

# A PC-Based Control System For HiSOR

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## 1 Introduction

A PC-based control system for a Synchrotron Radiation source at Hiroshima University (HiSOR) has been developed. The system is based on AURORA-2D[1] control system and consists of 4 PCs, and a file server. Concept and basic design of the control system can be seen in proceedings of IWCSMSA96, 1996 [2].

HiSOR started commissioning February 1997. Some improvements will be scheduled.

In this paper, HiSOR system and its software are described.

## 2 HiSOR system

The HiSOR system consists of AURORA-2D (Microtron and storage ring) and two undulators. The energy of beam from the microtron is 150MeV. Usually, this microtron is used as an injector for the storage ring. The electron beam from the microtron can be switched to another direction and is used for other purposes for which the pulse repetition rate and peak output current of the microtron can be increased from 10Hz, 5mA to 100Hz, 10mA.

The storage ring is a compact racetrack type AURORA-2D which has two long straight sections for insertion devices. In the HiSOR system a linear undulator and a helical undulator are installed in each straight section. The storage ring has 16 beam ports including two from the undulators.

As of October 1997, the initial stored current is around 200mA and the 1/e life time of beam at 100mA is almost 3 hours.

## 3 Control system

A schematic of the control system is shown in Fig.1. There are 4 PCs and a file server. The beam user PC and touch panel are optional. 2 PCs named the main control PC and the monitor control PC are connected to devices under control and the other 2 PCs are for man-machine communication. For machine study, 2 PCs are used as consoles.

The software scheme of the control system is shown in Fig. 2.

Some control parameters are defined by databases and parameter files.

This system has four databases: a display database, a command database, a device database and a logging database. These databases except the logging database are created from CSV format file.

The display database is used to define the display format of the console PC (called OPU : operation unit).

The command database is used to define the command format from OPU to the main control PC and the monitor control PC (they are called as EXU : execution unit).

The device database is used to define all devices used in this control system. This database also has the current status, setting and actual value of devices. Virtual devices, such as the state of the microtron and storage ring, and readout of monitors, are included in this database.

The logging database is used to store logging data. Each night, stored data in this logging database is transferred to text files according to a classification key. Format of the text file is CSV, so one can process data by using a spread sheet program.

The EXUs acquire status and actual values and update the device database periodically. There are two levels of operation from an OPU, an individual device operation and a sequence operation. A sequence operation is a set of individual device operations and which are executed according to a pre-determined sequence which is written in a sequence file. Each individual device operation is converted to a command from OPU to EXU by the contents of the command database and the device database.

When an EXU receives command from an OPU, the EXU executes the command as soon as possible.

If software for status display is loaded on an OPU PC, it accepts requests from an external LCD (liquid crystal display) with a touch panel which is connected to a serial port.

When a request message from the touch panel is received, the status display PC selects the associated sequence file and executes it.

A serial port on the status display PC is also used as a communication port with the beam line user computer. The scheme of message execution is the same as in the case of a touch panel. This scheme limits operation from the external system and keep stable operation.

## 4 Conclusion

A PC-based HiSOR control system is described. Simple touch panel and user interface for the beam line user are

provided. Parameters of software are stored in four databases and parameter files. A request from the user interface is used to execute a pre-defined sequence. This scheme prevents unexpected external operation.

[1] T.Hori and T.Takayama ICSRS-AFSR'95, Oct. 25-27, 1995, Kyongju, Korea, p.148-158  
 [2] K.Aoki, K.Kawamura and K.Yoshida IWCSMSA96 Nov. 11-15, 1996, KEK, Tsukuba, Japan.

**References**

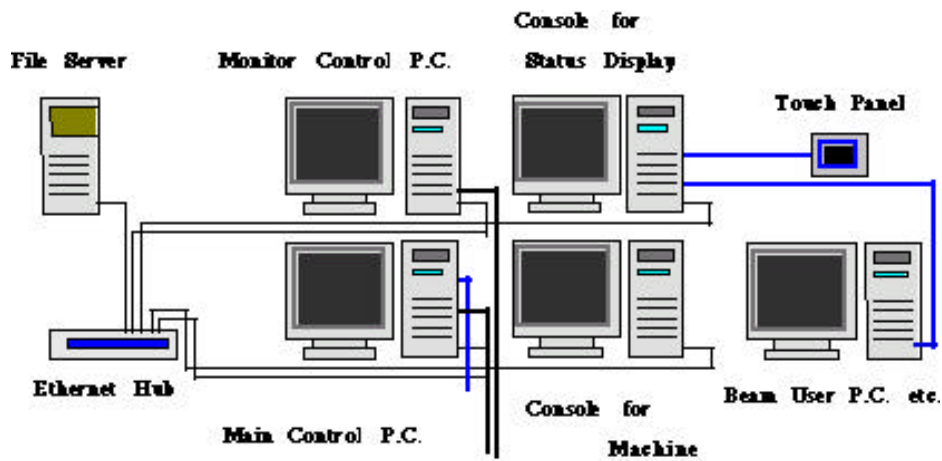


Fig. 1 Schematic of the control system

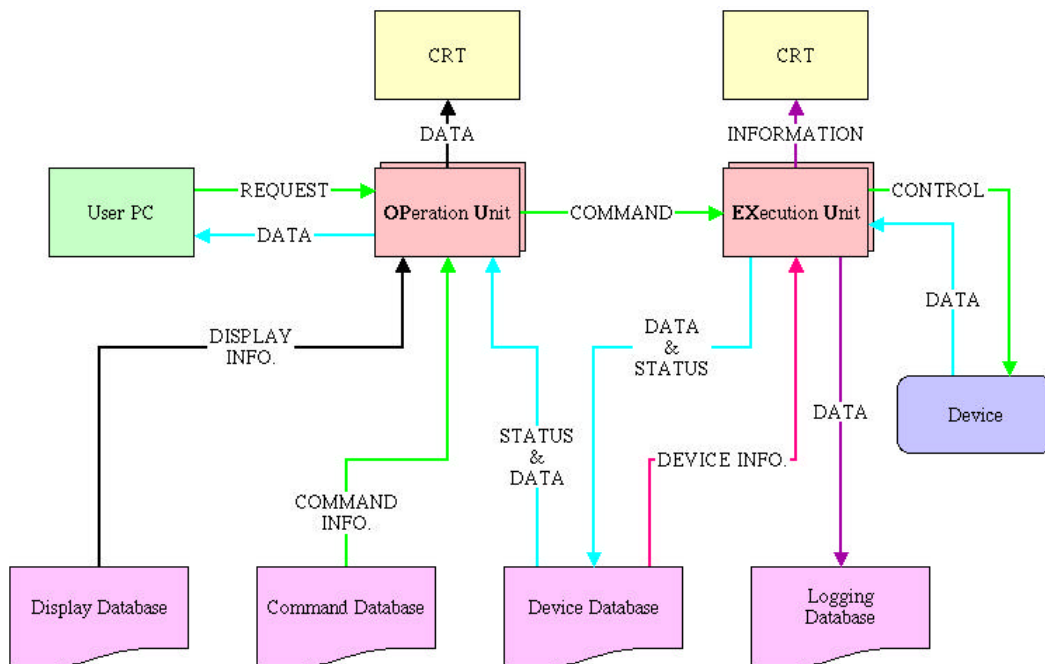


Fig. 2 Software scheme of the control system