

# TINE Services

Background slide 2

Services (Archiving, Alarms, ...) slide 19

Instant Client (and other utilities) slide 146

# Part I. Background Information

- Control elements are *distributed*
  - Many (disparate) **platforms**
    - Windows, Unix, VxWorks, java, (DOS , VMS, NIOS)
  - And **Frameworks**
    - .NET, LabView, MatLab, Python, Perl
    - Device Servers and Property Servers
    - Servers with device instances, Services, ...
  - **Client Applications**
    - Native
    - Frameworks: (jddd, CSS, COMA)
    - RAD tools: ACOP

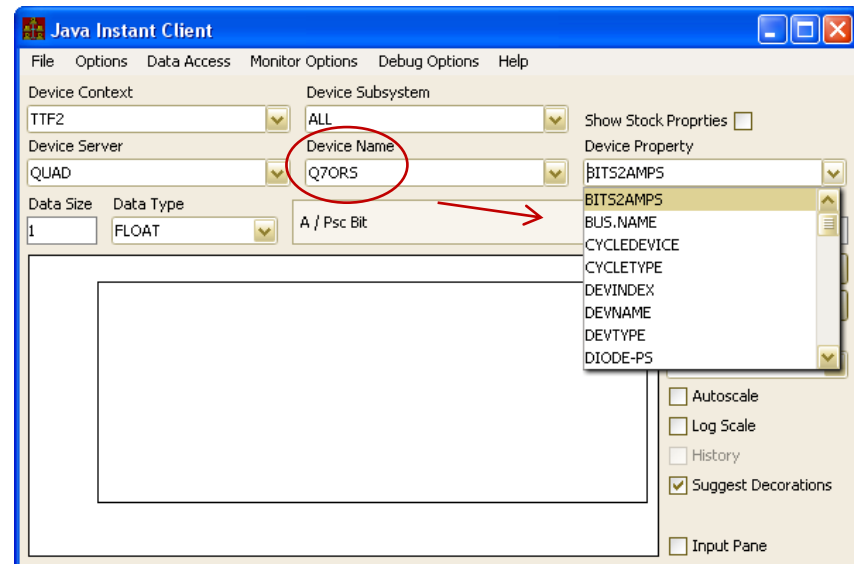
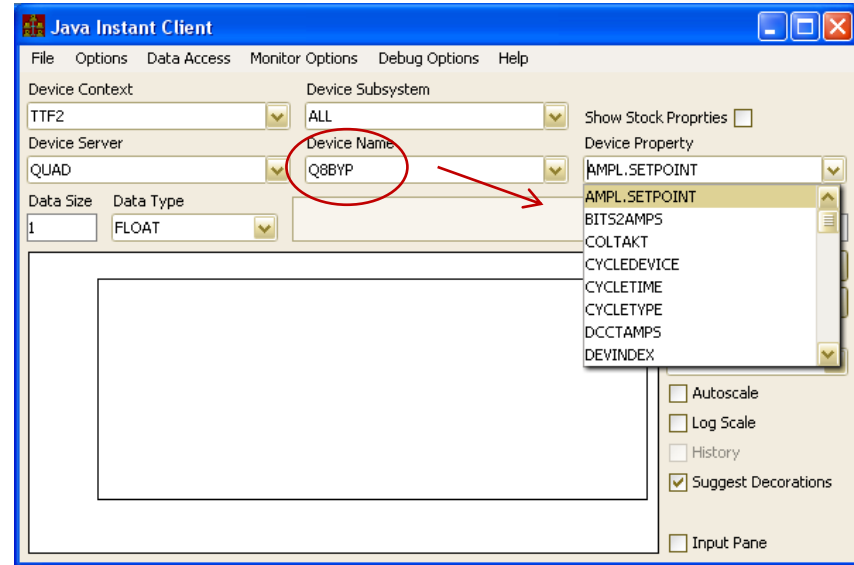
# FECs

- *Front End Controller* (a process)
- Unique *address* (IP + port offset)
- Unique *name*
  - Not 'visible' to most API routines.
- Platforms *with virtual memory* (Win32, Win64, Unix, VMS)
  - Many FECs per host possible
    - Same IP, different port offsets
- Platforms *without virtual memory* (DOS, Win16, VxWorks)
  - One FEC per host
- Each FEC can have many *Equipment Modules* (EQM)
  - 'Equipment Module' is what is exported as a 'Server'
    - Has a *local* name tag (6-characters, not 'visible')
  - All EQMs share the same address space.
  - Most FECs only have 1 EQM.

# Servers

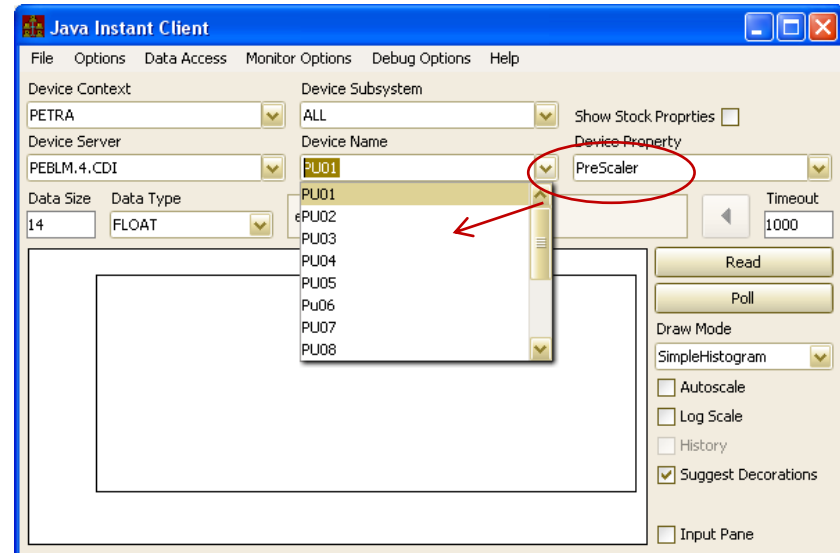
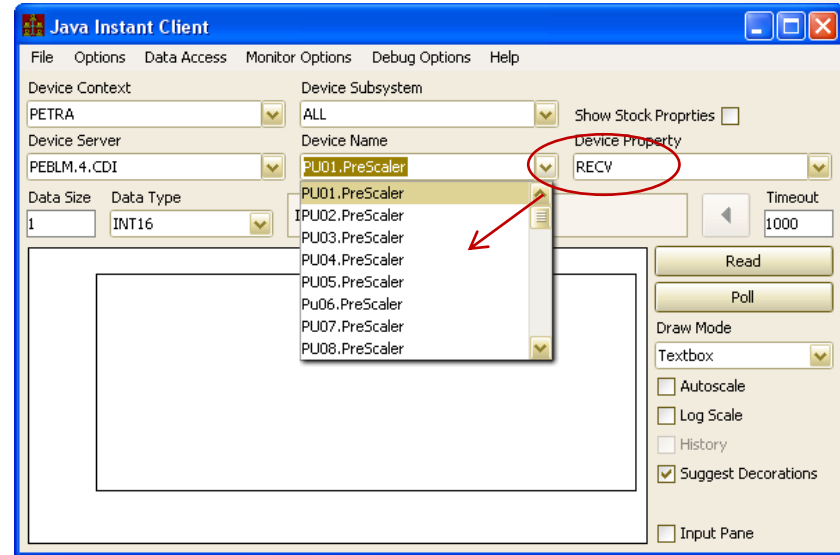
- Device Servers

- *Instances* of hardware devices
- Hierarchy is *flat* or *device-oriented*
  - Each device supports a set of properties
- *The device has properties !*
- e.g. BPM, BLM, VAC.ION\_PUMP, ...



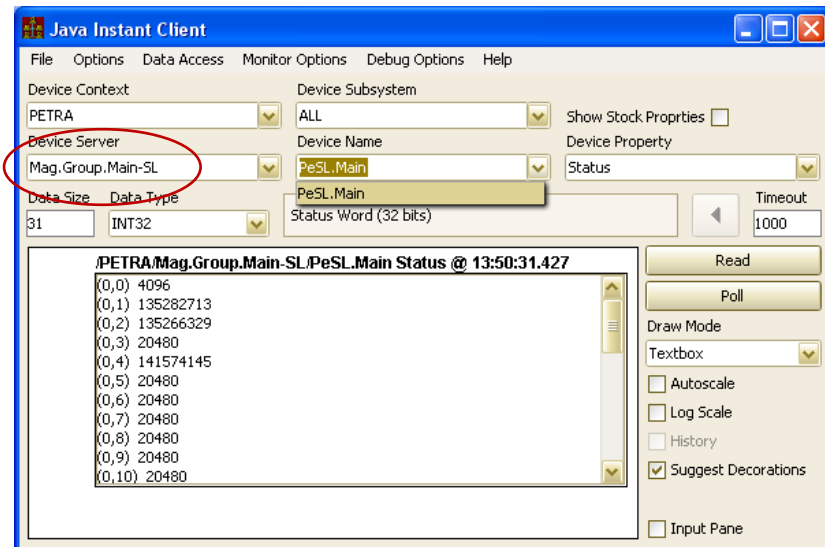
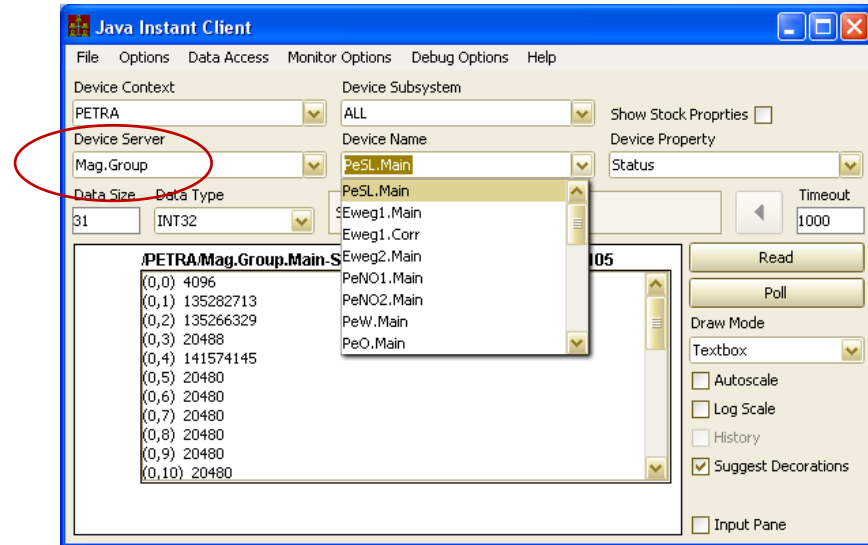
# Servers

- Property Servers
  - *Services* accessed by properties
  - Hierarchy is *flat* or *property-oriented*
    - Each property supports a set of 'devices' (i.e. keywords)
  - *The server has properties !*
  - e.g. ARCHIVER, CAS, any CDI server, ...



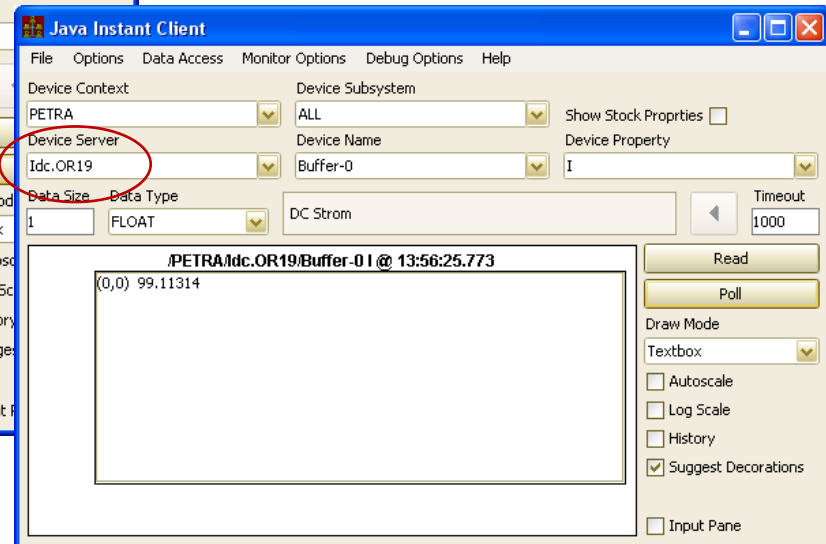
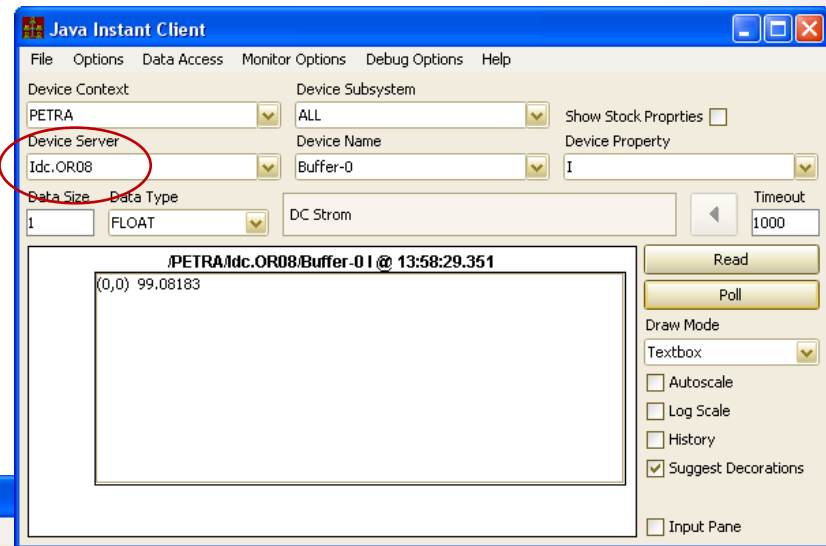
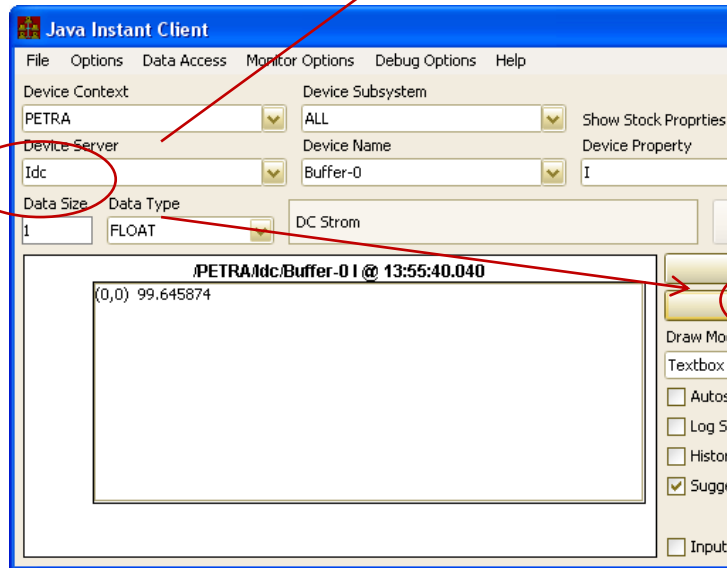
# Servers

- Logical (i.e. 'group') Servers
  - Distributed among *multiple device servers* (members)
  - Each 'member' device server has unique set of devices
  - e.g. PiConditions, Mag.Group, ...



# Servers

- **Failover** (software failover)
  - *Master* and *Slave* share the same Server Name
  - e.g. Idc, BunchStrom\_IMA (DESY2), ...



# Properties

- Define the '*action*' part of a request to an equipment module
- Are really '*Methods*'
- *Attribute style* properties :
  - READ/WRITE (i.e. get/set) '*something*'
  - Department of Redundancy Department:  
No need to register "*rdSomething*" and "*wrSomething*"
- *Command* style properties :
  - WRITE command initializes action
    - e.g. "RESET", "INIT", "START", "STOP"
- *Call* style properties :
  - READ (or WRITE or WRITE/READ) involves sending input and receiving output (not necessarily of the same data type)
    - e.g. "CorrectOrbit"
- *Properties can be overloaded!*
  - Registered multiple times with different input/output data.
    - e.g. return simple or detailed information based on requested output data type.



# Properties

- Need to be registered (along with all meta information) !
  - *Units, settings, description, etc.* +
  - *Array type* !
    - Make use of multi-channel arrays where possible !
    - **MCA** is NOT the same as multiple single element acquisition or wildcard access.
    - Can play a BIG roll in data archiving !
- **Stock Properties**
  - All Servers have them!
  - Some are *FEC specific*
    - SRVSTARTTIME, SRVCMDLINE, etc.
  - Some are *EQM specific*
    - ALARMS, CONTRACTS, etc.
    - ACCESSLOCK (quite a useful one!).

# Properties

- Have '*meta*' information !
  - Access most information via a property query structure (STRUCT + tag = "PRPQsr4") or
  - Individually via *meta property decorations*:
    - .EGU, .XEGU, .MAX, .MIN, .DESC
  - *Interface* meta properties:
    - .HIST is the interface to retrieve the local history of the property (*if it is being taken*).
    - Also: .BIT.x, .MASK.x, .GATE.x
      - Apply to integer types only
  - *Hidden from general browsing* !

# Properties

A property query :

The screenshot shows the Java Instant Client interface. The main window title is "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

Configuration fields include:

- Device Context: PETRA
- Device Subsystem: ALL
- Device Server: BLM
- Device Name: PU01
- Device Property: PROPERTIES
- Data Size: 12
- Data Type: STRUCT
- Input Data Type: NAME64
- Write Access:
- Timeout: 1000

The "Data Type" dropdown is circled in red, and the text "[PRPQsr4] Exported Properties" is visible next to it.

The main display area shows the results of a query for "LossRates" at "15:59:13.744". The results are as follows:

```

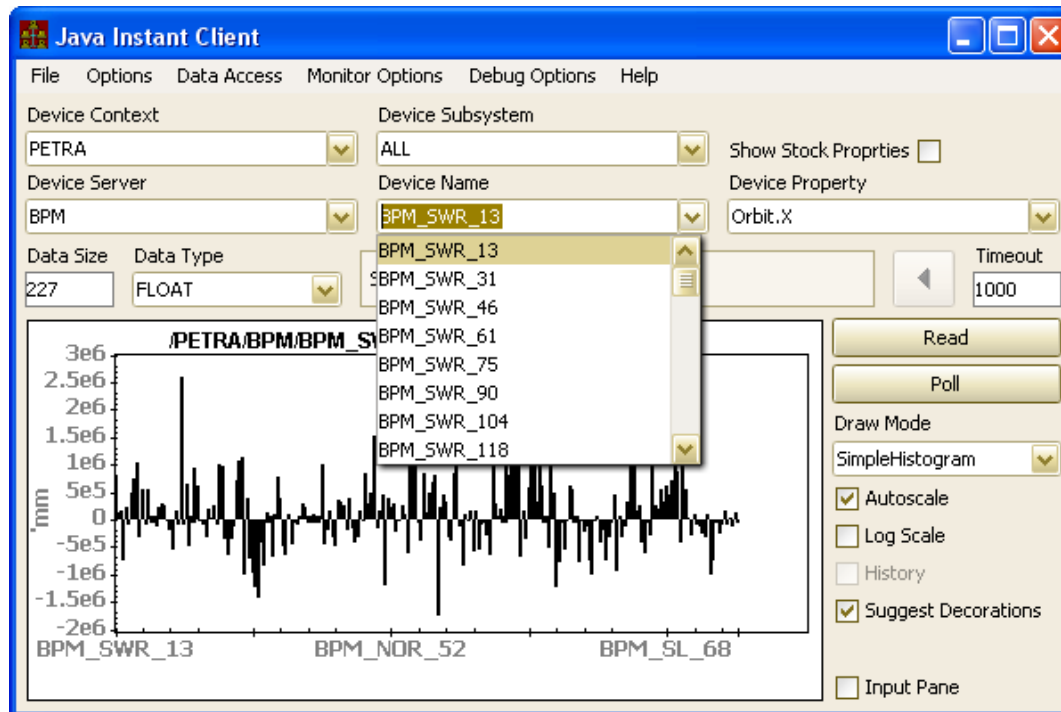
/PETRA/BLM/PU01 PROPERTIES @ 15:59:13.744
(0,0) [property] ->LossRates
(0,1) [description] ->get BLM losses
(0,2) [redirection] ->
(0,3) [tagOut] ->
(0,4) [tagIn] ->
(0,5) [units] ->cnts
(0,6) [min] -> 0.0
(0,7) [max] -> 32767.0
(0,8) [sizeOut] -> 14
(0,9) [sizeIn] -> 0
(0,10) [overloads] -> 1
(0,11) [historyShort] -> 600
(0,12) [historyLong] -> -1
(0,13) [formatOut] -> 3
(0,14) [formatIn] -> -1
(0,15) [access] -> 1
(0,16) [graphType] -> 0
(0,17) [rangeUnits] ->
(0,18) [rangeMin] -> 0.0
(0,19) [rangeMax] -> 0.0
(0,20) [numRows] -> 1
(0,21) [rowSize] -> 14
(0,22) [arrayType] -> 18
(0,23) [reserved] -> 0,0,0

```

Additional controls on the right include "Read", "Poll", "Draw Mode" (set to Textbox), "Autoscale", "Log Scale", "History", "Suggest Decorations" (checked), and "Post-Fix (TEXT Input)" with radio buttons for "None", "LF", "CR", and "LF-CR". The "Input Pane" checkbox is also checked.

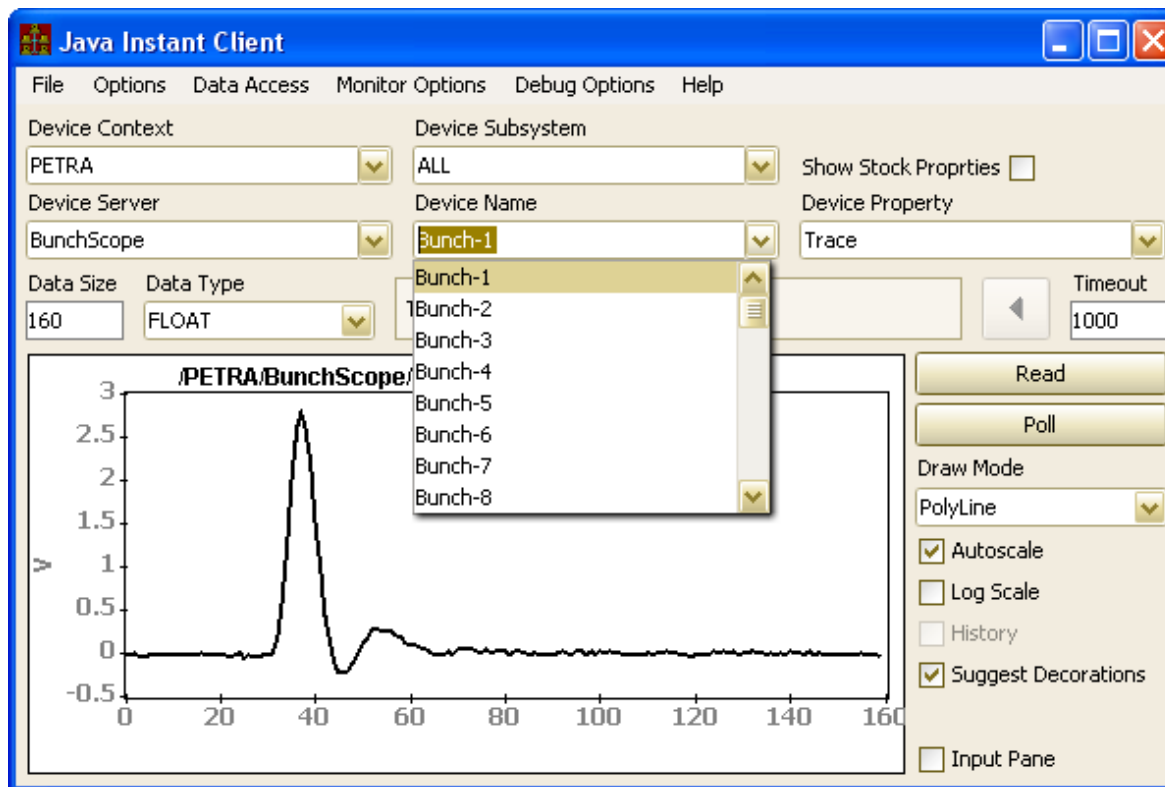
# Devices

- *Input device name checked at the EQM (property handler) !*
- Can signify particular *instances* of a hardware module
  - device server view
  - e.g. BPM has devices BPM\_SWR\_13, BPM\_SWR\_31, etc.



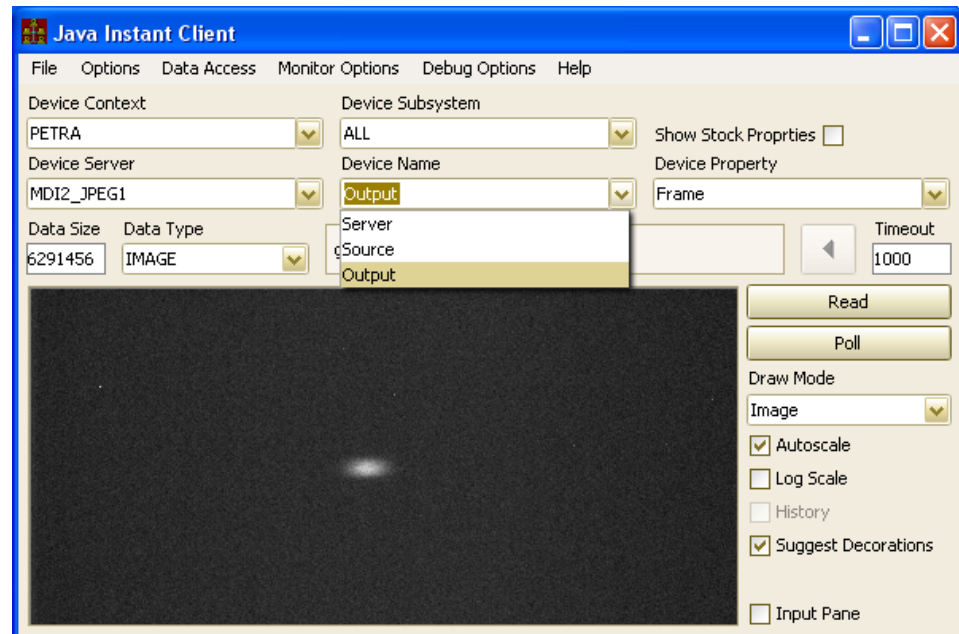
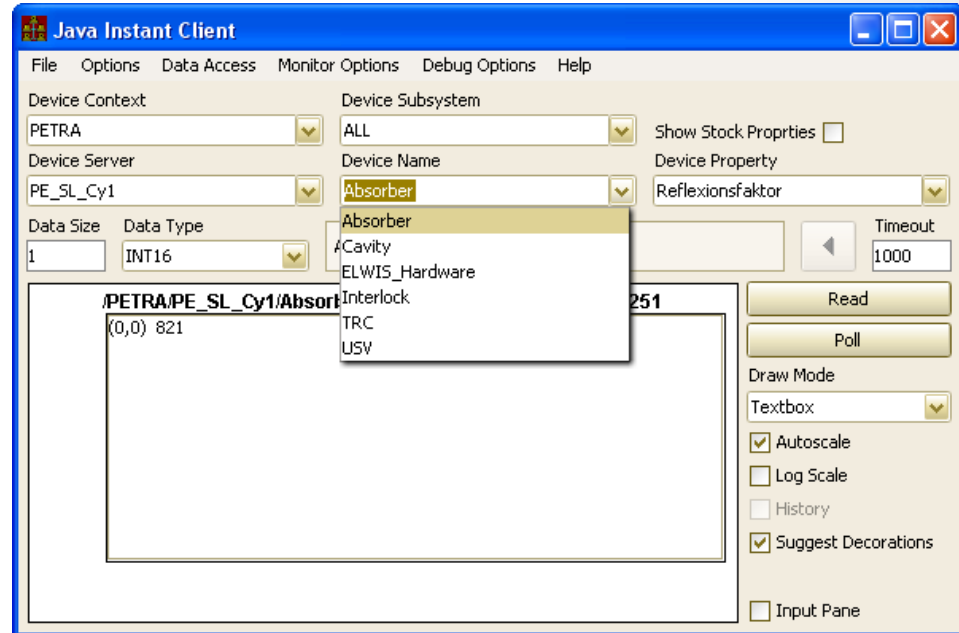
# Devices

- Can signify particular readout *elements*
  - e.g. BunchScope has devices Bunch-1, Bunch-2, etc.



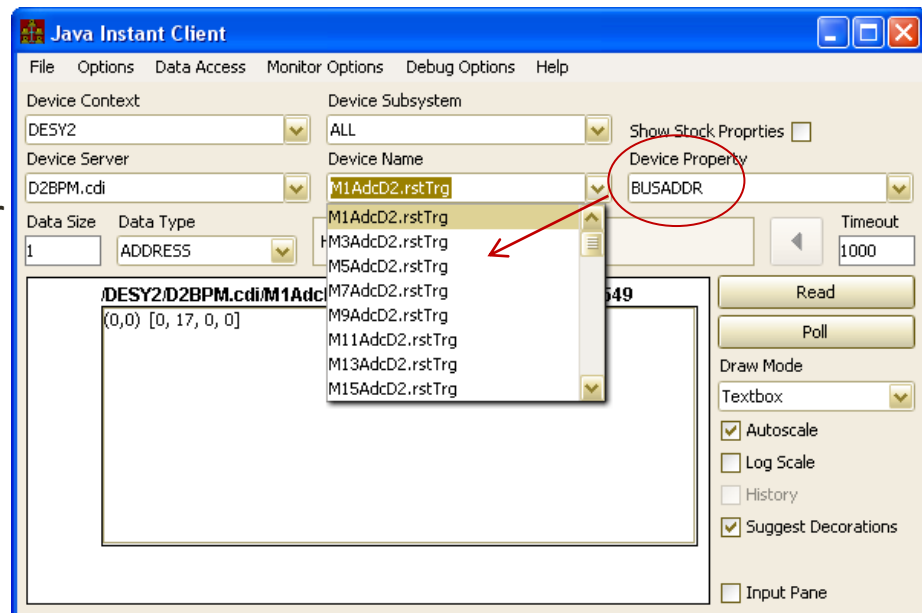
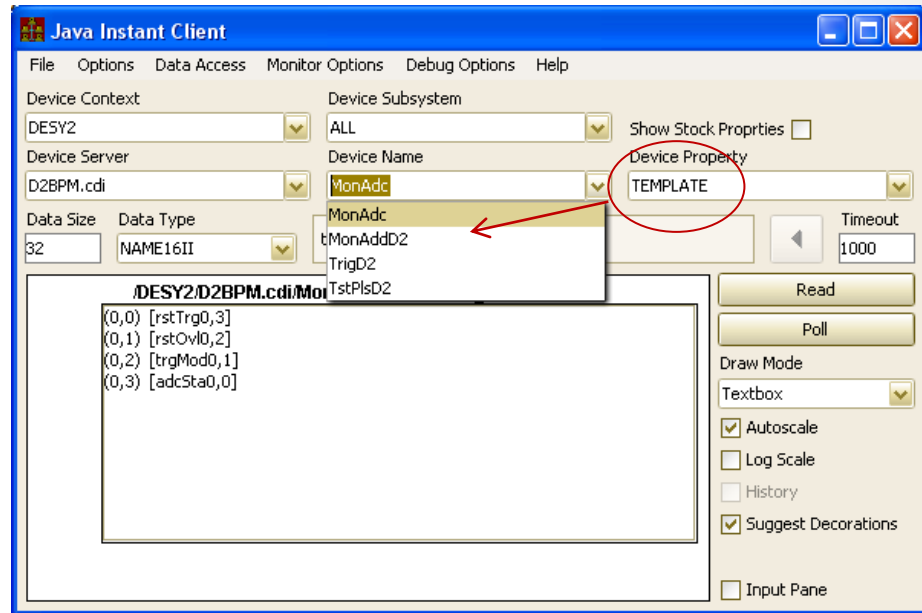
# Devices

- Can signify different readout *categories*
  - e.g. ELWISes have devices “Absorber”, “Cavity”, “Interlock”, etc.
  - e.g. Video has devices “Server”, “Source”, “Output”, “Adjustments”, etc.



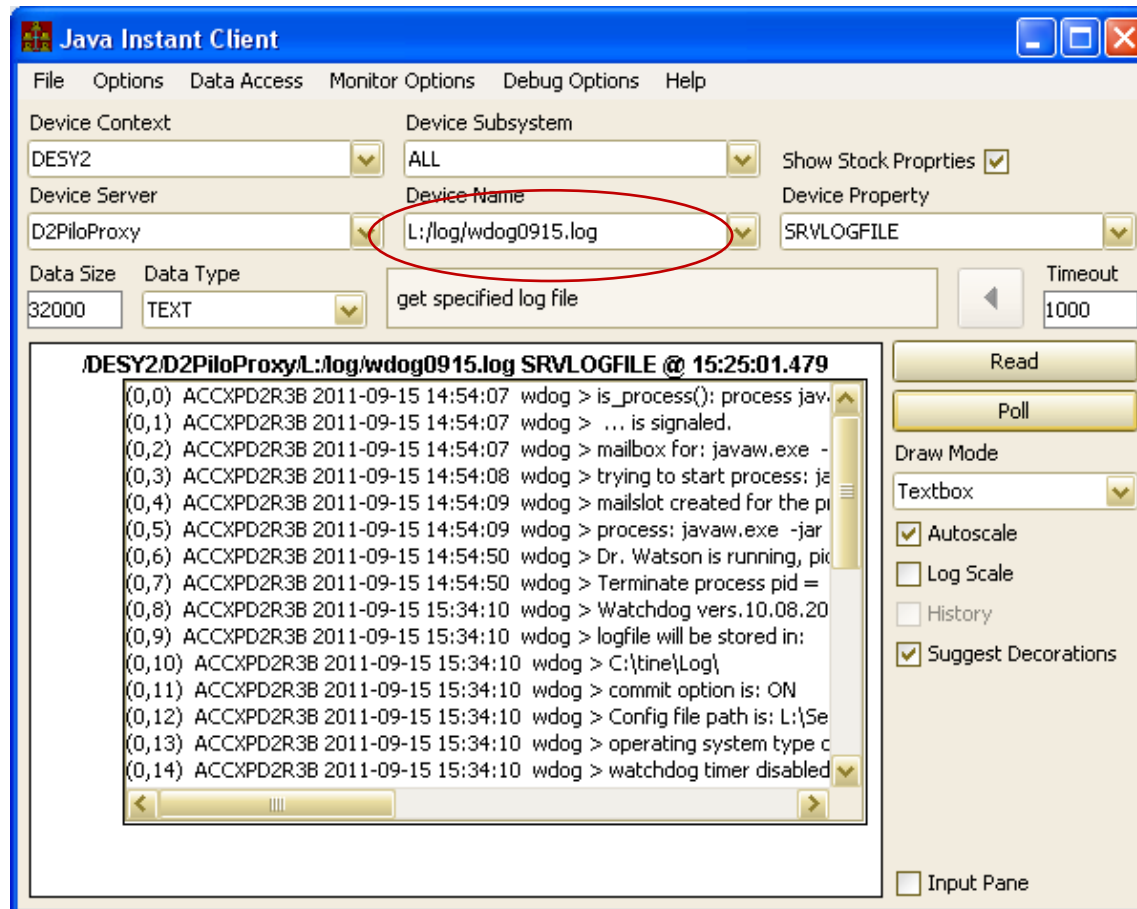
# Devices

- Can signify property related *'keywords'*
  - Property server view
  - e.g. CDI lists
    - cdi devices for BUS properties (SEND, RECV, etc.)
    - registered Templates for properties TEMPLATE, INSTANCES
    - 'split' device locations for extended properties, etc.



# Devices

- A ‘free’ string used as input.
  - e.g. stock property “SRVLOGFILE” takes device ‘name’ as file path and name.





# Security

- Based on *User Name* and/or *Network address*
- *Fec Name = User Name* when servers are clients !
- Applies to **WRITE** access and to **exclusive READ** access.
- Usually assigned at the server level, but:
  - Can be applied to *individual Properties*
  - Can be applied to *individual Devices*
- Stock Property “**ACCESSLOCK**” can be used to assign an *access token* to a single specific client process.
  - Inherent in API calls ‘SetAccessLock()’, ‘FreeAccessLock()’, etc.
  - Exclusive READ can also be registered to take effect only when an Access Lock is in play !

# Error (status) Codes

- *Are in general NOT exceptions!*
- *Systematic codes* (< 512)
  - Several used at the protocol level
    - *'illegal\_protocol', 'get\_subscription\_id', 'property\_is\_mca', ...*
- *User defined* (>= 512)
- *Can send data + status !*
  - return (**CE\_SENDATA** | **status**)
  - e.g. *'has\_query\_function'* status is used to signal either property or device query precedence.
  - e.g. *'information\_static'* applied when polling a property whose data will not change.
  - *"here's the data, but there's something else you should probably know ..."*

# Part II: Services and Utilities

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# Naming Services

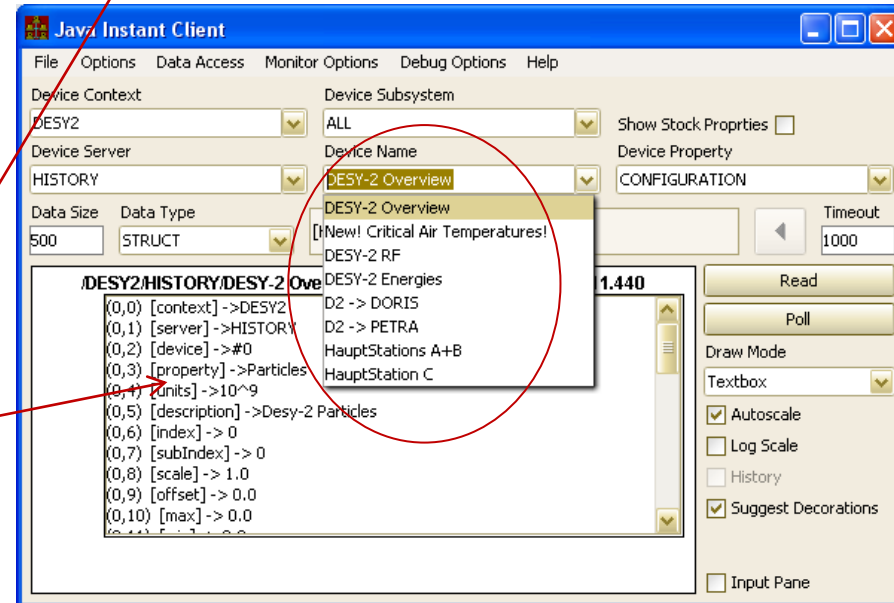
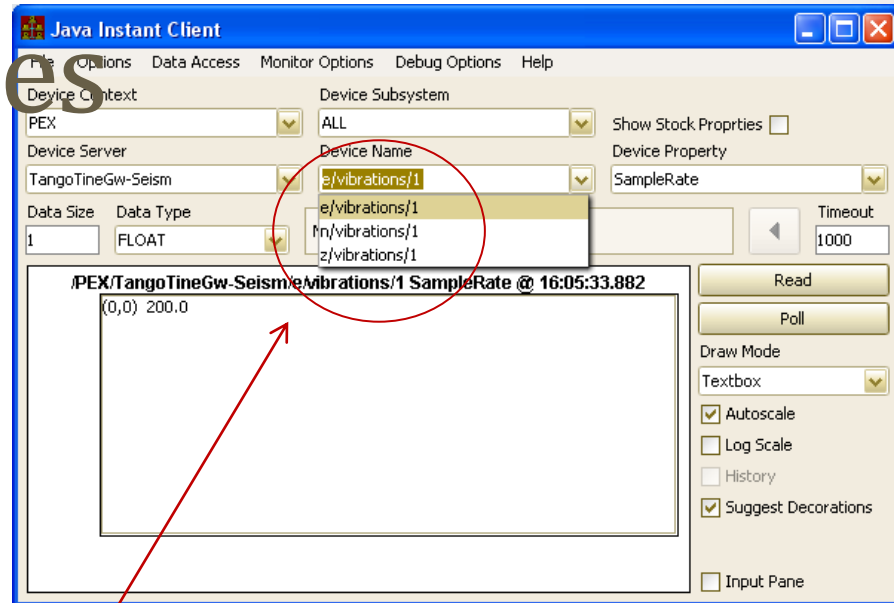


# Naming Services

- Hierarchical Naming convention
  - *“/context/server/device[property]”*
  - *subsystem* provide extra (browseable) information
  - *context* and *server* names :
    - $\leq$  *32 characters*
    - must begin with *alpha-numeric* character
    - cannot contain ‘\’, ‘/’, or ‘\*’
    - *But please avoid blanks and exotic characters and names like “12345678” !*
  - *context* :
    - can be omitted (if no ambiguity)
    - n.b. “DEFAULT” is NOT a context !
  - *device* name, *property* name :
    - $\leq$  *64 characters*
    - No character restrictions
    - *But please avoid blanks and exotic characters !*

# Naming Services

- Hierarchical Naming convention
  - *device name* (further information)
    - *NOT* required to be registered or supplied in call !
    - 64 character *official* limit (for queries, redirection, etc.)
    - can contain *1024 characters* ! (any individual contract)
      - e.g. device =  
“cdiDev1,cdiDev2,cdiDev3, ...”
    - A ‘/’ can sometimes be used to *extend* the hierarchy !
    - ‘blanks’ sometimes not a bad option, after all !



# Naming Service

- **wild cards**

- e.g. *device* or *property* =  
“\*”, “ABC\*”, “\*DEF”,  
“\*CD\*”

- **BUT:**

- *don't know what will come back !*
- requested data type *must* be able to carry ‘*device name*’, *value*, *status*
  - NAME64DBLDBL,  
NAME16FLTINT, USTRING,  
etc.

- an *MCA property* handles the call as such

- *else* loops through all devices or properties!

The screenshot shows the Java Instant Client interface. The 'Device Context' is 'PETRA' and 'Device Subsystem' is 'ALL'. The 'Device Server' is 'BLM' and 'Device Name' is '\*'. The 'Data Type' is 'NAME64DBLDBL'. The data table shows a list of PU01 through PU14 with their respective values.

Index	PU	Value
(0,0)	PU01	[PU01, 0.0, 0.0]
(0,1)	PU02	[PU02, 0.0, 0.0]
(0,2)	PU03	[PU03, 0.0, 0.0]
(0,3)	PU04	[PU04, 0.0, 0.0]
(0,4)	PU05	[PU05, 0.0, 0.0]
(0,5)	PU06	[PU06, 0.0, 0.0]
(0,6)	PU07	[PU07, 162.0, 0.0]
(0,7)	PU08	[PU08, 55.0, 0.0]
(0,8)	PU09	[PU09, 136.0, 0.0]
(0,9)	PU10	[PU10, 10.0, 0.0]
(0,10)	PU11	[PU11, 0.0, 0.0]
(0,11)	PU12	[PU12, 0.0, 0.0]
(0,12)	PU13	[PU13, 0.0, 0.0]
(0,13)	PU14	[PU14, 0.0, 0.0]

The screenshot shows the Java Instant Client interface. The 'Device Context' is 'PETRA' and 'Device Subsystem' is 'ALL'. The 'Device Server' is 'PE\_SL\_Cy1' and 'Device Name' is 'Cavity'. The 'Device Property' is 'Einkoppler\*'. The 'Data Type' is 'NAME64DBLDBL'. The data table shows a list of properties for the 'Einkoppler' with their respective values.

Index	Property	Value
(0,0)	[Einkoppler_H2O_Menge_klein	[0.0, 0.0]
(0,1)	[Einkoppler_H2O_T_RL	[26.162324905395508, 0.0]
(0,2)	[Einkoppler_H2O_dT	[1.3454914093017578, 0.0]
(0,3)	[Einkoppler_Luft_T_RL	[42.7017936706543, 0.0]
(0,4)	[Einkoppler_Luft_T_VL	[38.7751579284668, 0.0]
(0,5)	[Einkoppler_Luft_dT	[3.9266357421875, 0.0]
(0,6)	[Einkoppler_Luftmenge_klein	[0.0, 0.0]
(0,7)	[Einkoppler_Ueberschlag	[0.0, 0.0]
(0,8)	[Einkoppler_Ueberschlag_Test_#	[0.0, 0.0]

# Naming Services

- **subsystems**
  - $\leq$  16 characters
  - Registered subsystem compared with an *allowed* list !
    - *Not in the list ?* -> **no subsystem information** !
- *decorated context* + **no subsystem** (at registration):
  - **decoration** is used as the **subsystem** and **removed** (!) from the **context** !
  - e.g.
    - context = "TTF2.**RF**", server = "KLY.INTERLOCK", subsystem = ""
    - > context = "TTF2", server = "KLY.INTERLOCK", subsystem = "**RF**"
  - Name resolution will honor a request for "/TTF2.RF/KLY.INTERLOCK"
    - "TTF2.RF/KLY.INTERLOCK" and "/TTF2/KLY.INTERLOCK" both map to the same server !
  - Exceptions: context.TEST, context.SIM always allowed.
    - (=> Maybe we can cleanup context.TEST and context\_TEST, etc. ?)



# Naming Services

- Clients/Servers use *plug-and-play* !
- Equipment Name Server (ENS) manages control system server database.
  - Context + server -> EQM name + FEC
  - FEC -> address (IP and port)
  - (Properties and devices managed at the server)
  - ANY *new server* is allowed to *plug* into the system.
    - (Optionally restrict allowed 'root' contexts)
  - BUT *importance* is administered !
  - *On-line status* is regularly checked
    - If allowed dead time (default = 3 months) *exceeded* -> *server is removed* !
- Clients find an address by *asking* the ENS
  - *ENS down or doesn't know* -> *ask local address cache*.

