assistant. Very recently in Mar-2016, its artificial intelligence twitter based chatterbot named Tay, was in the news for the wrong reasons. It had to be taken offline within a day after its launch since it started tweeting sexist, racist, abusive and inflammatory responses. It is based on AI and unsupervised machine learning technologies. It fell prey to the concerted effort by trolls to give such responses.

Speech Interpretation and Recognition Interface, commonly called as Siri, is Apple's intelligent personal assistant. It is bundled and shipped with various Apple products. Apple has bought San Diego based AI startup company named Emotient and UK based AI outfit called Vocal IQ. Vocal IQ is a speech related AI company which has developed spoken dialogue technology. Emotient has developed AI technology that can read facial expressions of people and understand their emotions.

Facebook has its own Facebook Artificial research team (FAIR in short). It also has a research group for Applied Machine Learning. Facebook has over 1.5 billion active users. Facebook is making huge efforts in AI to be able to serve better and provide innovative features to its huge number of users. Facebook is using AI and object recognition technology to provide captions and tags on photos with reasonable accuracy for the benefit of visually impaired people. Without AI, it would be impossible to have human workers/employees manually tag the enormous number of photos uploaded by users on Facebook.

Amazon which is one of the world's largest retailers, is using and investing in machine learning and AI for various purposes like demand forecasting, product recommendations to customers and automating warehouse operations. Amazon acquired California-based AI startup named Orbeus which has developed photo-recognition technology based on ANN. Amazon is providing Amazon Machine Learning as a service to its developers to enable them to create Machine Learning models using wizards without the need to learn complex machine learning technology.

Indian IT services company have also jumped into the AI bandwagon. With great focus on Automation in the IT services industry, AI technologies are hogging the limelight. On 22-Dec-2015, Tech Mahindra launched its robotics automation and AI framework called AQT (Automation, Quality, Time). TACTiX, an AI-powered Knowledge Engine is part of this toolkit. TCS unveiled Ignio, its neural automation system for enterprises. It is a platform backed by machine learning and computing power of cloud. Its use is in the areas of infrastructure services and business process services. Infosys has Artificial Intelligence as a Service Offering as a part of its Engineering Services. In April-2016, it launched Mana, which is its Knowledge-based AI Platform to drive automation and innovation as a part of its Aikido framework. In Jun-2016, Wipro launched Holmes, its in-house AI platform. It is developed based on open source technology. Its purpose is automating industry specific business processes.

AI Programming languages and Open source software

AI programs can be written using any programming language such as C, C++, Java. Information Processing Language (IPL) was invented by Allen Newell, Cliff Shaw, and Herbert A. Simon in 1956. It was used for writing the first AI programs like Logic Theorist and General Problem Solver.

LISP programming language was designed by John McCarthy and was first implemented by Steve Russell on an IBM 704 computer. It was one of the most used languages for writing AI programs. LISP was used by Terry Winograd in writing an early natural language program called SHRDLU in 1968. Prolog is a logic programming language created by a French computer scientist named Alain Colmerauer in 1972 and is highly used in AI and NLP. Prolog was highly used by European AI researchers while LISP was used more in USA. Python (which was developed by Dutch programmer Guido van Rossum in 1989) is used frequently used in NLP.

For the benefit of AI developers, Google recently (in May-2016) open sourced its language parser software and neural network framework called SyntaxNet. This release also includes English language parser called Parsey

McParseface which is built on powerful machine learning algorithms. Earlier in Nov-2015, Google open sourced its machine learning system named TensorFlow.

In this month of May-2016, Amazon open sourced its machine learning engine named Deep Scalable Sparse Tensor Network Engine (DSSTNE in short and pronounced as Destiny) and made it available on Github. This software is used by Amazon for product suggestions and recommendations.

In Nov-2015, Microsoft open sourced its Distributed Machine Learning toolkit and made it available on Github.

AI – Institutes, Universities and Organizations in India

Technology Industry is an industry where skills get obsolete frequently and very fast. It is an absolute necessity for the people in this industry and the students who want to pursue a career in this industry, to plan, learn and be a step ahead of the current technologies. If we see now, AI and related technologies are definitely among the top in the list of technologies of the future. Amid growing fears that AI will lead to huge Job losses, there is a need for students and employees in technology industry to embrace AI so as to not become obsolete and be left out.

Artificial Intelligence as a subject or an elective, is already a part of the syllabus of computer science and information technology undergraduate courses in many IITs, NITs, universities in India.

University of Hyderabad offers an exclusive M.Tech in Artificial Intelligence. Computer Science departments of the top IITs pursue research in AI and related disciplines. IIT Madras has Artificial Intelligence and Database Lab (AIDB Lab) which focuses on research in AI and teaches courses in this subject. IISc Bangalore has a Machine Learning Special Interest Group which pursues research in Machine Learning and related areas.

Center for Artificial Intelligence & Robotics (CAIR) of Defence Research & Development Organisation of India is a premium laboratory for research and development of AI and Robotics solutions for Defence Forces of our country.

Applied Artificial Intelligence Group of Centre for Development of Advanced Computing (C-DAC) has done advanced work on machine translation and has developed a solution named 'An Expert English to Indian Languages Machine Translation System [EILMT]'. C-DAC has also developed LILA [Learn Indian Languages through Artificial intelligence]

Fears and Risks related to AI

The foremost fear related to AI is that it will unleash mass unemployment. With great advances in AI and machine learning technologies, AI based systems will be able to learn and outperform humans in almost all tasks at a much cheaper rate. AI, Robotics and automation is already being used in a big way in manufacturing industry. The power and capabilities of AI is such that they will find their way increasingly into service and knowledge based industry which has been the domain of humans. This leads to valid fears that AI will lead to much more job losses than the jobs that AI will help create. An ongoing study by McKinsey on workplace automation (by AI and advanced robotics technologies) suggests that as much as 45 percent of activities performed by human workers can be automated by currently demonstrated technologies. If the impression is that, this is only for low skills jobs, then it is not so. The study suggests that significant amount of activities performed by people in high skill jobs like that of doctors, finance managers and senior executives (like CEOs), can also be automated.

Fears that AI systems could prove to be biggest existential threat to human race, may appears to be far-fetched and more in the realm of fiction but they are very valid fears nevertheless and are definitely not to be ignored. These fears of Super Artificial Intelligence systems going rogue and threatening humanity, have not just been expressed by Fiction and Hollywood writers but also by technology leaders and scientists like Stephen Hawking, Elon Musk (CEO of Tesla Motors) and Bill Gates. There is definitely a need to have proper safeguards and control while developing these AI systems to prevent such doomsday scenarios.

Other fears are about usage of AI in weapons and wars. Autonomous weapons and drones for targeting enemies and persons of interest (as depicted in American Science fiction TV series of the same name) are a real possibility, in view of advances in AI and pattern recognition and matching technologies. Leaders and experts like Stephen Hawking, Noam Chomsky and Jaan Tallinn are warning against development of such AI weapons.

Conclusion

There is huge interest in AI in both industry and academia. We are at the dawn of a AI revolution similar to the Industrial revolution of the 18th and 19th century. One of the reasons for this, is big advances in hardware and software which are helping in realizing the full potential of AI. Collection and availability of huge data using technologies like Big Data is complementing AI related technologies like machine learning. With various AI based applications being developed and becoming available, AI is slowly becoming ubiquitous. So we can clearly say that AI is definitely a fact and not going to remain just a fiction.

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Developing Solutions with Big Data Technology

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Introduction

In today's world, as the volume of digitized data grows exponentially, the need and the ability to store and computationally analyze large data sets is growing along with it. The phrase "big data" refers to large or complex datasets that classical data processing software applications are inadequate to manage.

To demonstrate how technology today has greatly benefited almost all the domains including finance, marketing, government agencies, forensics, education, and so on, we need to take a look at the state of data processing technologies about 20 years back. In case of an adverse event in the markets(e.g., suddenly losing sales to competitors), the CEOs would call for emergency board meetings filled with the top management executives. Questions would be asked on the sales trends for recent years, current market share, and variance from projected sales. The middle management would spend countless hours trying to determine answers to the most basic of questions. Neither the computer equipment nor the techniques of the day were sufficient to provide quick answers to these critical questions that could decide the direction of the business practices.

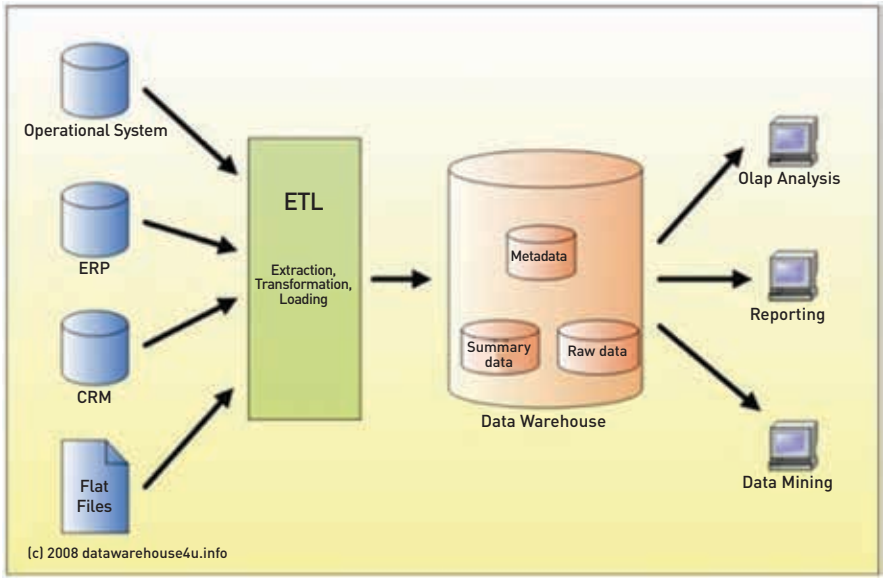
In today's world, businesses are much better equipped to answers these inquiries in a time efficient manner. Technology has taken the center stage and the capabilities of business intelligence and data science have expanded well beyond the ability to answer these simplistic questions. The professionals today are well equipped with many tools with the support of the business intelligence (BI) experts. They make the data speak for literally everything that has happened over a period of years. They are able to analyze

The big data word cloud

the growth of a company over time, the performance of products, employees, and divisions in distributed geographical areas and much more. While this may seem sufficient to meet the needs of market research teams, and also for those budding start-ups who wish to analyze the market before diving into it,BI and data sciences have gone much further. Data science has helped enable CEOs to make quick decisions in the face of rapidly changing markets. Not only can they analyze the past performance of their firms, but also make predictions on the movement of market forces in the future. They can make quick yet well thought out decisions on the best point of investment and also foresee how their products may perform in the next quarter or year. Answers to such important business questions can be critical in capturing the market early on. Important sales and supply chain statistics can help the decision making processes of strategic leaders of a corporation, with their investments, product launches, organization restructuring and much more.

Data vs Information vs Knowledge – General Overview

The three key components of the modern world of information are: data, information, and knowledge. Real facts stored in a physical medium may be termed data. For example,if we consider the network of metropolitan buses in a city, the traffic signal information and bus GPS data are usually logged into a central relational database (RDBMS). Running a simple query on that database fetches a list of columns with unique identifiers, numbers, timestamps and some textual information. This data barely makes sense to an ordinary viewer. The database administrator (DBA) of the database has a complete idea of the database schema, column mappings, id mappings and other technical information. The DBA is able to design a complex query, which helps render a dataset more comprehensible, because he has simplified the data in a readable format. The report may now have columns like date, bus number,



The ETL process to prepare data for BI and data science processes

stop name, journeys and arrival time. This is something that makes more sense to an ordinary reader than rows of data that seemed unintelligible before. This is a transformed version of captured data that provides correct and understandable facts about the schedule of the city buses. While information presented in this format may be sufficient for riders, the team delivering the bus services may need more information for smooth provision of the services to the city. They would want to know the bus frequencies, stops occupancies, bus accidents, traffic information and much more. For example, they may discover that a certain route goes practically unoccupied, while another route is always overloaded with passengers. With this information, they may decide to change the routes of certain buses to better meet demand. The ability to make such critical decisions in a timely manner requires that information be processed rapidly (summarization, categorization, etc.), and be made available to the appropriate personnel quickly via modern channels of communication (e.g., email, browsers, smartphone apps, etc.).

It is easy to understand the process of data capture and storage, for example, of the weekly schedule of city buses. But a closer look reveals the size of the collected information: an average bus network with 200 buses, sending GPS positions every 5 seconds, transmits around 3.45 million records per day. Once this data has been deposited in a database, the problem arises of efficiently extracting knowledge from this massive data set. How does one read through all the data and come up with a condensed report that enables better decisions? This is the challenge that the discipline of business intelligence and data sciences strives to address. As defined by Gartner Inc.,"Business intelligence (BI) is an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance." Going back to our city bus network example, in addition to the 200 buses sending GPS positions every 5 seconds, resulting in 3.45 million records, an average of 200 bus stops record the arrival and departure of buses throughout the city,resulting in another 3 million records. Considering a complete system with other logging mechanisms for tickets, passenger counts, etc., the database size can easily exceed 12 million records a day. There could also be additional inputs to the database, for example, bus schedules created by bus operators in spreadsheets, which may need to be fed into the database in a batch. So, we are faced with a situation where there could be multiple types of sources like flat files, spreadsheets, and other systems. To deal with this issue, business intelligence with its impressive data extract, transform, and load (ETL) technology can be applied. The ETL helps integrate the data from various data sources (which are not generally structured) into a single location. Even after the data integration has been achieved, we still have a problem: billions of records are getting logged every week into the database. This leads to a situation that can be termed"data explosion," where it becomes difficult to handle the sheer volume of data. Moreover, running a query for a multi-year analysis of this data will end up performing very poorly. To overcome this situation, business intelligence offers a methodology called data warehousing. A data-warehouse is a copy of the transactional database, which is restructured for analysis purposes (again using ETL) using a technique called de-normalization. Also, a data warehouse is designed to hold large data volumes, so historical data can be archived in the warehouse and deleted from the transactional system. Thus, complex and historical analysis can now be performed on the data warehouse instead of on the transactional system that initially records the data. Another technique in business intelligence that provides for efficient analysis is online analytical processing (OLAP) cubes. OLAP cubes are BI components that store data in a compressed and pre-aggregated form,which makes running analytical queries against the cubes extremely efficient. These cubes are structured to store data in an optimized way and have the capacity to store several years of historical data. Finally, the processed information needs to be presented to analysts based on their needs. To this end, BI offers reporting services, which help represent the data through interactive reports. These reports help us get a birds eye view of the progress of the business. A term closely associated with BI is 'data science' which is defined by Wikipedia as follows: "Data Science is the extraction of knowledge from data." The various techniques to extract knowledge out of the stored information or data make this a deeply interesting field. Professionals working in the field of data science are termed

data scientists. Applying data science techniques on data varies from case to case, and it needs to have a well-planned approach. The field of data science borrows from a myriad of other disciplines. There are techniques, algorithms and patterns derived from areas like information theory, information technology, mathematics, statistics, programming, probability models, data engineering, data modelling, pattern learning, predictive modelling and analytics, business intelligence, data compression and high performance computing. The predictive modelling, theories and models of data mining have added a lot to data science, as they have enhanced the predictive capabilities of the field.

