ACCELERATOR CONTROL PROGRAM PACKAGE ON OS/2

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Abstract

Software tools that greatly simplify development and operation have been developed in the domain of accelerator control. ACPP (Accelerator Control Program Package) was designed to provide operators with an easy way to produce Linac control procedures of the PF LINAC with little or no programing.

1. Introduction

ACPP is a graphically oriented, easy-to-use, flexible control/monitor system. ACPP runs under OS/2 on a 32-bit personal computer using networking capabilities of a database on the server system of the DSLink (a local area network made by FUJITSU on the basis of IEEE802.3). The operating systems MS-DOS and OS/2 are used for the accelerator control console of the PF LINAC under the DSLink network segment [1,2].

In the existing control system, programs have been developed using conventional programing languages for any needs; the productivity in programing was thus low and costly, and it was not easy to run bug free programs. In order to overcome this difficulty, ACPP has been developed in the OS/2 system for the purpose of increasing the productivity on the existing system. Moreover, one of the purposes is to explore a set of tools that will allow the configuration of data acquisition and control to meet the full requirements of any accelerator (only for the LINAC this time) with no conventional programming procedure for users. An expert system is introduced to make ACPP more easy to use and to build.

The features of the program package (ACPP) are discussed in the present paper.

2. ACPP Block diagram

An overview of the major components of ACPP is shown in Fig.1.

In accelerator control systems, the following four essential blocks are found:

1) flexible input/output system;
2) database, data-analysis, data-logging and control;
3) alarming and reports; and
4) operator interface, editor, simulation and automation.

Under actual operation of ACPP, a pulldown menu on the CRT provides information concerning utilities (items) that can be used to build the LINAC control procedures; no operation manual is required.

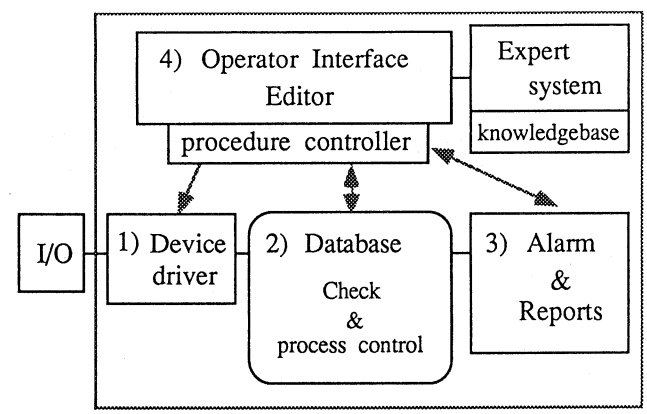

Fig.1 ACPP Block diagram

3. Hardware configuration

ACPP's organization is shown in Fig.2. The graphic display has 640 X 400 pixels in FMR-50 (FUJITSU 16/32 bit personal computer) and 1120 X 750 pixels in FMR-70 (80386,25MHz) with 15-inch or 21-inch CRT monitors. There are about 30 personal computers (PC) under the DSLink network; each PC has its own purposes or functions, such as gateway, server, accelerator operator's console, monitors, development, expert system, and OS/2 stations. The DSLink operator's console network of the LINAC is connected to the conventional LINAC networks through the gateway (FMR-70 HX3).

4. I/O drivers (Data acquisition)

No program has been developed at this stage, since a conventional data acquisition system can provide data streams to ACPP database through the existing network system. It has been working for more than ten years. The existing I/O drivers were not modified at all in order to make sure of the possibility of ACPP earlier, also, no changes were made regarding the data format.

5. Database (Processor)

ACPP database is not a commercial-type database, but is generated from simple ASCII text files which contain information concerning the channels and equipment at a worksite, which can either be written directly or generated by commercial editors such as Mifes, Final, Red, Brief, etc., or a spread sheet.

The runtime database consists of several global sections in memory.

It was primarily designed to provide an instantaneous reflection of the accelerator status under the DSLink network. It also has a long-term storage of the data with an MO (Magnetic Optical CD, 600MB) system.

This allows value modifications on channels, and provides a means to monitor or edit the value, even on a spread sheet.

6. Operator Interface (Editors)

An operator interface was designed in order to provide a capability for fast and easy prototyping development. Everything can be accomplished by selecting an item from a pulldown menu, as in recent computer systems.

