

# BERNET: BANGLADESH EDUCATION AND RESEARCH NETWORK

M. Lutfar Rahman

## 1. INTRODUCTION

Computer networks enable computers to exchange information with each other in a meaningful way. Computer networks now wrap around the world and electronic mail and electronic data interchange are common place. Communication between computers is a fundamental requirement for sustaining and developing modern trade, industry, education and culture. Academic and research institutions need to exchange information for research and development activities. Cooperative activities between such institutions help in accelerating research and development activities and resource sharing. A nation-wide computer network connecting educational and research institutions should be established in Bangladesh on priority basis.

A proposal, by this author, for setting up Bangladesh Education and Research Network (BERNET) was accepted as one of the recommendations in the workshop on "Application of computer communications in Educational Institutions in Bangladesh" organised jointly by the Ministry of Education, Government of the People's Republic of Bangladesh and National Training and Research Academy for Multilingual Shorthand (NTRAMS), Bogra held on 9 September 1995 at National Academy for Education and Management (NAEM), Dhaka.

This article presents a draft outline with a view to set up the BERNET, a wide area network for connecting the educational and research institutes of Bangladesh. The BERNET may be set up under the management of the Bangladesh University Grants Commission (BUGC) and initially the network should connect the universities and research institutes of the country and the network should gradually extend to relevant administrative departments, colleges, schools, madrasahs and the resources abroad.

## 2. OBJECTIVES OF THE BERNET

The network will make the interconnection between the institutions and researchers, irrespective of their geographical locations, through dialup or leased telephone lines and other means of communications (e.g. VSAT, Packet switching public data network) if and when available. The possibility of using the spare capacity of the optical fiber connection of the Bangladesh Railway

may also be examined. The BERNET should be set up and expanded in phases.

**Phase I:** The applications and services for Phase I should be: Electronic mail and File transfer (text).

**Phase II:** The applications and services for phase II should be: Document transfer and Database access (offline and online).

**Phase III:** Setting up a National gateway in Dhaka for connection through the Internet to databases outside Bangladesh.

## 3. POSSIBLE ARCHITECTURE OF THE BERNET

The BERNET should have four levels of hierarchy. The first level consisting of the central node and forming the main frame of the network should be established in Dhaka. The second level consisting of the city nodes (e.g. Rajshahi node, Khulna node, Chittagong node etc.) should act as the clearing houses for the traffic originating or terminating over the regions. The third level (organisation nodes) consisting of individual laboratory or institution nodes may be connected directly to the central node or connected to it through city nodes. The user nodes should form the fourth level of the hierarchy. The individual institution or research nodes in Dhaka city should be connected to the central node directly via dialup or leased telephone lines. Fig 1 shows a possible layered hierarchy of the BERNET.

The Communication between the central node, city and organisation nodes may be based on UUCP (Unix to Unix Copy) protocol using dialup (or leased) telephone lines. The user node of the BERNET may use DOS system.

## 4. CONNECTIVITY, TECHNOLOGY AND PROTOCOL

The choice of technology is dictated by the volume of data traffic. The BERNET may use any or all of the following communication links.

- Dialup lines of the Bangladesh T&T Board
- Leased lines of the Bangladesh T&T Board
- Packet switched Public Data Network (PSFDN) to be introduced by the Bangladesh T&T Board
- VSAT links to be installed by the Bangladesh T&T Board.

The UUCP protocol, a part of the UNIX system, is used for data communication between the mail nodes. It is a store and forward protocol and supports the following functions

- Mail transfer
- Remote command execution
- File transfer

With these functions mentioned above, UUCP should support E-mail and file transfer applications of the BERNET.

The BERNET should follow the domain based naming and addressing conventions. An e-mail address is generally represented as: `userid@domain name`

## 5. NODES AND THEIR TECHNOLOGY

Two types of nodes for the BERNET could be mail nodes and user nodes. The characteristics of each type are given belows:

**Mail node:** It should be a good quality microcomputer forming a part of the network and should perform all functions related to e-mail. It should use UNIX operating system and UUCP for mail exchange. It should have the following capacity:

- a microcomputer with 32-bit processor (or above)
- 8 MB RAM
- 1GB hard disk drive
- 1.44 floppy disk drive
- RS 232C ports (2 or more)
- Parallel port for printer
- 14.4 kbps (or above) modem having error corrective facility
- Telephone line with STD
- UNIX supporting UUCP (Unix to Unix copy)

**User node:** Any user computer that is registered with a mail node on the network where a mail-box is assigned to it. The user should log into the mail node to collect and deposit mails. Its characteristics could be:

- any personal computer
- Min 640 KB RAM
- one floppy disk drive
- RS 232C port and modem with 2400 bps or above
- Telephone line (with STD)
- Operating system: DOS
- PROCOM, CROSSTALK, QMPRO or similar packages

## 6. NETWORK MANAGEMENT

Once operational, the BERNET should require minimum attention. The central node to be setup under the management of the BUGC should include a network management centre for the efficient management of the BERNET. The most of the problems faced by the users are caused by the modems. The users should be trained to reset the modem parameters when changed. The reliable telephone line is essential for data communication.

If the telephone lines do not work nothing can be done. The central and city nodes and the machines of the BERNET management centre should be reliable and their downtime should be zero.

## 7. GATEWAY TO INTERNATIONAL NETWORKS

A gateway will be required to connect the users of the BERNET to the Internet and other international networks. The central node of the BERNET, Dhaka should connect its users to international networks through the gateway. A gateway should be established at Dhaka under the management of the BUGC or an appropriate authority.

## 8. EXPENDITURE FOR THE CENTRAL NODE

The central node should first be setup and users of Dhaka city should be encouraged to use the central node. The approximate expenditure for setting up the main facility of the central node and its manpower are estimated (please see the box below). Besides the main facilities, a number of microcomputers, printers and other peripheral devices will be required.

