TINE Release 4 in Operation

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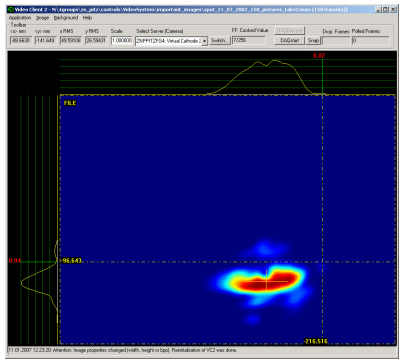
"Damn the use cases, full speed ahead!"

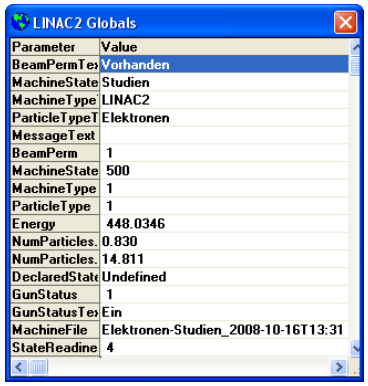
TINE Background …

- Mature control system
  - Lots of attention paid to transfer protocol
    - Asynchronous, synchronous
    - Datagrams, streams
    - Multicast
  - Lots of attention paid to central services
    - Archive, Alarm, Logging, Naming, State, Globals
  - Recent additions at the hardware layer
    - CDI, TICOM, Network Queue
  - But: Release 3.31 ready for an overhaul
    - Too many protocol deficiencies requiring workarounds.
    - Keep pace with IT

TINE: Some old features you should know about …

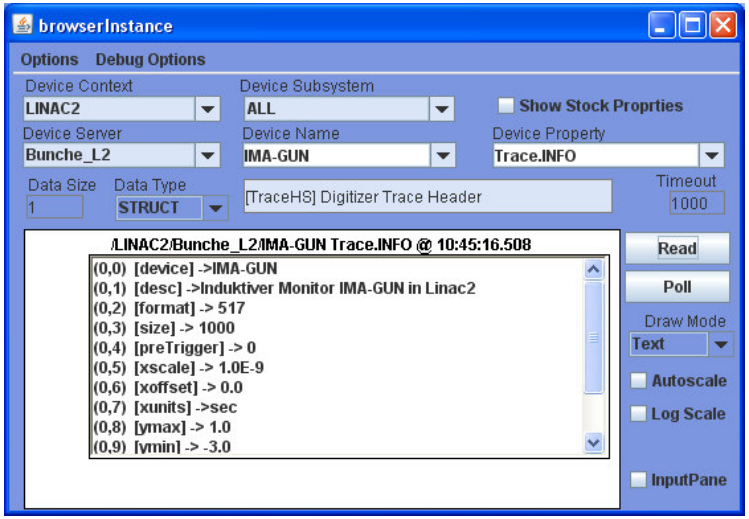
- Multicasting
  - Cut back on bandwidth, cpu load on a server
  - 2 ways to multicast:
    - Publisher-subscriber
      - Connection table entry reduces to single entry
      - e.g. video frames
    - Producer-consumer
      - No connection table, just send it out!
      - e.g. beam parameters (“globals”)
  - Caution: this is UDP, not TCP! (reliability?)





TINE: Some old features you should know about …

- Data Types
  - All the primitives …
  - Many complex types
    - Doublets (e.g. value–status pair)
    - Triplets (e.g. name-value-status)
    - Quadruplets (e.g. bus address)
  - User defined "tagged" structures
    - Registered at server and client
    - Can be 'discovered' from the server

