PCaPAC'99

PASSPORT

Valid : January 12-15, 1999

The International Workshop on
Personal Computers and Particle Accelerator Controls

Tsukuba, Japan

PCaPAC'99 Schedule

	12 (Tuesday)	13 (Wednesday)	14 (Thursday)	15 (Friday)
8:30	Registration			
8:45				
9:00	Opening address	KEK status	Poster Session	Control system architecture (1)
9:15				
9:30	Invited talk (1)			
9:45				
10:00				
10:15	Coffee			
10:30				Coffee
10:45	Invited talk (2)	KEK Control Tour		
11:00				Control system architecture (2)
11:15				
11:30				
11:45				
12:00				Database, PC system management
12:15				
12:30				
12:45	Lunch			
13:00		Lunch	Lunch	Lunch
13:15	*12:30-13:30*			
13:30	*IPC Meeting*			
13:45				
14:00	Invited talk (3)	Java, ActiveX, Componentware (1)	I/O controller with PC	
14:15				Closing Remarks
14:30				
14:45				
15:00				
15:15				
15:30	Coffee			
15:45				
16:00	Invited talk (4)	Coffee	Coffee	
16:15				
16:30		Java, ActiveX, Componentware (2)	Object technology	
16:45				
17:00				
17:15				
17:30			BUS	
17:45				
18:00				
18:15				
18:30			Banquet (until 20:30)	

Place : San-Go-Kan(Bld. 3) & Kenkyu-Honkan

Talks : Seminar Hall (San-Go-Kan 1F)
Poster : Lecture Hall (Kenkyu-Honkan 1F)
Registration : Conference Room (San-Go-Kan 1F)
Electronic Publication: Conference Room (San-Go-Kan 1F)

Welcome to PCaPAC'99 Tsukuba

Dear Colleagues,

When I started my career as a physicist at KEK in 1973, the word "personal computer" did not exist; however, the advent of microprocessor chips such as the 8008 and 8080 was so impressive to me and really made me get a glimpse of the future world changed by microprocessors. From that time we have witnessed unbelievable progress of hardware; now computers have become personal and personal computers are almost as mundane as TV sets.

As all of you know the progress of hardware is not directly connected to the progress of the use of the hardware. This is indeed true for personal computers. We may reasonably say that a wide variety of possibilities is still hidden from us. This is why we are holding the PCaPAC'99 workshop at KEK. It is my belief that people should talk to each other and exchange ideas to create new and valuable ideas.

It is my great pleasure to work as chairperson of the workshop. Please enjoy the PCaPAC'99.

Sincerely yours,

Shin-ichi Kurokawa
Chairman of PCaPAC'99

International Program Committee:

Isamu Abe, KEK
Subrata Dasgupta, VECC
Ivan Deloose, CERN
Philip Duval, DESY
Andy Goetz, ESRF
Jeffrey O.Hill, LANL
Goro Isoyama, Osaka Univ.
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Franz Peters, DESY
Mark Plesko, JSI
Tian jian Shen, SINR
Masayoshi Sugimoto, JAERI-Tokai
Eiichi Takada, NIRS
Ryotaro Tanaka, Spring-8
Noboru Yamamoto, KEK
Kozo Yamazaki, NIFS
Jijiu Zhao, IHEP

PCaPAC'99 Tsukuba

The 2nd International Workshop on Personal Computers and Particle Accelerator Controls

January 12-15, 1999

Organized by **KEK (High Energy Accelerator Research Organization)**

Location: **KEK Oho 1-1, Tsukuba, Ibaraki 305-0801, Japan**

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PCaPAC'99

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Hotels

Tsukuba Dai-ichi Hotel	52-1112
Hotel Grand Shinonome	56-2212
Sunroot Hotel	52-1151

Others

Ambulance	119
Police	110
Hospital (Medical center)	51-3511
Post office (Gakuen Yuubin kyoku)	51-9225
Narita Flight Information	0476-34-5000
Narita Airport Information Center	0476-32-2802
Taxi (Osone Taxi)	64-0301

Airlines - Reservations & Information -

Aeroflot Russian International Airlines	03-3434-9681
American Airlines	03-3214-2111
Air China International	03-5251-0711
Air France	03-3475-1511
Air India	0476-34-8261
British Airways	0476-32-7222
Cathay Pacific	0476-32-7650
China Eastern Air	03-3506-1166
KLM Royal Dutch Airlines	0476-32-5720
Korean Air	0088-21-2001 (toll free)
Lufthansa German Airlines	0120-051-744 (toll free, German)
	0120-051-844 (toll free, Japanese)
Malaysia Airlines	0476-34-8270
Northwest Airlines	03-3533-6000
Philippine Airlines	0476-34-8381
Scandinavian Airlines (SAS)	0120-678-101 (toll free)
Singapore Airlines	03-3213-3431
swissair	0476-34-8430
Thai Airways	03-3503-3311
United Airlines	03-3817-4411
Virgin Atlantic	0476-32-4675
Japan Airlines (JAL)	0120-25-5931 (toll free)
All Nippon Airways (ANA)	0120-029-333 (toll free)
Japan Air System (JAS)	0120-7-11283 (toll free)
Japan Asia Airways (JAA)	03-5460-0533

Travel agency

Nissin travel agency	52-4305
Ken-ou tourist	58-3123
JTB Traveland	52-5582

General information

Language: The workshop language is English.

Insurance: The organizer cannot accept responsibility for accidents which occur. Delegates are encouraged to obtain travel insurance(medical, personal accident, and luggage) in their home countries prior to departure.

Currency Exchange: Foreign currencies and certain credit cards may not be accepted at hotels, restaurants and souvenir shops. You can exchange US dollars for Japanese Yen at the Joyo Bank in Tsukuba Center.

Traveler's checks and credit cards: Traveler's checks are accepted only by leading banks and major hotels and the use of traveler's checks in Japan is not as popular as in some other countries. VISA, MasterCard, Diners Club, and American Express are widely accepted at hotels, department stores, shops, restaurants and nightclubs.

Electrical appliances: Japan operates on 100 volts for electrical appliances. The frequency is 50Hz in eastern Japan including Tokyo, Tsukuba and 60Hz in western Japan including Kyoto and Osaka.

Tipping: Tips are not customary anywhere in Japan even at hotels and restaurants.

Registration and workshop office

The workshop registration fee is 20,000Yen (Student 2,000Yen) and includes CD-ROM proceedings and the PCaPAC'99 workshop banquet.

Registration desk	Hours
January 11th (Mon.)	14:00 to 16:00
Through 12th (Tue.) to 14th (Thu.)	8:30 to 17:00
15th (Fri.)	8:30 to 12:30

Payment

All payments for PCaPAC'99 must be made at the registration desk in cash (Japanese Yen) only. Personal checks and credit cards will not be accepted.

Cafeteria, Restaurant and Kiosk in KEK

Opening	Hours
Cafeteria	8:10 - 9:30, 11:30 - 13:30, 17:00 - 19:00
Restaurant	10:00 - 20:30
Kiosk	10:00 - 18:30

At the workshop, morning bread and drinks will be available from 8:30 to 9:00.

The KEK cafeteria, restaurant and kiosk will be closed on January 15th (Fri.), the final day of the workshop due to a Japanese national holiday. For locations, see "KEK Site Map".

Presentation

For oral sessions, the allotted time for talks is as follows:

Invited talk:	45 min (40min talk and 5min discussion)
Oral talk:	30 min (25min talk and 5min discussion)

Overhead and computer projectors will be available at the session.
Please consult the workshop office, if you need a 35mm slide projector or have any other requirements.

Poster (mounting and removal)

Mount your poster on the board between 15:00 and 18:00 on the 13th (Wed.) in the lecture hall. The Poster session is on the 14th (Thu.) in the morning from 9:00 to 12:30. Please remove your poster after the session or by 14:30. Pins and adhesive tape for setting up your poster will be available in the lecture hall.

Electronic publishing

Authors should submit all of the source files (text and figures) needed to make the paper, the postscript version, a hard copy of the paper, together with the completed Paper Check Sheet (blue paper). All contributed papers will be distributed on CD-ROM after the workshop.

Electronic publishing office	Hours
12th (Tue.) to 14th (Thu.)	8:30 to 17:00
15th (Fri.)	8:30 to 12:30

PCaPAC'99 Banquet

The PCaPAC'99 banquet will be held at 6:30pm on Thursday 14th at the Grand Hotel Shinonome.
The bus for the Banquet via Dai-ichi Hotel leaves at 17:45 from 3-goukan, the direct bus for the Banquet hall will depart from 3-goukan at 18:00.
The return bus from Hotel Grand Shinonome to KEK will go via the Dai-ichi Hotel.

You are cordially invited to attend the PCaPAC'99 Banquet

Thursday, January 14th, 1999
from 18:30 to 20:30
at the Grand Hotel Shinonome

Accompanying guests will be charged 7,000Yen

Daily bus transportation between hotels and KEK

Operation date: January 12th to 15th
Departure time from hotels: 8:10 am

Please wait in the lobby of your hotel, Tsukuba Dai-ichi Hotel or Hotel Grand Shinonome. The schedule of the return bus from KEK to Hotels will be announced at the workshop site.

Public transportation

For transportation to and from KEK, and in and around Tsukuba, we recommend using the public bus system.

From Tsukuba Center to KEK

There are two alternatives for this trip, Taxi (about 3,000Yen) or local bus (460Yen). Taxis are always available at Tsukuba Center. The local bus departs from bus stop number 1 at Tsukuba Center. Of the eleven lines that depart from this bus stop, only two go to KEK(Kou-Enerugi-Ken, 高エネルギー研 in Japanese). Buses travel to Techno-Park-Oho (テクノパーク大穂) and Tsukuba Eki (筑波駅). As numbers are not assigned to these lines you must locate your bus by reading the Japanese characters (as above) on the front of the bus. The timetables for these two lines are shown in Table 1.

KEK to Tsukuba Center

The bus stop is located opposite the KEK main gate (see “KEK Site Map”).
You should pay when you leave the bus. Please do not use an expressway bus as they don't stop at Tsukuba Center.

Table 1. The Timetable for local buses from Tsukuba Center to KEK

For Techno-Park-Oho	For Tsukuba-Eki
7:19	8:30
8:12	10:15
8:47	11:55
10:32	13:30
12:32	15:15
14:12	16:20
15:45	18:10
16:47	
18:40	

Table 2. KEK to Tsukuba Center

For Tsuchiura-Eki (via Tsukuba Center)
8:09
9:07
9:42
11:31
13:24
15:11 (To Tsukuba Center)
16:36
17:41
19:27
20:06

Tokyo to Tsukuba Center or KEK

We recommend taking an expressway bus (called " highway" bus in Japanese, but written as an expressway bus on signboards) from Tokyo station to Tsukuba. Buses leave Tokyo station from the Yaesu-Minami-Guchi (八重洲南口) gate. There are two lines at bus stop No. 2. The first is called the Tsukuba Line (つくば号), which doesn't go to KEK, its last stop is Tsukuba Center. The second line is called the New Tsukuba-ne Line (ニューつくばね号). Tickets for both lines must be bought before boarding the bus. The Tsukuba line bus does not stop on the highway, and stops only five times after leaving the highway, the last stop being Tsukuba Center (つくばセンター). Leaving Tokyo station every fifteen minutes, the journey takes one hour and fifteen minutes and costs 1,250 Yen. (See table 3)

The New Tsukuba-ne line bus comes to KEK without changing, its final destination is Mt Tsukuba (筑波山) as indicated on the signboard at bus stop 2. The New Tsukuba-ne line is less frequent than the Tsukuba line and makes many stops in Tsukuba except Tsukuba Center. Tickets are 1,450Yen one way. See table 4 for the New Tsukuba-ne line timetable.