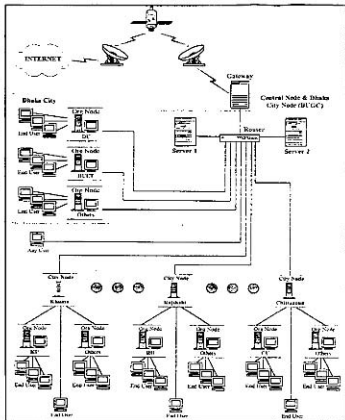
A well equipped computer centre should be established for the BERNET and its management and administration. The computer centre for the central node will require qualified and experienced administrative and technical personnel.

## 9. CITY NODES AND THE GATEWAY

The expenditure to setup the technical equipment for the city nodes and the manpower for them should be less than the central node. However, first the central node should be established and the city nodes then be setup gradually to cover the whole country.

A national gateway should be setup at Dhaka for connecting the BERNET users to the facilities abroad. The estimated expenditure for setting up the gateway should be about 2 crore taka and it will involve considerable technical know how. A team of experts may be sent abroad (Singapore or India) to earn practical knowledge and know how for setting up the gateway. Financial assistance and technical advice may be obtained from the United Nation Development Programme (UNDP).

	Qty	Unit price (Tk.)	Total price (Tk.)
1. Main Server: A high performance Server Computer with 32MB RAM, 2x2GB (SCSI-2) HDD, 1FDD with two (Quad speed) CDROM Drive (SCSI-2)	2	3,00,000/=	6,00,000/=
2. Backup tape drive (4GB, SCSI-2)	1	1,00,000/=	1,00,000/=
3. Integrated Rack System Modem with 5 Modern Cards (14.4 kbps)	1	1,20,000/=	1,20,000/=
4. Stabilizer 2KVA	1	20,000/=	20,000/=
5. UPS 2KVA	2	40,000/=	80,000/=
6. Air Cooler 18,000 BTU	2	60,000/=	1,20,000/=
7. SCO Unix Ver-6 Enterprise (128 user)	1	5,00,000/=	5,00,000/=
8. E-mail service software	1	1,00,000/=	1,00,000/=
9. Misc. Software and hardware for System design (when required)	1	3,00,000/=	3,00,000/=
10. ISD Digital telephone lines to be set up for the central node	4	30,000/=	1,20,000/=
		<b>Total Tk.</b>	<b>20,60,000/=</b>



## 10. DATABASE ACCESS

Indigenous databases may be developed under the management of the BUGC in cooperation with the BANSDOC, Dhaka for the BERNET users. The BERNET users should be in a position to subscribe to these online indigenous databases which should be installed on the host computer in the central node of the BERNET. The database for the following subjects may be developed for online access through the BERNET:

- National catalogue of scientific serials/journals
- Current contents of national journals
- Databases for different professional journals (e.g. medical, agriculture, engineering etc)
- Database on Bangladeshi experts in different fields
- Database on Bangladeshi patents etc.

## 11. CONCLUSIONS

1. Suggestions have been made for setting the BERNET under the management of the Bangladesh University Grants Commission.
2. The central node should be established first with e-mail and file transfer facilities.
3. The city nodes should then be developed gradually to cover the whole country.
4. The approximate cost for computers and associated equipment for the central node and for ten city nodes should be about Taka two crore (Taka 30 lacs + 10x15 lacs) and the cost for the equipment and other technical facilities for the gateway should be about Taka two crore.
5. The technical assistance may be sought from the UNDP for setting up the network and the gateway for international links.
6. Indigenous databases should be developed for online access through the BERNET.

This is a draft outline for setting up the BERNET. This draft outline needs careful evaluation before actually embarking on the project for setting up the BERNET. ♦

# SOME SUGGESTIONS FROM THE EXPERIENCE OF SEARCC INTERNATIONAL SOFTWARE COMPETITION '95

Dr. R I Sharif

From the recent participation of the Bangladesh team in the International Software Competition of SEARCC Region held between 5-9 September 1995 in Colombo, Sri Lanka, students under 17 years of age met the young programmers of the region and exchanged ideas, views and cultures among them. The member countries of SEARCC (South East Asia Regional Computer Confederation) are Australia, Bangladesh, Hong Kong, India, Indonesia, Malaysia, New Zealand, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, and Thailand. The competition has become an important feature of the SEARCC programme. It provides the opportunity for whiz kids from the Asia Pacific region to meet, receive valuable exposure and compete in a friendly atmosphere. It will also help the youths to understand and facilitate the role IT plays in fostering regional cooperation and support, across the barriers of time and space.

Searcc Software competition started since the year 1989 and this year Bangladesh team participated for first time. Though Bangladesh team could not do well to win prizes among top five positions but gained many experiences from the participation. Only 9 countries out of 14 participated in the competition. So the team participating first time from Bangladesh was highly appreciated by the SEARCC committee. The comment "The Victory of Bangladesh team was certain but wrong selection made it impossible" quoted in the editorial column of Computer Jagat in September '95 issue is totally baseless and unreasonable. Nobody should make such comments without knowing the quality of the other participants and the standard of the problems of such an international software competition.

The selection of the Bangladesh team was made by the Professors of BUET and Dhaka University through a test organised by Bangladesh Computer Society, and Bangladesh Computer Council after inviting applications through advertisements in prominent daily newspapers.

It is important to focus the standard of computer education and the role of government of the other SEARCC regions. The standard of School/College education of most of the SEARCC countries and their way of learning computer science may be useful for us to reconsider our proposed

plan and policy of computer science education system at SSC/HSC level.

We have come to know that most of students of the SEARCC region got enormous training facilities in their home country before participation in the competition. In addition to that students learn a programming language thoroughly in their school and college. They get enormous facilities in practical classes also. The Ministry of Education and the Ministry of science and Technology in all SEARCC countries provide all necessary help and cooperation for computer education in School/College. Even in Pakistan, Government declared duty free purchase of microcomputer for the student from the year 1989.

