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Multiplatform and Information Systems Architecture

by Asadul Huq

A Computer System can build up an effective information data base covering all the areas of operation within the organizational setup. The implementation of a information system architecture integrating multiple platforms can satisfy a wide range of information needs at various presentation level.

Network is the backbone of Information System Architecture. 1990s is overwhelmed with hardware and software ranging from PC to IBM mainframe. Each of these hardware and hardware based software has definite and unique advantages which make it desirable to integrate all available resources to maximize the benefit. The UNIX System is usually associated with high powered graphic workstations. These stations feature reduced instruction set computing (RISC) design, and graphic displays that use the X Window system and produce a visual effect similar to that of Micro Soft Windows. Another increasingly popular use is to run UNIX on a 386 class PC as a low cost application or database server. One thing UNIX does well is to mix with DOS operating system on PCs. In that role it can act as the host to a network of DOS based PCs. IBM mainframe has its own place in the information technology. There are few characteristics of mainframe which can not be satisfied by any other system. The most powerful PC servers lacks the sustained data thruput capabilities of even the smallest mainframe. A high volume transaction processing application requires safeguards to ensure that any recorded transaction is a complete one. Mainframe assures both high volume processing and data reliability. It also assures data security and data integrity. In a mixed computing environment, network can accommodate, integrate, and present multiple platforms for a large number of users running increasingly sophisticated and diverse applications on different, and often distant networks from workstations. Client server and other processing often takes place on multiple computing devices, where network is residing between different clients and servers. The network servers are classical implementation of Client Server architecture. The server machines act as the server points that fulfill work requests from requesters or clients all over the network. The integration of platforms and interoperability of applications across network is possible through connectivity and communication among platforms; and integration and interfacing of applications as well.

Communication and Connectivity

The first requirement of a communication sub system is to be able to physically link up with other machines. The set of rules or protocols, known as Open Systems Interconnection (OSI) is used as the standard for connection and communication in a network environment. The OSI architecture known as the OSI referenced model, is a layered concept, where each layer has a name, a layer number, a specific function and defined services. The reference model is a complete peer-to-peer communication environment. According to OSI reference model, all processes are initiated at application layer, traveling downward through the stack. Each layer performs a service, passing the results to the next lower layer. Finally, at layer 1 (physical) layer the data is shipped across the physical link to the connected computer system. There the process reverses, traveling from layer 1 up through the layers to the receiving application in layer 7 (the application layer).

A proper protocol may turn PC into a formidable communication machine that can handle both local and remote networking with every conceivable client server machine. This includes PCs running Novel or Micro Soft network protocols for almost any type of UNIX machine, midrange and most IBM mainframes. However there is not a single standard protocol available which can link all aspects of communication. As a result multiple protocols coexist on the same network to connect different hardware platforms.

In an ideal environment the connectivity option should satisfy LAN attachment, remote connectivity and direct attachment to IBM mainframes. LAN attachment provides high speed local connectivity over a shared LAN cable that serve as the broadcast medium. It can be provided by IEEE 802.5 Media Access Control protocol, otherwise known as Token Ring, and the IEEE 802.3, Media Access Control protocol, otherwise known as Ethernet. Both Token Ring and Ethernet connects and communicates at Physical layer and partly Data link and network layer. Transmission Control Protocol/ Internet Protocol (TCP/IP) has established itself as a widely accepted protocol. TCP provides reliable transmission across physical network. IP the lowest level in TCP/IP provides packet delivery across the internet. TCP/IP interoperates with the world of UNIX, as well as IBM's TCP/IP products for VM, MVS, MS-DOS, AS/400, the RS/6000, and the AIX family. In addition, the product incorporates a number of UNIX network services such as the Berkeley sockets, Sun OS RPC, HP/Apollo's and MIT's Kerberos authentication (security) services. TCP/IP allows to play both a client and server role in UNIX networks. TCP/IP also provides wide area network support using the X.25 protocol, that connects computers to either public or private packet switching data network. As a matter of fact TCP/IP, Netware IPX/SPX, and NetBIOS stacks happily coexist on the same token ring or Ethernet adopter, where Novel's Netware LAN can provide advanced file, print and communication services, comprehensive security, fault, tolerance, and resource security; NetBIOS (a low level software interface) can provide programme to network software communication or programme to programme communication on an IBM PC or compatible machine; and APPC (Advanced Programme To Programme Communication) can talk to mainframe.

