JoiMint

A Java Operator Interface and Management Integration Toolkit

Matthias Clausen, Zoltan Kakucs (DESY)
Piotr Bartkiewicz (DESY & FPNT/AGH)
Alexei Dmitrovski, Albert Kagarmanov,
Anatoli Khvorostianov, Slava Korobov (DESY & IHEP)

A XML

The Initiative for a new Display Tool

Started as a Feasibility Study for the COSMIC* Project at SLAC

- Synoptic (CUD) display (live updates)
- ‘Emulate’ SCP 8*8 Button Panels (previously Touch Screens)
  - Sending commands to applications
  - Receive configurations and commands from applications

•Control System Migration Challenge

Main Objectives

- Develop a toolbox which accepts configurations and commands from other applications
- Save and reload configuration files (in XML)
- Easy integration of graphic objects and/or complete applications
- Connection to multiple data sources easy integration of new data sources
- Online: add; delete; save; restore objects
- Management of applications (registration, inspection)

First Implementation (June-’01 @ SLAC)

- Use Java as core technology
    - ->Run Application on NT and Linux

  Visual Cafe as development environment
- Simple graphic objects
- Multiple data sources (EPICS channel access and COSMIC / AIDA)
- Support for asynchronous data exchange

Development at DESY (I)

(Sept/Nov-2001)

- Joint effort of five members from three different groups
- New design for graphic objects
- Implementation of save/ restore
- New layer for multiple data sources
- Http client/ server

Development at DESY (II)
(Jan/May-2002)

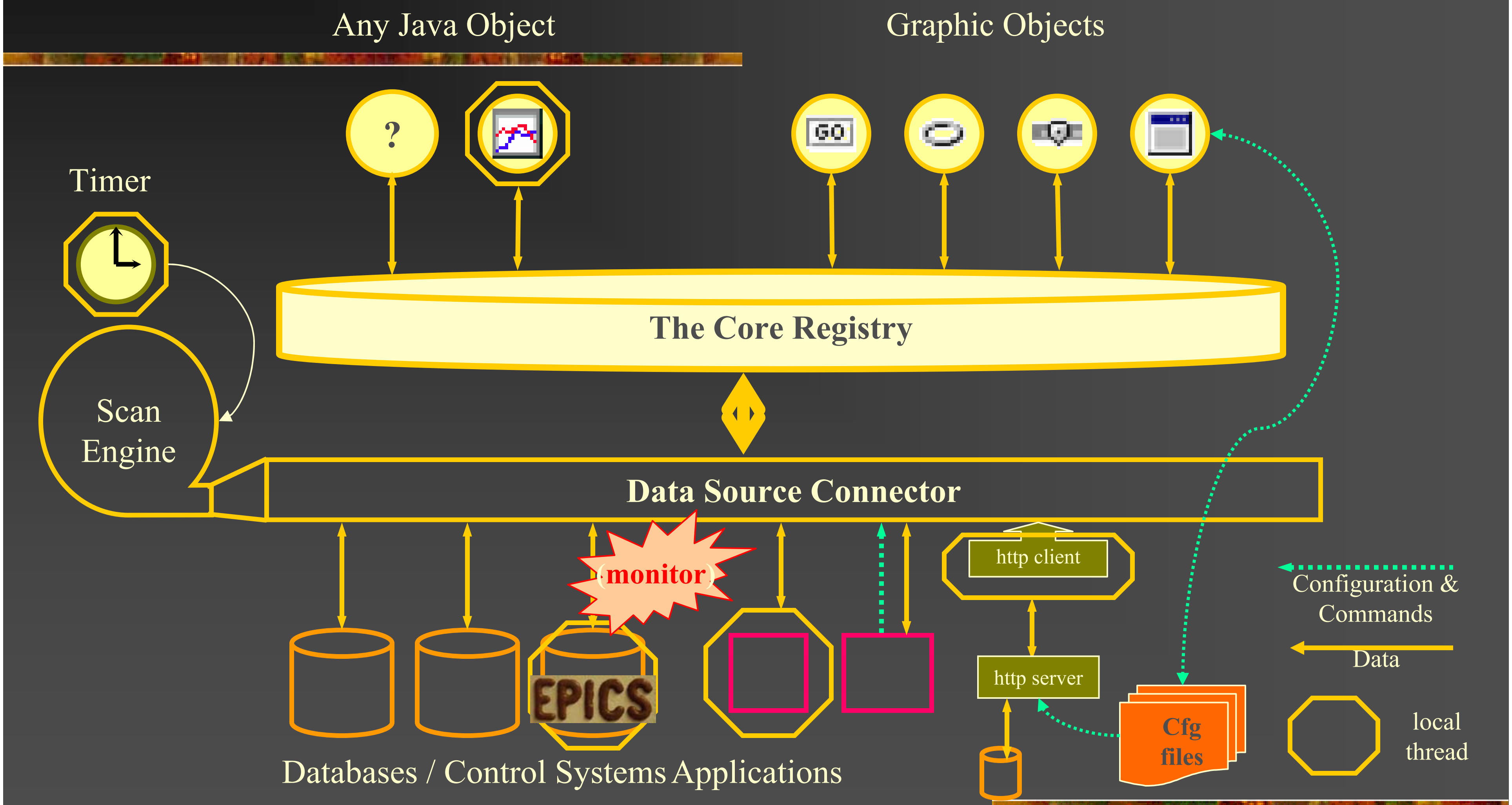
- Improvement of the http (DIXI) server and the related (XML) protocol
  - Support multiple data sources
  - Support multiple archives
  - Support diagnostic tool (dynamically created property displays)
- Multiple data sources
  - Support for Oracle access as a data source (used for diagnostic information)

Development at DESY (II) cont.

(Jan/May-2002)

