

Real-Time Computer Control

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 interpreting user requirements to produce a detailed specification of the system to be developed and an outline plan to the resources—people, time, equipment, costs—required to carry out the develop-

(Concluding Part)

6 Real-time Operating System

Real-time operating systems have to create, maintain, and support the execution in which real-time applications can execute. Clearly, one of the major functions of the operating system is that of resource management. The timing behaviour of the applications depends crucially on the way the resources are managed and made available to the applications. Traditional approaches to the design of operating systems, aimed at the time-sharing systems for general purpose computing, do not address the problems of real-time systems. One way of structuring operating system is to design them in hierarchical organisation, using object encapsulation. Real-time operating systems must provide solutions to timing and interaction problem, in addition to providing the support given by the conventional, general purpose operating systems.

Resource management must therefore relate to time explicitly. Time services must support application requirements for accuracy and granularity. Failure modes and recovery mechanisms must take into account timing correctness as well as containment problems. Every access mechanism in the system, including communication

channels, must support these timing and interaction issues. Clearly, these complex requirements must be achieved with minimal invasiveness and overhead costs.

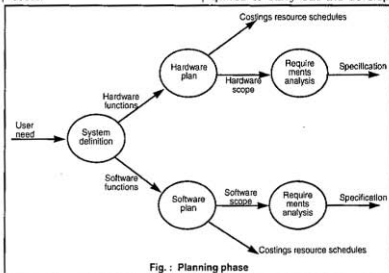


Fig. : Planning phase

7. Design approach of real-time system

The design work of real-time control system can be divided into two main sections:

1. Planning phase ; and,
 2. Development phase.
- The Planning phase is illustrated in Fig. 2 and is concerned with

ment. At this stage preliminary decisions regarding the division of functions between hardware and software will be made. A preliminary assessment of the type of controller structure—a single central computer, a hierarchical system, or a distributed system—will need to be made. The outcome of

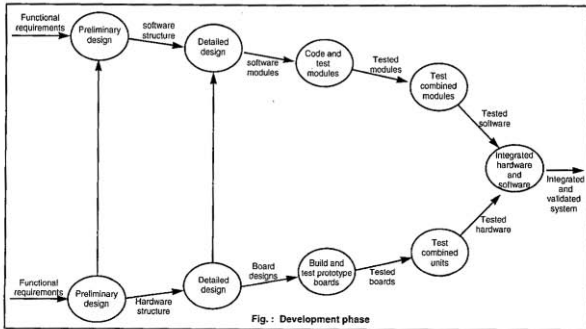


Fig. : Development phase

this stage is specification or requirements document. It cannot be emphasised too strongly that the specification documents for both the hardware and software which results from this phase must be complete, detailed and unambiguous. General experience has shown that a large proportion of 'errors' which appear in the final system can be traced back to unclear, ambiguous or faulty specification documents. It is frequently recommended that, as part of the specification of the system, the user documentation should also be produced. Whatever the form of documentation produced it should have been checked in detailed with the customer.

The stages of the development phase are shown in Fig. 3. The aim of the preliminary design stage is to decompose the system into set of specific sub-tasks which can be considered separately. The preliminary design stage is also referred to as the high-level design stage. The inputs to this stage are the high-level specifications; the outputs are the global data structures and the high-level software architecture. During the stage extensive liaison between the hardware and software designers is needed, particularly since, in the case of real-time system, there will be a need to revise the decisions on the type of computer structure proposed and if, for example, a distributed system is to be used, to decide on the number of processors, communication systems (bandwidth, type) etc. At the end of the preliminary design stage a review of both hardware and software designs should be carried out.

The detailed design usually broken down into two stages:

1. Decomposition into modules; and
2. module internal design.

For hardware design, the first of these stages involves questions on the board structure of the system such as: are separate boards going to be used for analogue inputs and digital inputs or are all inputs going to be concentrated on one board? Can the processor and memory be located on one board? What type of bus structure should be used? The second stage involves the design of boards.

8. Conclusion

The advent of the microcomputer has probably had more impact upon the discipline of control engineering than any other. Applications are now blossoming in all areas of industry on plants both large and small. The hardware revolution is still taking place but future changes are not likely to be as dramatic as in recent years. The emphasis in control systems research and development must, and will, change. Much greater emphasis will be given to applying the new techniques and making them work. Computers will be used not only for the implementation of controllers but also to assist with defining controller configurations and with tuning, so that the best controlled performance is achieved. Techniques such as computer-aided design, identification of plant dynamics and adaptive/self-tuning control will become features of standard software packages supplied by the manufacturers of the hardware. The use of more sophisticated procedures for improved process control will become more common. ◻

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Goading a child to learn and explore via computers

How an educational software attempts to make the child learn is almost as important as what it professes to teach. A good instructional method will make it more appealing for the child to learn.