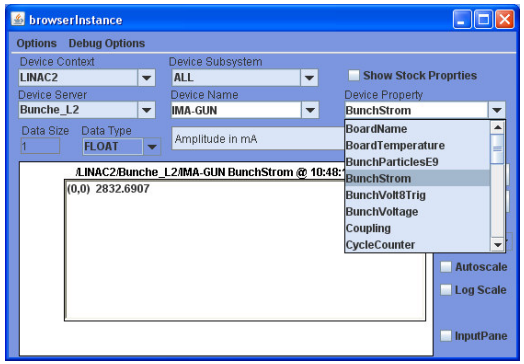


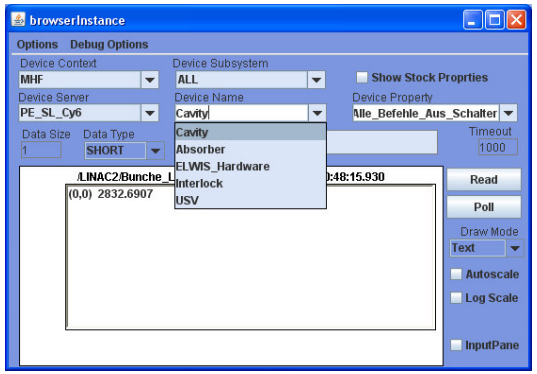
TINE: Some old features you should know about …

- Array Types
  - Scalar (single value – array of length 1)
  - Spectrum (trace, e.g. scope trace, bunch profile)
  - Multi-channel
    - Atomic collection of property values with same units and settings
      - e.g. vacuum pressures, beam position, psc currents, …
    - Extremely useful in archiving !
    - Can retrieve a single value or subset
    - Not the same thing as (but similar to) a wild-card call (device = “*”)

TINE: Some old features you should know about …

- Query Precedence (relevant to browsing)
  - None
    - All registered devices support all properties
    - All properties apply to all devices
  - Device-query precedence
    - Each device supports a subset of properties
    - New device selection -> re-acquire property list
  - Property-query precedence
    - Each property applies to a different device list
    - New property selection -> re-acquire device list





/LINAC2/Bunche/IMA_BUN[Trace]

New in TINE Release 4.0.4

- Namespace
  - Longer names (64 characters)
    - Extended string sets up to 1024 chars
  - Case insensitive
- Data Objects
  - Timestamps +
    - System Data Stamp (e.g. cycle number)
    - User Data Stamp (set by the device server)
  - Transfer 'Reason'
    - Data change, heartbeat, event, etc.
- Multicasting
  - Server-specific multicast groups
    - Last 2 bytes of IP address define the group
      - (Actually: host-specific)
    - No longer uses single multicast group for everyone!

New in TINE Release 4.0.4

- Redirection now supports …
  - Context, server, device, and property
- Tagged Structures can now contain …
  - all TINE data types
  - other tagged structures!
- Bitfields
  - Encode individual bits and fields of bits
  - “Tagged” a la tagged structures.

New in TINE Release 4.0.4

- Alarm Messages
  - Higher precision timestamps
  - Alarm start time
  - 64 bytes of alarm data
- Local Histories
  - Non-fragmented ‘worst-case’ history files
  - History access on a separate thread
- Server configuration
  - API or
  - CSV file hierarchy or
  - XML file

New in TINE Release 4.0.4

- Images and Video
  - Image data type (coordinated with DOOCS)
  - Image header specifies
    - Frame characteristics
    - compression/image type
  - Advanced API features
    - SetPacketMTU()
    - SetPropertyBuffer() (restrict double buffering)
    - etc.

Central Services

- Globals

FLASH Globals

Context Help

Keyword	Value
ChargeBunch	0.8188937
MessageText	SASE for PG2 Delay Line Study
Energy	502.83932
Wavelength	25.86352
Globals Time	15.10.08 16:51:35.157 CEST

DESY2 Globals

Context Help

Keyword	Value
BeamPermText	Vorhanden
MachineStateText	Ein.NutzerBetrieb
MachineTypeText	DESY2
ParticleTypeText	Positronen
MessageText	
BeamPerm	1
MachineState	101
MachineType	2
ParticleType	2
Energy	5.9988847
NumParticles	3.3482747077941895
DeclaredState	Undefined
MagCurrPermText	Vorhanden
MagCurrPerm	1
BeamForText	Unbestimmt
BeamFor	4
MachineFile	Positronen-Ein.NutzerBetrieb-Teststrah...
StateReadiness	4
StateReadinessText	Unbestimmt
Globals Time	15.10.08 16:52:24.803 CEST