- Add more graphic objects
- Improve graphic functionality

Basic Structure



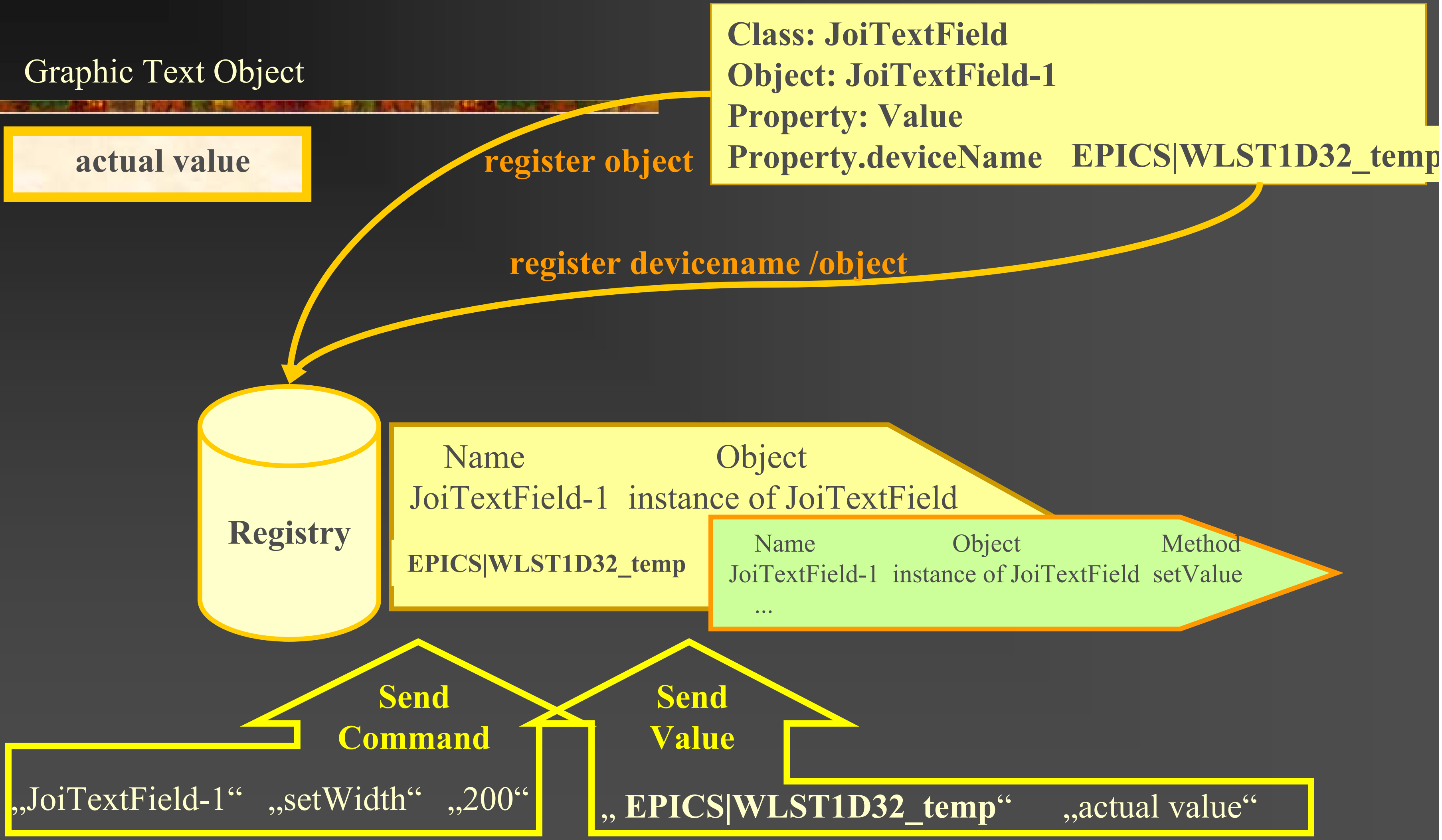
Registry

- The Registry is a central hash table storing name/ object duplets
- Register Objects as
  - ObjectName/ ‚Instance of ObjectClass‘
  - DeviceName/ hash table of Graphic Objects
    - The hash table of Graphic Objects contains objects which are registered with one of their properties for a deviceName

DeviceName: EPICS|WLST1D32_temp

Registration

Register a Graphic text Object



Class: JoiTextField
Object: JoiTextField-1
Property: Value
Property.deviceName EPICS|WLST1D32_temp

Name	Object
JoiTextField-1	instance of JoiTextField
EPICS|WLST1D32_temp	

Name	Object	Method
JoiTextField-1	instance of JoiTextField	setValue
…		

„JoiTextField-1“ „setWidth“ „200“

„ **EPICS|WLST1D32_temp**“ „actual value“

Message:
Graphic Objects

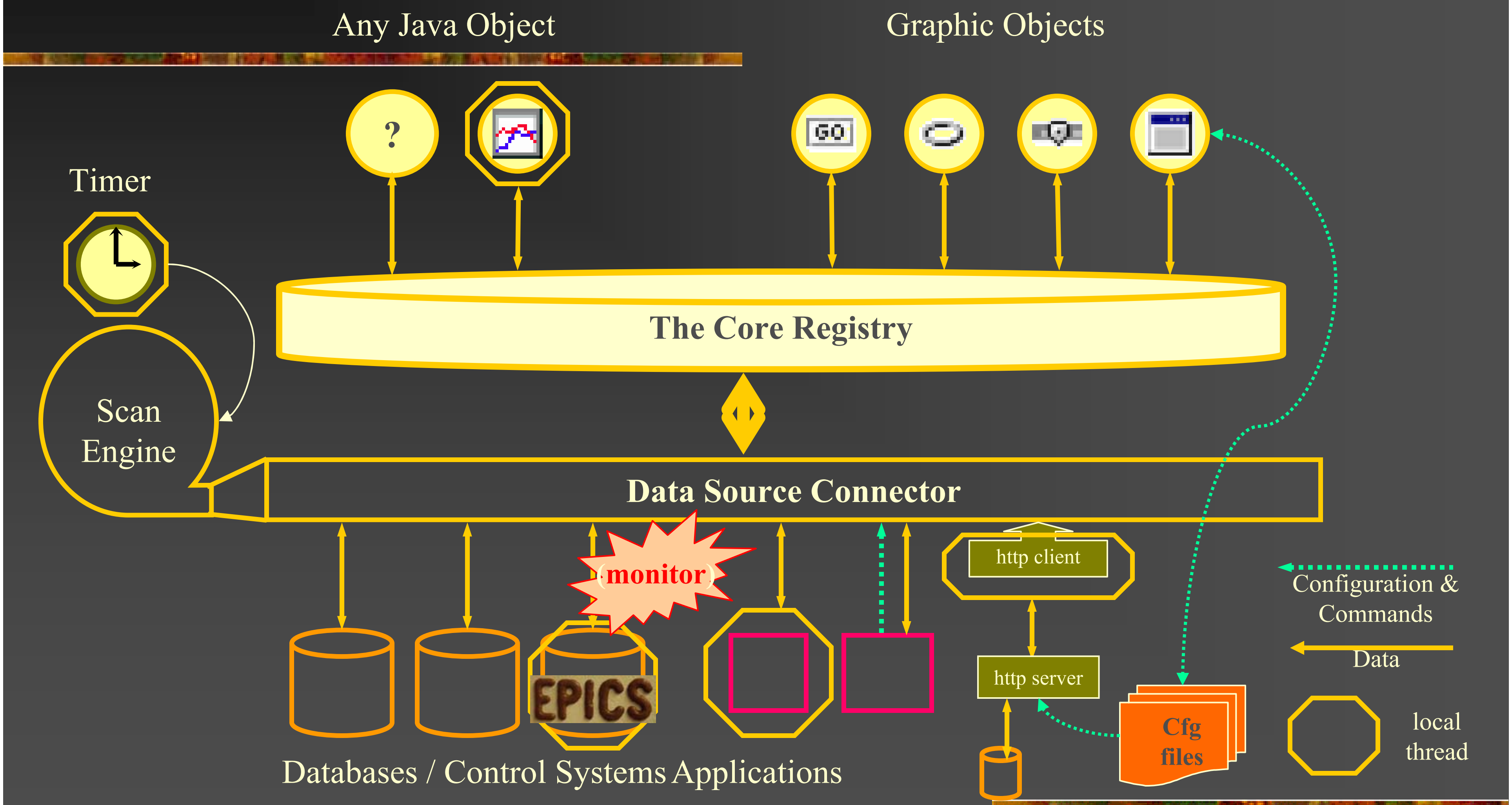
Registration using:

- (String) Name
- (Object) Object Instance
- (Method) property Method

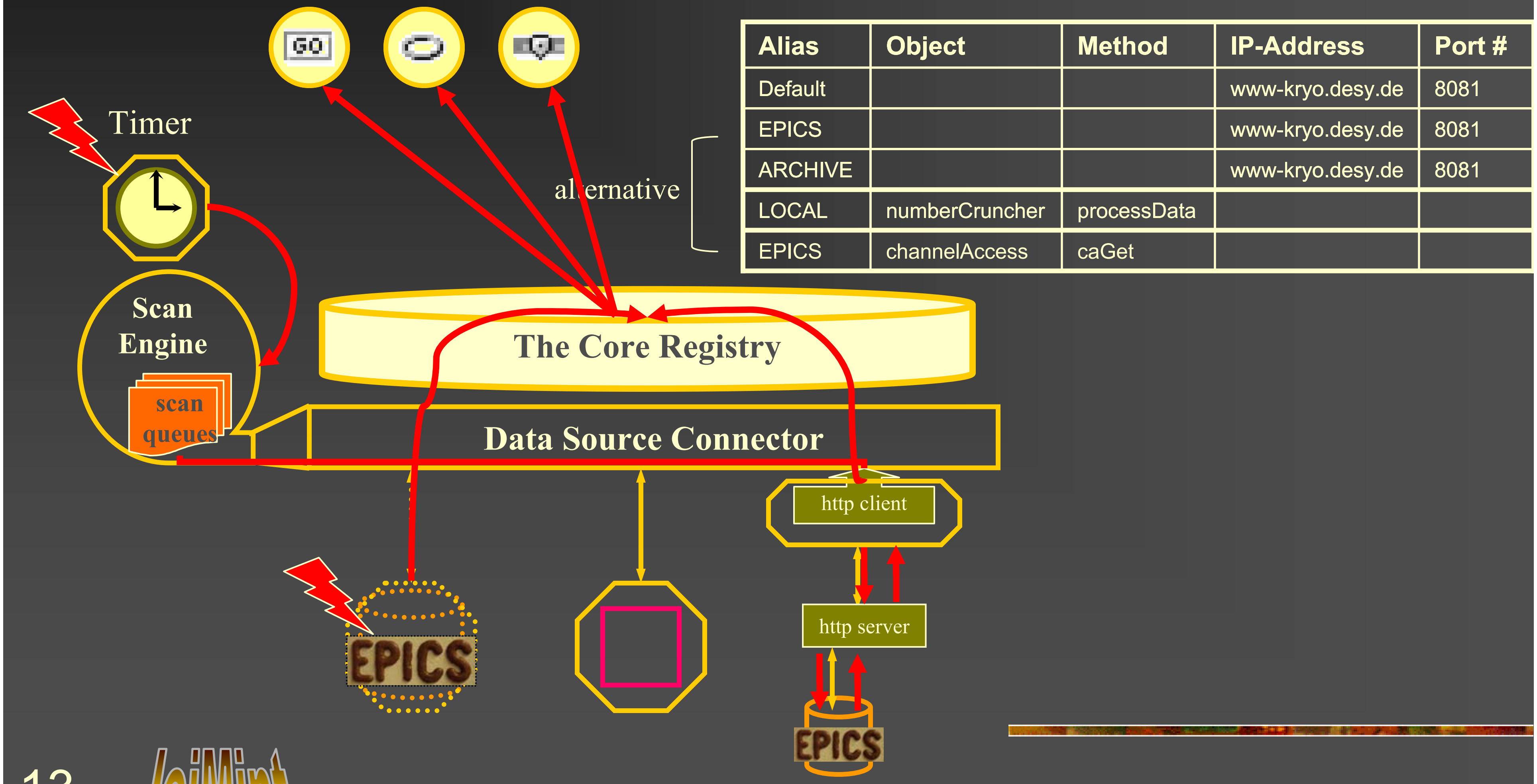
Activation using:

- (String) Object Name + Method Invocation
- (String) Device Name + Method Invocation

Basic Structure



Configuring and Running the DataSource



Alias	Object	Method	IP-Address	Port #
Default			www-kryo.desy.de	8081
EPICS			www-kryo.desy.de	8081
ARCHIVE			www-kryo.desy.de	8081
LOCAL	numberCruncher	processData		
EPICS	channelAccess	caGet		

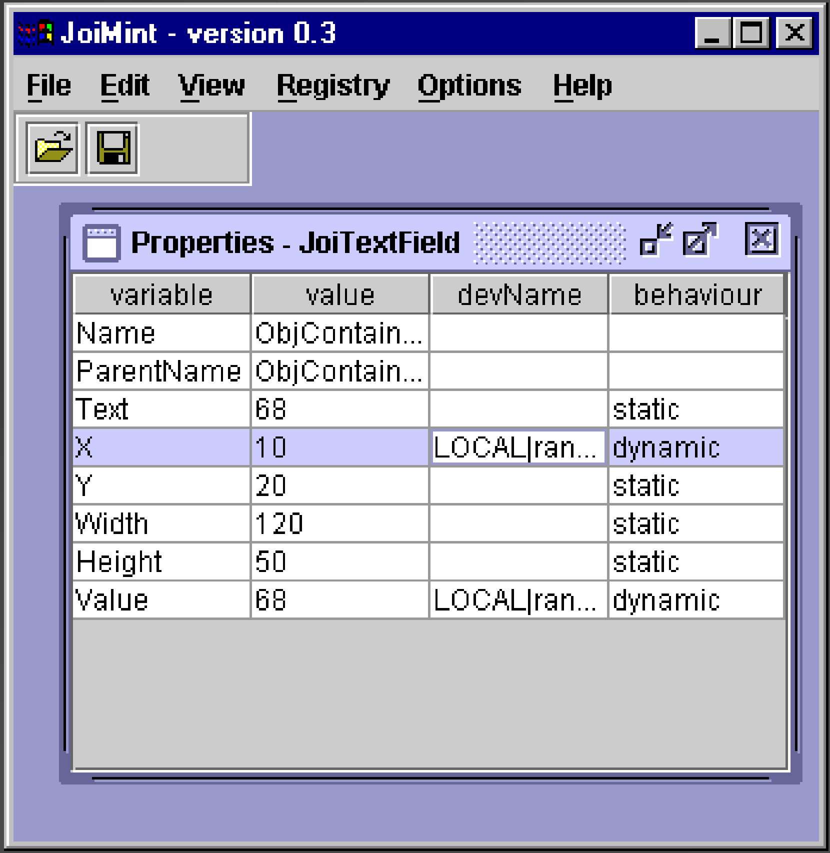
LMI
Local Method Invocation

A very effective way to decouple the Graphics Objects and the data source implementation from the main code.

- Objects register themselves.
  (no object dependant code in any other class)
- Base class supports save and restore of XML config. files. (once for all)
- Dynamic access to all properties
  -> property window

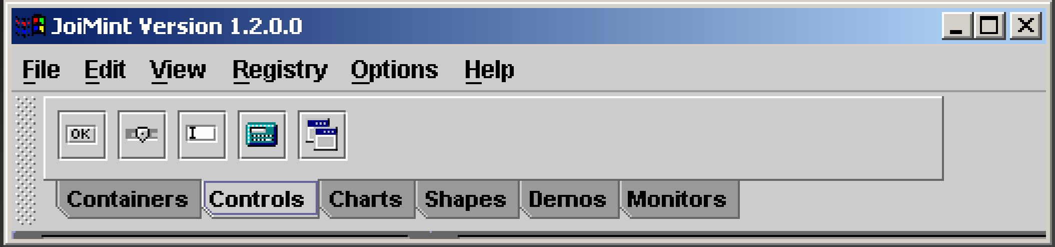
Property Window

- Access to all Properties
- All Properties can be:
  - **Static** (number)
  - **Dynamic** (deviceName)
- Some objects have Properties (like the text field), which can also be:
  - **Active** (deviceName)


JoiMint - version 0.3
File Edit View Registry Options Help
Properties - JoiTextField

variable	value	devName	behaviour
Name	ObjContain...		
ParentName	ObjContain...		
Text	68		static
X	10	LOCAL|ran...	dynamic
Y	20		static
Width	120		static
Height	50		static
Value	68	LOCAL|ran...	dynamic

Object Tab



Definition of available objects in XML config file:

```
<section>
<caption>Controls</caption>
<element>JoiButton</element>
<element>JoiSlider</element>
<element>JoiTextField</element>
<element>JoiScrollTime</element>
</section>
```

- Connection between JoiMint and the object class is referenced –by name-!

