THE NEW CONTROL SYSTEM FOR THE FUTURE LOW-EMITTANCE LIGHT SOURCE PETRA 3 AT DESY: SPRINTING TO THE FINISH

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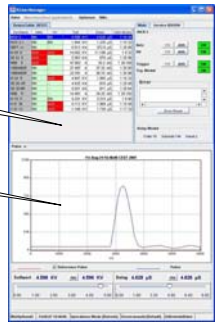
MCS Machine Control System

Rich Client Java Applications with ACOP

ACOP = Accelerator Component Oriented Programming (developed by Cosylab and DESY)

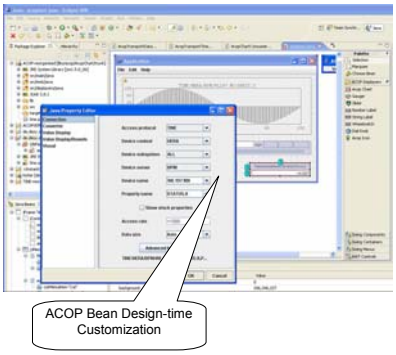
Components

- ACOPChart
- ACOPSlider
- ACOPWheelSwitch
- ACOPDialKnob
- ACOPGauge
- ACOPLabel



Features

- Java beans following the Swing standard
- Connection to TINE through invisible ACOPTransport bean
- Design-time and run-time customization with connection browser and dialog panels
- Dragging & Dropping of connection and component parameters



Thin Client Applications with the Web2cToolkit

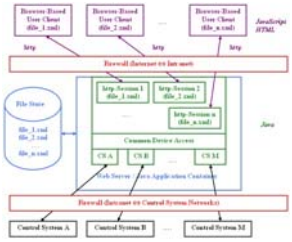
Web2cToolkit = Framework for thin ajaxian control system clients

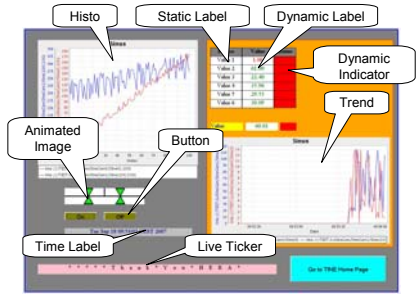
Features

- Simple graphical control system installation clients, no additional specific software (HTML and JavaScript),
- Platform independent (runs in Web browser)
- Supports different user roles (expert, layman)
- Secure user authentication and authorization (password encryption)
- Accessible from everywhere, no firewall constraints (asynchronous communication through port 80xx)
- Control system independent (TINE plug implemented)
- Common device access for various device control networks or field-bus systems (through Common Device Interface)

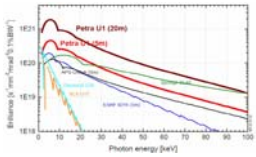
Implemented Tools

- Synoptic display (Web2c)
  - Application layout described by configuration file (.xml)
- Graphical synoptic display editor (Web2cEditor)
- Archive viewer (Web2cArchiveViewer)





The PETRA 3 Project



high-brilliance 3rd-generation light source

Storage ring: E = 6 GeV, I = 100 mA, $\varepsilon_{transverse}$ = 1 mm mrad

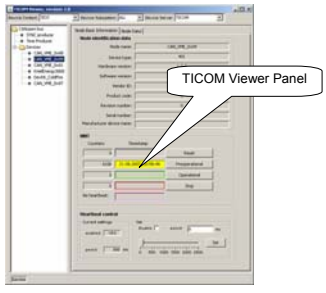
14 undulator beam lines operated by HASYLAB, EMBL and GKSS

Start of beam operation: January 2009

Control system:

- Upgrade of the control systems and attached front-end electronics of PETRA and the electron/positron pre-accelerators LINAC 2 and DESY 2

CANopen-based Front-End Electronics and TICOM



Front-End Electronics

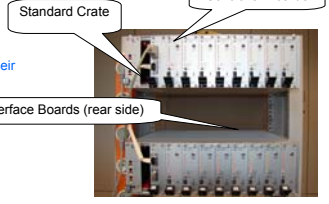
- Communication: CANopen fieldbus interface standard
- Controller boards: Coldfire, HCS12 and Altera NIOS II
- User-specific boards to connect to user equipment

TINE Device Server and CANopen bus master

- PC104 system
- embedded Linux

TICOM = TINE-based CANopen Manager software library

- TICOM server:
  - provides almost all CANopen bus master functionality
  - provides APIs to access CANopen devices and their object dictionaries
  - TINE control system server
- TICOM client:
  - provides visualization of bus topology / status and process data flow



TINE Control System Software Suite

Threefold Integrated Network Environment (TINE), Release 4.0:

- **Multi-platform:** runs on Windows, Linux, Unix, MACOS, VxWorks, NIOS
- **Multi-architecture:** data exchange via client-server, publisher-subscriber, broadcast and multicast communication
- **Multi-protocol:** supports UDP, TCP/IP and IPX transport protocols

APIs: provided for Java, VisualBasic, C/C++, LabView, Agilent(HP)Vee, MATLAB and command line interface for script languages

Code generating wizards: provided for C, Java and VisualBasic

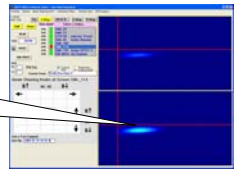
Client / Server implementations: in C and Java

Name services: with plug-and-play automated server registration and user access control

Integrated interfaces to common services: data filtering and archiving, event handling, alarm filtering and archiving, central message processing and archiving, accelerator component database

Gateways: available for EPICS-, Tango-, DOOCS and COACK / STARS-servers

Integrated Video Transmission
- frame size: 0.5 MByte
- repetition rate: 10 Hz
- lossless
- in multicast mode
- through 100 MB Ethernet

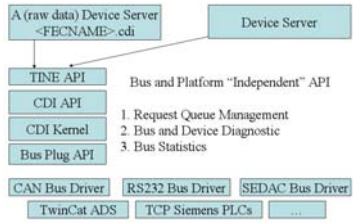


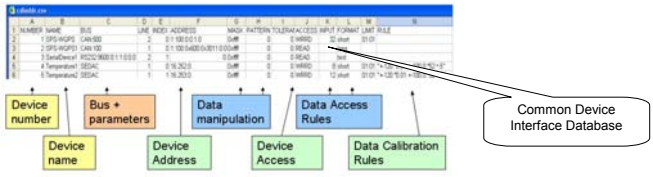
Front-End Device Access with the Common Device Interface

CDI = Common Device Interface

Features

- Common interface to various front-end electronic standards (CANopen, SEDAC, RS232, Siemens SIMATIC PCS7/Ethernet, Beckhoff TwinCAT ADS and Instrumentation Technologies Libera beam position modules)
- Integrated interface to TINE control system
- No coding, devices are registered in database, configuring of bus and device access parameters
- Templates for devices of the same type
- Simple data manipulation parameters (masks, patterns, calibration rules)





References:

PETRA 3: http://petra3.desy.de **TwinCAT ADS:** http://beckhoff.de **Libera:** http://www.it-tech.si **Coldfire, HCS12:** http://www.freescale.com **CANopen:** http://www.can-cia.org **TINE:** http://tine.desy.de

Web2cToolkit: http://adweb.desy.de/mst/web2cToolkit **Cosylab:** http://www.cosylab.com

DOOCS TINE