PC's can be connected to most IBM hosts and their front end processor (the 37XX series) through token Ring and Ethernet LAN's and X.25. IBM 3270 Terminal (3178,3278, 3279 models) emulation provides access to IBM System/ 370 host computers from a PC. File transfer to and from IBM Mainframe host running MVS/TSO, VM/CMS, or CICS is supported over any active 3270 session. A mixed system of PCs and larger systems using a Token Ring network can support IBM's System Network Architecture (SNA) as a mainframe protocol, which was designed primarily to link minicomputers, mainframes, and terminals. The SNA is a network of peers where PC programmes can talk to the host programmes at a programmes to programmes level through the use of well defined verb command which is known as LU 6.2 type of session. SNA is a true distributed operating system that supports cross network directory services, transparent network access to resources such as servers, applications, displays, printers, common data stream, and integrated network management.

Other Connectivity Issues

AppleTalk is Applies family of network software protocols which controls everything

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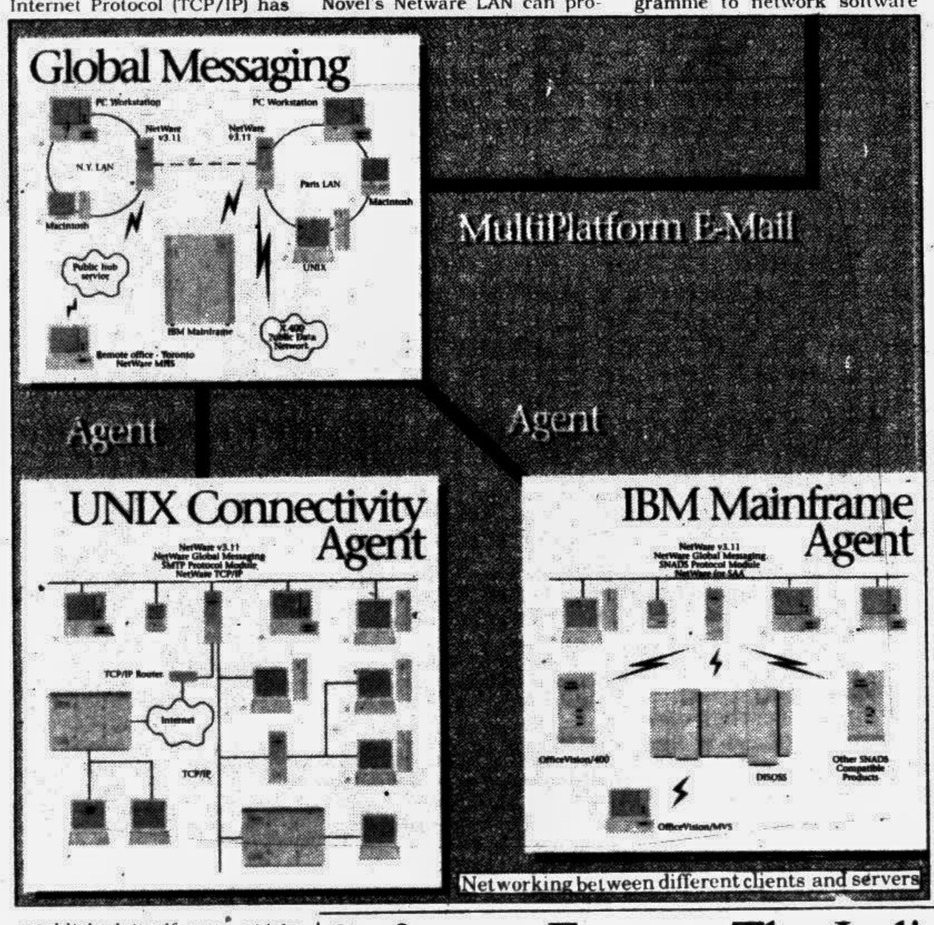


Computerizing SSC and HSC Exams

by Staff Correspondent

THE government, in a bid to improve the country's standard of education, is going to computerise the Secondary School Certificate examinations, to be held in March next.

The Computer Centre of the Bangladesh' University of Engineering and Technology (BUET) has taken up adequate training programmes to orient the examinees and the examiners to familiarise them with the modern system.

The SSC examinees will have to answer the objective questions set in their papers on a special computer-readable sheet while the narrative part of the question paper will be checked manually.