XML

Is used for:

- Configuration Data:
  - Graphic Object Tab
  - (Http) Data source definition
  - Synoptic Displays (i.e. translated dm2k screens)
- Data/ Commands
  - Value Updates
  - Archived Data
  - Commands to/ from Applications

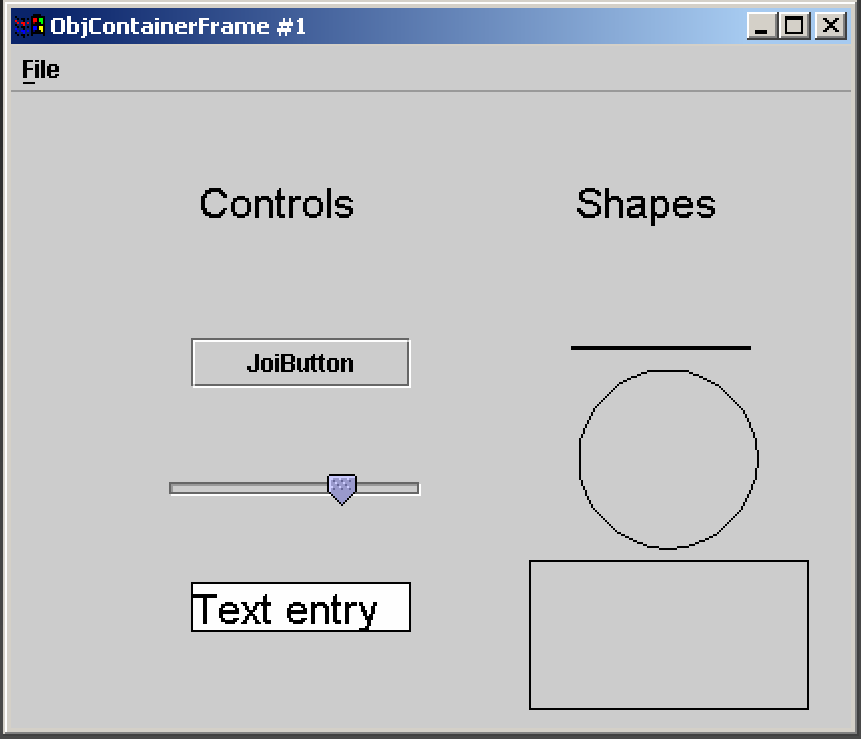
JoiMint

Where to use it?

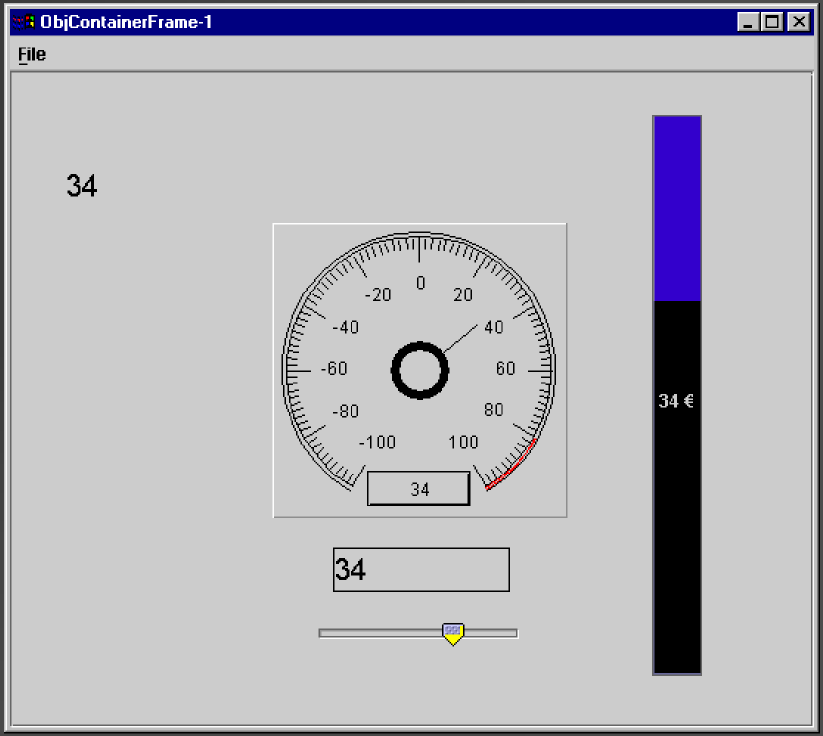
- Create graphics ‘on the fly’ -> JoiMint does not distinguish between runtime and edit mode.
  All changes (adding/ removing objects; save/ restore displays) is done in the online mode.
- Remote access to control system’s data
- Diagnostic data from ‚smart devices‘
  - PLC‘s or power supplies
  - Get graphic config file from default http port
- Quick diagnostic using a PDA version (planned)
- An example of a ‘light weight’ application for Global Accelerator Networks

Graphic Objects

Controls and Shapes



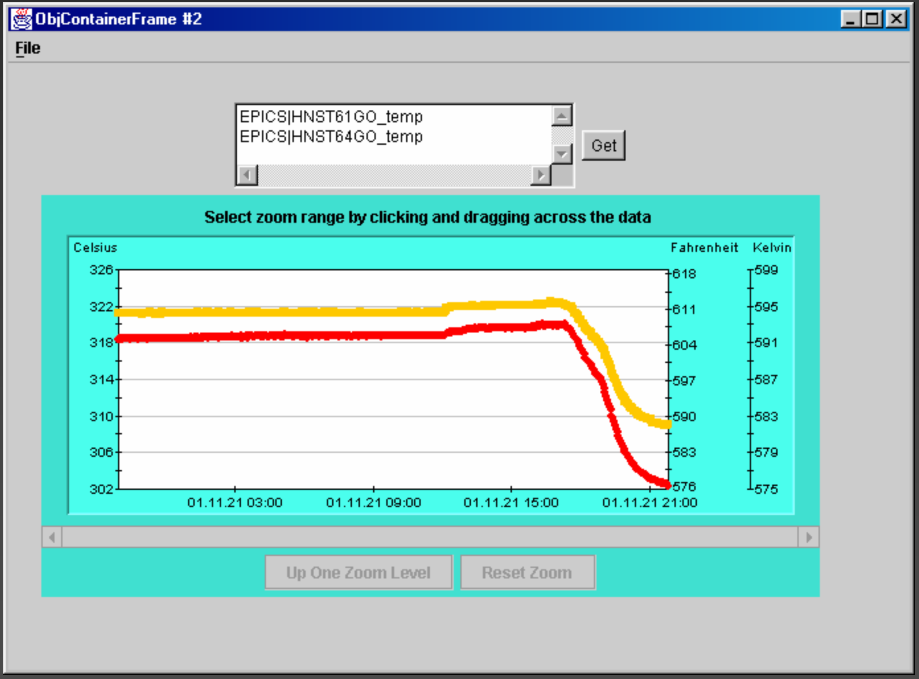
Meters and Bars



Graphic Objects

Complex Types:

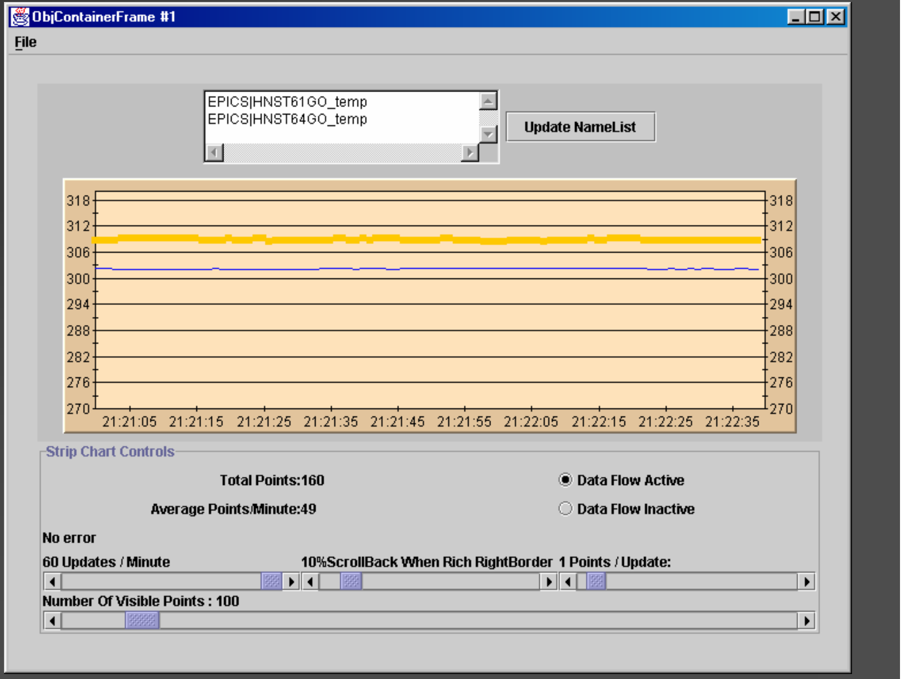
Archive Plot



EPICS|HNST61GO_temp
EPICS|HNST64GO_temp

Select zoom range by clicking and dragging across the data

Strip Chart



EPICS|HNST61GO_temp
EPICS|HNST64GO_temp

Total Points:160

● Data Flow Active

Average Points/Minute:49

○ Data Flow Inactive

No error

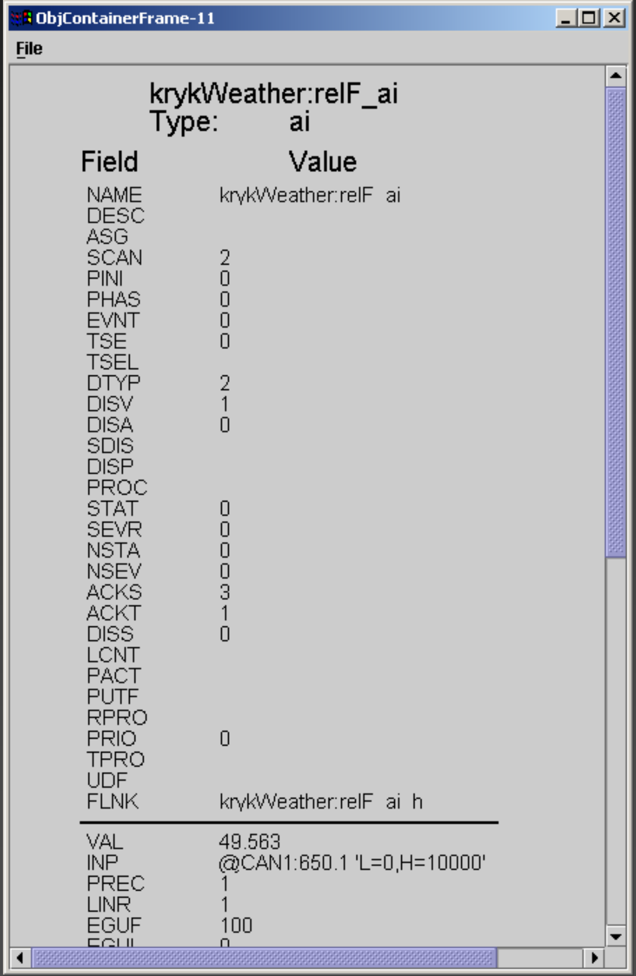
60 Updates / Minute

10%ScrollBack When Rich RightBorder

1 Points / Update:

Number Of Visible Points : 100

Diagnostic Tools: EPICS property table



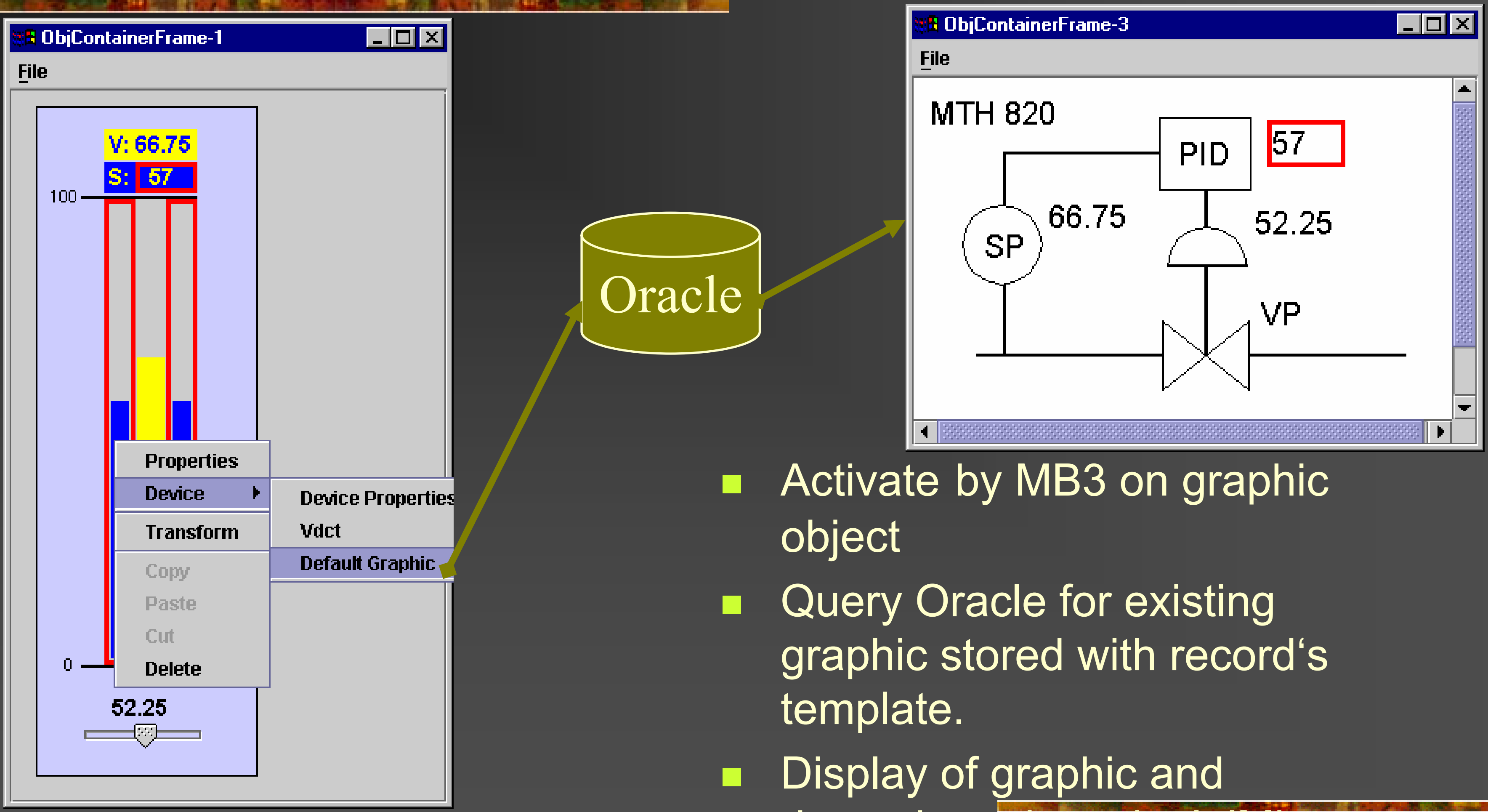
krykWeather:relF_ai
Type: ai

Field	Value
NAME	krykWeather:relF ai
DESC	
ASG	
SCAN	2
PINI	0
PHAS	0
EVNT	0
TSE	0
TSEL	
DTYP	2
DISV	1
DISA	0
SDIS	
DISP	
PROC	
STAT	0
SEVR	0
NSTA	0
NSEV	0
ACKS	3
ACKT	1
DISS	0
LCNT	
PACT	
PUTF	
RPRO	
PRIO	0
TPRO	
UDF	
FLNK	krykWeather:relF ai h
VAL	49.563
INP	@CAN1:650.1 'L=0,H=10000'
PREC	1
LINR	1
EGUF	100
EGUL	0