Unfortunately, Bangladesh Computer Society did not get any cooperation and support from the Government for sending such a national team. As a result we were completely uncertain about the financial grant and so no training arrangement was made in proper time. They got some training from BUET Computer Science and Engineering department and Microland International Institute of Computer and Electronics just few days before their departure. We should give a thank to them for providing such free help to the team. We were not sure about our participation even two days before the departure. The main reason was the uncertainty of participation due to lack of management of financial grant from the Ministry of Science and Technology. We spent our valuable time and energy for finding financial grant for the team without gaining anything. At last the team participated by spending money from their own pocket. However, Bangladesh Computer Society has promised to provide 50% travel cost to the participants.

It is relevant to mention that I had a dream to teach international standard of computer science education in Bangladesh from School level to the University level and that is why Microland (IICE) was established and approval was given by Examinations and Assessment Council of the University of London in the year 1989, first time in the history of Bangladesh to prepare students for the examination of GCE O-level Computing Studies. For showing better performance of this institute, University of London has given

approval to prepare students of GCE A-level Computing Science in the year 1992 and BSc Computing and Information Systems for External Students in the year 1993. This is one of the institutes that has been offering international standard Computer Science education in the country. But that effort is very negligible compared to the number of young people showing eagerness to learn computer science. It is known that we have very few international standard software programmers of this age in Bangladesh and they have learned from private sources but we cannot consider that factor.

However, we have learned many things from our present activities and now this is still time that we should think and prepare ourselves for the next.

We should have a plan and programme to produce large number of young programmers from the education in SSC and HSC level. All of us know that the proposed syllabus for SSC and HSC Computer Science will not at all meet the standard of international requirements to produce young programmers. The main step to be an expert programmer is the efficient program design. This includes (i) Understanding the problem (ii) Proper description of the problem (iii) Efficient algorithm design to solve the problem (iv) Techniques of writing programs (v) Suitable methods of testing and error checking. In addition to that mathematical background is essential for solving a problem using efficient computer programming. Here I am not talking about software packages or package programs such as dBase, Fox Pro and 4th GL. I am giving importance to solve a problem efficiently using any high level languages. Most of the so-called experts suggest to include application packages/ package programs in the SSC and HSC syllabus rather than giving emphasis on a high level language such as QUICK BASIC with a knowledge of efficient ways of program design. All parents know that children can learn any natural language faster than grown up people. Computer language is like a natural language. We should provide suitable techniques and tools for teaching computer science in Schools/Colleges so that our young people get interest to learn it. We want to learn easy things or want to get anything done in an easy way but we don't realise that to get anything easily is not so useful and demanding. I want to say that we

need to produce few experts programmers who will be able to write such packages in the near future for the general users. So we should not teach our SSC and HSC students how to use only application packages to work as data entry operators. With this shadow knowledge, they will be treated as computer slaves in the hand of few programmers and system analysts. Proper education and training for the teachers to teach SSC and HSC students are one of the very important and vital point in teaching line. It is an application oriented subject so proper practice in the practical class with computer must be provided to the students. Standard text books are required to follow by the teachers and students. This is the proper time to design HSC and SSC syllabus. So far I know that the Syllabus of SSC and SSC of other subjects are not significantly changed for the last 20 years. So the proposed syllabus for HSC and SSC of Computer Science may not be changed for next next 10 years. It is important to mention that our HSC and SSC education are not considered as an entry qualification to enter into BSc degree of Computer Science in any world-wide recognised Universities. Whereas similar levels of 12 years education from India and Sri Lanka are accepted as an entry qualification to enter into BSc degree of world-wide recognised Universities. I hope the Ministry of Education would consider these points for providing better education for the nation as a whole. We should accept the fact that today's Whiz Kids in Computer Science will be the tomorrow's top experts of IT in the country.

We need to produce some international standard software experts from their school/college life so that they can compete internationally. In order to find out or pick up such Whiz kids from the country, we need to arrange some regular software competition initially for School and College students for proper identification of the talents in this field. Once you can find out real

kids then special training and education can be provided to make them international figures. If we use this system then we are sure that we will be able to produce some future software experts and they may be in a position to make revolutionary change in the socio-economic condition of the country. You cannot ignore the use of modern IT to make any positive development of the country.

In this connection you may need to know the standard of SEARCC International software competition. Four problems were given to solve in 2 hours time. A team's score is the sum of points awarded for the work on the four problems. The programming language used is QBASIC.

The solutions must execute on the judges' microcomputer in 60 seconds. Problems are constructed so that a reasonable solution will meet this requirement using the competition data.

Feedback for a bad run/submission are given with one or more of the following comments on the program Submission Sheet :

TOO MUCH TIME, NO OUTPUT, TEST DATA FAILED, ERRORS OCCURRED, BAD OUTPUT FORMAT and IMPROPER SUBMISSION.

a) 100 points are awarded for each solution deemed correct. No points are given for solutions that are incomplete or inaccurate.

b) Teams will be awarded a bonus of 1 point for each five-minute period, or part of such period, remaining when the solution is submitted to judges. (A problem submitted within the first five minutes and judged as correct earns a maximum time bonus of 24 points. A problem submitted in the last five minutes judged as correct earns 1 point).

c) Each submission that is judged incorrect for any reason will incur a penalty of 10 points (i.e. minus 10 points) regardless of whether the problem is eventually solved.

d) The judging of the team is determined by the scores obtained, the placing of the team is determined by applying each of the following

criteria in sequence:

- the number of problems solved
- the time when the last correct solution is submitted.

The judges' decision will be the final decision.