The Data Explosion

Along with the rise of technology and data storage systems over the years, the cost of storage hardware has gone down significantly. This has allowed IT companies to buy numerous commodity servers and storage systems to store data and also to extend data storage as a service to their clients. Content generated from analog systems in the form of sensors, mobile devices, instruments, web logs and transactions has been digitized and stored. It is worth highlighting the fact that 90% of the data in the world today has been generated in the past two years. Data scientists have applied numerous techniques to this massive data to identify patterns that may benefit society at large. This avalanche of data has led to the inception of new technologies like big data, which have helped perform experiments quicker and more efficiently on the incoming data. Several high performance computing systems like Hadoop and Cluster computing have helped data scientists explore petabytes of data much quicker than ever before. It is a huge benefit for a data scientist to be well-versed with big data technologies. Data analytics teams usually have a number of experts from each sub-discipline; for example, ETL data integrators, reporting experts, business matter experts, etc., help the core data scientist with the various critical tasks that support data analysis.

Tools and Technologies with Application Solutions

There are more than 50 open source tools available for dealing with big data; the most popular is Hadoop. Hadoop is an open-source software framework for storing data and running applications on clusters of commodity hardware. It provides massive storage for any kind of data, enormous processing power and the ability to handle virtually limitless concurrent tasks or jobs. As the World Wide Web grew in the late 1900s and early 2000s, search engines and indexes were created to help locate relevant information amid the text-based content. In the early years, search results were returned by humans. But as the web grew from dozens to millions of pages, automation was needed. Web crawlers were created, many as university-led research projects, and search engine start-ups took off (e.g., Yahoo, AltaVista, etc.).One such project was an open-source web search engine called Nutch, the brainchild of Doug Cutting and Mike Cafarella. They wanted to return web search results faster by distributing data and calculations across different computers so multiple tasks could be accomplished simultaneously. During this time, another search engine project called Google was being developed. It was based on the same concept: storing and processing data in a distributed, automated way so that relevant web search results could be returned faster.

In 2006, Cutting joined Yahoo and took with him the Nutch project as well as ideas based on Google's early work with automating distributed data storage and processing. The Nutch project was divided: the web crawler portion remained as Nutch and the distributed computing and processing portion became Hadoop (named after Cutting's son's toy elephant). In 2008, Yahoo released Hadoop as an open-source project. Today, Hadoop's framework and ecosystem of technologies are managed and maintained by the non-profit Apache Software Foundation (ASF), a global community of software developers and contributors.

Government Solutions using Hadoop

What types of problems can government agencies use Hadoop to solve? In many cases, when a question can be answered without looking at all the data at once, Hadoop can help. Text mining, which can be undertaken using Hadoop, can be applied to financial fraud detection, research paper classification, student sentiment analysis and smarter search engines for all manner of government records. On top of that, machine learning can be used for decision support systems for healthcare, model generation for climate science, speech recognition for security and mobile data entry across agencies. In many cases, the Hadoop data storage system can be implemented securely enough for many applications on cloud-based servers, which keeps costs minimal. Moreover, popular pay-per-use services such as Amazon web services' Elastic MapReduce require little commitment and lend themselves conveniently to experimentation.

Hadoop Makes It Easier to Find Government Documents

Many government agencies need to provide a means for officials and the public to find documents (e.g., patent applications, research reports, etc.).But there are far too many documents for an individual (or even a large team) to catalog all of them on their own. Even the task of manually creating indices of documents in various topic areas is daunting. One solution is to create a search engine that can automatically find documents relevant to a particular set of query terms. In order to build such a search engine, it is necessary to create a list of documents, indicating the documents where a term or phrase can be found. The collection of all these terms, and the documents that contain them, is known as an "inverted index." With millions of documents, creating an inverted index can be an enormous task, but it can be generated quickly and expediently with Hadoop.

Hadoop can achieve that as follows: when the collection of documents to be indexed is uploaded to Hadoop, it gets divided into pieces, backed up and assigned to different computers using its storage mechanism called Hadoop distributed file system(HDFS®) and a framework called MapReduce®. A Hadoop engineer can specify the task for the mapper to scan through a document, keeping track of each word that appears in the paper, and a way for the reducer to combine the results from different computers (e.g.,making a list of all the different documents that the

mapper associated with each word). The result is an inverted index, containing all the words from all the documents on all the different computers, generated automatically and in a fraction of the time it would have taken to conduct all the operations sequentially. Map Reduce also has a few other intermediate steps that involve shuffling and sorting.

Prevent Fraud and Waste

In another real world example, a federal agency with a large pool of beneficiaries turned to Apache Hadoop and the Hortonworks data platform to discover fraudulent claims for benefits. The implementation reduced ETL processing time from 9 hours to 1 hour, which allowed them to create new data models around fraud, waste and abuse.

After speeding the ETL process, the agency used that efficiency to triple the data included in its daily processing. Because Hadoop is a "schema on read" system, rather than the traditional "schema on load" platform, the agency now plans to search additional legacy systems and include more upstream contextual data (such as social media and online content) in its analysis. All of this makes it easier to identify and stop fraud, waste and abuse.

Tax Compliance

The MapReduce distribution for Hadoop can be used by tax organizations to analyze both unstructured and structured data from a variety of sources in order to identify suspicious behavior and multiple identities, which could lead to an increase in tax fraud identification. By leveraging the power of Hadoop, tax organizations can proactively detect and prevent tax fraud.

Research Directions

There are many challenges in the field of big data, including data capturing, data storage, data analysis, data curation, data searching, sharing and transferring, data visualization, data querying and updating among others. But the biggest challenge is information security and privacy of big data. A lack of big data security can lead to great financial losses as well as damage to the reputation of a company. Security threats and attacks are becoming more active in violating cyber rules and regulations. These attacks also affect big data and information contained in it. Attackers target personal and financial data, or a company's confidential intellectual property information, which greatly affects their competitiveness. The biggest threat is when attackers target personal or consumer financial information stored in big data. Although there are rules and regulations in place to protect data, there still are vulnerabilities in big data that are serious enough to warrant substantial concern.

In a recent and highly publicized incident, WikiLeaks released a huge trove of alleged U.S. Central Intelligence Agency (CIA)internal documents. It is by far the largest leak of CIA documents in history. There are thousands of pages describing sophisticated software tools and techniques used by the agency to break into smart phones, computers and even Internet-connected televisions. Both government and corporate leaks have been made possible due to the ease of downloading, storing and transferring millions of documents in a very short time.

Conclusion

The future of big data looks very promising;it is one of the most efficient storage mechanisms to date and is a highly sought after skill in the job market. Companies today want to know more about markets and products before making a major investment. Departments today are making huge investments to perform analytics of the massive amounts of data stored in their databases. The demand-supply model is completely imbalanced now, due to the high demand for big data researchers, and a scarcity of available trained personnel. Every company today wants to employ these trained professionals,who can help them analyze their data, and allow them to grow faster than competitors. Corporations are ready to shell out generous compensation to attract the brightest workforce in this ever growing area. With data volumes skyrocketing, the need of the hour is the ability to gather intelligence from the data using the latest tools and technologies available today.

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Big Data Analytics Meets Blockchain

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The world across has been witness to a surge in awe-inspiring technological tempests over last two decades wherein each of these technology marvels are only increasing their immensity in terms of exploitation. Who would have reckoned Internet, as presented to a common man, around early nineties to be a stake holder in Online shopping, Education, Banking, Harnessing surveys, facilitating real time logistics, traffic ,air control, Smartphone revolution and the list is sempiternal in reality. Leave aside Internet, provisioning storage as a service or Software as a service or Infrastructure as a service vide cloud computing nearly a decade later was again a game changer in the IT world. Such is the potent might of these technologies that the world is still getting exposed to the wider domains that these can effect into.

To add to the above league of behemoths, two more newfangled technologies are awaiting to detonate in the arena ie Big Data and Blockchain. This article will build upon these two marvels including a brief overview of these technologies, edifice further to *Big Data Analytics* and concluding with the shake hand of *Big Data Analytics* with *Blockchain*.

Big Data

Big Data is a technology revolution which has though existed now for a while, proving its mettle all the way in a variety of domains, but still confusion persists with respect to what actually it is? Is it a lot of data? Is it just mammoth data? The fact is that whatever such kind of assumptions exist, Big Data is amalgamation of all these theories rolled into a simple one line explanation that says Big Data is data that surpasses the processing capacity of traditional database systems and is characterized by four Vs of Volume, Velocity, Veracity and Variety.

Volume : This **V** refers to the huge volume of data that's sourced from variety of devices including networks and human interaction on systems like Social Media, Modern automobiles, Logistics etc. Data is forever and is continuously generating. This **V** of Big Data taps this volume of data irrespective of format, size, shape or any attributes. Just TAP it, collect it first.

Velocity : This **V** refers to the phenomenal speed at which the data is pouring in from variety of sources. The data movement is now more realtime like never before and its inundating the data centers and containers at a exceedingly high pace.This V of Big Data taps this velocity of data to funnel to the desired containers without any loss and expiration involved because each bit of this data matters.

Variety : This **V** of Big Data refers to the variety of formats of data that's being sourced in. Each of the Videos, Audios, Text files, Word files, Libre files, Image files, Application files, Binary files, Markup languages and the endless files have distinct and multiple formats to offer whilst the data collection is happening.

Veracity : The Veracity **V** is only trying to accomplish data accuracy which necessitates ostracizing the dirty data hoarding in systems.

Big Data Analytics

Big data analytics is the process of analyzing big data sets to reveal obscured patterns, terra incognita correlations, Commercial stock trends, customer predilections and other utile clientele entropy to mention a few. Such analytical determines can contribute to more efficacious marketing, high revenue generations, more effective client service, meeting operational targets and other business derivatives.

Blockchain

The typical connect of masses as **Blockchain** is cited and discussed around, is mostly limited to Bitcoin. The blockchain is an undeniable brainiac invention and the brainchild of a pseudonym Satoshi Nakamoto, who uploaded a paper titled " Bitcoin: A Peer-to-Peer Electronic Cash System "in Oct 2008 and that's seen as the first Blockchain database creation and deployment of the first decentralized digital currency. Not dwelling on Bitcoin per se here, the world soon realized the potential of Blockchain, in fact, we are still realizing the huge potential benefits and world of advantages Blockchain can offer in more wider domains and not just being confined to digital currency applications.

What's A Blockchain?

Blockchain is a shared, inalterable, public, transparent ledger for recording the history of transactions, not only for any currency but, virtually everything that holds a value. Digital information being allowed to be distributed but not copied, Blockchain has actually introduced a newfangled internet. The tech community is now ascertaining potential uses for the technology other than Bitcoin to which we typically connect to.

For a more simpler approach to interpret Blockchain, imagine a typical excel sheet or a database table, being realtime altered and updated, that is replicated across millions of nodes across the globe and this is uniquely characterized by a immediate update of the excel sheets or the database table ie continuous reconciled. This decentralized record holds each transaction detail that happens over a peer-to-peer network that can be either public or private. Blockchain's integrity depends upon impregnable and secure cryptography that corroborates and links together all blocks of transactions, making it almost inconceivable to alter or hack any transaction record without being discovered. Although more recently 51% Attack aka Majority Hash Rate Attack have been discussed in communities that grants someone controlling a majority of network hash rate to revise transaction history and prevent new transactions from

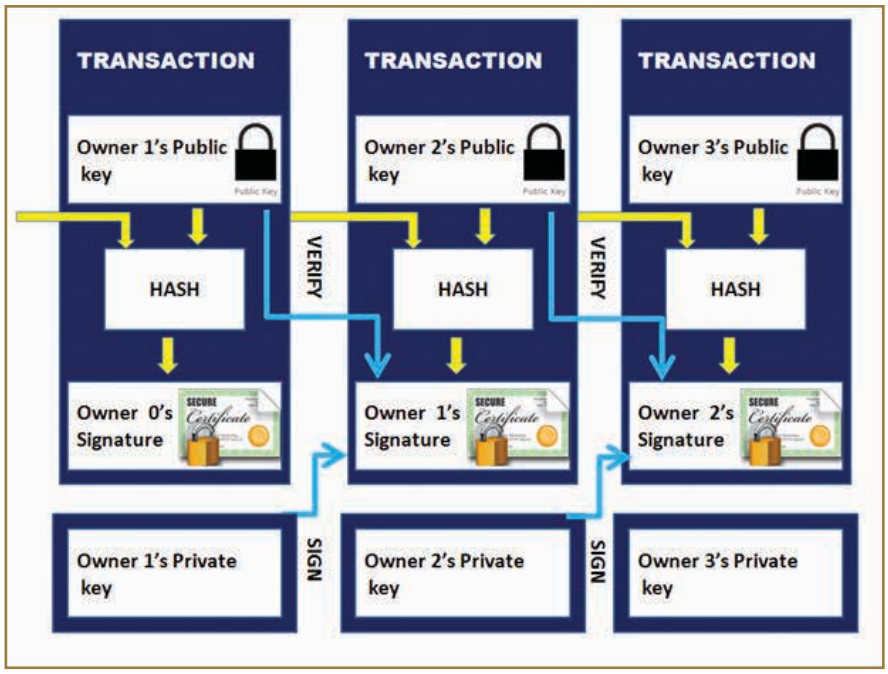

Fig. 1 : Blockchain Schematic Look

confirming, a way to tamper the blockchain, but I would avoid going tangent on the topic and would discuss ahead the link between ***Blockchain and Big Data Analytics***.