- Activate by MB3 on graphic device
- Select: Device -> Device Property
- Device Properties ‚known‘ by http (DIXI) server
  No special knowledge programmed into JoiMint
- DIXI server creates JoiMint graphgic (as XML file)
- Display of graphic and dynamic updates in JoiMint

Diagnostic Tools:

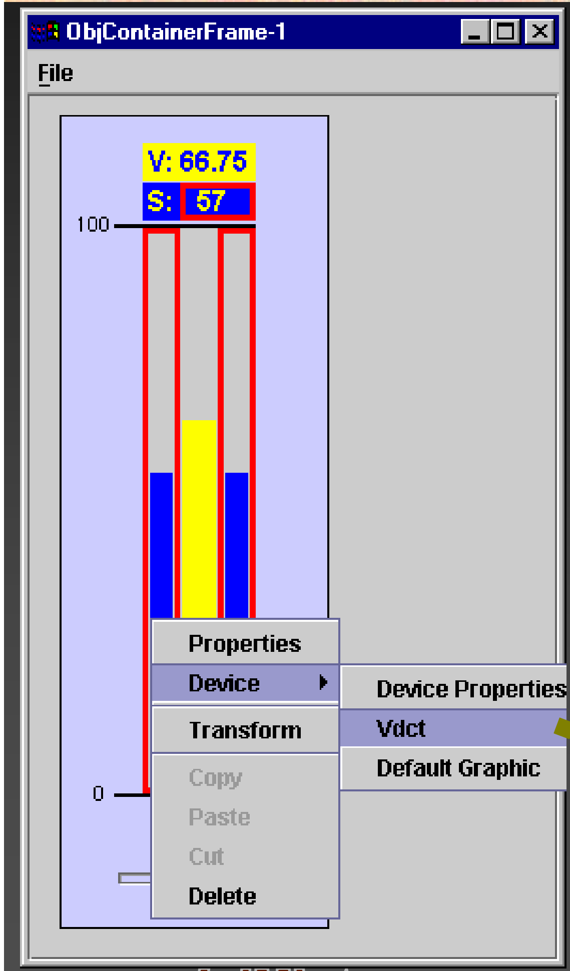
Graphics related to template stored in Oracle

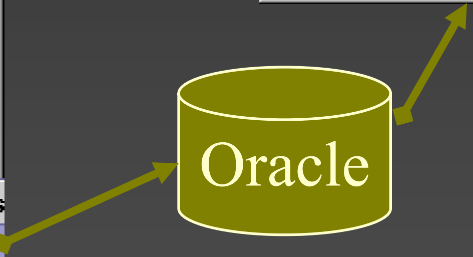


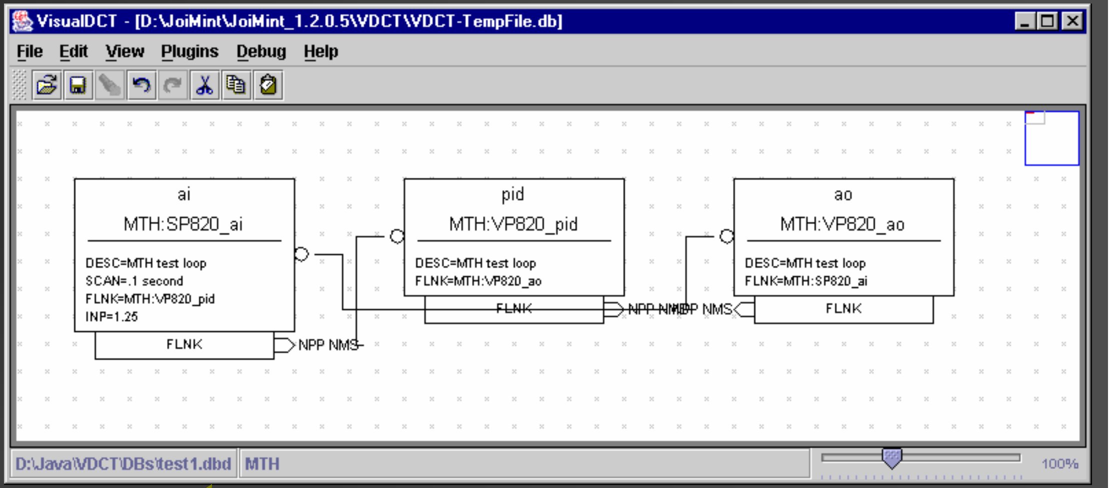
- Activate by MB3 on graphic object
- Query Oracle for existing graphic stored with record‘s template.
- Display of graphic and dynamic updates in JoiMint

Diagnostic Tools:

VDCT configurations related to template stored in Oracle






VisualDCT - [D:\JoiMint\JoiMint_1.2.0.5\VDCT\VDCT-TempFile.db]
File
Edit
View
Plugins
Debug
Help
ai
pid
ao
FLNK
NPP NMS
D:\Java\VDCT\DBs\test1.dbd
MTH
100%

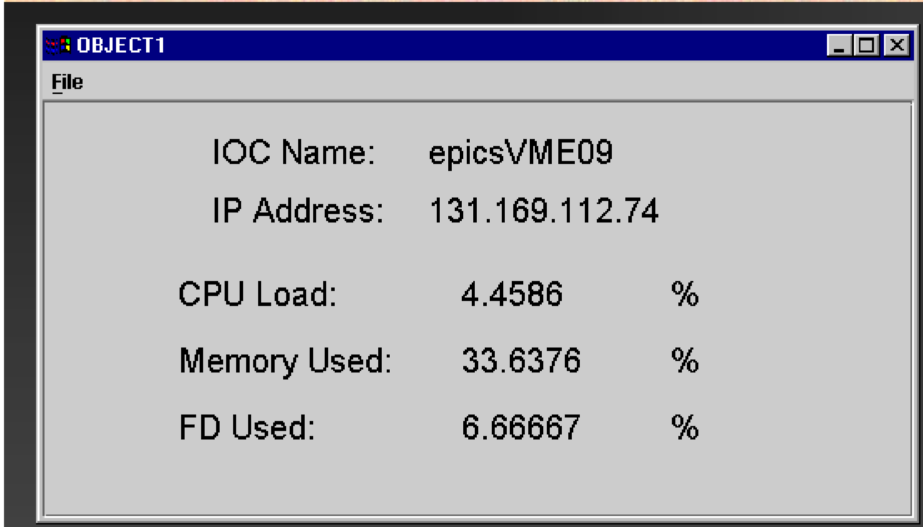
MTH:SP820_ai
DESC=MTH test loop
SCAN=.1 second
FLNK=MTH:VP820_pid
INP=1.25