The top five positions of SEARCC '95 International Software Competition is shown below :

Name of country	Total scored
Sri Lanka	466
New Zealand	459
Singapore	423
Australia	413
India	322

However, we should think how we can provide suitable education to our young people. First of all the education system must be application oriented. It means what they will learn in the theory class they will find out its proper application in the real life. In order to encourage them we should arrange a nation-wide software competition for the School/College students in every year. In order to do that, Ministry of Education, Bangladesh Computer Council, Bangladesh Computer Society, Bangladesh Computer association, Computer Magazines and Enthusiastic parents should come forward with helping hands. In this connection I should appreciate the role played by **Computer Jagat** to organise software competitions first time in Bangladesh in the year 1992 and 1993. We should now organise national computer software competition to identify our real talents through a systematic process by utilizing our joint efforts to meet the standard of international software competition. A proposal to the Ministry of Education can be placed to arrange a few seat at the University for some whiz kids of HSC and SSC level for higher education. They may not be in a position to do well in other subjects for exceptional contribution in the field of computing science. I believe that if the opportunity is provided for their higher education, certainly their national contribution will be much higher than normal brilliant students. ♦

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# The Simple-As-Possible (SAP) Computer

Shaikh Hasibul Karim (Rana)

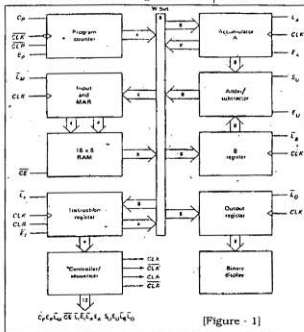
This article is for those people who are interested in knowing the ideas behind computer operation. The SAP (Simple-As-possible) computer has been designed for the beginners. The main purpose of SAP is to introduce all the crucial ideas behind computer operation without burying us in unnecessary detail. Still SAP covers many advanced concepts. There are mainly three different generations of the SAP computer; they are—

- SAP - 1
- SAP - 2, and
- SAP - 3

SAP - 1 is the first stage in the evolution toward modern computers. Although primitive, SAP - 1 is a big step for a beginner. In this article we'll see the architecture, the instruction set and a sample program of SAP-1.

## (1.0) ARCHITECTURE OF SAP-1

SAP-1 is a bus-organized computer. The figure shows its architecture. All register outputs to the W bus are three-state; this allows orderly transfer of data. All other register outputs are two-state; these outputs continuously drive the boxes they are connected to. A brief description of each box comes in the following sections.



[Figure - 1]

### (1.1) Program Counter

The program counter is a part of the control unit. It counts from 0000 (binary) to 1111 (binary). The program is stored at the beginning of the memory with the first instruction at binary

address 0000, the second instruction at address 0001, the third at address 0010, and so on. The task of the program counter is to send to the memory the address of the next instruction to be fetched and executed. It does this as follows.

The program counter is reset to 0000 before each computer run. When the computer run begins, the program counter sends address 0000 to the memory. The program counter is then incremented to get 0001. After the first instruction is fetched and executed, the program counter sends address 0001 to the memory. Again the program counter is incremented. After the second instruction is fetched and executed, the program counter sends address 0010 to the memory. In this way, the program counter is keeping track of the next instruction to be fetched and executed. The program counter is sometimes called a 'pointer'; because it points to an address in memory where something important is being stored.

### (1.2) Input and MAR

This block is below the program counter. It includes the address and data switch registers. These switch registers (part of the input unit) allow the users to send 4 address bits and 8 data bits to the RAM.

The memory address register (MAR) is part of the SAP-1 memory. During a computer run, the address in the program counter is latched into the MAR. A bit later, the MAR applies this 4-bit address to the RAM, where a read operation is performed.

### (1.3) THE RAM

The RAM is a 16 x 8 static TTL (Transistor-transistor logic) RAM. We can program the RAM by means of the address and data switch registers. This allows the users to store a program and data in the memory before a computer run.

During a computer run, the RAM receives 4-bit addresses from the MAR and a read operation is performed. In this way, the instruction or data word

stored in the RAM is placed on the W bus for use in some other part of the computer.

### (1.4) Instruction Register

This is a part of the control unit. To fetch an instruction from the memory the computer does a memory read operation. This places the contents of the addressed memory location on the W bus. At the same time, the instruction register is set up for loading on the next positive clock edge. The contents of the instruction register are split into two nibbles. The upper nibble is a two-state output that goes directly to the block labeled 'Controller-sequencer'. The lower nibble is a three-state output that is read on to the W bus when needed.

### (1.5) Controller-sequencer

Before each computer run, a CLR signal (CLR=clear) is sent to the program counter and a CLR signal to the instruction register. This resets the program counter to 0000 and sweeps out the last instruction in the instruction register.

In order to synchronize the operation of the computer, a clock signal CLK is sent to all buffer registers; this ensures that things happen when they are supposed to happen. 12 bits are coming out of the controller-sequencer. They make a word that controls the rest of the computer. The 12 wires carrying the control word are called the 'control bus'. The control word is given by the following format:

CON = Cp Ep Lm Ce L1 E1 L2 EA

Su E1 E2 L3 L4 L5 L6 L7 L8

This format determines how the registers will react to the next positive CLK edge. For example, a high Ep and a low Lm mean that the contents of the program counter are latched into the MAR on the next positive clock edge.

### (1.6) Accumulator

It's a buffer register that stores intermediate answers during a computer run. The accumulator has two outputs. The two-state O/P goes directly to the adder-subtractor. The three-state O/P goes to the W-bus. Thus, when EA is high, the 8-bit accumulator word continuously drives the adder-subtractor; the same word appears on the W bus.

### (1.7) The adder-subtractor

It is a 2's complement adder-subtractor. When Su is low the sum out of the adder-subtractor is

$$S = A + B$$

A = Content of accumulator

B = Content of B register

When Su is high, the difference appears:

$$A = A + B$$

B' = 2's complement of the content of B register.

It is to be noted that 2's complement is equivalent to a decimal sign change.

The adder-subtractor is asynchronous; this means that it's contents change as soon as the input words change. When Eu is high, these contents appear on the W bus.

### (1. 8) B Register

This buffer register is used in arithmetic operations. The two state outputs of this register drives the adder-subtractor, supplying the number to be added or subtracted from the contents of the accumulator.

### (1. 9) Output Register

The processed data can leave the computer through this register. It is also called an output port. In microcomputers the output ports are connected to interface circuits that drive peripheral devices like printers, cathode-ray-tubes, tele typewriters, and so forth.

### (1. 10) Binary Display

It contains a row of eight light-emitting diodes (LEDs). It shows us the contents of the output port. Thus, after we've transferred an answer from the accumulator to the output port, we can see the answer in binary form.