# Naming Services

**File View Tools Help**

ALARMSTATE	Mag.Group.Main-N...	PE_SR_Cy6	PET3ID14.CDI
ALMSTATE	Mag.Group.Main-N...	PE_SR_Kly1	PETRASTATE
ARCHIVER	Mag.Group.Main-E...	PE_SR_Kly2	PEVAC-W.CDI
BkrScopes	Mag.Group.Main-E...	PE_SR_Mod1	PEVAC-SO.CDI
BLM	Mag.Group.Main-E...	PE_SR_Mod2	PEVAC-SR.CDI
BMS_FEC	Mag.Group.Main-E...	PE_SR_TRANSMI...	PEVAC-SW.CDI
BPM	Mag.Group.Main-E...	PE_SR_TRNSM_L...	PEVAC-O.CDI
Bunche_EWeg	Mag.Group.Corr-W	PEALARMSTATE	PEVAC-NO.CDI
BunchScope	Mag.Group.Corr-TA	PeBeam	PEVAC-NR.CDI
BunchScope.Data	Mag.Group.Corr-SL	PeBeamLH	PEVAC-NW.CDI
BunchScope.Control	Mag.Group.Corr-SO	PEBLM.4.CDI	PiConditions
BunchScope.Atten...	Mag.Group.Corr-SW	PeCanEwC1	PiControls
CANalyzer	Mag.Group.Corr-NL	PeCanEwC2	PiCoPy
CAS	Mag.Group.Corr-NO	PeCanEwM1	PiDisplayDeviceSt...
CAS.ARCHIVE	Mag.Group.Corr-NW	PeCanEwM2	PiKeyBoxes
Cms.MagnetPs	Mag.Group.Corr-EXL	PeCanExC1	PiloEWAuf
Cms.PsGroup	Mag.Group.Corr-E...	PeCanExC2	PiloEWSta
CSSPY	Mag.Group.Corr-E...	PeCanExC3	PiloEW.CDI

**Ping all** Active: 311 of 316 (12:59:12)

Device context: **PETRA**

**Selected Subsystems**

<input checked="" type="checkbox"/> SER	<input checked="" type="checkbox"/> DIAG	<input checked="" type="checkbox"/> HIST	<input checked="" type="checkbox"/> RF
<input checked="" type="checkbox"/> VAC	<input checked="" type="checkbox"/> TIM	<input checked="" type="checkbox"/> PINTLK	<input checked="" type="checkbox"/> MAG
<input checked="" type="checkbox"/> TRANS	<input checked="" type="checkbox"/> INJ	<input checked="" type="checkbox"/> MEX	<input checked="" type="checkbox"/> INSTR
<input checked="" type="checkbox"/> EXP	<input checked="" type="checkbox"/> VIDEO	<input type="checkbox"/> TEST	

OS Color Code: **Dos Unix VxWorks VMS Win16 Win32 Java**

FEC Importance: **ALL**

**Front End** OS Address  
PEALMSTATE UNIX 131.169.119.64

**Host Computer** Responsible Location  
accfxpfacil01.desy.de P.Duval 30 rm 102 CSR-6 (Sw/8)

**Device servers** Description  
**ALARMSTATE** PETRA Alarm State Server

**Ping**  
**Control**  
**Restart**

**Activity** **Contracts** **Clients** **Alarms** **Log File** **Stats**

Server	PEALMSTATE
Local Time	Thu Nov 03 13:00:23
Start Time	Wed Nov 02 08:21:55
Sys Poll Rate	500
Nr bkg tasks	0
[SRV] Nr total contracts	12
[SRV] Nr total clients	7
[SRV] PETRA/ALARMSTATE contracts	12
[SRV] PETRA/ALARMSTATE clients	2
[SRV] Nr UDP packets received	37796
[SRV] Nr TCP packets received	0

12:59:12: Normal

# Naming Services

**FEC Remote Control Panel**

File View Tools Help

ALARMSTATE	Mag.Group.Main-E...	PE_SR_Kly2	PET3ID12.CDI
ALMSTATE	Mag.Group.Main-E...	PE_SR_Mod1	PET3ID14.CDI
ARCHIVER	Mag.Group.Main-E...	PE_SR_Mod2	PETRASTATE
BMS_FEC	Mag.Group.Corr-W	PE_SR_TRANSML...	PEVAC-W.CDI
BPM	Mag.Group.Corr-TA	PE_SR_TRNSM_L...	PEVAC-SO.CDI
BunchScope	Mag.Group.Corr-SL	PEALARMSTATE	PEVAC-SR.CDI
BunchScope.Data	Mag.Group.Corr-SO	PeBeam	PEVAC-O.CDI
BunchScope.Atten...	Mag.Group.Corr-SW	PeBeamLH	PEVAC-NO.CDI
CAS	Mag.Group.Corr-NL	PeCanEwC1	PEVAC-NR.CDI
CAS.ARCHIVE	Mag.Group.Corr-NO	PeCanEwC2	PEVAC-NW.CDI
Cms.MagnetPs	Mag.Group.Corr-NW	PeCanEwM1	PiConditions
Cms.PsGroup	Mag.Group.Corr-EXL	PeCanEwM2	PiControls
CSSPY	Mag.Group.Corr-E...	PeCanExC1	PiCoPy
CurrentThreshold	Mag.Group.Corr-E...	PeCanExC2	PiKeyBoxes
DiagBeamData	MDI2_RAWVIDEO1	PeCanExC3	PiloEW.CDI
Dump	MDI2P3SMLA1.CDI	PeCanExC4	PiloP3.CDI
EVENTAPC	MHFHISTORY	PeCanExC5	PiloP3Sta
EVENTS	MHFTrcTranslator	PeCanExC6	PiPrivateComman...

Ping all Active: 274 of 274 (13:01:19)

Device context: PETRA

Selected Subsystems

<input checked="" type="checkbox"/> SER	<input checked="" type="checkbox"/> DIAG	<input checked="" type="checkbox"/> HIST	<input checked="" type="checkbox"/> RF
<input checked="" type="checkbox"/> VAC	<input checked="" type="checkbox"/> TIM	<input checked="" type="checkbox"/> PINTLK	<input checked="" type="checkbox"/> MAG
<input checked="" type="checkbox"/> TRANS	<input checked="" type="checkbox"/> INJ	<input checked="" type="checkbox"/> MEX	<input checked="" type="checkbox"/> INSTR
<input checked="" type="checkbox"/> EXP	<input checked="" type="checkbox"/> VIDEO	<input type="checkbox"/> TEST	

OS Color Code: Dos Unix VxWorks VMS Win16 Win32 Java

FEC Importance: **IMPORTANT**

Front End	OS	Address
PEALMSTATE	UNIX	131.169.119.64
Host Computer	Responsible	Location
accfxpefaci01.desy.de	P.Duval	30 rm 102 CSR-6 (Swf8)
Device servers	Description	Ping
ALARMSTATE	PETRA Alarm State Server	Control
		Restart

Activity	Contracts	Clients	Alarms	Log File	Stats
Server			PEALMSTATE		
Local Time			Thu Nov 03 13:02:06		
Start Time			Wed Nov 02 08:21:55		
Sys Poll Rate			500		
Nr bkg tasks			0		
[SRV] Nr total contracts			12		
[SRV] Nr total clients			7		
[SRV] PETRA/ALARMSTATE contracts			12		
[SRV] PETRA/ALARMSTATE clients			2		
[SRV] Nr UDP packets received			37858		
[SRV] Nr TCP packets received			0		

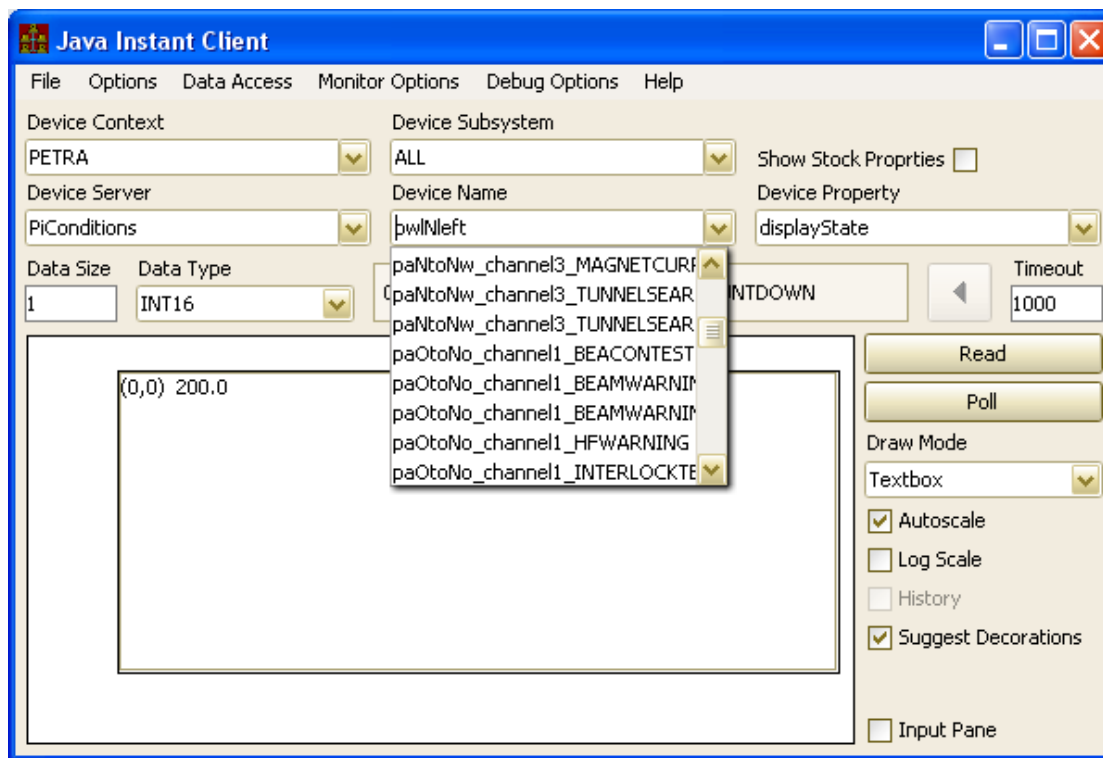
13:01:19: Normal

# Naming Services

- *How does a client know where the ENS is ?*
  - **API** call sets the ENS address (takes precedence).
  - environment variable **TINE\_HOME** points to location of file **cshosts.csv** (list of installed name servers).
  - Ask **DNS** for address of “**tineens**” in local domain.
  - Issue a **multicast** asking for an ENS to respond.

# Naming Services

- Group Equipment Name Server (GENS)
  - Companion server to the ENS
  - Manages groups, group members, group device lists.



# Naming Services

- ENS administration (who is allowed ?)
  - Registered administrators
  - The FEC's 'responsible' party is allowed to remove the associated FEC.
    - Login name (user name) must match 'responsible'.

The screenshot displays the 'ENS Administration' window. The title bar includes 'File Options Help'. The main area is divided into several sections:

- ENS:** A 'Toggle ENS' button and status text: 'Current ENS: ENS#0 Current ENS Address: 131.169.120.41'.
- Administration Panel:**
  - Available contexts:** A dropdown menu showing 'PETRA'.
  - Fec importance:** A dropdown menu showing 'IMPORTANT' and a 'Set' button.
  - Go To Fec for Server:** A list of contexts including ALARMSTATE, ALMSTATE, ARCHIVER, BLM, BMS\_FEC, BPM, BkrScopes, BunchScope, BunchScope.Data, BunchScope.Control, BunchScope.Attenuator, and Bunche\_FWen.
  - Registered FECs:** A list of FECs including W0M0.Z, MPSALARMS.41, MPSSERVER.1, MPUACCXPPEFOFBMP, OP83a997ab.2e0, OptMeasure.11, P3MST, P3SMON.1, P3TURBO, P3\_AMPFECACXPPE, P13Collimator, P14Collimator, and PEALMSTATE.
  - Registered Device Servers:** A list of device servers including ALARMSTATE, ALMSTATE, and PEALARMSTATE.
  - Registered Groups:** A list of groups including Mag.Group, PiControls, PiConditions, PiPrivateCommands, and PiPrivateSwitchables.
- Fec Information Panel:** A table with the following data:

Description	PETRA Alarm State Server
OS	UNIX
Responsible	P.Duval
Location	bldg 30 rm 102 CSR-6 (Sw/8)
Ver	4.02.0005
IP	131.169.119.64
Port Offset	2
Host Name	accixpefacil01.desy.de
- Group Members:** A list of group members including PiPrivCond\_piFieldPetraNoP, PiPrivCond\_piFieldPetraWP, PiPrivCond\_piFieldPetraSrP, PiPrivCond\_piFieldPetraSoP, PiPrivCond\_piFieldBkrPetraP, and PiPrivCond\_piCentralPetraP.

At the bottom, there are buttons for 'Add Server', 'Remove Server', 'Add FEC', 'Remove FEC', 'Add Group', 'Add Member', and 'Remove Member'. A status bar at the very bottom reads: '17:13:49: Group members loaded for PETRA:PiConditions.'

# Network Globals



# Network Globals

- Keyword parameter set multicasted (producer-consumer)
  - Default rate = 1 Hz
  - Keyword oriented (no device names)
  - Server = “**GLOBALS**” (in the given context).
  - Attempts to attach() to e.g. “/context/GLOBALS[BeamCurrent]” are coerced into listening for globals multicast !
    - ‘receive()’ (java) or recvNetGlobal() (C) are the preferred API methods.
    - n.b. any server can ‘produce’ data via ‘sendNetGlobal()’.



# Network Globals

## Utilities and Viewers :

**Globals Database Manager**

Options Configuration Options Target

Record Browsing (Archive Server Direct Access)

Archive Server  
PETRA

Database Entries (dbl-click to enable/disable)

- [ 1] GlobalsCollector/Keyword : BeamPermissionText
- [ 2] GlobalsCollector/Keyword : MachineStateText
- [ 3] GlobalsCollector/Keyword : MachineTypeText
- [ 4] GlobalsCollector/Keyword : ParticleTypeText
- [ 5] GlobalsCollector/Keyword : MessageText
- [ 6] GlobalsCollector/Keyword : BeamPermission
- [ 7] GlobalsCollector/Keyword : MachineState
- [ 8] GlobalsCollector/Keyword : MachineType
- [ 9] GlobalsCollector/Keyword : ParticleType
- [10] GlobalsCollector/Keyword : Energy
- [11] Idc/Buffer-0 : 1
- [13] STATE/#0 : DECLSTATE
- [14] GlobalsCollector/Keyword : MagnetCurrentPermissionText
- [15] GlobalsCollector/Keyword : MagnetCurrentPermission
- [18] GlobalsCollector/Keyword : MachineFileName
- [19] GlobalsCollector/Keyword : StateReadiness
- [20] GlobalsCollector/Keyword : StateReadinessText
- [21] GlobalsCollector/Keyword : Optic
- [22] GlobalsCollector/Keyword : BeamLifetime
- [23] GlobalsCollector/Keyword : FastOrbitFeedbackStatus
- [24] GlobalsCollector/Keyword : FastOrbitFeedbackStatusText
- [25] GlobalsCollector/Keyword : NumberOfBunches
- [26] GlobalsCollector/Keyword : OrbitRMSX
- [27] GlobalsCollector/Keyword : OrbitRMSY
- [28] GlobalsCollector/Keyword : SlowOrbitFeedbackStatus
- [29] GlobalsCollector/Keyword : SlowOrbitFeedbackStatusText
- [30] GlobalsCollector/Keyword : TopUpStatus
- [31] GlobalsCollector/Keyword : TopUpStatusText

Assigned Keywords  
Device Context  
PETRA

Device Property  
TopUpStatusText

Clone Add

Data Output List (s  
TopUpStatusText

Keyword	Data Format	Size	Units	Max	Min	Tolerance	Plot Style
TopUpStatusText	NAME64	1	none	100	0	1	LIN

Offset: 0, Scale: 1, Description: , Subsystem: Diagnostics

Is Global Keyword

Add/Edit Remove

**PETRA Globals**

Context Help

Keyword	Value
BeamPermText	Vorhanden
MachineStateText	Betrieb->Kontrollraum
MachineTypeText	PETRA
ParticleTypeText	Positronen
MessageText	
BeamPerm	1
MachineState	102
MachineType	3
ParticleType	2
Energy	6.0835114
BeamCurrent	21.450420379638672
DeclaredState	User Mode controlroom (e+)
MagCurrPermText	Vorhanden
MagCurrPerm	1
MachineFile	Positronen-Betrieb->Experimente 2011-09-30T13:27
StateReadiness	2
StateReadinessText	Bereit
Optic	p3 20wig
BeamLifetime	10.845273971557617
FastOrbitFBStatus	2
FastOrbitFBStatusText	Aus
NumberOfBunches	60
OrbitRMSX	72.58274044040844
OrbitRMSY	78.77661613544825
SlowOrbitFBStatus	2
SlowOrbitFBStatusText	Aus
TopUpStatus	2
TopUpStatusText	Ohne Top-Up
Globals Time	04.10.11 17:39:12.987 CEST

# TIME Synchronization



# TIME Synchronization

- Server “/SITE/**TIMESRV**” multicasts the **reference time** at 1 Hz.
- A server automatically **syncs** to this incoming time (*if available*)
  - *Does NOT adjust local clock !*
  - Applies an **offset** to the current clock when applying data timestamps or log entries.
  - **5 consecutive updates** must give a consistent offset !
    - Considers both jumps and slopes in various NTP correction strategies which might be running in parallel.
  - Offset must be **> 100 msec**.
- Note:
  - a server schedules activity *based on its clock*
  - a client accepts or rejects incoming data *based on its timestamp* (among other things).

# Central Logger



# Central Logger

- Server “/SITE/CLOG” is happily logging entries sent its way from any **context** on site.
  - API: `clslog()` will send a log entry to the central logger (see <http://tine.desy.de>) for details.
  - Event Server automatically logs incoming events
  - Watchdog automatically logs restarts
  - *Not seeing much action at the moment ....*

Context	Tag	Logger	Text	Priorität	Status
DORIS	Services	EVENTSTORE	DOTRCRFSR.1 : TRIGGER dotrcrfsr (set nr 2)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	PE_SL_TRANSMITTR : TRIGGER mhf_sl1cav_trc (set nr 3)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	PE_SL_TRANSMITTR : TRIGGER mhf_sl1cav_trc (set nr 3)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
FLASH	Services	EVENTSTORE	KLY6ARC.2 : TRIGGER kly6_hv (set nr 13)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	PE_SL_TRANSMITTR : TRIGGER mhf_sl1cav_trc (set nr 3)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
DORIS	Services	EVENTSTORE	DOTRCRFSR.1 : TRIGGER dotrcrfsr (set nr 2)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
DORIS	Services	EVENTSTORE	DOTRCRFC.1 : TRIGGER dotrcrfc (set nr 5)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
DORIS	Services	EVENTSTORE	DOTRCRFNL.1 : TRIGGER dotrcrfnl (set nr 3)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
SERVICE	HASP05VIL	Watchdog	stopping all processes	CLOG_PRIORITY_NONE	CLOG_STATUS_NONE
SERVICE	HASP05VIL	Watchdog	CDI-Server stopped.	CLOG_PRIORITY_NONE	CLOG_STATUS_NONE
SERVICE	HASP05VIL	Watchdog	See: <a href="file:///M:HASP05VIL/Controls\Log\SCR_10_04_14_33.bmp">screen shot</a>	CLOG_PRIORITY_NONE	CLOG_STATUS_NONE
DORIS	Services	EVENTSTORE	DOTRCRFC.1 : TRIGGER dotrcrfc (set nr 5)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
DORIS	Services	EVENTSTORE	DOTRCRFSR.1 : TRIGGER dotrcrfsr (set nr 2)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
DORIS	Services	EVENTSTORE	DOTRCRFNL.1 : TRIGGER dotrcrfnl (set nr 3)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	PE_SR_Control : TRIGGER mhf_sr1cav_err (set nr 11)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	PE_SL_Control : TRIGGER mhf_sl1cav_err (set nr 9)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN
PETRA	Services	EVENTSTORE	LBRESRV : TRIGGER bpm_intlk (set nr 16)	CLOG_PRIORITY_IMPORTANT	CLOG_STATUS_WARN

# Alarm System



# Alarm System

- Alarms
  - Belong to a *registered device* !
  - Defined by: */context/server/device* + **alarm code** + **starttime**
  - Have a *history*
    - Tagged as '*new*', '*transient*', '*oscillating*', '*data changed*', '*heartbeat*', '*terminated*'.
  - Have '*static*' information defined by alarm code
    - alarm tag, various descriptive texts, url, severity, data format
  - Have '*dynamic*' information
    - descriptor, alarm time, alarm start time, alarm data
  - **Alarm Message**: *dynamic part* + cross-reference to *static part*.

# Alarm System

- e.g. a magnet alarm :

*static* information:

Property	Value
Alarm System	Magnete
Device Server	Mag.Main-EW1
Alarm Device	ME005
Device Text	HauptMagnet
FEC Name	PEMAG-EWEG1
Host Address	131.169.151.169
HostName	acclxpepwreweg1.desy.de
Location	bldg 20 rm MKKHausEG N1-6-R7 (R)
Alarm Text	PS IST-SOLL : Warnung
Severity	4
Alarm Data Text	Ist-Soll Amps
Alarm Tag	PS IST-SOLL WARNUNG
URL	
Code	524
Format	5
Dimension	1
Mask	0

Alarm Descriptor	Alarm Time	Duration
Data Changed Terminated	13:08:29.124 - Oct 05 CEST	34 sec
Data Changed	13:07:58.999 - Oct 05 CEST	4 sec
New	13:07:54.941 - Oct 05 CEST	4 sec
Data Changed Terminated	12:51:13.763 - Oct 05 CEST	38 sec
Data Changed	12:50:39.818 - Oct 05 CEST	4 sec
New	12:50:35.795 - Oct 05 CEST	4 sec
Data Changed Terminated	12:50:23.707 - Oct 05 CEST	39 sec
Data Changed	12:49:48.291 - Oct 05 CEST	4 sec
New	12:49:44.211 - Oct 05 CEST	4 sec

**Alarm Data: Ist-Soll Amps**  
-22.208591

Set Alarm Definition      Close

*dynamic* information:



# Alarm System

- *static* alarm definitions:
  - Given by alarms.csv (or fec.xml or via API)
  - Can be edited 'on-the-fly'
    - > but changes are volatile !
  - Best to leave '*alarm system*' = 0  
(signals the CAS to apply the alarm system registered for the server issuing the alarm).

**Edit Alarm Definition**

Any editorial changes will be lost upon the next server restart. Please notify the responsible parties if your edits need to be made permanent!

<b>Context</b> PETRA	<b>System</b> Magnete
<b>Server</b> Mag.Main-EXM	<b>Format</b> INT32
<b>Data Size</b> 1	<b>Severity</b> 13
<b>Alarm Code</b> 532	<b>Mask</b> 0
<b>Tag</b> > N PS ALARMS	<b>Text</b> > 6 PS ALARMS
<b>Device Text</b> HauptMagnet	<b>Data Text</b> Num. PS Alarms
<b>URL</b> 	

**Add** **Close**

# Alarm System

- Alarm Code:
  - Systematic TINE error codes < 512
    - e.g. `hardware_error` = 79
    - Have default severity (most have '8')
    - Have default alarm system = 0
  - User defined 512 and above (require corresponding static alarm definition in order to apply non-zero severity).
- Alarm System Numbers :
  - No particular systematics used
  - Alarm system 'tags' are more relevant in displays
  - e.g. alarm system 100 = 'Magnets'
- Alarm Severity:
  - 0 = none -> do not display
  - 1 -> 3 = information
  - 4 -> 7 = warning
  - 8 -> 11 = error
  - 12 -> 14 = impending doom
  - 15 = operations not possible
- Alarm Data:
  - 64 bytes to include 'other relevant information'

# Alarm System

Only set to non-zero if setting alarms in another category than the server !

Java Instant Client

File Options Data Access Monitor Options Debug Options Help

Device Context: PETRA Device Subsystem: ALL Show Stock Properties

Device Server: BPM Device Name: BPM\_SWR\_13 Device Property: ALMDEFS

Data Size: 48 Data Type: STRUCT [AD5r4] Defined Alarm Descriptions Timeout

/PETRA/BPM/BPM\_SWR\_13 ALMDEFS @ 18:26:26.52

```
(0,0) [almTag] ->interlock
(0,1) [almCode] -> 543
(0,2) [almMask] -> 0
(0,3) [almSystem] -> 0
(0,4) [almSeverity] -> 1
(0,5) [almDataFormat] -> -1
(0,6) [almDataArraySize] -> 0
(0,7) [almOscWindow] -> 8
(0,8) [almOscPinned] -> 0
(0,9) [alarmText] ->alarm interlocked
(0,10) [deviceText] ->libera module
(0,11) [dataText] ->not supplied
(0,12) [url] ->not supplied
```

Buttons: Poll, Draw Mode, Log Scale, History, Suggest Decorations

Low severity => informational

No data

Useful reference to "further information"

# Alarm System

- Every server has a *Local Alarm System*
  - Does *nothing* unless:
    - Alarms are *defined* (see alarms.csv, fec.xml, or API call, or code < 512)
      - code, severity, tag, + ...
    - Alarms are *set* (and cleared)
      - via API : setAlarm(), clearAlarm() (terminateAlarm())
      - via alarm watch table (see almwatch.csv, fec.xml, or API call)
      - Special cases: Link error alarms, disk space alarms
  - *Manages* the local alarm list to first order
    - Sets the alarm 'descriptor' bits
      - *'new', 'heartbeat', 'oscillating', 'data change', 'transient', 'terminated'*
    - Sets the alarm timestamps (start time, alarm time)
    - Collapses alarm *storms* to a single alarm.
  - *Offers* alarms list to any interested clients (e.g. the CAS)
  - *Clears* alarm list at the Central Alarm Server (CAS) upon start up.

# Alarm System

- Alarm descriptors
  - *'new'* applied to initial entry into the alarm list.
    - *start time* = *alarm time* = time of setAlarm().
  - *'heartbeat'* applied every 20 minutes
    - *alarm time* updated
  - *'oscillating'* applied when a 'cleared' alarm has been reset prior to termination
    - *alarm time* updated
    - Note: clearAlarm() augments a clear counter but by itself does not mark an alarm as terminated
    - *'oscillation window'* (default = 8) gives clear-termination threshold.
  - *'data change'* applied when alarm data have changed
    - *alarm time* updated
    - *'data change window'* (default = 30 sec) gives elapsed time before a new alarm time is applied.

# Alarm System

- Alarm descriptors
  - *'terminated'* applied when the alarm is declared as terminated.
    - **alarm time** = time of termination.
    - clear counter > oscillation window
    - removeAlarm() has been called.
  - *'transient'* applied when setAlarm() declares the alarm as transient.
    - **start time** = **alarm time** = time of setAlarm()
    - *'new'* and *'terminated'* applied simultaneously !
    - does not have a duration !
  - *'test'* (= *'suppress'*) is ignored by the CAS
  - *'disabled'* is set by the CAS

# Alarm System

- setAlarm() strategies (alarm system managed):

Let the system check for oscillating alarms !

```
public void update()
{
    clearAlarms();
    int[] v = new int[numberValues];
    getReadbackValues(v);
    for (int i = 0; i < numberValues; i++)
    {
        if (v[i] > numberThreshold) setAlarm(512,v[i]);
    }
}
```

clear all alarms at start of update cycle

get the new data

set alarm if necessary

- setAlarm() strategies (user managed):

'remove' marks an alarm for termination immediately !

```
public void update()
{
    int[] v = new int[numberValues];
    getReadbackValues(v);
    for (int i = 0; i < numberValues; i++)
    {
        if (v[i] <= numberThreshold)
        {
            removeAlarm(512);
        }
        else
        {
            setAlarm(512,v[i]);
        }
    }
}
```

get the new data

either remove alarm

or set alarm

# Alarm System

- Automatic Alarms: *Alarm Watch Table*
  - *Monitors* a specific *property* via a local call to the associated equipment module.
  - *Checks* readback value against low and high *thresholds*
    - *value\_too\_high, value\_too\_low*
  - *or Checks* a readback value against a valid *pattern*
    - *invalid\_data*
  - Supply monitor parameters via *almwatch.csv, fec.xml*, or *API*.
    - Can supply '*on-the-fly*' (but new information is volatile).
  - All 'setAlarm()' and 'clearAlarm()' logic is done for you.



# Alarm System

Alarm Viewer: PETRA

File View Options Navigate Help

Context

- Acknowledge Selected Locally
- Acknowledge All Locally
- Unacknowledge Selected Locally
- Unacknowledge All Locally
- Add To Watch Table...
- Open Filter Dialog...
- Suspend Display
- Show Active Alarms Only
- Collapse Equal Alarms
- Collapse Alarms Events
- Show Hidden Systems
- Select Alarm Systems
- Sound Notifications (local)
- Test Sound (local)

System	Device Name	Message
Magnete	D	PS IST-SOLL WARNUNG
Magnete	QD	PS IST-SOLL WARNUNG
Magnete	QF	PS IST-SOLL WARNUNG
Magnete	PDA	PS IST-SOLL WARNUNG
Magnete	Main-NO1	> N PS ALARMS
Magnete	QA5_OL_62	PS IST-SOLL WARNUNG
Magnete	QB2_OL_125	PS IST-SOLL WARNUNG
Magnete	QB2_OL_116	PS IST-SOLL WARNUNG
Magnete	Main-EXM	> N PS ALARMS

13:50:02: Alarms loaded.

Add To Alarm Watch Table

**Any editorial changes will be lost upon the next server restart. Please notify the responsible parties if your edits need to be made permanent!**

Context: PETRA

Severity: 7

Server: BPM

Device: BPM\_SWR\_13

Property: Orbit.X

Data Size: 227

Format: FLOAT

Low Threshold: -2000.0

High Threshold: 2000.0

OK Cancel

# Alarm System

- Automatic Alarms:
  - 'link\_error' alarms (middle layer servers).
    - can suppress if desired
- Disk space alarms:
  - 'low\_disk\_space' if given path does not have the registered minimum disk space.
    - Yes, there's an API call.

# Alarm System

- Central Alarm Server (CAS)
  - Uses a *'pull'* strategy to acquire alarms
    - **NOT** a *'push'* strategy from the server!
  - Has a *configuration database* giving which servers to listen to.
    - A server knows if the CAS is listening to it !
    - Servers 'clear' their alarm lists at the CAS when the start up.
      - `/context/CAS/server + "REMOVEALARMS"`
  - Can take *'actions'* upon specific alarms
    - Trigger events
    - Send emails (SMS)
- Alarms pulled via stock properties `"NALARMS"` and `"ALARMS"`

# Alarm System

- “NALARMS”
  - Provides a ‘snapshot’ of the current alarm situation at the server.

The screenshot shows the Java Instant Client interface. The configuration is set to Device Context: PETRA, Device Subsystem: ALL, Device Server: PEVAC-NW.CDI, Device Name: \*, and Device Property: NALARMS. The Data Size is 5 and Data Type is INT32. The current alarm list is displayed as follows:

Index	Alarm ID	Severity
(0,0)	40	40
(0,1)	1317833082	40
(0,2)	8	40
(0,3)	18	40
(0,4)	40	40

Annotations and their corresponding data points:

- Acquire info for all devices: Points to the Device Name field containing '\*'.
  - There are 40 alarms in the list: Points to the first row of the alarm list.
  - Most recent alarm time stamp: Points to the value 1317833082 in the second row.
  - Highest alarm severity in the list: Points to the value 40 in the third row.
  - 18 alarms have the most recent alarm time: Points to the value 18 in the fourth row.
  - 40 alarms have the highest severity: Points to the value 40 in the fifth row.

# Alarm System

- “ALARMS”
  - Can provide range as input (default = all alarm times)
  - And minimum severity as input (default = 0)

The screenshot shows the Java Instant Client interface. The main window title is "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

Configuration fields include:

- Device Context: PETRA
- Device Subsystem: ALL
- Device Server: PEVAC-NW.CDI
- Device Name: \*
- Device Property: ALARMS
- Data Size: 512
- Data Type: STRUCT
- Timeout: 1000

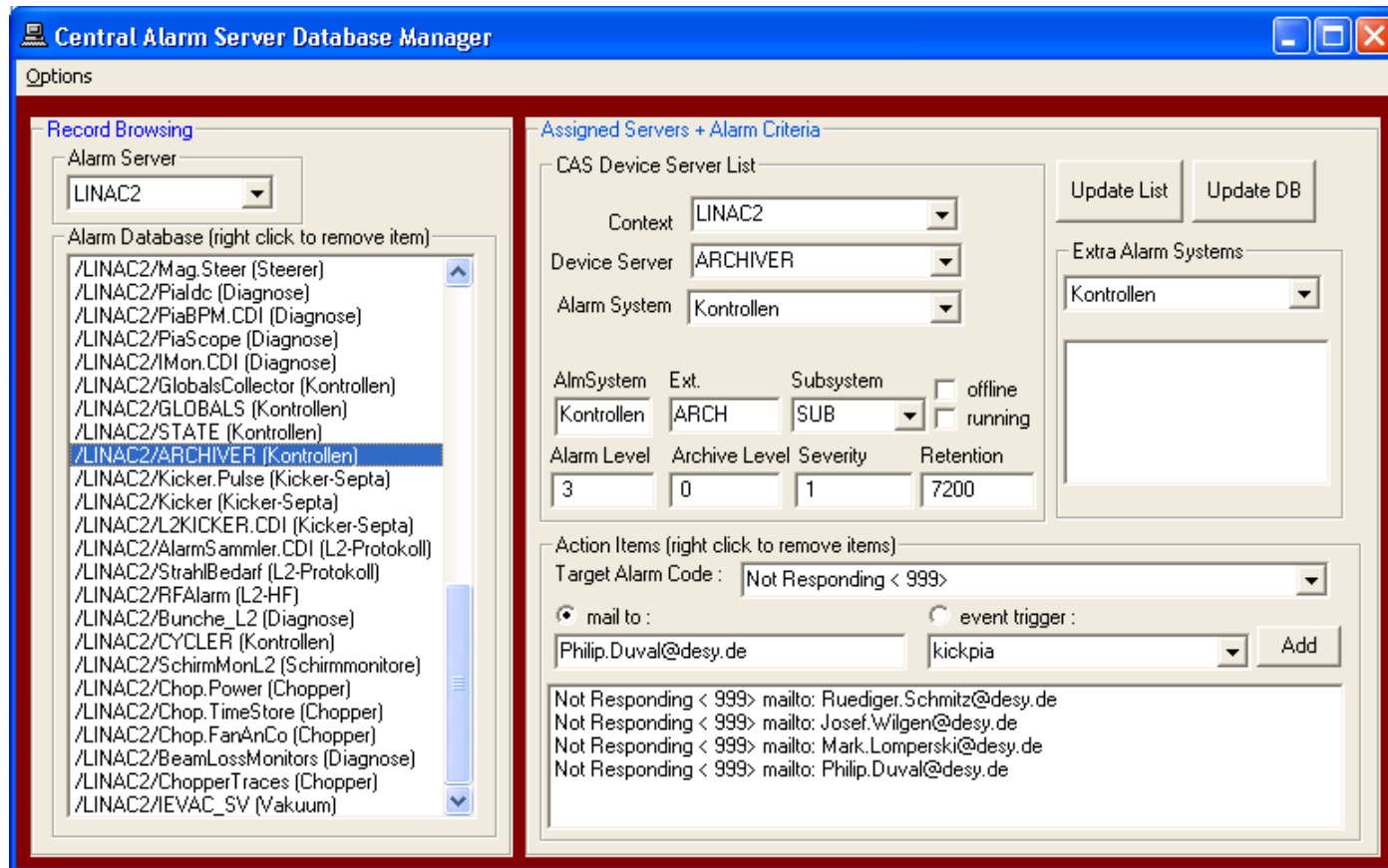
The main display area shows the title "/PETRA/PEVAC-NW.CDI/\* ALARMS @ 18:53:57.861" and a list of alarm data:

```
(0,0) [server] ->PEVAC-NW.CDI
(0,1) [device] ->INTLK-NW.status
(0,2) [almTag] ->Hardware error
(0,3) [almCode] -> 34
(0,4) [almTime] -> 1317833341
(0,5) [almMask] -> 0
(0,6) [almData] -> 67,65,78,80,69,65
(0,7) [almDataFormat] -> 4
(0,8) [almDataLen] -> 64
(0,9) [almSeverity] -> 8
(0,10) [almDescriptor] -> 6
(0,11) [almSystem] -> 0
```

Control buttons include "Read", "Poll", "Draw Mode" (set to "Textbox"), "Autoscale" (checked), "Log Scale" (unchecked), "History" (unchecked), "Suggest Decorations" (checked), and "Input Pane" (unchecked).

# Alarm System

- Database manager:





# Alarm System

Alarm Viewer: PETRA

File View Options **Navigate** Help

Content

Acknowledge Selected Locally  
 Acknowledge All Locally  
 Unacknowledge Selected Locally  
 Unacknowledge All Locally  
 Add To Watch Table...  
 Open Filter Dialog...  
 Suspend Display  
 Show Active Alarms Only  
 Collapse Equal Alarms  
 Collapse Alarms Events  
 Show Hidden Systems  
 Select Alarm Systems  
 Sound Notifications (local)  
 Test Sound (local)

Error	Warning	Alarm Display			
0	42	<input checked="" type="radio"/> Live	<input type="radio"/> Archive		
>= 0 Selected/Total No. of Alarms: 42/42 Active Alarms Only (3 Disabled)					
0	0	Kicker-Septa	0 0 0	Kontrollen	0 0 1
0	0	Orbit Feedback	0 0 0	Front-End	0 0 20
0	0	Feedback	0 0 0	Diagnose	2 0 0 1
0	0	PIT	0 0 0	Interlock	0 0 0
0	0	Timing/TopUp	0 0 0	Strahlung	0 0 0
0	0	Machine Prot.	0 0 0	Vakuum	1 0 0 20
0	0	Kolli./Scraper	0 0 0	Undulatoren	0 0 0
				Schirmmonitore	0 0 0

System	Device Name	Message	Sev	Alarm Descriptor	Alarm Time	Duration
Vakuum	INTLK-NW.status	Hardware error	8	Heartbeat Oscillating	22:29:13.472 - Oct 05 CE...	469.0 hr
Front-End	INTLK-NW.status	Hardware error	8	Heartbeat Oscillating	22:29:13.472 - Oct 05 CE...	469.0 hr
Kontrollen	PiloEW.CDI	Not Responding	3	Heartbeat	22:25:57.000 - Oct 05 CE...	222.1 hr
Diagnose	PiloEW.CDI	Not Responding	3	Heartbeat	22:25:57.000 - Oct 05 CE...	222.1 hr
Vakuum	NWR3_6.RdStatus	Hardware error	8	Heartbeat Oscillating	22:24:53.569 - Oct 05 CE...	397.0 hr
Vakuum	NWR5_8.RdStatus	Hardware error	8	Heartbeat Oscillating	22:24:53.569 - Oct 05 CE...	397.0 hr
Vakuum	NWR9_8.RdStatus	Hardware error	8	Heartbeat Oscillating	22:24:53.569 - Oct 05 CE...	397.0 hr
Vakuum	NWR11_8.RdStatus	Hardware error	8	Heartbeat Oscillating	22:24:53.569 - Oct 05 CE...	397.0 hr
Vakuum	NWR15_1.RdStatus	Hardware error	8	Heartbeat Oscillating	22:24:53.569 - Oct 05 CE...	397.0 hr

18:45:07: Alarms loaded.



# Alarm System

## Alarm Analysis

Alarm Analysis

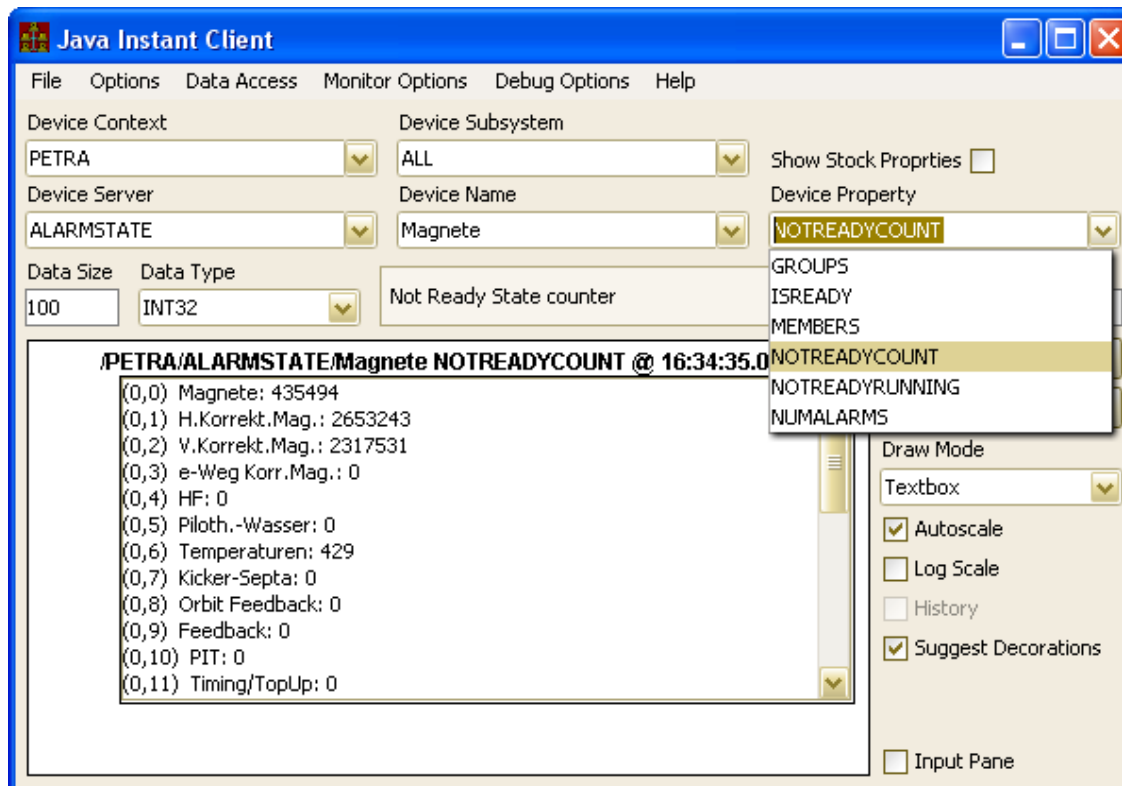
Order By:  Device  Server  Code  Severity

#	Device	Server	Code	Sever...	Tag	Al. Data	Al. Data Text	Descriptor	St Time	Duration
0	D	Mag.Main-NO1	523	9	PS IST-SOLL ...	-3.0945296	Ist-Soll Amps	Terminated	10:39:52.404 ...	7 sec
1	- -	- -	- -	- -	PS IST-SOLL ...	-592.02563	Ist-Soll Amps	Data Change...	10:49:36.639 ...	11 sec
2	- -	- -	524	4	PS IST-SOLL ...	41.684597	Ist-Soll Amps	Terminated	07:01:28.390 ...	7 sec
3	- -	- -	- -	- -	PS IST-SOLL ...	50.35477	Ist-Soll Amps	Terminated	07:01:58.708 ...	8 sec
4	- -	- -	- -	- -	PS IST-SOLL ...	-0.65918976	Ist-Soll Amps	Data Change...	10:39:54.427 ...	16 sec
5	- -	- -	- -	- -	PS IST-SOLL ...	-50.006866	Ist-Soll Amps	Terminated	10:43:07.417 ...	6 sec
6	- -	- -	- -	- -	PS IST-SOLL ...	50.18082	Ist-Soll Amps	Terminated	10:44:04.046 ...	7 sec
7	- -	- -	- -	- -	PS IST-SOLL ...	-50.492104	Ist-Soll Amps	Terminated	10:45:00.709 ...	7 sec
8	- -	- -	- -	- -	PS IST-SOLL ...	39.972534	Ist-Soll Amps	Terminated	10:45:18.924 ...	6 sec
9	- -	- -	- -	- -	PS IST-SOLL ...	51.151295	Ist-Soll Amps	Terminated	10:45:56.277 ...	8 sec
10	- -	- -	- -	- -	PS IST-SOLL ...	-40.99794	Ist-Soll Amps	Terminated	10:46:21.547 ...	6 sec
11	- -	- -	- -	- -	PS IST-SOLL ...	-51.14214	Ist-Soll Amps	Terminated	10:47:00.959 ...	7 sec
12	- -	- -	- -	- -	PS IST-SOLL ...	49.70474	Ist-Soll Amps	Terminated	10:48:33.942 ...	6 sec
13	- -	- -	- -	- -	PS IST-SOLL ...	-52.030212	Ist-Soll Amps	Terminated	10:48:57.238 ...	7 sec
14	- -	- -	- -	- -	PS IST-SOLL ...	51.050583	Ist-Soll Amps	Terminated	10:50:40.426 ...	7 sec
15	- -	- -	- -	- -	PS IST-SOLL ...	-51.508354	Ist-Soll Amps	Terminated	10:51:44.148 ...	7 sec
16	- -	- -	- -	- -	PS IST-SOLL ...	38.4802	Ist-Soll Amps	Terminated	10:52:08.433 ...	7 sec
17	- -	- -	- -	- -	PS IST-SOLL ...	48.28565	Ist-Soll Amps	Terminated	10:52:48.890 ...	6 sec
18	- -	- -	- -	- -	PS IST-SOLL ...	-41.37331	Ist-Soll Amps	Data Change...	10:55:41.961 ...	12 sec
19	IME186	Mag.Main-EW2	519	13	PS AUS FEHL...	5263360; 103...	Status: Gesamt, PSC, Reg1, Reg2	Data Change...	10:16:51.669 ...	13 sec
20	- -	- -	524	4	PS IST-SOLL ...	75.73816	Ist-Soll Amps	Terminated	07:05:27.783 ...	6 sec
21	- -	- -	- -	- -	PS IST-SOLL ...	-92.17213	Ist-Soll Amps	Terminated	10:41:20.226 ...	7 sec
22	- -	- -	- -	- -	PS IST-SOLL ...	91.32525	Ist-Soll Amps	Terminated	10:42:09.772 ...	8 sec
23	ME005	Mag.Main-EW1	- -	- -	PS IST-SOLL ...	22.255589	Ist-Soll Amps	Data Change...	07:05:02.587 ...	35 sec
24	- -	- -	- -	- -	PS IST-SOLL ...	-22.717022	Ist-Soll Amps	Data Change...	10:40:47.575 ...	39 sec
25	- -	- -	- -	- -	PS IST-SOLL ...	22.35813	Ist-Soll Amps	Data Change...	10:41:38.099 ...	39 sec
26	- -	- -	- -	- -	PS IST-SOLL ...	-22.49485	Ist-Soll Amps	Data Change...	10:55:17.294 ...	37 sec
27	- -	- -	526	- -	PS EIN : WAR...	53512; 13421...	Status: Gesamt, PSC, Reg1, Reg2	Data Change...	10:31:43.660 ...	8.2 min
28	ME163	Mag.Main-EW2	519	13	PS AUS FEHL...	5263360; 103...	Status: Gesamt, PSC, Reg1, Reg2	Terminated	10:16:51.669 ...	10 sec
29	- -	- -	524	4	PS IST-SOLL ...	-88.78462	Ist-Soll Amps	Terminated	10:41:20.226 ...	8 sec
30	- -	- -	- -	- -	PS IST-SOLL ...	87.47997	Ist-Soll Amps	Terminated	10:42:09.772 ...	9 sec
31	- -	- -	- -	- -	PS IST-SOLL ...	-1.9455254	Ist-Soll Amps	Data Change...	10:42:19.854 ...	13 sec
32	Main-W	Mag.Main-W	532	13	> N PS ALAR...	6	Num. PS Alarms	Heartbeat Dat...	07:02:20.178 ...	3.1 hr
33	Main-SL	Mag.Main-SL	- -	- -	> N PS ALAR...	9	Num. PS Alarms	Heartbeat Dat...	07:02:20.828 ...	3.1 hr
34	Main-O	Mag.Main-O	- -	- -	> N PS ALAR...	7	Num. PS Alarms	Heartbeat Dat...	07:02:21.900 ...	3.1 hr
35	- -	- -	- -	- -	> N PS ALAR...	8	Num. PS Alarms	Terminated	10:45:13.381 ...	13 sec
36	Main-NL	Mag.Main-NL	- -	- -	> N PS ALAR...	9	Num. PS Alarms	Heartbeat Dat...	07:02:21.787 ...	3.2 hr
37	Main-NO1	Mag.Main-NO1	- -	- -	> N PS ALAR...	6	Num. PS Alarms	Data Change...	07:01:29.401 ...	35 sec
38	- -	- -	- -	- -	> N PS ALAR...	17	Num. PS Alarms	Heartbeat Dat...	07:02:12.853 ...	1.2 hr
39	- -	- -	- -	- -	> N PS ALAR...	17	Num. PS Alarms	New Terminat...	08:15:48.583 ...	49 sec
40	- -	- -	- -	- -	> N PS ALAR...	9	Num. PS Alarms	Heartbeat Dat...	08:17:08.526 ...	1.9 hr

Refresh Save Close

# Alarm System

- Availability
  - server : “/<context>/ALARMSTATE”
  - monitor *fatal alarms* for all alarm systems from CAS.
  - At least 1 alarm => system *NOT AVAILABLE*



# Archive System



# Archive System

- **Central Archive** (2 processes)
  - “ARCHIVER” : Netmex Gateway / Archiver
  - “HISTORY” : archive retriever / viewer configurations
  - data always available
  - many filter options to reduce unnecessary data storage
  - ‘*property*’ server
- **Local History** (server sub system)
  - *short term* storage (ring buffer with defined depth)
  - *long term* storage (stored on disk with defined depth in months)
  - data disappears when ‘*depth*’ is surpassed
    - Can optionally and purposefully ‘*keep*’ data if desired.
  - filter on tolerance only (absolute or relative).
  - ‘*device*’ server
    - history data accessed via <*property*>.HIST meta property

# Archive System

- *Archive Record*
  - Refers to data set take from some *property* and *device(s)*.
  - Make use of multi-channel arrays (MCAs) as often a possible.
    - => *record is an array*
- *Archive Retrieval*
  - Single array *element* or *scalar* over a time range
  - *Entire record* at a specified time.
  - Can Specify
    - *Range* : *start time* to *stop time* (default: now – depth to now)
    - *Array element index* : (default: given by device name)
    - *Raster* : (default: automatic)
      - -> YES, we can return ALL stored data in the doocs manner as well.
    - *Filter* : min value, max value (default: ALL)

# Archive System

- Notes about rastering
  - By default: the *server decides on a raster*
    - Specifying **start** and **stop** times and **buffer size** defines the raster
    - e.g. last 24 hours, 4000 points
  - Lightning fast look ups !
    - Skip through the stored data at the raster points !
    - No data massaging or the like
      - *What was taken is what was stored is what you get !*
  - **Points of Interest** are included in the returned data set if the raster does NOT = 1.
    - *Peaks and dips will appear in the displayed data set !*
    - *(this isn't always perfect).*
  - Archive Viewer uses an '*optical zoom*' approach
    - Any zoom will re-acquire data sets at the new zoom boundaries
    - And will have a smaller raster !