Table 3. The timetable for expressway bus (Tsukuba Line)

	Form Tsukuba Center to Tokyo Sta.	Form Tokyo Sta. to Tsukuba Center
5	15 30 45	
6	00 12 24 36 48	00 30
7	00 12 24 36 48	00 30 45
8	00 12 24 36 48	00 12 24 36 48
9	00 12 24 36 48	00 12 24 36 48
10	00 12 24 36 48	00 12 24 36 48
11	00 12 24 36 48	00 15 30 45
12	00 12 24 36 48	00 15 30 45
13	00 12 24 36 48	00 15 30 45
14	00 12 24 36 48	00 15 30 45
15	00 12 24 36 48	00 12 24 36 48
16	00 12 24 36 48	00 10 20 30 40 50
17	00 12 24 36 48	00 10 20 30 40 50
18	00 12 24 36 48	00 10 20 30 40 50
19	00 12 24 36 48	00 10 20 30 40 50
20	00 15 30 45	00 10 20 30 40 50
21	00 15 30	00 10 20 30 40 50
22		00 10 20 30 40 50 55 23 00

Table 4. The timetable for expressway bus (New Tsukuba-ne Line)

Form KEK to Tokyo Sta.	Form Tokyo Sta. to KEK
6:01	7:15
7:56	9:05
10:11	11:05
12:11	12:05
14:06	14:45
15:51	16:35
17:36	18:35
19:28	20:20

KEK to Narita Airport

The easiest way from KEK to Narita Airport is by catching a local bus from KEK to Tsukuba Center. An airport bus (Airport Liner) runs from Tsukuba Center to Narita airport. Tickets must be purchased in advance for the Airport Liner (NATT'S), and can be arranged through the registration desk of the PCaPAC99 workshop. The airport bus leaves bus stop 13 from Tsukuba Center. It stops at terminal 2 at Narita airport, then proceeds to terminal 1. The timetable for Airport liner is shown in table 5.

Table 5. The timetable for Airport Liner (NATT'S)

Tsukuba Center to Narita Airport	Narita Airport to Tsukuba Center
6:30	**8:20**
7:20	**10:05**
11:20	**11:30**
13:20	**14:30**
14:50	**16:30**
17:10	**18:40**

Dormitory

Check in time is from 16:00 to 22:00 at the KEK dormitory.
Your name and room number will be listed on the white board at the entrance lobby of the KEK dormitory. See "KEK Site Map". There are four wings (1 号棟、 2 号棟、 3 号棟、 4 号棟). Please be aware the room numbers in each wing start from 101. Please check which wing your room is in and you will find your key in your room door. When you check out, please return your room key to the green key box at the information desk in the entrance lobby.

Payment:

Please come to the PCaPAC'99 workshop office. Payment should be completed at the time of registration.

Telephone calls:

Local calls can not be made from the dormitory rooms. There are public telephones in the entrance lobby. We recommend purchasing a telephone card (1,000Yen), otherwise ensure you have adequate coins (100Yen) on hand. To make an international call, use the gray ISDN phone, for local calls use the green telephone.

Some useful words

禁煙	**No smoking**	撮影禁止	**No photography**
立入禁止	**Keep out**	案内所	**Information**
開	**Open (in elevator)**	閉	**Close (in elevator)**
紳士用（男子）	**Gentlemen**	婦人用（女子）	**Ladies**
非常口	**Emergency Exit**	入口	**Entrance** 出口 **Exit**
危険	**Danger**		

PCaPAC'99 Programs

Tuesday, 12th January

8:30 - 9:00 Registration

9:00 - 9:30 Opening Address

- TU1 -
9:30 - 10:15 Can Java Replace C++ on Windows for Accelerator Controls?
Hiroshi Nishimura, LBNL

10:15 - 10:45 Coffee

- TU2 -
10:45 - 11:30 Using ACOP in HERA Control Applications
Philip Duval, DESY

- TU3 -
11:30 - 12:15 Experience with PC Based EPICS IO Controllers
Jeffrey O. Hill, LANL

12:15 - 14:00 Lunch ((Meeting of IPC from 12:30 to 13:00.))

- TU4 -
14:00 - 14:45 Implementing Distributed Controlled Objects with CORBA
Mark Plesko, JSI

- TU5 -
14:45 - 15:30 Using the CERN generic NT infrastructure in a specific control environment
Alberto Pace, CERN

15:30 - 16:00 Coffee

- TU6 -
16:00 - 16:45 How PC helps to develop new small control system for new small accelerator.
A.S.Chepurnov, INP, MSU

- TU7 -
16:45 - 17:30 TANGO - New Generation TACO on PCs
W.D.Klotz, ESRF

- TU8 -
17:30 - 18:00 Overview of the Large Helical Device (LHD) Control System and its First Operation
K. Yamazaki, NIFS

Wednesday, 13th January

- WE1 -

9:00 - 9:30 LINAC PC based control system using ActiveX
Isamu Abe, KEK

- WE2 -

9:30 - 10:00 An implementation of the PC-based control system in KEK 12GeV Proton Synchrotron Complex
jun-ichi Kishiro, KEK

10:00 - 10:15 KEKB control system
Tadahiko Katoh, KEK

10:15 - 12:30 KEK Control Tour

12:30 - 14:00 Lunch

- WE3 -

14:00 - 14:30 Java Beans of Accelerator Devices for Rapid Application Development
Gasper Tkacik, JSI

- WE4 -

14:30 - 15:00 PC-based Remote Console System using Java for High Energy Accelerators
Noriichi KANAYA, KEK

- WE5 -

15:00 - 15:30 Java-based Operator Interface (JOI)
Obukhov G., DESY

- WE6 -

15:30 - 16:00 Integrating the latest JAVA Technologies in Process Control MMI
Frederic MOMAL, CERN

16:00 - 16:30 Coffee

- WE7 -

16:30 - 17:00 Performance Evaluation of Particle Tracking Simulation with Java
Ryoichi Hajima, U. Tokyo

- WE8 -

17:00 - 17:30 A Control System Based on Web, Java, CORBA and Fieldbus Technologies
Mark Plesko, JSI

- WE9 -

17:30 - 18:00 Sequencing and Ramping in HERA
Juergen Maass, DESY

Thursday, 14th January

9:00 - 12:30 Poster Session (Lecture Hall in Kenkyu-HonKan 1F)

12:30 - 14:00 Lunch

- TH1 -
14:00 - 14:30 Development of PC Based Field Controller with Linux
T. Masuda, Spring-8

- TH2 -
14:30 - 15:00 I/O Control with PC and Fieldbus
Uros Platise, JSI

- TH3 -
15:00 - 15:30 Updation of ECR Power Supply Controls To Distributed PC Environment
Tushar K. Das, VECC

- TH4 -
15:30 - 16:00 Distributed acquisition of Beam-View and Property through standard Video components
Sarbajit Pal, VECC

16:00 - 16:30 Coffee

- TH5 -
16:30 - 17:00 Interface extension IO Lib of class library MFC for control applications
Yurii A.GAPONOV, SSRC

- TH6 -
17:00 - 17:30 Experience with an object oriented control system at DESY
Kay Rehlich, DESY

17:45 Bus for Banquet Hall via Dai-ichi Hotel

18:00 Bus for Banquet Hall

18:30 - 20:30 Banquet (Grand Hotel Shinonome)

Friday, 15th January

- FR1 -
9:00 - 9:30 From a Unix to a PC Based SCADA System
Frederic MOMAL, CERN

- FR2 -
9:30 - 10:00 The Present Status of the Control System for a Stretcher-Booster Ring at Tohoku University
Masakatsu Mutoh, Tohoku Univ.

- FR3 -
10:00 - 10:30 A Control System for the DESY Accelerator Chains
Ruediger Schmitz, DESY

10:30 - 11:00 Coffee

- FR4 -
11:00 - 11:30 Low Cost Beam Line Control System
Takashi Kosuge, KEK

- FR5 -
11:30 - 12:00 Computer Control System for the Siam Photon Source
Weerapoon Pairsuwan, NSRC

- FR6 -
12:00 - 12:30 The Lo.Co.Mo.tion MonteCarlo farm
Emanuele Leonardi, INFN Roma

12:00 - 13:30 Lunch

13:30 - 14:30 Closing Remarks

<<Notes>>

Abstracts

(Invited talks & Oral sessions)

TU1

Can Java Replace C++ on Windows for Accelerator Controls?

Hiroshi Nishimura, LBNL

We discuss the possibilities of using Java instead of C++ for accelerator modeling, simulation and controls, covering the items of run-time performance, availability of numerical libraries, migration from C/C++, link to C++ routines, and distributed objects. We will be presenting Java class libraries for modeling and simulation studies, on-line device access and operation at ALS on Windows NT 4.0.
This work was supported by the Director, Office of Energy Research, Office of Basic Energy Sciences, Material Sciences Division, U. S. Department of Energy, under Contract No. DE-AC03-76SF00098.

TU2

Using ACOP in HERA Control Applications

Philip Duval, Honggong Wu, DESY

The ACOP (Accelerator Component Oriented Programming) ActiveX control is now used in a wide variety of console applications in the control of ERA and its pre-accelerators. It has proven itself to be a versatile graphics control in its own right, with an intuitive interface for the developer. Its primary function, however, has been to provide a common Application Programmer's Interface (API) for three rather different data exchange mechanisms found in accelerator control as DESY. These include the TINE data exchange protocol, MKI3 data exchange, and Channel Access. At DESY, ACOP is primarily used in console applications programmed in Visual Basic 5.0 running on Windows NT. Nevertheless, there are a number of applications which use ACOP in MS Visual C++ and Delphi. In all cases, the ease in programming in a high-level language such as Visual Basic with components has proven to be a marked advantage. We report here on our first year's experience using ACOP at DESY.

TU3

Experience with PC Based EPICS IO Controllers

Jeffrey O. Hill, LANL

The Experimental Physics and Industrial Control System (EPICS) has been widely adopted in the accelerator community. Although EPICS is available on many platforms, the majority of sites have deployed VME- or VXI-based input output controllers running the VxWorks real time operating system. Recently, a hybrid approach using VxWorks on both PC and traditional platforms is being implemented at LANL. To illustrate these developments we will compare our recent experience deploying PC-based EPICS input output controllers with experience deploying similar systems based on traditional EPICS platforms.

TU4

Implementing Distributed Controlled Objects with CORBA

Mark Plesko, JSI

The heart of the control system implementation of the light source ANKA is an object model of devices. It is the Accelerator Control Interface (ACI), a language independent collection of interfaces based on network distributed objects using the CORBA standard. All common accelerator components such as power supplies, vacuum, RF, position and current monitors are defined by means of functions and parameters. The devices are described according to CORBA with the Interface Definition Language (IDL), which presents a language-independent way of defining object interfaces. Each controlled parameter, called device property, is an object by itself, implementing atomic actions such as get/set, increment/decrement, etc. All constants related to a property such as min/max, name, description, etc. are obtained from the property directly by means of remote methods - no direct database access is necessary. Values of the properties are updated asynchronously by means of monitor objects. The ACI is meant to be a standardized interface so that applications and pieces of control systems can be hooked to it from either side. The ACI does not replace existing control system architectures and frameworks but rather tries to use their features in order to be as compatible as possible to those systems.