### (2. 0) INSTRUCTION SET

A computer is useless unless someone programs it. Before programming a computer we must learn its instruction set, the basic operation it can perform. The SAP-1 instruction set follows.

#### 2. 1 LDA

LDA stands for "Load the accumulator". A complete LDA instruction includes the hexadecimal address of the data to be loaded.

**Example:** LDA 8H [Here H denotes a 8 is in hexadecimal system]

This instruction load the accumulator with the data whose address is 8H. Say, if at the memory cell (addressed with 8H) the data 10011001 is stored, then with the above instruction, the accumulator is loaded with 011001.

#### 2. 2 ADD

A complete ADD instruction includes the hexadecimal address of the data to be added. This data is added to the data of the accumulator. The sum replaces the original content of the accumulator.

**Example:** ADD 9H

By this instruction, the content of memory (addressed with 9H) is added to content of the accumulator and the sum is stored in the accumulator.

Say, the content of the register (memory) is given by R9 = 00000001 and the content of the accumulator is given by A = 00000001. During the

execution of ADD 9H, the following things happen. First, R9 is loaded into B register to get B = 00000001 and almost instantly the adder-subtractor performs the sum of A and B to get:

SUM = 00000010

Second, this sum is loaded into accumulator to get

A = 00000010

#### 2. 3 SUB

The format of this instruction is SUB address

By this instruction, the content of the memory location, whose address is given in the instruction, is subtracted from the content of the accumulator and the result is stored in the accumulator replacing its original content.

**Example:** We have A = 00000111  
R0 = 00000011

the execution of SUB CH takes place as follows.

1) R0 is loaded into B; i.e. B → R0.

Thus we get

B = 00000011

and almost instantly the adder-subtractor forms the difference of A and B:

DIF = 00000100

2) This difference is loaded in the accumulator.

A → DIF. Thus A = 00000100

#### 2. 4 OUT

This instruction informs the computer to transfer the accumulator contents to the output port. After OUT has been executed, we can see the answer to the problem being solved.

We do not have to include an address when using OUT because the instruction does not involve data in the memory.

#### 2. 5 HLT

HLT stands for halt. This instruction tells the computer to stop processing data. HLT marks the end of a program. We must use a HLT instruction at the end of every SAP-1 program; otherwise, we get computer trash. HLT is complete by itself as this instruction does not involve the memory.

#### 2. 6 Memory-Reference Instructions

LDA, ADD, and SUB are called memory-reference instructions because they use data stored in the memory. OUT and HLT are not memory reference instructions because they do not involve memory.

#### 2. 7 Mnemonics

LDA, ADD, SUB, OUT and HLT are the instruction set for SAP-1. Abbreviated instructions like these are called mnemonics (memory aids). Mnemonics are popular in computer work because they remind the user of the operation that will take place when the instruction is executed. The following table summarizes the SAP-1 instruction set.

Mnemonic	Operation
LDA	Load RAM data into accumulator
ADD	Add RAM data into accumulator
SUB	Subtract RAM data from accumulator
OUT	Transfer accumulator data into output register
HLT	Stop processing

Table 1 : SAP-1 Instruction set

### 3. 0 PROGRAMMING SAP-1

In order to load instruction and data into the SAP-1 memory, we have to use some sort of code that the computer can interpret. These codes are called the operational-code or the 'Op code'. Table-2 shows the code used in SAP-1.

Mnemonic	Op code
LDA	0000
ADD	0001
SUB	0010
OUT	1110
HLT	1111

Table-2: SAP-1 OP-CODE

In the following examples, the instructions are converted to the corresponding op-codes.

(1) LDA FH = 0000 1111

(2) ADD EH = 0001 1110

(3) HLT = 1111 XXXX

In the first instruction, 0000 is the op-code for LDA and 1111 is the binary equivalent of F (hexadecimal) or FH. Similar arguments are valid for the second one. In the third example XXXX stand for don't cares because the HLT is not a memory-reference instruction.

#### 3. 1 A Sample program

# How would you program SAP-1 to solve the following arithmetic problem?

10 + 20 + 30 - 40

The numbers are in decimal form.

**Solution:** Hexadecimal equivalent of the given numbers are— 0A, 14, 1E, 28. Let's store these data in memory locations 1H to CH. Then we can have the following assembly-language version:

Address	Contents
0H	LDA 1H
1H	ADD AH
2H	ADD BH
3H	SUB CH
4H	OUT
5H	HLT
6H	XX
7H	XX
8H	XX
9H	0A H
AH	14 H
BH	1E H
CH	28 H

(Contd. on page 42)

# Telemarketing— A Personal Sales Champion Fights To Stay On Top

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## 1. Prelude:

The biggest sales buzzword of the 1990 is telemarketing. Telemarketing is a marketing communication system using telecommunication technology and trained personnel to conduct planned and measurable marketing activities directed at targeted groups of consumers<sup>1</sup>. Shopping by telephone is a long existing method of consumer and industrial buying. Selling by telephone is a method of nonstore, in-home retailing. Today it is being used more widely than ever. This is because consumers are putting higher values on time savings and convenience in shopping. Moreover, most of the women now in the outside labour force and traditional consumer shopping patterns are changing. At the same time sellers are finding that telemarketing is a productive and low-cost method of selling<sup>2</sup>.

The first sales campaign incorporating telephones was conducted by the Ford Motor Company in 1962. Since then, selling by telephone has expanded greatly in both extent of use and degree of sophistication. It is used in both industrial and consumer marketing programs. In industrial marketing, the telephone call is used essentially as a substitute for a sales call at the customer's place of business. In consumer marketing, in-store retailing is replaced by direct contact with the customer via telephone<sup>3</sup>.

Telemarketing encompasses such things as contacting potential customers, giving information to potential customers, providing a customer service and information centre, researching markets and running promotion campaigns<sup>4</sup>.