# Archive System

- Central Archive Server
  - Breaks down acquired data records into properties and keywords
    - Data from “/PETRA/SomeServer/#0[ALLDATA]” can be given sensible record names !
    - e.g. “WidgetTemperature”
  - Has a broad and definable range of filters.
  - Registers property aliases referring to originating property call.
    - e.g. “SomeServer.ALLDATA” is a property alias for “WidgetTemperature”
- Has a database manager

# Archive System

Archive Database Manager

File Configurations Options Help

Archive Server: PETRA

Database Entries

Index	Active	Device Server	Device Name	Device Property
596	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell2
597	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell3
598	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell4
599	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell5
600	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell6
601	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell7
602	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell8
603	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell0
604	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell1
605	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell2
606	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell3
607	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell4
608	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell5
609	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell6
610	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell7
611	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell8
612	<input checked="" type="checkbox"/>	Undulator	PU00	Gap
613	<input checked="" type="checkbox"/>	Undulator	PU00	Gap.NAM
614	<input checked="" type="checkbox"/>	Undulator	PU00	Taper
615	<input checked="" type="checkbox"/>	Petra3_P10vil.CDI	BS_0_S_V	P10
616	<input checked="" type="checkbox"/>	Petra3_P10vil.CDI	#0	P10.NAM
617	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_ARV
618	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_ARV.NAM
619	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_MIN
620	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_MAX
621	<input checked="" type="checkbox"/>	TempStrom	#0	Temperature
622	<input checked="" type="checkbox"/>	TempStrom	#0	Temperature.NAM
623	<input checked="" type="checkbox"/>	Petra3_P08vil.CDI	#0	P08
624	<input checked="" type="checkbox"/>	Petra3_P08vil.CDI	#0	P08.NAM
625	<input checked="" type="checkbox"/>	Petra3_P05vil.CDI	#0	P05
626	<input checked="" type="checkbox"/>	Petra3_P03vil.CDI	#0	STELLUNG.NAM

Index: 612 Tweak Edit Clone New Add MCA Names

Device Context: PETRA Device Server: Undulator Device Name: PU00 Access Rate: 1000

Device Property: Gap Array Size: 16 Format: FLOAT Input Format: NULL

Filter

NEVER  ONCE  ALWAYS  FAST

SLOW  FIXTIME  HRT  STATUS

VOLATILE  NOPOI  BEAM  RUNNING

Data Input

Data Output List

Undulator.Gap.Test,FLOAT,1,mm,220.0,9.5,1.0,0.0,LIN,1.0,0.0,Gap Width in mm,,Experiments

Undulator.Gap,FLOAT,15,mm,220.0,9.5,0.01,0.0,LIN,1.0,0.0,Gap Width,,Experiments

Reload DB Write DB



# Archive System

**Archive Database Manager**

File Configurations Options Help

Archive Server: **PETRA**

Database Entries

Index	Active	Device Server	Device Name	Device Property
596	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell2
597	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell3
598	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell4
599	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell5
600	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell6
601	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell7
602	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamXPosDeltaCell8
603	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell0
604	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell1
605	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell2
606	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell3
607	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell4
608	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell5
609	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell6
610	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell7
611	<input checked="" type="checkbox"/>	GlobalsCollector	Keyword	BeamYPosDeltaCell8
612	<input checked="" type="checkbox"/>	Undulator	PU00	Gap
613	<input checked="" type="checkbox"/>	Undulator	PU00	Gap.NAM
614	<input checked="" type="checkbox"/>	Undulator	PU00	Taper
615	<input checked="" type="checkbox"/>	Petra3_P10vii.CDI	BS_0_S_V	P10
616	<input checked="" type="checkbox"/>	Petra3_P10vii.CDI	#0	P10.NAM
617	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_ARV
618	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_ARV.NAM
619	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_MIN
620	<input checked="" type="checkbox"/>	MPU_FEC	#0	Output_MAX
621	<input checked="" type="checkbox"/>	TempStrom	#0	Temperature
622	<input checked="" type="checkbox"/>	TempStrom	#0	Temperature.NAM
623	<input checked="" type="checkbox"/>	Petra3_P08vii.CDI	#0	P08
624	<input checked="" type="checkbox"/>	Petra3_P08vii.CDI	#0	P08.NAM
625	<input checked="" type="checkbox"/>	Petra3_P05vii.CDI	#0	P05
626	<input checked="" type="checkbox"/>	Petra3_P03vii.CDI	#0	STELLUNG.NAM

Index: **623**

Apply Cancel

Device Context: **HASYLAB** Device Server: **Petra3\_P08vii.CD** Device Name: **#0** Access Rate: **1000**

Device Property: **P08** Array Size: **107** Format: **INT 16** Input Format: **NULL**

Filter

NEVER  ONCE  ALWAYS  FAST

SLOW  FIXTIME  HRT  STATUS

VOLATILE  NOPOI  BEAM  RUNNING

Data Input

Data Output List

P08.Misc.INT 16,106,none,100.0,0.0,0.9,0.0,LIN,1.0,0.0,Misc,,Experiments

P08.Misc.Watch,INT 16,1,none,100.0,0.0,1.0,0.0,LIN,1.0,0.0,Misc - Watch Device,,Experiment

Maximum size: **107** Remaining size: **0**

Keyword	Data Format	Size	Units	Max	Min
P08.Misc.Watch	INT 16	1	none	100.0	0.0

Abs. Tolerance: **1.0** Rel. Tolerance: **0.0** Plot Style: **LIN** Offset: **0.0** Scale: **1.0**

Description: **Misc - Watch Device** Subsystem: **Experiments** Associate:

Bind To:  Apply Add Remove

Reload DB Write DB

# Archive System

Archive Database Manager

File Configurations Options Help

Archive Server: DESY3

Database Entries

Index	Active	Device Server	Device Name	Device Property
1	<input type="checkbox"/>	D3IDC	#0	StromScaled
2	<input type="checkbox"/>	D3IDC	#0	Strom
3	<input type="checkbox"/>	DESY3	DESY3	RD_ARCHIV
4	<input type="checkbox"/>	IPLVAC	#0	PRESSURE
5	<input type="checkbox"/>	IPLVAC	#0	DEVICES
15	<input type="checkbox"/>	D3IDC	#0	StromScaled
49	<input type="checkbox"/>	D3Beam	#0	D3OrbitDelay
50	<input type="checkbox"/>	D3Beam	#0	D3OrbitDelay.X
51	<input type="checkbox"/>	D3Beam	#0	D3OrbitDelay.Y
52	<input type="checkbox"/>	D3Beam	#0	D3OrbitEject.X
53	<input type="checkbox"/>	D3Beam	#0	D3OrbitEject.Y
54	<input type="checkbox"/>	D3Beam	#0	D3OrbitInject.X
55	<input type="checkbox"/>	D3Beam	#0	D3OrbitInject.Y
63	<input type="checkbox"/>	D3Beam	#0	D3TrimDelay
64	<input type="checkbox"/>	D3Beam	#0	D3ZyklusIst
65	<input type="checkbox"/>	D3Beam	#0	D3OrbitdP_P
66	<input type="checkbox"/>	D3Beam	#0	D3OrbitMean.X
67	<input type="checkbox"/>	D3Beam	#0	D3OrbitMean.Y
68	<input type="checkbox"/>	D3Beam	#0	D3OrbitRMS.X
69	<input type="checkbox"/>	D3Beam	#0	D3OrbitRMS.Y
74	<input type="checkbox"/>	D3Beam	#0	D3ITopBottom
75	<input type="checkbox"/>	D3Beam	#0	D3I
76	<input type="checkbox"/>	D3Beam	#0	D3IScaled
87	<input type="checkbox"/>	DESY3DIPOLE	D3VME	GETENERGY
88	<input type="checkbox"/>	DESY3DIPOLE	D3VME	GETMOMENTUM
105	<input type="checkbox"/>	D3Beam	#0	D3Seki.NAM
106	<input type="checkbox"/>	D3Beam	#0	D3SekiSoll
107	<input type="checkbox"/>	D3Beam	#0	D3SekiDelay
153	<input type="checkbox"/>	D3TVDATA	#0	MODUS
157	<input type="checkbox"/>	MKKINFRASTRUCT2	D3TraegerTemp	D3TraegerT
158	<input type="checkbox"/>	MKKINFRASTRUCT2	D3TraegerTemp	D3TraegerT.NAM

Index: 3   Tweak   Edit   Clone   New   Add MCA Names

Device Context: DESY3   Device Server: DESY3   Device Name: DESY3   Access Rate: 1000

Device Property: RD\_ARCHIV   Array Size: 25   Format: FLOAT   Input Format: NULL

Filter

NEVER    ONCE    ALWAYS    FAST

SLOW    FIXTIME    HRT    STATUS

VOLATILE    NOPOI

Data Input

Data Output List

```
D3RFVacVoltage,FLOAT,1,kV,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFVacLogI,FLOAT,1,A,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFCavTemp,FLOAT,6,'C,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFPowerFwd,FLOAT,1,kW,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFPowerRef,FLOAT,1,W,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFCathode_I,FLOAT,1,A,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFGitter_I,FLOAT,1,mA,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFAnode_I,FLOAT,1,A,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFAnode_V,FLOAT,1,kV,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFPreAmpOut,FLOAT,1,mV,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFEndStufeOut,FLOAT,1,V,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFDeltaPhase,FLOAT,1,Grad,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFShold,FLOAT,3,kV,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFPulseDelay,FLOAT,2,ms,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFStatus,FLOAT,1,none,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
D3RFReserved,FLOAT,2,none,100.0,0.0,5.0,0.0,LIN,1.0,0.0,,,RF
```

Reload DB   Write DB

# Archive System

## Archive Filters

**Archive Database Manager**

File Configurations Options Help

Archive Server: PETRA

Database Entries

Index	Active	Device Server	Device
60	<input checked="" type="checkbox"/>	Cms.PsGroup	EwCorr
61	<input checked="" type="checkbox"/>	Cms.PsGroup	EwCorr
62	<input checked="" type="checkbox"/>	Cms.PsGroup	EwCorr
63	<input checked="" type="checkbox"/>	Cms.PsGroup	EwCorr
64	<input checked="" type="checkbox"/>	Cms.PsGroup	EwMain
65	<input checked="" type="checkbox"/>	Cms.PsGroup	EwMain
66	<input checked="" type="checkbox"/>	Cms.PsGroup	EwMain
67	<input checked="" type="checkbox"/>	Cms.PsGroup	EwMain
67	<input checked="" type="checkbox"/>	Cms.PsGroup	Strom.Imms
67	<input checked="" type="checkbox"/>	Cms.PsGroup	Strom.Soil
74	<input checked="" type="checkbox"/>	NEG.ABSCHNITTE	#0 GpDruck.NAM
75	<input checked="" type="checkbox"/>	NEG.ABSCHNITTE	#0 GpDruck
76	<input checked="" type="checkbox"/>	NEG.STROMKREISE	#0 CAct.NAM
77	<input checked="" type="checkbox"/>	NEG.STROMKREISE	#0 CAct
78	<input checked="" type="checkbox"/>	NEG.STROMKREISE	#0 VAct
79	<input checked="" type="checkbox"/>	TurboPumpen	#0 DEVICES
80	<input checked="" type="checkbox"/>	TurboPumpen	#0 DRUCK
81	<input checked="" type="checkbox"/>	LBRENV.RPT	BPM_SWR_13 SA_X
82	<input checked="" type="checkbox"/>	LBRENV.RPT	BPM_SWR_13 SA_Y
83	<input checked="" type="checkbox"/>	LBRENV.RPT	#0 DEVICES
84	<input checked="" type="checkbox"/>	TermoLogger	#0 TERMOLOG_ARRAY
85	<input checked="" type="checkbox"/>	TermoLogger	#0 DEVICES
86	<input checked="" type="checkbox"/>	VAC.ION_PUMP	SEK.* P.MEAN
87	<input checked="" type="checkbox"/>	VAC.ION_PUMP	SEK.* P.MEAN
88	<input checked="" type="checkbox"/>	Kicker	Kicker1_Inj DelayAllIARC
89	<input checked="" type="checkbox"/>	Kicker	#0 DEVICES
90	<input checked="" type="checkbox"/>	Kicker	Kicker1_Inj HVAll
91	<input checked="" type="checkbox"/>	P3PiloProxy	#0 Status
92	<input checked="" type="checkbox"/>	P3PiloProxy	#0 Name
93	<input checked="" type="checkbox"/>	EWPIloProxy	#0 Status
94	<input checked="" type="checkbox"/>	EWPIloProxy	#0 Name
95	<input checked="" type="checkbox"/>	P3WdwProxy	#0 Status
96	<input checked="" type="checkbox"/>	P3WdwProxy	#0 Name
97	<input checked="" type="checkbox"/>	EWPIloProxy	#0 Status

Reload DB Write DB

**Editable Filters**

PETRA

archive only with beam in the machine  
archive only when machine is running

Tag: BEAM

Description: archive only with beam in the machine

Keyword: CurDC

Valid min: 0.05 Valid max: 1.0E10

Valid text: MATCH

Add As New Apply To Selected

Remove Selected Close

SLOW  FIXTIME  HRT  STATUS

VOLATILE  NOPOI  BEAM  RUNNING

Data Output List

Orbit.X, FLOAT, 227, nm, 2000000.0, -2000000.0, 25000.0, 0.0, 0.0, LIN, 1.0, 0.0, Diagnostics

Maximum size: 227 Remaining size: 0

Keyword	Data Format	Size	Units	Max	Min
Orbit.X	FLOAT	227	nm	2000000.0	-2000000.0

Abs. Tolerance: 25000.0 Rel. Tolerance: 0.0 Plot Style: LIN Offset: 0.0 Scale: 1.0

Description: Subsystem: Diagnostics  Associate:

Bind To: Apply Add Remove

# Archive System

- *Filters + Archiving Rules*
  - call status  $\neq 0 \Rightarrow$  *do not archive*
    - *But call status is now archived separately !*
  - data timestamp does NOT change  $\Rightarrow$  *do not archive*
  - **FILTER = ONCE**  $\rightarrow$  **archive** a single record at
    - archive server start
    - reconnect to server (following server link timeouts)
    - Midnight
    - e.g. MCA array device names
  - **archive** at least once per archive heartbeat (15 minutes)
  - data change *within tolerance* ?  $\rightarrow$  *do not archive* (unless heartbeat)
  - **FILTER = FAST**  $\rightarrow$  **archive** at polling interval
  - **FILTER = SLOW**  $\rightarrow$  **archive** no more often than once/minute
  - **FILTER = NEVER**  $\rightarrow$  *do not archive*
    - record available as NETMEX entry only (data pump)
  - **else** : **archive** no more often than once/two seconds
  - other defined **filters** also apply ....

# Archive System

- Central Archive Server
  - Manages all viewer configurations
    - Archive Viewer
    - MCA Viewer
    - Scope Trace Viewer
  - Now stores call [status](#)/record if NOT = 0
  - Now stores user provided [annotations](#)/record

# Archive System

- Local Archive System
  - **Record** given by a call to the local equipment module
    - must ensure *unique record index* !
      - Must have consistent data size and format !
    - **no data** kept if return **code <> 0** !
    - **access** parameter contains the **CA\_HIST** bit if call is coming from the local history sub-system.
      - *Note: This is useful !*
  - **Short term** ring buffer storage
    - depth of ring buffer => depth in time
      - Polling interval = 1 Hz -> depth is in seconds
    - filter on data time stamp only !
    - *volatile*: starts from scratch upon server restart !
  - **Long term** disk storage
    - depth in months
      - keeps 'daily' files by default
    - filter on tolerance (absolute or relative)
    - **old data removed**
      - Can also set minimum free disk space !
      - Can also explicitly move files to **SAVED** area !

# Archive System

- Local Archive System
  - *local configuration database*
    - `history.csv`, `fec.xml`, or via `API`
    - contain call, storage, and filter information
    - history manifest (`hstmf.csv`) is dumped after server start.
  - `HISTORY_HOME` gives location of archive files
    - default = “../HISTORY”
  - Use ‘`mkhstfiles`’ utility to make the ‘*standard*’ set of history files
    - ‘*worst-case*’ non-fragmented file set
      - => fast lookups
      - rotated when necessary
    - very useful on windows systems !
      - e.g. pandora servers
  - *Note: java servers store data primitives as big-endian regardless of the platform architecture !*

# Archive System

- Local Archive System
  - data retrieval based on stock meta properties
    - `<property>.HIST (time range)`
      - *Note: input = 1 integer value gives number points in range !*
    - `<property>.HIST@ (snapshot at given time)`
      - *Note: returns next record at or more recent than given time !*
    - `<property>.ARCH (redirect to central archive)`
  - If selected property is not being archived then these calls return an error !
    - A property query will return the short and long term depths
      - **= 0 => no history configured !**
  - Can **add/edit** local history information '*on-the-fly*'
    - *Changes are volatile !*



# Archive System

- Local/Central Archive System

- input:*

- CF\_NULL

- start time given by requested data array size; stop = NOW

- 1 CF\_INT32, CF\_DOUBLE



Typically used !

- UTC start time (stop = NOW for trend call; stop = start for snapshot)

- 2 CF\_INT32, CF\_DOUBLE



Typically used !

- UTC start and stop times

- 3 CF\_INT32, CF\_DOUBLE

- UTC start and stop times; desired array index (default = 0)

- 4 CF\_INT32, CF\_DOUBLE

- UTC start and stop times; desired array index (default = 0); sampling raster

- 1 CF\_FWINDOW (CF\_INTINTFLTFLT)

- UTC start and stop times; lower and upper data limits

# Archive System

- Local/Central Archive System
  - requested data types
    - 1 CF\_INT32, etc.
      - -> return number points in interval given
    - CF\_FLOAT and other 'simple' types
      - snapshot of the stored data at time requested.
    - CF\_DBLDBL, CF\_FLTINT, CF\_INTINT, CF\_NAME64INT, etc.
      - -> array of value-timestamp pairs
    - CF\_TDS (CF\_INTFLTINT)
      - DOOCS style (UTC time, data, status (= 0))
    - CF\_HISTORY
      - Array of 'HISTORY' instances
        - Carries any stored data type + timestamp, system stamp, user stamp

# Archive System

- Local/Central Archive System user **APIs**
  - *don't try use the 'stock' and 'meta' properties unless you really know what you're doing !*
  - **C-Lib:**
    - GetArchivedDataAsAny()
    - GetArchivedDataAsText()
    - GetArchivedDataAsSnapshot()
    - GetArchivedDataAsFloat()
  - **Java:**
    - Thistory class with lots of static methods to retrieve data !
  - **MatLab:**
    - tine\_history()
  - **command line:**
    - thistory

# Archive System

- Archive Viewer
  - acquires and displays trend data
    - Normal mode
      - 2 sources ! (central archive and local history)
      - displays data from source with fewest number points in given range but with at least 500 !
      - checks for status information
      - checks for annotations

# Archive System

Archive Viewer: PETRA Motto: Hold the Pickles, Hold the Lettuce...

File Navigate Options Help

Found an annotation !

Had a bit of trouble getting going here, didn't we?

Oct 01 Oct 02 Oct 03 Oct 04 Oct 05 Oct 06 Oct 07  
Sat Oct 01 00:00:00 CEST 2011 6 Days

Time: Thu 06.10.2011 21:55:28.000 CEST UTC: 1317930928

Status	Property [Device]	Value	Description	Log
<input checked="" type="checkbox"/>	OK Energy	6.08 GeV	Magnet Energy	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK CurDC	79.59 mA	Beam Current	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK TauDC	1.62 hr	Beam Lifetime	<input type="checkbox"/>

Enough points from central archive !

Selected Trace: Energy

Chart Scale: Scale (Auto, Default, Custom), Prim (Max 7.00, Min 0.0), Sec (Max 7.00, Min 0.0)

Chart Options: Extra Digits, Text, Chubby Lines, Show Grid, Best Scale, Default, Abs. View, Norm. View

Points / Central / Local: 881 / 878 / 8638

History Mode Live Mode

12:45:29: History data for selected channels loaded.

# Archive System

Archive Viewer: LINAC2 Motto: Hold the Pickles, Hold the Lettuce...

File Navigate Options Help

Time: Wed 05.10.2011 12:08:22.000 CEST UTC: 1317809302

Status	Property [Device]	Value	Description	Log
<input checked="" type="checkbox"/>	OK CurD2	0.00 mA	DESY2 Beam Cur...	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK CurL2	4674.14 mA		<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK VacPressure.L2[L2-A1:Gun...	3.47E-10 mbar	LINAC2 Vac Pres...	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK VacPressure.L2[L2-A2:GP 8]	4.04E-08 mbar	LINAC2 Vac Pres...	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK TempSLED[SLED 1.1]	40.60 Deg C	Linac Temps...	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK PChopDelay_ImS	No Data	Zero-Crossing - R...	<input type="checkbox"/>

Reason for 'No Data' ?

Time Span Configurations Selector Chart & Trace View & Kin...

Subsystem: ALL

- ModTrigReady
- ModTrigShifted
- ModVorMagI
- ModVorMagV
- OperationStatisticsTrigger
- PChopDelay\_ImS
- PIAKickRegDevStatus
- PIAKickRegStatus
- ParticleSign
- ParticleTypeText

Device Name: keyword

Selected Bit: ALL

Add Selected

History Mode Live Mode

13:12:23: No history data available for channel 'LINAC2/HISTORY/keyword/PChopDelay\_ImS'.

# Archive System

- Archive Viewer
  - Local history Modes
    - configured local history subsystems !
    - general browsing !

# Archive System

Archive Viewer: PETRA Motto: Hold the Pickles, Hold the Lettuce...

File Navigate Options Help

Data Options...  
 Use Absolute X Scale  
Number of History Points...  
 Central Archive  
 Subsystem Browsing  
 Local History Browsing  
 Warn About Log Channels  
 Debug Chart

Sat Oct 01 00:00:00 CEST 2011

Time: Sun 02.10.2011 08:24:28.000 CEST UTC: 1317536668

	Status	Property [Device]	Value	Description	Log
<input checked="" type="checkbox"/>	OK	Energy	6.08 GeV	Magnet Energy	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK	CurDC	99.03 mA	Beam Current	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK	TauDC	2.31 hr	Beam Lifetime	<input type="checkbox"/>

Refresh All Remove Selected Remove All

12:54:45: Characteristics for property 'LossRates' loaded.

Add To Local History

**Any editorial changes will be lost upon the next server restart. Please notify the responsible parties if your edits need to be made permanent!**

Context: PETRA  
Server: BLM  
Device: PU01  
Property: LossRates  
Data Size: 20  
Format: INT32

Depth Long (months): 1  
Depth Short (ring buffer): 600  
Heart Beat (seconds): 1800  
Polling Interval (msec): 1000  
Archiving Interval (msec): 1000  
Relative Tolerance: 0  
Absolute Tolerance: 0

OK Cancel

Server: BLM  
LossRates

Device Name: PU01  
Selected Bit: ALL

Add Selected Add To History

History Mode Live Mode



# Archive System

- Archive Viewer
  - Array snapshots and movies
  - Correlation plots

# Archive System

Archive Viewer: PETRA Motto: Hold the Pickles, Hold the Lettuce...

File Navigate Options Help

Normalized values

Oct 01 Oct 02 Oct 03 Oct 04 Oct 05 Oct 06 Oct 07  
Sat Oct 01 00:00:00 CEST 2011 6 Days

Orbit.X: 02:22:29.000

BPM\_SWR\_13 BPM\_NOL\_31 BPM\_SOR\_61

Time: Tue 04.10.2011 23:45:22.000 CEST UTC: 1317764722

Status	Property [Device]	Value	Description	Log
<input checked="" type="checkbox"/>	OK Energy	6.08 GeV	Magnet Energy	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK CurDC	99.76 mA	Beam Current	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK TauDC	1.99 hr	Beam Lifetime	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK OrbitX[BPM_SWR_13]	6.71E05 nm		<input type="checkbox"/>

Refresh All Remove Selected Remove All

Time Span Configurations Selector Chart & Trace View & Kino

Charts

Main Chart

Correlation Chart

Array Chart

Array Chart Options

Axis Scale: LIN

Bit Breakdown

Data Options...

Array Options:

Start Movie Stop Movie

1,006 2000

Save Ref

Ref: 05.10.2011 10:00:44.000

History Mode Live Mode

13:00:56: Array data for channel 'PETRA/HISTORY/BPM\_SWR\_13/Orbit.X' loaded.

# Archive System

Archive Viewer: PETRA Motto: Hold the Pickles, Hold the Lettuce...

File Navigate Options Help

Normalized values

Oct 05/00h Oct 05/10h Oct 05/20h 25 Hours

Wed Oct 05 00:00:00 CEST 2011

Correlation Plot

0L153.7/Vac.IonPumps.Pressure mb

#0/CurDC mA

Time: Wed 05.10.2011 01:16:08.000 CEST UTC: 1317770168

Status	Property [Device]	Value	Description	Log	X	Y
<input checked="" type="checkbox"/>	OK Energy	6.08 GeV	Magnet Energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK CurDC	99.32 mA	Beam Current	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	OK TauDC	1.85 hr	Beam Lifetime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK Orbit.X[BPM_SWR_13]	6.69E05 nm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK Orbit.Y[BPM_SWR_13]	6.84E05 nm		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK P02.Temp[BL_0]	25.00 none	Temps	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	OK Vac.IonPumps.Pressure[...]	5.49E-08 mb		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Refresh All
Remove Selected
Remove All

Time Span Configurations Selector Chart & Trace View & Kino

Calendar Interval Recent Past

October 2011

Mon	Tue	Wed	Thu	Fri	Sat	Sun
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

History Mode
Live Mode

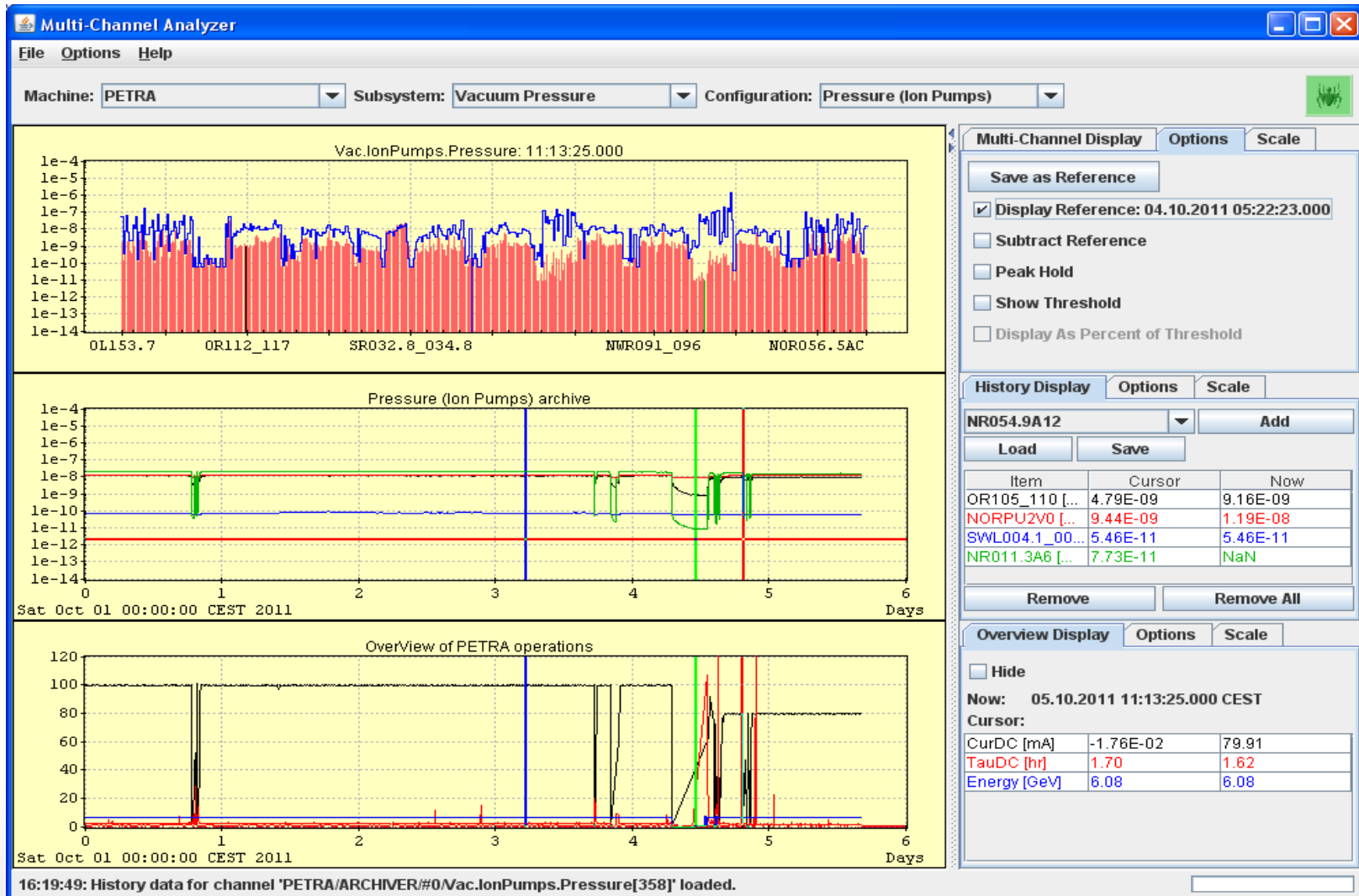
13:08:42: History data for selected channels loaded.

# Archive System

- Archive Viewer designed to *'plot'* data
  - *trends*
  - *snapshots*
  - *'text'* as string shown in data label and tool tip
- How to show *'complex'* data elements ?
  - Can store / retrieve any data type (except CF\_HISTORY)
  - e.g. data stored as NAME16FLTINT
    - => a range of these will be an 'array' of NAME16FLTINTs coupled with a set of time/data stamps.
    - how to display this in the archive viewer?
      - “trap and ask?”
        - i.e. ask the user which field he wants to display vs. time ?

# Archive System

- Multi-Channel Analyzer uses archive system !



# Event System



# Event System

- **Event server**
  - “/SITE/EVENTMGR”
  - provides event numbers to event archive servers
    - defined event window : default 5 seconds
  - record event participants
    - which triggers are associated with an event number ?
- **Event Archive Server**
  - “/<context>/EVENTS” and “/<context>/EVENTSTORE”
  - reacts to event trigger
    - => event script (“get this, get that, wait here, sent this there”, etc.)
  - generally acquires data from *1 or more sources*
  - *post mortem data* stored in hardware or short term local history
  - designed for *transient recorders*
  - Can store **any type** of event data
    - ‘positive’ events (e.g. “get orbit settings at injections”, etc.)
    - store video train on demand, etc.

# Event System

- data retrieval : must specify
  - *event trigger* : (what kind of event ?)
  - *event time* : (when ?)
  - *stored target* : */context/server/property/device*
- events defined via event database manager
- event triggers sent via API
  - SendEventTrigger()
    - Sent to */context/EVENTSTORE/trigger[TRIGGER]*
  - *state change* triggers are sent automatically from STATE server.
- events can be annotated



# Event System

The screenshot displays the 'Event Archive Database Manager' application window. The main area is titled 'Options' and is divided into several sections:

- Event Trigger Browsing:** Includes a 'Context' dropdown set to 'PETRA' and an 'Event Keep Depth' of 3 months. A 'Write DB' button is present.
- Event Triggers:** A list of triggers on the left, with 'mhf\_slr\_trc' selected. An 'Add Trigger' button is above the list.
- Trigger Action List:** A large text area containing a list of actions, starting with 'WAIT 20 seconds' and followed by numerous '/PETRA/MHFTrcTranslator/#0-#15[SL\_Cy1] -> /PETRA/PE\_SL\_Cy1/#0-#15 [SAMPLE] <READ>' entries.
- Action Items:** A configuration panel with several sub-sections:
  - Device Context:** Device Server: MHFTrcTranslator, Device Name: #0-#15.
  - Device Property:** SL\_Cy1, Array Size: 209710, Format: FLOAT.
  - Data Tag:** Store As: PE\_SL\_Cy1, Device Property: SAMPLE.
  - Data Operations:** Fields for offset (0), scale (1), repeat (0 times), interval (1000 msec), delay (0 sec), wait (0 sec), wait prior to next step, target (0), timeout (0 sec), and monitor options (interval 1000 msec, duration 60 sec, TIMER).
  - Input Data:** Checkboxes for 'has data' and 'Write Access', radio buttons for 'single value' and 'multiple values', a 'file name' field, and a list for 'input data' with 'INT32' selected.

# Event System

- Generic event viewer:

The screenshot displays the 'Event Archive Viewer: PETRA' application window. The interface is divided into several sections:

- Event Context:** A list of event identifiers such as 'mhf\_sl0cav\_trc', 'mhf\_sl1cav\_trc', etc.
- Event Selection:** A list of events with timestamps, where the 7th event '27.10. 08:11:08' is selected.
- Calendar/Interval:** Date selection controls for 'Start Date' (Oct 6, 2010) and 'End Date' (Oct 6, 2011).
- Device Servers:** A list of server paths like '/PETRA/PE\_SL\_Cy1' through 'Cy5'.
- Devices:** A list of channels including 'Ch1.Amplitude', 'Ch1.Phase', etc.
- Properties:** A section for 'SAMPLE' with a 'Keep Selected Property' checkbox.
- Header Information:** Metadata for the selected event, including 'Wed Oct 27 08:11:08 CEST 2010', 'channelID', 'eventCode', 'arraySize', and 'dataType'.
- Chart View:** A graph titled 'Sender/Ruecklaufleistung: Wed Oct 27 08:11:08 CEST 2010'. The y-axis is labeled 'B' (0 to 2000) and the x-axis is 'time [seconds]' (-0.5 to 0.35). The plot shows a signal that is noisy around 800-900 units before time 0, then drops sharply to around 200-300 units at time 0.
- Buttons:** 'Send Trigger', 'Stop Trigger', 'Update Comment', 'Auto Scale', 'Default Scale', 'Hold Graph', 'Legend...', and 'Chart Options...'.

At the bottom of the window, a status bar reads: '16:02:43: Archived data for PETRA/PETRA/PE\_SL\_TRANSMITTR/Ch2.Amplitude/SAMPLE: Wed Oct 27 08:11:08 CEST 2010 loaded.'

# Event System

- Generic event viewer:

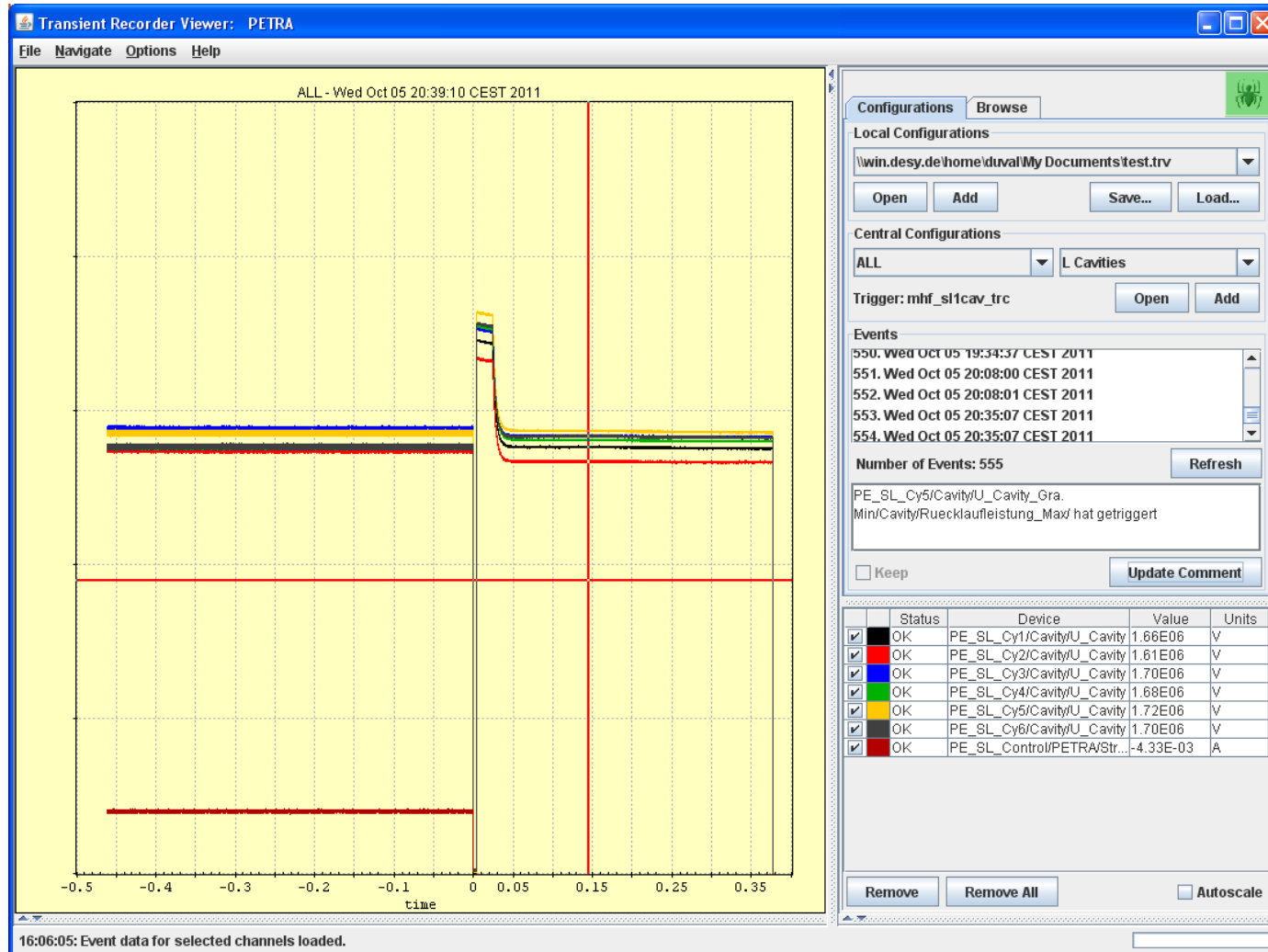
The screenshot displays the 'Event Archive Viewer: PETRA' application window. The interface is organized into several panels:

- Event Context:** A list of event sources including `mnr_test_trc`, `temp_mdi_intlk`, `bpm_intlk`, `mps_intlk`, `video_test_trig`, `mps_intlk_test`, `MDI2_video_test`, `SRINT_video_test`, and `SRINT2_test`.
- Event Selection:** A list of four events with timestamps: `1. 07.07. 13:38:49`, `2. 07.07. 13:51:48`, `3. 07.07. 13:52:18`, and `4. 07.07. 13:54:10`.
- Device Servers:** Shows the selected server path: `/PETRA/SRINT1.JPEG`.
- Devices:** Shows the selected output: `Output`.
- Properties:** Lists `Frame.Sched` and `Frame.Sched.NSEQ`, with a checked `Keep Selected Property` option.
- Header Information:** Provides details for the selected event: `Thu Jul 07 13:54:10 CEST 2011`, `channelID : Output`, `eventCode : 0`, `arraySize : 6291456`, `dataType : IMAGE`, `SamplingRate : 6291456.0`, and `nPreTrigVals : 0`.
- Calendar/Interval:** Includes date pickers for `Start Date` (Day: 6, Month: Oct., Year: 2010) and `End Date` (Day: 6, Month: Oct., Year: 2011), along with `Apply` and `Cancel` buttons.
- Comment:** A text field containing `test`, with `Update Comment` and `Keep` options.
- Trigger Control:** Features `Send Trigger` and `Stop Trigger` buttons, and a `Trigger Status: 0` indicator.
- Video Playback:** A large central area showing a video frame with a dark, blurry pattern. Below it are `Start Movie` and `Stop Movie` buttons, a progress bar showing `29 / 58`, and a seek bar.

The status bar at the bottom of the window displays the message: `16:04:39: No data for PETRA/PETRA/SRINT1.JPEG/Output/Frame.Sched: Thu Jul 07 13:54:10 CEST 2011.`

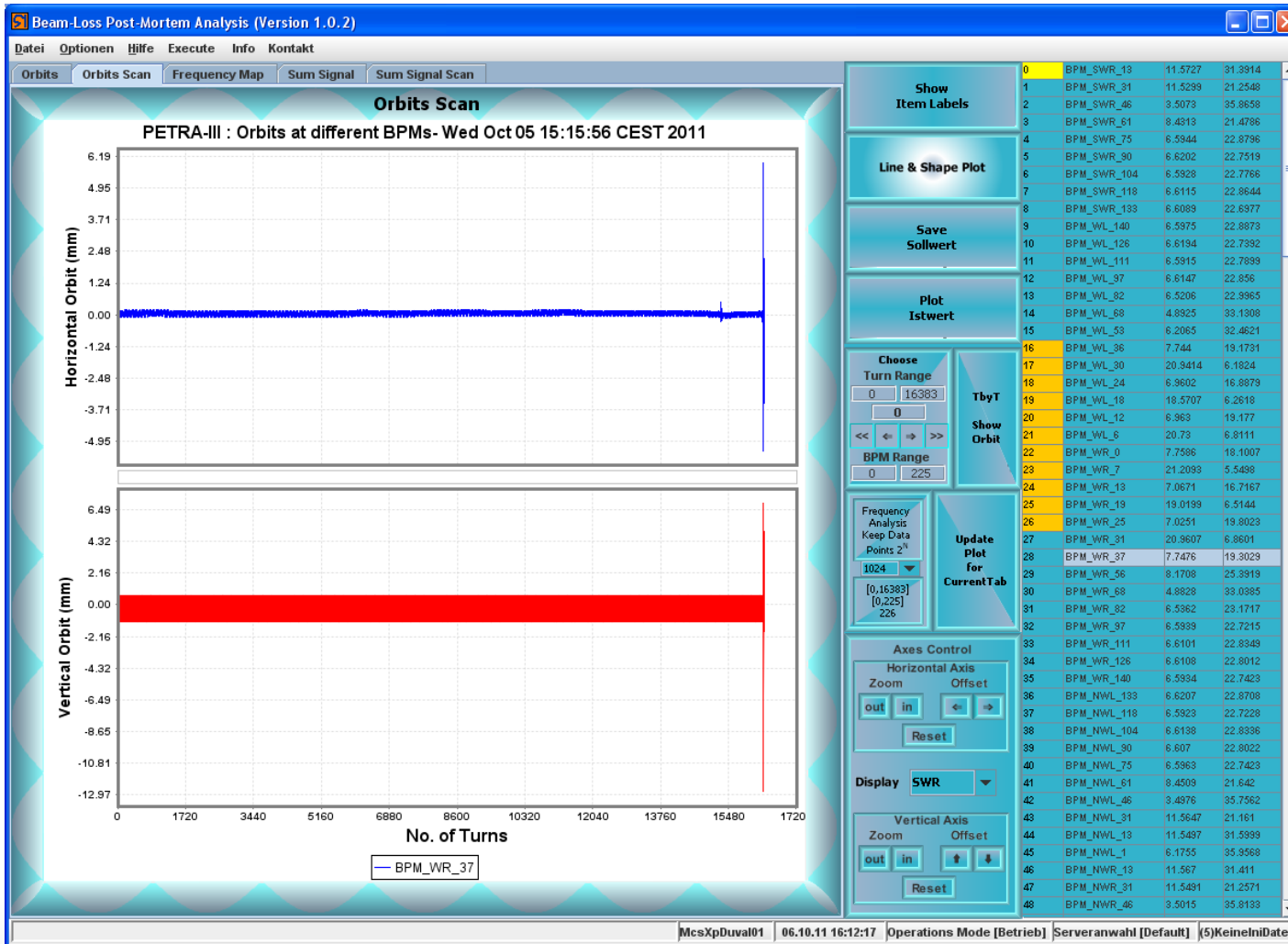
# Event System

- Transient Recorder viewer



# Event System

- BPM Event viewer



# Event System

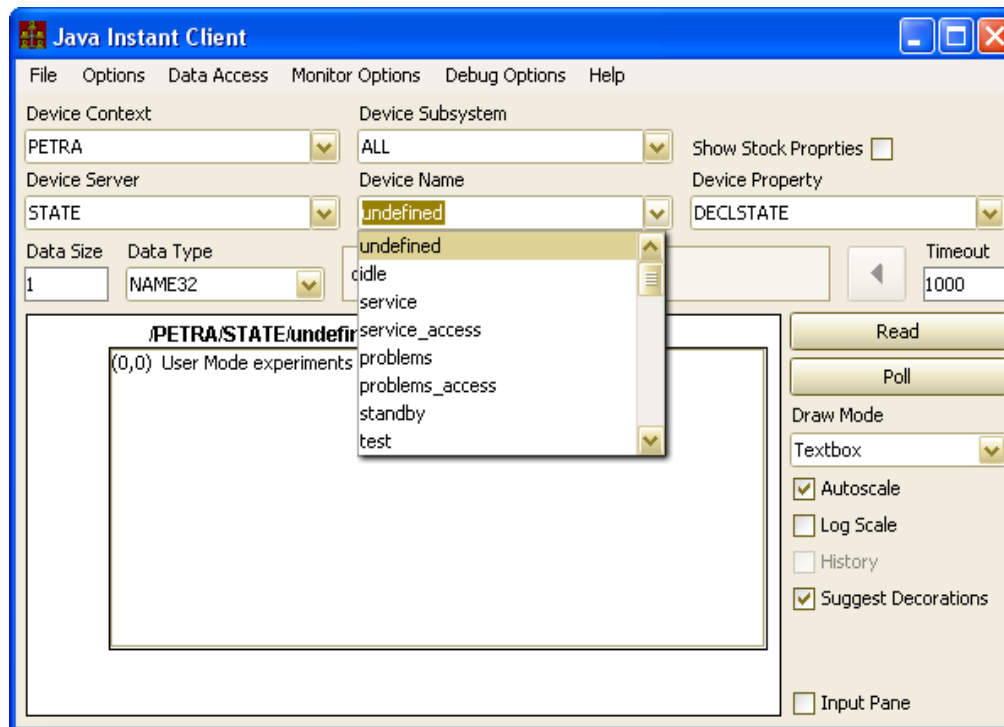
- Event System **APIs**
  - **C-Lib**
    - sendEventTrigger()
    - And from the 'eventtools' lib: (no documentation yet)
      - GetArchivedEventData()
      - GetArchivedEventList()
      - GetArchiveTriggers()
      - GetArchiveComment()
  - **Java**
    - Numerous calls from eventArchive.jar
  - **MatLab**
    - tine\_eventdata
  - **command line**
    - teventdata

# State Server



# State Server

- “/`<context>`/STATE”
  - accepts state change commands
    - forwards trigger to **EVENTSTORE**
  - counts time spent in given state
  - Manages operation statistics profiles (i.e. those ‘pie slices’)





# State Server

**Operation History and State Server Database Manager**

State Browsing

DESY2

States and Procedures

**Configured States**

- test
- preparing\_e+
- preparing\_e-
- preparing\_e+\_doris
- preparing\_e-\_doris
- preparing\_e+\_petra
- preparing\_e-\_petra
- preparing\_e+\_teststrahl
- preparing\_e-\_teststrahl
- studies\_e+
- studies\_e-

**Configured Procedures**

- Pnotrunning
- Ptransfer
- Ptransfer\_e
- Pprepare
- Pstandby
- Pstudies
- Puserestbeam
- Puserestbeame
- Puserbeam
- Puserbeame

**States in Procedure**

- preparing\_e-
- preparing\_e-\_doris
- preparing\_e-\_petra
- preparing\_e-\_teststrahl

**selected state :**  
Machine Preparation (e-)  
number of procedures: 1

Operation History Viewing Configurations

**Configurations**

- DESY-2 Overview

**Machine Parameter Trends**

- D2 Energy
- Pia Part.
- D2 Part.
- Avail.