MTH:VP820_pid
DESC=MTH test loop
FLNK=MTH:VP820_ao

MTH:VP820_ao
DESC=MTH test loop
FLNK=MTH:SP820_ai

- Activate by MB3 on graphic object
- Query Oracle for existing VDCT config file stored with record's template.
- Activate VDCT with config file

Diagnostic Tools:
IOC diagnostic page

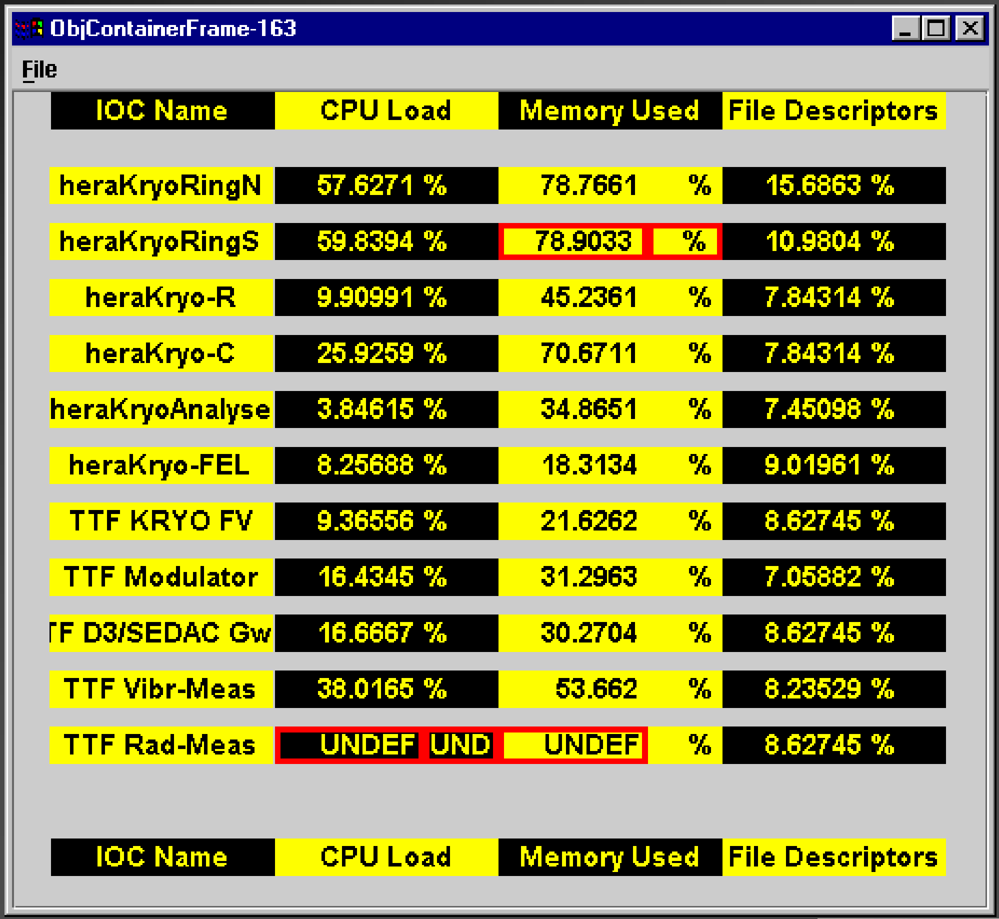


IOC Name: epicsVME09
IP Address: 131.169.112.74

CPU Load:	4.4586	%
Memory Used:	33.6376	%
FD Used:	6.66667	%

- Activated by related display button calling http connection to special port on IOC
- A Program on the IOC will dynamically create an XML file which contains static information (top part) and the configuration for dynamic CA-records (bottom).
- JoiMint will display the contents of the XML file
- Dynamic data will be retrieved from the data sourcelayer (i.e. the DIXI server)

Exsample of a System Status Display



IOC Name	CPU Load	Memory Used	File Descriptors
heraKryoRingN	57.6271 %	78.7661 %	15.6863 %
heraKryoRingS	59.8394 %	78.9033 %	10.9804 %
heraKryo-R	9.90991 %	45.2361 %	7.84314 %
heraKryo-C	25.9259 %	70.6711 %	7.84314 %
heraKryoAnalyse	3.84615 %	34.8651 %	7.45098 %
heraKryo-FEL	8.25688 %	18.3134 %	9.01961 %
TTF KRYO FV	9.36556 %	21.6262 %	8.62745 %
TTF Modulator	16.4345 %	31.2963 %	7.05882 %
TF D3/SEDAC Gw	16.6667 %	30.2704 %	8.62745 %
TTF Vibr-Meas	38.0165 %	53.662 %	8.23529 %
TTF Rad-Meas	UNDEF UND	UNDEF %	8.62745 %
IOC Name	CPU Load	Memory Used	File Descriptors

Future Plans

- Add more graphic objects (collaboration with Josef Stefan Institute in Slovenia)
- Support more data sources (TINE, DOOCS) –(partly done)
- Record and playback
- Cut and paste objects

Future Plans (I)
Command Record and Playback

- Record all operator commands
  - Allow command editing
- Store commands as XML file
- Load command-set from XML file
- Replay commands
- Implementation of sequencing features:
  - Loops
  - If – then – else structures
    (based on live data from the underlying control system)

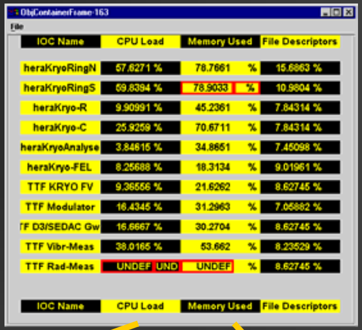
How to run JoiMint

- Simulation mode:
  - Test all graphic objects using the built in LOCAL|*** device names. (i.e. time, random data, alarms...)
- On site mode
  - Use native network interfaces implemented in the data source layer
  - Select diagnostic information from Oracle database
- Remote mode
  - Access different kind of control systems or data sources of the same kind through different http connections from the DIXI server
  - Retrieve archived data from different systems from DIXI server

Data Sources:
HTTP Communication

- Server:
  - Simple ‚C‘ program accepting http requests
  - Designed for XML communication
    - Data and commands are transferred as XML streams of data
- Client:
  - Simple Java html client
  - Parsing XML for further processing in JoiMint
- Advantage:
  - Easy to manage (html passes firewalls)
  - Clients can connect from anywhere (default for Applets)
- Disadvantage:
  - Only ASCII data/ slow i.e. for archived data