## 2. Techniques Used In Telemarketing:

Telemarketing is considered as an information technology based personal selling system. Information technology has been changing over time. Gradually, new and sophisticated techniques are evolving. However, technology based tech-

niques used in telemarketing are briefly outlined below:—

### 2.1. Telemarketing Agency:

Many companies prefer to use agencies because of the high cost of setting up telemarketing centers. For instance, a special promotion or advertising campaign will necessitate many telephone lines being made available. The majority of these lines and the staff to operate them would not be needed by the organization under normal circumstances<sup>5</sup>.

### 2.2. Automatic Call Distributors (ACD):

Some companies and most of the agencies use ACDs within their telemarketing system. ACDs sort the calls coming into an organization or agency and report on their handling to ensure an efficient service is provided. They (ACDs) have considerable benefits when a large number of calls are received. With a large number of incoming calls it is vital to control the cost and to make sure that productivity is high. The more sophisticated ACD systems help to generate daily management reports on the following:

- The number of calls received and made.
- The duration of the calls.
- How long the caller had to wait for attention.
- The percentage number of calls put on hold.
- How many calls were transferred to back-up staff.

In addition, ACDs give managers the facility to listen into calls with a view to discussing and possibly changing an individual or groups answering technique. More advanced ACDs help the telephonist to respond more quickly by identifying which client is calling. Together these factors result in real cost savings<sup>6</sup>.

### 2.3. Telecommunication And Computer Technology:

Telemarketing requires a combination of telecommunication and computer technology. The hardware required will include an ACD to send

calls to appropriate agents, processors and database to record incoming data and to access data to answer inquiries. Local Area Networks (LANs) are used to distribute incoming calls. The input voice units are required to record messages to be sent.

### 2.4. Integreted Services Digital Network (ISDN):

The ISDN enables a combination of voice, text and images to be transmitted. This means that PCs have an integral telephone and video link and that a caller may transfer and discuss sets of figures during the course of a telephone conversation<sup>7</sup>. A caller's area code and telephone number can be captured instantly and sent to a customer database. On the agent's screen the customer's name and the business or work involved is displayed immediately so that the agent answers the telephone knowing who the customer is and any details of work being done for the customer. An additional database can be searched to retrieve the name and address of the dealer nearest to the customer and this can be displayed as the agent answers the telephone. This procedure drastically reduces the time of the call, making the agent more productive and saving on telephone charges. It also helps a company to appear more aware and appreciative on the customer.

### 2.5 Automatic Dialing And Recorded Message Players (ADRMPS):

Some telemarketing systems are fully automated. Automatic dialing and recorded message players (ADRMPS) can dial numbers, play a voice activated advertising message and take orders from interested customers on an answering machine device or by forwarding the call to an operator.

### 2.6. Wide Area Telephone Service (WATS):

Telemarketing blossomed with the introduction of inbound and outbound Wide Area Telephone Service (WATS). With IN WATS, marketer can offer customers and prospects toll-free 800 numbers to place orders for goods and services. With OUT WATS, they can use the phone

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to sell directly to consumers and business<sup>8</sup>.

### 3. Benefits Of Telemarketing:

Telemarketing centres give information to present and potential customers. It is telemarketing which provides management with valuable information about potential problems with products, the type of individual buying the products, potential sales leads and so on. However, telemarketing plays very important role in the following fields.

#### 3.1. Sales promotion:

Reactions to rising marketing costs have brought about some changes in promotion by the firm. Rapid increases in travel costs combined with a concerted advertising campaign have resulted in telephone sales calls<sup>9</sup>. Thus, telemarketing is used increasingly at the expense of personal sales calls.

Business marketers are contacting prospects by phone, on a wide-spread basis, to supplement the efforts of their sales people. Telephone selling is becoming a cost efficient means of reaching smaller accounts or those hard to reach by sales people<sup>10</sup>.

#### 3.2. Lowering Cost:

In recent years, the face-to-face personal selling has spurred companies to consider telemarketing as an alternative. Phoenix company claims that each face-to-face sales call costs \$ 220, and many calls may be necessary for even a single sale<sup>11</sup>. Telephone calls, on the other hand, are far less expensive because the cost of travel and travel time is replaced by the much lower cost of telephone tolls. It cost less than one-sixth as much to sell by phone compared to a personal contact<sup>12</sup>.

#### 3.3. Quick follow-up:

In recent time, many companies use computers in conjunction with telemarketing. The computerized system provides sales representatives with easy, immediate access to the most complex and detailed product information and customer information. This information can be moved off and on the computer screen quickly with the "Click of a mouse" from a scripted survey or a prepared sales pitch. The computer can also automatically dial the telephone and produce personalized follow-up letters.

#### 3.4. Increased Revenue And Customer Generator:

Telemarketing works better for generating higher revenue. The in-

roduction of telemarketing by Sam Summers for selling expensive medical equipments increased sales ten times over that generated by the field salesforce. It also generated 5000 new customers. One sales person could telephone 12 prospects in the time it takes for one face-to-face sales call<sup>13</sup>. A survey over direct marketing was conducted in the United States in 1987. The result indicates that by order of importance in terms of sales, telephone is first, followed by mail, print and electronic media, vending machines, and in-home sales<sup>14</sup>.

#### 3.5. Simple and Less imposing:

Telemarketing is simpler, faster, and less imposing in comparison to face-to-face selling. For a straight rebuy of an inexpensive or low-technology product, the hassle of face-to-face transactions hardly seems justified given the nature of the task. When segments are highly fragmented or geographically dispersed, telemarketing may provide the savings edge that maximizes competitiveness. Sales managers often like telemarketing because they can monitor activity level and quality much more easily for telemarketing than for face-to-face selling.

#### 3.6. Efficient Use of Sales Time:

Companies are constantly seeking ways to use sell force time effectively. A telemarketer is an efficient inside salesperson. The telemarketers use the phone to find new leads, qualify them, and sell to them. A telemarketer can call upto 50 customers a day compared to the four that an outside salesperson can contact<sup>15</sup>.