**Profile Slice Names**

- Running: DORIS
- Running: PETRA (beam)
- Running: PETRA (idle)
- Running: TEST
- Running: Control Room
- Preparing
- Standby
- Machine Studies
- Problems
- Service Mode
- Undef.
- Total Beam Time DORIS
- Trans. Time DORIS
- Total Beam Time PETRA
- Trans. Time PETRA

**Procedures in Slice**

- Puserdoris
- Puserdorise
- Ptransferdoris
- Ptransferdorise

Running: DORIS  
type : slice  
slice color : ■

**statesEditor**

	selected State	associated Procedures	available procedures
trigger	preparing_e-	Ppreparee	Ppreparee
desc.	Machine Preparatio		<- Add
	<input type="checkbox"/> remove		

**slicesEditor**

	selected Slice	associated Procedures	available procedures
tag	Running: DORIS	Puserdoris Puserdorise Ptransferdoris Ptransferdorise	Puserdoris
type	slice		<- Add
color	<span style="color: red;">■</span> change		<input type="checkbox"/> remove

**paramsEditor**

Machine Parameter Trends

- D2 Energy
- Pia Part.
- D2 Part.
- Avail.

parameter device name: keyword

parameter property: Energy

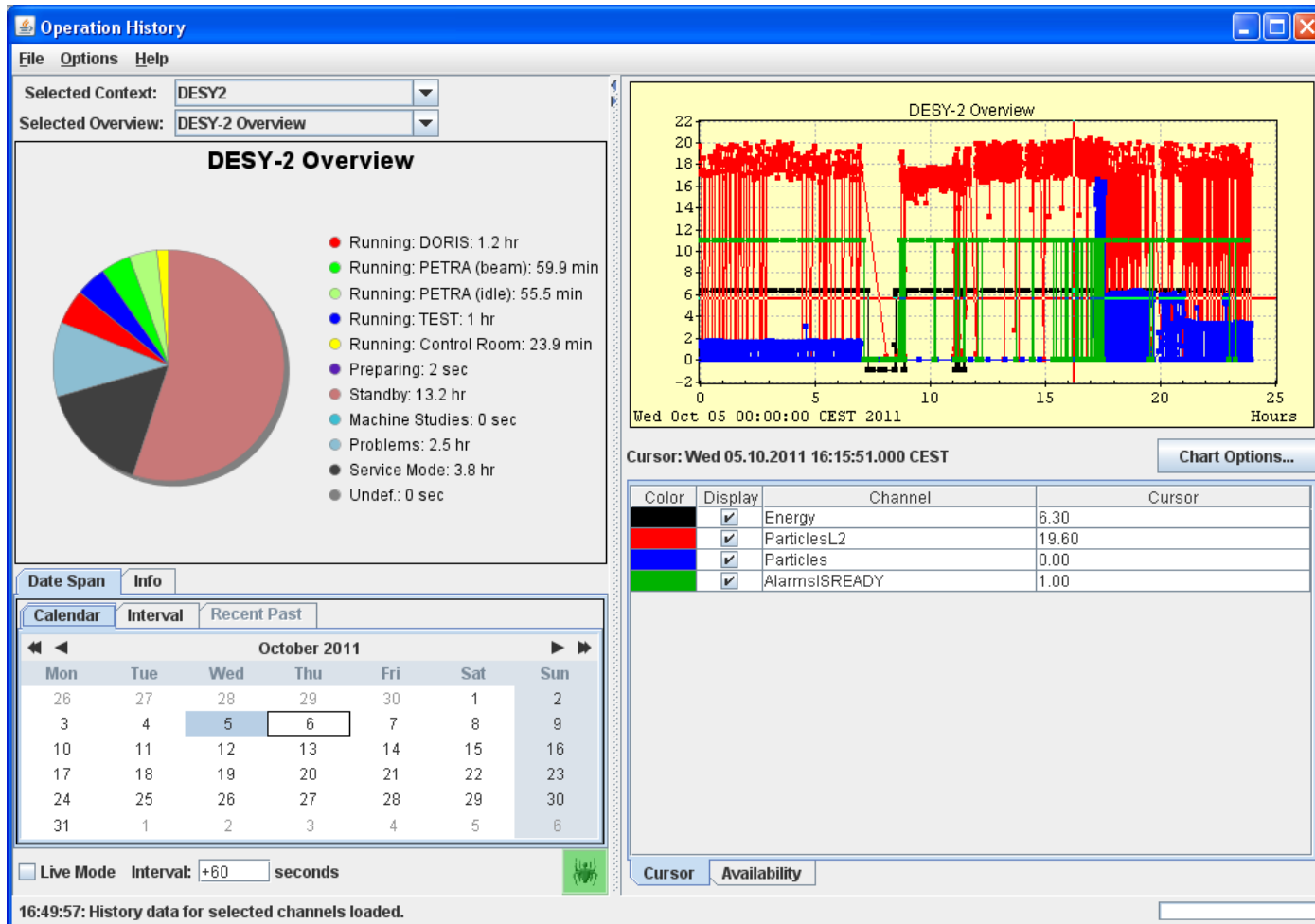
parameter description: D2 Energy

<- add

OK Cancel

# State Server

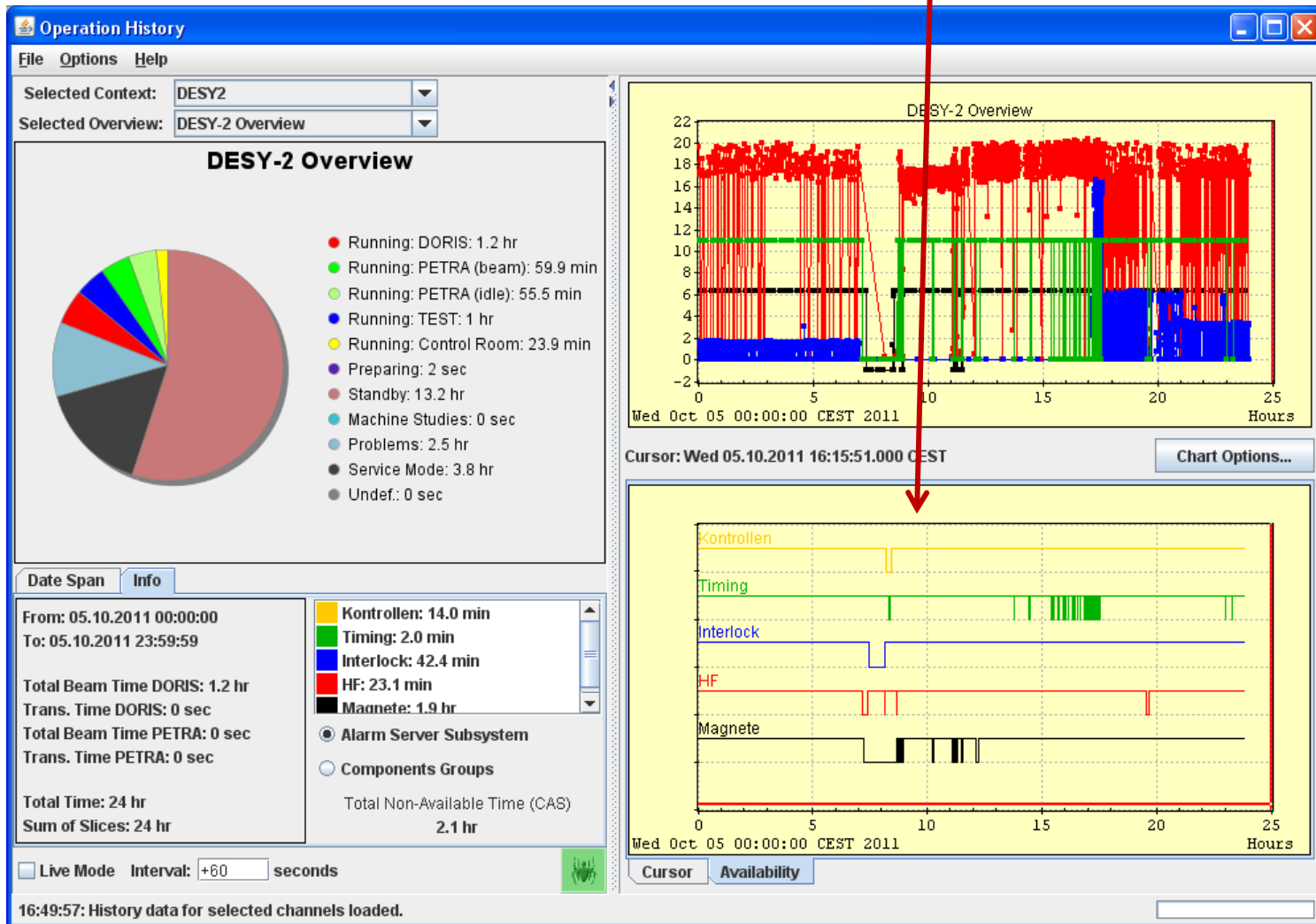
- Operation Statistics



# State Server

- Operation Statistics

“ALARMSTATE” used for availability statistics !

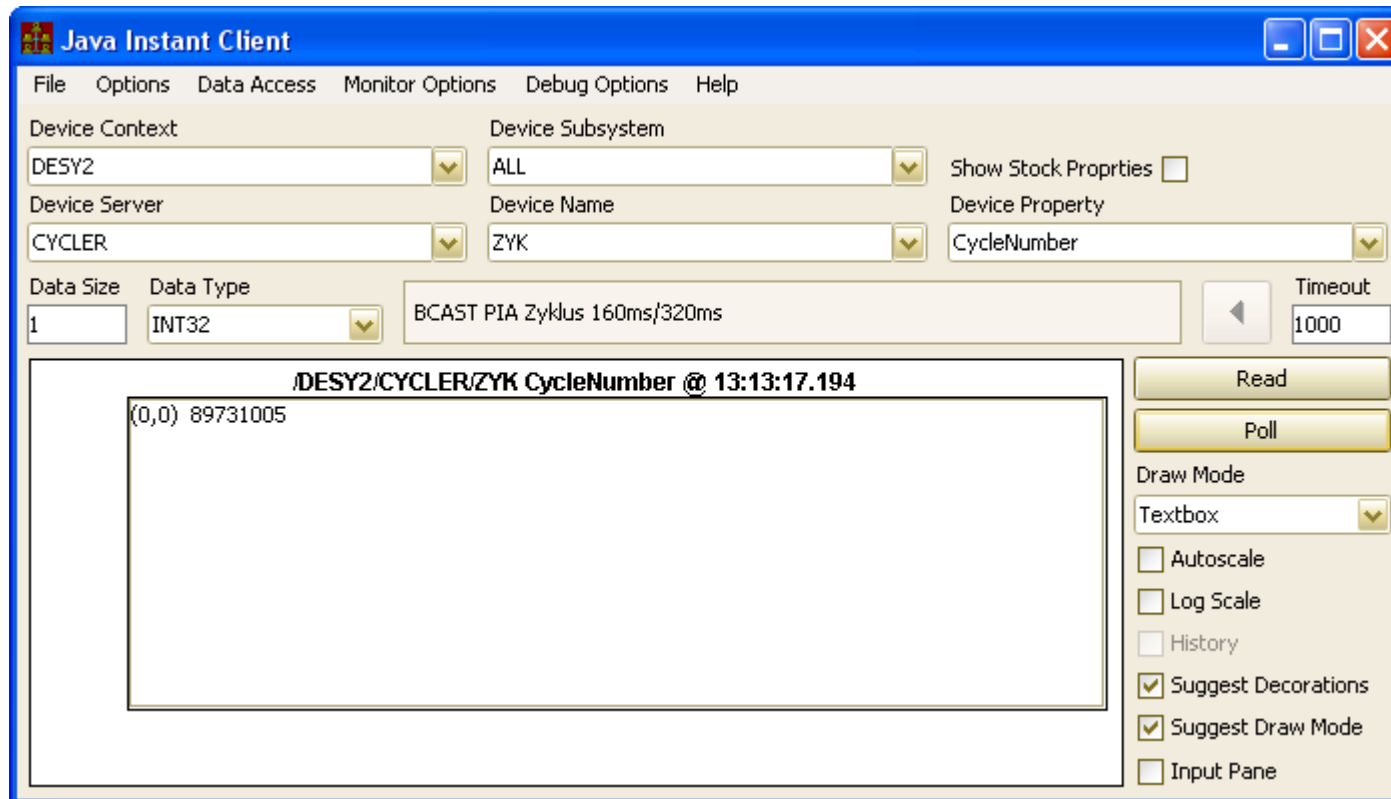


# The CYCLER



# The CYCLER

- automatic system data stamps via server “CYCLER” and property “CycleNumber” :



# The CYCLER

- If a cycler exists for '*my*' context then a server will :
  - listen for **cycle multicasts**
  - apply cycle number to the **data stamp** of all property data being accessed.
  - support **cycle trigger functions**
    - initiate/synchronize hardware i/o
    - supply cycler delay offset (if necessary)

# The CYCLER

```
typedef void (*HDWIOFCNP) (int);
void hdwIoCycle(int cycle)
{
    /* read relevant hardware (here we just print something out) */
    printf("read hardware for cycle %d\n",cycle);
}
void onCycleTrigger1(int cycle,int cc,void *ref)
{
    printf("received cycle %d <%d>\n",cycle,cc);
    cycleNumber = cycle;
}
void onCycleTrigger2(int cycle,int cc,void *ref)
{ /* call the referenced function */
    if (cc == 0) ((HDWIOFCNP)ref)(cycle);
}
void PreSystemInit(void)
{
    SetSystemUseDataProtection(TRUE);
    SetPacketMTU(64000);
    RegisterFecInformation("CYCCATCH.8","TST","TEST","Cycle catcher tester","My Office","none","me",8);
}
void PostSystemInit(void)
{
    /* register the equipment module: */
    RegisterEquipmentModule("CycleCatcher",EQMTAG,1,tsteqm,tstinit,tstbkg,100,NULL);
    /* register a cycle trigger function with no scheduling and no reference */
    RegisterCycleTriggerFunction(onCycleTrigger1,EQMTAG,NULL,NULL);
    /* register another cycle trigger function with a scheduled property and a reference to another function */
    RegisterCycleTriggerFunction(onCycleTrigger2,EQMTAG,"CycleNumber",(void *)hdwIoCycle);
}
```



# The CYCLER

## Cycle Delay and Cycle Offset :

I 'know' I'm going to be late getting my data ready ...

```
void SetSystemStampDelay ( int cycleDelay )
```

Establishes the system cycle delay.

If a server's context has a registered 'CYCLER' then all read data will be tagged with the incoming system cycle number. If it is known a priori that due to hard i/o latency the application of the cycle tag needs to be delayed by some value, then this routine may be used to establish such a cycle delay value (in milliseconds).

**Parameters:**

**cycleDelay** is the desired cycle delay (milliseconds), which will must elapse before the incoming cycle number from the registered CYCLER is to be applied to all readback data. (default = 0).

**See also:**

[GetSystemStampDelay](#)

```
void SetSystemStampOffset ( int cycleOffset )
```

Establishes a system cycle offset.

If a server's context has a registered 'CYCLER' then all read data will be tagged with the incoming system cycle number. If it is known a priori that due to hard i/o latency the cycle tag needs to be offset by some value, then this routine may be used to establish such an offset.

**Parameters:**

**cycleOffset** is the desired cycle offset (counts) to be applied to the incoming cycle number from the registered CYCLER. (Default = 0).

**See also:**

[GetSystemStampOffset](#)

I 'know' the incoming cycle is 'off' by some number of counts ...



# FEC Statistics



# FEC Statistics

- “/*<context>*/FECSTATS”
  - maintains general statistics of all important servers in a context
  - stock property “SRVSTATS” from each server
  - reboot counts from ENS
  - timeouts (as determined by the FEC stats server itself)

# FEC Statistics

**FEC Remote Control Panel**

File View Tools Help

DiagBeamData	MDI2_JPEG1	PeCanExC4	PiloP3Sta
Dump	MDI2_JPEG2	PeCanExC5	PIPrivateComman...
EVENTAPC	MDI2_RAWVIDEO1	PeCanExC6	PIPrivateSwitchabl...
EVENTS	MDI2P3SMLA1.CDI	PeCanExM1	PIPrivCmds_piFiel...
EVENTSTORE	MHFHISTORY	PeCanExM2	PIPrivCmds_piFiel...
EWegBPM.cdi	MHFTrcTranslator	PeCanExM3	PIPrivCmds_piFiel...
EWegBPMs	MOMO.CDI	PeCanExM4	PIPrivCmds_piFiel...
EWegBPMStatus	MpsAlarms	PeCanExM5	PIPrivCmds_piFiel...
EWegTestPuls	MPSALARMS.CDI	PeCanExM6	PIPrivCond_piFiel...
EWpiloProxy	MPU_FEC	PeCanNIC1	PIPrivCond_piFiel...
EWVdwProxy	MPU_FEC-TEST4	PeCanNIC2	PIPrivCond_piFiel...
FBUSBFEC_TEST	MPUSVD	PeCanNIM1	PIPrivCond_piFiel...
FEC_DPA	MPUSVD_FEC	PeCanNIM2	PIPrivCond_piFiel...
FECSTATS	NEG.ABSCHNITTE	PeCanNoC1	PIPrivCond_piFiel...
FMM-VXW	NEG.INTERLOCK	PeCanNoM1	PIPrivCtrls_piCentr...
FREQ-VXW	NEG.CONDITIONS	PeCanNoM2	PIPrivSwitc_piFiel...
GLOBALS	NEG.STROMKREI...	PeCanNoM3	PIPrivSwitc_piFiel...

Ping all Active: 313 of 320 (16:58:19)

Device context: PETRA

Selected Subsystems:

<input checked="" type="checkbox"/> SER	<input checked="" type="checkbox"/> DIAG	<input checked="" type="checkbox"/> HIST	<input checked="" type="checkbox"/> RF
<input checked="" type="checkbox"/> VAC	<input checked="" type="checkbox"/> TIM	<input checked="" type="checkbox"/> PINTLK	<input checked="" type="checkbox"/> MAG
<input checked="" type="checkbox"/> TRANS	<input checked="" type="checkbox"/> INJ	<input checked="" type="checkbox"/> MEX	<input checked="" type="checkbox"/> INSTR
<input checked="" type="checkbox"/> EXP	<input checked="" type="checkbox"/> VIDEO	<input type="checkbox"/> TEST	

OS Color Code: Dos Unix VxWorks VMS Win16 Win32 Java  
FEC Importance: ALL

Front End: piFieldPetraSrP OS: JAVA Address: 131.169.213.44

Host Computer: accIxPIPetraSR.desy.de Responsible: an May, Tel-4636 (mays)" Location: rm EIRaum S2-23 (sw9)

Device servers: PiPrivCmds\_piFieldPetr Description: <subversion> <revision>7324</revision> <committed>7324

Activity Contracts Clients Alarms Log File **Stats** Refresh

Ave Busy Time (%)	9
Cycle Counts	0
Max Cycle Counts	0
Sgl Link Counts	585376
Client Misses	199
Client Reconnects	18537804
Client Retries	218
Contract Misses	0
Contract Delays	0
Burst Limit Reached Count	0
Data Timestamp Offset (ms)	0

16:58:44: Normal

# FEC Statistics

PETRA FEC Statistics

Printing Machine

PETRA FEC Timeout Count Statistics

Timeout Count Statistics for PET3ID14.30

Timeout Count binned Statistics for PET3ID14.30

Available Counters

- Average Busy Time
- Num Synchronous Calls
- Num Client Reconnects
- Num Contract Misses
- Timeout Count
- Server Reboot Count

Timeout Count description

The number of timeouts as registered by the statistics server. This is a direct indication of connection timeouts. This could be an indication that the server is down or busy. If the server is very busy, then this count will also be reflected in the CLNRECONNECTS counts. This quantity is bested viewed in the binned window.

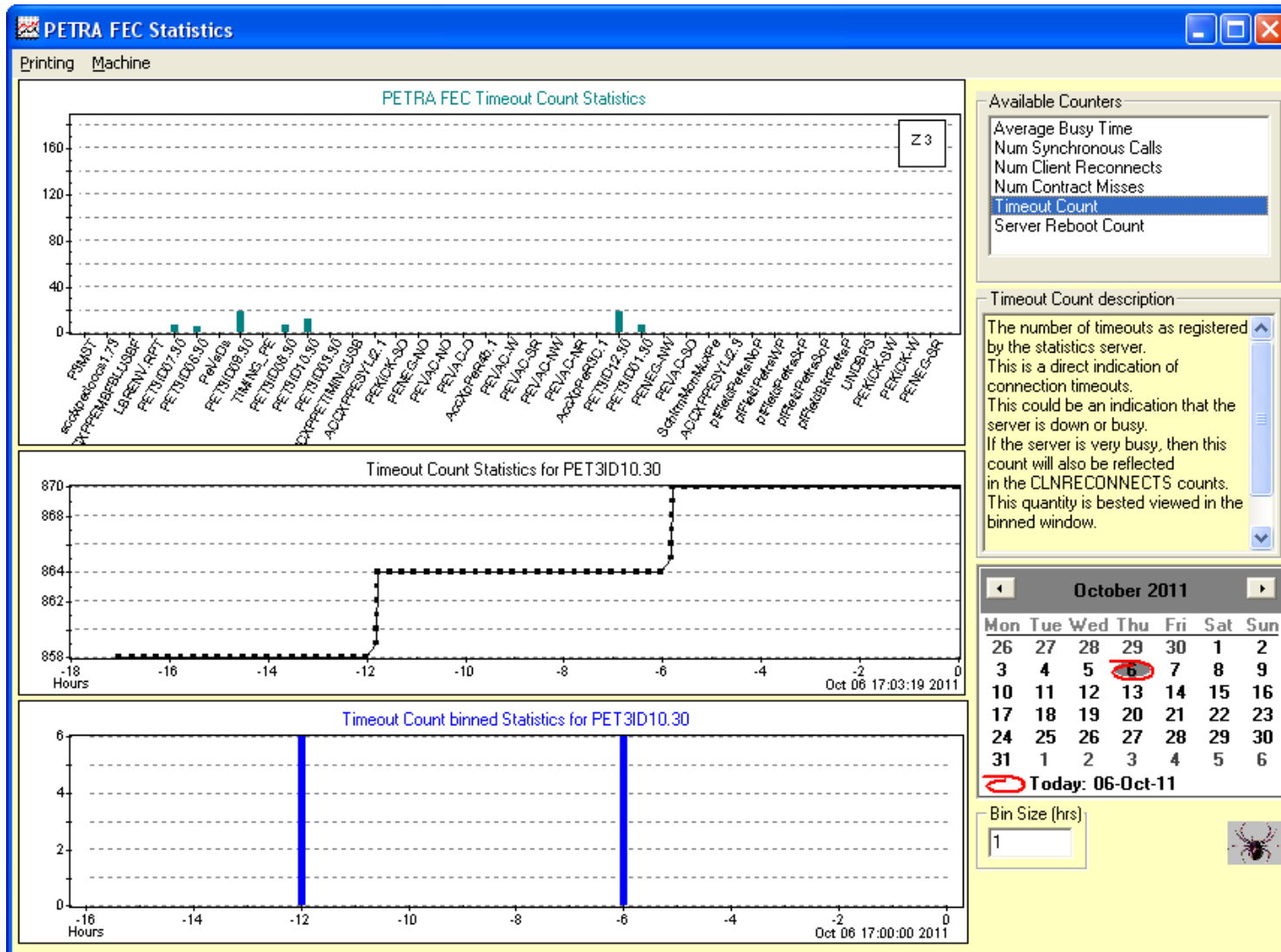
October 2011

Mon	Tue	Wed	Thu	Fri	Sat	Sun
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

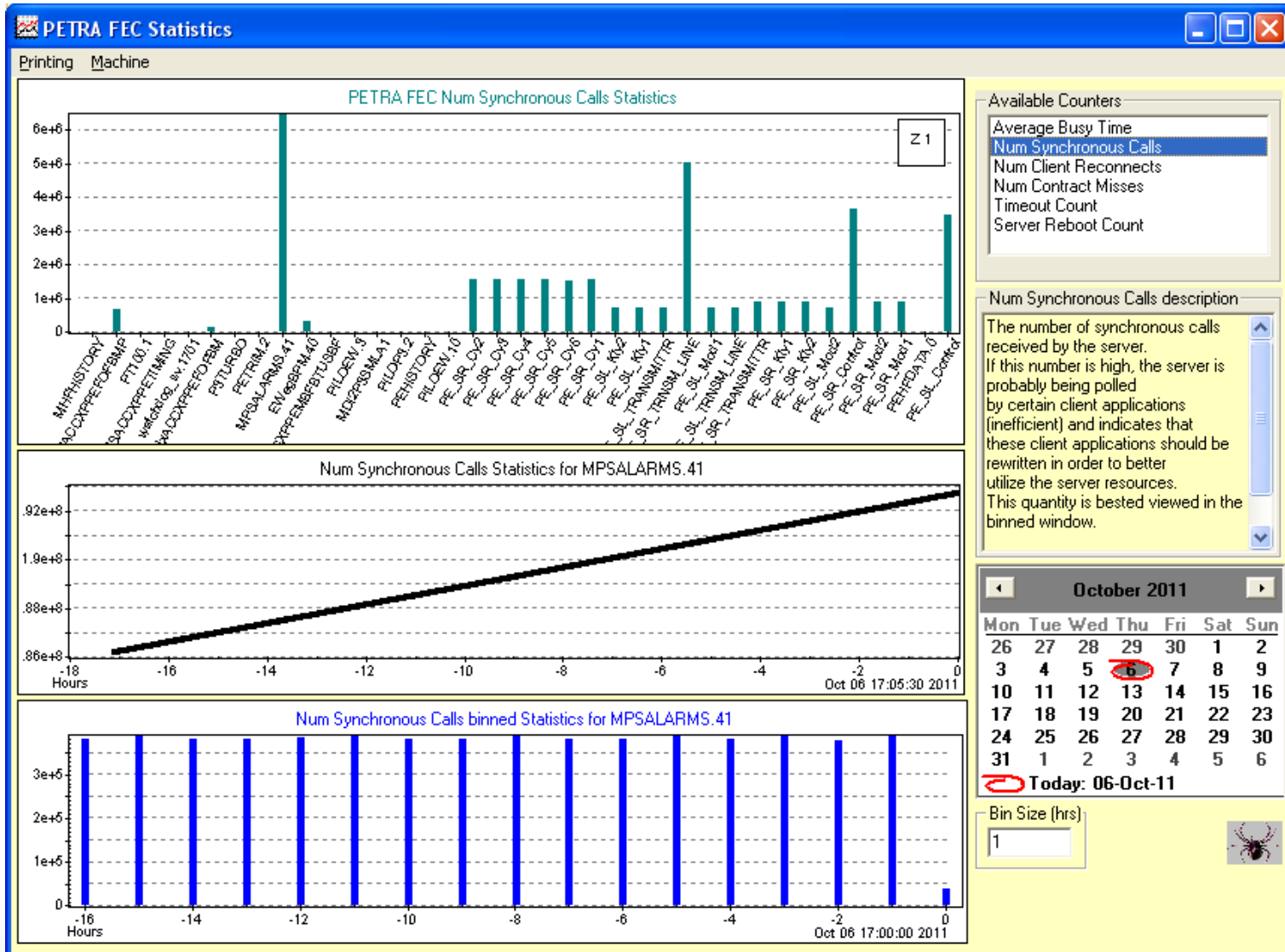
Today: 06-Oct-11

Bin Size (hrs)

# FEC Statistics



# FEC Statistics



# Control System SPY



# Control System SPY

- “/*<context>*/CSSPY”
  - who’s watching who (big-brother style).
  - scans all important servers in a context
  - makes use of stock properties:
    - “CLIENTS”
    - “SRVCOMMANDS”
    - “USERS”



# Control System SPY

**Control System Spy (REGAE)**

Navigate Options

User	Current Rights
PPOTOTZK	has WRITE privileges!
<b>TSDMMER</b>	has WRITE privileges!
DESYCON	has WRITE privileges!
MPSADMIN	has WRITE privileges!
COMONCON	has WRITE privileges!
REGAECON	has WRITE privileges!
TKURPS	has WRITE privileges!
SUSEN	READ only
LEDERER	has WRITE privileges!
PVAK	has WRITE privileges!
SEEBACH	has WRITE privileges!
HOPPE	has WRITE privileges!
GRYGIEL	has WRITE privileges!
ADMINISTRATOF	has WRITE privileges!
REGAEDEV	has WRITE privileges!
MBAREN	has WRITE privileges!
HGROSSER	READ only
NETCHAEV	has WRITE privileges!
PILORGP.55	has WRITE privileges!
OHENSLER	has WRITE privileges!
HINSCH	has WRITE privileges!
REUTHER	READ only
STECKEL	READ only
MDILPA	has WRITE privileges!
BOEHNERT	has WRITE privileges!
TSCHULZ	READ only
CPEITZ	has WRITE privileges!

TSDMMER is logged into:

ReVacTPG GENS ReVacTSP  
ReVacSV RegaeP lo83a999d4.1f8  
RgRFSserverModula

TSDMMER is logged in on stations:

131.169.148.98 131.169.75.42  
131.169.100.83

TSDMMER has full control over:

ReVacTPG ReVacTSP ReVacSV  
lo83a999d4.1f8

**Control System Spy (PETRA)**

Navigate Options

User	Current Rights
SUSEN	has WRITE privileges!
PETRACON	has WRITE privileges!
COMONCON	has WRITE privileges!
MKKUSER1	has WRITE privileges!
MKKUSERS	has WRITE privileges!
MVARUFB	has WRITE privileges!
TTFLINAC	has WRITE privileges!
DUVAL	has WRITE privileges!
BREDE	has WRITE privileges!
ACCUSER	has WRITE privileges!
DORISCON	has WRITE privileges!
WEBADMIN	has WRITE privileges!
MATLAB	has WRITE privileges!
HEIKO	has WRITE privileges!
DESYCON	has WRITE privileges!
SAHOO	has WRITE privileges!
DESYCO	has WRITE privileges!
MHFEUSR	has WRITE privileges!
MHFEOPA	has WRITE privileges!
MITTAG	has WRITE privileges!
HINSCH	has WRITE privileges!
ULLA	has WRITE privileges!
<b>DNKENR</b>	has WRITE privileges!
WINMAG	has WRITE privileges!
MPSADMIN	has WRITE privileges!
ROOT	has WRITE privileges!
SYSTEM	has WRITE privileges!

DNKENR is logged into:

PEHFDATA.4 PERF.ML  
PE\_SR\_Control PE\_SL\_Control  
lo83a997ab.2908  
PE\_SL\_TRANSMITTR PE\_SR\_Mod2  
PE\_SL\_TRNSM\_LINE PE\_SR\_Mod1  
PE\_SR\_Kly2 PE\_SR\_TRANSMITTR  
PE\_SR\_TRNSM\_LINE PE\_SR\_Cy6  
PE\_SR\_Cy2 PE\_SR\_Cy5

DNKENR is logged in on stations:

131.169.209.99 131.169.209.128  
131.169.209.123

DNKENR has full control over:

PEHFDATA.4 PERF.ML  
PE\_SR\_Control PE\_SL\_Control  
lo83a997ab.2908  
PE\_SL\_TRANSMITTR PE\_SR\_Mod2  
PE\_SL\_TRNSM\_LINE PE\_SR\_Mod1  
PE\_SR\_Kly2 PE\_SR\_TRANSMITTR  
PE\_SR\_TRNSM\_LINE PE\_SR\_Cy6  
PE\_SR\_Cy2 PE\_SR\_Cy5

# Command Line Utilities

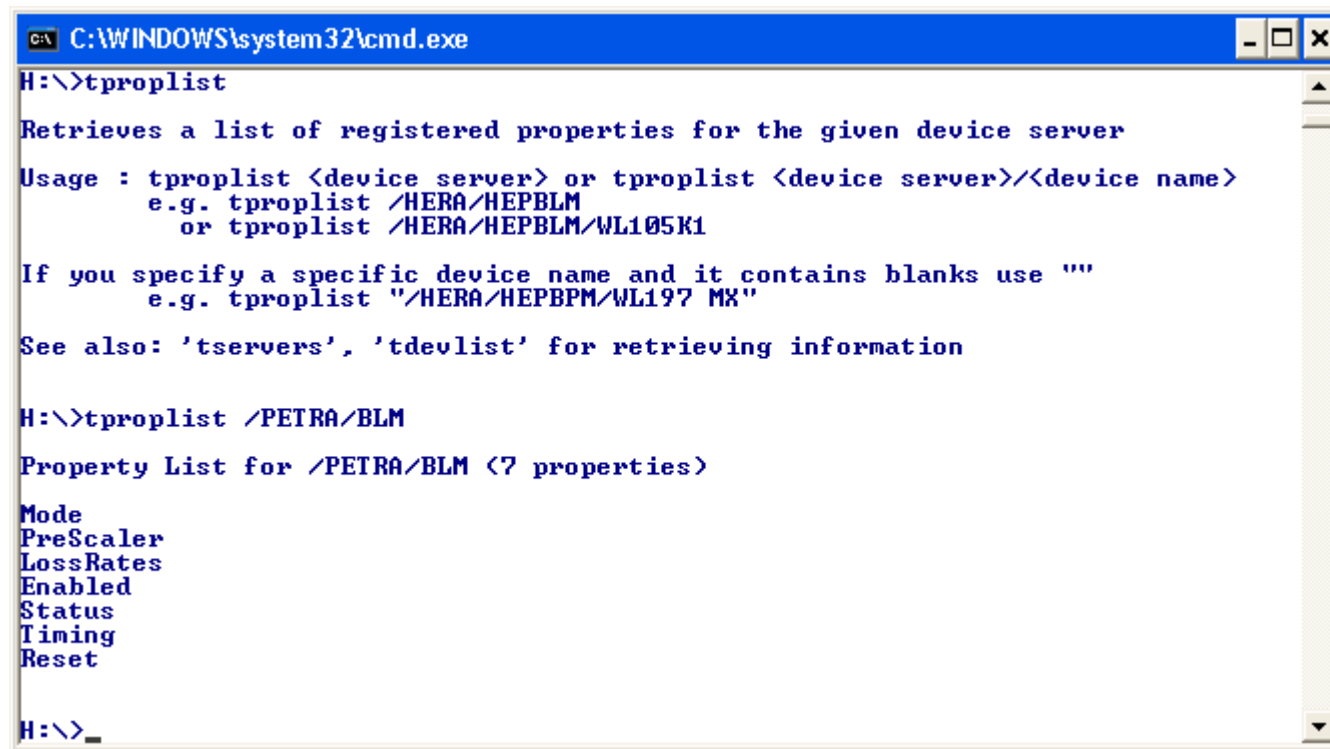


# Command Line Utilities

- See <http://tine.desy.de> (command line utilities)
- Query Utilities:
  - tservers
    - queries the Equipment Name Server ENS for registered servers
  - tdevlist
    - queries a server for its devices
  - tproplist
    - queries a server for its properties
  - tinfo
    - queries a server for property information

# Command Line Utilities

e.g.



```
C:\WINDOWS\system32\cmd.exe
H:\>tproplist

Retrieves a list of registered properties for the given device server

Usage : tproplist <device server> or tproplist <device server><device name>
       e.g. tproplist /HERA/HEPBLM
            or tproplist /HERA/HEPBLM/WL105K1

If you specify a specific device name and it contains blanks use ""
       e.g. tproplist "/HERA/HEPBPM/WL197 MX"

See also: 'tservers', 'tdevlist' for retrieving information

H:\>tproplist /PETRA/BLM

Property List for /PETRA/BLM (7 properties)

Mode
PreScaler
LossRates
Enabled
Status
Timing
Reset

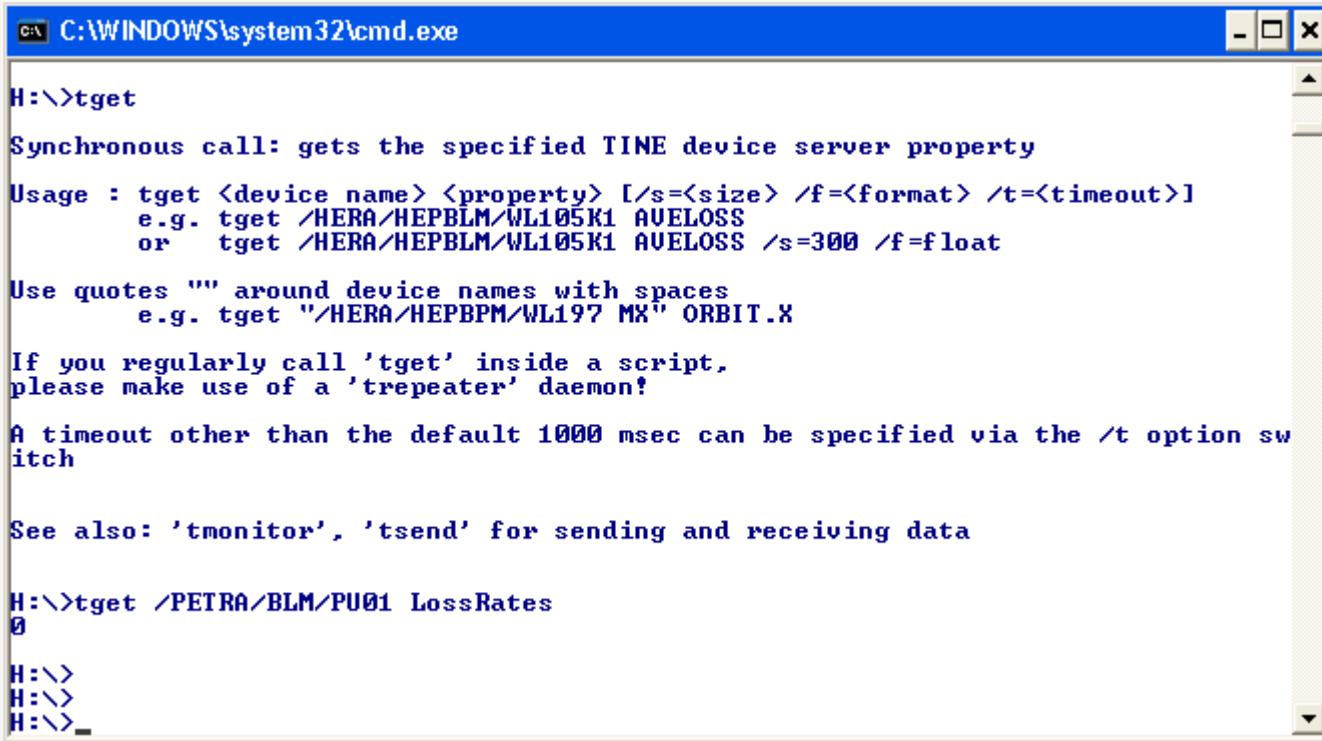
H:\>_
```

# Command Line Utilities

- Data Acquisition:
  - tget
    - synchronous read-only call to server
  - tmonitor
    - asynchronous read-only poll to server
  - tsend
    - synchronous write call to server
  - tputget
    - synchronous atomic write/read for attribute style properties
  - tsendrecv
    - synchronous atomic write/read for call style properties)
  - twait4target
    - monitor readback from a server until a requested target is met

# Command Line Utilities

e.g.



```
C:\WINDOWS\system32\cmd.exe

H:\>tget

Synchronous call: gets the specified TINE device server property

Usage : tget <device name> <property> [/s=<size> /f=<format> /t=<timeout>]
       e.g. tget /HERA/HEPBLM/WL105K1 AVELOSS
       or  tget /HERA/HEPBLM/WL105K1 AVELOSS /s=300 /f=float

Use quotes "" around device names with spaces
       e.g. tget "/HERA/HEPBPM/WL197 MX" ORBIT.X

If you regularly call 'tget' inside a script,
please make use of a 'trepeater' daemon!

A timeout other than the default 1000 msec can be specified via the /t option switch

See also: 'tmonitor', 'tsend' for sending and receiving data

H:\>tget /PETRA/BLM/PU01 LossRates
0

H:\>
H:\>
H:\>_
```

# Command Line Utilities

- Services:
  - thistory
    - queries the archive server for archive data
  - talarms
    - queries a specific server for its current alarm list
  - tglobals
    - monitors and displays the current globals for the context given.
  - teventdata
    - queries the event archive server for event data

# Command Line Utilities

e.g.

```
C:\WINDOWS\system32\cmd.exe
H:\>thistory

Retrieves a stored archive data for the keyword and device specified
Data can be obtained from a central archive server or from a local history,
depending on how the context and keyword are specified.

A simple keyword along with a context will contact the central archive
server for the context.

    e.g. thistory HERA HPDCCur now 1hour

The history depth can be specified in hours, days, weeks, or months and
is parsed as

    <number><time unit>

The history target time can be 'now', a valid unix timestamp, or a date
and time string in the form

    <day>.<month>.<year>_<hour>.<minute>.<second>

where all entries except <day> are optional from right to left.

    e.g. thistory HERA HPDCCur 31.05.2006 1day
        or thistory HERA HPDCCur 31.05.2006_12:00:00 1hour

A local history can be obtained by specifying the target device server
along with the context (<with a leading "/">)

    e.g. thistory /HERA/HEEKOLLI SOLLWERT HESL66i 31.05.2006 1day

A history snapshot of an array record at a specific time can be obtained
by specifying 'snapshot' as the depth parameter.

    e.g. thistory /HERA/HEPBPM ORBIT.X #1 7.06.2006_12:00:00 snapshot

returns the array data record stored at or after noon on June 7th 2006.
The timestamp of the record found is always displayed along with the data.

Usage : thistory <context> <keyword> <device name> <stop time> <depth>

H:\>thistory FLASH Energy 19.07.2011 1day
Energy/#0, Timestamp
954.794, Mon Jul 18 00:02:27 2011
954.799, Mon Jul 18 00:17:27 2011
954.825, Mon Jul 18 00:32:27 2011
955.072, Mon Jul 18 00:47:28 2011
954.96, Mon Jul 18 01:02:28 2011
954.773, Mon Jul 18 01:17:28 2011
954.819, Mon Jul 18 01:32:28 2011
954.829, Mon Jul 18 01:47:28 2011
954.741, Mon Jul 18 02:02:28 2011
954.962, Mon Jul 18 02:17:29 2011
954.897, Mon Jul 18 02:32:29 2011
955.103, Mon Jul 18 02:47:29 2011
954.68, Mon Jul 18 03:02:29 2011
954.9, Mon Jul 18 03:17:30 2011
954.821, Mon Jul 18 03:32:30 2011
954.67, Mon Jul 18 03:47:30 2011
954.865, Mon Jul 18 04:02:30 2011
```



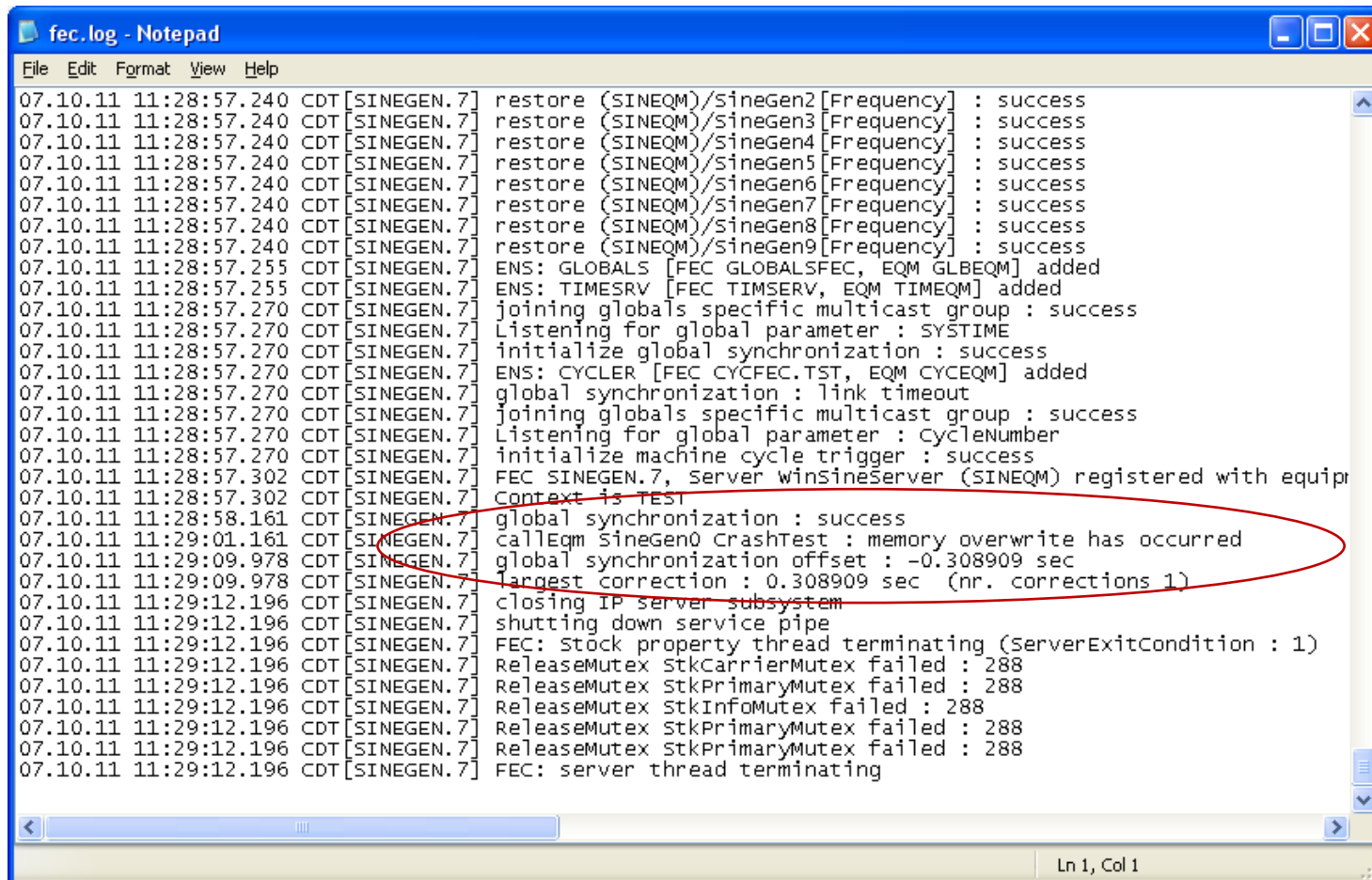
# Debugging Utilities



# Debugging Utilities

- See <http://tine.desy.de> -> “Remote Debugging Tools”
- Server Problems
  - *In the unlikely event of a [Crash](#)*
    - check core dumps, stack traces, etc.
    - report any TINE bugs to <http://tinetracker.desy.de>
    - note: segmentation faults or exceptions often occur in user code within dispatch routines !
    - check the last few entries in fec.log
      - detected memory overwrites in dispatch routines are logged (win32).
      - TINE configuration problems are logged.