Important elements of a blockchain as seen in the schematic Fig. 1 are:

Signed Blocks of Transactions

- Ensures the chronological sequence of transactions as it happens
- Create real-time continuous updated audit trails
- Admit Allow real time fine grained access control at the each transaction

Digital Signatures

- Admit real-time version control of data
- Verify that messages came from the right source
- Verify ownership of private key
- Ensures no tempering takes place

Distributed, Shared Ledgers

- Eliminate the need for centralized agencies or any third parties like Banks etc
- Establish one and one only unitary version of transaction

Blockchain and Bigdata

As we now have an overview of these two technology marvels, how do they eventually meet and how do we tap the compounding solution?

Big Data has various challenges as it stands today still evolving. In our context of trying to brew a relation with Blockchain, there are specifically three challenges, that blockchain will be able to resolve:

Challenge One : Data Sharing-Update-Location-Control-Replication ?

Each organization in the market, busy collating datasets from various sources, with immense competition has a task in hand including:

- Who holds the control over the huge and ever-changing data sets?
- Who stores the ever changing data?
- How to configure accurate sharing of these data sets ?
- Who controls the replication?
- How to decide which one data replication node has the latest data?
- Envisaging Data to behave like electricity or internet, wherein you just plug your query and you get the desired analytic result without worrying about related attributes about fake data, source credibility etc.

Solution BLOCKCHAIN to Challenge One

The one point solution to the above is Blockchain, which by its own set of characteristics and cosmos, comes to rescue of these challenges mentioned above. Blockchain per se resolves the control issues since; it is a publicly distributed ledger without any third party intervention. Each node has the same data, each node can update independent,each node sees the same ledger. No issues exist of who replicates and who has the latest copy of the data sets.

Challenge Two : AUDIT TRAILS AND LEADS

An audit trail is a security-relevant chronological set of records, that holds destination and source of records that provide documentary evidence of the sequence of activities that have affected at any time a specific operation, procedure, or event. For a Bigdata corporate, holding huge bigdata sets, conserving audit trails of all types of structured and unstructured data will indeed be a challenge. Other challenges include resolving and configuring access to audit relevant data; the accessibility of dependent resources to process and analyze the data commingled with apropos desegregation of analytics into the audit only step-ups the challenge.

Solution BLOCKCHAIN to Challenge Two

Blockchain technology allows us to have audit trails on data that betters the trust and reliance of the data. Blockchain has made possible to securely timestamp information in a decentralized and tamper-proof validation. Digital data in each block is hashed and the hash is integrated into a transaction stored in the blockchain, which serves as a secure proof of the exact time at which that data existed. The substantiation owes to enormous computational effort performed after the hash is submitted in the blockchain. Any tampering attempt with the timestamp would conduce to breaching

the integrity of the entire chain which would thus not allow recording and entry in the blockchain ledger

The cardinal aspects of the blockchain's timestamps include its own characteristics that it is decentralized and no one entity controls the recorded timestamps, and everyone in the network confirms that timestamp has occurred ie "mining", it is immutable ie it cant be undone and modified once in a block.

Challenge Three : Global Data Exchange

Every Big data organization has this task in hand to provision accurate, real-time, updated same data exchange across. They establish Data centers, they make mirror sites, Create all infrastructure , then configure them for real time updation and backup in different time zones followed by configuring sharing it all, believe it, it is not easy with increasing index of Velocity, Veracity, Volume and Variety of Data.

Solution BLOCKCHAIN to Challenge Three

The blockchain answers this easily without hassles by its own definition that says it is a publicly distributed, shared, immutable and transparent ledger. There is simply no need to backup, establish mirror sites, ensure real-time updation.

Conclusion

Blockchain database technology resolves three of big data's prominent challenges ie How to trust the data, How to manage audit trails and How to ensure global data exchange that is same, real-time updated and remains untampered. Blockchain also ascertains that each transaction is encrypted, time-stamped and verified across multiple users which betters the data's relevancy and importantly raises the security of the information for more accurate analytics.

The handshake of these two giants of technology is imminent in near future, may not be immediately practicable and viable for exploitation today. Both the technologies are still evolving and hold a huge scope and potential for the benefits that the humankind will reap in for long sure and soon.

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ROI Selection for medical image watermarking

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In this article, a technique to select ROI (Region of interest) which is actual sensitive area of medical image is proposed. For providing security to confidential information such as hospital details or patient details we hide such information with medical image as watermark. But when we hide watermark inside medical image the quality of medical image is degrades, which may create problem in doctors analysis. So it's necessary to prevent quality of medical image. for that we separate the ROI from which Doctor's analyze decease and hide confidential information in RONI (Region of non interest),it provide security to confidential information without affecting ROI.

Digital watermarking is Method of Hiding data into digital multimedia content, this term digital watermarking was first introduced in 1993.

Types of Digital watermarking:

1) Visible Digital watermarking
2) Invisible Digital watermarking

In visible Digital watermarking the watermark which we embed into digital signal is easily visualize to human eyes. In Invisible Digital watermarking the watermark is invisible, so the invisible watermarking is secure as compare to visible watermarking. Digital watermarking divided into two main modules, Watermark embedding and extraction module.

Digital watermarking Applications:

1) Copyright protection.
2) Broadcast monitoring.
3) Medical image etc.

Now a day's modern healths care systems and availability of electronic media, Telemedicine help us to provide best physician available by eliminating distance hurdle. So most of hospitals use telemedicine techniques to send medical images to physician who is located at different geographical location for diagnosis purpose. For that one physician can select ROI and provide hospital information or patient information as a watermark and send the watermarked medical image to another physician for diagnosis. At other end the receiver physician separate Medical image as well as watermark and helps to sender physician in treatment of patient.

Security to the watermark is most important in telemedicine technique, because if attacker attacks on transmitted watermarked medical image and got success to exchange information of different patient in that case wrong treatment will be given to both patients. For that purpose We scramble the watermark by Arnold scrambling algorithm. But attacker may use different keys to find out actual watermark. So we use combination of Arnold transform algorithm and RSA encryption algorithm to provide security to watermark.

RSA algorithm is based on Public-key cryptography described by Rivest, Shamir and Adleman i.e Use two keys, every user having its two key one is secret key and other one is public key which is publicly known. Every User knows the public key of other user.

A) Embedding Algorithm:

Inputs : Medical Image, Watermark Image.

Output: Watermark Medical Image.

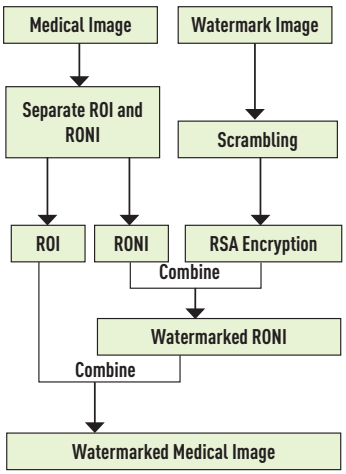

Fig 1: Embedding process algorithm.

Steps:

1. Select medical image.
2. Select ROI of 100x100 with help of mouse click on medical image, it separates ROI and RONI. As shown in fig 2.

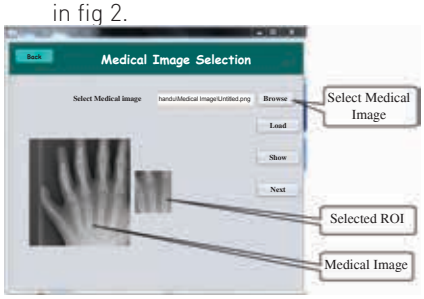

Fig 2: Selection of ROI

3. Select Watermark Image.
4. Scramble the selected watermark. As shown in fig 3.

Fig 3: Watermark selection and Scrambling

5. RSA Encryption of scrambled watermark.
6. Embed RONI and RSA encrypted watermark, it gives watermarked RONI image.
7. Combine ROI and Watermarked RONI, it gives Watermarked medical image. As shown in fig. 4

Fig. 4 : Combine RONI and ROI

B) Extraction Algorithm:

Inputs : Watermark Medical Image
Output: Medical Image, Watermark Image.

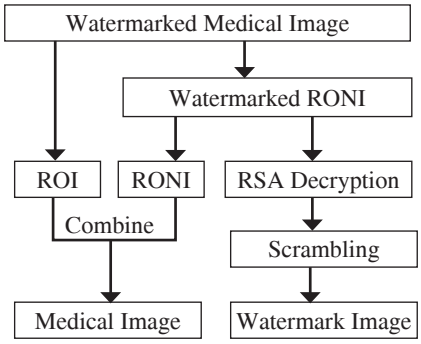

Fig 5: Extraction Process algorithm.

Steps:

1. Select Watermarked medical image.
2. Extract ROI from Selected medical image. As shown in fig 6.

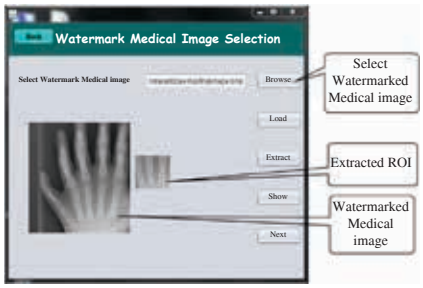

Fig 6: Selection of watermarked medical image and ROI Extraction.

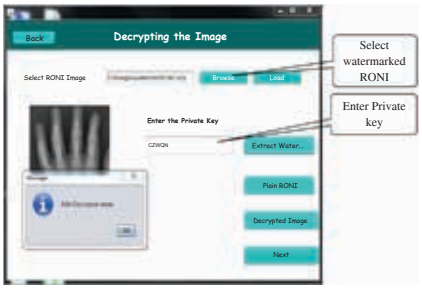

Fig. 7 : RSA Decryption.

3. Select watermarked RONI medical image.
4. Separate plane RONI and encrypted watermark.
5. Enter private key and decrypt RSA Encrypted watermark.
   As shown in fig 7.
6. Arnold transforms iteration to get watermark.
7. Combine ROI and RONI to get medical image. As shown in fig 8.

Fig 8: Watermark image and Medical image.

It is a need of healthcare industry to transmit medical images from one geographical location to other geographical location with patient or hospital information for patient diagnosis purpose. But quality of medical image as well as security of confidential information is essential factor. For that Digital Image Watermarking is help us to increased security levels and ROI selection and embedding confidential information inside RONI Prevent quality of actual sensitive area. And Arnold Scrambling is special property that shuffled watermark image before embedding inside image and after extraction gives original watermark image after specific number of iteration. Those specific numbers of iteration are called as 'Arnold periodicity'. But it's fusible to get actual watermark after applying trial and error method or using different Arnold periodicity, So we encrypt Scrambled watermark with RSA encryption algorithm to provide more security to confidential information. So algorithm of ROI selection and image watermarking fulfills our mail goal i.e Security to Actual sensitive are and quality of Medical image.

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Big Data-based In-Memory Data Grid (IMDG) Technologies: challenges of implementation by analytics tools

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In recent years, the amount of data has increased in most fields, from the global economy to society administration, and from scientific researchers to national security, so big data has become the effort of researchers, pioneers of the information technology, large companies, and big institutions. When the data becomes big to the extent difficult to manage it by using traditional data management systems begin with the emergence of challenges as of how can manage this data, collect the data, store the data, analyze the data for utilizing of them.

Processing-based In-memory has been newly topic lately. Dealing with Big Data needs to increase the number of transactions with minimum execution time, a lot of applications and companies changing their core systems architectures to minimize the time of execution and throughput by using the main memory RAM during implementation. This is because the time of implementation in the main memory faster and cheaper to load the entire operational dataset into memory.

In this paper, we present the challenges and benefits of using the In-memory data grid for big data implementation and application.

Keywords : Big Data, Data Grid, In-Memory Data Grid (IMDG), Java Heap.

I. Introduction

Handling the huge volume of data is becoming a real challenge. Most the data of organizations is growing at a rate of 40 to 60 percent per year. Managing huge streams of data from various distinct sources lead to a lot of companies have difficulty recognizing the right data and defining how to best use it.

Data Grid one of the approaches, which addresses problems of big data. Data Grid defined as a set of services that offer persons and organizations the ability to access to geographically distribute huge data for research determinations like the Large Hadron Collider (LHC), the Laser Information Gravitational Wave Observatory (LIGO), and the Sloan Digital Sky Survey (SDSS). In addition, Data Grid used to increase services and decrease costs by providing access to dispersed and dispersed data systems such as governments, hospitals, schools, and businesses.

Big data is a collection of data sets that exceeds the processing volume of traditional database management systems. Big Data has improved the approach that we implement in exploit businesses, managements, and researches. Data-intensive science, particularly in data-intensive computing is coming into everywhere that aims to afford the tools that we need to manage the Big Data problems. To capture the value from Big Data, we need to improve new techniques, technologies for analyzing it, and no conventional techniques to powerfully handle a large volume of data within limited run times. So far, researchers have established a wide variety of techniques and technologies to hold, analyze and visualize Big Data. However, they are far away from meeting the variety of needs.

Fig. 1 : increasing the volume and discipline of data

II. In- Memory Data Grid (IMDG)

An in-memory data grid (IMDG) is a particular type of data storage (keep data in main memory) and distribute it across the servers of clusters, thus offers the very high availability of data. Guaranteeing speeds, by loading data in-memory, and size by using scalability structures provided by a cluster. Thus, by loading huge volume of data (Terabytes) into memory IMDGs are

capable of working with most of the Big Data processing requests today.