LINAC2 Globals

Context Help

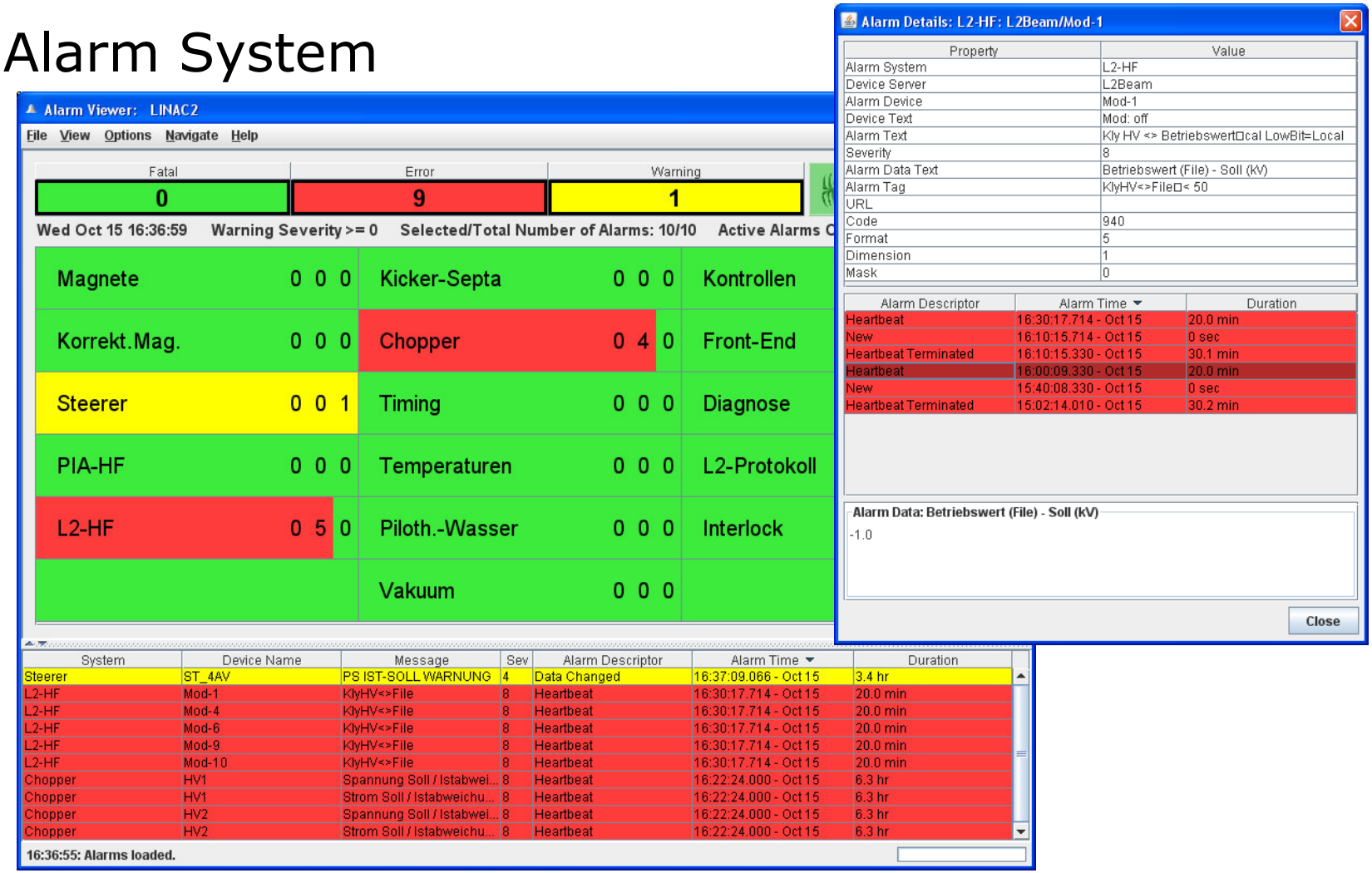
Keyword	Value
BeamPermText	Vorhanden
MachineStateText	Ein.D2Betrieb
MachineTypeText	LINAC2
ParticleTypeText	Positronen
MessageText	
BeamPerm	1
MachineState	101
MachineType	1
ParticleType	2
Energy	449.5974
NumParticles.L2	1.1230469942092896
NumParticles.PIA	5.3085126876831055
DeclaredState	Undefined
GunStatus	1
GunStatusText	Ein
MachineFile	Positronen-Ein.D2Betrieb 2008-10...
StateReadiness	4
StateReadinessText	Unbestimmt
Globals Time	15.10.08 16:51:15.971 CEST