# Debugging Utilities



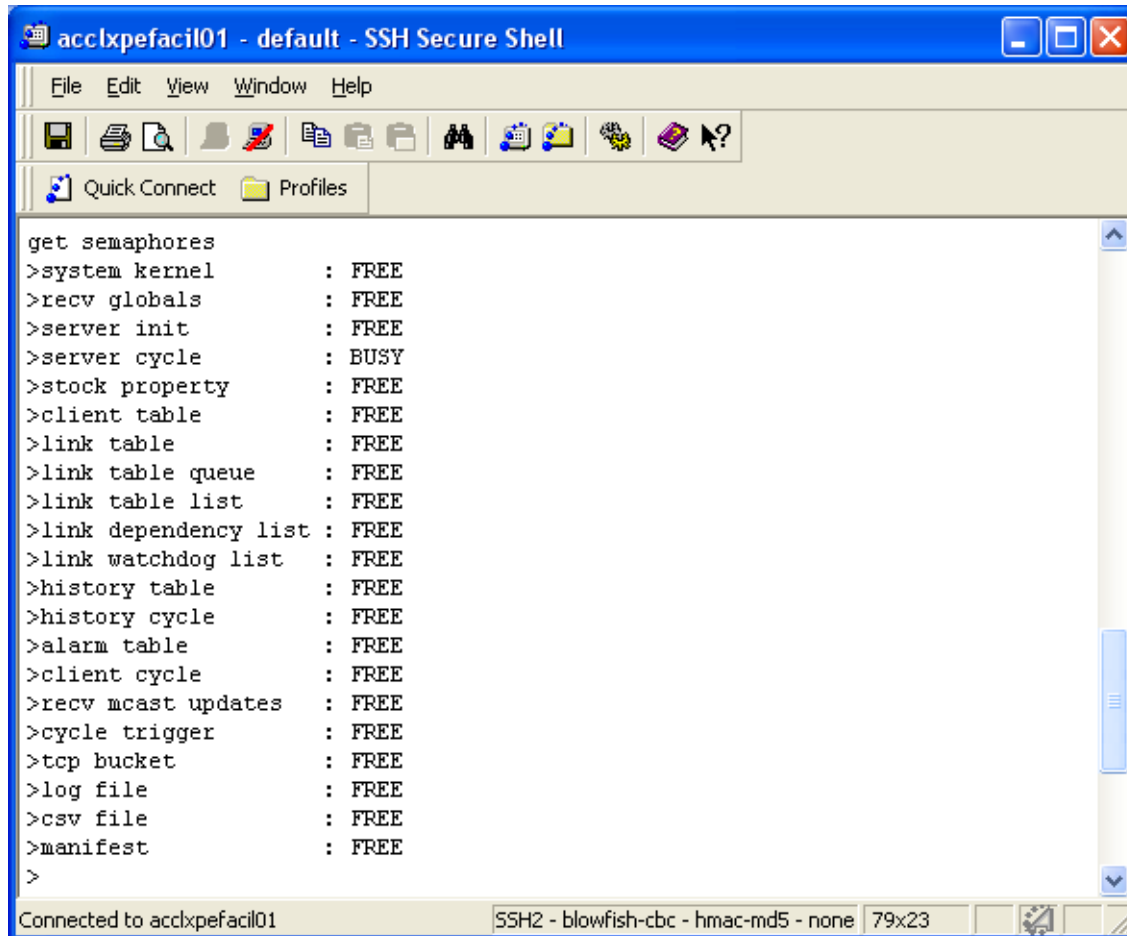
```
fec.log - Notepad
File Edit Format View Help
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen2[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen3[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen4[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen5[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen6[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen7[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen8[Frequency] : success
07.10.11 11:28:57.240 CDT[SINEGEN.7] restore (SINEQM)/sineGen9[Frequency] : success
07.10.11 11:28:57.255 CDT[SINEGEN.7] ENS: GLOBALS [FEC GLOBALSFEC, EQM GLBEQM] added
07.10.11 11:28:57.255 CDT[SINEGEN.7] ENS: TIMESRV [FEC TIMSERV, EQM TIMEQM] added
07.10.11 11:28:57.270 CDT[SINEGEN.7] joining globals specific multicast group : success
07.10.11 11:28:57.270 CDT[SINEGEN.7] Listening for global parameter : SYSTIME
07.10.11 11:28:57.270 CDT[SINEGEN.7] initialize global synchronization : success
07.10.11 11:28:57.270 CDT[SINEGEN.7] ENS: CYCLER [FEC CYCFEC.TST, EQM CYCEQM] added
07.10.11 11:28:57.270 CDT[SINEGEN.7] global synchronization : link timeout
07.10.11 11:28:57.270 CDT[SINEGEN.7] joining globals specific multicast group : success
07.10.11 11:28:57.270 CDT[SINEGEN.7] Listening for global parameter : cycleNumber
07.10.11 11:28:57.270 CDT[SINEGEN.7] initialize machine cycle trigger : success
07.10.11 11:28:57.302 CDT[SINEGEN.7] FEC SINEGEN.7, server winSineServer (SINEQM) registered with equip
07.10.11 11:28:57.302 CDT[SINEGEN.7] Context is TEST
07.10.11 11:28:58.161 CDT[SINEGEN.7] global synchronization : success
07.10.11 11:29:01.161 CDT[SINEGEN.7] callEqm sineGen0 CrashTest : memory overwrite has occurred
07.10.11 11:29:09.978 CDT[SINEGEN.7] global synchronization offset : -0.308909 sec
07.10.11 11:29:09.978 CDT[SINEGEN.7] largest correction : 0.308909 sec (nr. corrections 1)
07.10.11 11:29:12.196 CDT[SINEGEN.7] closing IP server subsystem
07.10.11 11:29:12.196 CDT[SINEGEN.7] shutting down service pipe
07.10.11 11:29:12.196 CDT[SINEGEN.7] FEC: Stock property thread terminating (ServerExitCondition : 1)
07.10.11 11:29:12.196 CDT[SINEGEN.7] ReleaseMutex stkCarrierMutex failed : 288
07.10.11 11:29:12.196 CDT[SINEGEN.7] ReleaseMutex stkPrimaryMutex failed : 288
07.10.11 11:29:12.196 CDT[SINEGEN.7] ReleaseMutex stkInfoMutex failed : 288
07.10.11 11:29:12.196 CDT[SINEGEN.7] ReleaseMutex stkPrimaryMutex failed : 288
07.10.11 11:29:12.196 CDT[SINEGEN.7] ReleaseMutex stkPrimaryMutex failed : 288
07.10.11 11:29:12.196 CDT[SINEGEN.7] FEC: server thread terminating
Ln 1, Col 1
```

# Debugging Utilities

- Server Problems
  - *In the unlikely event of a Hang*
    - check CPU load for the process
      - near 100% => infinite loop problem
      - near 0% => thread deadlock
    - use *attachfec* to check the activity
      - no response => debug thread is blocked too!
      - 'get semaphores' to check for deadlocks
      - 'set debug=1' to check for possible infinite loops, etc.

# Debugging Utilities

- Normal state of semaphores and mutexes:



The screenshot shows a terminal window titled "acclxpefaci01 - default - SSH Secure Shell". The terminal displays the output of the command "get semaphores", which lists various system components and their states. The status of each component is either "FREE" or "BUSY".

```
get semaphores
>system kernel      : FREE
>recv globals      : FREE
>server init       : FREE
>server cycle      : BUSY
>stock property    : FREE
>client table      : FREE
>link table        : FREE
>link table queue  : FREE
>link table list   : FREE
>link dependency list : FREE
>link watchdog list : FREE
>history table     : FREE
>history cycle     : FREE
>alarm table       : FREE
>client cycle      : FREE
>recv mcast updates : FREE
>cycle trigger     : FREE
>tcp bucket        : FREE
>log file          : FREE
>csv file          : FREE
>manifest          : FREE
>
```

The terminal window also shows a menu bar (File, Edit, View, Window, Help), a toolbar with icons for file operations, and a status bar at the bottom indicating the connection details: "Connected to acclxpefaci01" and "SSH2 - blowfish-cbc - hmac-md5 - none 79x23".

# Debugging Utilities

- Server Problems
  - Make use of *attachfec* as a general rule.
    - *Windows*: GUI
    - *Unix*: command line tool



- '*local pipe*'
  - does not involve the network
  - *attachfec* must run on same host as the FEC.
- '*remote stream*' connects via a dedicated TCP socket.

# Debugging Utilities

- e.g. attachfec /REGAE/Mag.Corr

The screenshot shows a terminal window titled "/REGAE/Mag.Corr Activity". At the top, there is an "Input Command:" field containing "help" and a "send" button. Below this is a menu bar with buttons for "Help", "clients", "contracts", "connections", "stats", "modules", "time", "version", and "security". The "clients" button is circled in red. To the right of the menu bar, there is a "Screen Buffer Size" field set to "1000" and a "Debug Level" section with radio buttons for "Off", "1", "2", "3", and "4". The main area of the window displays a list of commands and their descriptions, starting with "Currently available commands:". The list includes commands like "quit", "kill", "get modules", "get properties(<eqm>)", "get devices(<eqm>)", "get histories(<eqm>)", "get alarmwatch(<eqm>)", "get clients", "get contracts", "get contract(#)", "flush contracts", "flush clients", "get ServerIdle", "set ServerIdle", "get globals", "get connections", "get connection(#)", "get messages", "get BurstLimit", "set BurstLimit", "get CycleDelay", "set CycleDelay", "get time", "get version", "get users", "get nets", "get stats", "get settings", "get semaphores", "get threads", "get users", "get nets", "get filter", "set filter", "set debug = 0", "set debug = 1", "set debug = 2", "set debug = 3", "set debug = 4", "set logdbg = 0", "set logdbg = 1", "which <addr>", "dump histories(<eqm>)", and "help". There are also "Extra commands:" listed at the bottom: "histclear", "histdump", "dump", and "dump()". Red arrows point from a callout box on the right to the "set debug" and "set filter" commands. The callout box contains the text "very useful!".

```
Input Command: help
Screen Buffer Size: 1000 lines
Debug Level: Off 1 2 3 4

Currently available commands:
>
> quit - terminates process (foreground) or service viewer (background)
> kill - terminates process as well as service viewer
> get modules - displays a list of registered equipment modules
> get properties(<eqm>) - displays the registered properties for equipment module <eqm>
> get devices(<eqm>) - displays the registered devices for equipment module <eqm>
> get histories(<eqm>) - displays the registered local histories for equipment module <eqm>
> get alarmwatch(<eqm>) - displays the registered alarm watch table for equipment module <eqm>
> get clients - displays the current consumer list
> get contracts - displays the current contract list
> get contract(#) - displays contract Nr. <#> information
> flush contracts - removes all attached clients and their contracts
> flush clients - removes all attached clients and their contracts
> get ServerIdle - displays server cycle idle state
> set ServerIdle - sets server cycle idle state
> get globals - displays the current globals list
> get connections - displays the current connection list
> get connection(#) - displays connection Nr. <#> information
> get messages - displays the current system message table
> get BurstLimit - displays Burst Limit in packets
> set BurstLimit - sets Burst Limit to num packets input
> get CycleDelay - displays Cycle Delay in msec
> set CycleDelay - sets Cycle Delay to msec input
> get time - displays local time
> get version - displays TINE version number
> get users - displays WRITE access user list
> get nets - displays WRITE access net list
> get stats - displays operational statistics
> get settings - displays performance settings
> get semaphores - displays current semaphore status
> get threads - displays thread priorities
> get users - displays the users with WRITE permission
> get nets - displays the networks with WRITE access
> get filter - displays current debug output filter string
> set filter - sets debug output filter string
> set debug = 0 - turns debug printing off
> set debug = 1 - sets debug level 1 (trace commands)
> set debug = 2 - sets debug level 2 (trace network activity)
> set debug = 3 - sets debug level 2 (trace data exchange)
> set debug = 4 - sets debug level 3 (full diagnostic trace)
> set logdbg = 0 - turns debug logging off
> set logdbg = 1 - turns debug logging on
> which <addr> - display address information of target (e.g. 'which ENS')
> dump histories(<eqm>) - writes local history configuration into a manifest file
> help - display this list

>Extra commands:
> histclear - get function value
> histdump - get function value
> dump - get function value
> dump() - get function value
```

very useful !

# Debugging Utilities

The screenshot shows a terminal window titled "/REGAE/Mag.Corr Activity". At the top, there is an "Input Command:" field containing "get contract(7)". Below this are navigation buttons: "Help", "clients", "contracts", "connections", "stats", "modules", "time", "version", and "security". On the right, there is a "Screen Buffer Size" field set to "1000" lines and a "Debug Level" section with radio buttons for "Off", "1", "2", "3", and "4".

The main output area displays the following text:

```
help - display this list
Extra commands:
histclear - get function value
histdump - get function value
dump - get function value
dump()

CLIENT ADDRESS PROTOCOL CONTRACTS
(0) RGSPYFEC 131.169.153.213:8061 UDP 6
(1) RGFECSTATS 131.169.153.213:8055 UDP 1
(2) RGCASFEC 131.169.153.213:8057 UDP 3

Client: RGCASFEC
Inet Protocol: UDP, address : 131.169.153.213:8057
Time Protocol: 6, number contracts : 3

CONTRACT POLL TO
[0] PSCGRP ACTIVITY <#0> (68 elements) 30000 msecRGSPYFEC
[1] PSCGRP SRVSTATS <> (10 elements) 5000 msec RGFECSTATS
[2] PSCEQM ACTIVITY <#0> (68 elements) 30000 msecRGSPYFEC
[3] PSCGRP SRVLASTACCESS <#0> (1 elements) 30000 msecRGSPYFEC
[4] RegEQA ACTIVITY <#0> (68 elements) 30000 msecRGSPYFEC
[5] PSCEQM SRVLASTACCESS <#0> (1 elements) 30000 msecRGSPYFEC
[6] RegEQA SRVLASTACCESS <#0> (1 elements) 30000 msecRGSPYFEC
[7] PSCGRP NALARMS <*> (6 elements) 500 msec RGCASFEC
[8] RegEQA NALARMS <*> (6 elements) 500 msec RGCASFEC
[9] PSCEQM NALARMS <*> (6 elements) 500 msec RGCASFEC

CONTRACT:
>eqm: PSCGRP dev: * prp: NALARMS
>output: 6 INT32 elements (no tag)
>input: 0 NULL elements (no tag)
>current status: 129 last return code: 0 separate thread: NO
>POLL LAST SENT LAST STALE MISSES DELAYS
>500 msec 1317981743 sec 774100 usec 1317981718 sec 618231 u 0 0
>CLIENTS
>RGCASFEC [DATACHANGE] 500 ms +88 : FRESH 1317981718 s 618231 us 0 miss 0 rec
```

Four callout boxes with red arrows point to specific parts of the output:

- "get clients" points to the CLIENT table header and its three rows.
- "get client(2)" points to the "Client: RGCASFEC" line.
- "get contracts" points to the CONTRACT table header and its nine rows.
- "get contract(7)" points to the "CONTRACT:" section, specifically the "current status" line.



# Debugging Utilities

**/REGAE/Mag\_Corr Activity**

Input Command: help

Screen Buffer Size: 1000 lines

Debug Level: Off 1 2 3 4

Help clients contracts connections stats modules time version security

Currently available commands:

- quit - terminates process (foreground) or service viewer (background)
- kill - terminates process as well as service viewer
- get modules - displays a list of registered equipment modules
- get properties(<eqm>) - displays the registered properties for equipment module <eqm>
- get devices(<eqm>) - displays the registered devices for equipment module <eqm>
- get histories(<eqm>) - displays the registered local histories for equipment module <eqm>
- get alarmwatch(<eqm>) - displays the registered alarm watch table for equipment module <eqm>
- get clients - displays the current consumer list
- get contracts - displays the current contract list
- get contract(#)- displays contract Nr. <#> information
- flush contracts - removes all attached clients and their contracts
- flush clients - removes all attached clients and their contracts
- get ServerIdle - displays server cycle idle state
- set ServerIdle - sets server cycle idle state
- get globals - displays the current globals list
- get connections - displays the current connection list
- get connection(#)- displays connection Nr. <#> information
- get messages - displays the current system message table
- get BurstLimit - displays Burst Limit in packets
- set BurstLimit - sets Burst Limit to num packets input
- get CycleDelay - displays Cycle Delay in msec
- set CycleDelay - sets Cycle Delay to msec input
- get time - displays local time
- get version - displays TINE version number
- get users - displays WRITE access user list
- get nets - displays WRITE access net list
- get stats - displays operational statistics
- get settings - displays performance settings
- get semaphores - displays current semaphore status
- get threads - displays thread priorities
- get users - displays the users with WRITE permission
- get nets - displays the networks with WRITE access
- get filter - displays current debug output filter string
- set filter - sets debug output filter string
- set debug = 0 - turns debug printing off
- set debug = 1 - sets debug level 1 (trace commands)
- set debug = 2 - sets debug level 2 (trace network activity)
- set debug = 3 - sets debug level 3 (trace data exchange)
- set debug = 4 - sets debug level 3 (full diagnostic trace)
- set logdbg = 0 - turns debug logging off
- set logdbg = 1 - turns debug logging on
- which <addr> - display address information of target (e.g. 'which ENS')
- dump histories(<eqm>) - writes local history configuration into a manifest file
- help - display this list

Extra commands:

- histclear - get function value
- histdump - get function value
- dump - get function value
- dump()

What are these and how did they get there ?

# Debugging Utilities

## Function Documentation

get/set style commands  
(legacy routine)

```
int RegisterUserCommand ( char *      cmd,  
                        int(*) (int, int, int, int) fcn,  
                        int *      iparam,  
                        float *    fparam,  
                        int         access  
                        )
```

Registers a user-defined command or variable which can be accessed via the TINE command line interpreter.

As a console application, a running tine server (or client) offers a variety of services at the command line (just type 'help'). For instance, you can turn debugging on or off, get the current server statistics, examine the connection tables, etc. This interface is available via the 'remote' accessor even if the server is running in the background. It is often frequently desirable to examine or alter server-specific variables or call a server specific routine. This can be partially achieved by making use of this registration function.

### Parameters:

**cmd** is the command string to be parsed by the command interpreter.

**fcn** is an optional user defined function taking four integer arguments.

**iparam** is a pointer to an optional global integer variable.

**fparam** is a pointer to an optional global float variable.

**access** is a TINE access code (either CA\_READ or CA\_READ|CA\_WRITE). To allow 'set' commands at the command line, you should include the CA\_WRITE flag.

### Note:

Only one of fcn, iparam, or fparam, should be non-NULL when making this call. If the user types "get <cmd>" without arguments at the command line, then either iparam or fparam is displayed on the console, depending on which parameter was non-NULL at registration time. Likewise "set <cmd> = <val>" can set this variable to a value entered at the console. If a function is registered, then "get <cmd>(arg1,arg2,arg3,arg4)" will call the function registered with the arguments supplied. "set <cmd>(arg1,arg2,arg3,arg4) = <val>" will set all arguments equal to <val> and then call the function. If fewer arguments than 4 are supplied then the function will be called with '0' for the missing arguments.

A more reasonable command line function registration call is underway. However the routine so presented is generally sufficient for checking hardware readouts etc. and checking and setting the contents of global variables.

### Returns:

0 if successful, otherwise a TINE completion code

# Debugging Utilities

'Call' style (modern)

```
int RegisterUserFunction ( char *          name,  
                          int (*)(int argc, char *argv[]) fcn  
                          )
```

Registers a user-defined function which can be accessed via the TINE command line interpreter.

As a console application, a running tine server (or client) offers a variety of services at the command line (just type 'help'). For instance, you can turn debugging on or off, get the current server statistics, examine the connection tables, etc. This interface is available via the 'remote' accessor even if the server is running in the background. It is often frequently desirable to examine or alter server-specific variables or call a server specific routine. This can be partially achieved by making use of this registration function.

#### Parameters:


**name** is a string identifying the function to be parsed by the command interpreter.  
**fcn** is the user defined function taking the argc and argv.

#### Returns:

0 if successful, otherwise a TINE completion code

e.g.

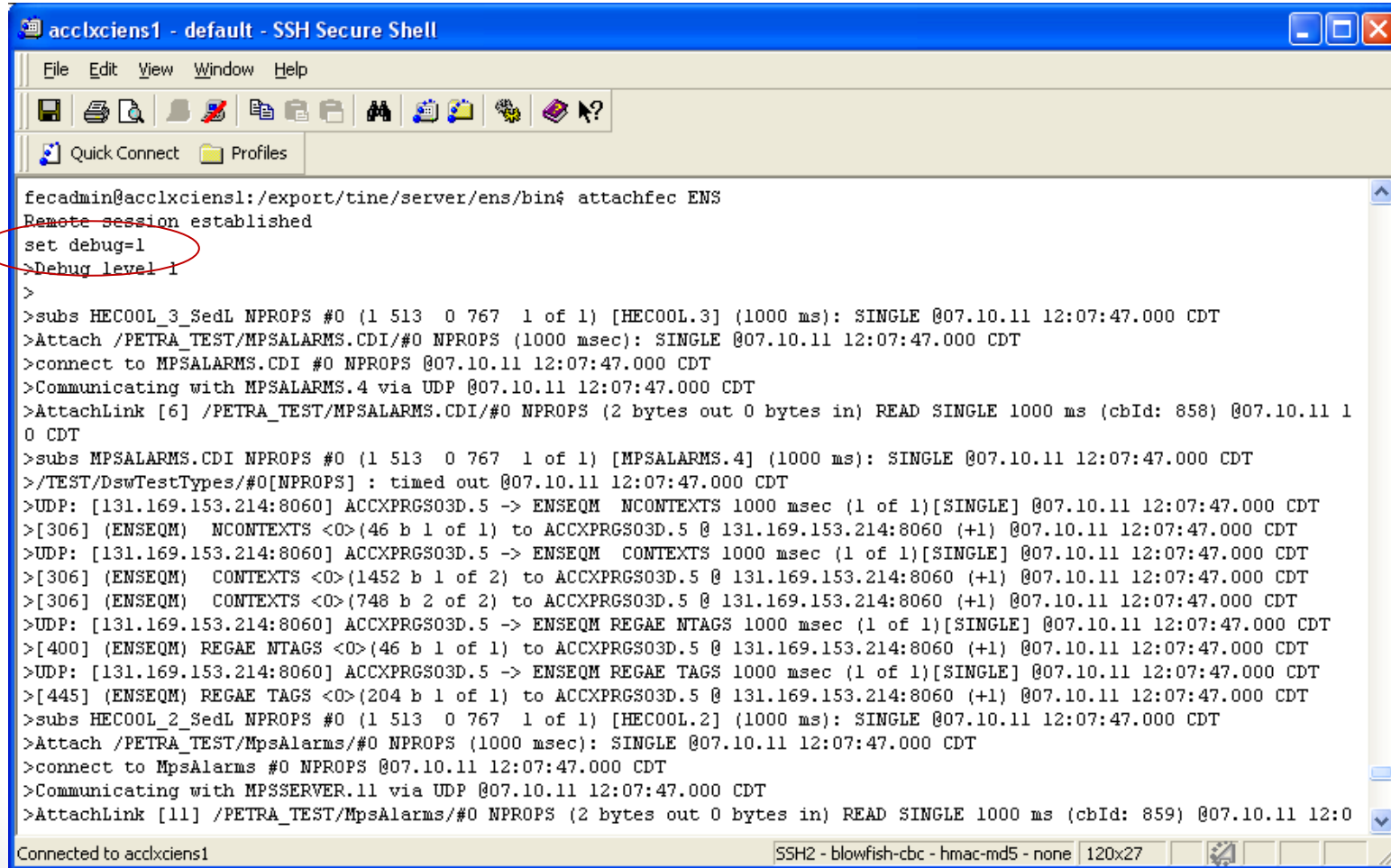
```
// other initialization omitted ...  
RegisterUserFunction("reload", daqReload);  
// ...  
  
int daqReload(int argc, char *argv[])  
{  
    argc = argc; argv = argv;  
    feclog("reload DAQ database");  
    /* flushStructCache(); */  
    freeDaqDb();  
    /* we should be back to square one now */  
    daqInit();  
    return 0;  
}
```



Then: type 'reload' at the command prompt to call the designated function.

# Debugging Utilities

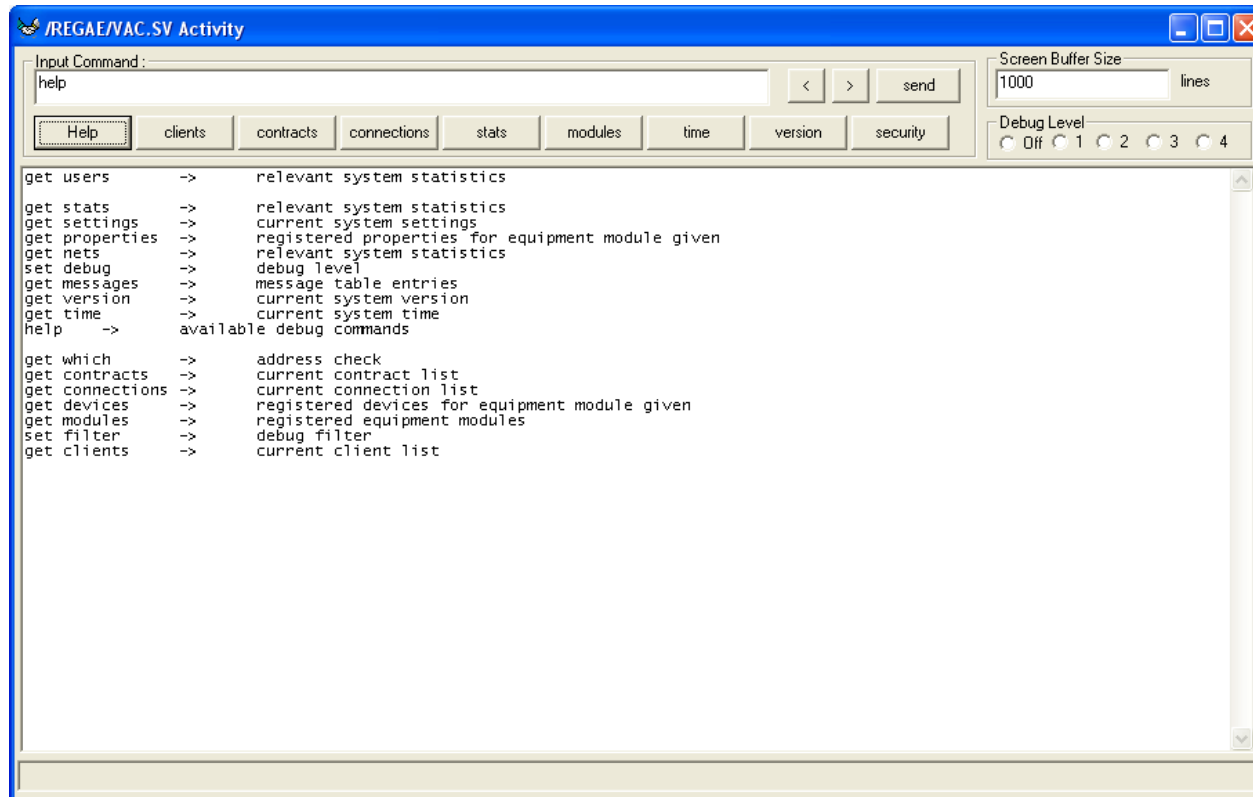
- attachfec ENS (someone who is usually busy!)



```
accbxciens1 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
fecadmin@accbxciens1:/export/tine/server/ens/bin$ attachfec ENS
Remote session established
set debug=1
>Debug level 1
>
>subs HEC00L_3_SedL NPROPS #0 (1 513 0 767 1 of 1) [HEC00L.3] (1000 ms): SINGLE @07.10.11 12:07:47.000 CDT
>Attach /PETRA_TEST/MPSALARMS.CDI/#0 NPROPS (1000 msec): SINGLE @07.10.11 12:07:47.000 CDT
>connect to MPSALARMS.CDI #0 NPROPS @07.10.11 12:07:47.000 CDT
>Communicating with MPSALARMS.4 via UDP @07.10.11 12:07:47.000 CDT
>AttachLink [6] /PETRA_TEST/MPSALARMS.CDI/#0 NPROPS (2 bytes out 0 bytes in) READ SINGLE 1000 ms (cbId: 858) @07.10.11 12:07:47.000 CDT
>subs MPSALARMS.CDI NPROPS #0 (1 513 0 767 1 of 1) [MPSALARMS.4] (1000 ms): SINGLE @07.10.11 12:07:47.000 CDT
>/TEST/DswTestTypes/#0[NPROPS] : timed out @07.10.11 12:07:47.000 CDT
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM NCONTEXTS 1000 msec (1 of 1)[SINGLE] @07.10.11 12:07:47.000 CDT
>[306] (ENSEQM) NCONTEXTS <0>(46 b 1 of 1) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @07.10.11 12:07:47.000 CDT
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM CONTEXTS 1000 msec (1 of 1)[SINGLE] @07.10.11 12:07:47.000 CDT
>[306] (ENSEQM) CONTEXTS <0>(748 b 2 of 2) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @07.10.11 12:07:47.000 CDT
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM REGAE NTAGS 1000 msec (1 of 1)[SINGLE] @07.10.11 12:07:47.000 CDT
>[400] (ENSEQM) REGAE NTAGS <0>(46 b 1 of 1) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @07.10.11 12:07:47.000 CDT
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM REGAE TAGS 1000 msec (1 of 1)[SINGLE] @07.10.11 12:07:47.000 CDT
>[445] (ENSEQM) REGAE TAGS <0>(204 b 1 of 1) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @07.10.11 12:07:47.000 CDT
>subs HEC00L_2_SedL NPROPS #0 (1 513 0 767 1 of 1) [HEC00L.2] (1000 ms): SINGLE @07.10.11 12:07:47.000 CDT
>Attach /PETRA_TEST/MpsAlarms/#0 NPROPS (1000 msec): SINGLE @07.10.11 12:07:47.000 CDT
>connect to MpsAlarms #0 NPROPS @07.10.11 12:07:47.000 CDT
>Communicating with MPSSERVER.11 via UDP @07.10.11 12:07:47.000 CDT
>AttachLink [11] /PETRA_TEST/MpsAlarms/#0 NPROPS (2 bytes out 0 bytes in) READ SINGLE 1000 ms (cbId: 859) @07.10.11 12:07:47.000 CDT
Connected to accbxciens1 SSH2 - blowfish-cbc - hmac-md5 - none 120x27
```

# Debugging Utilities

- NOTE: java servers
  - have a reduced set of debug commands
  - have slightly different output with debug > 0



# Debugging Utilities

- General overview of all servers :

The screenshot displays the 'FEC Remote Control Panel' interface. It features a menu bar (File, View, Tools, Help) and a main window divided into several sections:

- Server List:** A table listing various servers with columns for name, PE, PENE, and Temp/Trigger modules.
- Host Information:** Details for the selected server 'lo83a997ab.2908', including OS (UNIX), Host Computer (acclxpedoocs1.desy.de), and Location (30 rm 102 PE-R4 (Sw/8)).
- Device Servers:** A list of device servers, with 'VAC.HF\_ION\_PUMP' selected. It includes buttons for Ping, Control, and Restart.
- Device Context:** A dropdown menu set to 'PETRA' and a grid of checked subsystems (SER, VAC, TRANS, EXP, DIAG, TIM, INJ, VIDEO, HIST, PINTLK, MEX, TEST, RF, MAG, INSTR).
- Activity Log:** A table showing server status, local time, start time, poll rate, and various performance metrics like contracts, clients, and packet counts.
- OS Color Code:** A row of colored buttons for different operating systems: Dos, Unix, VxWorks, VMS, Win16, Win32, Java.
- FEC Importance:** A dropdown menu currently set to 'ALL'.

At the bottom left, the status bar shows the time '12:24:47' and the level 'Normal'.

# Debugging Utilities

- Client problems (where the client is not a FEC)
  - just some process (not bound to a host, port, pid, ...)
    - no de-facto log file.
  - GUI applications with the ACOP spider can launch a console-like debugging session. (java and activeX)
    - ACOP Tarantula can provide a complete hierarchical link status tree (java only)
  - Can also use 'attachfec' locally (even though it isn't a FEC) if the partners can agree on a pipe name!
    - e.g. the pid

# Debugging Utilities

**Ante Linac Chopper**

File Options Help

Betriebszustand

Chopper einschalten

Chopper in den Sparzustand schalten

Chopper ausschalten

Prepuls Ein

Hochspannung Ein

Gitter Ein

Heizung Ein

Lüfter Ein

Puls

Position - fein Breite - fein

Soll: 984.597µs 984.597E-6s Old store

-10ns -1ns -100ps +100ps +1ns +10ns

Timing

884.597µs

200

IniDatei

**Tine Status Viewer**

Links Tarantula Messages Exceptions

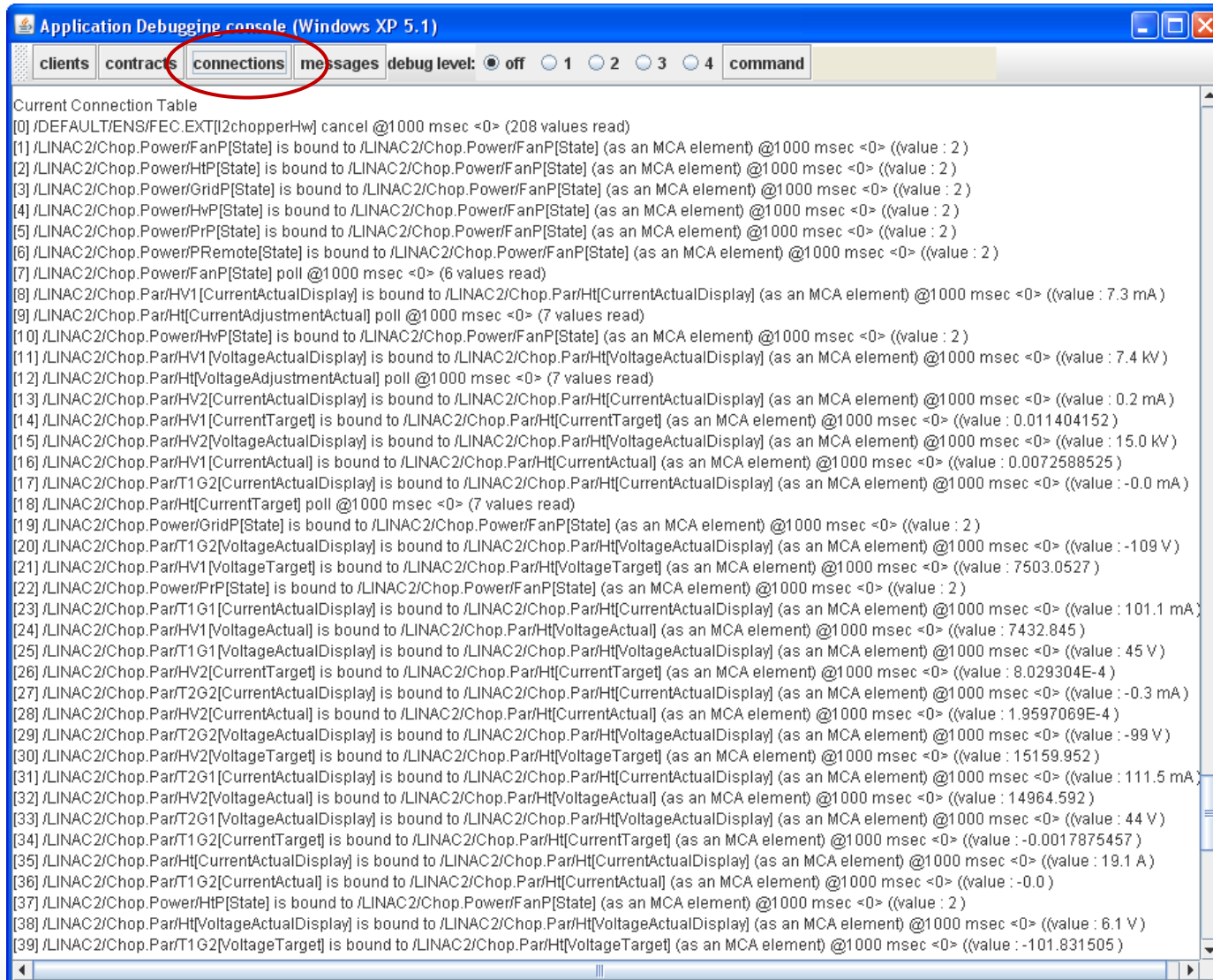
Timestamp	Status	Message
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Power/FanP/State
Fri Oct 07 14:30:41 CEST 2011	success	./LINAC2/Chop.Par/Ht/CurrentAdjustmentActual
Fri Oct 07 14:30:41 CEST 2011	success	./LINAC2/Chop.Par/Ht/VoltageAdjustmentActual
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Par/Ht/CurrentTarget
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Par/Ht/VoltageTarget
Fri Oct 07 14:29:42 CEST 2011	success	./LINAC2/Chop.Par/#0/NALARMS
Fri Oct 07 14:30:41 CEST 2011	success	./LINAC2/ChopperTiming/GEMEINSAM/Time
Fri Oct 07 14:30:41 CEST 2011	success	./LINAC2/ChopperTiming/PULSBREITE/Time
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Par/Ht/CurrentActualDisplay
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Par/Ht/VoltageActualDisplay
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.FanAnCo/Freq/ActualDisplay
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/ChopperTraces/Timing/ErrorString
Fri Oct 07 14:30:41 CEST 2011	success	./LINAC2/Chop.Par/Ht/CurrentActual
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/Chop.Par/Ht/VoltageActual
Fri Oct 07 14:30:40 CEST 2011	success	./LINAC2/ChopperTraces/Timing/Trace
Wed Oct 05 11:29:34 CEST 2011	success	./LINAC2/ChopperTraces/Timing/Trace.REF

Clear Refresh

Close  Debug Debug level:  1  2 History



# Debugging Utilities



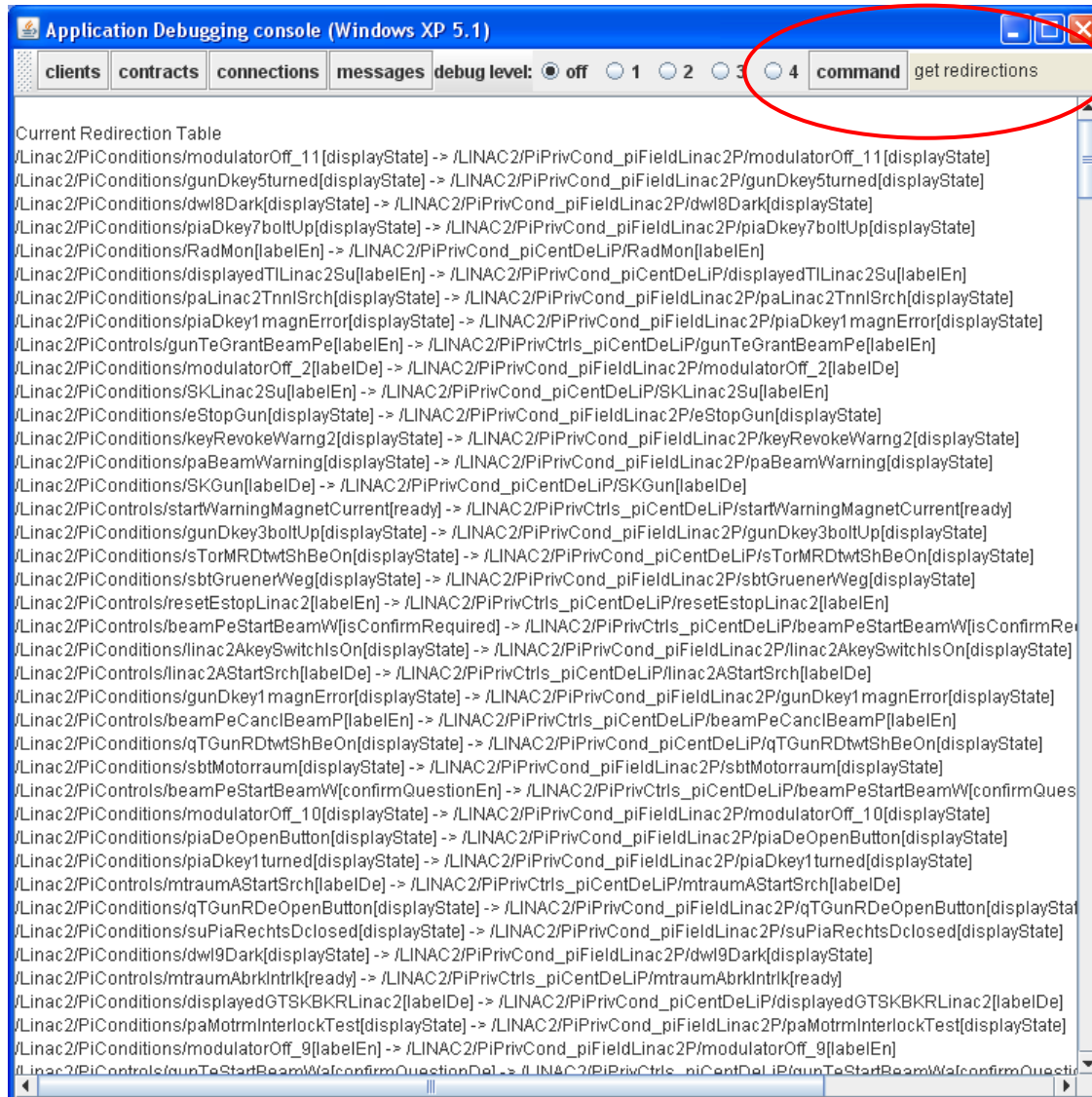
Application Debugging console (Windows XP 5.1)

clients contracts **connections** messages debug level:  off  1  2  3  4 command

Current Connection Table

- [0] /DEFAULT/ENS/FEC.EXT[I2chopperHw] cancel @1000 msec <0> (208 values read)
- [1] /LINAC2/Chop.Power/FanP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [2] /LINAC2/Chop.Power/HtP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [3] /LINAC2/Chop.Power/GridP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [4] /LINAC2/Chop.Power/HvP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [5] /LINAC2/Chop.Power/PrP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [6] /LINAC2/Chop.Power/PRemote[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [7] /LINAC2/Chop.Power/FanP[State] poll @1000 msec <0> (6 values read)
- [8] /LINAC2/Chop.Par/HV1[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : 7.3 mA)
- [9] /LINAC2/Chop.Par/Ht[CurrentAdjustmentActual] poll @1000 msec <0> (7 values read)
- [10] /LINAC2/Chop.Power/HvP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [11] /LINAC2/Chop.Par/HV1[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : 7.4 kV)
- [12] /LINAC2/Chop.Par/Ht[CurrentAdjustmentActual] poll @1000 msec <0> (7 values read)
- [13] /LINAC2/Chop.Par/HV2[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : 0.2 mA)
- [14] /LINAC2/Chop.Par/HV1[CurrentTarget] is bound to /LINAC2/Chop.Par/Ht[CurrentTarget] (as an MCA element) @1000 msec <0> ((value : 0.011404152)
- [15] /LINAC2/Chop.Par/HV2[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : 15.0 kV)
- [16] /LINAC2/Chop.Par/HV1[CurrentActual] is bound to /LINAC2/Chop.Par/Ht[CurrentActual] (as an MCA element) @1000 msec <0> ((value : 0.0072588525)
- [17] /LINAC2/Chop.Par/T1G2[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : -0.0 mA)
- [18] /LINAC2/Chop.Par/Ht[CurrentTarget] poll @1000 msec <0> (7 values read)
- [19] /LINAC2/Chop.Power/GridP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [20] /LINAC2/Chop.Par/T1G2[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : -109 V)
- [21] /LINAC2/Chop.Par/HV1[VoltageTarget] is bound to /LINAC2/Chop.Par/Ht[VoltageTarget] (as an MCA element) @1000 msec <0> ((value : 7503.0527)
- [22] /LINAC2/Chop.Power/PrP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [23] /LINAC2/Chop.Par/T1G1[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : 101.1 mA)
- [24] /LINAC2/Chop.Par/HV1[VoltageActual] is bound to /LINAC2/Chop.Par/Ht[VoltageActual] (as an MCA element) @1000 msec <0> ((value : 7432.845)
- [25] /LINAC2/Chop.Par/T1G1[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : 45 V)
- [26] /LINAC2/Chop.Par/HV2[CurrentTarget] is bound to /LINAC2/Chop.Par/Ht[CurrentTarget] (as an MCA element) @1000 msec <0> ((value : 8.029304E-4)
- [27] /LINAC2/Chop.Par/T2G2[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : -0.3 mA)
- [28] /LINAC2/Chop.Par/HV2[CurrentActual] is bound to /LINAC2/Chop.Par/Ht[CurrentActual] (as an MCA element) @1000 msec <0> ((value : 1.9597069E-4)
- [29] /LINAC2/Chop.Par/T2G2[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : -99 V)
- [30] /LINAC2/Chop.Par/HV2[VoltageTarget] is bound to /LINAC2/Chop.Par/Ht[VoltageTarget] (as an MCA element) @1000 msec <0> ((value : 15159.952)
- [31] /LINAC2/Chop.Par/T2G1[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : 111.5 mA)
- [32] /LINAC2/Chop.Par/HV2[VoltageActual] is bound to /LINAC2/Chop.Par/Ht[VoltageActual] (as an MCA element) @1000 msec <0> ((value : 14964.592)
- [33] /LINAC2/Chop.Par/T2G1[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : 44 V)
- [34] /LINAC2/Chop.Par/T1G2[CurrentTarget] is bound to /LINAC2/Chop.Par/Ht[CurrentTarget] (as an MCA element) @1000 msec <0> ((value : -0.0017875457)
- [35] /LINAC2/Chop.Par/Ht[CurrentActualDisplay] is bound to /LINAC2/Chop.Par/Ht[CurrentActualDisplay] (as an MCA element) @1000 msec <0> ((value : 19.1 A)
- [36] /LINAC2/Chop.Par/T1G2[CurrentActual] is bound to /LINAC2/Chop.Par/Ht[CurrentActual] (as an MCA element) @1000 msec <0> ((value : -0.0)
- [37] /LINAC2/Chop.Power/HtP[State] is bound to /LINAC2/Chop.Power/FanP[State] (as an MCA element) @1000 msec <0> ((value : 2)
- [38] /LINAC2/Chop.Par/Ht[VoltageActualDisplay] is bound to /LINAC2/Chop.Par/Ht[VoltageActualDisplay] (as an MCA element) @1000 msec <0> ((value : 6.1 V)
- [39] /LINAC2/Chop.Par/T1G2[VoltageTarget] is bound to /LINAC2/Chop.Par/Ht[VoltageTarget] (as an MCA element) @1000 msec <0> ((value : -101.831505)

# Debugging Utilities



# Debugging Utilities

The screenshot shows the 'Tine Status Viewer' application window. It has a blue title bar and a menu bar with 'Links', 'Tarantula', 'Messages', and 'Exceptions'. Below the menu bar, there are controls for 'Max Loop Time' (set to 60 s) and a 'Filter' dropdown (set to 'All Connections'). A 'Help' button is also present.