TU5

Using the CERN generic NT infrastructure in a specific control environment

Albertp Pace, Ivan Deloose, CERN

CERN has a large Windows 95/NT infrastucture with more than 3500 PCs connected that is used as one of the main infomation services for the laboratory. This infrastructure is used for a wide set of services, namely Office Automation, Computing Aided Engineering, Calculations, Software Development, and ... controls. This paper will describe the CERN generic infrastructure for Windows 95 and Windows NT and then give several examples of PC control applications and its future directions.The implementation of an object oriented device server based on Windows NT and ActiveX in the CERN-ISOLDE-REX experiment will be reported.

TU6

How PC helps to develop new small control system for new small accelerator

A.S.Chepurnov, A.S.Alimov, D.I. Ermakov, V.I. Shvedunov, F.N.Nedeoglo*, V.V.Garbuzov*, N.S.Kochetkov*, A.S.Lisjytin*, R.E.Shugaley*,
INP, MSU, *School of Physics, MSU

The problem how to develop control system (CS) for newly designed compact electron linac which beeing planed to be industrial installation was solved. During the first stage of CS development, when the accelerator is under final designing and parallel assembling, it is necessary to study the accelerator as object to control, to develop algorithms and procedures of operation. We used as much as possible already existing and well known hardware and software components usually used not for control but for experiments automation. Flexible modern DAQ boards were installed in conventional PC and were used to control subsystems of accelerator. To normalize signals for acquisition and generate signal to control, existing rather old but simple analogue blocks (industial and custom designed) were applied. All data acquisition and control algorithms, were implemented under PC version of LabView 4.0 together with some simple operator interface to test and study subsytems of the accelerator. The PC, played a role of front-end level, was connected through Eternet with TCP/IP stack to another remote PC worked under Linux and supported operator interface and simple data-base. During the second, final stage of CS development "industrial type" control system was developed. Front-end PC with analo- gue electronics was replaced with few members of "Smart device" family - intelegent front-end devices. Ethernet was replaced with CAN-bus while the same operator console under Linux was used. The approach allows parallel work of peopole involved in developing accelerator hardware, software and hardware of CS.

TU7

TANGO - New Generation TACO on PCs

W.D.Klotz, A.Götz, P.Mäkijärvi, B.Regad, E.Taurel, J.Meyer, J.M.Chaize, ESRF

TANGO is the next generation of TACO the ESRF object oriented control system. It is based on multi-threaded distributed objects implemented in C++ or Java. This paper will present the major features of TANGO namely the IDL interface, CORBA, the root class, the database, monitors, multi-threading. It will describe how these features are implemented in C++ and Java on PCs running Linux and/or Windows as desktop clients or as embedded PCs in PC-104 and/or VME format . It will describe how TANGO will be introduced to the running TACO system using Gateways. Experience deploying the new system will be presented as well as the difficulties encountered in introducing new technologies in a running system.

Overview of the Large Helical Device (LHD) Control System and its First Operation

K.Yamazaki, H.Yamada, K.Y.Watanabe, S.Yamaguchi, H.Nakanishi, T.Mito, H.Chikaraishi, A.Komori, K.Murai, O.Motojima and the LHD Group, NIFS

The first plasma operation of the Large Helical Device (LHD) fusion system has been successfully carried out on March 31, 1998 just on schedule. This is a world-largest helical fusion machine with a major radius of 3.9 m and a minor radius of 0.65 m. Steady-state operation has been realized by means of superconducting coils with 3 Tesla after eight-year construction period. In this presentation, we will explain the overview of the LHD control system in the following:

(1) LHD control concept.
(2) Central (Chu-oh) Control System (COCOS) with hard-wired interlock, soft sequential control and optical timing control units.
(3) FDDI/ATM network architecture.
(4) Client/server LHD Man-machine-interface System (LMS) using Windows NT with Visual Basic.
(5) Control data monitoring system (VME and Windows NT (Visual C++) / Unix (Java)).
(6) Control sub-systems relevant to machine commissioning, such as vacuum pumping control system, cryogenic cooling control system, and coil power supply control system.
(7) Distributed control systems for plasma diagnostics, and advanced data acquisition system by Windows NT network.

A variety of operations and experiments will be continued on LHD using these flexible, reliable and advanced control systems.

WE1

LINAC PC based control system using ActiveX

Isamu ABE, Masahiko TANAKA, Akihiro SHIRAKAWA, Masakatsu MUTOH*,
KEK, *LNS Tohoku Univ.

A PC based control system has been in operation at the PF Linac control system for more than 10 years, initially DOS based, it is now based on Windows NT. The first control system in the PF Linac was composed of a mini-computer and CAMAC. Old libraries were reassembled to windows VBX or OCX, then moved to OLE, and recently expanded to ActiveX. ActiveX brought many new benefits to the field of accelerator control. In the current Linac control system, PC's perform the function of device controller, middle layer processor and database, and GUI.Recently, we have found that it is possible to create a standardized accelerator kernel system. This system will be able to be used with any type of accelerator up to that of a medium size. We have been developing COACK (Componentware Oriented Accelerator Control Kernel) using ActiveX -a standard model for accelerator control kernel. This paper will discuss the functions of COACK and its performance.

WE2

An implementation of the PC-based control system in KEK 12GeV Proton Synchrotron Complex

Jun-ichi KISHIRO, E. Kadokura, H. Nakagawa, K. Nigorikawa, Y. Yano, KEK

Throughout twenty years history of the KEK 12GeV proton synchrotron(PS), accelerator control system has been changed twice causing from the development of computer and interface hardware technologies. The third generation of PC-based new control system is now implementing and aiming to replace the second generation based on VME-MAP system. Power supply control for LINAC Rf equipment and beam line magnets are almost replaced by programmable logic controller(PLC). And some kind of new interface hardware are implementing for fast data acquisition. Ten PCs are distributed, SCADA software and API for the data acquisition interface provide an software developing environment on Windows NT system. According to the accelerator operation program, more replacements are undergoing and unification of the whole system, including a database configuration, is now designing.

WE3

Java Beans of Accelerator Devices for Rapid Application Development

Gasper Tkacik, M. Plesko, M. Dach, S. Hunt, JSI

A Java Bean is a reusable component that can be manipulated in a visual builder environment, similar to Visual Basic: Beans can be graphically arranged and connections between them established. Such environments enable the programmer to build an application without typing a single line of code. Many visual Beans exist, such as buttons, gauges, charts, etc.. However, Beans can be also invisible, having pure functionality without graphical representation. We have written a library of invisible Java Beans, called Abeans for accelerator Beans, that implement controlled objects of an accelerator - devices. The concept is based on ACOP, but goes further such that for each device type there is one corresponding device Bean. A device Bean encapsulates all remote calls from the client to a device server of the process control layer, e.g. get/set, on/off, etc.. Thus the network is invisible to the user of device Beans. Tasks of a device Bean include opening the connection and performing the function calls on remote objects; report and manage all errors/exceptions/timeouts arising from network communication, providing handles for asynchronous messages, etc.. Abeans currently support CORBA communication through the ACI interface and CDEV. All the applications for the control system of the ANKA light source have been built using Abeans. The SLS light source uses Abeans to connect the same applications to CDEV.

WE4

PC-based Remote Console System using Java for High Energy Accelerators

Noriichi KANAYA, Seiji ASAOKA, Hideki MAEZAWA, KEK

The PC-based Remote Console System has been designed and implemented using Java for high-energy accelerators. The Remote Console System provides control information on accelerator control operation in order to control and monitor high-energy accelerator components. The system was implemented on PCs and portable lap-top computers running under WindowsNT. The system allows operating the accelerator as well as diagnosing the accelerator at any place in the field through the network. The system provides functionality of consoles either in the control room or, if a failure occurs in the accelerator, in the vicinity of the faulty accelerator component. The system can greatly reduce shutdown time caused by a malfunctioned accelerator component. The design and implementation of the system is discussed in detail.

WE5

Java-based Operator Interface (JOI)

G. Obukhov, M. Clausen, N. Kamikubota, DESY

The proposal for Java-based Operator Interface (JOI) is discussed in this paper. Several examples were implemented for demonstration purpose. These examples can communicate with real equipment at DESY. JOI was implemented as 3-tier architecture: JavaBeans as reusable components on the client side, they communicate through CORBA/IIOP protocol with servers which provide connection to diffent control systems at DESY. Such approach enables to have multi-platform operator interface for diverse control systems. The development of JOI's JavaBeans and building of JOI itself was done under Windows NT. JOI can run without any modifications on any Java-enabled platform.

WE6

Integrating the latest JAVA Technologies in Process Control MMI

Frederic MOMAL, CERN

The LHC/IAS Group is developing supervisory systems by means of industrial SCADA packages. For the past four years, we have provided Web remote access to the data coming from our supervisory and control systems. Combining our findings, an architecture and a strategy have been set-up for a generic Java interface, which offers a remote and unique access to all kinds of control data. Using the object-oriented technology, the architecture dissociates the data access layer from the presentation one. Thus, the interface may be used to access different types of data. The data are stored in the interface together with a set of related information (acquisition date, unit, etc.). The graphical interface is based on components that may be stored independently and accessed on demand. Attention has been given to easing the integration of commercial components. To aid non-specialists in creating components, a graphical scripting language has been developed.

WE7

Performance Evaluation of Particle Tracking Simulation with Java

Ryoichi Hajima, Dept. Quantum Eng., & Systems Sci., University of Tokyo

Programming language Java promises a possible solution for standardization of accelerator software: accelerator modeling, designing, controlling, operating, logging and so on. Performance of Java is a key issue in these applications, if we replace existing simulation codes and class libraries into Java. In the present study, performance of Java based particle tracking code including space charge calculation is evaluated in comparison with C code. It has been found that the performance of Java is significantly improved by JIT compiler which shows calculation speed of 1/2 or 1/3 as C code, while the performance of classical Java VM with interpreter is less than 1/10 of C code. Performance evaluation with HotPoint Java VM will be also presented.

WE8

A Control System Based on Web, Java, CORBA and Fieldbus Technologies

Mark Plesko, M. Dach, S. Hunt, B. Jeram, M. Juras, K. Kenda, I. Kriznar, K. Mele, T. Milharcic, M. Perko, M. Peternel, U. Platise, R. Sabjan, H. Schieler, M. Smolej, G. Tkacik, JSI

We present the control system for the light source ANKA, which builds on the three-tier standard model architecture. Modern products based on standards in distributed objects and networking are applied in addition to low-cost hardware including PCs. The LonWorks field bus network with intelligent nodes and standard I/O modules connect the individual devices directly to PCs. Those PCs act as Web servers for data transmission, application distribution and documentation retrieval. Other PCs on the net run Web browsers with Java clients. The communication with the control system data servers is done through CORBA. CORBA objects are wrapped into JavaBeans, which are connected with commercial data-manipulation and visualization Beans using visual tools or programmatically. The CORBA objects and JavaBeans are generic models of controlled data that can be used at any other control system. The Java applications are based on those objects only and can thus be run on any other accelerator. Experiences with the running system for the ANKA microtron and a successful port to CDEV at the Swiss Light Source will be presented, too.