XML Data Passing Firewalls
To/ From dedicated Hosts:Port



IOC Name	CPU Load	Memory Used	File Descriptors
heraKryoRingN	57.6271 %	78.7661 %	15.6863 %
heraKryoRingS	59.8394 %	78.9033 %	10.9804 %
heraKryo-R	9.90991 %	45.2361 %	7.84314 %
heraKryo-C	25.9259 %	70.6711 %	7.84314 %
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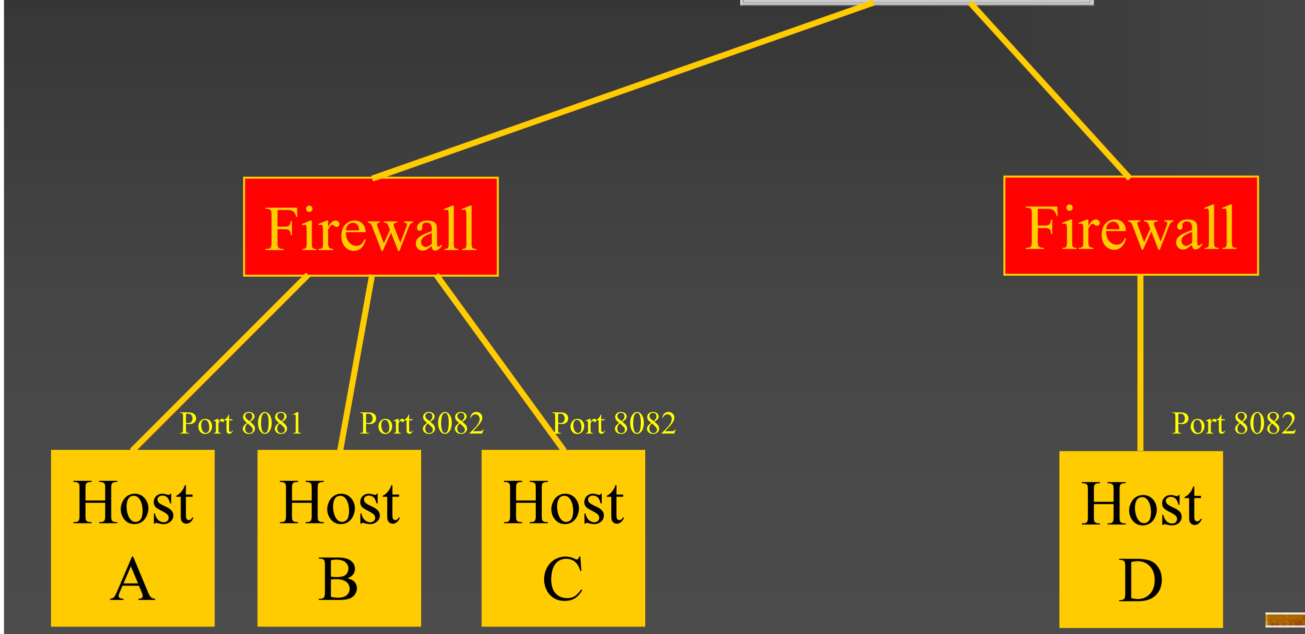
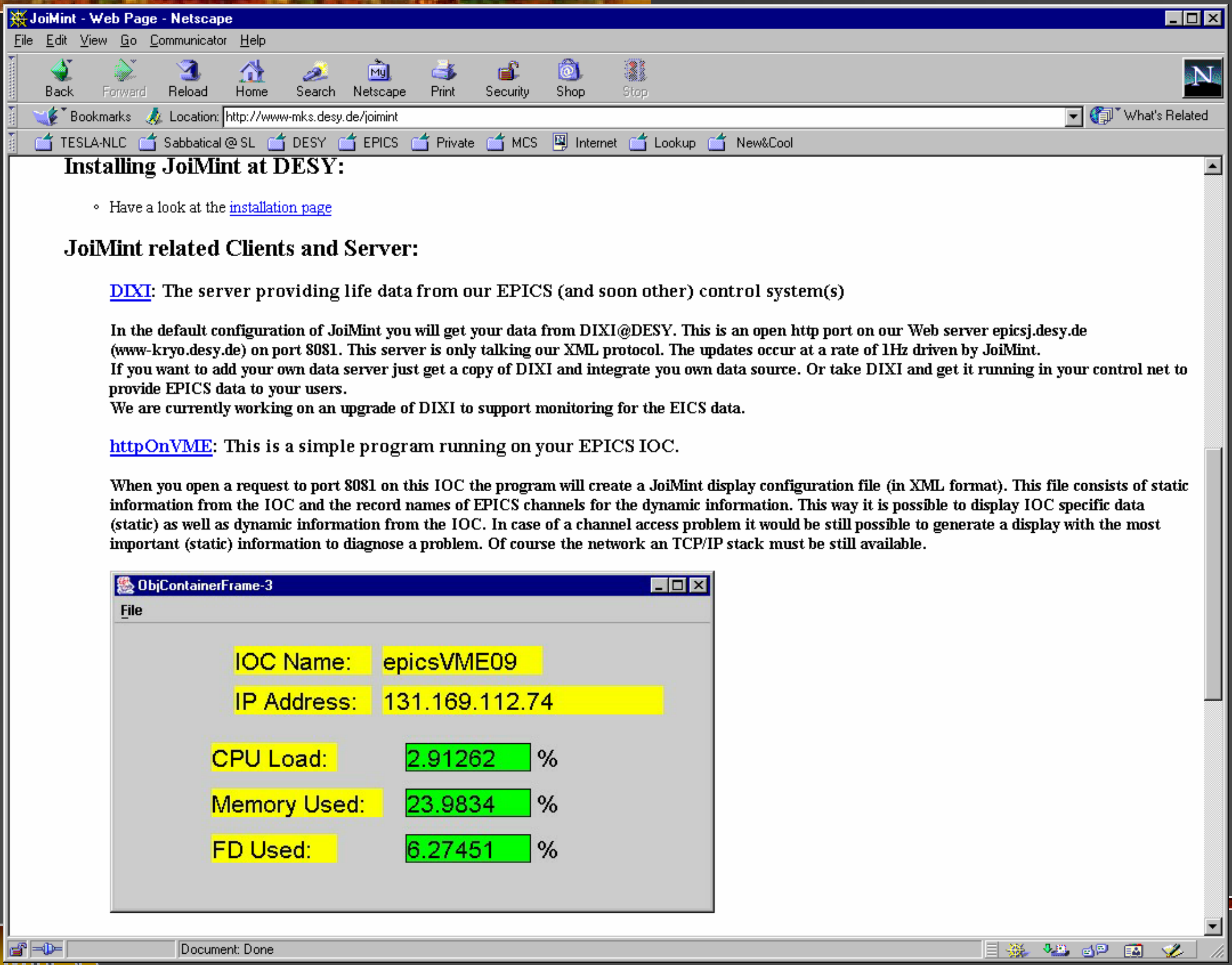
TTF Modulator	16.4345 %	31.2963 %	7.05882 %
TF D3/SEDAC Gw	16.6667 %	30.2704 %	8.62745 %
TTF Vibr-Meas	38.0165 %	53.662 %	8.23529 %
TTF Rad-Meas	UNDEF UND	UNDEF %	8.62745 %
IOC Name	CPU Load	Memory Used	File Descriptors



Where to find JoiMint source code: www-mks.desy.de/JoiMint

Version 1.2.*
Will be soon released


JoiMint - Web Page - Netscape
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://www-mks.desy.de/joimint
What's Related
TESLA-NLC Sabbatical @ SL DESY EPICS Private MCS Internet Lookup New&Cool
Document: Done

Installing JoiMint at DESY:

- Have a look at the installation page

JoiMint related Clients and Server:

DIXI: The server providing life data from our EPICS (and soon other) control system(s)

In the default configuration of JoiMint you will get your data from DIXI@DESY. This is an open http port on our Web server epicsj.desy.de (www-kryo.desy.de) on port 8081. This server is only talking our XML protocol. The updates occur at a rate of 1Hz driven by JoiMint.
If you want to add your own data server just get a copy of DIXI and integrate you own data source. Or take DIXI and get it running in your control net to provide EPICS data to your users.
We are currently working on an upgrade of DIXI to support monitoring for the EICS data.

httpOnVME: This is a simple program running on your EPICS IOC.

When you open a request to port 8081 on this IOC the program will create a JoiMint display configuration file (in XML format). This file consists of static information from the IOC and the record names of EPICS channels for the dynamic information. This way it is possible to display IOC specific data (static) as well as dynamic information from the IOC. In case of a channel access problem it would be still possible to generate a display with the most important (static) information to diagnose a problem. Of course the network an TCP/IP stack must be still available.

IOC Name: epicsVME09
IP Address: 131.169.112.74

CPU Load: 2.91262 %
Memory Used: 23.9834 %
FD Used: 6.27451 %

Short Demo