A special computer code will be used to camouflage the identity of the examinee to avoid any vested interest.

The BUET computer centre has been working for the last four months to computerise the individual details of every student. Moreover, to orient the students with the novel process, the examinees had to fill their examination registration forms on a computer-readable sheet which is now being scrutinised by the computer centre.

According to informed sources, the government has already trained 100 teachers — 25 from each of the four education boards — about the new system. These trained teachers will replicate the training process in their concerned areas.

Other than analysing the personal details of the examinees, the computer centre will also set code numbers for each candidate's answer scripts as well as the examiners. Then, the examiners' codes will be matched with those of the examinees for publication of the final results.

"It is a process of coding and decoding", the source said, adding that even the minutest possibility of leakage has been taken into consideration.

The computer-readable sheets for the Optical Manual Reader (OMR) computer have been imported from the NCS International while the other materials for the new system have been locally procured.

"The examinees must use ball-point pens to fill their question papers, so that the chances of cheating and changes in the scripts can be checked," the source said.

"The OMR sheet — a non-reflective printed paper — can also be filled with soft pencils but we discouraged that," the source added.

According to him, a large number of OMR sheets were imported to ensure quality and to avoid mistakes.

"We are talking about millions of students' academic future here ... we cannot afford to take risks about the sheets," he said.

The contract with the NCS International says the company will have to take back the whole consignment of sheets even for a single mistake. The BUET Computer Centre is presently evaluating the OMR sheets through random sampling.

The purpose of the new system is to save time and ensure the most neutral evaluation of the scripts.

However, the main drawback of the proposed system, as felt by some guardians of the examinees, is that perhaps not enough will have been done to orient the students of the more remote areas, especially the villages, with the new answer scripts.

According to the source, the new system will have a positive impact on the school-goers. "This might make some of the students more curious and inspire an interest about computers," he said.

The proposed examination system will also require the services of many computer experts, thereby creating new jobs, he added.

The government has already taken initiatives to inform and educate the concerned persons about new system through the audio-visual media, but how far this campaign has been effective remains to be seen.

Software Export: The Indian Experience

by Abu Y M Ahmed

A recent survey by MATRIX of Holland found that by 1995 more than 50 per cent of IT spend will be on open system and client server platforms and the share of UNIX market will increase by almost 100 per cent (i.e. from 12 per cent to 23 per cent). Now where does this trend lead us to in terms of Forward linking (Export) and backward linking (local market) in a software industry! Infact are we at all interested in this forward and backward linking process! This process is no longer a hypothesis, one or two softward houses have already proved that software export is possible from Bangladesh through either body shopping or product development or both and it is a reality.

Assuming that we in the IT Industry and the National Planners are convinced that Bangladesh has the potential to do software/Data Entry export what do we need to do to make it happen? Dr Robert Schware of the World Bank, Washington DC has carried out a comprehensive study on this subject based on the experiences of two countries (India and Brazil) who had been successful to penetrate into North American and European software market.

The Indian Experience

Though the Indian Software Industry has been active for more than 20 years, it is still very small compared to other comparable economics in the world. Indian Software Industry is dominated by a few large firms e.g. Tata Group, WIPRO, CMC, etc. According to a recent confederation of Indian Industry (CIE) survey in 1992 the value of Indian Software Industry was 243 million USD out of which 133 million USD was export, 55 per cent. Between 1956 and 1992 Indian Software Industry has grown by 39.7 per cent per annum. During the same period the export grew by 51.4 per cent per annum. Out of 133 million USD export, on site services (Body shopping) accounts for 98 million USD and 33 million stands for turnkey projects.

Characteristics of Indian Model

From the very beginning Indian Software export has been focused on human skill export. Regulated economic policies, availability of university graduates and relatively low barriers to initial entry interms of capital requirement made the human skill export proposition very attractive to both small and large corporate bodys like TATA. For example, some firms operate from a one room office, a telephone and a fax machine and other giants like Tata Consultancy Services (TCS), CMC and WIPRO each has more than 5000 programmers. TATA had the farsightedness to identify this opportunity and acted as the catalyst to develop this export sector. During 70s and 80s it was relatively easy to get work permits in North America and Europe which also acted as a major incentive for Indian entrepreneurs to venture into this sector. Local computer market was too small to support a vibrant local software industry. In 1989-90 there were approximately 75,000 microcomputers, 3,200 minicomputers and 170 mainframe computers in India.