WE9

Sequencing and Ramping in HERA

Juergen Maass, DESY

For all accelerators at DESY we use so called file-operating or ramp programs to save and set the magnet currents. Hera, the biggest accelerator at DESY, consists of two coupled machines with both seperate and common magnets. The HERA proton machine has normal and superconducting magnets with very different changes in their magnetic fields. The ramp software must take all of these factors into consideration during magnet operation. The sequencer is responsible for processing the task list nessessary to store colliding proton and electron beams. During the winter shut down 1997/98 the PC dominated control system for HERA was largely in place. The ramp program like all HERA console programs is written in Visual Basic 5 with ActiveX controls and runs in the control room on Windows NT workstations. The graphic display for the control of the magnet ramp and the data exchange with the magnet server (a SUN-workstation running under solar 2.6) are implemented with the ACOP-control. The new ramp program has been in operation and running reliably since May 1998. We report here on our experiences and note that the combination of Visual Basic plus ActiveX controls has been invaluable in debugging and fine-tuning the application to meet the needs of the operators.

TH1

Development of PC Based Field Controller with Linux

T. Masuda, T. Fukui, M. Kodera, R. Tanaka, A. Yamashita, SPring-8

In SPring-8 storage ring control system, VMEbus systems with real-time UNIX(HP-RT) are used as front-end controllers. For increasing requirements of temporary measurements, it is useful to introduce inexpensive I/O controllers. Linux based PC system was adopted as a supplement system with the same functionality as that of the VMEs. Control software running on the VME system was migrated to Linux system and the new system was used for such as measurement of cooling water temperature, air temperature at the machine tunnel and so on. At this moment, four PC systems are actually used as field controllers. We report development experiences of device drives of Linux based PCs with ISA slots and measured performance based on the accelerator operation.

TH2

I/O Control with PC and Fieldbus

Uros Platise, K. Kenda, I. Kriznar, M. Perko, M. Plesko, M. Smolej, JSI

The LonWorks field bus is a powerful data acquisition/networking system that connects up to 32000 intelligent nodes with I/O modules directly to a PC that runs under Windows 98/NT. LonWorks offer a complete network system in hardware and software in a single micro-controller (the Neuron chip) and eliminate any need for network programming. Many LonWorks boards are commercially available, however it is also relatively straightforward to interface own designs to the Neuron chip. After a careful analysis of all our I/O requirements, three I/O boards were designed that cover all cases: a multipurpose serial interface, a high precision 16-bit DAC/ADC board and 40 channel digital I/O board. The software that we have written for the Neuron chips implements quite complex functions such as state machine and alarms, synchronous ramping in 0.1 millisecond steps and others. The communication to the PC is done through the LCA/LNS library through network variables and remote command invocation, which allows also for network management. On top of this, we have written additional functionality such as a template compiler and a file transfer protocol, which loads all run-time constants at start-up from a centralized database. Thus each constant that is used by the Neuron and the PC clients and servers is stored in one place only. Results of operations and performance measurements will be presented.

TH3

Updation of ECR Power Supply Controls To Distributed PC Environment

Tushar K. Das, Amitava Roy, Sushanta Pal , S. Dasgupta, VECC

Controls of the ECR source and the beam-handling elements for injection of the heavy ions into the cyclotron, are being shifted to the central control room, in phases. The work constitutes a part of the retro-fitted distributed computerization of the Cyclotron. A Pentium, Win95 PC working in the ECR front-end takes care of the above power supplies controls. Existing CAMAC crate, several ADC & DAC modules have been put to use, after in-house development of Windows compatible CAMAC library functions. VB callable hardware In/Out functions have been used in the libraries, by incorporating available freeware from internet. Several graphic bit-map icons, specially suited for the purpose, have been prepared and used in the VB MMI form. The Client-Server mode implementations of the distributed controls work using SocketWrench-VBX socket control on Windows-95.

TH4

Distributed acquisition of Beam-View and Property through standard Video components

Sarbajit Pal, Tapas Samanta, Subrata Dasgupta, VECC

Distributed acquisition of Beam-View and Property through standard Video components. Sarbajit Pal, Tapas Samanta and Subrata Dasgupta Variable Energy Cyclotron Centre Dept. of Atomic Energy, Calcutta An inexpensive computerised beam-viewer has been developed exploiting readily available PC add-on h/w and s/w on a Pentium PC running Windows95. A Video Blaster add-on board from popular multimedia system, is driven to digitize inputs from commercial CCD cameras placed along the beam transport lines. The view acquisition, histogram generation, data compression, intensity computation take place on a "view_server", on request from a "view_client", across a switched Ethernet LAN. The client collects and displays these on a VB Window, on activation of its control buttons for displaying size, shape, position, histogram, centroid, intensity etc.. Iso-intensity contour generation and thence emittance calculation at the view station is also possible. Service response time is usually around two seconds. The network communications are implemented using SocketWrench/VBX Socket control on Windows 95. Using some freeware s/w's as OLE inside the application, various image processing facilities are incorporated, for enhanced viewing of beam properties. Major portion of the s/w is written in Basic except some compute intensive functions that are written in C.

TH5

Interface extension IOLib of class library MFC for control applications

Yurii A.GAPONOV, Kazuki ITO, Yoshiyuki AMEMIYA,
SSRC, BINP SB RAS, ISSC SB RAS

The hierarchical scheme of C++ object class library IOLib is described and discussed. This library is interface extension of the class library MFC for control applications in Windows 95. The extension consists of three main parts: external device interface, windows interface and programming interface. The external device interface supports a control of CAMAC modules. The windows interface supports different types of windows objects: controlling (switches, buttons), numerical (integer, double, string), graphical (2D). Programming interface supports operations with binary and ASCII text files; multithread operations.

TH6

Experience with an object oriented control system at DESY

Kay Rehlich, Gerhard Grygiel, Olaf Hensler, DESY

For the Tesla Test Facility (TTF) we have developed the object oriented control system DOOCS. The Linac is now in operation for more than one year. The control system is implemented on PC's with the Linux operating system and on SPARC processors with Solaris. During the last years a lot of experience with the design of C++ libraries has been gained as well as implementing device server programms with the help of these libraries. A device is added to the system with the assistance of a automatically generated template of a new server process. Only device specific code has to be programmed to the server. We will also describe the progress we made in creating operator application using object libraries. This DOOCS Data Display (DDD) tool, based on these object libraries, allows to create graphical operator panels without programming.

FR1

From a Unix to a PC Based SCADA System

Frederic MOMAL, Cedric POURCEL, CERN

To facilitate the development of supervisory applications involved in slow process control (such as cryogenic control) the LHC/IAS Group opted, a few years ago, for an industrial SCADA package which runs on Unix platforms. However, to reduce costs and following current market trends, it has been decided to move over to a PC based package. Several processes relating to the testing of the prototypes of the LHC magnets are already controlled in this way. However, it was still necessary to provide all the services previously available to the users, e.g.: data archiving in central databases, real-time access through the Web, automatic GSM calls, etc. The paper presents our findings, namely the advantages and drawbacks of a PC based package versus a Unix based system. It also lists the criteria used in the market survey to arrive at the final selection, as well as, the overall architecture, highlighting the developments needed to integrate the package into the global computing environment.

FR2

The Present Status of the Control System for a Stretcher-Booster Ring at Tohoku University

Masakatsu Mutoh, M. Nanao, Y. Shibasaki, O. Konno, M. Oyamada, T. Tamae, I. Abe*, LNS Tohoku Univ., *KEK

A stretcher-booster ring (STB) was constructed in the autumn of 1997 and has been commissioned. The main operation modes of the STB, a stretcher-ring mode and a booster-ring mode, have achieved their design performance so far. The STB control system, based on personal computers (PCs), was developed to perform a multi-mode operations and has successfully done so. The PCs are run as a client/server system using Windows NT. The server PC plays the role of database server, and about ten client PCs have different particular functions. All of the PCs are interconnected with a 100Base-TX/FX Ethernet. Some types of commercially available software are employed to reduce the development and maintenance loads, in particular LabVIEW, used as a graphical user interface on the operation consoles, has contributed to the construction of the software system in a short period of time. In this paper, we introduce the STB control system and report on its current status.

FR3

A Control System for the DESY Accelerator Chains

Ruediger Schmitz, DESY

DESY has 9 accelerators in permanent operation. The reliable and operator friendly control of these accelerators is necessary for successful operation of HERA, DORIS and PETRA to provide a good experimental environment for the 6 Experiments at HERA and the numerous users of synchrotron light at DORIS and PETRA. As already reported in PCaPAC96 PETRA was upgraded to a PC-based control system in spring 1996. The proven concepts and improved programs have been used to renew the control system of the storage ring DORIS in the shutdowm 1997. A step by step migration of controls from the old system to the PC-based one is under way during normal machine operation for the injection accelerators for leptons and protons. A review of the underlying concepts of the homogeneous control system will be given. Focus is put on new control system features since the first version was realized in PETRA.

FR4

Low Cost Beam Line Control System

Takashi Kosuge, Yoshinori Uchida, KEK

The Photon Factory has many different kinds of beam line control systems, which are mostly based on PCs. Recently, many users requested that a standard control system be made . The new system must be made at minimal cost and be easy to remodel. This paper will discuss the trial of the development of a low cost standard system at the Photon Factory. Generally, the beam line optics composed with monochromator and mirrors have been controlled by pulse-motor controller using GPIB at the. As high speed control was not requested, it was decided that an RS232C-GPIB converter would be used. Our system has become hardware independent. By writing the application in Perl, and running it on FreeBSD, costs have significantly reduced. Perl is a very powerful, and from our experience, a very easy to use language. Staff with limited programming knowledge can learn to program in Perl at a low training cost. Perl is a popular, powerful CGI language used in the Web world, through the use of Perl in the application of a Beam line control system, the language's full potential has been realized. This paper will stresse that in comparison to other languages Perl is far superior.

FR5

Computer Control System for the Siam Photon Source

Weerapoon Pairsuwan, Takehiko Ishii, Goro Isoyama, Tatsuya Yamakawa, Yutaka Hirata, Naohisa Tsuzuki, Tamotsu Takeda, NSRC

The synchrotron radiation facility named the Siam Photon Laboratory is being constructed in Thailand. The accelerator system used in the SORTEC Laboratory in Tsukuba, Japan, which consisted of the electron linac, the booster synchrotron and the 1 GeV electron storage ring, were dismantled and transported, and will be reassembled in Thailand. The control system used in the SORTEC Laboratory was, however, outdated and its performance is insufficient for the Siam Photon Source, which will be upgraded from the SORTEC storage ring to be one of the highest-performance light-sources in the world. Therefore the control system will be replaced with new one. The new control system uses some personal computers with Windows-NT as control computers and operator terminals, and several programmable logic controllers as local controllers and interfaces to the controlled devices. They are connected with Ethernet. Most of the controlled devices are connected to so-called remote IO stations, which are distributed near the respective controlled devices. Remote IO stations in a group are connected with a local network to a programmable controller. The control system will be installed in the summer of 1999. In this paper, we will report the design of the control system for the Siam Photon Source.

FR6

The Lo.Co.Mo.tion MonteCarlo farm

Emanuele Leonardi, Magda Pedace, INFN Roma

The LO.CO.MO.TION (LOw COst MOntecarlo producTION) project is devoted to the study and realization of a PC-based farm for MonteCarlo production in the L3 experiment at CERN. The farm, located in Rome, Italy, currently consists of 5 machines running the Linux OS. The management software, entirely written in Perl, allows for fully automatic job submission and data retrieval procedures, while remote monitoring of the farm status is made possible via a web-based graphical interface. The system has been operational since the beginning of June 1998 and produced about two millions of fully simulated MonteCarlo events for the collaboration. Future developments include the use of a SQL database for a more sophisticated handling of the production process, a web-based control interface and further improvements in processing power.