Central Services

- Special Globals (optional, systematic)
  - "SYSTIME"
    - Scope = SITE
    - Used for synchronization
  - "CycleNumber"
    - Scope = Context
    - Applies a System Data Stamp to a server's data
    - Can be used as a trigger

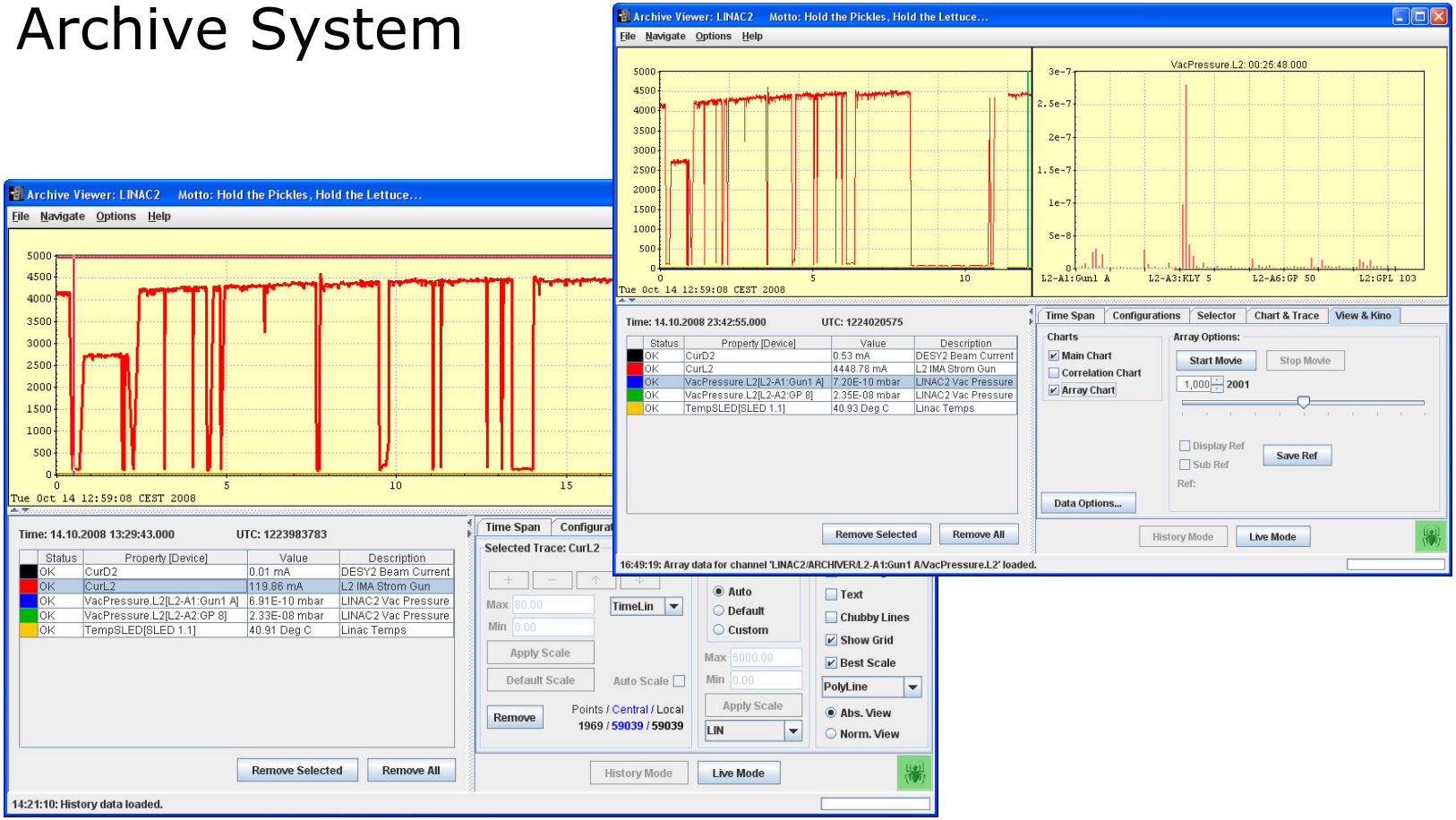
Central Services

- Alarm System



Central Services

- Archive System

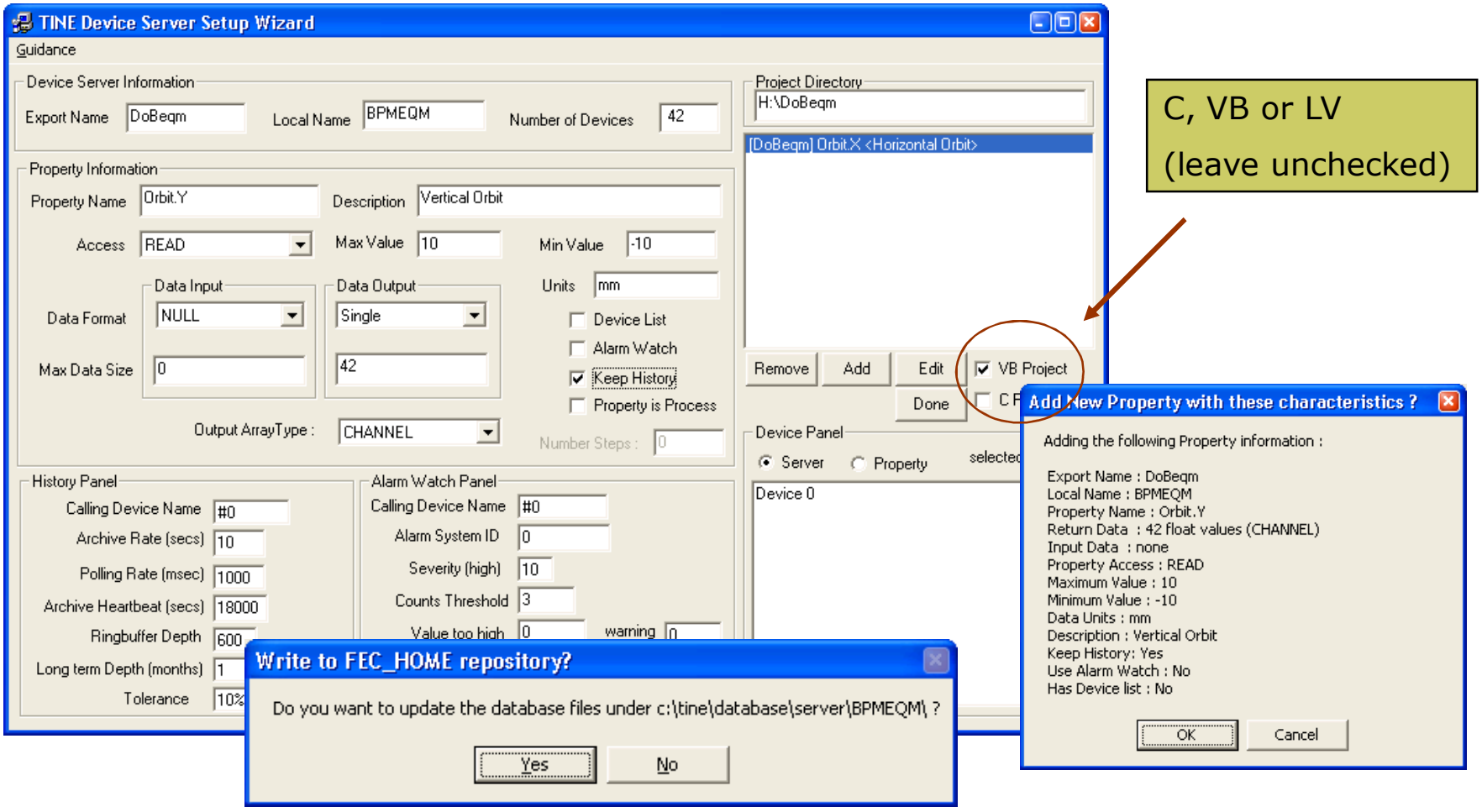


Development Tools

- Servers
  - Legacy device server wizards
    - C, VB, LabView (databases)
  - Java device server wizard → TUP013
- Hardware
  - CDI → WEZ01
  - TICOM (DESY Magnets, GKSS)
  - Network Queue (PITZ)
- Rich Clients
  - ACOP beans (+ Eclipse, NetBeans)
  - TINE Labview VIs
- Simple Clients
  - COMA + ACOP beans
  - jDDD → TUZ04
  - Web2C → WEX01
  - CSS → TUP011, TUP009, TUZ03