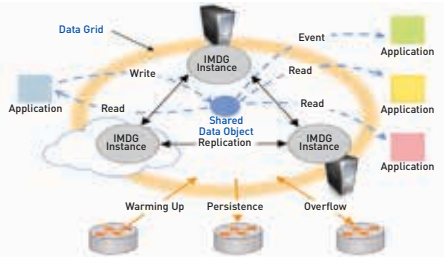

Fig. 2 : Application integration scenarios In-Memory Data Grid

IMDGs help users reduce the cost of running huge volume of data, transactional or analytical applications by enhancing their scalability and performance while maintaining the integrity of data in memory. It is not an in-memory relational database, an NOSQL database or a relational database. IMDG has a completely different architecture. The structures of IMDG can be brief as follows:

- The data is scattered on several servers (Data Fabric).
- The data is stored in the main memory (RAM) of the servers
- All servers in the IMDG environment operate their data in the active mode.
- For increasing the amount of memory, servers can be added or removed.
- A data model is usually object-based and non-relational.

A) IMDG Architecture

To use main memory as a storage capacity, two weaknesses must be overcome:

- Limited space of storage: includes data that exceeds the maximum capacity of the main memory of the server.
- Reliability: includes data that damage in case of a (system) failure.

By using horizontal scalability architecture IMDG overcomes the limit of capacity, where horizontal scalability means the capability to increase capacity by linking multiple hardware or software entities which are operated as a single logical part. When servers are clustered, the scope of the original server is expanded horizontally. Using a distributed structural design, and resolves the issue of reliability over a replication system as part of the grid (or a distributed cluster).

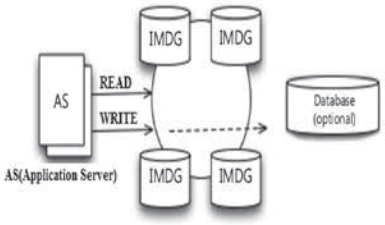

Fig. 3 : The architecture of In-Memory Data Grid (IMDG)

B) Management of Memory

The Memory Management facility is used to help the client in avoiding a state where a capacity of the server gets into an out-of-memory failure scenario. Based on the configured cache policy, the memory manager protects the space (and the application, in the case it is running collocated with space) from consuming memory beyond a defined threshold.

Most of the products which are used IMDG use Java as an execution language. When Java application started the JVM (Java Virtual Machine) gets some memory from RAM. JVM uses this memory for all its need and part of this memory is call java heap memory (Heap). In contrast, nowadays Java applications have developed so that in many cases they require data storage and compute capabilities that go beyond the limitations executed by a single JVM. By using a large amount of data we getting two problems, which are:

- *The limitation of heap size:* The default size of the heap is 128 MB which causes in cases this limit is gotten no new objects can be created and the Java application will display some nasty errors.
- *Application performance:* The default size of the heap can increase to 4 gigabytes, but this change leads to serious issues with memory managements. The application which needs more than 4 gigabytes of memory by using this method cause slow down or even freeze.

However, Java has Garbage Collector (GC), which periodically scans the heap and checks the maximum size of it. The space memory can be managed using the eviction policy, where can set the policy to run ALL_IN_CACHE or LRU (Least Recently Used) or custom employment. The Cache Eviction Policies are managed as:

- *ALL IN CACHE-Cache Policy* - Assumes the JVM holding the space instance has enough heap to keep all data in memory.
- *LRU-Cache Policy* - Assumes the JVM holding the space instance does not have enough heap to keep all data in memory. By default, ALL IN CACHE policy is used for an in-memory data grid, and LRU-Cache Policy is used with Garbage Collector enabled.

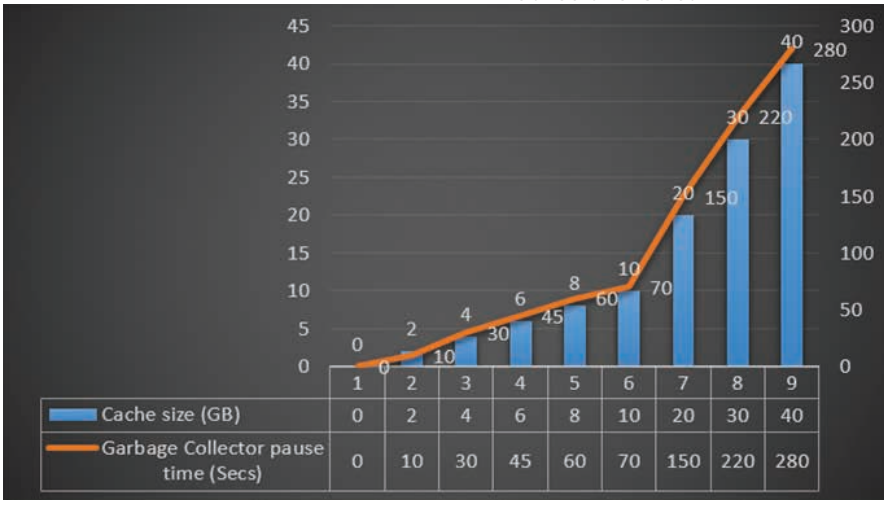

Fig. 4 : Maximum Garbage Collector GC Pause Time

Although the Garbage Collector is used periodically for a persistent space in memory, the heap can be used as an off-heap. Off-heap means data will not be stored in Java's heap, but directly in the available memory (RAM). The reason for using this method is Garbage Collector after a certain time gets a pause. For example when the cache memory is reached to 40GB, the GC pause nearly 5 Min.

C) How an IMDG actually works

First of all, it is essential to understand that an IMDG is not the same as an in-memory database. IMDG is No tables, indexes, triggers, stored procedures, process managers etc. Just plain storage. One of the main differences would be essentially scalable Data Partitioning across a cluster. An application server has a client library that contains IMDG. Some of IMDG products make available of synchronizing data to RDBMS.

The data model which is used in IMDG is key-value pairs. A key-value pair is a list of only two parts: a key and a value. The key can be used for storing and retrieving the values in the list. A key can be equalled to the index or primary key of a table in a database. The values of key-value pairs can be whatever reaching from simple data types such as a number or string to complex objects.

The steps of how do use an In-Memory Data Grid as a follow:

1. Install servers in a single site or across multiple sites. Each group of servers within a site is denoted to as a cluster.
2. Install the IMDG software on all the servers and indicate the appropriate topology for the implementation. For multi-site operations there two options a partitioned or replicated cache.
3. Setup APIs or GUI interfaces to let replicated between the various servers.
4. Develop data model and the business logic around the model.

III. Big Data-based In-Memory Data Grid

New technologies are needed, that can distribute processing and storage across machines as maintaining a flexible and appropriate programming interface for developers. However, the actual influence of IMDG lies in its networking and clustering abilities, providing structures as data replication, data synchronization among clients, failover and high availability. To accomplish this, a cluster of servers doings a backbone of the structure. Applications which are associated to the cluster can share, replicate and backup their data with either the cluster or other applications.

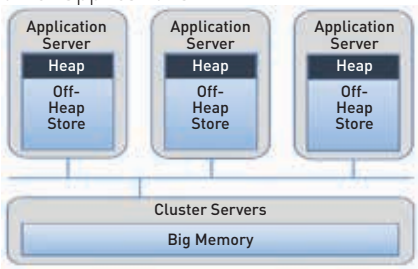

Fig. 5 : The structure of using Heap as big memory

In recent times, there are many IMDG products, some of them are commercial and others are open source. The most commonly used products are:

- GridGain DataGrid
- Hazelcast
- JBoss Infinispan
- Terracotta Enterprise Suite
- Gigaspaces XAP
- VMware Gemfire
- Oracle Coherence

IV. Conclusion

Big Data fetches us some new challenges. First of all, storing and retrieving huge amounts of data makes us reconsideration traditional approaches and technologies. The consequence, there is the question what to do with all the available data. The potential value for marketing, financial and other businesses is huge.

In order to organize Big Data, In-Memory Data grids (IMDGs) are considered the best approach. IMDGs with off-heap storage are even more influential, allowing data-centric enterprise products to overcome certain limits of the Java platform, such as memory and performance restrictions.

As the amount of data that (large) companies produce and store, grows exponentially, databases will hit a limit. Accessing your data without a performance penalty simply will not be possible. The answer to this is using an IMDG.

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Nanocomputing -Trends and Applications

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After the discovery of first computer, a lot of revolutions came in the computer industry. After Supercomputers, the demand for smaller and faster computers is increasing tremendously past few years. Numerous advances came in computer fabrication technology that resulted into the evolution of powerful and extremely small computer system architectures. Nanocomputing made it to produce computers that have reduced physical size, high computing power, high performance and more responsive than the computers we had before. Nanocomputing is an evolving paradigm that provides the speed and performance of supercomputers at much reduced physical size. From past few years, we were working with solutions that are based on generic microprocessor architectures and brute force miniaturization of transistors to improve the responsiveness and performance of computers. Except difference in physical scale size, Electronic computers operate in same way as present day microcomputers work. Nanocomputing has shown its impact in many industry applications such as Carbon nanotubes, Life sciences, Robotics, Power systems, medical science etc. With emerging trends in nanocomputing, it is becoming the crucial concept of consideration in industries.

Keywords - Nanocomputing, Quantum computing, biological computing, molecular computing, types of Nanocomputing, trends in Nanocomputing, applications of Nanocomputing.

Introduction

What is Nanocomputing? - A nanocomputer is computer with microscopic physical dimensions. The nanocomputing is an emerging field of nanotechnology which uses very small or microscopic, nanoscale devices. Nanocomputing is a new paradigm to computing using small devices and individual molecules. In nanocomputers, more and more transistors are squeezed into silicon chips, which make Integrated circuits (ICs) capable of high storage capacity and processing power. The atomic structure of matter imposes the limit to the number of transistors per unit volume. The arrangement of electrons provides computational output. The architecture called "crossbar switching" places molecules at the intersection of the nanometer scale wires. These molecules provide strong coupling between wires and high computational functionality. An area of consideration is the fabrication of these nanoscale systems. There are some problems like techniques to create arrays of nanostructures, organizing nanodevices into these useful architectures, getting data input and output and performing computing etc. which are not yet solved. Whereas the nanocomputing has potential to change the way computers are used presently. With nanocomputing device technology advances, computer architectures and IC processing capabilities have been increased. Artificial Life and Central Processing Unit become feasible commercially and make industry adopt nanocomputing.

Classes of Nanocomputing - We can divide nanocomputing into three main classes according to the performance of devices, cost and physical size. These are –

1) High Performance Computing –The demand for computers grew rapidly and focus is on high performance. Supercomputers are designed for high performance but they are much expensive and use cutting edge technology for this purpose. If nanocomputing reaches its highest density levels and maintain the scaling we expect from silicon chips used, this can help to use supercomputing applications with lowered price and high performance. Self assembly makes these systems very inexpensive, thus leads to new field for example called ubiquitous computing. High Performance Computing had several bottlenecks like Host computer bottleneck, network infrastructure bottleneck and application behavior bottlenecks.
2) Inexpensive and cost effective computing- Some applications require nanocomputing systems which should be capable of ad hoc networking, power scavenging, distributed resource management, fault tolerance at the system level. Hence, programming such systems require thousands of processors, new modeling techniques, knowledge of machine learning to produce efficient globally accepted system.
3) Size or nanoscale computing – Sensors based on nanoelectronics are used to provide interface to real world systems at microscopic or nanoscale level. This is helpful when we cannot move data from one location to another or from one remote processor to other. This type

of computing is useful in biological systems, sensors and actuators, molecular computing, molecular sensors. Due to very small size of nanoscale devices, they are used in body implantable devices to carry drugs, imaging of internal organs, electrical stimulation and other medical purposes.

Nanocomputing is a new paradigm used to enhance the computing speed at small sizes.

Trends in Nanocomputing

There are five trends proposed in nanocomputing. These are described below:

1. Quantum Computing
2. Molecular computing
3. Optical Computing
4. Biological Computing

The brief description is given below and related applications of nanocomputing:

Quantum Computing - Quantum mechanics describe some rules which are different from classical computing. Boolean logic and algorithms are used in traditional computing environment and are associated with variables in the form of 0 and 1. In quantum mechanics, the basic variable is called as Qubit. A Qubit is represented as normalized vector in Hilbert space. Qubits are slightly different from Boolean logic used in gates, thus it gives new possibilities to quantum field. In Quantum computers the power of atoms and molecules is harnessed so as to perform memory and other processing tasks. Quantum computers are more faster in performing calculations than any other silicon-based computers.

Conventional digital computers store information in the form of 0's and 1's, using bit representation, while in quantum computing quantum bits(qubits) are used to store information in 0's or 1's or both at the same time. A quantum computer uses two-mode logic gates. These modes are- XOR and Q01 mode. The Q01 mode has the ability to change 0 into a superposition of 0 and 1.This Q01 logic gate is not present in classical computing. Quantum mechanics and Quantum physics follows two principles- Principle of Superposition and entanglement.

Superposition - In superposition any particle behaves in a way that it has both states 0 and 1 at the same time. A qubit behaves like an electron in magnetic field. In this magnetic field, the spin of electron can be in align with the field(spin-up) or opposite to the field(spin-down). This all happens at a appropriate level of laser light. Suppose this happens at 1 unit of laser energy, but if we decrease the laser energy to its half, the state of superposition will be posed by the electron. That means, the electron is in both states at the same time simultaneously. It has been observed that number of computations that a quantum computer can perform is 2^n where n is the number of qubits used.

Entanglement - When pair or groups of particles interact with each other or they are generated in a way that quantum state of each particle cannot be descried independently to each other, this physical phenomenon is known as quantum entanglement.

Quantum computers are useful where we need to solve highly complex optimization problems in the areas like machine learning, cyber security, image analysis, financial analysis, software and hardware verification and validation, cancer research domains.

Molecular Computing - In molecular computing individual molecules are used as microscopic switches. It has been observed that molecular devices are easy and potentially cheap to make. This is also known as DNA computing as the basic unit of all cells is gene and a gene is made up of DNA which behaves as information storage systems. In cells, the information is processed and retrieved at molecular level. At molecular level, the gene expression of a cell is always controlled. In bacteria also all aspects of gene expression can be controlled easily. The behavior of one molecule cannot be predicted and thus intrinsic unreliability is an important aspect of molecular computing.