Therefore,

★ Indian software sector chose the low risk, low investment and low value adding option (e.g. export of programming skill) to enter into the International Software Market.

★ This lead to a skill demand and supply imbalance.

★ Participation of Big Business houses like Tata and strategic decisions by Indian Government (e.g. formation of CMC to computerise major utilities (e.g. Indian Railway), helped Indian Software Houses to have a good track record to secure overseas contracts.

★ Government led software export target helped to establish synergy in hardware and software platforms through forward linking (export) and backward linking (local market).

★ A massive software skill development programme relevant to the international demand (e.g. open systems, 4GL tools and RDBMS). India now has 1.5 million trained computer programmers (source: CIE).

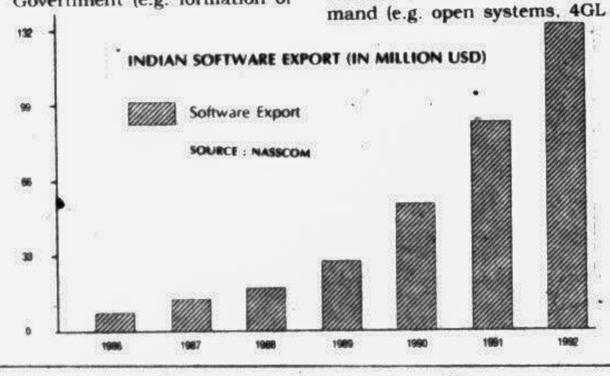
★ Joint Ventures e.g. Tata — UNISYS Ltd.

However, drive towards renting out programmer for the export market has led to the problem of brain drain at the early stage, but the trend is now in decline as software carrier in the local market is getting more rewarding.

Today India has a viable software export industry and it is growing fast. The Indian success can by highlighted by the following comment made by a senior executive of a leading American Software House "Probably India will hijack the world software industry just the same way the Japanese has hijacked the world electronics industry."

The author is the MD of IBCS-PRIMAX Software (BD) Ltd.

(In the next instalment, the author will discuss the Brazilian experience)



Software Entrepreneurship

by R A A Abdullah and M Shahidul Islam

THE word 'computer' must have some fascinations built in since it attracted us like anything. We would buy each and every magazine that had the word printed at any corner although, at that time, we could not afford anything costing more than taka forty to fifty.

Back in 1986, it was just the preamble of micro computer era in Bangladesh. There were very few places where micro computer could be found. There were even fewer sources of information. We became friends of each other when we were in class nine at Dhaka Residential Model College and found ourselves delving into the same subject of interest trying utmost to learn and earn newer knowledge. We used to buy all the books, magazines and periodicals which mentioned computers and which we could afford, most of them being the used ones. With lots of patience, spending weeks, we used to save a few bucks and buy some books on computers and BASIC programming. One of us also managed to get some lecture sheets of a BASIC training course.

That was the beginning. We forgot our world around, we forgot our studies. All our brains could think of was computer. We had many tireless evenings planning a program. Whenever one of us learned about a new command or a new technique, he couldn't afford to wait to discuss that with the other.

Days went by. We were learning and programming in full swing. But of course, we didn't have any real computer. Our major programming tools were pen and paper. We would define some problem; write a program to solve it and run the program step by step on the very paper, that is, we emulated computer running our program, thus ensuring the program's correctness.

One day, we were wandering around the city, looking for a place where we could enroll in a training course just to have a chance to touch a REAL computer. Whimsically, we entered a computer training center (now defunct) at Elephant Road and asked whether any BASIC course would be available. Hearing about our educational qualification (we were in class ten), they told us that we didn't meet their minimum educational level. But when we told them that we knew BASIC, they were surprised and ultimately thundered when we immediately and successfully demonstrated a program to calculate the average of three numbers according to their will. That happened to be our first venture of programming on a real computer. Eventually they agreed to provide use of a computer on an hourly charge and we also agreed in that. But later we found ourselves unable to afford even that and we had to go without it. Before our SSC exam, we had only another chance - a three hour long session to type in and test a bigger (some seventy lines only!) program written in BASIC at a training facility of BIDE where a senior friend was working on his project.