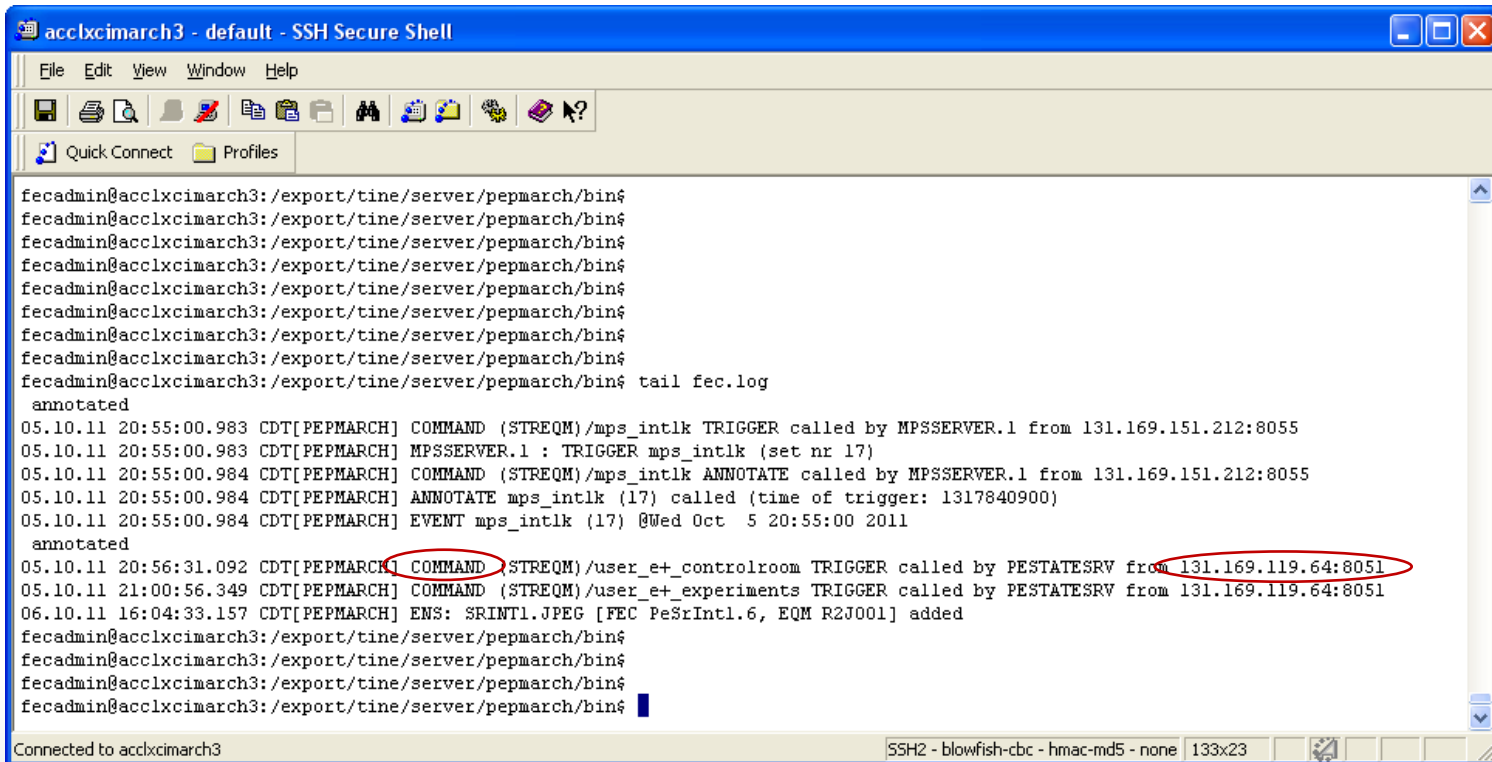
The main area displays the 'Network Connectivity Structure (NCS)' with a tree view of application connections. The connections are listed as 'Link OK' with their respective addresses. A context menu is open over one of the links, showing the following details:

Description:	Buffer fuer die letzten gesetzten Zeiten des B
Responsible:	labudda
Location:	bldg 30 rm 102 IE-R2 (Sw/8)
FEC name:	l2chopsrv
Equipment name:	CHO006
Operating system:	JAVA
TINE version:	4.2.5
Hardware:	sedac/cdi
Host name:	AccXpL2R2e.desy.de (131.169.154.219)
Port offset:	2

At the bottom of the window, there are controls for 'Structure Depth' (set to 3), 'Expand All', 'Collapse All', and 'Start Refreshing the Structure!' buttons. A 'Close' button, a 'Debug' checkbox, a 'Debug level' selector (set to 1), and a 'History' button are also visible.

# Debugging Utilities

- Finding the *'bad'* client ...
  - A server is *'under attack'* from some client
  - The clients network address (including port) is displayed in the server's *fec.log* as well as on the debug console.



```
acclxcimarch3 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

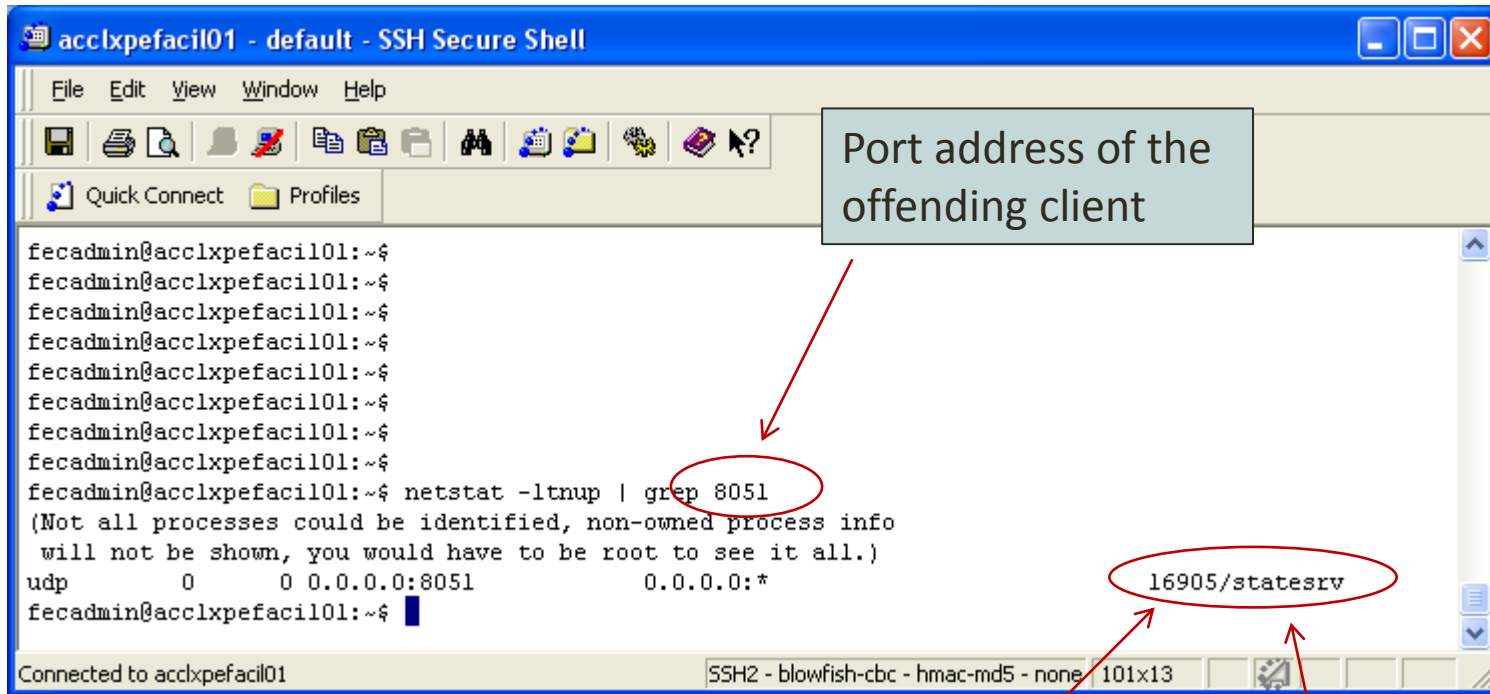
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$ tail fec.log
annotated
05.10.11 20:55:00.983 CDT[PEPMARCH] COMMAND (STREQM)/mps_intlk TRIGGER called by MPSSERVER.1 from 131.169.151.212:8055
05.10.11 20:55:00.983 CDT[PEPMARCH] MPSSERVER.1 : TRIGGER mps_intlk (set nr 17)
05.10.11 20:55:00.984 CDT[PEPMARCH] COMMAND (STREQM)/mps_intlk ANNOTATE called by MPSSERVER.1 from 131.169.151.212:8055
05.10.11 20:55:00.984 CDT[PEPMARCH] ANNOTATE mps_intlk (17) called (time of trigger: 1317840900)
05.10.11 20:55:00.984 CDT[PEPMARCH] EVENT mps_intlk (17) @Wed Oct 5 20:55:00 2011
annotated
05.10.11 20:56:31.092 CDT[PEPMARCH] COMMAND (STREQM)/user_e+_controlroom TRIGGER called by PESTATESRV from 131.169.119.64:8051
05.10.11 21:00:56.349 CDT[PEPMARCH] COMMAND (STREQM)/user_e+_experiments TRIGGER called by PESTATESRV from 131.169.119.64:8051
06.10.11 16:04:33.157 CDT[PEPMARCH] ENS: SRINT1.JPEG [FEC PeSrIntl.6, EQM R2J001] added
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
fecadmin@acclxcimarch3:/export/tine/server/pepmarch/bin$
```

Connected to acclxcimarch3

SSH2 - blowfish-cbc - hmac-md5 - none 133x23

# Debugging Utilities

- login to 131.169.119.64 and use e.g. 'netstat' (for linux)



Port address of the offending client

pid

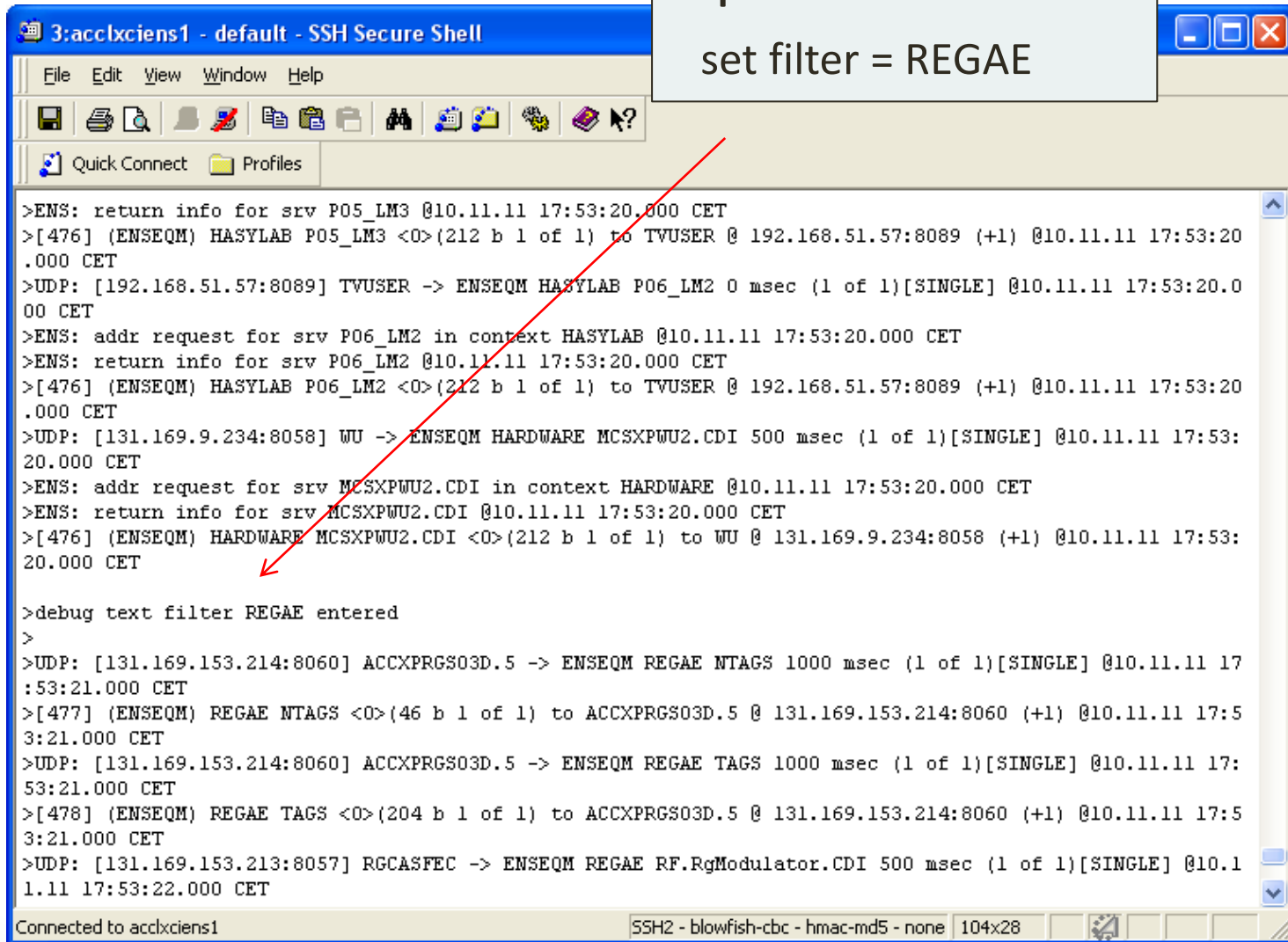
process name

# Debugging

- Things that sometimes happen ....
  - *Rapid polling from a client*
    - e.g. a script running through all 1000 devices one-by-one at 1 Hz.
    - will make the server (and probably the network) very busy
    - a script doing this will also make the ENS busy !
- Use '*filters*' to help find needles in haystacks ...
  - positive filter
  - negative filter

# Debugging

a positive filter :  
set filter = REGAE



```
3:acclxciens1 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles

>ENS: return info for srv P05_LM3 @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P05_LM3 <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P06_LM2 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv P06_LM2 in context HASYLAB @10.11.11 17:53:20.000 CET
>ENS: return info for srv P06_LM2 @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P06_LM2 <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [131.169.9.234:8058] WU -> ENSEQM HARDWARE MCSXPWU2.CDI 500 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv MCSXPWU2.CDI in context HARDWARE @10.11.11 17:53:20.000 CET
>ENS: return info for srv MCSXPWU2.CDI @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HARDWARE MCSXPWU2.CDI <0>(212 b 1 of 1) to WU @ 131.169.9.234:8058 (+1) @10.11.11 17:53:20.000 CET

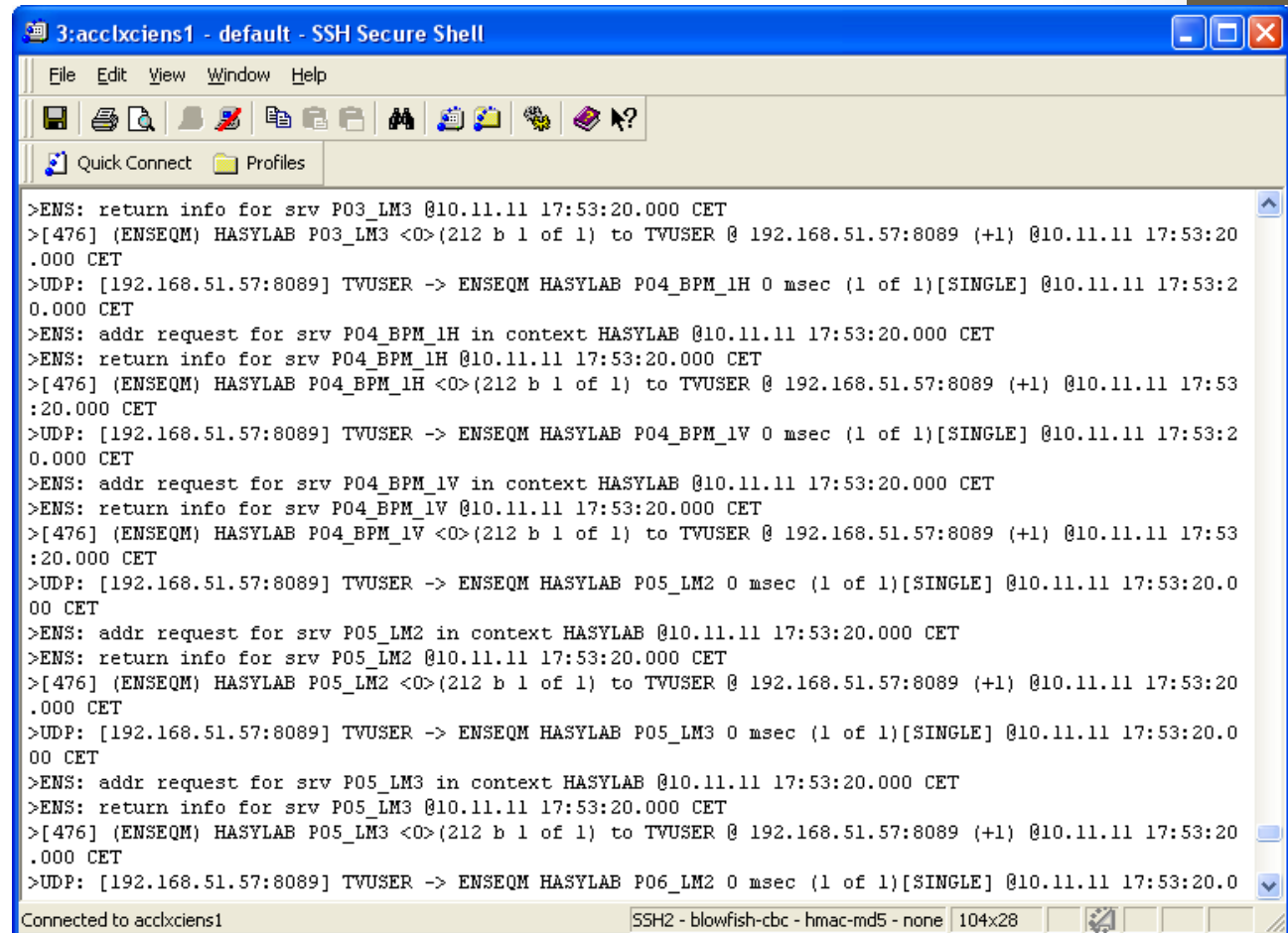
>debug text filter REGAE entered
>
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM REGAE NTAGS 1000 msec (1 of 1)[SINGLE] @10.11.11 17:53:21.000 CET
>[477] (ENSEQM) REGAE NTAGS <0>(46 b 1 of 1) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @10.11.11 17:53:21.000 CET
>UDP: [131.169.153.214:8060] ACCXPRGS03D.5 -> ENSEQM REGAE TAGS 1000 msec (1 of 1)[SINGLE] @10.11.11 17:53:21.000 CET
>[478] (ENSEQM) REGAE TAGS <0>(204 b 1 of 1) to ACCXPRGS03D.5 @ 131.169.153.214:8060 (+1) @10.11.11 17:53:21.000 CET
>UDP: [131.169.153.213:8057] RGCASFEC -> ENSEQM REGAE RF.RgModulator.CDI 500 msec (1 of 1)[SINGLE] @10.11.11 17:53:22.000 CET

Connected to acclxciens1 SSH2 - blowfish-cbc - hmac-md5 - none 104x28
```

# Debugging

But sometimes  
you want to filter  
'out' and not filter  
'in' :

e.g. get rid of  
"TVUSER" from  
the output !



```
3:acclxciens1 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
>ENS: return info for srv P03_LM3 @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P03_LM3 <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P04_BPM_1H 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv P04_BPM_1H in context HASYLAB @10.11.11 17:53:20.000 CET
>ENS: return info for srv P04_BPM_1H @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P04_BPM_1H <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P04_BPM_1V 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv P04_BPM_1V in context HASYLAB @10.11.11 17:53:20.000 CET
>ENS: return info for srv P04_BPM_1V @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P04_BPM_1V <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P05_LM2 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv P05_LM2 in context HASYLAB @10.11.11 17:53:20.000 CET
>ENS: return info for srv P05_LM2 @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P05_LM2 <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P05_LM3 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
>ENS: addr request for srv P05_LM3 in context HASYLAB @10.11.11 17:53:20.000 CET
>ENS: return info for srv P05_LM3 @10.11.11 17:53:20.000 CET
>[476] (ENSEQM) HASYLAB P05_LM3 <0>(212 b 1 of 1) to TVUSER @ 192.168.51.57:8089 (+1) @10.11.11 17:53:20.000 CET
>UDP: [192.168.51.57:8089] TVUSER -> ENSEQM HASYLAB P06_LM2 0 msec (1 of 1)[SINGLE] @10.11.11 17:53:20.000 CET
Connected to acclxciens1 SSH2 - blowfish-cbc - hmac-md5 - none 104x28
```



# Debugging

a negative filter :  
set filter = -TVUSER

```
3:acclxciens1 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
fecadmin@acclxciens1:/export/tine/server/gens/bin$ attachfec ENS
Remote session established
set filter=-TVUSER
>debug negative text filter TVUSER entered
>
set debug=1
>Debug level 1
>
>UDP: [131.169.72.139:8051] ROOT -> ENSEQM PETRA.EXT PiConditions3 0 msec (1 of 1)[SINGLE] @10.11.11 18:00:51.000 CET
>ENS: addr request for srv PiConditions3 in context PETRA.EXT @10.11.11 18:00:51.000 CET
>ENS: return info for srv PiConditions3 @10.11.11 18:00:51.000 CET
>[476] (ENSEQM) PETRA.EXT PiConditions3 <0>(212 b 1 of 1) to ROOT @ 131.169.72.139:8051 (+1) @10.11.11 18:00:51.000 CET
>UDP: [131.169.72.139:8051] ROOT -> ENSEQM PETRA.EXT PiConditions3 0 msec (1 of 1)[SINGLE] @10.11.11 18:00:51.000 CET
>ENS: addr request for srv PiConditions3 in context PETRA.EXT @10.11.11 18:00:51.000 CET
>ENS: return info for srv PiConditions3 @10.11.11 18:00:51.000 CET
>[476] (ENSEQM) PETRA.EXT PiConditions3 <0>(212 b 1 of 1) to ROOT @ 131.169.72.139:8051 (+1) @10.11.11 18:00:51.000 CET
>UDP: [131.169.72.139:8051] ROOT -> ENSEQM PETRA.EXT PiConditions3 0 msec (1 of 1)[SINGLE] @10.11.11 18:00:51.000 CET
>ENS: addr request for srv PiConditions3 in context PETRA.EXT @10.11.11 18:00:51.000 CET
>ENS: return info for srv PiConditions3 @10.11.11 18:00:51.000 CET
>[476] (ENSEQM) PETRA.EXT PiConditions3 <0>(212 b 1 of 1) to ROOT @ 131.169.72.139:8051 (+1) @10.11.11 18:00:51.000 CET
>UDP: [131.169.72.139:8051] ROOT -> ENSEQM PETRA.EXT PiConditions3 0 msec (1 of 1)[SINGLE] @10.11.11 18:00:51.000 CET
Connected to acclxciens1 SSH2 - blowfish-cbc - hmac-md5 - none 104x28
```

YES! You can have a positive AND a negative filter simultaneously !

# Part III: The Instant Client



*It doesn't do everything, but it tries ...*

# The Instant Client

- a control system *browser*
- **queries ENS** for *contexts*, *servers*, and *subsystems*
  - these entries are **fixed** in the *java* combos!
  - and should be fixed in the *windows* version as well!
- **queries** selected server for *devices* and *properties*
  - the populated combo boxes here are **NOT fixed**
    - BUT any random, entered property and device names are unlikely to succeed!
- determines one of :
  - *flat hierarchy*
  - *device-query precedence* (device server model)
  - *property-query precedence* (property server model)

# The Instant Client

- **queries** selected property for all relevant information
  - data size and format
  - data array type
  - units and settings
  - property description
  - number of overloads (usually = 1)
  - history depths
- information used to fill in **default selections**
  - e.g. Draw Mode = “poly line” when array type = TRACE
  - Draw Mode = “histogram” when array type = CHANNEL
  - Draw Mode = “text” when array type = SCALAR or UNKNOWN

Note: this particular adjustment is sometime annoying  
=> need a checkbox to turn this off (coming soon!)

# The Instant Client

The screenshot shows the Java Instant Client window with the following configuration:

- Device Context: PETRA
- Device Subsystem: ALL
- Device Server: BLM
- Device Name: PU01
- Device Property: PROPERTIES
- Data Size: 12
- Data Type: STRUCT
- Input Data Type: NAME64
- Timeout: 1000

The main display area shows the results of a property query for "/PETRA/BLM/PU01 PROPERTIES @ 16:38:40.781". The results are listed as follows:

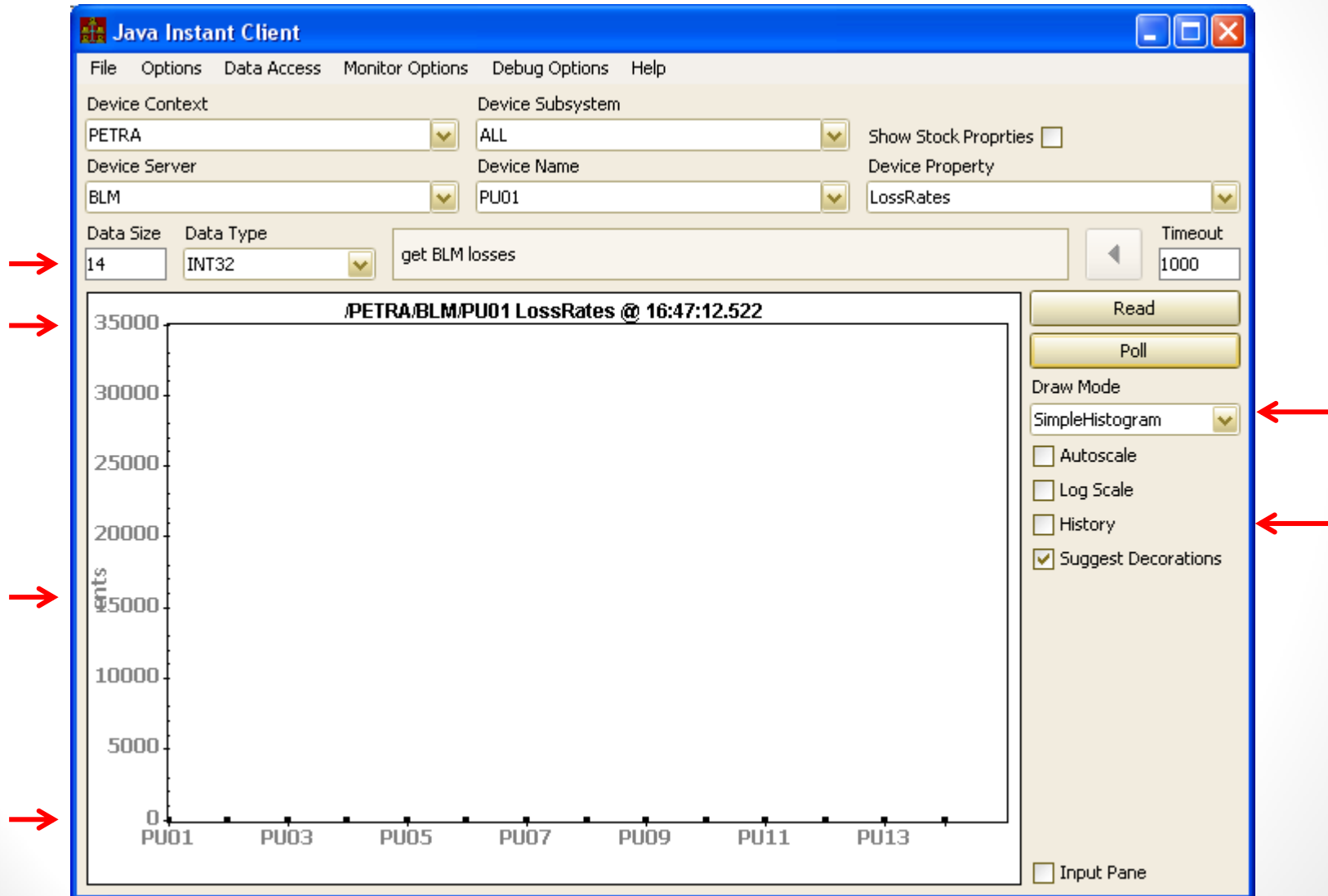
```
(0,0) [property] ->LossRates
(0,1) [description] ->get BLM losses
(0,2) [redirection] ->
(0,3) [tagOut] ->
(0,4) [tagIn] ->
(0,5) [units] ->cnts
(0,6) [min] -> 0.0
(0,7) [max] -> 32767.0
(0,8) [sizeOut] -> 14
(0,9) [sizeIn] -> 0
(0,10) [overloads] -> 1
(0,11) [historyShort] -> 600
(0,12) [historyLong] -> 1
(0,13) [formatOut] -> 3
(0,14) [formatIn] -> -1
(0,15) [access] -> 1
(0,16) [graphType] -> 0
(0,17) [rangeUnits] ->
(0,18) [rangeMin] -> 0.0
(0,19) [rangeMax] -> 0.0
(0,20) [numRows] -> 1
(0,21) [rowSize] -> 14
(0,22) [arrayType] -> 18
(0,23) [reserved] -> 0,0,0
```

Several lines in the list are circled in red: (0,4) [tagIn] ->, (0,5) [units] ->cnts, (0,6) [min] -> 0.0, (0,7) [max] -> 32767.0, (0,8) [sizeOut] -> 14, (0,13) [formatOut] -> 3, (0,21) [rowSize] -> 14, and (0,22) [arrayType] -> 18.

A callout box labeled "Information from a property query" points to the list of results.

Other interface elements include "Read" and "Poll" buttons, "Draw Mode" (Textbox), "Autoscale", "Log Scale", "History", "Suggest Decorations", "Write Access", "Input Pane", and "Post-Fix (TEXT Input)" (None, LF, CR, LF-CR).

# The Instant Client



# The Instant Client

The screenshot displays the Java Instant Client interface. At the top, the title bar reads "Java Instant Client" with standard window controls. Below the title bar is a menu bar with "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

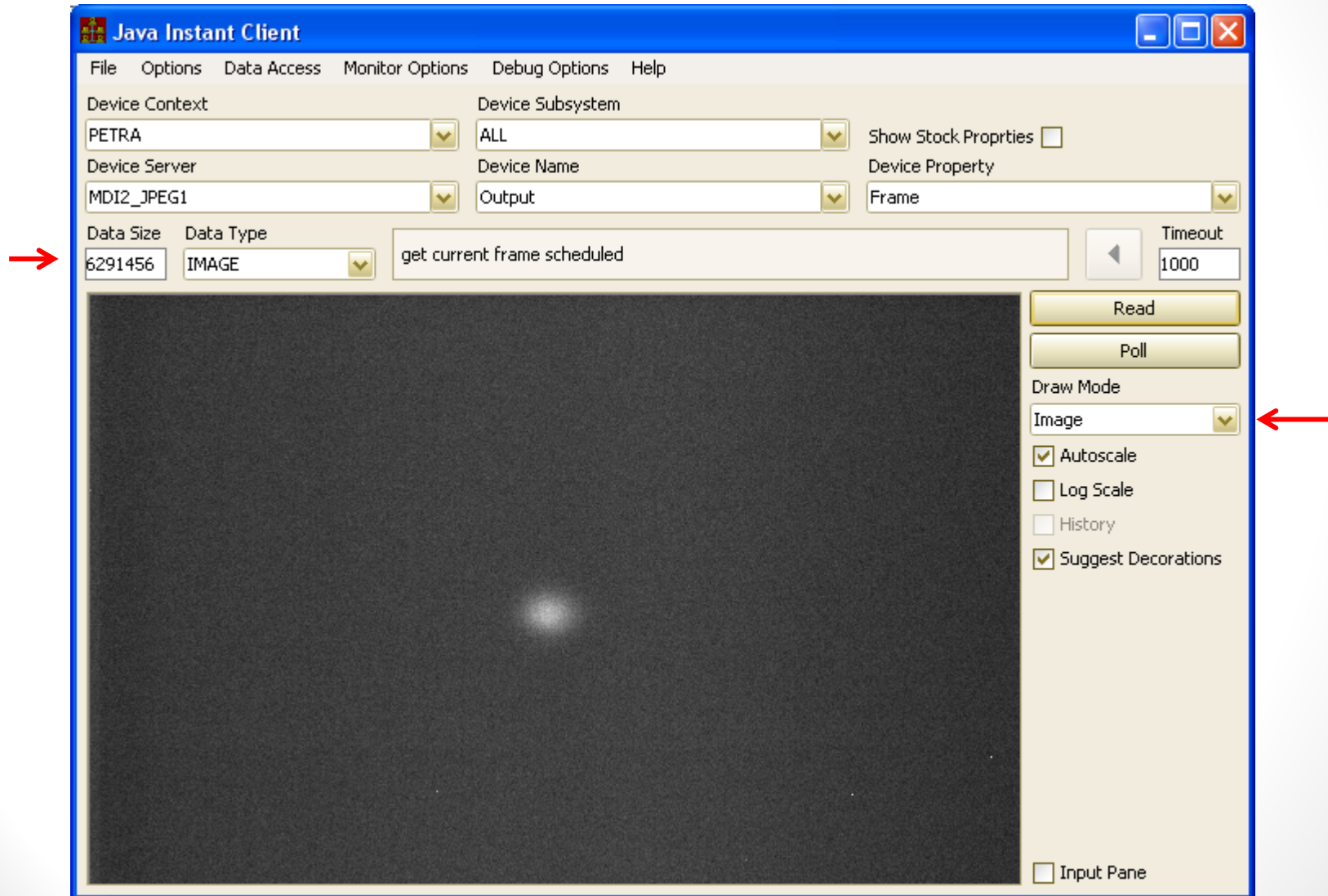
The main interface is divided into several sections:

- Device Context:** Includes dropdown menus for "Device Context" (set to "PETRA") and "Device Subsystem" (set to "ALL").
- Device Server:** Includes dropdown menus for "Device Server" (set to "PE\_SR\_Kly1") and "Device Name" (set to "TRC").
- Device Property:** A dropdown menu set to "CH1\_Amplitude".
- Data Size:** A text input field containing "209715".
- Data Type:** A dropdown menu set to "FLOAT".
- Signal Name:** A text input field containing "CH1\_Ampl\_Signal".
- Timeout:** A text input field containing "1000".
- Buttons:** "Read" and "Poll" buttons are located to the right of the signal name field.
- Draw Mode:** A dropdown menu set to "PolyLine".
- Options:** Checkboxes for "Autoscale" (checked), "Log Scale" (unchecked), "History" (unchecked), and "Suggest Decorations" (checked).
- Input Pane:** A checkbox at the bottom right, currently unchecked.

The central part of the interface features a plot titled "/PETRA/PE\_SR\_Kly1/TRC CH1\_Amplitude @ 16:55:16.941". The y-axis is labeled "V" and ranges from 10 to 80. The x-axis ranges from 0 to 2.5e5. The plot shows a signal that starts at approximately 20V, exhibits small oscillations, then a larger peak of about 40V around x=1e5, followed by a sharp rise to a steady state of approximately 75V.

Red arrows point to the "Data Size" field, the "Draw Mode" dropdown, and the "History" checkbox.

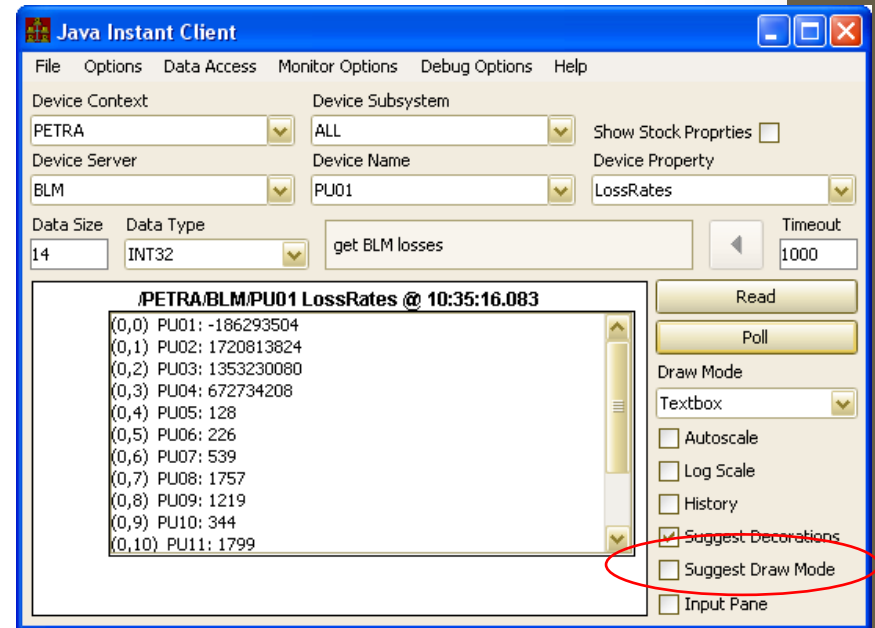
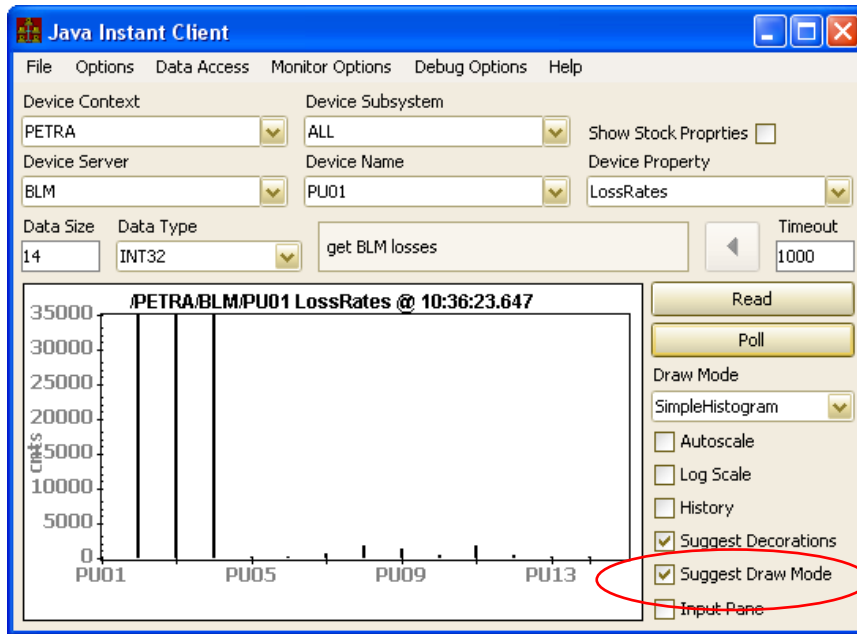
# The Instant Client





# The Instant Client

- Hot off the presses:



# The Instant Client

- *overloaded* properties
  - a server can *register* a property *more than once* (with different data input/output criteria) !
    - e.g. output format = INT32 -> raw hardware readback;  
output format = FLOAT -> calibrated readback
    - e.g. structured format supporting 'legacy' as well as 'modern' structures.

# The Instant Client

The screenshot shows the Java Instant Client interface. The title bar reads "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

Configuration fields include:

- Device Context: PETRA
- Device Subsystem: ALL
- Device Server: CAS
- Device Name: SYS:ALL
- Device Property: SYSALARMS

Data fields include:

- Data Size: 1000
- Data Type: STRUCT
- Value: [AMS] current system alarms
- Timeout: 1000

A red arrow points to the Data Type field. A red circle highlights the [AMS] current system alarms field. Another red circle highlights the left arrow button next to the Timeout field. A text box on the right contains the text: "e.g. 'SYSALARMS': legacy call".

The main display area shows the following output:

```
/PETRA/CAS/SYS:ALL SYSALARMS @ 17:14:50.000
(0,0) [server] ->RadMonIP
(0,1) [device] ->
(0,2) [almTag] ->P-012
(0,3) [almCode] -> 0
(0,4) [almTime] -> 0
(0,5) [almMask] -> 0
(0,6) [almData] -> 0,0,0,0,0,0
(0,7) [almDataFormat] -> 0
(0,8) [almDataLen] -> 0
(0,9) [almSeverity] -> 0
(0,10) [almDescriptor] -> 0
(0,11) [almSystem] -> 0
```

On the right side, there are controls for "Toggle Property Overload", "Poll", "Draw Mode" (set to Textbox), "Autoscale" (checked), "Log Scale" (unchecked), "History" (unchecked), "Suggest Decorations" (checked), and "Input Pane" (unchecked).



# The Instant Client

- *Input panel*
  - accepts **all** input data types (*except* **STRUCT**)
    - (parsing structure input might be a good cosylab assignment)
  - array input:
    - **delimiter** = *comma or white space*
    - strings with *blanks* enclose in ""
  - *special case* : type **TEXT**
    - Can add a **CR**, **LF**, or **CR-LF** as a post-fix
      - e.g. RS232 input requires a termination character
  - *important Reminder*:
    - Data Input does **NOT** imply WRITE ACCESS !

# The Instant Client

The screenshot shows the Java Instant Client window with the following configuration:

- Device Context: REGAE
- Device Subsystem: ALL
- Device Server: CAS
- Device Name: SYS:ALL
- Device Property: SYSALARMS
- Data Size: 1000
- Data Type: STRUCT
- Input Data Type: INT32
- Timeout: 1000

The main display area shows a list of system alarms:

```
REGAE/CAS/SYS:ALL SYSALARMS @ 17:30:28.000
(0,0) [server] ->VAC.ION_PUMP
(0,1) [device] ->DISP.DDC2
(0,2) [almTag] ->Overload
(0,3) [almCode] -> 1024
(0,4) [timestamp] -> 1320856228
(0,5) [timestampUSec] -> 949505
(0,6) [starttime] -> 1316087719
(0,7) [starttimeUSec] -> 208020
(0,8) [almMask] -> 255
(0,9) [almData] -> 79,118,101,114,108,111,97,100,44,32,72
(0,10) [almDataFormat] -> 4
(0,11) [almDataArraySize] -> 64
(0,12) [severity] -> 8
(0,13) [descriptor] -> 14
(0,14) [almSystem] -> 350
(0,15) [almOscWindow] -> -80
(0,16) [almOscPinned] -> -79
(0,17) [server] ->VAC.ION_PUMP
(0,18) [device] ->GUN
(0,19) [almTag] ->Overload
```

Buttons and options on the right include: Read, Poll, Draw Mode (Textbox), Autoscale, Log Scale, History, Suggest Decorations, and Input Pane.



A "READ" call with input

Post-Fix (TEXT Input)  
 None  LF  CR  LF-CR

# The Instant Client

Complex data types: A parsing nightmare ...

The screenshot shows the Java Instant Client window with the following configuration:

- Device Context: TEST
- Device Subsystem: ALL
- Device Server: WinSineServer
- Device Name: SineGen0
- Device Property: Name64ITest
- Data Size: 100
- Data Type: NAME64I
- Data: name64-int test
- Timeout: 1000

The main display area shows the following data points:

```
/TEST/WinSineServer/SineGen0 Name64ITest @ 12:55:14.892
(0,0) [First in the list, 99]
(0,1) [Hey, Joe, 45]
(0,2) [name 3, 3]
(0,3) [Hello World, 55]
(0,4) [A name, with a comma, 99]
(0,5) [New Name Ted, 88]
(0,6) [And here's ..., number six, 666]
(0,7) [name 8, 8]
(0,8) [And Let's Try it, again, 77]
(0,9) [name 10, 10]
```

On the right side, the 'Log Scale' checkbox is highlighted with a red arrow pointing from a callout box.

Settings: UDP, Timer | Suppress Query Properties

Let's change this !

# The Instant Client

'escape' the characters that belong to the string !

The screenshot shows the Java Instant Client interface with the following configuration:

- Device Context: TEST
- Device Subsystem: ALL
- Device Server: WinSineServer
- Device Name: SineGen7
- Device Property: Name64ITest
- Data Size: 1
- Data Type: NAME64I
- Input Data Type: NAME64I
- Complex Name: Complex Name\, with a comma, 101
- Timeout: 1000
- Draw Mode: Textbox
- Autoscale:
- Log Scale:
- History:
- Suggest Decorations:
- Suggest Draw Mode:
- Input Pane:
- Post-Fix (TEXT Input):  None  LF  CR  LF-CR

The data transfer window shows the following output:

```
/TEST/WinSineServer/SineGen7 Name64ITest @ 13:00:54.848  
(0,0) [Complex Name, with a comma, 101]
```

Settings: UDP, Timer | Suppress Query Properties



# The Instant Client

- Menu Items
  - File:
    - 'New' launches new Instant Client
    - 'Clone' launches new Instant Client and preserves current settings

The image displays two instances of the Java Instant Client software. The left window shows the 'File' menu with 'Clone' highlighted, and a red arrow pointing to the 'Clone' button in the right window. The right window shows the main interface with a graph of a sine wave and various configuration options.

**Left Window (File Menu):**

- File | Options | Data Access | Monitor Options | Debug Options | Help
- New (Ctrl-N)
- Clone (Ctrl-D)**
- Close (Ctrl-W)
- Exit (Ctrl-X)

**Right Window (Main Interface):**

- File | Options | Data Access | Monitor Options | Debug Options | Help
- Device Context: TEST
- Device Subsystem: ALL
- Device Server: SineServer
- Device Name: SineGen0
- Device Property: Sine
- Show Stock Properties:
- Data Size: 8192
- Data Type: FLOAT
- Sine Curve
- Timeout: 1000
- Read
- Poll
- Draw Mode: PolyLine
- Autoscale:
- Log Scale:
- History:
- Suggest Decorations:
- Input Pane:

**Graph:** /TEST/SineServer/SineGen0 Sine @ 17:4  
Y-axis: V (ranging from -250 to 300)  
X-axis: ms (ranging from 0 to 6000)

# The Instant Client

- Menu Items
  - Options:
    - **Suppress Query Properties** -> hide *ALL over-ridden* meta properties
    - **Property Query Precedence** -> re-acquire *device list* following change of property
    - **Device Query Precedence** -> re-acquire *property list* following change of device
    - **Flush Address Cache** -> force new address acquisition from ENS
    - **Reload Names** -> re-acquire contexts and servers list from ENS
      - Note: re-selecting a context will automatically re-acquire servers for the given context !

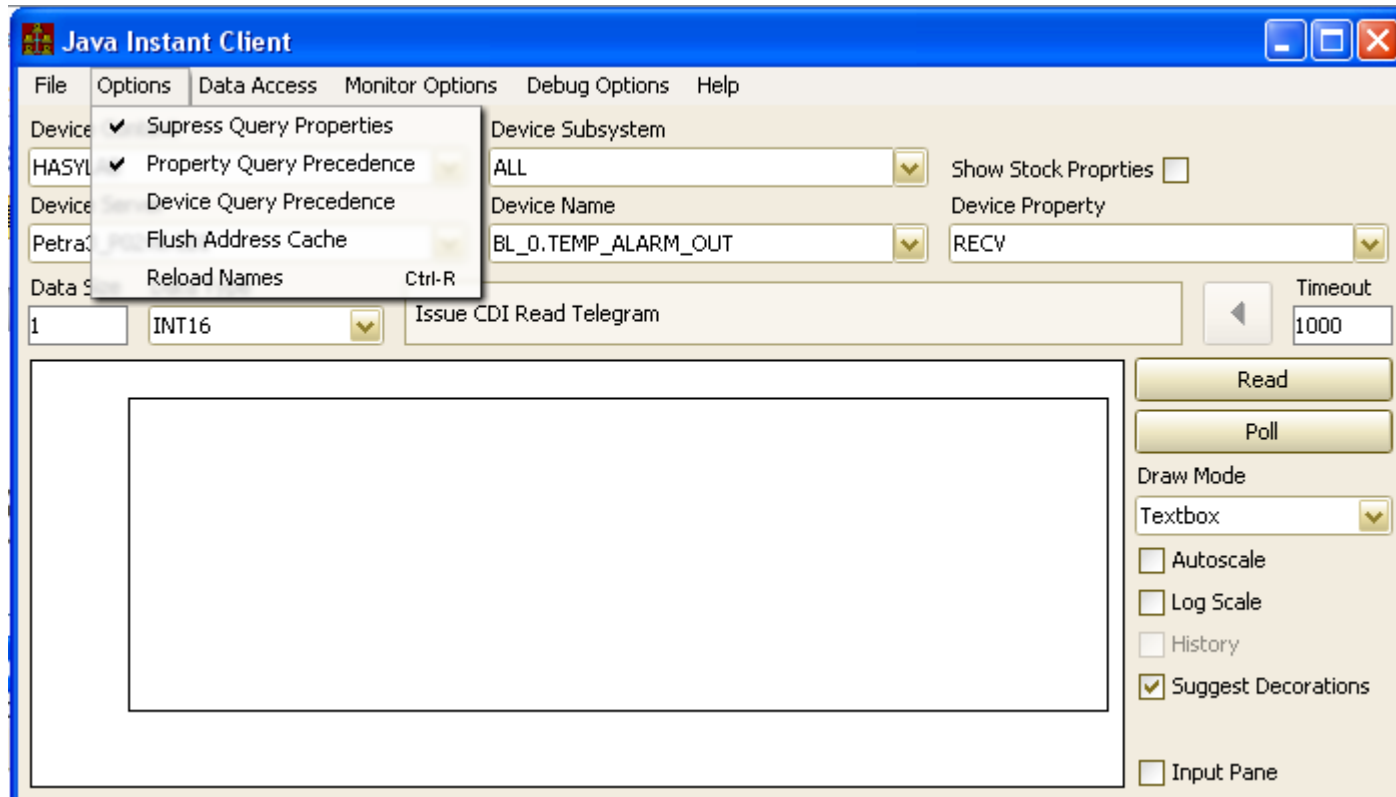
# The Instant Client

The image displays two screenshots of the Java Instant Client application. The top screenshot shows the 'Options' menu with 'Supress Query Properties' and 'Property Query Precedence' checked. The bottom screenshot shows the same interface with 'Device Query Precedence' checked and 'Flush Address Cache' unchecked. A text box at the bottom explains that these items can be unchecked for convenience.