#### 3.7. Freeing The Sales Forces:

Telemarketing does not replace sales persons from making personal sales contact. It minimizes the burden of them which results in the reduced size of salesforce. Many industrial firms use telemarketing to sell to smaller accounts, freeing the salesforce to concentrate on more profitable accounts. Dow Chemical for example, determined that it would be uneconomical for its salesforce to visit accounts representing less than \$ 50,000 in revenue. These accounts are sold by phone<sup>16</sup>. Telemarketing is specially useful when customers are small or in hard-to-reach places or when many prospects have to be contacted to reach on who is actually interested in buying<sup>17</sup>.

#### 4. Limitations of Telemarketing:

Despite the enormous benefits, telemarketing suffers from certain

limitations. These limitations are generated by the commercial message, customers' attitudes, mental and physical settings of consumers, unsolicited calls, technology involved, and unethical practices. The limitations that hinder telemarketing practices are described below:

#### 4.1. Unwanted Or Commercial Messages:

Telemarketing does not work better for all types of sales. Marketing directly to random consumers in their homes is not very effective. Many consumers believe that they receive too many undesired phone calls soliciting contributions or seeking to sell unwanted products. Unwanted telephone calls bother all of us to some extent, but it is very difficult to ignore unwanted or commercial messages.

#### 4.2. Screening Unsolicited Calls Is Difficult:

With the telephone, the only way to separate important or desired calls from unwanted ones is to listen to the caller long enough to gauge the purpose of the call. Screening calls usually disrupts current activities. For certain elderly or physically impaired people, answering the phone and screening the calls require considerable effort. Getting to the phone may be difficult and the call may come at an inappropriate time.

#### 4.3. Keeping The Caller Hang Up:

The caller must ask whether the receiver wants to hear the presentation if the consumer does not give permission, the caller must hang up.

#### 4.4. Lack Of Abstractness:

The disadvantage of telemarketing are the inability to use sight, smell, taste and touch. Moreover, it is not appropriate to monitor non-verbal cues and to size up a potential customer in terms of responsiveness or capacity to follow through with purchase<sup>18</sup>.

#### 4.5. Unethical Sales Practices:

The reputation of telemarketing has been damaged by the unethical sales practices of some firms. These firms tell consumers that they are conducting marketing research and are not selling anything. Such unethical procedures hurt other telemarketing Companies as well as legitimate research firms that conduct telephone surveys<sup>19</sup>.

#### 5. Epilogue:

Effective telemarketing depends on choosing the right telemarketers, training them well, and incentivizing them. Telemarketers should have



pleasant voices and project enthusiasm. Women are more effective than men for many products. The telemarketers should initially train with a script and eventually move toward more improvisation. The opening lines are critical. They should be brief and lead with a good question that catches the listener's interest. The telemarketer needs to know how to end the conversation if the prospect seems to be a poor one. The call should be made at the right time. The appropriate time for making call might be the late morning and afternoon to reach business prospects, and the evening hours of 7.00 PM to 9.00 PM to reach households. The telemarketing supervisor can build up telemarketer enthusiasm by offering prizes to the first one who gets an order or to the top performer. Given the higher cost per contact for telemarketing, and privacy issues, precise list selection and targeting is critical.

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## SAP Computer

(Contd. from page 37)

The machine-language version is

Address	Contents
0000	0000 1001
0001	0001 1010
0010	0001 1011
0011	0010 1100
0100	1110 XXXX
0101	1111 XXXX
0110	XXXX XXXX
0111	XXXX XXXX
1000	XXXX XXXX
1001	0000 1010
1010	0001 0100
1011	0001 1110
1100	0010 1000

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The output can be seen in the binary display.

Notes: (1) hexadecimal to binary code

```
OA H 0000 1010
14 H 0001 0100
1E H 0001 1110
28 H 0010 1000
```

(2) Xs denote the don't cares. That means its not necessary to know what are being denoted by the Xs.

#### 4.0 CONCLUSION:

The 8080 was the first widely used microprocessor. The 8085 is an enhanced version to make SAP practical the SAP instructions are compatible with the 8080/8085 instruction set. In other words the SAP (SAP-1, SAP-2, SAP-3) instructions are part of the 8080/8085 instruction set. Learning SAP instructions is getting a beginner ready for the 8080 and 8085, two very widely used microprocessors. Once any one learn the 8080/8085 instruction set, he/she can branch out to other modern microprocessors.

Most computers built now a days use microprogrammed control instead of hardware control. The microprogramming tables and circuits are more complicated than those for SAP-1, but the idea is the same. Microinstructions are stored in a control ROM and accessed by applying the address of the desired microinstruction.

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# "DCL HAS DONE A PIONEERING JOB IN INTRODUCING INTERNET TECHNOLOGY IN BANGLADESH"

— Dr. Tanvir Ahmed Khan,  
Managing Director, DCL.

*DCL— an Internet service provider is going to provide advanced E-mail products and training for the interested Internetworkers in Bangladesh. The company authorities were interviewed and the following article was written by Kamal Arsalan.*

Data Corner Ltd. (DCL) started its activities in the summer of 1993 with the prime objective of setting up a nationwide information super highway named as BDNet, connecting all the computer users in Bangladesh and a commercial quality gateway to the Internet.

BDNet will help the local computer users to grasp the power to make their computers 'talk' to each other; the ability to transact business instantly. BDNet is setting up commercial quality TCP/IP internetworking in Bangladesh and will provide connections to Internet and other international carriers.

As the BDNet is going to be a commercial quality Internet connection provider it is being integrated with the Internet so that its members can trade information in real times with over two million sites and tens of millions of users worldwide.

Using universal standard, TCP/IP protocols, BDNet connections will give its users real time interactive communications to any corner of the globe, sending and receiving messages and files or even accessing an application held on a computer/server on another continent.

DCL was the first Bangladeshi company to register an Internet domain name (BDNet.net) and applicant for the Bangladesh top domain to the Internet authority.

At present BDNet using the UNIX operating system (most common operating system used in Internet hosts) provides E-mail service in Dhaka with dial-up link to Internet via UUNET USA. BDNet has also set up a beta PoP (point of presence) site in Chittagong. When the BT&T authority provides the VSAT service in Bangladesh (which is expected to be available within December of the current year) DCL will introduce on-line Internet connection to its members.