<<MEMO>>

Abstracts

(Poster session)

P11

Realtime Display of Accelerator Status Using JAVA and CORBA

Shiro Kusano, N. Kamikubota*, K. Furukawa*,
Mitsubishi Electric System & Service Co.,Ltd., *KEK

Recently introduction of object-oriented technologies into accelerator controls has been understood as a future promising direction. Among the object-oriented technologies, Java and CORBA have been widely accepted in all the industrial fields. We, the KEK electron/positron injector-linac, have investigated the possibility to introduce such technologies for real-time display of accelerator status. A test program was developed with Java, which is act as a CORBA client, communicates with the CORBA server at an Unix workstation of the KEK-linac control system. As a result, the status of the KEK-linac was shown at a web-brawser of remote PC. Experiences and discussions are given in this article.

P12

A Real-time Observation System of Accelerator Operation using Java

Masakatsu Mutoh, M. Nanao, O. Konno, LNS Tohoku Univ.

A stretcher-booster ring (STB) was constructed at Tohoku University. Real-time information on the STB operation is provided through the Internet. Our goal for this system is for accelerator researchers and engineers to be able to diagnose any accelerator problems from their offices or homes via the Internet. A recently developed Java language is used for various graphic displays of the operation records which are saved in the database. The database which provides real-time information to the Internet is separate from the control database and has been installed on the www server. This has been done to protect the control database from illegal access from the Internet and also to help reduce the CPU load in the database server used for the accelerator control. The transmission of the data from the control database to the www database is achieved using a replication function having the MS-SQL. The control database is defined as a publication-server, and the www database is defined as a subscription-server. Vacuum pressures in the STB and a beam current of an experimental target point are currently displayed on our laboratory's home page using a Java-applet, we will provide other information about the status of the operation to the Internet soon.

P13

Interactive Data Visualization with Java 3D

Masahiko EMOTO, Joseph C. Narlo II, Sataro YAMAGUCHI, Mamoru SHOJI, Masakazu TAMURA, Ryohei MURATSU, Yoshiyuki TANAHASHI, Sakiko SUZUKI, Masanao KATO, Joji KARIYA, Yasuaki TERAMACHI, Haruhiko OKUMURA, NIFS

A real-time monitoring system is being developed for the LHD (Large Helical Device) experiments at NIFS (National Institute for Fusion Science). The system is utilizing Java technology, and it enables remote participants to monitor experiments in real-time and retrieve data from remote stations. Also with this technology, an alarming system, as presented in this conference, has been constructed to notify researchers by some physical method (I.e. email, pager, etc...). The goal is an easily used and complete monitoring system that can be used from any browser. To achieve part of this goal, a graphical representation of the various aspects of the monitoring system is needed and is being developed with Java3D technology. By using Java3D, integration with the Java based monitoring system is easily and efficiently realized. Java3D allows for a quick, easy, and interactive interpretation of the vast amount of data and geometry associated with the experiments. This allows participants to efficiently analyze key aspects and to quickly identify malfunctioning parts or troublesome areas in the experiment. From this aspect, we are studying the Java, including Java3D technology and its internet capability to carry on monitoring, data capture and data analysis of real-time LHD experiments with remote participation.

P14

Java Based Data Monitoring and Management System for LHD

J. Kariya, M. Shoji, M. Emoto, H. Okumura, Y. Teramachi, S. Yamaguchi, Yamaguchi Univ.

A real-time monitoring system is being developed for the LHD (Large Helical Device) experiments at NIFS (National Institute for Fusion Science). The system is utilizing Java technology, and it enables remote participants to monitor experiments in real-time and retrieve data from remote stations. Also with this technology, an alarming system, as presented in this conference, has been constructed to notify researchers by some physical method (I.e. email, pager, etc...). The goal is an easily used and complete monitoring system that can be used from any browser. To achieve part of this goal, a graphical representation of the various aspects of the monitoring system is needed and is being developed with Java3D technology. By using Java3D, integration with the Java based monitoring system is easily and efficiently realized. Java3D allows for a quick, easy, and interactive interpretation of the vast amount of data and geometry associated with the experiments. This allows participants to efficiently analyze key aspects and to quickly identify malfunctioning parts or troublesome areas in the experiment. From this aspect, we are studying the Java, including Java3D technology and its internet capability to carry on monitoring, data capture and data analysis of real-time LHD experiments with remote participation.

P15

Control panels made on Web browser by using ActiveX Data Objects

Ryukou Kato, Tetsuya Igo, Goro Isoyama, ISIR Osaka Univ.

A control system composed only of the personal computers (PCs) is being developed for the far-infrared free electron laser (FEL) at the Institute of Scientific and Industrial Research (ISIR), Osaka University. The software for the control system is designed such that user interface and the device driver levels are connected by a database working as a core of the data flow, which makes it easy to develop control programs. Making use of Active Server Pages (ASP) and Dynamic HTML, we can visually and interactively administer databases residing on other computers. The Web server reads an ASP file and then executes scripts written in it. A result of the execution is send to a client and displaced by Web browser. When an event occurs in a client, scripts in an ASP file on the client are executed and a result is sent to the server. Using this technology, we are developing control system, which has control panels on the Web browser, for the devices in the FEL beam transport line, such as the bending magnets, the quadruple magnets, the steering coils and the beam profiles monitors.

P16

Experience and problem of 3W technology at CNS cyclotron facility

Shin-ichi Watanabe, Masayuki Sekiguchi, Yoshitugu Arakaki*,
CNS U-Tokyo, * KEK Tanashi

A control system composed only of the personal computers (PCs) is being developed for the far-infrared free electron laser (FEL) at the Institute of Scientific and Industrial Research (ISIR), Osaka University. The software for the control system is designed such that user interface and the device driver levels are connected by a database working as a core of the data flow, which makes it easy to develop control programs. Making use of Active Server Pages (ASP) and Dynamic HTML, we can visually and interactively administer databases residing on other computers. The Web server reads an ASP file and then executes scripts written in it. A result of the execution is send to a client and displaced by Web browser. When an event occurs in a client, scripts in an ASP file on the client are executed and a result is sent to the server. Using this technology, we are developing control system, which has control panels on the Web browser, for the devices in the FEL beam transport line, such as the bending magnets, the quadruple magnets, the steering coils and the beam profiles monitors.

P17

Advancement Towards Development of Sharable Accelerator MMI

Sarbajit Pal, S. Dasgupta, I. Abe*, VECC, *KEK

The concept of universal sharable GUI objects for constructing MMI of Accelerator controls has been extended. Code writing for member-functions of MMI class and its various sub-classes, developed earlier, have been implemented in platform independent Java. The general purpose MMI screen has been further developed to accommodate multiple graph displays in addition to the spread-sheet type parameter display. The sub-class MMI_Injector has been loaded with detailed functionalities for operation and monitoring the vacuum system and the power supplies of the transport line elements of the ECR ion-source of the VEC Cyclotron. The control and setting information are interchanged through the functions of the database class. Development efforts are directed towards transforming the above independent MMI classes to ActiveX components to facilitate their usage in other accelerator control systems. The ActiveX components are constructed in VC++ for obvious reasons, and are plugged into our application on VJ++.

P18

Man-machine interface systems for LHD experimental operation

K.Y. WATANABE, H. YAMADA, H. OGAWA, N. YAMAMOTO, N. TANIGUCHI, K. YAMAZAKI, NIFS

A man-machine-interface system, we call LMS (LHD Man-machine-interface System) is a primary component of the LHD central control system. LMS involves a variety of intelligent functions. LMS provides a variety of information transmitted through LAN. While LHD is a plasma physics experimental device, it has a specific feature of a large-scale plant due to a steady-state capability and cryogenic systems. The control system is required to cooperate a number of component devices/facilities and should be reliable, flexible and extensible. Composition of conservative hard-wire logic control and LMS with client/server fulfills these requirements. The central control system has been constructed to operate LHD safely without LMS and hard-wired logic has priority over information transmitted through LAN, however, LMS greatly facilitates procedures of experimental set-up, supervision of facility condition and consequent accidents. LHD experiments started on 31, March, 1998. Now, we are using the LMS functions as follows: (1) pre-setting operation data, (2) management of experiment log, (3) presentation of LHD experiment present status, (4) presentation of LHD plant data. 4 sub-systems, which are the central operation system, power supply system for super-conductive-coils, fuel-gas-puffing system and microwave heating system, have connected with LMS through LAN, and 2 sub-systems are under test-connection.

P21

PC-based Control System of Storage Ring TERAS

Hideaki Ohgaki, R. Suzuki, N. Sei, S. Sugiyama, T. Mikado, K. Yamada, T. Ohdaira, H. Toyokawa, ETL

PC-based control system has been developed in storage ring TERAS since 1990. Currently it consists of several IBM-clone PCs that install several I/O boards. These control PCs run the Microsoft Windows95 operating system. The system controls the main magnet power supplies and the RF system. It also measures the vacuum and the beam position. A client/server system over the Ethernet with the TCP/IP protocol is adopted for the control system. A server application for each I/O board is developed to simplify the application and to be easy for maintenance or upgrade. The client applications can be launched on any PCs connected to the Ethernet, when it is needed. The client/server communication rate is 2 Hz and this rate is enough high for slow response of the storage ring magnet. A database system is also developed and stores the machine parameters in every second.

P22

Control system based on PCs for the ISIR-FEL at Osaka University

Tetsuya Igo, Ryukou Kato, Goro Isoyama, ISIR Osaka Univ.

A control system composed only of personal computers (PCs) is being developed for the far-infrared free electron laser (FEL) at the Institute of Scientific and Industrial Research (ISIR), Osaka University. The characteristics of the control system are as follows: 1. The system has a simple structure consisting of some PCs connected with Ethernet. Controlled devices are connected to the PCs with analog I/O, digital I/O and GP-IB interface modules inserted directly into PCI or ISA buses of the PCs. The system can be made inexpensively as we use only PCs and standard interface modules for them. 2. Microsoft Windows 95, 98 or NT is used as an operating system of PCs, so that we can make use of various developing programs commercially available, such as Visual Basic, Visual C++ and Borland Delphi. 3. The software for the control system is designed such that the user interface level and the device driver level are connected with a database working as a core of the data flow, which makes it easy to develop control programs in a distributed control system connected with Ethernet. Microsoft Access is used as the database. Since a product on the market is used as the core of the control system software, the reliability of the whole system is improved.

P23

HIRFL PC-based distributed control system

Huang Xinmin, Chu zhensheng, Zheng jianhua, Gao weizheng, IMP

A centralized control system in which a VAX/8350 computer was used run before 1996. The rebuilt HIRFL control system is a distributed one based on the powerful PC, workstations and servers. It consists of some independent subsystems: Ion source control station, SFC control station, SFC beam diagnosis station, SSC power control station, SSC beam diagnosis station, SSC vacuum control station and RF control station. A high speed network ,100M, is used to communicate between control stations. The windows socket is used in network programming. The application programs that are used to control equipment are written in C or C++ . They are linked into a DDL(dynamic linking library) which is called by standard windows' applications. The GUI is programmed in OOP programming language C++ or VB and run under Windows/95 Chinese version(next:Windows/NT). The system was built in 1996 and will be completed in the end of 1998.

P24

ConSys - A new Windows NT based Control System for ASTRID and ELISA

T. Worm, J.S. Nielsen, K.T. Nielsen, ISA

A new PC/Windows NT control system has been developed for ASTRID and ELISA. The system consists of three parts: The kernel, devices, and client programs. The kernel, common for all computers, handles all communication between devices and client programs, be it locally on the same computer or across the network. The devices store the values of the parameters on the system, and handle all the input/output communication to the hardware under control through device drivers etc. For interaction with the operators, a number of client programs have been developed, of which the major one is the Console. The tripartition of the system allow very easy addition of new devices and client programs, as new types of hardware needs control, and as new needs for utility programs arise. The computer-code is highly object-oriented reducing code size and development time. The system is fully software configurable with all addresses, conversions, and display properties stored in an ODBC compliant database (at our site a Microsoft SQL database is used).