There are many genetic algorithms proposed in DNA computing. Adleman's solution to the Hamiltonian path problem is solved using DNA computing.

Applications of molecular computers are- human interference or manual operation is not needed for complex computational problems, which was not possible in earlier biomolecular computers.

The information is processed in molecular form that is a trillion computers per microlitre.

Molecular computing analyses and thus helps in logical control of biological processes.

Three modules - computation module, input module and output module are used in molecular automation and automation transition probabilities.

Optical Computing - An Optical computer operates using photons in visible light or infrared beams for digital computations. In non-optical computers we use electric current for computations which is only 10 percent of the speed of light. In optical computers there is no shortcomings related to short circuits which are possible in electric current based computers.

In optical computing new conducting polymers are used to make components which are much faster than silicon based computers. The advantages of optical computing are that light does not need insulators, no heat dissipation and many beams of photons with different color frequencies can be targeted simultaneously and these light beams travel in parallel. There were some problems posed with conventional systems like electronic circuits limit the network speed and have a physical limit. With the rapid growth of internet and demand of terabit speed, optical computers came into development. Logic gates, holographic based truth tables, logic based on gratings, holographic storage are some devices used in optical computing.

Application areas of optical computing include communication, Fiber Channel Arbitration Loop, hybrid topologies and switching.

Biological Computing - Biological computers are a kind of biosensors and are mostly used in medical applications. Biological computing has emerged as an interdisciplinary field which uses molecular biology, computer science, mathematics and chemistry to the human body activities.

Biological computer is a device which is implantable and is designed for performing tasks like monitoring the body's activities and inducing therapeutic. The whole process is done at molecular level or cellular level.

In biological computing we are concerned with two type of technical issue which are positional control(positioning of molecular parts so as to facilitate assembly of complex structures) and self-replication.

DNA is fundamental building block of molecular and biological computers. DNA, a biomolecule is a store for genetic information and is a less active participant of reaction of networks.

Applications of Nanocomputing - Nanocomputing is an interdisciplinary field of research in nanotechnology. Carbon Nanotubes are the basic component in nanoelectronics. Nanocomputing is used in quantum computers and displays.

Nanotechnology is growing in the fields like nano devices to control and monitor human body activities, bio computers, DNA research in molecular computing and eliminating drawbacks of classical computing.

Conclusion/Future Work

Nanocomputing is a growing field of technology which covers almost every domain of our lives. There is a bright future for biological and molecular computing when CPU will be completely replaced by biological molecules and silicon chips based computers will be a past. Nanocomputing gives real time solutions to many practical problems. Optical computing also has its own way in the industries. Nanocomputing seems to take some years to find its way to the common man and will provide growth in every area of technology.

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Nano-computing: Perceptible trend and their Applications

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Technology is just like a river, always moving forward, never stopping. Nano-computing [1] has gradually become an essential part of our real lives. It reduces size of computing devices which may work in the area beyond the reach of conventional computing devices. It describes those components that use extremely small or nanoscale devices.

The movement from SSI to VLSI reduces the size of computers and makes it faster comparatively. In today's technologically driven world we all have fast computers for scientific computing and other applications.

Nano-computing [2] is an inter-disciplinary field of research. It is a new optimistic approach to provide the fast computing speed and power of supercomputers at very small physical size (extremely small as about one billionth of a meter devices). This is the new quest of computing and used in various applications.

1. Introduction:

In this innovation-fueled world where nano concept has hovered almost every sphere ranging from the size of SIM-Cards to the size of gadgets, everyday different approaches are being researched and developed to reduce the size of our computing gadgets and make them nimbler and efficient towards the environment.

In early days (mid-1940s) of the invention transistors and IC's were the base of the digital computers. Digital computers used to be large in size. With the growing years, the accuracy and precision increased whereas the size decreased. The concept of Nano-computing has brought a whole new revolution in the field of medical, space engineering, defense etc. by delivering high end precision devices capable of performing way too intricate and cumbersome processing.

The demand of Nano-computing devices grew rapidly due to the focus on Portability, Performance and efficiency. Nano-computing, a totally non-clichéd concept, challenges the abilities of the Supercomputers in a perfectly fabricated and smaller version of it.

Supercomputers are comparatively bulky robust structures and inflexible of mobility. They outperform the limits of any conventional computing device. The architectures of supercomputer include pipelined vector processors [PVP], array processors [AP] and systolic array processors[SAP].

2. Comparison between Current and future [3] architecture of nanotechnology.

Current Architecture	Future Architecture
Boolean logics are used	Neural networks, CNN, QCA...will be used.
Binary data representation is used	Associative, patterned, memory based etc. data representations will be used.
Based on 2 D	Based on 3 D
Homogeneous	Non homogeneous
Globally interconnected	Nearest neighbour interconnected
Synchronous	Asynchronous
Von Neumann	Integrated memory/logic
3 terminal	2 terminal

3. Perceptible trend in Nano-computing

Nano-computing is a totally new emerging technology enhancement.To enhance the computing speeds at tiny sizes there are five perceptible trends in Nano-computing. They are:

1. Quantum Computing
2. Molecular Computing
3. Biological Computing
4. Optical Computing
5. Nanotechnology Approach

The following sections briefly explain these trends and the applications of Nano-computing.

3.1 Quantum Computing

Traditional computing is based on Boolean logic and algorithms. A bit is a basic variable having two possible values i.e. 0 or 1 which represent the state ON or OFF(for 0 it is OFF for 1 it is ON). A new approached are introduced that offers a new set of rules known as Quantum mechanics. In quantum computing the basic variables is known as QUBIT which is represented in 2D Hilbert space as a normalized vector.

The implementation of logic with QUBIT is quite different from Boolean logic, and this opens a lot of possibilities and made quantum computing very

interesting.

The Quantum computer can work with logic gates having two-mode: XOR [4] and a mode we'll call QO1 (the ability to change 0 into a superposition of 0 and 1, a logic gate which cannot exist in classical computing). If a QUBIT has two aspects than there are four simultaneous, independent states (00, 01, 10, 11); if it has three aspects, there are eight possible states, binary 000 through 111, and so on.

The principles of superposition and entanglement are the two important relevant aspects of quantum physics.

Quantum computers might prove especially useful in the following applications:

a) Used to Break ciphers

b) Used for Statistical analysis data

c) Used for Factoring large numbers

3.2 Molecular Computing

Richard Feynman realized that the cell was a molecular machine and at the molecular level all the information was processed.

All cellular life is divided into two types:

a) Prokaryotes

b) Eukaryotes.

Eukaryotes are those having a nucleus like plants, animals, fungi and protests whereas prokaryotes are those having no nucleus like bacteria.

- As we know that Bacteria has no nucleus inside so it is unicellular and it is too much smaller than eukaryotic cells and it is very difficult to understood in comparison of Prokaryotic cells. Gene is the fundamental unit of all cells.
- A gene is made up of information storage system known as DNA.
- DNA is made up of molecules which are known as nucleotides. Each nucleotide contains three groups i.e. a sugar group,a phosphate group, and a nitrogen base.Nitrogen bases are basically four types

1) Adenine (A),

2) Thymine (T),

3) Guanine (G) and

4) Cytosine (C).

There are a Hydrogen bonding between specific bases i.e. A with T and G with C. DNA encodes information in one strand as a specific sequence of the nitrogenous bases.

DNA replication process is not spontaneous as nucleotides are present. For the synthesis of nucleotides and DNA agent are there known as enzymes made up of proteins. Apart from this an intermediate molecule named as messenger RNA (mRNA) are involve in the transformation. By using Transcription process DNA is converted into RNA and translation is the process to generate proteins by using RNA.

3.3 Biological Computing

In biological computing the specificity, convenience and programmability of DNA complementarily are exploited.

There are two major technical issues. One is holding and positioning molecular parts to facilitate assembly of complex structures and the other issues are self-replication.

The important point of Molecular Biology is to describes how the genetic information are inheriting by child from the parents which is stored in DNA. The genetic information is used to make single copies of that DNA and also transferred from DNA to RNA and to protein.

There are two primary approaches:

1) Cellular gates

2) Striker based computation

In cellular gate method, within a single cell we build a large number of logic gates. Proteins which are produced in a cell are treated as signal for computation and DNA genes as the gate.

In striker based model the DNA strands are used to represent information. A DNA strand is consisting of four basics i.e. A, T, C, and G as shown below:

A ⟷ T
C ⟷ G

Now again suppose we have two DNA strands in the form of TAGCC and ATCGG then together they will be:

.....A T C G G .....

.....T A G C C .....

3.4 Optical Computing

In the comparison of light, the electronic signal travels very slow. In 1980s the Optical computing was a heated research area but due to the non-availability of materials to make optical chip the progress goes down. With the limitations imposed by the electronic components electro-optical devices are available now a day's.

Due to the availability of new conducting polymers components are many times faster than their silicon counterparts and it hikes the Optical Computing. Light does not need insulators. Using different color frequencies one can send simultaneously hundreds of photon streams. It reduces the computation time as where it requires 11 years to compute could require less than one hour on an optical one. Light provides a large bandwidth and has low loss in transmission.

3.5 Nanotechnology Approach

Nanotechnology is the technology that deals with dimensions and tolerances of less than 100 nanometers. Especially the manipulation of individual atoms and molecules are done.

There are basically two approaches for synthesis of nano material and fabrication of nano structure:

1) Top-down approach

2) Bottom –up approach

In top-down approach there are cutting of materials in nano size but in bottom-up approach it is self assembly.

4. Applications

Super computers are enormous in design as well as applications. Supercomputers are very expensive due to the use of high speed processors and this trait ceases its application area. Nano-computing trend devices offer similar power, but in a cheap and light structures. Nano-computing is an emerging field of research. There are various applications of Nano-computing [5].

1. High performance computing.
2. High-Density inexpensive computing
3. Micron scale in-situ computing
4. In Life Sciences, Robotics and

Power systems.

5. Conclusions

Nano-computing is an important point in the rise of technology. Number of research is going in this area. Till date the basic principles have been used but it may be a decades from now when the fruits of Nano-computing reach the common man.

6. References

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Dr. Rakesh Ranjan [Membership No. 00078780] is currently working as Assistant Professor in PSIT (IT Dept) of AKTU University, Lucknow, India. He has around Eighteen year of teaching experience. The area of interest is Cryptography and Network Security, Theory of Automata and Design Analysis of Algorithm. He has a lifetime membership of CSI. He is involved in various academic activities in AKTU. (Email- sngrak@gmail.com)

Robotics Research Centers in India

Compiled by: **Dr. Vipin Tyagi,** RVP, Region-III, CSI

- **Autonomous Robotics Lab**, IIT Delhi
  Research Areas : Robot Control, Mobile Robotics, Tele-Operation of Robots, Computer Vision based Robot Control, Haptics and Virtual Reality for Robots, Education in Robotics
- **Advanced Reactor Technologies and Nuclear Power** Bhabha Atomic Research Center
  Research Areas : Robotics & remote handling
- **Centre for Artificial Intelligence & Robotics** Defense Research and Development Organization, Bangalore
  Research Areas : Surveillance/Reconnaissance robotics, Industrial Robotics, Educational Robotics, Search and Rescue Robots, Autonomous Robots
- **Central Mechanical Engineering Research Institute** CMERI, Durgapur, West Bengal
  Research Areas : Robotics and Mechatronics, Advanced Manufacturing Technology, Rapid Prototyping and Tooling
- **Central Institute of Mining and Fuel Research** CIMFR, Dhanbad, Jharkhand
  Research Areas : Application of 'Robots' in difficult and risky situations
- **Centre for Robotics and Control** IIT Indore
  Research Areas : Parallel Robots and Platforms, Underwater and Field Robots, Rehabilitation Robots
- **Center for Robotics and Intelligent Systems** BITS Pilani
  Research Areas : Humanoid Robots, Autonomous Ground Vehicles, Quad-Rotors
- **Intelligent Systems Laboratory** IIT Kanpur
  Research Areas : Intelligent control, Assistive robotics, Cognitive modeling and Quantum learning systems
- **Mechatronics with Robotic Applications Lab** IIT Ropar
  Research Areas : Customised Reconfigurable Manipulators, Integrated Design and Fabrication of Robots using Evolutionary Algorithm
- **Mobile Robotics Lab** IISc Bangalore
  Research Areas : Swarm Robotics, Multi-Robot Systems, Cooperative Robotics, Computer Vision, Aerial Robotics, SLAM
- **Robotics Lab**, IIT Guwahati
  Research Areas : Bio-Inspired, Networked and Emotional Robots, Intelligent Cyber Physical Systems, Speech - Analysis, Recognition & Categorization
- **Robotics Laboratory**, IIT Madras
  Research Areas : Underwater Robotics, Mobile Robotics, Manipulator Kinematics, Medical Robotics
- **Robotics and Intelligent Systems Lab** IIT Kharagpur
  Research Areas : Underwater Robotics, Humanoid Robotics, Biomedical Robotics, Virtual and Remote Robotics
- **Robotics Research Lab** IIIT Hyderabad
  Research Areas : Mobile and Aerial Robotics, Robotic Vision, Mechanism Design and Multi Robotic Systems
- **Robotics and Artificial Intelligence Lab** IIIT Allahabad
  Research Areas : Human Robot Interaction, Humanoid Robots, Autonomous Robotics
- **Robotics and Automation Lab** CSIR, CMERI Durgapur
  Research Areas : Underwater Robotics, Mobile Robotics, Robotics and Automation, Dynamics and Control, Sensor Fusion
- **Robotics and Control Lab** IIT Roorkee
  Research Areas : Space robots, Legged Robots, In Vivo robots, Bionic robots, Dynamics and Control, Fault identification and reconfiguration
- **Surface Robotics Lab** CSIR, CMERI Durgapur
  Research Areas : Surface Robotics, Mechatronics

e-Yantra [http://e-yantra.org/] is an initiative to spread education in Embedded systems and Robotics by IIT Bombay sponsored by Ministry of Human Resource Development through the National Mission on Education through ICT (NMEICT).