DCL is going much ahead of the other local E-mail service provider by installing a powerful Sun Server based on the Solaris operating system in their office. Other local E-mail providers at present are using

PCs as host machine. DCL has also done a remarkable job by networking BDNet with PradeshthaNet, Agni & Aurora; having ToolNet and DeltaNet in the pipeline which will enable the members of any local network to communicate with members of other local networks also.

The annual subscription charge for BDNet E-mail service is Tk. 12,000/-, Tk. 10/- per KB is charged for international outgoing traffic while Tk. 6 per KB is billed for international incoming traffic. For the popularisation of the use of E-mail in Bangladesh, DCL is providing free domestic E-mail service. Basic E-mail software is also supplied free of charge along with



Dr. Tanvir Ahmed Khan

free installation. There is a substantial discount for academic subscribers of BDNet.

In an interview with **Computer Jagat**, Dr. Tanvir Ahmed Khan, Managing Director of DCL, said that his company has done a pioneering job in introducing Internet technology in Bangladesh. From July 1993, they conducted theoretical research followed by action research to find out whether the local computer establishments are prepared to accept this new technology. Findings of their research encouraged them and they became highly optimistic about the future of E-mail service in Bangladesh. As soon as they get the VSAT connection BDNet will provide latest services of the E-mail & Internet technology.

Dr. Tanvir further said that they are developing their activities to provide a range of other related services such as—

**Training**—DCL will impart need based training on project planning analysis, computer hardware and software, Unix operating system, software programmes, etc.

**Technical Consultancy**—Vendor independent DCL Consulting providing strategic and practical advice plus project management and implementation services. DCL is also engaged in preparing databases on various themes e.g. agrarian reform and rural development, gender related, technical cooperations among developing countries, rural credit and poverty alleviations etc.

**Hardware and Software**—DCL represents a wide range of quality hardware and software which help them to provide a cost effective complete computer solutions to their customers. DCL is constantly searching the world wide computer arena for innovative hardware and software.

**Data Entry & Software Development**—DCL will engage itself in data entry and software development projects for both local and overseas companies.

**Computer Assembly**—To meet the growing need of computers as the company's different projects become operational, DCL will set up its own computer assembling facility.

Mr. Moinuddin Kashem (Tariq), Technical Director of DCL was associated with the Internet authority during his studies in London since '91. In '92 he registered BDNet with the Internet authority and applied for the top Domain for Bangladesh. During the interview while discussing about the training facilities in DCL, Mr. Tariq said that his company will provide

training for the local Internet workers in order to realise DCL's vision of universal access to local, corporate and global information resources from a single desktop system.

He emphasized on the following factors for the proper utilisation of the Internet technology.

\*Technologies which support information access must be developed.



Moinuddin Kashem

\* Networks and communications systems must be installed and maintained.

\* Users must be able to work with new tools.

Mr. Tariq further said that DCL will provide courses based on open systems technologies (UNIX, C, TCP/IP) and products (Solaris, Visual C++, PC/TCP, PC-XWare) to provide training in both the principles and the practicalities of working in a connected world.

DCL's courses will cover the training needs of users, developers and managers of all levels from novice to expert in the areas of Networking and Internetworking, developing Networked Application which includes comprehensive training in C and C++ for developers. There will also be a comprehensive range of UNIX training courses, developed by the instruction set and will cover the use and administration of UNIX for users, developers and system administrators. The course also covers the major UNIX variants, including System V Release-4, Solaris and AIX.

In the well-equipped training centre of DCL, all the participants will have access to a fully specified workstation with network access to a range of training systems and (through BDNNet) to the connected internet.

#### Attention Students!

Computer Jagat is going to organize a nation-wide Software Competition for the students under 15 years.

For details read our next issue.

-Editor

## NEWS WATCH

### COMPAQ'S NEW PRESARIO

Compaq Computer Corp. of USA rolled out its fall line of personal computers that includes big improvements in the sound and picture quality of the machines.

Compaq's updated Presario line now starts at \$1699 for the base model, not including a monitor, and tops out at \$2,999. All of the Presarios have Pentium microprocessors and multimedia capabilities.

In an industry dominated by intense price competition Compaq is trying to differentiate itself from lower priced rivals by emphasizing the "theatre like experience" of its new machines. □



#### COMPAQ DEALER FORUM '95

Compaq Computer South Asia dealer forum was recently held at Sheraton Grande Leguna Beach Hotel, Phuket Island, Thailand. The picture shows Mr. Borhan Uddin, Managing Director, Desktop Computer Connection Ltd and Mr. Tan Kok Hin, Managing Director, Compaq Computer South Asia/ IndoChina during the forum.

### NOVELL PUSHING SOFTWARE TO OTHER HORIZON

Novell Inc. pushing its software outside computer networks. The company announced an alliance with UtiliCorp. United to use electric power lines to help homes and businesses manage energy consumption.

The companies will jointly market technology that would let customer appliances communicate with utilities without additional wiring. Customers could authorize utilities, for example, to remotely monitor electric devices such as air conditioners, refrigerators and water heaters.

Most other companies are considering using fiber-optic cable or wireless technologies to communicate with homes. Novell, said its NEST software makes it possible to communicate over power lines at up to 2 million bits of data per second, much faster than existing power line technologies. □

### ACER GETS MORE THAN EXPECTATION

Taiwan's leading computer maker Acer Inc's group sales will likely hit NT\$200 billion (US\$27.27 billion) in 1997 due to expected successful sales of its new Aspire series of home PCs, Chairman Stan Shih said.

"Just our Aspire alone can reach annual sales of NT \$100 billion in 1997," he said.

Initially, Acer group set the NT \$ 200 billion target for the year 2000. Its group revenue reached NT \$ 85 billion last year and was expected to come in at NT \$110 billion this year.

Mr. Shih said Acer has been encouraging signs of buying interest in its new Aspire computers, which are equipped with eight megabytes of random-access memory and a 540MB hard disk drive. □

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