P25

Personal Computer in NSRL Control System

Hu Shouming, et al., NSRL

NSRL control system is a personal computer based control system. It has been in operation for about ten years. Personal computers are used in the 800Mev storage Ring and 200Mev Linac to control the Accelerator subsystems. They are playing not only important rules as Operation interface and Data base server, but the device controllers as well. At the front-end level, IPCs control physical devices in the field. Beamlines and Insert Devices also use PCs for controls and data acquisition. In phase II project, EPICS will be introduced to the NSRL control system. Many IPCs will be utilized as device controllers, OPIs and IOCs along with some VME crates and Workstations.

P26

RIKEN-RIBF Control System

Toshiya TANABE, Masayuki KASE, Yasushi WATANABE, RIKEN

The Radioactive Isotope Beam Factory (RIBF) is an expansion of the existing facilities at RIKEN. There will be two stages of development: The first one consists of two cyclotrons, one normal conducting, and the other superconducting. The second one is called MUSES (Multi-Use Experimental Storage rings) which comprises a linac, an accumulator, a booster and main double-storage rings. A preliminary plan of control systems for each phase of development will be reported.

P27

Indus-2 Control System

Pravin Fatnani, J. S. Adhikari, B. J. Vaidya, CAT

Indus - 2 is a 2.5 GeV Synchrotron Radiation Source (SRS) being constructed at Centre For Advanced Technology (CAT), Indore, India. Electron beam at 700 MeV from booster synchrotron will be injected into this machine. Indus-2 will raise the beam energy to 2.5 GeV and store the same. The control system for this facility is being developed around a three-layer architecture. The distinct feature is the use of 'All-PC' user interface layer. Indus-2 control system combines the total functionality in three computing layers viz. user interface layer at the top, supervisory layer in the middle and equipment interface layer at the bottom. The user interface layer has many computers for different jobs but all are PCs. Windows NT application and file servers, SQL database servers, Windows NT workstations as operator consoles, network gateways and WWW servers all hosted on IBM compatible PCs make it a versatile, easy to upgrade and low cost alternative for this layer. Availability of inexpensive yet powerful PCs together with host of low-priced software packages like windows based operating systems with built-in support for networking, SQL database servers, WWW servers and powerful development tools like VC++, VJ++, Visual Basic etc. make it an attractive and safe choice. Ethernet has been chosen as the networking standard to interconnect computers at this layer and also to supervisory computers at lower layer. The supervisory layer contains VME computers running OS-9 on MC68040 microprocessor boards.

P28

TINE: An Integrated Control System for HERA

Philip Duval, DESY

Beginning with the 1998 run period, the PC-dominated control system for HERA is largely in place. Most elements of the machine are controlled via the TINE (Three-fold Integrated Network Environment) data protocol. TINE offers a multi-platform, multi-protocol, multi-architecture control system. It features distributed, object-based, plug-and-play, front-end devices and middle layer servers which communicate directly with console (and office) computers. Although the consoles in the HERA control room all run WINDOWS NT, the HERA front end computers and servers run a wide variety of operating systems and are not always PCs. TINE has been invaluable in integrating the HERA front ends into a working system. Furthermore, it offers a transparent way to progressively upgrade existing hardware (as opposed to replacing everything at once). We describe below some of the finer points and details concerning TINE as a control system.

P29

Virtual Accelerator Control System for Development Stage of Application-oriented Projects

Masayoshi Sugimoto, JAERI

The design of the control system for application oriented accelerators needs to be started at the development stage of every project to keep the commissioning phase short. The facility usually consists of several sub-systems and the network based computer control is employed. A web-PC is the best terminal as the remote monitoring station and easy to use for novice. The conceptual design is carried out to implement the fundamental control tasks into the web-PC. It can provide the control experiments for the operators during the construction and commissioning phase. Such a virtual control system gives the good opportunity to receive the feed-back from the users and the maintenance becomes very easy. As an example, the experimental control system for the IFMIF (International Fusion Materials Irradiation Facility) is presented.

P30

Modification of SORTEC RING and the Associated Machine Control System

Pichit Keawbudta[a)], Weerapong Pairsuwan[a)], Prayoon Songsiriritthigul[a)], Takehiko Ishii[a)], Goro Isoyama[a)], Tatsuya Yamakawa[a)], Yutaka Hirata[b)], Naohisa Tsuzuki[c)], Tamotsu Takeda[c)], a) NSRC Thailand, b) Toshiba Japan, c) Toshiba-Fuchu Japan

The first synchrotron radiation source in Thailand is the modified SORETC ring that was owned by the shutdown SORETC Laboratory in Tsukuba,Japan. When the associated accelerators were dismantled and the components were transferred to NSRC,Thailand, it was decided that the machine control system should be completely renewed. Reformation of the storage ring and the high energy beam transport line shall also be made. In this report, the aspect of the modified storage ring will be described with particular emphasis on the machine control system. Central computers used as Man-Machine Interface Stations are four personal computers, three of which are usally used for status indication. Only one computer is used for controlling the whole system. Oder or status data are transmitted from or to several Device Control Stations(DCS) through Ethernet. One unit of DCS handles a group of equipment belonging to the major component pieces of apparatus in the accelerator system. DCS units to be set up are those for the linac and the low energy beam transport line, the synchrotron and the high energy beam transport line, the storage ring, the electric substation, and the system in the control room. Some details of the I/O connection will be mentioned along with the descriptions of the elements given above.

P31

Integration of a PC based experiment in a Network based Control System

L. Catani, INFN-ROMA2

Optical diagnostics controls and data analysis (ODCS) at Tesla Test Facility are based on Macintoshes. ODCS is stand alone and provides full control over the specific hardware while a network based Control System takes care of the whole machine apparatus. The ODCS computers are connected with fiber optic links to a VME crate with I/O modules; a console allows to operate the diagnostic stations and perform data analysis. The large number of heavy images continuously transferred among the different parts of the ODCS doesn influence the network bandwidth of the main Control System because they travel on the local fiber optic links. At the same time the two systems are almost fully integrated by means of a shared memory, on a common VME crate, where the database of the diagnostic system is located. A set of mailboxes are used as main communication system among the parts. Furthermore, for these experimental diagnostics we wanted to take advantage of the versatility of PCs, their low cost and large amount of software available for data analysis. This solution proved to be a way to integrate with very limited efforts two control systems based on different hardware, operative systems and software.

P32

An extensible architecture building on COM/DCOM

Erik Westlin, MSL

An extensible architecture using COM objects is described. Client programs communicate with a server using DCOM. The server itself is a thin object which loads inproc moduledrivers specific for each task the server is asked to perform. The main task the system performs is to monitor and control parameters in a generic sense. Different parameters need different handling which is taken care of by specific moduledrivers. When a client makes a request the server passes the request to the appropriate moduledriver which if necessary converts it to a Job-object and puts this object in a job-queue. The main server object contains a main queue where the module drivers appear as jobs. A clock interrupts a work thread regularly. This thread check's if some job is in the queue or needs to be awakened from a sleep queue. If a moduledriver has a job this get's executed in the work thread. The job then either finishes or if the parameter access needs wait states. If it finished the original client thread get signaled and can return the result. If a wait needed the job is placed in a sleep queue. The module drivers themself load other inproc com objects driving lower levels of communication. The lowest level are objects communication with hardware or network endpoints. This way multiple target device protocols are implemented sharing a common communication medium. New moduledrivers are easily incorporated.

P33

Application of Embedded Real-time Systems in Control Subsystems for Accelerators

Shao Beibei, Wang Ruopeng, TSINGHUA Univ.

The PIN photodiode with the coincidence technology for Beam Loss Monitor System (BLMs), was developed at DESY and has been installed on HERA ring. National Synchrotron Radiation Laboratory (NSRL) in Hefei, China has decided to use such detectors for beam loss monitor system. The system will be helpful in machine tuning, vacuum leakage monitor and beam life study. This paper discussed the system consideration in the view of physics, because synchrotron accelerator's energy of NSRL is much lower than HERA. The electronics design of the BLMs is also described in the paper. Some new technologies, such as FPGA, CAN bus, are first time to be used for accelerators in China. A PC based CAN bus board has been developed for data acquisition. The high level software for data analysis and online display will be developed based on PC. Other hardware solutions, such as VME based CAN IP card, and other software package, such as Labview, are compared with PC's solution in the paper.

P34

Controlling accelerators real time components with PCs

A. Kurakin, A. Sytin, IHEP Protvino

Controlling accelerators real time components with PCs By the reason of their heterogeneity, the existing accelerators control systems are different. There are mixed of single- and multitasking operating systems on the same platform. At the last time, on the new wave of computing technology there were many instruments are appeared on the scene that's helping to solve different tasks as the control system components. There are kind of instruments, which accepted like a standard in development process. We shall emphasize here the Windows NT operating system as the bright representative among the systems, which is getting high popularity at the last time. We shall also discuss NT as the component that's making control of down layer hardware components of accelerator control hierarchy is using it soft real time ability.

P35

A PC-BASED UNDULATOR CONTROL SYSTEM FOR HiSOR

Kayoko Kawamura, Kenichi Aoki, Daizo Amano, Kiminori Goto*, Katsuhide Yoshida*, SHI, *HSRC

The synchrotron radiation source at Hiroshima University (HiSOR) consists of the AURORA-2D storage ring, a linear and a helical undulators. The control system for HiSOR consists of a fileserver, two PCs for device control and two PCs as man-machine system. Recently, an undulator control program has been installed in this system. One of the man-machine PC has two RS-232C ports, to which a touch panel and/or a PC in experimental hall can be connected. Users in the experimental hall can change, through the touch panel or PC, the undulator gap of both undulators and the configuration of 4 magnet array positions of the helical undulator to control the ellipticity. In this paper, the schematics of the undulator control subsystem and the electron beam orbit compensation method are described.

P36

PC Based Alarm System for the HERA machine

V. Soloviev, M. Bieler*, P. Duval*, S. Herb*, F. Willeke*, A. Kurakin, V. Yarygin, IHEP Protvino, *DESY Hamburg

The new HERA Alarm System is based on PC hardware and software, it consists of three levels: the Local Alarm Server, a Central Alarm Server(CAS) and an Alarm Console. Alarms are generated by Local Alarm Servers running on each of the approximately 40 front end computers used for machine control. The CAS gathers, filters the alarms and loads them into an alarm list. It is a VC++ application running under Windows NT and uses the standard HERA Control System protocol both as a client and as a server, where the client-side is using the Accelerator Component Oriented Programming(ACOP). The Alarm Console is a Visual Basic application running on Windows NT which collects alarms from the CAS and displays them for the control room staff. The Alarm database is distributed as files on the front end computers, which are read in on startup of the Local Alarm Servers, these files contain detailed information about alarm events displayed on the Alarm Console.

P37

Voice alert system using PC

Noboru Yamamoto, KEK

Flexible voice alert system was build combining existing softwares in a very short time. When an alert condition occurs in the system, EPICS alarm handler program send UDP packet including alert message to a server program runnin on a Macintosh computer. The server program uses TextSpeech program to read it out as a human voice. Both client and server programs were written in Python programing language.