In ACPP, the following functions are necessary as the operator interface to define:

1) the hardware interface, channel by channel, so that the actual hardware can be ordered using spread sheet like Excel or ACPP's pulldown menu or commercial editor, and then the database can be built;
2) the automatic sequences and continuous control loops to be implemented.

A control algorithm must be developed. Steady

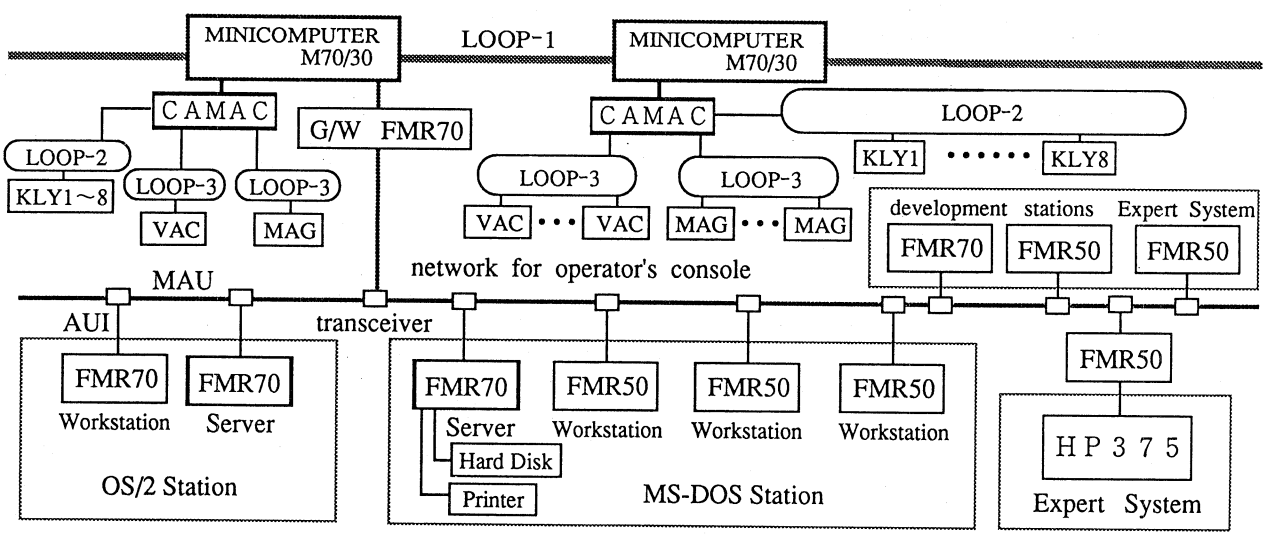

Fig.2 network for the Linac control

state operation is accomplished through either a sequential- or continuous-control mechanism. Automatic startup operations and automated fault recovery and shutdown operations for each device are also accomplished through this mechanism.

Once control procedures have been created, the operator can activate them and monitor the physical values of devices in many different graphical formats using a choice of many different tools, like Excel the spread sheet.

By using the pulldown menu, the operator can access any data in the system and can change any set point, thus allowing both active and passive elements to be run.

7. Alarm and Reports

The alarm component is an important operator interface running as a separate process on OS/2, and can send messages from an OS/2 to any different DOS workstation throughout the DSLink network. Monitoring or disabling alarms are achieved using a pulldown menu or editors for selecting devices. The DOS workstation receives messages by a background task using the CP manager of the DSLink.

8. Expert system support

If a software tool could have heuristic knowledge during operation, the user would find it easier to use ACPP. There is one expert system station on the DSLink network segment; it can be called for obtaining operation support or diagnosis. A PC-based inference shell, called SOGEN, is used on FMR-50 under the network. The knowledgebase is composed of production rules. In an old version, there was no flame.

9. Conclusion

It was proved that it is presently possible to make a standardized tool for an accelerator control/monitor in the domain; the beam transport magnet system is run by ACPP. Other objects, such as klystron modulators, vacuum system and trigger system will also be run by it as a next step. The productivity and maintenancebility were clearly improved. More graphics are needed for a better system.

Reference

[1] I.ABE, M.FUJIEDA, "DISPLAY SYSTEM FOR CONTROL CONSOLE OF KEK PF LINAC" Proceeding of the 6th symposium on Accelerator Science and Technology (1987)

[2] A.SHIRAKAWA, I.ABE, and K.NAKAHARA "OS/2 AND DSLink FOR THE PF LINAC CONTROL" 16th LINAC conference (1991)