Importance of Secure Coding in Making "Digital India" Successful

Shilpi Charu
Executive Content Solutions, Skill Cube

Santosh Kumar Gupta
Manage Content Solutions, Skill Cube

Introduction

Sharp rise of internet and its usage have commenced a massive digital proliferation across the world. The influx of digital connectivity through smart phones and IoT enabled devices has carved a new, entirely different "business model" to emerge that is environmentally impactful, socially effective, and economically beneficial. Nowadays, people's personal identifiable information is drifting into a digital form, there by ushering towards an open and globally accessible network. Digitization has woven into our daily life for every single task. As that happens, the risks associated with the digitization has become unnerving and daunting. The sense of security is a prime concern with every click. As the businesses across the world are transforming the mode of operation, digital platform is attracting huge volumes, hence it is imperative that we embracerobust security measures and protections to ensure security of business operations. Security can be achieved in the digital era by introducing secure coding in the backstage formulation of digital applications. Over the last two years, the Indian economy has witnessed radical enablers which shall play an important role in taking digitization into a next level. Some of these enablers are:

E-commerce evolution

The evolution of e-commerce has completely transformed the way we ever shop. E-commerce has evolved as an entirely new idea over the course of last 10 years and has now become a major contributor in the world's economy. Since then, the e-commerce has advanced as a fully functional, operational, and personalized shopping experience. E-commerce ensures the business reaches the crowd, reduces the cost, and develops binding relationships with their customers. The digital transaction, nevertheless, risks the consumers to disclose their sensitive personal information to the third party or the vendor of e-commerce platform. With the increased usage of e-commerce, the security issues and threats have also increased. Some of the e-commerce threats are:

- Financial fraud
- Identity theft
- Disruption of service
- Illegal intrusion of customer data

There are many more threats related to e-commerce which requires such platforms to be more secure while handling the customer's sensitive data. To ensure the security of e-commerce platforms, secure coding at the back end is a necessary and required practice.

Demonetization

Recently, on November 8, 2016 government of India announced the demonetization of both 500 and 1000 currency notes. As per the government, the demonetization would curtail the economic imbalance and clamp down the illegitimate and forged cash transactions in illegal activities. The concept fits well with the view of financial inclusion and digital India initiative to improve the socio-economic growth of marginal sections of society. Again, with the increased usage of digital platforms, security is the main concern. Because, digital platforms are potential targets for cyber criminals. With the increased usage of digital platform after demonetization, the risks have increased as the following incidents depict:

- Fraudulent use of digital payment networks
- Incidents of data theft
- Misuse of data
- Hacking of digital wallets

People want their data to be secure and safe while dealing with digital platforms. Therefore, to ensure security, mobile and web application developers need to include secure coding as a regular practice while developing the application.

Digital India initiatives

Digital India evokes the image of a networked economy that aims to connect over 1.2 billion people across the country. It prepares India for the future Knowledge. Hon'ble Prime Minister Shri Narendra Modi has initiated the Digital India campaign for transforming India into a digitally empowered technological society. Some of the Digital India initiatives include: mygov.in, digi locker, e-sign framework, digitize India platform, national scholarship portal, e-hospital, bharat net, and center of excellence on IoT. With these initiatives, cyber security has become the prime concern and forms an integral part of our national security. The risks associated application vulnerabilities and internet threats increases as the society is moving towards digitization.

Adoption of secure coding concept

Software developers need to know the essence of secure coding, which can help in protecting the information that are accessed or provided by different web and mobile application users. The best security practices, if included, in the development phase of applications will ensure: confidentiality, integrity, and availability of the information. There are some coding mistakes that are generally and inadvertently introduced in the common coding practices that increases the risks and vulnerability

areas in the digital application. Therefore, secure coding must be incorporated in each development stage of the web application to provide protection against cyber-attack, cybercrime, and cyber espionage. Secure coding best practices when included while developing an application gives security against the top 10 OWASP vulnerability areas that are:

1. **Injection**: occurs when a web application sends untrusted data to an interpreter as a part of a command or query.
2. **Broken authentication and session management**: occurs when developers build their own custom authentication and session management schemes that do not consider exhaustive security considerations.
3. **Cross site scripting**: occurs when an application takes untrusted data and sends it to a browser without proper validation or escaping the input data.
4. **Insecure direct object references**: occurs when an application uses the actual name or key of an object for generating web pages and do not verify the authority of the user who is accessing the target object.
5. **Security misconfiguration**: occurs when secured configuration is not defined and deployed for application, frameworks, application server, web server, database server, and platform.
6. **Sensitive data exposure**: occurs when sensitive data is not encrypted using strong encryption algorithm, not using strong key generation and management method, and not implementing infallible password hashing techniques.
7. **Missing function level excess control**: occurs when an application does not protect its functions with proper access control, thereby allowing access to functionality without proper authorization.
8. **Cross site request forgery**: occurs when web applications allow attackers to predict all the details of an action. As browsers send credentials like session cookies automatically, attackers can create malevolent web pages that generate forged requests appearing genuine.
9. **Using components with known vulnerabilities:** occurs when application uses various components that are not up to date.
10. **Unvalidated redirects and forwards**: occurs when application redirect users to other pages or use internal forwards.

Significance and Impact

Secure coding is no longer an option - it is a mandatory concept. It helps in aligning the digital platforms and services as per the best security standard. Some of the key benefits of incorporating secure coding concepts include the following:

- It helps in developing secure and robust application that practically reduces the security threats, risk areas, and vulnerabilities
- It safeguards against the accidental introduction of risks to prevent cyber attacks
- It deploys security controls like input validation, access control, data protection, etc. to strengthen the code from hacking
- It minimizes development efforts in the Software Development Life Cycle
- It avoids regulatory penalties arising from loss of sensitive information pertaining to customers and employees

One can secure the web and mobile applications by applying the secure coding practices in the development phase.

How can secure coding be the game changer?

With the implementation of the best secure coding concepts, an organization can save time while understanding the risks to deal with and learning the ways to fix the cyber issues in future. Best practices of secure coding help in providing complete protection and management of applications, whether it be a web or mobile based. Secure coding in software development and assurance if focused in the cyber driven world will deliver a secure and reliable platform to grow. It also reduces the vulnerabilities and risks areas that makes it impossible for cyber attacker to intrude in the software. It is the rudimentary need of the digital applications development and must be incorporated at the outset. When included in regular practice, secure coding reduces the vulnerability areas in an application and provides a sense of secure transactions with respect to digital India initiatives. Therefore, it is very important to implement robust secure coding concept, which will pave the way for building India strong & stable in the realm of trade & commerce and for making digital India a successful campaign, thereby guaranteeing digital furtherance and India's growth and development. ■

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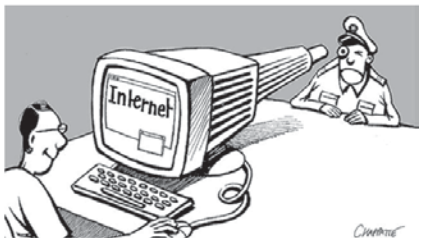
Is Internet Really Private ???

Nilesh Advani

Asst. Professor, Marwadi University, Rajkot

We know internet has become one of the basic requirements of all who use mobiles and of course computers. Although there are adequate uses for internet but amongst them most common uses are E-Mail, Web Surfing and Transactions which are ranging from any E-Commerce activity to online bill paying. Although E-Mail predates the internet, the internet's growth has made e-mail a staple of modern life.

E-Mail has replaced traditional letter system. Through E-Mail people transfer all the confidential information with minimal or no concern. People using e-mail or any other media on Internet believe that whatever they send is safe and only their related receivers can only read the content what they have sent.



When people do web surfing, they have the same feeling of security and privacy. When you use your Web browser, it appears to preserve anonymity because you only need to provide a URL. Secure Socket Layers are used along with Transport Layer Security as a layer below it by HTTPS. This is done by application to provide security by means of Encryption-Decryption for the user requests and to make sure that Server returns all the requested pages. This feature prevents eavesdropping and eliminates possible attack modalities. Today we use HTTP and HTTPS layers for the use of e-Commerce based applications which includes online banking, online payment and other online services. Whereas this URL feature provides security for your Internet transactions, most of browsers today lets you erase the browsing history on your computer.

Internet Privacy : A Gray Area

We can define Privacy as "a state in which one is not observed or disturbed by other people". Whereas this definition generally applies to the aforementioned activities, it doesn't universally apply in the realms of the Internet owing to various forces, including geopolitical concerns and law, and the Internet's physical structure.

Everywhere these terms and conditions should adhere to federal law and regulations. However, I must say that the Emergence of Internet has create a significance PAUSE in the area of Internet Regulations and Technology Law. As a result, individual privacy in the Internet isn't well defined, and the definitions tend to limit the privacy afforded to individual users. Similarly, the most of legislature and various federal agencies face the task of developing laws and regulations ensuring that ISPs don't infringe on personal privacy.

E-Mail Accounts

Google's Gmail, Microsoft's Hotmail, Comcast, and Yahoo are popular hosts for personal email. Along with Google many other online giants force you to accept the agreement which says that you must allow them to access your data whether belongs to email or contacts. This definitely supports data mining. One example of such data mining involves the selection of advertisements placed on your email account page (for example, "Sponsored Links" in Gmail). Similarly, email providers monitor your activity to suggest email addresses.

Even though you typically e-sign a user agreement for the privilege of using a service provider's email, the federal law governing email still applies, and it too limits privacy. Electronic Communications Privacy Act of 1986 (ECPA) was passed by US Congress in order to expand restrictions of government which was including transmissions of electronic data. **India also has developed an act called Information Technology Act (ITA) which is also known as ITA-2000.**

The Law of ECPA has made official to snoop the transmissions of Internet. At the same time, it also allows E-Mail provider to go through stored messages in the mailbox. This can include all the unread mails, mails sent by you, mails received by you under various conditions.

The ECPA controls draft emails stored on a cloud service such as Gmail or Yahoo. Cloud service providers can be compelled to disclose the email with a mere subpoena. After you write and send the email, the full warrant standard (Wiretap Act) protects it as it passes over the Internet.

Regarding unread email stored with a service provider for 180 days or less, once an email reaches your inbox, the portion of ECPA called the Stored Communications Act governs it. As long as the email remains unopened, the service provider can be forced to disclose it to the government only with a warrant.

The ECPA specifies that all email after 180 days loses the warrant

protection and is available with a subpoena that's issued without judicial approval.

Web Searches and Website Visits

Recently we all have seen that while searching the information or products, we get the list of products or information which we searched earlier. This indicates that now the searching information is saved for future use. Third-Party companies are allowed by websites. They allow to install such files which allows them to track web users and their habits while surfing or doing shopping on the internet. This is used to create database of habits by particular user.

A test case was generated by Mr. Soltani on this which is available on WSJ (Wall Street Journal). You can see the list of web sites tested on http://blogs.wsj.com/wtk/ where as the tracking information on http://online.wsj.com/article/SB10001424052748703977004575393121635952084.html

Delivery of Data

Consider to have a very basic knowledge of computers. By this we at least know that both TCP/IP and Open Systems Interconnection seven-layer model require a transport layer to deliver data to appropriate application process on the host computers. In order to transfer the data packets are being created which contains data, source address and destination address.

By simply, Eavesdropping on the transport layer header, someone can discover the user's behavioural patterns. For example, can know frequency of web sites visited.

Information Technology Act (ITA – 2000)

The Information Technology Act, 2000 (also known as ITA-2000, or the IT Act) is an Act of the Indian Parliament (No 21 of 2000) notified on 17 October 2000. It is the primary law in India dealing with cybercrime and electronic commerce. At times, many amendments are also done in ITA in order to cope up with ongoing issues of Cybercrime.

The major issue here is, ITA deals with offences and their related penalties where major of the offences are concerned to Tampering of data, information stolen issues, publishing private documents, sexual acts, etc.

People also should know that where their searching data will be utilized. They should also have right to give grant or revoke about the usage of their data.

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About the Author

Prof. Nilesh Advani is currently Chairman of CSI Rajkot Chapter and holding almost 18+ years of experience which includes 4+ years of International Experience. He has written 4 books with C#.NET, ASP.NET, Java and Fundamentals. Currently working as Assistant Professor in Marwadi University, Rajkot and working on M-Commerce related research area.

Minutes of Meeting of Hony Secretary's interaction with NCR Chapter OBs & Fellows India International Centre

16th April 2017, 7:00 PM

Attendees:

1. **Prof. A K Nayak** - Fellow & Hony National Secretary
2. **Brig. S V S Chowdhry** - Past President
3. **Ms. Nita Lal** - Fellow
4. **Dr. S S Agrawal** - Fellow
5. **Col. Shivraj** - Delhi Chapter
6. **Mr. Piyush Goyal** - Patron, Ghaziabad Chapter
7. **Mr. Saurabh Agrawal** - RSC, Region 1
8. **Dr. Manoj Sethi** - Chairman, Delhi Chapter
9. **Dr. Sunil Kr Pandey** - Ghaziabad Chapter
10. **Mr. Anil Kr Sinha** - Delhi Chapter
11. **Mr. Suresh Kr Mehta** - Treasurer, Gurgaon Chapter
12. **Mr. Akshay** - Delhi Chapter
13. **Dr. R C Tripathi** - Noida Chapter
14. **Mr. Hoshiyar Singh Katyal** - Noida Chapter
15. **Mr. Kapil Gaur** - Noida Chapter

Background:

Hony Secretary Prof A K Nayak was in Delhi to attend 'Global Exhibition on Services' (GES) organized by CII where CSI was a partner organization. CSI's participation in GES was managed by all NCR chapters. Prof Nayak also inaugurated CSI's booth at the exhibition. He took this opportunity to call for a networking meeting of all chapter OBs and senior CSI members in the area.