You can uncheck these menu items where “convenient”  
(e.g. accessing only the BUS properties from a CDI Server)

# The Instant Client

- Switching from property “RECV” to “RECV.CLBR”, “SEND”, “SEND.RECV.ATOM” etc. will automatically re-query devices unless you uncheck “Property Query Precedence” !



# The Instant Client

- Menu Items
  - Data Access
    - Use UDP (default) -> normal peer-to-peer communication via UDP
    - Use TCP -> normal peer-to-peer communication via TCP
      - respects given timeout parameters
    - Use STREAM -> peer-to-peer communication via TCP Stream
      - timeout only on connection establishment
      - i/o error only on TCP stack detected error
      - does not otherwise timeout !
      - Note: only multithreaded servers support TINE STREAM transport
    - Use NETWORK flag (multicast)
      - requests transfer per multicast
      - consistent only with UDP and asynchronous data acquisition.

# The Instant Client

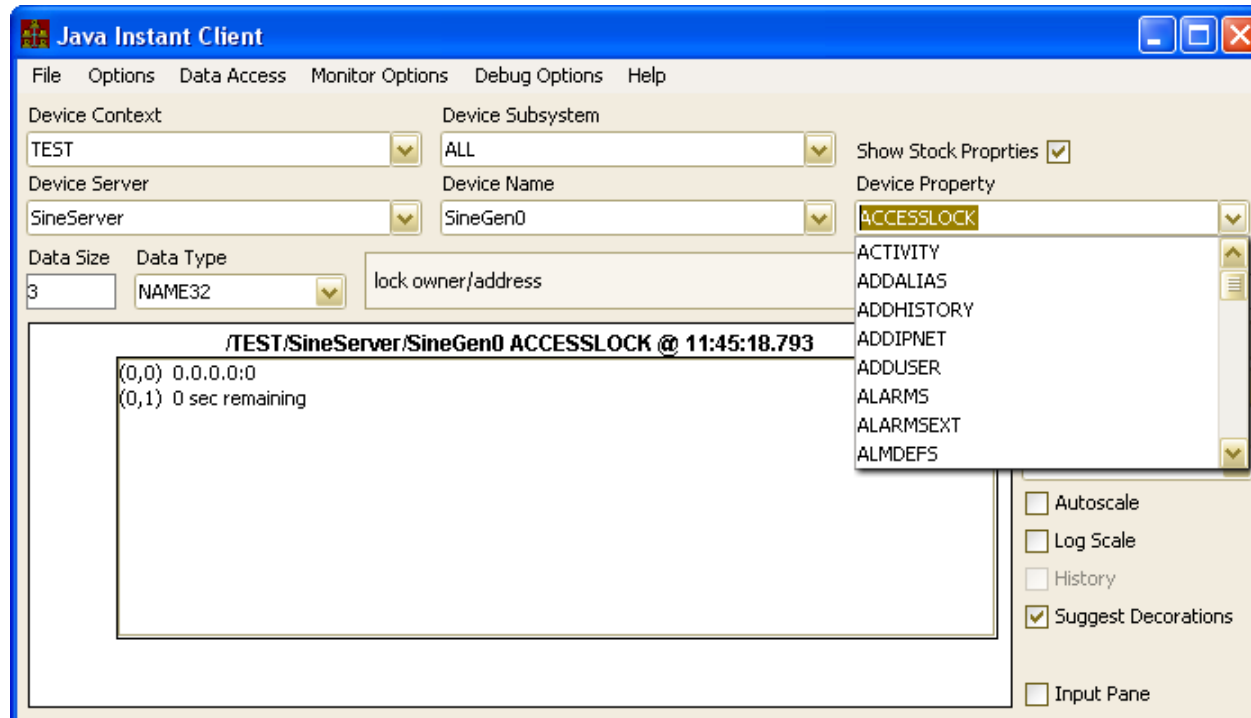
- Menu Items
  - Monitor Options
    - **TIMER**
      - normal asynchronous (server-side) polling monitor.
      - data sent to caller at the designated timer interval
    - **DATACHANGE**
      - normal asynchronous (server-side) polling monitor.
      - data examined at the server for changes.
      - data sent to caller if a change has been detected
        - zero-tolerance at the server !
        - caller can supply a notification tolerance (*but NOT the instant client*)
    - **EVENT**
      - normal asynchronous (server-side) polling monitor.
        - But the polling interval is irrelevant
      - data sent to caller only if it has been scheduled at the server
        - heartbeat updates are suppressed

# The Instant Client

- Menu Items
  - Debug Options:
    - Show Fec Information
      - display relevant FEC information of the FEC pertaining to the calling parameters showing.
    - Debug Off
      - Turns local debugging OFF. Closes the TConsole Panel.
    - Debug Level 1 (, 2, 3, 4)
      - Turns local debugging ON at debug level 1 (,2, 3, 4). Opens the TConsole Panel (see debugging).

# The Instant Client

- Stock Properties
  - “Show Stock Properties” check box: hidden by default
  - used systematically
    - => you need to know how they work in order to use them yourself!





# The Instant Client

- Stock Properties

Scope: Server

- “ACCESSLOCK”

- Not an attribute ! Separate **READ** and **WRITE** behavior !
- i.e. the property is *overloaded*.
- Use the **API** calls instead !
  - SetAccessLock(), GetAccessLockInformation(), GetAccessLockStatus(), FreeAccessLock()

- “ACTIVITY”

Scope: FEC

- **READ** only
- Used by FEC Remote Panel
- Use the overload with the “AQS” structure tag in the Instant Client
  - -> quasi meaningful information for the casual user

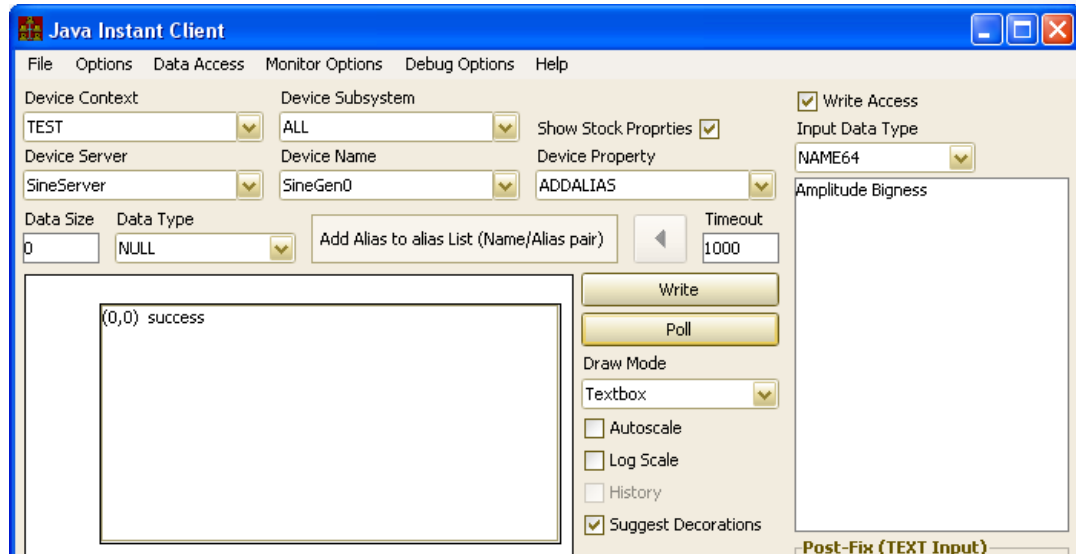
- “ADDALIAS”

Scope: FEC

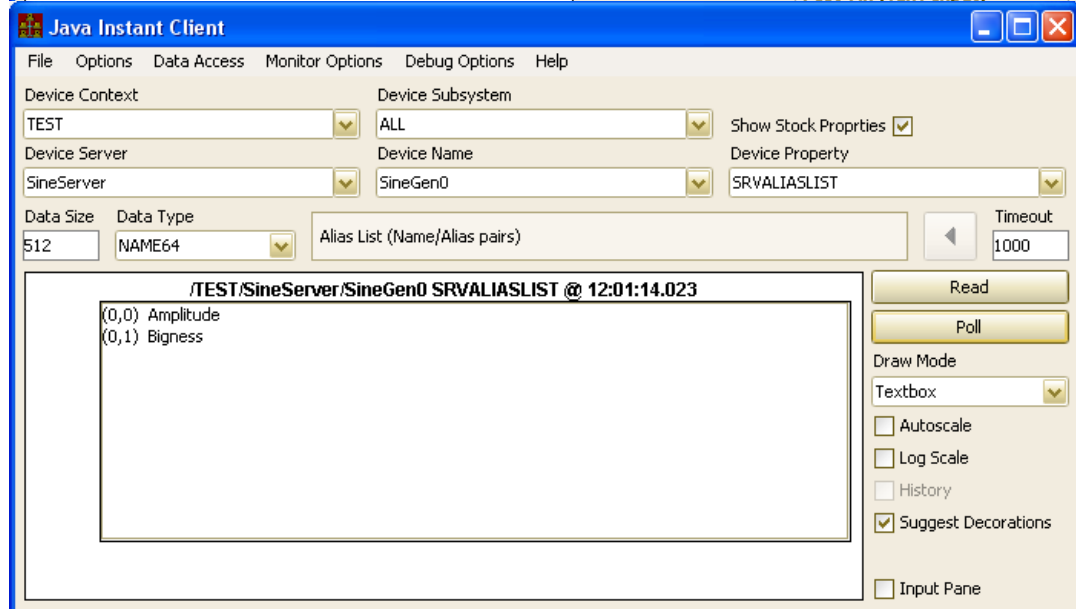
- **WRITE** only

# The Instant Client

- Stock Properties
  - “ADDALIAS”
    - WRITE only



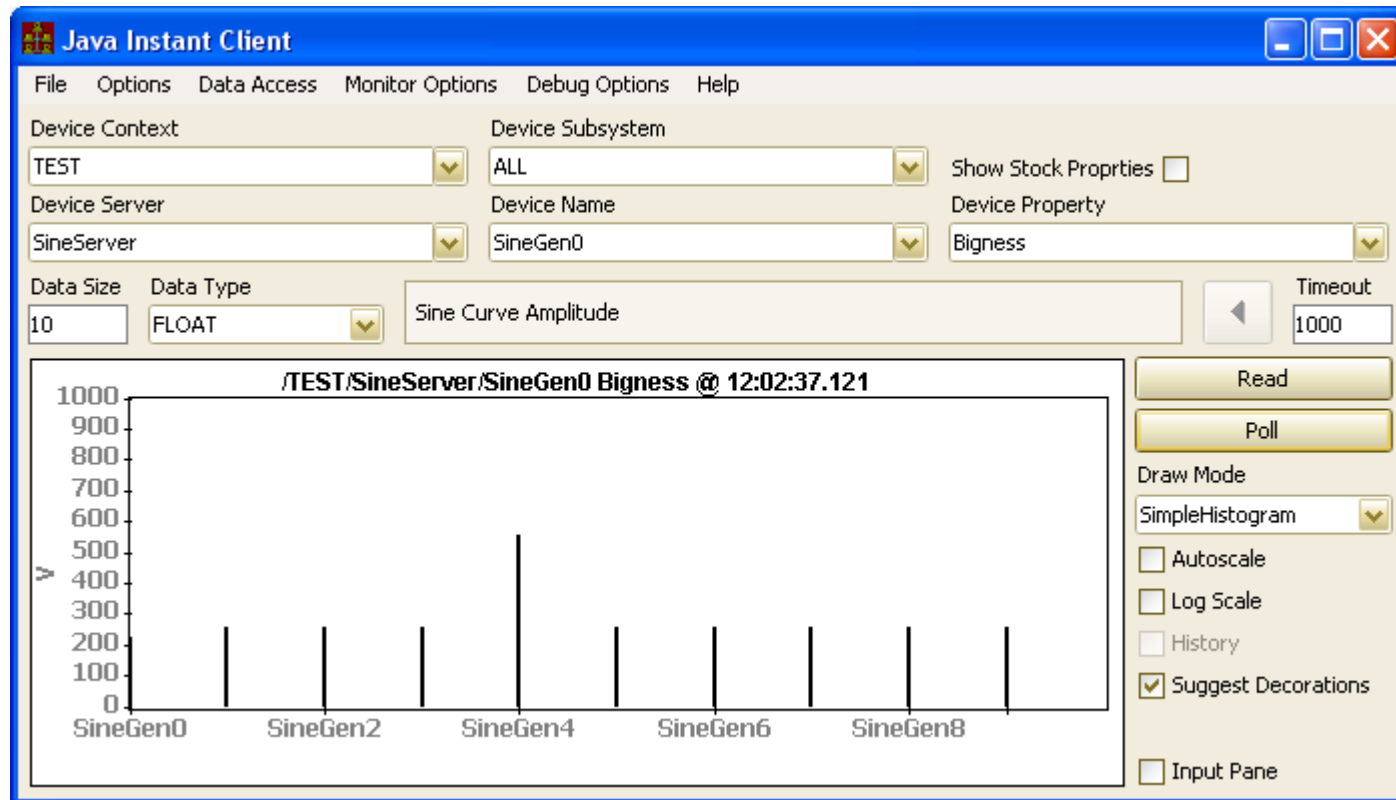
- “SRVALIASLIST”
  - READ only



Scope: FEC

# The Instant Client

- “Bigness” -> “Amplitude”



# The Instant Client

- Stock Properties

- “ADDHISTORY”

Scope: Server

- WRITE only
    - Used in the “Add Local History” panel in the Archive Viewer
    - Don’t even think of trying to use this from the Instant Client!

- “ADDUSER”, “ADDIPNET”

Scope: Server

- WRITE only
    - List of users, IP nets (can be CIDR qualified), to add to the ACL lists of the equipment module
    - Updates local database information (non-volatile changes !)
    - No input => forces a re-scan of local database information !

- “DELUSER”, “DELIPNET”

Scope: Server

- WRITE only
    - List of users, IP nets to be removed from the ACL lists of the equipment module
    - Updates local database information (non-volatile changes !)

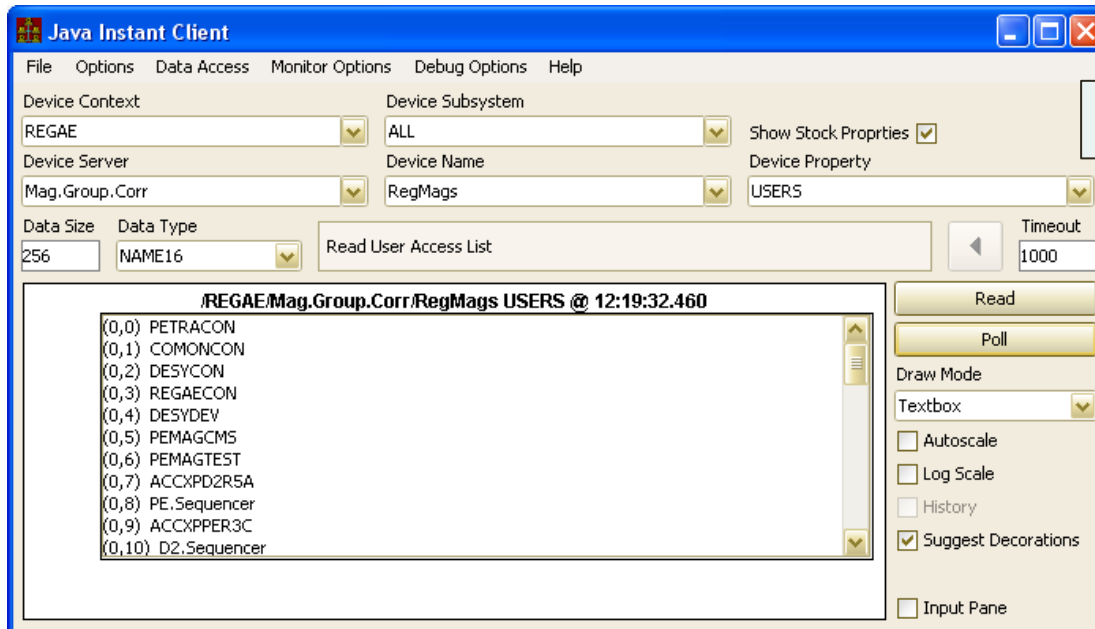
# The Instant Client

- Stock Properties

- “USERS”, “IPNETS”

- READ only
    - no input => returns list of ‘allowed’ users or IP Nets for the equipment module
    - input = registered Property or Device => returns list of ‘allowed’ users or IP Nets for the give property or device

Note: “DENIEDUSERS” gives list of users on the denied access list (“these guys can’t even READ!”)



Scope: Server

# The Instant Client

- Stock Properties
  - “ALARMS”
    - READ only
    - Used by CAS
    - input
      - none => all alarm times
      - 2 INT32 values (start and stop as UTC timestamps)
    - device = ‘\*’ => all alarms
    - overload with structure “AMSR4” of most interest
  - “ALARMSEXT”
    - completely equivalent to “ALARMS”
    - *deprecated*

Scope: Server

The screenshot shows the Java Instant Client window with the following configuration:

- File Options Data Access Monitor Options Debug Options Help
- Device Context: REGAE
- Device Subsystem: ALL
- Show Stock Properties:
- Device Server: VAC.ION\_PUMP
- Device Name: \*
- Device Property: ALARMS
- Data Size: 256
- Data Type: STRUCT
- [AMSR4] Total Current Alarm List
- Timeout: 1000

The main display area shows the following alarm data:

```
REGAE/VAC.ION_PUMP/* ALARMS @ 12:32:31.111
(0,0) [server] ->VAC.ION_PUMP
(0,1) [device] ->SEK.GUN
(0,2) [almTag] ->Device error
(0,3) [almCode] -> 1012
(0,4) [timestamp] -> 1320924493
(0,5) [timestampUSec] -> 23741
(0,6) [starttime] -> 1315401110
(0,7) [starttimeUSec] -> 506172
(0,8) [almMask] -> 255
(0,9) [almData] -> 77,105,116,116,108,101,114,101,114,32,68,114,117,99,1
(0,10) [almDataFormat] -> 4
(0,11) [almDataArraySize] -> 64
(0,12) [severity] -> 8
(0,13) [descriptor] -> 14
(0,14) [almSystem] -> 0
(0,15) [almOscWindow] -> -80
(0,16) [almOscPinned] -> -79
(0,17) [server] ->VAC.ION_PUMP
(0,18) [device] ->GUN.2CATH
(0,19) [almTag] ->Device error
(0,20) [almCode] -> 1012
(0,21) [timestamp] -> 1320923892
(0,22) [timestampUSec] -> 532397
(0,23) [starttime] -> 1315567247
(0,24) [starttimeUSec] -> 320928
(0,25) [almMask] -> 255
(0,26) [almData] -> 68,101,118,105,99,101,32,101,114,114,111,114,44,32,7
(0,27) [almDataFormat] -> 4
(0,28) [almDataArraySize] -> 64
(0,29) [severity] -> 8
(0,30) [descriptor] -> 6
(0,31) [almSystem] -> 0
(0,32) [almOscWindow] -> -80
```

Control buttons on the right include Read, Poll, Draw Mode, Textbox, Autoscale, Log Scale, History, Suggest Decorations, and Input Pane.

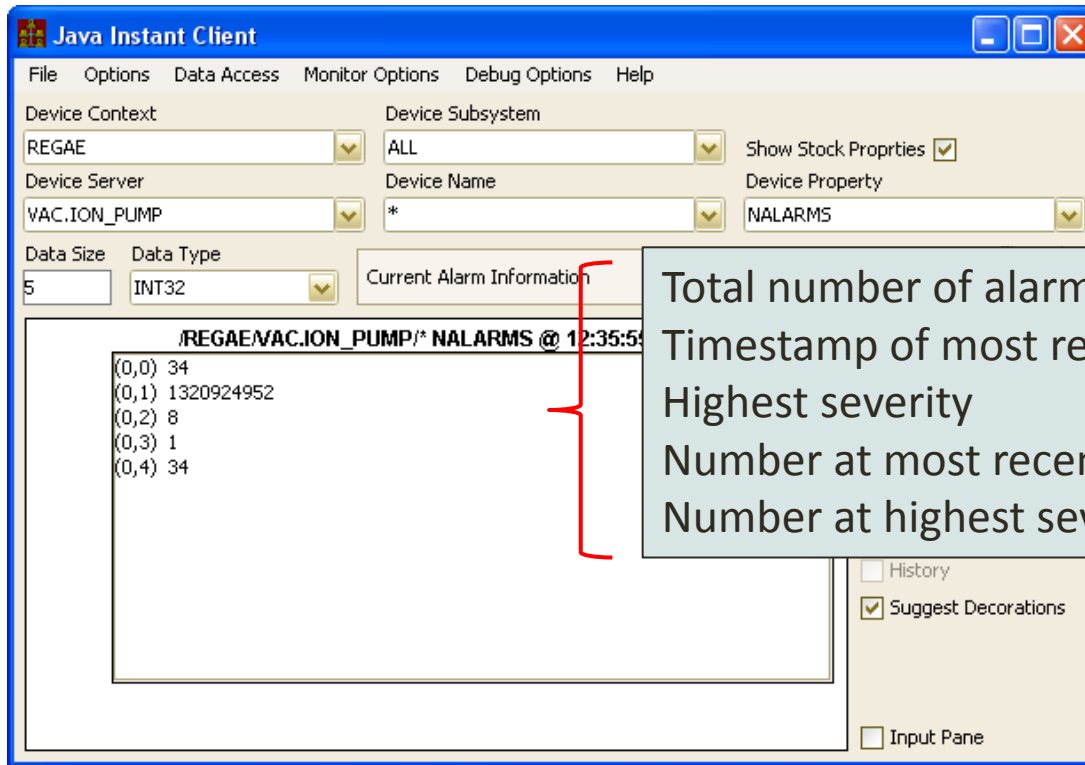
# The Instant Client

- Stock Properties

- “NALARMS”

Scope: Server

- READ only
    - Array of (up to) 5 INT32 values (see Alarms)



Total number of alarms  
Timestamp of most recent  
Highest severity  
Number at most recent timestamp  
Number at highest severity

# The Instant Client

- Stock Properties
  - “ALMDEFS”
    - **READ** only
    - array of static alarm information for defined alarms

Scope: Server

The screenshot shows the Java Instant Client window with the following configuration:

- Device Context: REGAE
- Device Subsystem: ALL
- Device Server: VAC.ION\_PUMP
- Device Name: \*
- Device Property: ALMDEFS
- Data Size: 48
- Data Type: STRUCT
- Timeout: 1000

The main display area shows the following alarm definitions for **/REGAE/VAC.ION\_PUMP/\* ALMDEFS @ 12:41:49.176**:

```
(0,0) [almTag] ->Remote sys. err
(0,1) [almCode] -> 1028
(0,2) [almMask] -> 255
(0,3) [almSystem] -> 0
(0,4) [almSeverity] -> 8
(0,5) [almDataFormat] -> 4
(0,6) [almDataArraySize] -> 64
(0,7) [almOscWindow] -> 104
(0,8) [almOscPinned] -> 0
(0,9) [alarmText] ->Remote sys. err
(0,10) [deviceText] ->VAC.ION_PUMP
(0,11) [dataText] ->
(0,12) [url] ->
```

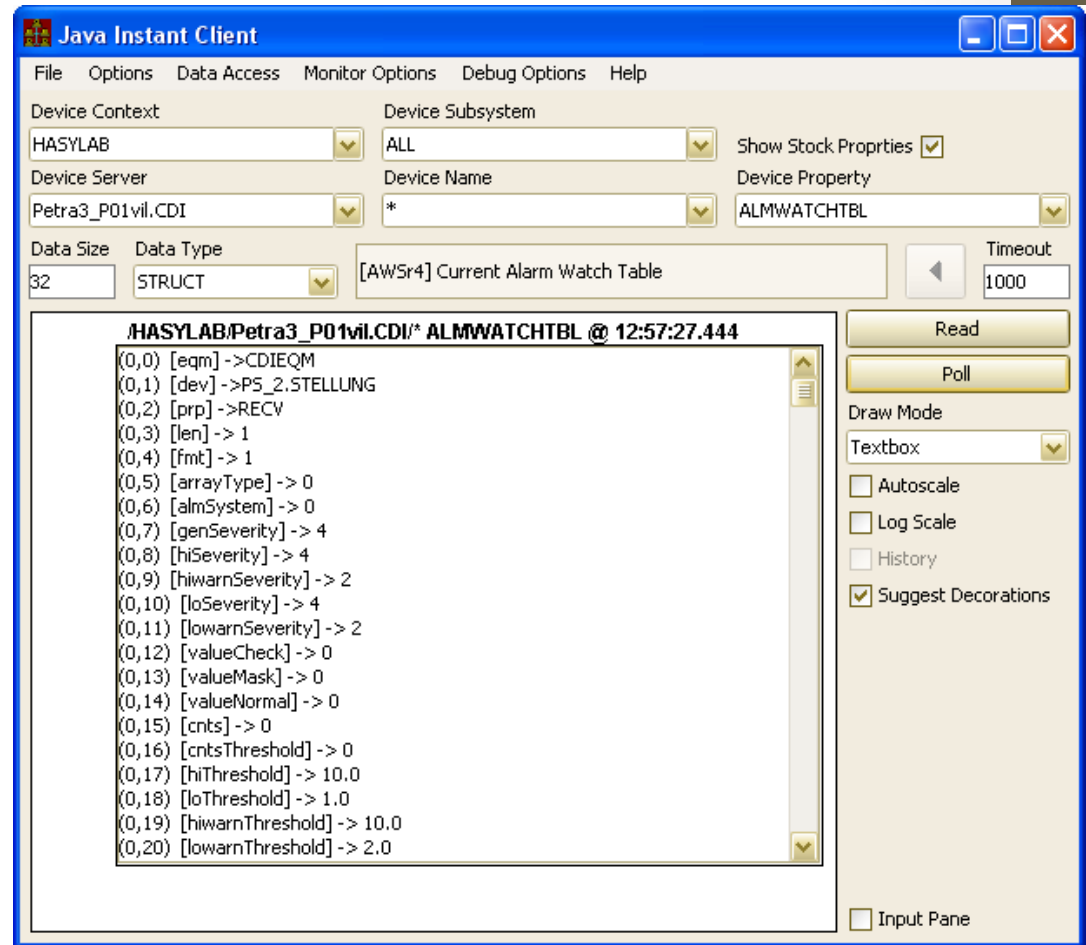
Control buttons on the right include Read, Poll, Draw Mode (set to Textbox), Autoscale, Log Scale, History, Suggest Decorations (checked), and Input Pane.



# The Instant Client

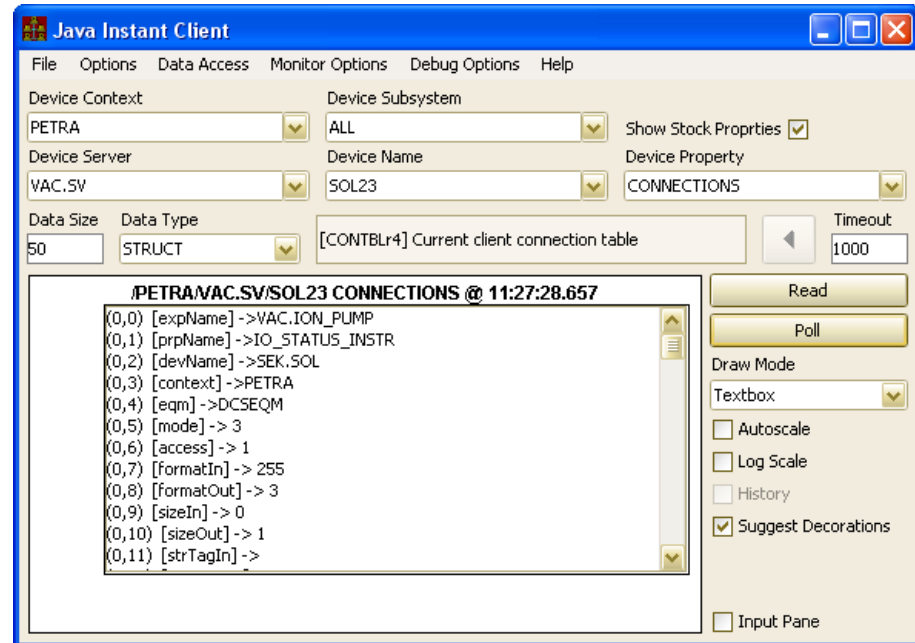
- “ALMWATCHTBL”
  - READ/WRITE
    - But don't try to WRITE with the instant client !
    - WRITE used by Alarm Viewer to add/edit watch table entries
    - READ returns current list of alarm watch table elements

Scope: FEC



# The Instant Client

- Stock Properties
  - “NALMDEFS”, “NALMWATCH”, “NDEVICES”, “NPROPS”, “NPROPERTIES”, “NHISTORIES”, “NUSERS”, “NIPNETS”, “NSTOCKPROPS”
    - READ only
    - Return a single INT32 giving the “number of” ...
- “CONNECTIONS”
  - READ only
  - A middle-layer server’s connection table
  - e.g. used by the Tarantula



# The Instant Client

- Stock Properties

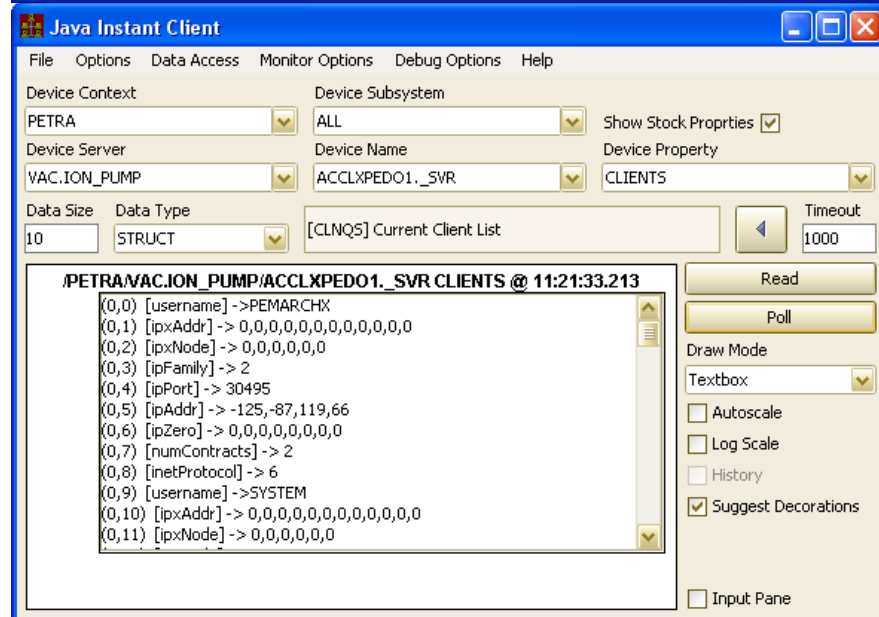
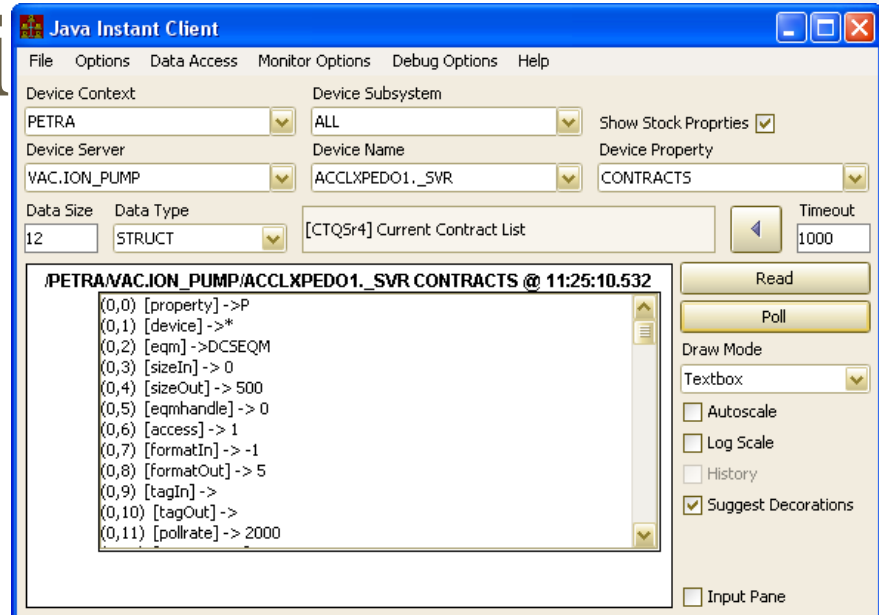
- “CONTRACTS” 

- READ only
    - overloaded => use the “CTQsr4” structure
    - e.g. used by the FEC Remote panel, SPY server

- “CLIENTS” 

- READ only
    - overloaded => use the “CLNQS” structure
    - e.g. used by the FEC Remote panel, SPY server

Scope: FEC



# The Instant Client

- Stock Properties

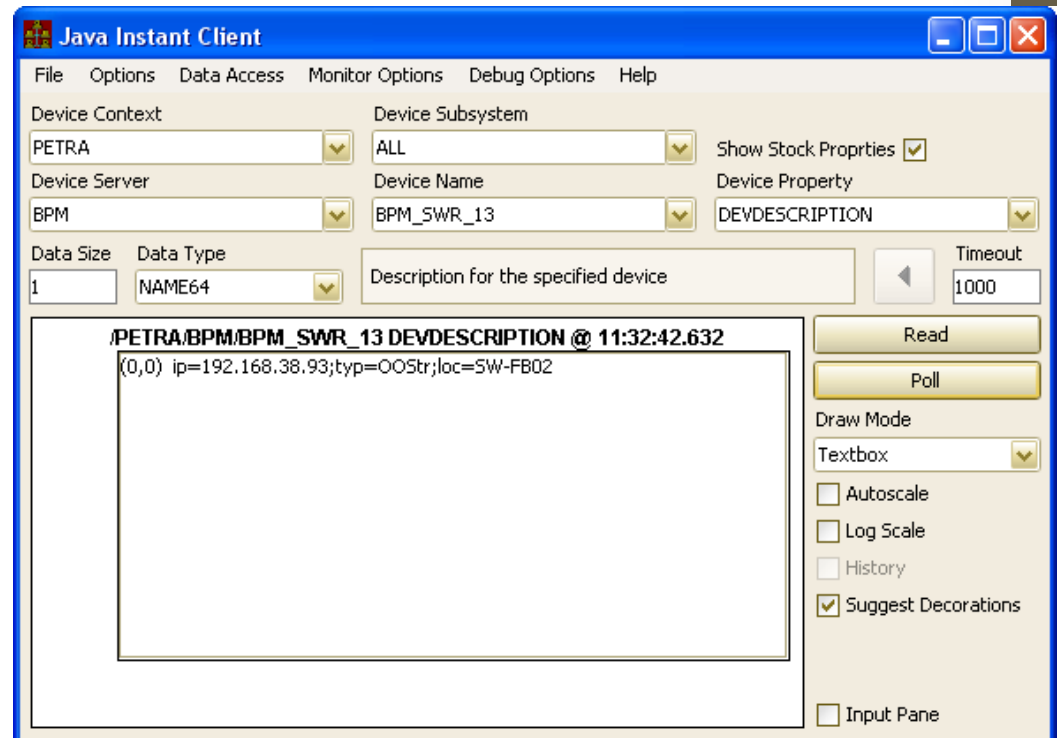
- “DEVICES”

- READ only
    - server’s *registered* device list

Scope: Server

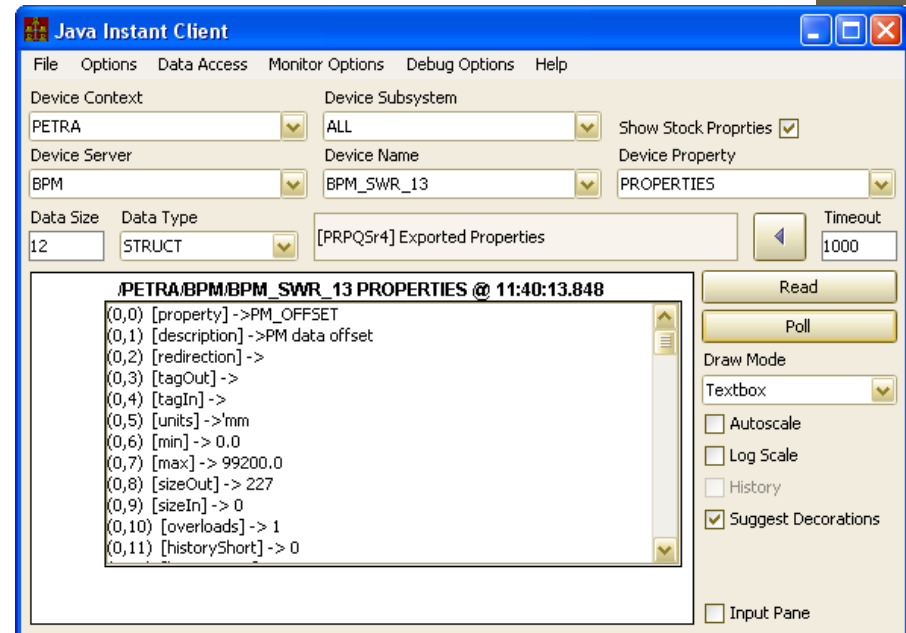
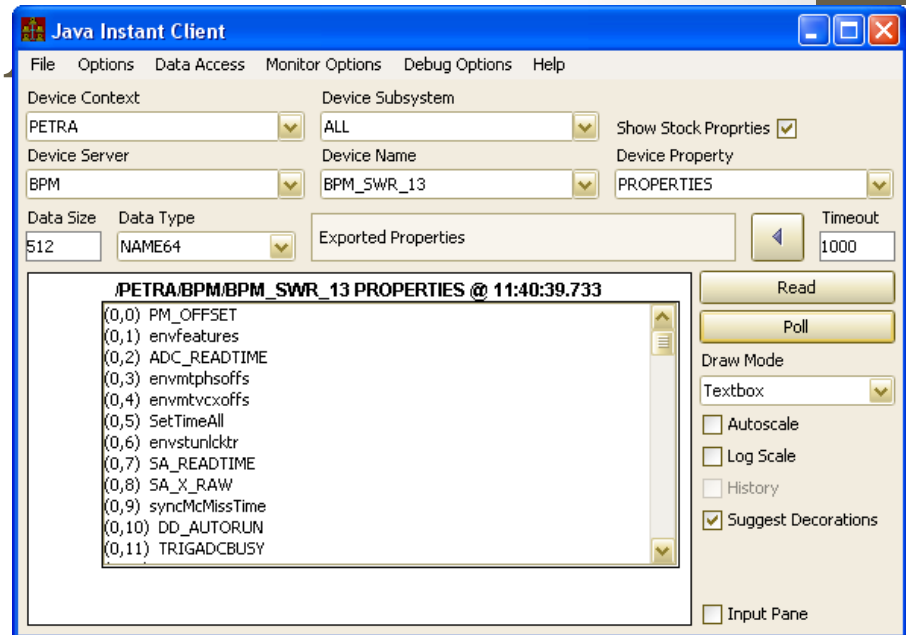
- “DEVDESCRIPTION”

- READ only
    - A registered device’s description
    - e.g. BPM Server:



# The Instant Client

- Stock Properties
  - “PROPERTIES”  
Scope: Server
    - READ only
    - “PROPS” is an alias
    - multiply overloaded
      - use NAME64 for a list
      - use “PRPQsr4” structure for full info
  - “STOCKPROPS”  
Scope: FEC
    - READ only
    - analogous to “PROPERTIES”



# The Instant Client

- Stock Properties

- “HISTORIES”

Scope: Server

- READ only

- overloaded

- use NAME64 for a list of properties with local history

- Use “HRSr4” structure for detailed information

The screenshot shows the Java Instant Client interface. The 'Device Context' is set to 'PETRA' and 'Device Subsystem' to 'ALL'. The 'Device Server' is 'RadMonIP' and 'Device Name' is 'P-001'. The 'Device Property' is 'HISTORIES'. The 'Data Size' is 32 and 'Data Type' is 'NAME64'. The 'Data Access' menu is open, and 'history properties' is selected. The main display area shows a list of properties for '/PETRA/RadMonIP/P-001 HISTORIES @ 14:12:35.694'. The list includes: (0,0) EnergyTime.Header, (0,1) EnergyTime.HeaderTotal, (0,2) EnergyTime.HeaderSpectra, (0,3) EnergyTime.HeaderSpectraTotal, (0,4) Monitor.Dose.Summary, (0,5) Monitor.Config, (0,6) EnergyTime.Header, (0,7) EnergyTime.HeaderTotal, (0,8) EnergyTime.HeaderSpectra, (0,9) EnergyTime.HeaderSpectraTotal, (0,10) Monitor.Dose.Summary, and (0,11) Monitor.Config. The 'Read' and 'Poll' buttons are visible, along with 'Draw Mode' options: Textbox, Autoscale, Log Scale, History, Suggest Decorations, and Input Pane.

The screenshot shows the Java Instant Client interface. The 'Device Context' is set to 'PETRA' and 'Device Subsystem' to 'ALL'. The 'Device Server' is 'RadMonIP' and 'Device Name' is 'P-001'. The 'Device Property' is 'HISTORIES'. The 'Data Size' is 32 and 'Data Type' is 'STRUCT'. The 'Data Access' menu is open, and '[HRSr4] history property information' is selected. The main display area shows a list of properties for '/PETRA/RadMonIP/P-001 HISTORIES @ 14:14:17.198'. The list includes: (0,10) [toleranceAbs] -> 0.0, (0,11) [property] -> EnergyTime.HeaderTotal, (0,12) [device] -> P-001, (0,13) [dataSize] -> 64, (0,14) [dataFormat] -> 512, (0,15) [pollingRate] -> 10000, (0,16) [archiveRate] -> 10000, (0,17) [depthShort] -> 2, (0,18) [depthLong] -> 3, (0,19) [heartbeat] -> 180, (0,20) [tolerancePct] -> 0.0, (0,21) [toleranceAbs] -> 0.0, and (0,22) [property] -> EnergyTime.HeaderSpectra. The 'Read' and 'Poll' buttons are visible, along with 'Draw Mode' options: Textbox, Autoscale, Log Scale, History, Suggest Decorations, and Input Pane.

# The Instant Client

- Stock Properties

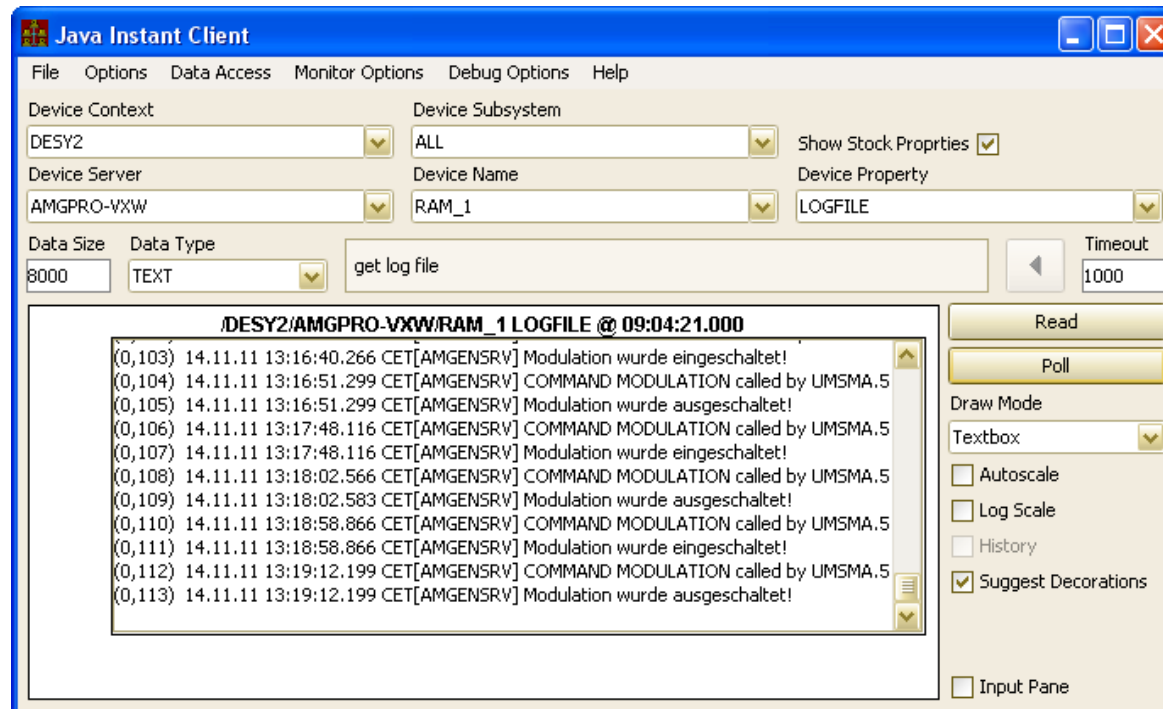
- “LOGFILE”

Scope: FEC

- READ only

- Returns the most recent entries of the current FEC log file

- number of entries determined by READ buffer size
      - either virtual file (e.g. VxWorks) or disk file (including file rotations)



# The Instant Client

- Stock Properties

- “LOGCOMMANDS”

Scope: FEC

- READ/WRITE

- en/dis-able COMMAND logging inside 'fec.log'

- “LOGDEPTH”

- READ/WRITE

- specify depth of fec.log file (before rotation)

- “SRVLOGFILES”

- READ only

- List of 'text'-based log files

- e.g. \*.log, \*.csv, \*.txt

- input:

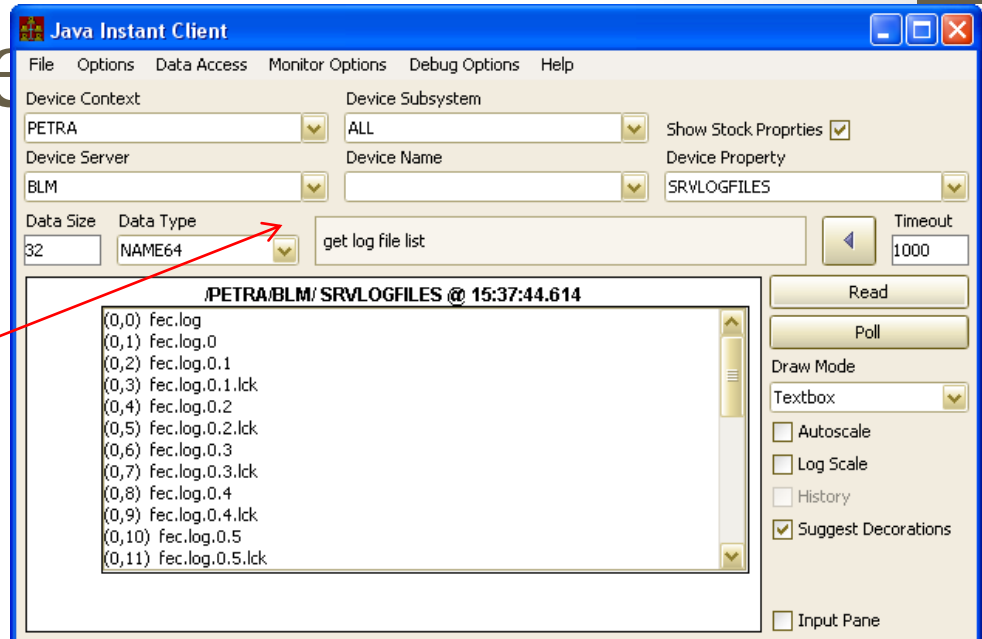
- via input data or 'device name'
      - none => use the FEC\_HOME location
      - otherwise => find files in the path given.