We encountered our 'major' computer experience only after the SSC examination in 1988. By that time, we finished (actually, there is no real finish in learning something) learning BASIC and Assembly languages and studying two other languages in parallel: Pascal and C. One day we met a student of the Department of Applied Physics and Electronics of Dhaka University named Azharul Mannan at a local book-shop who was willing to buy a book on Assembly Language but seeing us buy that book, wanted to borrow it instead. The guy told us that he and his friends had a company called ACCSEES where we could go with the book and talk in more details. We could

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I Think I Can, I Think I Can

by Samudra E Haque

READERS of the The Daily Star will remember a childhood bed-time story of the Little Erigine, that was so small, but was very brave and who made a name for himself by puffing and puffing all the way up the hill from his railway depot. It didn't matter to him that he was smaller than the rest, just that he wanted to do his work the best way he could think — by going forward and not looking behind at what he left back. We need a healthy dose of this type of looking forward in our Computer Industry in our plans to give the benefits of high technology to our society. Of course, as is the norm in this country sooner or later somebody will remind me of the fact that the little engine couldn't exactly look back — but I shall ignore that comment by saying that if he had been able to stop and look back, probably the only thing he would have seen is an express train about to run him down, if he didn't move forward right then.

As we are very fond of doing, we hold seminars which blame the Government for not helping the Computer Industry. We write articles which blame the Government for not helping the Computer Industry. We write letters to the National Board of Revenue for not helping the Computer Industry. We have also written ..., anyway, the list is likely to get longer and longer. What we have done is complain to all that indeed we have not been helped in getting our Computer Industry into working condition, and that sooner or later, unless significant help is given to us there won't be any Computer Industry at all.

I am going to take exception with this attitude, and say that perhaps industry executives have overlooked the fact that the Computer Industry hasn't actually been doing what it promised in the first place, and perhaps the view is now that unless some benefit is really received out of these massive investments of computer technology and *money*, we may be looking at real decline in the interest to invest into computers.

For example, the data entry people have been saying that the Government should liberalise import, lower taxes (on them!) and in general complain through the press that they are being forced to do their data entry work in private because they could be taxed at any time. If you don't believe what I am saying, look through the past few issues of the Computer Jagat, and by reading between the lines, count how many computer companies are "supposed" to be "not" doing data entry work.

The real situation is that these data entry companies are not doing much work at all, and they have tried but have not been able to bring any amount of appreciable data entry work to Bangladesh. I recently toured the US and Canada, asking companies what would take them to give jobs to Bangladeshi companies. After all with revenues in the hundreds of thousands of dollars, who wouldn't be excited and enthusiastic? The answer was the same from all of them: What have you done so far? Has there been any significant data entry jobs done in time, in budget in Bangladesh for these companies to compare qualitative data?

I challenge the community, (sorry, Computer Industry) to prove by the next two issues of The Daily Star Computer Special, that indeed they are fit to be called data entry services and have completed a substantial number of data entry jobs for clients on a commercial basis. If you prove it, allow others to advertise the fact that indeed in Bangladesh, there exists the capability to take on jobs for data entry for other people and return the implicit trust in the form of finished work.

If not, then I suggest that we give the consumers of our industry a taste of what lies in wait for them in investing computer technology. Let us all, as this one particular job is going to be very big, combine our finances and technical skills to enter into computer libraries, the works of literature produced by our own writers, poets, lyricists and (even? yes!) politicians. A crash programme to do data entry will serve two functions: (1) Train our young men and women and(2) Build up the necessary infrastructure to take on large data entry jobs. Of course, once the computer archives are built up, then the fun will start, as sooner than later, all schools and educational institutions will have to be given the collected volumes of writings of the great and respected, on computer disk.

Think of the intellectual power that a Bangladeshi village student will have in the year 1997 when he uses his solar powered terminal and modem (all locally manufactured of course!) to attach to the High Frequency Radio channel for his school. He will be able to tie into anything, anywhere anytime! And the best part of this is — the technology to do this exists even today! Try the following recipe if you don't believe me, but if you do, why not take on a project that does what I suggest? I think I can.

[Try this recipe to combine the following sub-sector technologies: Take a battery powered laptop computer data and fax modem (Tk. 10000), Rahimafrooz's Solar Cell Array, Build a Packet Radio TNC (Tk. 20000), Build a very low power HF SSB Radio (Tk. 25000), PC Terminal (Tk.40000) — assemble, and log into your nearest public data library which has the collected works of Rabindranath and Nazrul! This could be a small project for any NGO involved into rural education. It is all legal, prices are in the ball park and are even encouraged by the Bangladesh T&T.]