Most educational software has educational experts involved in the design of the software. While subject experts determine the information to be learnt, educational experts determine the instructional method.

Computer software can be classified into several categories depending on their method of instruction and treatment of content. Some of the categories are as follows.

No word software : For young children who are still unable to read, text-based instructions will be quite useless.

Therefore, software that use no words is appropriate, such as those which use life-like graphics, digitised speech and sound effects to communicate with the young learners.

For these young children to communicate with the computer, a mouse would be the best tool.

Exploratory software : Will have "hot" areas on the screen. If the child uses the mouse to point and click a certain picture or word, he will get either entertaining responses or more pictures or detailed explanations.

But sometimes there is no prompting at all from the computer.

The child is supposed to explore the graphics on the screen and point and click at interesting objects. These objects will have already been programmed to give certain responses such as, a cow will moo when clicked or clicking on a bag will result in a zoomed display of the bag's contents.

Each screen may also have "hot" areas that when clicked, will lead to other screens.

Knowledge-based software : These are not games in the sense that there is no target or goal. Knowledge-based software simply dispenses knowledge of a particular subject using the mouse point and click method.

It is similar to the exploratory method above except that on clicking a "hot" area, more detailed infor-

mation will appear.

Although knowledge-based software is usually text-based (the child must be able to read), certain information may be accompanied by graphics and sound effects.

Adventure: Some programmes have a story-line and goals and require that learners work towards these goals by solving problems. These can be simple riddles, mathematical or situational problems.

When the child gives the correct answer, he will get treasures, gems or clues. The child can then use these collected treasures or gems to buy gifts, rescue the good guys, save the environment or other similar goals.

Collecting a certain amount of treasures will also move the learner up levels.

This type usually allows the learner to interact will abstract concepts. It requires the learner to have skills in analysing a situation or idea and skills to extract relevant facts and apply them to solve problems.

Tutorial software : Is usually a stand-alone instructional unit, designed to teach rules, concrete and abstract concepts, to evaluate comprehension, to provide practice or application of principles.

However, unless enhanced by good graphics and sound effects, this type of software may not be very appealing to young children. Drill and practice — usually the software is designed to be used as a supplement to regular instruction.

The software allows learners to practise and refine concrete concepts. Rewards would be required to make this appealing to children.

The above are just some of the instructional methods use by the more recent programmes. Some programmes may use a combination of the methods.

Characteristics of a good educational software :

The most important characteristic of a good educational software for the pre-schooler is that the software can sustain the child's interest for a long time. The following factors should be able to sustain the child's interest :

Game setting : Children naturally like games, so it is not surprising that an educational software that

looks and behaves like a game will be able to sustain the child's interest.

Usually, competitive elements have been designed into the software to allow the children to play against the computer or their friends.

Interactive : Interactivity is not limited to the number of times that the child presses the keyboard or clicks the mouse button.

An interactive software should be able to challenge the child cognitively, where the child is required to think before he makes another move.

The software should also stimulate recall of the child's prior knowledge, provide guidance and elicit performance. It should also be able to respond to learners' performance by assessing the performance and providing feedback about it.

Exploratory : Exploratory software will allow the child to discover new things most of the time. When the child points and clicks certain "hot" areas on the screen, he will get either entertaining responses or more pictures or detailed explanations.

This is useful in teaching children from simple facts to more complicated ideas.

Graphics and sound effects : Although graphics and sound effects alone will not make good educational software, they make the programme very attractive. High resolution animated graphics with life-like sound effects will certainly attract the child's attention. Use of cartoon characters and voices, especially those that are already familiar to the child will sustain the child's interest in the software.

Fun, fun and fun : In short, to sustain the child's interest, the software should be fun for a child to use.

— by Dr. R. M. RAJA HUSSAIN

LEADS Signs Contract with HB

LEADS Corporation Limited, the exclusive Distributor of AT&T/NCR in Bangladesh, has recently signed a contract with Habib Bank Limited to computerize its Dhaka and Chittagong branches. The solution is based on NCR 3333, 486 based servers & UNIX for automating Habib Bank's operations in Bangladesh. This is going to be another achievement for LEADS in the Banking sector of Bangladesh. o

AST PowerExec

Upgradability is a key strength with AST Research Inc's PowerExec notebook PCs. The less-than-seven-pound PowerExec allows users to upgrade from a mono-chrome LCD screen to an active-matrix color display. Hard disk capacity can be increased up to 340M bytes and memory can be upgraded via snap-on modules, up to 32M bytes. Securely-wise, the notebook has a two-level password protection and a SmartKey ROM key to enable or disable the password. The PowerExec also boasts a host of options: PCMCIA data/fax modem, network interface card, automobile adapter and docking station. ◻

Flora Opens Its 4th Branch

Flora Ltd. has opened its 4th outlet at 78, Satmasjid Road, Dhanmendi R/A, Dhaka. The opening of this branch will provide localised service to their clients.