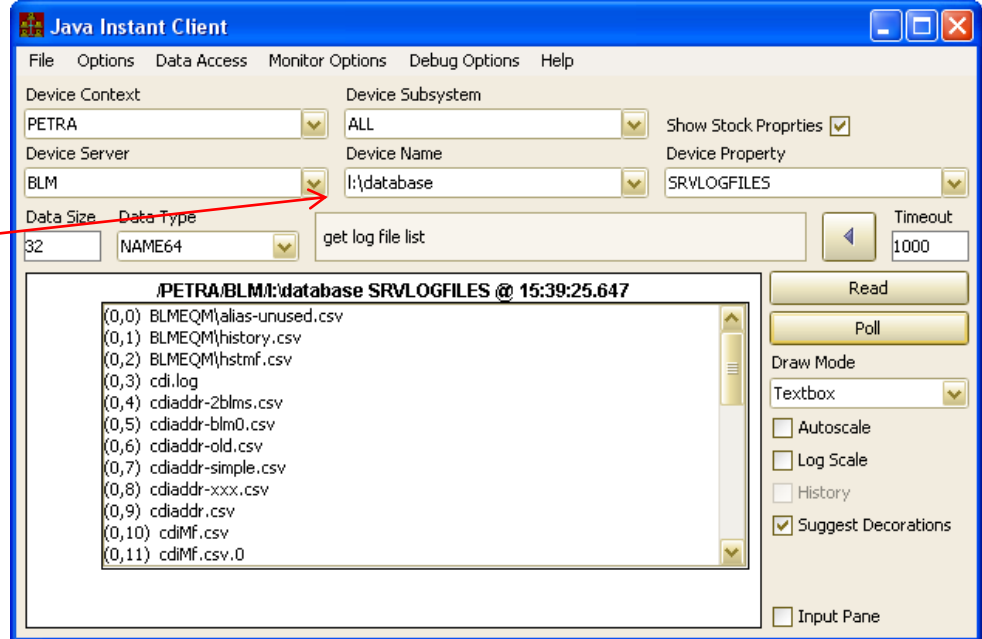
# The Instant Client

- “SRVLOGFILES”
  - READ only

No path = FEC\_HOME path



Path = I:\database  
(=> I know this is a windows system)



# The Instant Client

- Stock Properties

- “SRVLOGFILE”

Scope: FEC

- READ only

- input:

- via input data or ‘device name’
    - none => fec.log from the FEC\_HOME location
    - otherwise => the file given

- return:

- the (text) file input (most recent N bytes; N = requested data size)

- “SRVBINFILE”

- READ only

- input:

- via input data or ‘device name’
    - none => fec.log from the FEC\_HOME location
    - otherwise => the file given

- return:

- the (binary) file input (most recent N bytes; N = requested data size)

# The Instant Client

Scope: FEC

- Stock Properties
  - “STRUCTFORMAT”
    - READ only
    - input = “tag” of interest
    - structure information
      - used in data type ‘discovery’
  - “BITFIELDFORMAT”
    - READ only
    - input = “tag” of interest
    - bitfield information
      - used in bitfield ‘discovery’

# The Instant Client

Tagged structure acquisition

- e.g. “How does this work ?

The screenshot shows the Java Instant Client window with the following configuration and data:

**Device Context:** PETRA  
**Device Subsystem:** ALL  
**Device Server:** BunchScope  
**Device Name:** Bunch-1  
**Device Property:** Trace.INFO  
**Data Size:** 1  
**Data Type:** STRUCT  
**Timeout:** 1000

**Trace Log:**

```
/PETRA/BunchScope/Bunch-1 Trace.INFO @ 15:55:53.943  
(0,0) [DeviceName] ->Bunch-1  
(0,1) [DeviceDesc] ->Bunch/Trace Window  
(0,2) [DataFormat] -> 517  
(0,3) [ArraySize] -> 79  
(0,4) [preTrigger] -> 0  
(0,5) [ScaleX] -> 1.0E-10  
(0,6) [OffsetX] -> -4.0E-9  
(0,7) [UnitsX] ->seconds  
(0,8) [PlotMaxY] -> 3.689917  
(0,9) [PlotMinY] -> -0.6299171  
(0,10) [UnitsY] ->Volts  
(0,11) [Reserved] ->
```

**Buttons:** Read, Poll

**Draw Mode:** Textbox

**Options:**  Autoscale,  Log Scale,  History,  Suggest Decorations,  Input Pane

# The Instant Client

‘learn’ the structure composition via “STRUCTFORMAT”

The screenshot shows the Java Instant Client window with the following configuration and data:

- Device Context:** PETRA
- Device Subsystem:** ALL
- Device Server:** BunchScope
- Device Name:** Bunch-1
- Device Property:** STRUCTFORMAT
- Data Size:** 512
- Data Type:** NAME64DBLDBL
- Registered structure information:** (empty field)
- Timeout:** 1000
- Show Stock Properties:**
- Write Access:**
- Input Data Type:** NAME16
- TraceH5:** (empty text area)
- Draw Mode:** Textbox
- Autoscale:**
- Log Scale:**
- History:**
- Suggest Decorations:**
- Input Pane:**
- Post-Fix (TEXT Input):**  None  LF  CR  LF-CR

**Structure Information Output:**

```
/PETRA/BunchScope/Bunch-1 STRUCTFORMAT @ 15:58:23.132  
(0,0) [DeviceName, 64.0, 516.0]  
(0,1) [DeviceDesc, 256.0, 516.0]  
(0,2) [DataFormat, 1.0, 515.0]  
(0,3) [ArraySize, 1.0, 515.0]  
(0,4) [preTrigger, 1.0, 515.0]  
(0,5) [ScaleX, 1.0, 517.0]  
(0,6) [OffsetX, 1.0, 517.0]  
(0,7) [UnitsX, 16.0, 516.0]  
(0,8) [PlotMaxY, 1.0, 517.0]  
(0,9) [PlotMinY, 1.0, 517.0]  
(0,10) [UnitsY, 16.0, 516.0]  
(0,11) [Reserved, 256.0, 516.0]
```

# The Instant Client

“Intelligent” browsing :

The screenshot shows the Java Instant Client interface. The title bar reads "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

Configuration fields include:

- Device Context: PETRA
- Device Subsystem: ALL
- Device Server: BunchScope
- Device Name: Bunch-1
- Data Size: 1
- Data Type: STRUCT
- Data Description: [TraceHS] Trace Header Info Time Units in Bunches

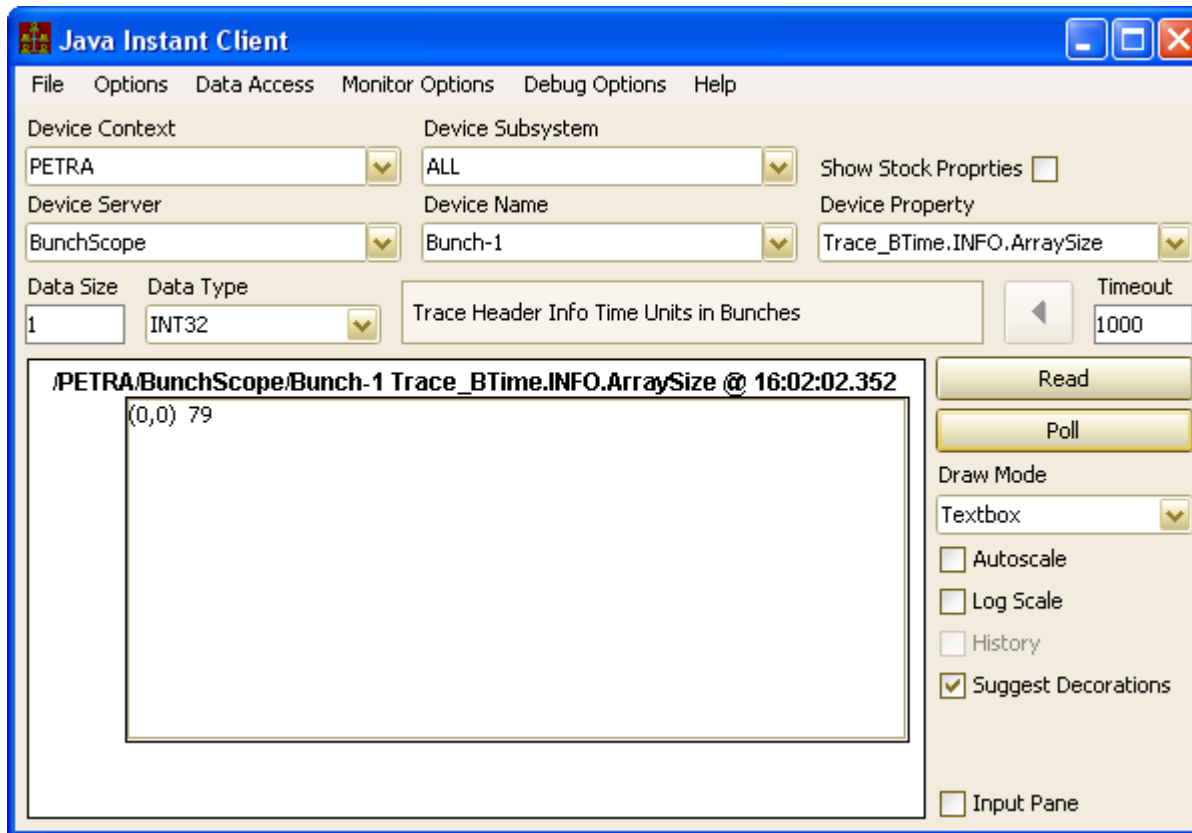
On the right, there is a "Device Property" list with a scroll bar. The selected property is "Trace\_BTime.INFO.". Other visible properties include "Trace\_BTime.INFO.ScaleX", "Trace\_BTime.INFO.OffsetX", "Trace\_BTime.INFO.UnitsX", "Trace\_BTime.INFO.PlotMaxY", "Trace\_BTime.INFO.PlotMinY", "Trace\_BTime.INFO.UnitsY", "Trace\_BTime.INFO.Reserved", and "Trace\_BTime.INFO.". Below this list are checkboxes for "Autoscale", "Log Scale", "History", "Suggest Decorations" (which is checked and circled in red), and "Input Pane".

The main display area shows a list of data points:

```
(0,0) [DeviceName, 64.0, 516.0]
(0,1) [DeviceDesc, 256.0, 516.0]
(0,2) [DataFormat, 1.0, 515.0]
(0,3) [ArraySize, 1.0, 515.0]
(0,4) [preTrigger, 1.0, 515.0]
(0,5) [ScaleX, 1.0, 517.0]
(0,6) [OffsetX, 1.0, 517.0]
(0,7) [UnitsX, 16.0, 516.0]
(0,8) [PlotMaxY, 1.0, 517.0]
(0,9) [PlotMinY, 1.0, 517.0]
(0,10) [UnitsY, 16.0, 516.0]
(0,11) [Reserved, 256.0, 516.0]
```

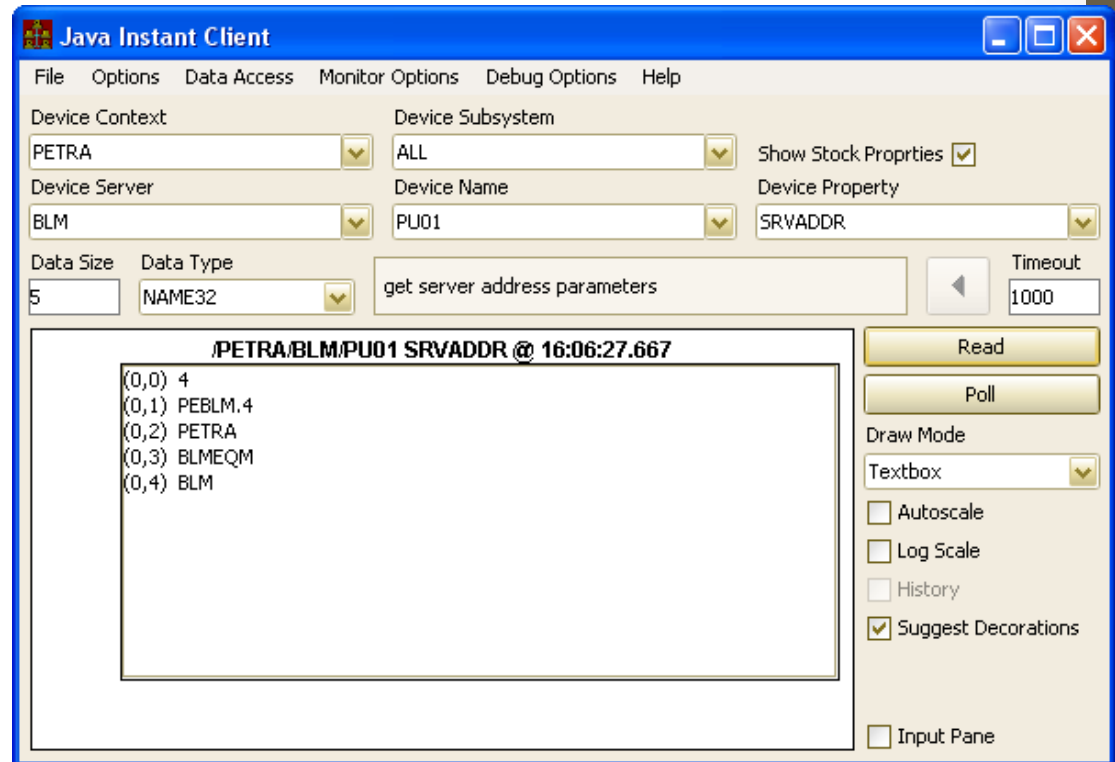
# The Instant Client

Can obtain individual 'fields' :



# The Instant Client

- Stock Properties
  - **SRVADDR**
  - **READ** only
  - Output:
    - Up to 5 NAME32 entries
      - port offset
      - FEC name
      - context
      - local name
      - server name





# The Instant Client

- Stock Properties

- **SRVOS**

Scope: FEC

- **READ** only
    - return: server (i.e. FEC) OS

- **SRVLOCATION**

- **READ** only
    - return: server (i.e. FEC) location

- **SRVDESC**

Scope: server

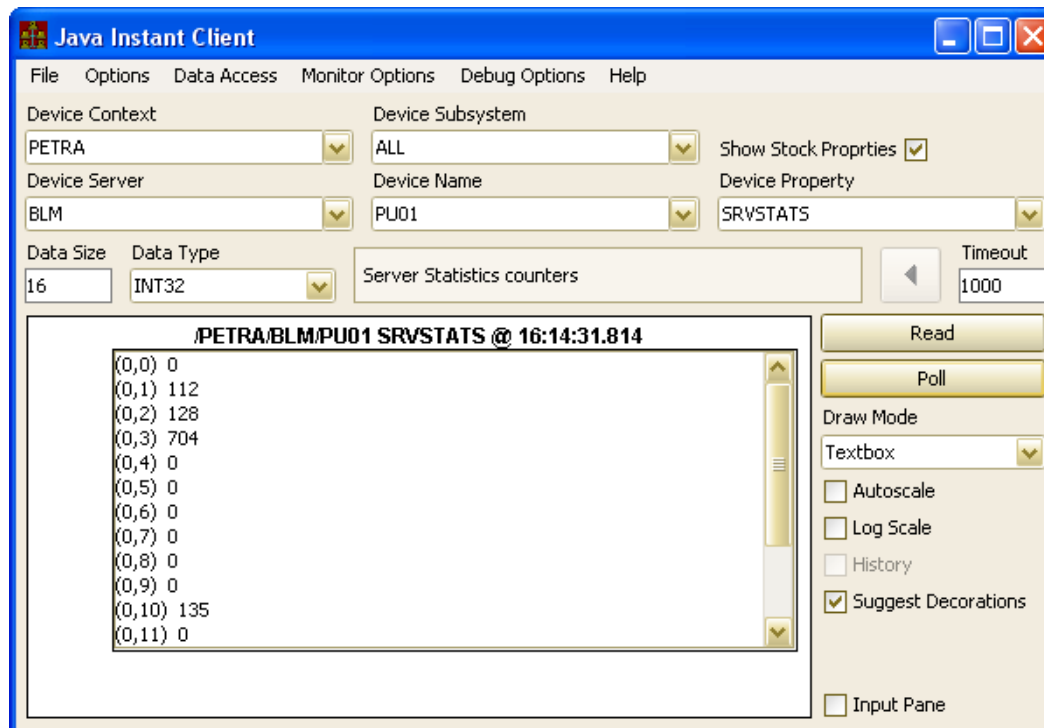
- **READ** only
    - return: server description

- **SRVSUBSYSTEM**

- **READ** only
    - return: server subsystem

# The Instant Client

- Stock Properties
  - **SRVSTATS** Scope: FEC
    - **READ** only
    - return: a 'collection' array of 16 INT32s
    - 'you have to know what they are' (the FEC panel does)



# The Instant Client

**FEC Remote Control Panel**

File View Tools Help

ALARMSTATE	Mag.Group.Main-E...	PE_SR_Mod1	PEVAC-SO.CDI
ALMSTATE	Mag.Group.Main-E...	PE_SR_Mod2	PEVAC-SR.CDI
ARCHIVER	Mag.Group.Main-E...	PE_SR_TRANSML...	PEVAC-SW.CDI
BkrScopes	Mag.Group.Main-E...	PE_SR_TRNSM_L...	PEVAC-O.CDI
BLM	Mag.Group.Main-E...	PEALARMSTATE	PEVAC-NO.CDI
BMS_FEC	Mag.Group.Corr-W	PeBeam	PEVAC-NR.CDI
BPM	Mag.Group.Corr-TA	PeBeamLH	PEVAC-NW.CDI
Bunche_EWeg	Mag.Group.Corr-SL	PEBLM.4.CDI	PIConditions
BunchScope	Mag.Group.Corr-SO	PeCanEwC1	PIControls
BunchScope_Data	Mag.Group.Corr-SW	PeCanEwC2	PICoPy
BunchScope.Atten...	Mag.Group.Corr-NL	PeCanEwM1	PIDisplayDeviceSt...
CANalyzer	Mag.Group.Corr-NO	PeCanEwM2	PIKeyBoxes
CAS	Mag.Group.Corr-NW	PeCanExC1	PiloEWAuf
CAS.ARCHIVE	Mag.Group.Corr-EXL	PeCanExC2	PiloEWSta
Cms.MagnetPs	Mag.Group.Corr-E...	PeCanExC3	PiloEW.CDI
Cms.PsGroup	Mag.Group.Corr-E...	PeCanExC4	PiloP3.CDI
CSSPY	MDI2_JPEG1	PECanExC5	PiloP3Sta
CurrentThreshold	MDI2_JPEG2	PeCanExC6	PIPrivateComm...

Ping all Active: 309 of 313 (16:18:56)

Device context: PETRA

Selected Subsystems:

<input checked="" type="checkbox"/> SER	<input checked="" type="checkbox"/> DIAG	<input checked="" type="checkbox"/> HIST	<input checked="" type="checkbox"/> RF
<input checked="" type="checkbox"/> VAC	<input checked="" type="checkbox"/> TIM	<input checked="" type="checkbox"/> PINTLK	<input checked="" type="checkbox"/> MAG
<input checked="" type="checkbox"/> TRANS	<input checked="" type="checkbox"/> INJ	<input checked="" type="checkbox"/> MEX	<input checked="" type="checkbox"/> INSTR
<input checked="" type="checkbox"/> EXP	<input checked="" type="checkbox"/> VIDEO	<input type="checkbox"/> TEST	

OS Color Code: Dos Unix VxWorks VMS Win16 Win32 Java

FEC Importance: ALL

16:18:58: Normal

Front End	OS	Address
PEBLM.4	WIN32	131.169.151.217
Host Computer	Responsible	Location
AccXpPeR2c.desy.de	P.Duval	30 rm 102 PE-R2 (Sw/8)
Device servers	Description	Ping Control Restart
BLM	Beam Loss Monitors	

Activity		Contracts	Clients	Alarms	Log File	Stats
Refresh						
Ave Busy Time (%)	0					
Cycle Counts	106					
Max Cycle Counts	128					
Sgl Link Counts	745					
Client Misses	0					
Client Reconnects	2					
Client Retries	0					
Contract Misses	0					
Contract Delays	0					
Burst Limit Reached Count	0					
Data Timestamp Offset (ms)	135					

# The Instant Client

- Stock Properties
  - SRVSETTINGS
    - READ only
    - configuration settings.

Scope: FEC

The screenshot shows the Java Instant Client application window. The title bar reads "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help".

The main interface is divided into several sections:

- Device Context:** "PETRA" (dropdown), "ALL" (dropdown), and "Show Stock Properties" (checked checkbox).
- Device Server:** "BLM" (dropdown), "PU01" (dropdown), and "Device Property" (dropdown).
- Data Size:** "1" (input field), "Data Type": "STRUCT" (dropdown), and "Timeout": "1000" (input field).
- Server Configuration Settings:** "[SrvSetQy] Server Configuration Settings" (text field).
- Buttons:** "Read" and "Poll" (yellow buttons).
- Draw Mode:** "Textbox" (dropdown), "Autoscale" (unchecked checkbox), "Log Scale" (unchecked checkbox), "History" (unchecked checkbox), and "Suggest Decorations" (checked checkbox).
- Input Pane:** "Input Pane" (unchecked checkbox).

The central display area shows the following configuration data for "/PETRA/BLM/PU01 SRVSETTINGS @ 16:20:55.100":

```
(0,0) [srvWorkArea] -> 65536
(0,1) [cycDeadBand] -> 10
(0,2) [minPollInterval] -> 10
(0,3) [conTblCapacity] -> 1000
(0,4) [conRenewalLen] -> 60
(0,5) [clnTblCapacity] -> 100
(0,6) [ackOnChange] -> 1
(0,7) [srvBurstLimit] -> 1000
(0,8) [srvBurstCycDly] -> 20
(0,9) [srvPacketMTU] -> 1472
(0,10) [tcpMaxMsgSize] -> 100000000
(0,11) [tcpTblCapacity] -> 32
(0,12) [srvSendBuffers] -> 65536
(0,13) [srvRecvBuffers] -> 32768
(0,14) [srvLazySched] -> 0
(0,15) [srvBkgTskRentr] -> 0
(0,16) [srvCycInSepThrd] -> 1
(0,17) [tcpTraInSepThrd] -> 1
(0,18) [clnWorkArea] -> 65536
(0,19) [lnkTblCapacity] -> 1000
(0,20) [clnBurstLimit] -> 1000
(0,21) [clnSendBuffers] -> 65536
(0,22) [clnRecvBuffers] -> 32768
(0,23) [clnRecvQueue] -> 10
(0,24) [useLoopbackAddr] -> 0
(0,25) [useWdogLinks] -> 1
(0,26) [allowCommonLnks] -> 1
(0,27) [retryOnTimeout] -> 1
(0,28) [srvSchedIntvl] -> 0
(0,29) [srvRetrdRemovl] -> 0
(0,30) [srvAllowRemote] -> 0
(0,31) [reserved4] -> 0
```

# The Instant Client

- Stock Properties

Scope: FEC

- **SRVSTARTTIME**

- **READ** only
    - return: server startup time

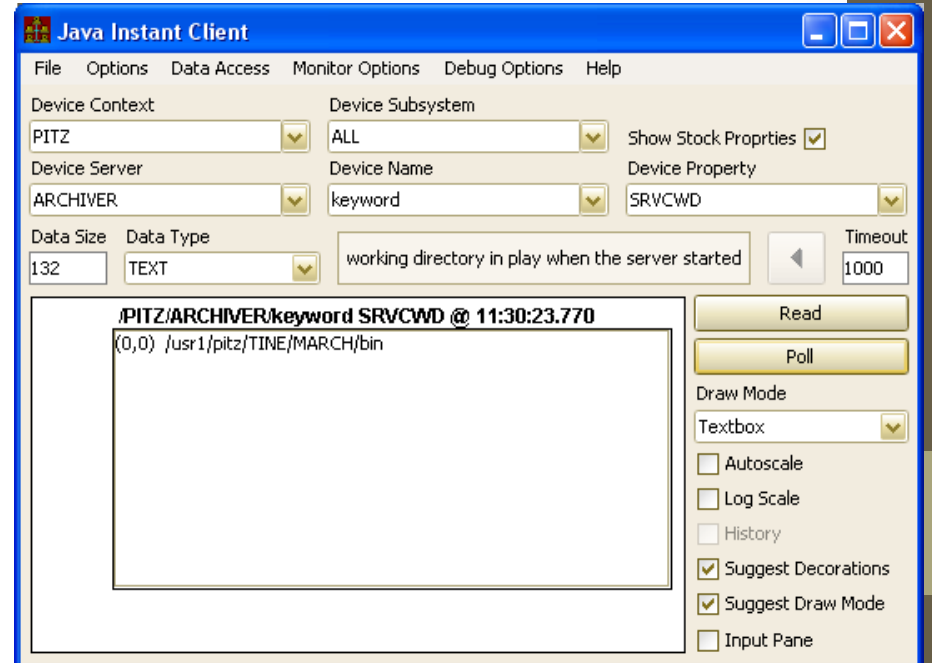
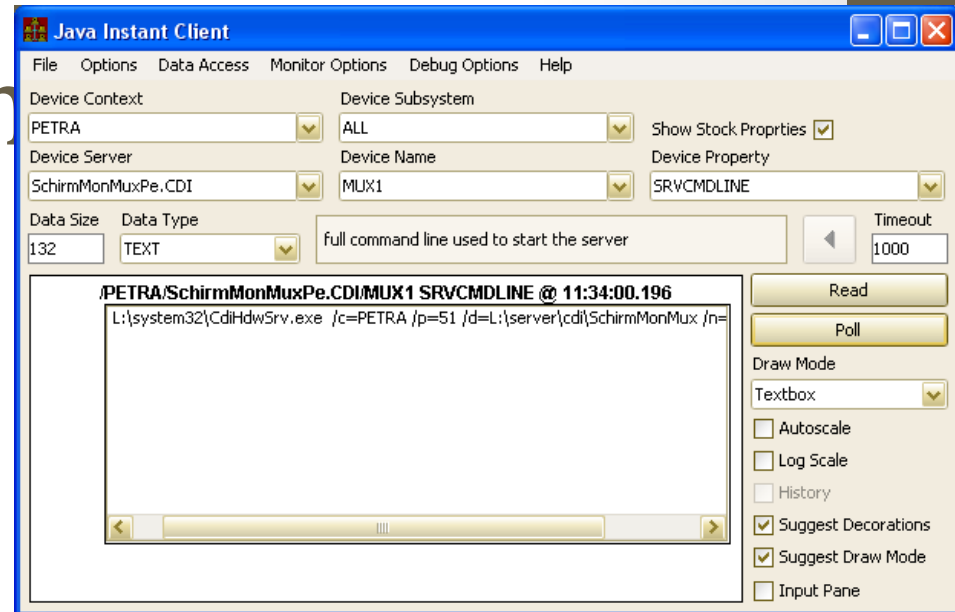
- **SRVPID**

- **READ** only
    - return: server process id

# The Instant Client

- Stock Properties
  - SRVCMDLINE
    - READ only
    - return: server command line
  - SRVCWD
    - READ only
    - return: server current working directory

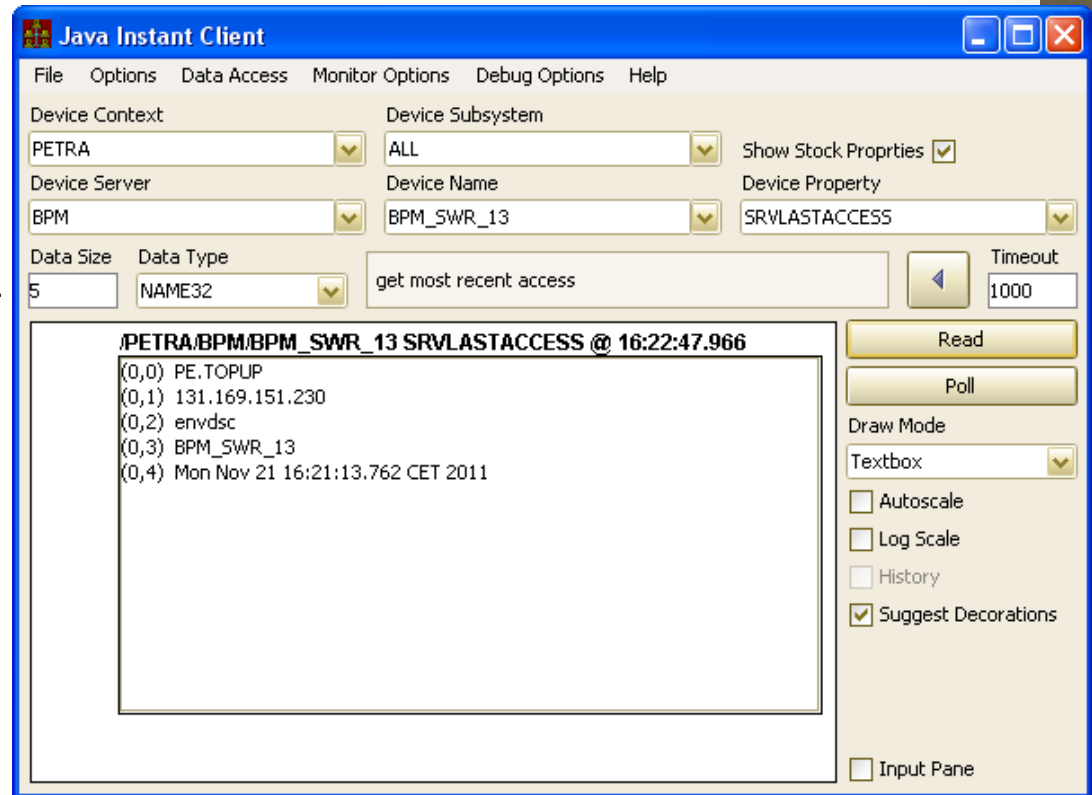
Scope: FEC



# The Instant Client

Scope: server

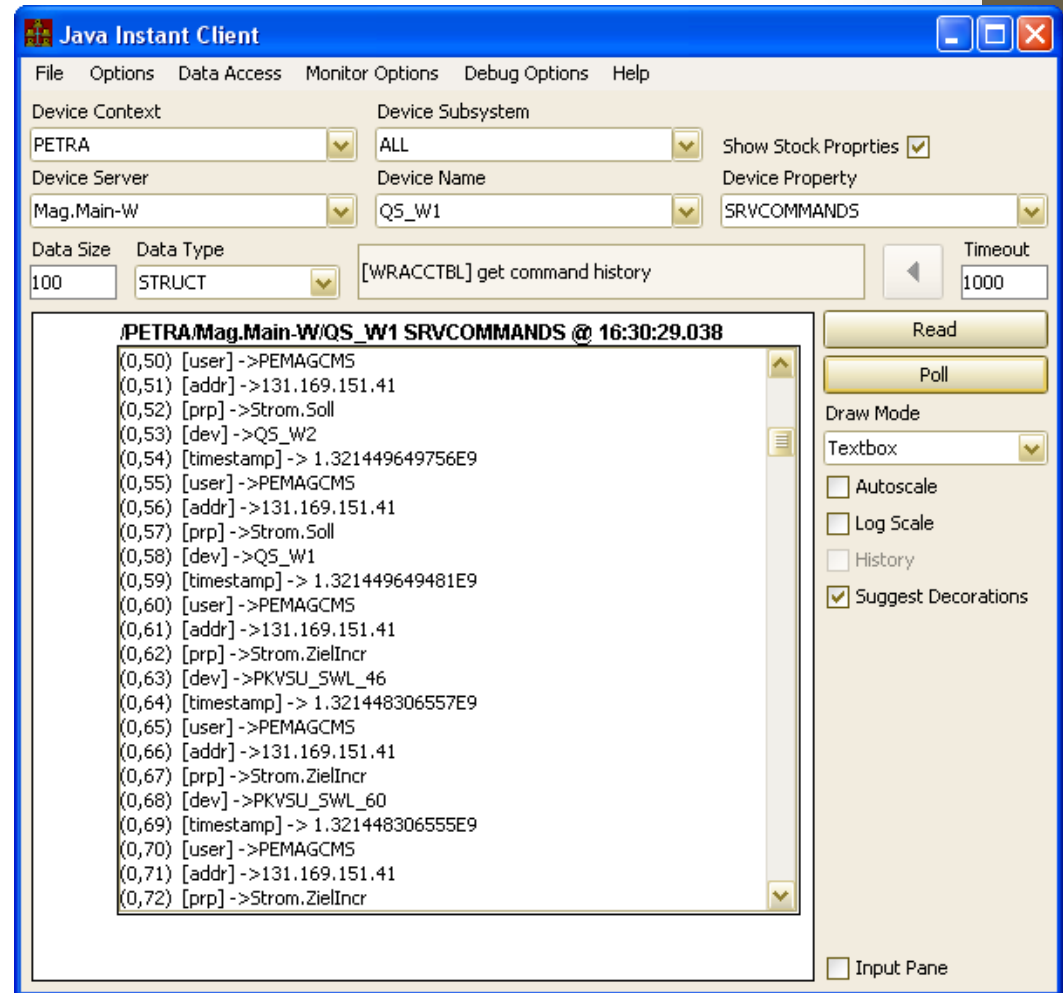
- Stock Properties
  - **SRVLASTACCESS**
    - **READ** only
    - return:
      - up to 5 NAME32 values
      - info related to last WRITE access.
        - user
        - net address
        - property called
        - device called
        - access time.



# The Instant Client

- Stock Properties
  - SRVCOMMANDS
    - **READ** only
    - return up to 100 of the most recent WRITE commands (struct “WRACCTBL”)

Scope: server





# The Instant Client

- Stock Properties
  - **DEBUGLEVEL**
    - **READ/WRITE**
    - Sets/gets the debug level at the FEC
  - **SRVEXIT**
    - **WRITE** only
    - must be enabled (!) e.g. "SetAllowRemoteManagement(TRUE)"
    - input:
      - 1 INT32 value gives the exit level
      - no input => exit level = 0

Scope: FEC

# The Instant Client

- Stock Properties

Scope: server

- SRVIDLE

- READ/WRITE
    - must be enabled (!) e.g. "SetAllowRemoteManagement(TRUE)"
    - input: 1 INT32 value
      - 0 => not idle
      - non-zero => idle
    - an idle server will NOT call any eqm dispatch routines
    - attempts to access the server receive 'server\_idle'

- SRVINIT

- WRITE only
    - must be enabled (!) e.g. "SetAllowRemoteManagement(TRUE)"
    - no input
    - Calls a server's registered 'init' routine.

Scope: FEC

- SRVRESET

- WRITE only
    - must be enabled (!) e.g. "SetAllowRemoteManagement(TRUE)"
    - no input
    - de-registers all equipment modules and returns all memory to the heap.
    - Calls any registered 'PostSystemInit()' routine.

# The Instant Client

- Stock Properties
  - **DEBUGLEVEL**
    - **READ/WRITE**
    - Sets/gets the debug level at the FEC
  - **SRVEXIT**
    - **WRITE** only
    - must be enabled (!) e.g. "SetAllowRemoteManagement(TRUE)"
  - **SRVIDLE**
    - **WRITE** only
  - **SRVINIT**
    - **WRITE** only
  - **SRVRESET**
    - **WRITE** only
  - **MESSAGE** (write only) text appended to fec.log and on console (e.g. "address in use" from the ENS)
    - **WRITE** only

Scope: FEC

# The Instant Client

- Stock Properties
  - MESSAGE
    - WRITE only
    - input: a text message
    - text appended to fec.log and on console
      - e.g. "address in use" from the ENS

Scope: FEC

# The Instant Client

- Stock Properties (abandoned ?)

- **SRVSELFTTEST**

Scope: Server

- **READ** only
    - return: a self-test file with a list of properties/devices (with input) to access
      - each call must return 'success' in order to pass the test

- **APPDATE**

Scope: FEC

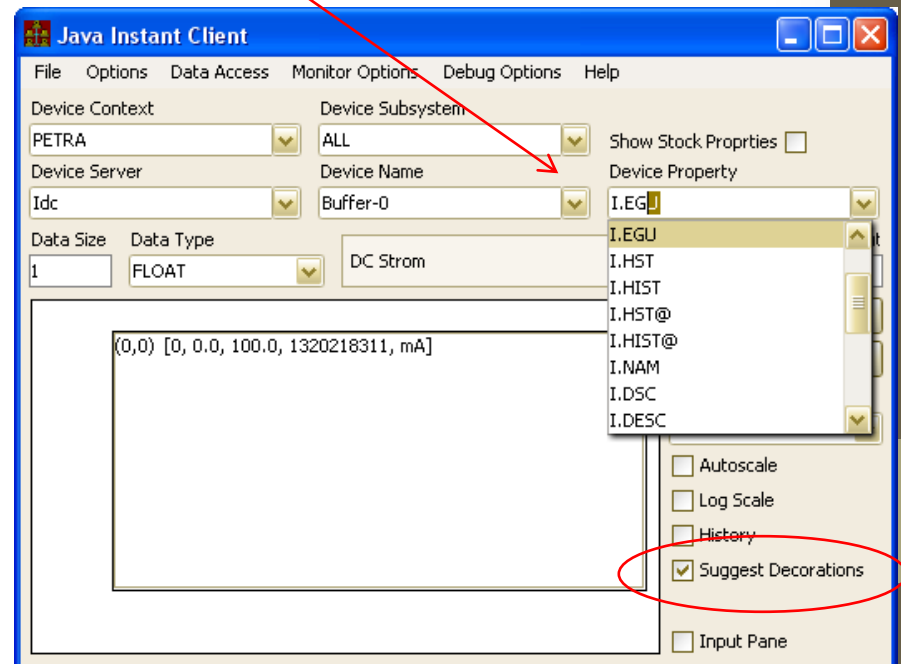
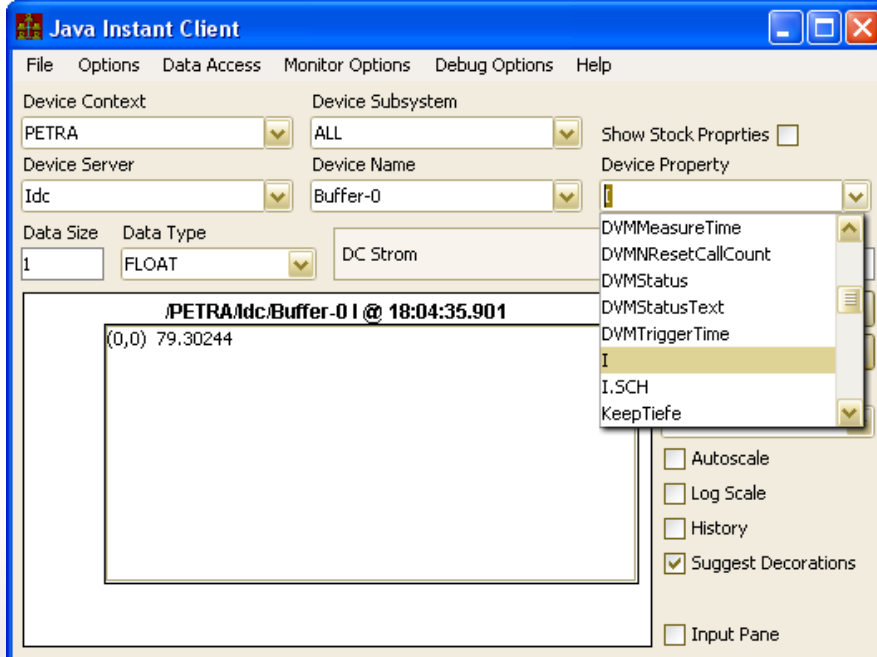
- **READ** only
    - return the last application compile data
    - BUT: information must be provided via API (SetAppDate())

- **APPVERSION**

- **READ** only
    - return the last application version
    - BUT: information must be provided via API (SetAppVersion())

# The Instant Client

- Meta Properties
  - “properties” giving information about other Properties !
  - hidden from general browsing !
  - displayed in java client via supplying a "." in the property combo box



# The Instant Client

- Meta Properties
  - give a '*mechanism*' for obtaining something
  - do **NOT** imply 'success'
    - e.g. ".HIST" will return '*not allocated*' if no history stored !
  - .HIST, .ARCH
    - input as shown above (as in the central archive, etc.)
      - array of INT32 or doubles with 'start', 'stop' ('index', 'raster')
      - start, stop in UTC
        - so this is getting '*uncomfortable*' in the instant client!
    - output:
      - DBLDBL (what the viewer uses), or FLTINT, or INTFLTINT
      - CF\_HISTORY *not available* in the instant client
  - .HIST@, .ARCH@
    - single input gives the target time.

# The Instant Client

Some examples:

no input :

The screenshot shows the Java Instant Client interface. The title bar reads "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help". The "Device Context" is set to "PETRA" and "Device Subsystem" is "ALL". The "Device Server" is "Idc" and "Device Name" is "Buffer-0". The "Device Property" is "I.HIST". The "Data Size" is "1000" and "Data Type" is "DBLDBL". The main display area shows a list of data points for "PETRA/Idc/Buffer-0 I.HIST @ 07:16:43.441". The data points are as follows:

Index	Value 1	Value 2
(0,0)	[79.24517059326172, 1.3219425979251065E9]	
(0,1)	[79.23627471923828, 1.3219425990191066E9]	
(0,2)	[79.20423126220703, 1.3219426012381065E9]	
(0,3)	[79.22624206542969, 1.3219426023471065E9]	
(0,4)	[79.3875961303711, 1.3219426034411066E9]	

Buttons for "Read" and "Poll" are visible. The "Draw Mode" section includes "Textbox", "Autoscale", "Log Scale", "History", "Suggest Decorations" (checked), and "Input Pane" (unchecked).

start and stop UTC  
as INT32 :

The screenshot shows the Java Instant Client interface. The title bar reads "Java Instant Client". The menu bar includes "File", "Options", "Data Access", "Monitor Options", "Debug Options", and "Help". The "Device Context" is "PETRA" and "Device Subsystem" is "ALL". The "Device Server" is "P3MagTempProxy" and "Device Name" is "NL\_151DKs". The "Device Property" is "Temperature.HIST". The "Data Size" is "1000" and "Data Type" is "DBLDBL". The main display area shows a list of data points for "PETRA/P3MagTempProxy/NL\_151DKs Temperature.HIST @ 07:09:58.00". The data points are as follows:

Index	Value 1	Value 2
(0,0)	[35.90146255493164, 1.321932637659E9]	
(0,1)	[35.90146255493164, 1.321932689816E9]	
(0,2)	[35.90146255493164, 1.321932742739E9]	
(0,3)	[35.90146255493164, 1.321932794489E9]	
(0,4)	[35.90146255493164, 1.321932847365E9]	
(0,5)	[35.90146255493164, 1.321932899944E9]	
(0,6)	[35.90146255493164, 1.32193295321E9]	
(0,7)	[35.90146255493164, 1.321933004179E9]	
(0,8)	[35.90146255493164, 1.32193305818E9]	
(0,9)	[35.90146255493164, 1.321933109462E9]	
(0,10)	[35.90146255493164, 1.321933161056E9]	

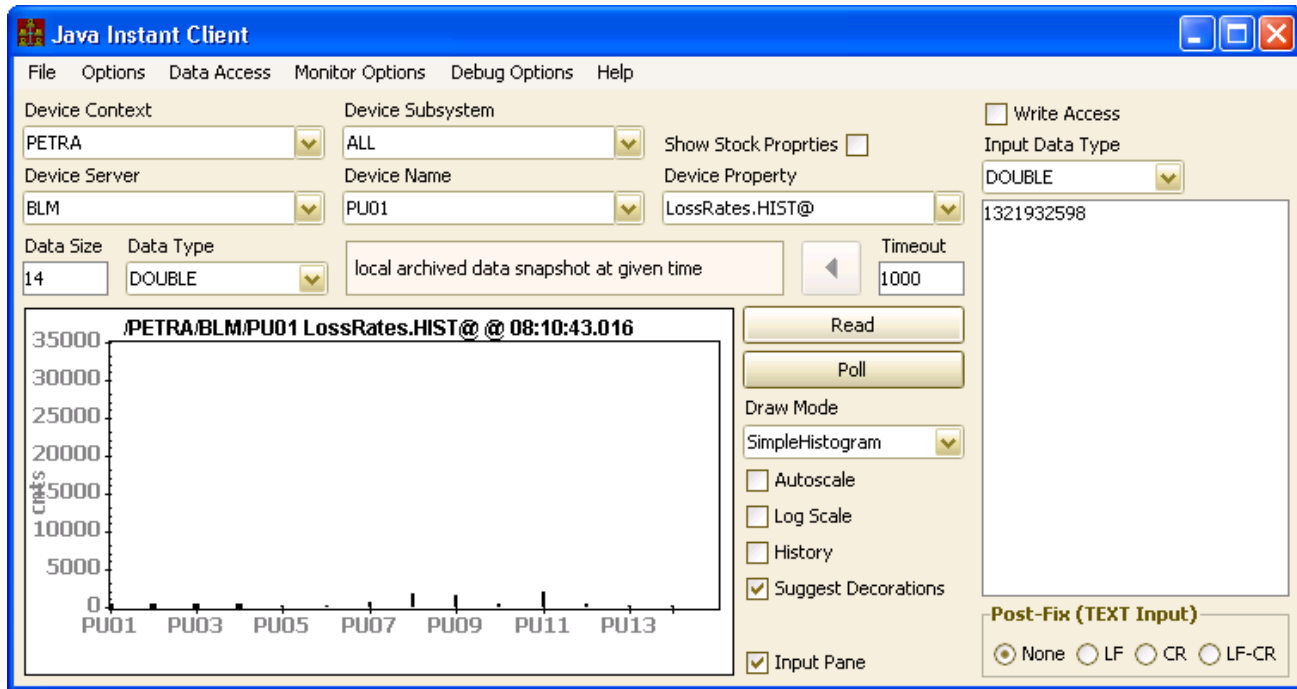
Buttons for "Read" and "Poll" are visible. The "Draw Mode" section includes "Textbox", "Autoscale", "Log Scale", "History", "Suggest Decorations" (checked), and "Input Pane" (checked). The "Post-Fix (TEXT Input)" section includes "None" (selected), "LF", "CR", and "LF-CR".



# The Instant Client

- History snapshot:

input: target time (UTC)



- 'UTC' input makes this difficult to use with the Instant Client
  - (better to use the archive APIs let the Archive Viewer handle this)

# The Instant Client

- Maybe add a 'UTC generator'?
  - calendar + clock ?
  - 'now' – N hours ?
  - drag-and-drop to input panel ?

# The Instant Client

- **Limitations**
  - **Structure fields** via '*suggest decorations*'
    - does not handle 'nested' structures !
    - if a field is itself another structure, it stops 'suggesting'
  - **Structure input** not possible
    - could provide an input *form* with fields etc. ?
    - could simply try to **parse the input** according to the known structure type ?