Meeting started by Prof Nayak giving update on CSI's activities and sharing with participants how CSI is growing. Prof Nayak also shared updates from the 1st meeting of the newly elected ExeCom. Various suggestions given by the members were as follows:

1. Increase industry participation in CSI so as to benefit student members, who are the largest stakeholders
2. Actively participate in PM's initiatives like 'Digital India', 'Start Up India' and 'PM Kaushal Vikas Yojana to stay relevant in today's digital world and contribute to the nation.
3. Formation of Government Interface Cell at the National level to interact with government authorities at the central and state levels and increase CSI's involvement in government policies
4. Improve CSI branding by expanding the presence in all the forms – print media, electronic media and social media
5. Improve the CSI website
6. Chapters should get some revenue share from Institutional and Student branches membership fee.
7. Give all chapters database of all their professional and student members and also more travel grants for attending convention
8. National Eligibility Test for Engineering students which can be used as a benchmark by the industry for recruitment purpose
9. Updation of CSI speakers and experts regularly
10. Technical committees of IFIP should be constituted

CSI National Student Coordinator (NSC) Activities

Prof. Prashant R. Nair, CSI NSC inaugurated a CSI Student Branch at Mohandas College of Engineering and Technology, Nedumangad, Trivandrum on 2nd May, 2017. College Director, Dr. Ashalatha Thampuran; Principal, Dr. S. Sheela and HOD-CSE, Dr. P. Jayaprakash participated in the inaugural ceremony

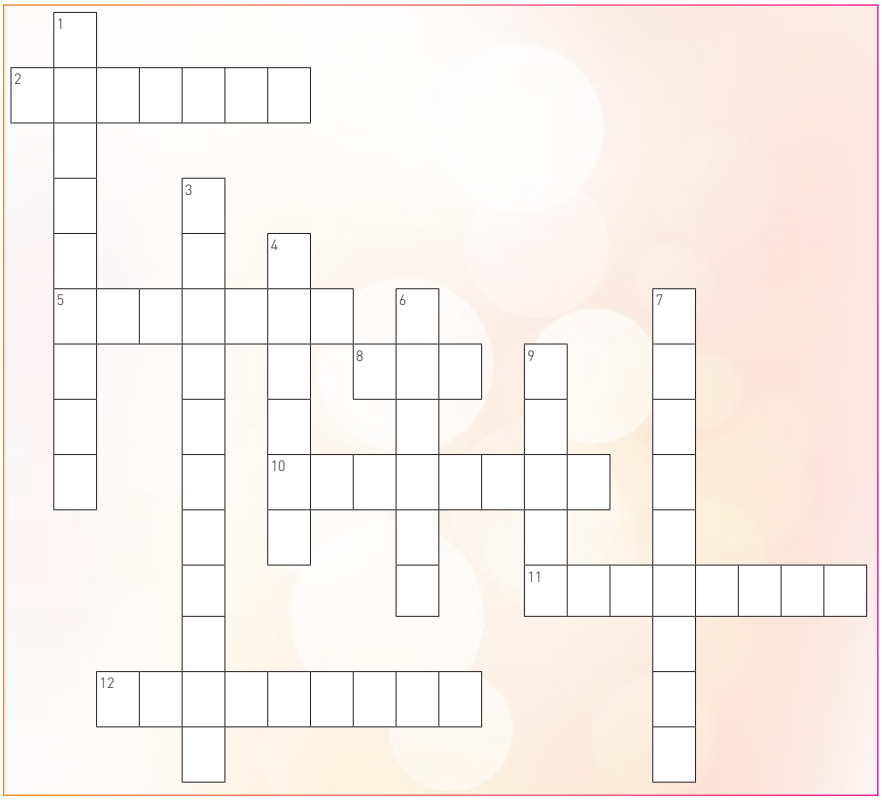
Prof. Prashant R.Nair, CSI NSC presented Best CSI Active Student Branch award to the CSI student branch of Amrita School of Arts & Sciences, Mysore on 30th March, 2017. College Director, Br. Sunil Dharmapal; Correspondent, Br. Venugopal; Principal, Prof. Vidya C. Pai; HOD-CSE & SBC, Prof. Gokuldev S and SB coordinator, Mr. Manishankar S. were present during the ceremony.

CrossWord »

Durgesh Kumar Mishra
Chairman, CSI Division IV Communications
Professor (CSE) and Director Microsoft Innovation Center, Sri Aurobindo Institute of Technology, Indore. Email – drdurgeshmishra@gmail.com

Test your knowledge on NANO COMPUTING

Solution to the crossword with name of first all correct solution provider(s) will appear in the next issue. Send your answer to CSI Communications at email address csic@csi-india.org and cc to drdurgeshmishra@gmail.com with subject: Crossword Solution – CSIC May 2017 Issue.



CLUES

ACROSS

2. Nano-scale particle
5. A suspension of fine particles in a gas
8. A microscope
10. A holo cylendrical structure of nanometer dimension
11. The extent to which a chemical is poisonous
12. Synonym for fullerene

DOWN

1. A layer of atom/molecule thickness
3. Immitating biological systems
4. Process of adding impurity to a semiconductor
6. Complete set of genetic material
7. An artificial molecule
9. The quantum-computing analogue to a bit

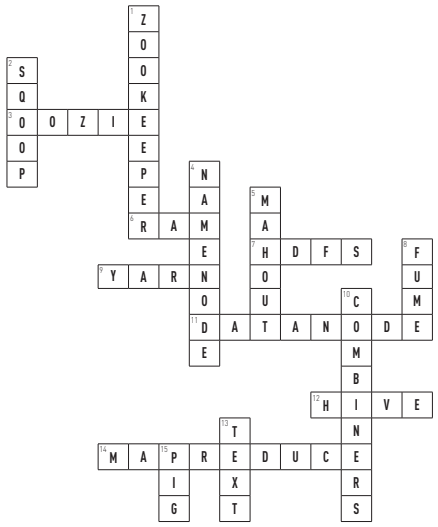
We are overwhelmed by the response and solutions received from our enthusiastic readers

Congratulations!

All nearby Correct answers to April 2017 month's crossword received from the following reader:

- **Ms. Priyanshu Jadon,** M.Tech., Sri Vishnav Vidhya Peeth, IndoreNashik
- **Prof. Kirti Patil,** Assistant Professor, MET's BKC Institute Of Engineering, Adgaon, Nashik
- **Bira sudhakar,** Assistant General Manager, Visakhapatnam Steel Plant, Visakhapatnam
- **Prof. Hiral Raveshiya**, IT Department, Universal College of Engineering, Thane, Mumbai
- **A. Vanathi**, Associate Professor, Aditya Engg. College, Rajahmundry, Andhra Pradesh

Solution for April 2017 Crossword



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AHMEDABAD CHAPTER

On the eve of 51st CSI Foundation Day CSI Ahmedabad Chapter and Gujarat University Accountancy Teachers Association & Indian Accounting Association (Gujarat Branch), Tally Education Pvt. Ltd. jointly organized a Faculty Development Program on 3rd March 2017. Inaugural address was given by Mr Saurabh Choksi, President, Gujarat State Universities Accountancy Teacher's Association and Mr. Jayesh Solanki, Chapter Chairman. Mr. Jayesh Solanki described about the achievements of CSI. Guest speaker Mr. Pugal AVP, Tally Solutions, Pvt. Ltd. shared the background of indirect taxation regime in India. More than 140 participants registered and actively participated.

The chapter organized a one day workshop on "Linux Administration" on 15th April 2017 for the faculty and students of Computer Science and Engineering in association with School of Computer Studies, Ahmedabad University. Tata Consultancy Services (TCS) was knowledge partner. Objective of the workshop was to create awareness about open source platform and encourage students and faculty to use Linux as their primary operating system. As Linux operating system is easy when you use daily else it is very difficult, said by Mr. Vishal Mehrotra, Open Source Global Head, TCS, Mumbai in his opening remarks for the workshop. The workshop was conducted by Mr. Niraj Bhatt, Linux Expert, TCS-Gandhinagar. To motivate participants of the workshop, Team CSI – AC including Dr. Sandeep Vasant (Chairman), Dr. Samir Patel (Vice Chairman) and Mr. Niraj Shah (Hon. Treasurer) were present during the opening and concluding remarks of the workshop. The workshop was concluded with interesting Q&A session and certificate distribution for the participants of the workshop.

BANGALORE CHAPTER

CSI Foundation Day was celebrated by CSI Bangalore Chapter on 18th March 2017. Dr Anirban Basu, President, Mr. Sanjay Mohapatra, Vice President, Dr. A K Nayak, Hon. Secretary, Mr. R K Vyas, Hon. Treasurer, Mr. Raju Kanchibotla, RVP-5, Dr. S Prakash, Chairman, Mr. Anbunathan Ramaiah, Hon. Secretary CSI Bangalore Chapter were present in the function. The program started with cake cutting. More than 50 Members included Fellows & Past Chairpersons attended the function

COIMBATORE CHAPTER

Installation of New Office Bearers Function held on 12th April 2017 with a prayer song to get the blessings of almighty. Mr. S Vishnu Potty, outgoing Chairman welcomed the dignitaries and the gathering. Dr. G Radhamani, Secretary, presented the annual report for the year 2016-17. Dr. M Sundaresan, Chairman, Nomination Committee, introduced the new office bearers for the year 2017-2018. Mr. N Valliappan, Incoming Chairman addressed the gathering. He gave insights on forth coming trends in the technology and the skills sets needed for new generation. Mr. A Sivabalan, Vice Chairman & Chairman Elect introduced the guest of the day Prof. Dr. K Ramasamy, Vice Chancellor, Tamil Nadu Agricultural University. Guest of the day Prof Dr. K Ramasamy, Vice Chancellor, Tamil Nadu Agricultural University, spoke about the history of various societies formed around the world. He shared some of the research projects that are related with Agriculture and Computer science. E-Governance should be enhanced for the betterment of administration, he added. He congratulated for successfully conducting CSI 2016 recently. He urged to help the agricultural projects that are related with Information technology to serve the farmers

and society. More real time research projects should be done in order to use it in the daily life. Then it was time for the new team photo session and thanks giving moments. Dr. G Radhamani, Secretary delivered the vote of thanks. The session came to an end with National Anthem.

HARIDWAR CHAPTER

Haridwar Chapter conducted the 4th Computer Science National Conference (NATCOM) on Contemporary Research in Computing and Informatics (CRCI-2017) on 25th March 2017. Mr. L S Maurya, Convener has briefly elaborated the theme. He discussed the three keywords included computing, informatics and contemporary. Prof. M N Hoda, Director, Bharti Vidhapith, New Delhi has illustrated the concept of learning. Mr. Aditya Murti (Secretary SRMS Trust) encourage the students to use all the opportunities. Chairman has released the Conference Souvenir and graced the occasion.

The Chapter in association with Faculty of Engg. & Tech. has organized a workshop on Android, Matlab and Solid Works on 7th April 2017. Around 150 students took part. The resource person was Mr. Alok Mishra, RCPL Noida delivered on Android, Mr. Rohan Kumar delivered on Matlab Programming and Mr. Ishu Sethi delivered on Solid work. The event organized by Mr. Suyash Bhardwaj Chapter MC Member.

NASHIK CHAPTER

CSI Nasik Chapter organized CSI Project competition 2016-17 for providing platform to the students to showcase their Project Ideas and Model. 85 project ideas were registered. Jury members from various domains like Academics, Industries and IT professionals were screened these ideas and 22 out of 85 ideas finalized for the further round. The final round of CSI Project Competition was held on 27th March 2017 at Digital Impact Square (DISQ), TCS Innovation Center, Nashik. Final round of CSI Project Competition stared with expert session for all project groups. Session was conducted by Mr S R Karode, CSI Fellow on the "Presentation & Communication Skills". Winners of Competition was "Smart Onion Warehouse Management" from SNJB's COE, Chandwad. 2nd Prize goes to "Automated Lecture Attendance System Based on Face Recognition" from NDMVP's KBT COE, Nasik. 3rd Prize awarded to "Log Based Analytical Engine Using Hadoop and Spark" from SIEM, Nasik and "Waste Management for Smart City" from SNJB's COE, Chandwad.

SIVAKASI CHAPTER

Valedictory function of Computer Society of India club was held on 13th April 2017. This function started with a prayer song. Ms. Suriya, Chairperson, IV-IT welcomed the gathering. The activities of the club during the academic year 2016-2017 was narrated by Prof. Maruthu Pandi. Annual report & Presidential address was delivered by Dr. Revathi, Past Chapter Chairperson. The presidential address inspired the students to participate in more competitions and events. The prizes were distributed to the winners and runners by Dr. Revathi.

TIRUCHIRAPPALLI CHAPTER

Tiruchirappalli Chapter organized the guest Lecture on Wireless Sensor Networks on 14th Mar 2017. Speaker for this Programme is Er Muthuramalingam, Asst. Prof., Dept. of CS and Engg., Bharathidasan University, Tiruchirappalli.

Tiruchirappalli Chapter organized the Guest Lecture on Goods and Services Tax (GST) on 11th April 2017. Speaker for this event is Mr T V Sundaram, Senior Manager, Enterprise Resource Planning, BHEL, Trichy

VADODARA CHAPTER

CSI, Vadodara Chapter Management Committee Meeting for the Year 2017-2018 was held on Saturday, 8th April 2017. Prof A K Nayak, Hon Secretary attended the meeting and formally handed over the CSI Patron Award to Mr Umakant Shah. He discussed various points with the MC members. He described that Chapter to conduct more events to generate more revenue. CSI is giving number of Awards to Individual & Chapter, and Vadodara Chapter should apply for various awards in future. Chapter can initiate Industry – Academia interaction program for students. CSI should arrange program for IT teachers to improve their knowledge level.

VELLORE CHAPTER

CSI Vellore Chapter and CSI VIT Student Branch organised a workshop on back end web framework using Django on 22-3-2017. Mr Pradyun, Palash and Hitesh. The speakers began the session by describing how the web works, how internet communications work and what servers and clients are. They proceeded to explain what Django is, why it is needed, its advantages, drawbacks and how it is structured. The users were then taught how to create a server and give a custom response to the client, aided by the presentations made by the speakers. Django is a high-level Python Web framework that encourages rapid development and clean, pragmatic design. Built by experienced developers, it takes care of much of the hassle of Web development, so focus can be on writing your app without needing to reinvent the wheel. It's free and open source. There were a total of 52 participants, organized by Prof Govinda, Prof Senthilkumar.