AT&T GIS ranked #1

The April 1994 issue of *Retail Systems Alert* examined the overall growing popularity of in-store applications in its 1994 In-Store Survey in the USA. Respondents of the survey were asked to name and evaluate suppliers of in-store hardware, software, products, and services in three different categories: (1) value received per dollars spent, (2) problem solving capabilities, and (3) creative support provided.

AT&T Global Information Solutions ranked top supplier by performance on a consolidation of scores for all three categories: ◻

E & C Signs 2 Contracts

A leading software house in Bangladesh, THE ENGINEERS & COMPUTERS have signed two contracts with the leading construction company in Bangladesh- CONCORD ENGINEERS & CONSTRUCTION LTD. and another contract with SIEMENS (BANGLADESH) LTD.

1. The Engineers & Computers will computerize CONCORD ENGINEERS & CONSTRUCTION LTD. This work includes developing software as well as providing management consultancy for head-office and all projects and hardware maintenance services.

2. Mr. Sohail Sharif, President- THE ENGINEERS & COMPUTERS, has been appointed as Management Consultant by CONCORD ENGINEERS & CONSTRUCTION LTD. for a new Tk.52 (Fifty two) Crore project acquired by CONCORD ENGINEERS & CONSTRUCTION LTD. His responsibility includes management consultancy, CPM/PERT analysis, budget monitoring, resource management etc. of this project.

3. THE ENGINEERS & COMPUTERS will also provide all required computer hardware maintenance services for SIEMENS (BANGLADESH) LTD. ◻

BEST In World Cup USA '94

BEST has been selected as the Equipment Supplier to World Cup USA '94 for Power Protection Equipment.

FERRUPS, Fortress, Patriot and the new UNITY/I will be protecting an intricate network from SUN, Sybase, Sprint and EDS linking nine stadiums around the USA and the FIFA headquarters in Switzerland.

Meanwhile, BEST has won the ASM Computer Products "Award of Merit-Power Supplies for Product Quality" and "Award of Merit - Power Supplies for Innovation". The ranking is based on a survey of the region's 300+ product leaders, conducted by the ASM Computer Group Research for Computer Products and was co-sponsored by DHL. ◻

Software Piracy Losses

Worldwide losses due to software piracy in 1993 totalled \$7.45b, according to an estimate by the Software Publishers Association. The figure was \$9.7b in 1992.

NEC Sharpens Edge With Silentwriter

NEC Corp. recently introduced a 300dpi Silentwriter Superscript 610 laser printer. The printer can produce 600 dpi-like copies with its Sharp Edge technology.

The Windows-based laser printer produces up to six pages a minute. The Silentwriter comes with Laser Jet IIP emulation, so your DOS files print through Windows. NEC officials pointed out that when the PC's processing power or memory is upgraded, the printer's throughput speed is automatically upgraded as well.

The 370 x 358 x 120mm, 7.5kg Silentwriter requires a 16MHz 386SX-based PC running Windows 3.1 with 4M bytes of RAM and 8.5M bytes of hard disk. The recommended RAM is 6M to 8M bytes.

The Energy-Star-compliant Silentwriter supports manual duplex printing, its bidirectional parallel interface requires a parallel cable. ◻

Compaq & Microsoft : The Frontline Partnership

Compaq and Microsoft have recently joined forces to realize the same vision, a new PC computing environment in which the traditional gap between hardware and software development disappears. These two companies have unique credentials: Compaq is the PC hardware innovator that spends more on R&D than most clone makers make in gross sales. Microsoft is the developer of the Windows operating system and with over 50 software products, is the world's largest producer of easy-to-use software. As leaders in their fields, Compaq and Microsoft have come together to provide products that are simple to install, easy to use, and provide the best performance and value available.

Since 1986, Compaq and Microsoft have worked together to optimize Windows operating system software on Compaq products. The Frontline Partnership is the next logical step in a history of successful cooperation; the joint development and customer support of a new generation of computing solutions. ◻



Mr. Borhan Uddin, Managing Director of Desktop Computer Connection is seen with Mr. Tan Kok Hin, Managing Director, Compaq Computer South Asia/Indochina and Mr. P.S. Raju, Sales Manager, during COMPAQ PAN ASIA PACIFIC DEALER FORUM held at Compaq Computer Corporation head quarter, Houston, Texas between May 16-19, 1994.

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