P38

Application of PC in BEPC Interlock System

S.M. Tang, X.Y. Na, J.S. Chen, Y.L. Yu, J.X. Yan, J.M. Wu, T.H. Li, H.J. Cheng, IHEP

BEPC (Beijing Electron Positron collider) interlock system is based on Programmable Logic Controllers, has been built in order to improve the reliability of personnel safety and interlock functions. One multimedia PC as the host computer, monitors the PLC system. This paper describes the hardware configuration of the PC, the design idea of the application software for the interlock system.

P39

PC as a touch-terminal controller

N. Kamikubota, K. Furukawa, H. Akimoto, KEK

Touch-terminals and knobs have been used extensively at the KEK e-/e+ Linac since it's commissioning in 1982. They were connected directly to the minicomputers through dedicated CAMAC modules. A new controller for touch-terminal and knob was developed with a DOS-based personal computer in early 90'es. TCP/IP remote execution environment was installed to utilize resources of the linac control system. Tools for managing touch-sensitive areas was developed for easier maintenance. So far this system has been used for daily operation of the linac, which implies high reliability of a DOS-based PC with TCP/IP protocol as an IO controller.

P40

Sharing software resources between Unix controls and PC consoles

Kazuro Furukawa, Norihiko Kamikubota, KEK

At KEK electron/positron linac, operator's console system based on Windows machines is utilized. It is also discussed to employ Windows terminals at JHF linac with EPICS. Since those control systems are developed on Unix machines with and without EPICS, the software maintenance on PCs' is not easy to manage. We are trying to resolve this problem employing Java and Corba. However, it'll take some time to finish the new software framework. And there already exists much software based on Unix/Posix environment. Thus it's a quick way to adapt the software both to Windows and to Unix if possible. Recently several POSIX packages has become available on Windows. We evaluated some of them, and we have improved our control client software to be shared between Unix and Windows. Not only source codes written in C/C++ and Tcl/Tk languages but also procedures to build software have been made sharable.

P41

The Proton Linac Control as Part of the DESY Accelerator Chains Control System

G. Franke, A. Labudda, DESY

The Control System of the DESY 50 MeV Proton Linac was replaced by a PC-based distributed system. Applications for the radio frequency for the Alvarez structure and the quadrupoles inside as well as the beam transport and monitoring systems are reported upon. The DESY Accelerator Chains Control System - widely written in Visual Basic - is composed of small and flexible modules which can be sorted into one of the three levels for servers, services, and operation. Most of the LINAC control applications were taken from these modules with no or slight modifications.

P51

RDBMS on Linux for accelerator control

Akihiro Yamashita, T. Fukui, T. Masuda, R. Tanaka, SPring-8

Recent developments on Unixes on PC platform begin to impact not only academic computing society but also commercial software developers. Major relational database management system (RDBMS) vendors announced to port their fully featured products to Linux and some have already shipped with low price. These products make possible to migrate database servers which were running on expensive unix platforms to PC platforms. We port relational databases for SPring-8 storage ring control system to a PC server running with Linux, and look for possibility of RDBMS on free operating system focusing on performance and reliability.

P52

Database system in the LINAC PC based control

Masahiko TANAKA, Isamu ABE, Hitoshi KOBAYASHI, KEK

The 8GeV Linac has been running an MS-SQL database system since 1994 for accelerator operation, including operation and fault logging. The database is a client-server system using MS-SQL under a Windows NT environment. The accelerator operator uses MS-Access as a GUI for daily operation, and the data is entered in MS-SQL on the server. Users can view important data at remote sites via the Web. The Automatic logging system for Linac operation, and the data base system for accelerator operation and fault logging are discussed in this paper.

P53

The PC-Based Archive System at BEPC

L. Ma, P. Shi, IHEP

For a better understanding of the machine performance, a PC-based archive system was introduced for the Beijing Electron-Positron Collider (BEPC) in 1996. The kernel of the system is a Microsoft SQL server database. The data-taking is based on client and server application programs running on PCs with the operating system of the Microsoft Windows NT and on the DEC mini-computer under VMS. The archive system can provide various services of the data storage, query and analysis to the accelerator physicists and machine operators. This paper will give the detailed description of the archive system at BEPC.

P54

A Data Archive System for the SRS Control System

M.J. Pugh, B.G.Martlew, W.R. Rawlinson, CLRC Daresbury Laboratory

The Synchrotron Radiation Source (SRS) at Daresbury is controlled by a hybrid system consisting of Concurrent Computer Corporation 3200 series mini-computers and IBM compatible PCs. A historical parameter archive system is provided that records the state of all control system parameters every 2 minutes for future reference or fault analysis. Originally, this system was implemented on a Unix workstation and the data stored in a non-standard format. Recently, this archive has been completely rewritten to run on a Windows NT Server using MS SQL Server as the database management system. This allows for very much more flexible access to the data and simplifies the generation of easy to use, graphical interfaces for browsing or plotting archived data. This paper describes the way the data is collected, archived in the database and shows some of the application software that can be used to interrogate the database.

P55

Laboratory Data Compression

Haruhiko Okumura, Masakazu Tamura, Masahiko Emoto, Joji Kariya, Yasuaki Teramachi, Satarou Yamaguchi, Matsusaka Univ.

Most of the existing tools for lossless data compression, including LHA, Zip, gzip, and bzip2, are based on either the Ziv-Lempel methods (LZ77 or LZ78) or the Burrows-Wheeler transform. These tools assume that the data have clear 8-bit boundaries and repetitive substrings. Laboratory data such as A/D converter outputs, however, does not in general satisfy these conditions. To compress such data, we developed a general-purpose real-time compression library suitable for quantized (up to 16-bit) time-series data of unlimited number of channels. The first part of the algorithm adaptively chooses a prediction model among a family of polynomials, and estimates the variance of the prediction residuals, for each channel of the input. The second part of the algorithm encodes the residuals by a simplified length-limited minimum-redundancy code, assuming either a Gaussian or Laplace distribution. The library is used by our Java/Web-based data acquisition/management system developed for the National Institute for Fusion Science (NIFS). It can also be used as a standalone compression tool. Typical compression ratio is around 3:1 to 4:1.

KEK-PS OPERATION RECORD AND ITS STATISTICAL CALCULATION BY COMPUTER

E. KADOKURA, T. KAWAKUBO, M. SAOTOME*,
KEK, *Mitsubishi Electric Plant Engineering Co. Ltd.

During the accelerator operation period of KEK-PS, it is very important to take operation record which includes beam supply time for users, shut down time caused by various machine (Pre-injector, Linac, 40MeV-BT, Booster ring, etc.) trouble, and beam intensity to different users. By the analysis of these data, we know the reliability of every machine and the contribution of PS to users. Until now, all these works are done by one person, which takes him for long time. Therefore we will manage above works by computer, i.e.; taking all data by beam switch PLC, communicating with PLC by the InTouch software, and calculating by EXCEL.

P61

A BEAM PROFILE VIEWER DEVELOPMENT WITH OO APPROACH

Tushar K. Das, Amitava Roy, Subrata Dasgupta, VECC

It is a 32 bit MDI application on WIN-95, written in VC++. It is meant to display and log the beam current intensity profile along radius of Cyclotron. It scans the internal beam-current along radius by a current probe, to acquire data through an ISA Add-on ADC/DIO board. In off-line, it is able to read previously scanned data files and for each, displays graphically the radial profile data obtained on three fingers of the probe. Child Windows can be opened to view the on-line and/or off-line data. The off-line data are members of a Document-class attached to a View-class through which the data can de displayed on a child window. The on-line data is a member of another class which interfaces the hardware and this data-member is referenced to the document-class. The application runs in cyclotron control room and helps operators to visually diagonise the unwanted loss of beam current. The application runs in a client server model, communicating through MFC-C++ sockets. In our retro-fitted control system, one control room PC is connected directly to the motor controller and beam-signal cables available in the control room. The user of the appliaction works on another console-PC connected to the control-LAN.

P62

Beam Loss Monitor System for an 800 MeV Synchrotron Accelerator in NSRL

Cui Yonggang, Shao Beibei, Li Yuxiong*, TSINGHUA univ., *NSRL

The PIN photodiode with the coincidence technology for Beam Loss Monitor System (BLMs), was developed at DESY and has been installed on HERA ring. National Synchrotron Radiation Laboratory (NSRL) in Hefei, China has decided to use such detectors for beam loss monitor system. The system will be helpful in machine tuning, vacuum leakage monitor and beam life study. This paper discussed the system consideration in the view of physics, because synchrotron accelerator's energy of NSRL is much lower than HERA. The electronics design of the BLMs is also described in the paper. Some new technologies, such as FPGA, CAN bus, are first time to be used for accelerators in China. A PC based CAN bus board has been developed for data acquisition. The high level software for data analysis and online display will be developed based on PC. Other hardware solutions, such as VME based CAN IP card, and other software package, such as Labview, are compared with PC's solution in the paper.

P63

Development of object-oriented data acquisition system for LHD fusion plasma experiment using O2 database

Ohsuna Masaki, Nakanishi Hideya, Kojima Mamoru, Komada Seiji, Emoto Masahiko, Kodaira Junichi, Sugisaki Hideki, Sudo Shigeru, LABCOM NIFS

The data acquisition system using the object-oriented databases has been newly developed for the LHD fusion plasma experiment. It is designed entirely to be based on the object-oriented methods, and its application programs for the data acquisition and storage are all written in the object-oriented programming language Visual C++ on Windows NT. The data management programs consist of hierarchical class definitions which have the diagnostics, the CAMAC module, and the module channel class. The lowest channel objects contains the substance of the diagnostic data. As for the data object archiving, the object-oriented database management server product, named O2, is applied to each diagnostic acquisition computer locally. It enables to store and retrieve the whole data object directly into/from it. For compacting the data object size and improving the database transaction throughputs, the archived-channel class is also applied in which the raw data block is compressed by GNU-zip library engine named zlib. Archived-channel objects are held in the bag objects which are made for each discharge experiment and each diagnostics. As the data retrieving user terminal, the data visualization products IDL or PV-WAVE are applied in which the O2 client function can be called through the Windows NT DLL.

P64

Distributed Mass Data Acquisition System Based on PCs and Windows NT for LHD Fusion Plasma Experiment

Nakanishi Hideya, Kojima Mamoru, Ohsuna Masaki, Komada Seiji, Emoto Masahiko, Sugisaki Hideki, Sudo Shigeru, LABCOM NIFS

The new data acquisition and management system has been developed in order to manage the diagnostics of the LHD fusion plasma experiments. It is required to have the capability to process 100 MB -- 1 GB raw data rapidly within the following few ten seconds after every plasma discharge experiment. It has, therefore, employed the wholly distributed and loosely-tied parallel-tasking structure through the fast network. The data acquisition server computer is installed for each diagnostics of about 30 kinds, which locally has a 50 GB RAID, a object database server on it, and the 100 Mbps CDDI NIC. The optical SCSI extenders are applied individually for each connection between the CAMAC digitizer front-end and the Windows NT acquisition computer. The synchronous timing is also optically distributed as a module of the real-time remote-controlling VME computer which is installed nearby each diagnostic equipment and provides the synchronous clocks or triggers for digitizers and sensors. The data retrieving terminals behaving as the database access clients are functionally separated through the switching Ethernet, and the cluster of the distributed database servers seems to them to be a virtual macro-machine as a whole.