REGION-I

The NorthCap University, Gurugram

22-3-2017 - Coding Competition

23-3-2017 - Special event for children of Shakuntalam Shiksha Kendra (school for underprivileged kids)

Amity University, Noida

30-3-2017 – Guest Lecture on Enhancing Interview Skills

Institute of Technology and Science, Ghaziabad

1-4-2017 - Annual inter-institutional technical Fest Technovation-2017

Amity University, Gurgaon

6-4-2017 - Mr. Saurabh Agrawal, Past RSC-1 inaugurated the Student Branch

Panipat Institute of Engineering and Technology, Panipat

12-4-2017 – Dr. M N Hoda & Shri R K Vyas Inaugurated the CSI Student Branch

REGION-III

Sagar Institute of Science & Technology, Bhopal

6-4-2017 - SISTec Startup Meet

G H Patel College of Engg. & Tech., Vallabh Vidyanagar

28-3-2017 - One day workshop on MATLAB Programming

REGION-IV

Silicon Institute of Technology, Bhubaneswar

16-2-2017 to 18-2-2017 – Prof Saroj K Misra is addressing during Inauguration of Annual TechFest (NOESIS) 2017

REGION-V

Vasavi College of Engineering, Hyderabad

15-4-2017 – Technical Debate Contest

REGION-V

Bharat Institute of Engineering and Technology, Hyderabad

22-2-2017 & 23-2-2017 - MATLAB Programming to Contemporary Real World Engineering Problems

12-4-2017 – Event on Project Day 2017

Geethanjali Institute of Science & Technology, Nellore

20-3-2017 & 21-3-2017 - Two day workshop on IOT

23-3-2017 - Guest Lecture by Mr Sreenivas

G Pullaiah College of Engineering and Technology, Kurnool

4-3-2017 - IGNITE 2K17 - 8th National Level Technical Symposium

G Narayanamma Institute of Tech. and Science, Hyderabad

17-3-2017 & 18-3-2017 - Event on Big Data Analytics

REGION-V

Gudlavalleru Engineering College, Gudlavalleru

25-3-2017 - Guest Lecture on Software Testing Tools

CMR Technical Campus, Hyderabad

1-4-2017 - Session on **Arduino Day**

Chalapathi Institute of Engineering and Technology, Guntur

25-3-2017 - One day seminar on Information Security

31-3-2017 to 1-4-2017 - Two day workshop on Web Design and Development

Sasi Institute of Technology & Engg., Tadepalligudem

13-3-2017 to 14-3-2017 - Two Day Workshop on Internet of Things using Raspberry Pi

NBKR Institute of Science and Technology, Nellore

8-4-2017 - One Day Workshop on UG Level Projects and its Recent trends

GITAM University, Bengaluru

3-4-2017 - National Conference on Recent Innovations in Computer Science and Engineering

Acharya Institute of Technology, Bangalore

4-3-2017 & 11-3-2017 - Two day workshop on Big Data & Hadoop Ecosystem

REGION-V

Channabasaveshwara Institute of Technology, Tumkur

3-3-2017 & 4-3-2017 – Inauguration of workshop on R-Language

JSS Academy of Technical Education, Bangalore

18-3-2017 - Technical talk on Advanced File Structures and Cup-o-code' Programming with current Technology

GSSS Institute of Engineering & Technology for Women, Mysore

11-3-2017 – Mr. Harisha handling the Technical talk on Shell Programming in industry perspective

11-3-2017 – Mr. Sunil handling the Technical talk on Efficient Techniques to deals with webpage complexity

REGION-VI

D Y Patil School of Engineering Academy, Pune

27-2-2017 to 3-3-2017 - One week workshop on Digital Signal Processing

KIT's College of Engineering, Kolhapur

23-3-2017 - Dr Kamat, Director, IQAC addressing during INNOWIZ 2017 - A State level Project Convention

Universal College of Engineering, Vasai

10-3-2017 - Ubuntu Perl Workshop

18-3-2017 - Industrial Visit at Divisional Railway Office

REGION-VI

Sharad Institute of Technology College of Engineering, Yadrav (Ichalkaranji)

27-1-2017 & 28-1-2017 - Two days hands-on workshop on Big Data and Hadoop

10-2-2017 - One day hands-on workshop on PHP & MySQL

REGION-VI

Vishwakarma Institute of Information Technology, Pune

17-2-2017 - Inter College Competition on **Blind Coding**

Region-VII

Rajalakshmi Engineering College, Chennai

20-3-2017 - Technical Event on Boot Up 2017 inaugurated by Mr. Vasudeva Rao, Vice Chairman, CSI Chennai Chapter

REGION-VII

St. Joseph's College of Engineering, Chennai

18-3-2017 - Distinguished Guest Lecture Program on Recent Trends in Data Mining

Syed Ammal Engineering College, Ramanathapuram

4-3-2017 - TECHCON'17 (Student Level Technical Convention)

Einstein College of Engineering, Tirunelveli

21-2-2017 - Mr. Jerry Neuner, Project Manager, Shell addressing during the Seminar on Internet of Things

Sathyabama University, Chennai

4-4-2017 & 5-4-2017 - Two days technical symposium INFICODEC '17

REGION-VII

Valliammai Engineering College, Kattankulathur

5-4-2017 to 7-4-2017 – National Workshop on Impact of IoT on Big Data

Er Perumal Manimekalai college of Engineering, Hosur

13-3-2017 – Mr. Aravindkumar Explaining The Kit Usages to Students during Hands on training Internet of Things(IoT)

Sethu Institute of Technology, Kariapatti

7-4-2017 - Mr. Muthukumar, Vice-Chairman, CSI Sivakasi Chapter inaugurated CSI Student Branch

19-4-2017 – Guest Lecture on Smart Challenges in Internet of Things

Kongunadu College of Engineering & Technology, Trichy

24-3-2017 & 25-4-2017 - First International Conference on Innovations in Electrical, Information and Communication Engineering (ICIEICE'17)

Student branches are requested to send their report to
sb-activities@csi-india.org
with a copy to
admn.officer@csi-india.org

Chapters are requested to send their activity report to
chapter-activities@csi-india.org
with a copy to
admn.officer@csi-india.org

Kindly send high resolution photograph with the report.

Student Branch Inauguration

Dr. Anirban Basu, Immediate Past President, CSI presenting the Certificate of Institutional Membership to Prof. T N Sreenivasa, Principal of AMC Engineering College, Bangalore on April 20, 2017 to mark the Inauguration of CSI Student Branch in the college. AMC Engineering College, Department of Computer Science and Engineering organized 5th International Conference on Pervasive Computing and Networking ICPCN, under CSI banner in the college premises on 20th & 21st April 2017.

Gautam Mahaptra, Vice President, CSI, Email: vp@csi-india.org

Date	Event Details & Contact Information
MAY 08-10, 2017 25-27, 2017	**ICSE 2017** - International Conference on Soft Computing in Engineering, Organized by : JECRC, Jaipur, **www.icsc2017.com** Contact : Prof. K. S. Raghuwanshi, **hod.it@jecrc.ac.in**, Mobile : 9166016670 **Indian Engineering Educators and Administrators Conference (IEEAC-2017)** Organized by Terna Engineering College
JUNE 05-30, 2017	**Workshop on LAMP (Linux, Apache, My SQL, Perl/Python)**, Jaypee University of Engineering and Technology, Raghogarh, Guna - MP, **www.juet.ac.in** Dr. Shishir Kumar (**dr.shishir@yahoo.com**) 9479772915
JULY 20-22, 2017	**IEEE International Conference on Networks & Advances in Computational Technologies (NetACT 2017)**, organized by CSI Trivandrum chapter http://netact17.in/ Contact : netact17@gmail.com **IEEE International Conference on Networks & Advances in Computational Technologies (NetACT 2017)** organized by CSI Trivandrum chapter **http://netact17.in/** Contact : **netact17@gmail.com**
OCTOBER 28-29, 2017	**International conference on Data Engineering and Applications-2017 (IDEA-17)** at Bhopal (M.P.), **http://www.ideaconference.in** Contact : **conferenceidea@gmail.com**
DECEMBER 21-23, 2017	**Fourth International Conference on Image Information Processing (ICIIP-2017)**, at Jaypee University of Information Technology (JUIT), Solan, India, (http://www.juit.ac.in/iciip_2017/) Contact : Dr. P. K. Gupta (**pkgupta@ieee.org**) (O) +91-1792-239341 Prof. Vipin Tyagi (**dr.vipin.tyagi@gmail.com**)

Memorandum of Understanding

between Computer Society of India and Springer Nature valid upto 31st December 2020

Requirements :

- Formulate strong Technical and Advisory Committees comprising of national and international experts (from renowned Universities/corporates of repute) in the focus area of proposed conferences
- Build communities around conferences
- Define steps to check plagiarism
- Focus on stringent peer-review process involving all the members mentioned in the Committees and by allowing sufficient time for review

Interested Conference organizers can contact:
Ms. Suvira Srivastav, Associate Editorial Director, Computer Science & Publishing Development
Springer India, 7th Floor, Vijaya Building, Barakhamba Road, New Delhi, India.
Ph: +91-11-45755884, Email: Suvira.Srivastav@springer.com.

Benefits for CSI members: Knowledge sharing and Networking

- Participating in the International, National, Regional chapter events of CSI at discounted rates
- Contributing in Chapter activities
- Offering workshops/trainings in collaboration with CSI
- Joining Special Interest Groups (SIG) for research, promotion and dissemination activities for selected domains, both established and emerging
- Delivering Guest lecturers in educational institutes associated with CSI
- Voting in CSI elections
- Becoming part of CSI management committee

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India-Africa ICT Summit and Launch of India-Africa ICT Knowledge Consortium

The 2017 India-Africa ICT Summit

A High Level Summit for ICT Stakeholders from Africa & India The Launch of the India-Africa ICT Knowledge Consortium

1-2 December 2017: New Delhi, India

Objective: India-Africa ICT Summit will bring together Ministers in Charge of ICT from all Governments in Africa, Executives Directors or Heads of Government Information Communications Technology Agencies or Authorities from Africa countries, Chief Executive Officers (CEOs) of Major Telecommunication Companies such as Telephone Service Providers in Africa Countries, Selected Heads of ICT Academic Institutions from Africa and CEOs of Major Internet Service Providers in Africa countries. The summit will also be attended by top ICT CEOs in India, Leading ICT Investors in India, Leading ICT Consultants in India, members of India Computer Society and members of India Innovation Society. The summit is organized by Computer Society of India, Innovation Society Delhi, Public Opinions International from Uganda, East Africa and partnership with The Ministry of Electronics and Information Technology of the Republic of India.

The theme of the summit is: Confronting ICT and Cyber Challenges, Developing India and Africa through ICT, Opportunities, challenges and way forward

India-Africa ICT Achievement Award: The Computer Society of India together with the Ministry of Electronics and Information Technology of India, India Innovation Society and Public Opinions will award and recognize 100 Best Performing Information Communication Technology (ICT) stakeholders from India and Africa such as Best Telephone Service Providers, Government Agencies, Companies, Ministries, ICT Investment Companies,ICT Educational Institutions,etc. The Best 100 Winners will received a Certified Certificate of Award from Ministry of Electronics and Information Technology of India,India Computer Society and Public Opinions in appreciation of their contribution towards confronting Cyber Challenges, utilising ICT for development of Africa and India,etc. The profiles,logos and contacts of winners will be published on the website of India Computer Society,Ministry of Electronics of India,Innovation Society of India and will be published in the India-Africa ICT Journal.

Certification: Participants will be recognised with "ICT Competence Certificate" from Computer Society of India, innovation Society of India and Ministry of Electronics and Information Technology of India. Please Register today.Companies involved in ICT, or Government agencies in charge of ICT and u are nominated for the Award,Please submit your corporate profile by 20th August 2017.

Launching of the Knowledge Consortium : The India Minister of ICT Will Launch the INDIA-AFRICA ICT KNOWLEDGE CONSORTIUM in the presence of all participants from Africa whose institutions will automatically become members and the consortium will keep on Expanding. The consortium is for networking amongst ICT Leaders and ICT Providers as well as ICT Consultants from Africa and India, it's a consortium for information sharing, generating Ideas to confront ICT Challenges

Participating Countries : African , India and rest of World as per the invitation by organizing Committee

Expected Participants: 400 Participants from Africa & 600 Participants from India especially those interested in doing ICT Business in Africa

Sponsors : The event is supported by a number of leading companies and organizations in and outside India.

Fitness and Health Exercise: Participants will participate in the daily morning Health Fitness Excercise

Participation Fees : Each participating Person but strictly invited from Africa will pay 1500 USD Participation fees for participating in the summit and subscription to the India-Africa ICT Knowledge Consortium. For African Deligate Deadline for Registration : 20th August 2017 Participation Fees (India Participants)

- ICT Scholars/Consultants/ Professors/Doctors from India — 500 USD
- CEOs of Member Companies of Computer Society of India — 500 USD
- CEOs of Top ICT Companies from India — 1000 USD
- India ICT Students Leaders — 200 USD

Deadline for Registration (Indian Deligate) : 20th October 2017

The fees above also include automatic membership to The India-Africa ICT Knowledge Consortium.Please provide full name,full contact address and brief profile about the company,brief profile about the person in case of professors,scholars and ICT Doctors. The above will be published in the India-Africa ICT Summit Participants Directory to be distributed to all participants and to all Indian Embassies abroad.

Summit Organising Committee

1. **Mr. Sanjay Mohapatra**
   President, Computer Society of India
2. **Anirban Basu**, IPP,
   Summit Advisor, Computer Society of India
3. **Dr. Gautam Mahapatra**
   Vice President
4. **Prof. A K Nayak**
   Hon Secretary
5. **Dr. Manas R Pattanaik**
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   International Organization for Educational Development "IOED"
7. **Luzindana Adam Buyinza**
   Team Leader/CEO
   Public Opinions Uganda Limited

Regards and Welcome
Prof. (Dr.) Ripu Ranjan Sinha
Chairman,Organising Committee

INDIA-AFRICA ICT SUMMIT, 2017
The India-Africa ICT Knowledge Consortium
New Delhi India