P65

A VME-base Data Acquisition System for Scattering Experiment at Pulsed Neutron Source

Setsuo Satoh, Michihiro Furusaka, KEK

We developed a VME-base data acquisition system for scattering experiment at pulsed neutron source. Single-ended and linear position sensitive 3He neutron detectors are used on various neutron scattering experiments. The data are acquired by multi-channel time analyzer (TA) and position sensitive detector (PSD) modules. We use a PC in place of a VME CPU module which is usually necessary to use a VME system. For this purpose, we developed an interface-module (SCSI-VME) which performs read/write data from/to VME modules via standard SCSI connection. By employing the SCSI standard, we can use any PCs or workstations which has the port in principle. Instrument control software is written in a package software LabVIEW from NATIONAL INSTRUMENTS. We have developed a SCSI driver software for it. The SCSI-VME module is housed in a VME double-height 1-span module. The module supports the extension, standard, and short address modes. The data size is 1 byte or 2 byte. Although the transfer speed of the module depends on controlled VME modules and the computers' SCSI controller, the net speed of it is about 0.5 microsecond/byte.

P66

Real Time Monitor on the Internet for the Experimental Apparatus

Shigeru Ishimoto, Syoji Suzuki, Tsuneaki Tsuru, KEK-IPNS

The control and monitor of the experimental apparatus by Personal computers (PCs) become very common. Recently, we have developed a simple program to capture the PC screen and save it to GIF or JPEG files periodically. The experiment E-248 (AIDA) "Search for H-particle in reaction of pp a K+K+X" at KEK-12GeV-PS used the super conducting spectrometer magnet "BENEKI" and the liquid hydrogen target. These low temperature devices were controlled and monitored by the PCs. Microsoft Windows 95 was used as an operating system (OS) and Personal Web Server (PWS) was installed for the use of the Web server. The PCs were connected to the LAN and the Internet by TCP/IP. The numerical data of the instruments were stored to the FTP root-directory webshare¥ftproot on the hard disk in every 1 minute. These data were monitored on the Internet using auto-reload mode by the WWW browser. The stored data were transferred by the FTP to the other computers. The PC graphic data were captured as a BMP file, changed to a GIF file and transferred to the WWW root-directory webshare¥wwwroot in every 5 minutes. The GIF files were monitored on the Internet by the HTTP and the WWW browser also by the auto-reload mode. This real time monitor on the Internet can be used for wide fields using PCs.

P67

On-Chip Cellular Automata Based Message Authenticator for Internet Communication

Prabir Dasgupta, VECC

A data authenticator scheme which is radically different and superior to the conventional approaches is proposed in this paper. The theoretical foundation is based on algebraic properties of a class of non-group cellular automata (C.A). Experimental data confirms its superiority in terms of C.P.U. time compared to standard MD-5 method, even for software implementation. Regular, modular and cascadable structure of C.A. makes it ideal for VLSI implementation. A register in the data path of the processor can be easily converted to a C.A. to realize the hardware. This C.A. can be run at the speed of C.P.U. clock and achieve a speed improvement of 1500 times (for HP- 9000 machine). Due to inverted tree structure of this C.A. transition, it is impossible to get back the key from authentication signature except by brute random trial, with probability not more than one in 2 to the power n, where n is the key length.

P71

Distributed Power Supply Control for SSRF

Jinhong Zhang, Tianjian Shen, SINR

The project of SSRF(Shanghai Synchrotron Radiation Facility) will be started at the end of 2000. Now it is in the period of R&D. There are more than 1,000 magnet power supplies for the storage ring. To control such a large number of power supplies, it is very important to construct a kind of power supply system with high reliability, good speed and low cost. After discussion, we decided to design a distributed power supply control system based on CAN-Bus. The controller is composed of an INTEL 80C196 microprocessor and a PHILIPS 82C200 CAN-Bus interface. It contains 8 bits I/O and 4 channels analogue I/O. 16 bit DAC and 16 bit ADC are both selected here. Every digital and analogue I/O for power supply control is optically isolated from the CPU and bus section. The microprocessor receives commands from the upper control computer via CAN-Bus, and then sends signals to the power supply. And it can also take the information from the power supply and pass on to the upper control computer in case of necessity.

P72

PC Control of Injection Power Supplies for the BEPC Storage Ring

H. Zhang, R. Zhang, S. Lu, H. Ren, IHEP

A PC plays an important role to the power-supply control in the BEPC ring injection system. It functions as a gateway to set up a connection between the bitbus network and the Ethernet network. The bitbus control network consists of nine nodes which control ring injection power supplies directly. The front-end signals are collected to a PC, then any type of computers which support TCP/IP protocol can access the PC through the Ethernet network to share the resources. The PC is also used as a friendly man-machine interactive interface to display data from power supplies and execute control functions.

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Vacuum Control Systems Upgrade and Analysis Features at DESY

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Vacuum Control Systems Upgrade and Analysis Features at DESY The vacuum control systems of the particle accelerators at DESY are beeing progressivly upgraded using the DESY PETRA style system described at PCaPAC 1996. It is based on a network of PC and Novell File Server Systems. To date, the DESY particle accelerators HERA-e, DORIS and LINAC 3 have been successfully transferred to the upgraded system. The new vacuum systems support analysis of status and dynamic processes. Investigation of individual pressure measurements and pressure profiles of a whole maschine are possible. Short and long range archives of the near and far past are included. The long range archive is a separate system which performs data logging for many other device controls as well. Special emphasis is put onto the data visualisation. Time accelerated views of pressure profiles help to watch the development of vacuum quality or locate a developing leak. Experience gained on the DESY Vacuum Control Systems Upgrade and the Vacuum Analysis Features will be described.

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The neutrino beam line control system

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The construction of the beam line for the long base-line neutrino oscillation experiment is almost in the final stage now. This beam line consists of a 400m proton beam section and a 200m pion decay section. In the proton beam section, there are 104 magnet power supplies, and two 250kA pules power supplies operated synchronously with 12GeV proton synchrotron. These components are installed in three houses far from each other. The demands for the control system, are low cost, high reliability, and good assistance of the maintenance of power supplies, On this situation, as components of the control system, PC and POD (Programmable operator display), and LAN and GPIB are adopted. The top-level controller is PC with Windows NT, and controls magnet power supplies and 250kA pulse power supplies through LAN and GPIB. For operator, the PC offers control panel on the POD through LAN, and also offers status display of magnet power supplies as Web pages. The low-level magnet power supply controller has GPIB interface, and is connected to LAN.

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Controlling of beam line with PCs

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The beam line control system of the Neutron and Meson Laboratory of KEK was replaced with programmable logic controllers (PLC) and personal computers (PC). The new system is composed of three functionally different sub-systems. One piece is the control for the equipment such as safety, magnet, power supply etc. by using plural PLC, which are connected with a network. The 2nd is acquisition of data from beam monitors. The reading of the data from CAMAC is performed by using a PC running DOS and the data is stored to a server PC that is using an Unix-like operating system. The last is a human interface of the system that is using commercial based graphical user interface tools that running on the Windows NT. These sub-systems are integrated in one system. PCs and a gateway to the PLC's network are connected with a network. The control of the equipment and monitoring of the beam is possible from the console PCs on the network.

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The shot preparation PC-based control system for the pulsed power fusion device

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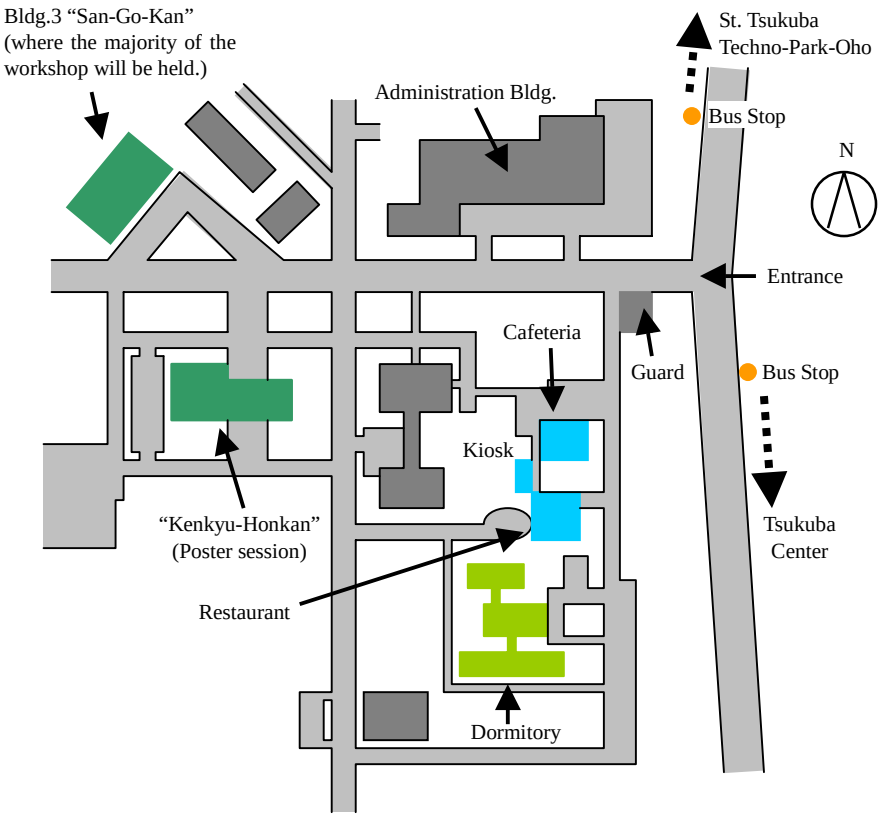
The special powerful electrical generators on the base of the pulsed power technique application are used in the thermonuclear fusion experiments. The working shot of such generators is produced by means the temporal-sharpening of the electrical energy pulses The sharpening process is the series of switching operations of storage units. The gas filled spark switches are used for this purpose. Before working shot it is necessary to prepare device to the shot. The PC-based control system for shot preparation of fusion device Angara-5 is described. Preparation procedure includes the gas pressure control in the switches, the capacitor bank charging control and the parameter monitoring of the auxiliary systems (vacuum, water conductivity etc.) The control system hardware includes CAMAC blocks (ADC, multiplexers, I/O blocks, PC-connected controllers) and IBM PC. The design permits to maintain the self-testing operations. The main part of the software is the polling program that gives possibility to fulfill the preparation of the pressure values and to start the charging procedure. The program interface is simple and is based on very limited set of the commands. The program users are technical personnel. The program has reporting and archiving capabilities. There are some instruments for the system test and maintenance too. The design of the system have taken into account the shot preparationschedule. As result the control system was made reliable and relatively simple. The hard- and software schemes are given.

<<MEMO>>

KEK Site Map



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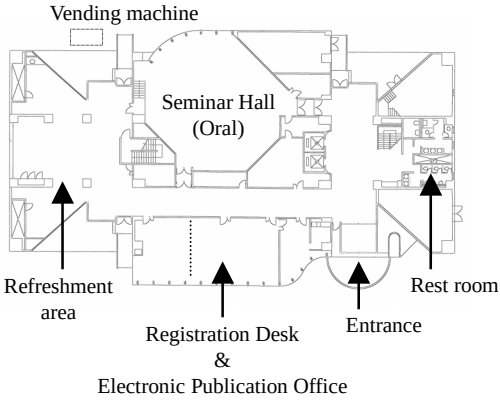

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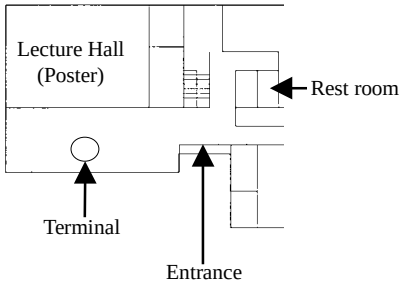

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