Standard Device Server Wizard

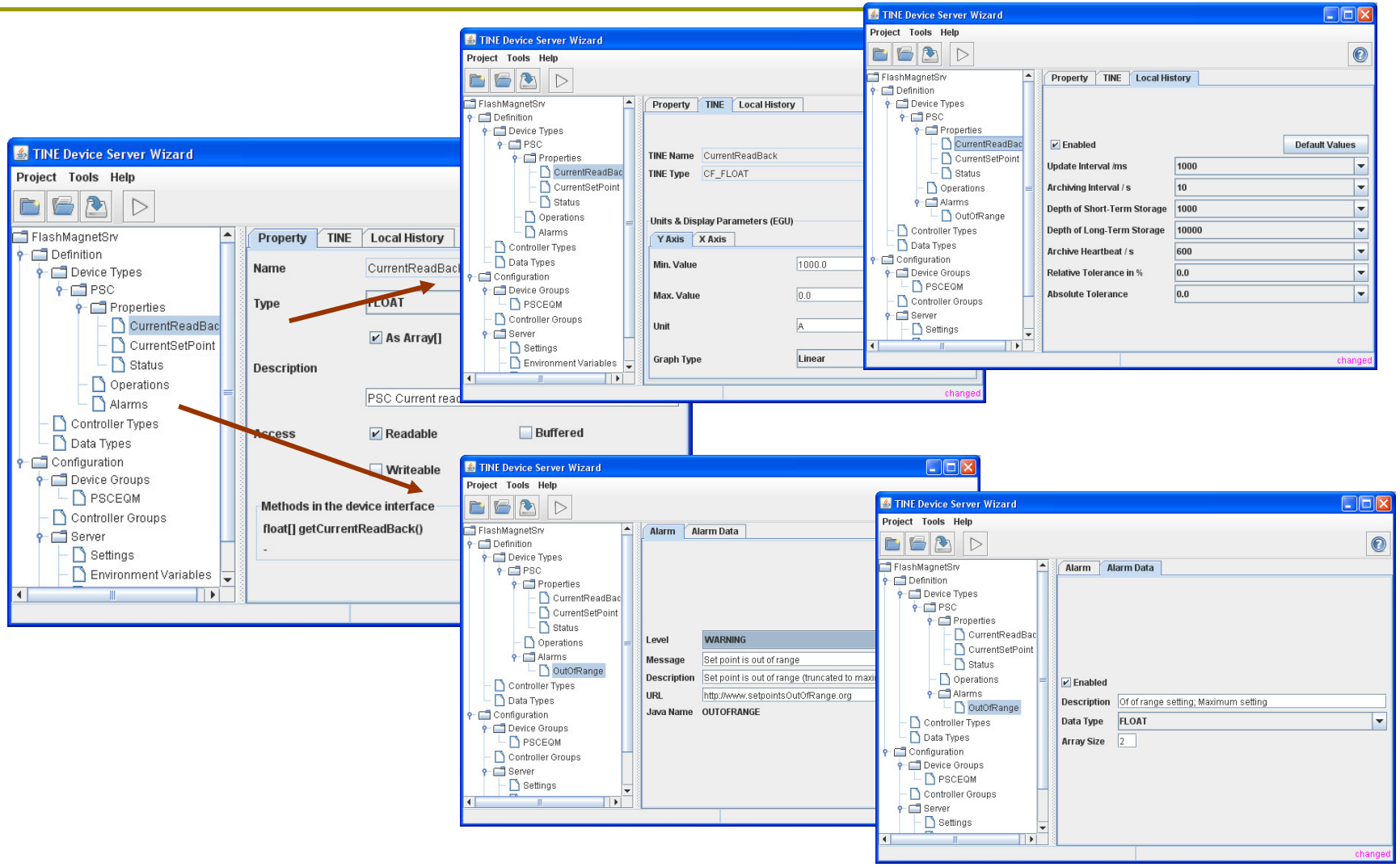
(refitted to TINE Release 4.0)



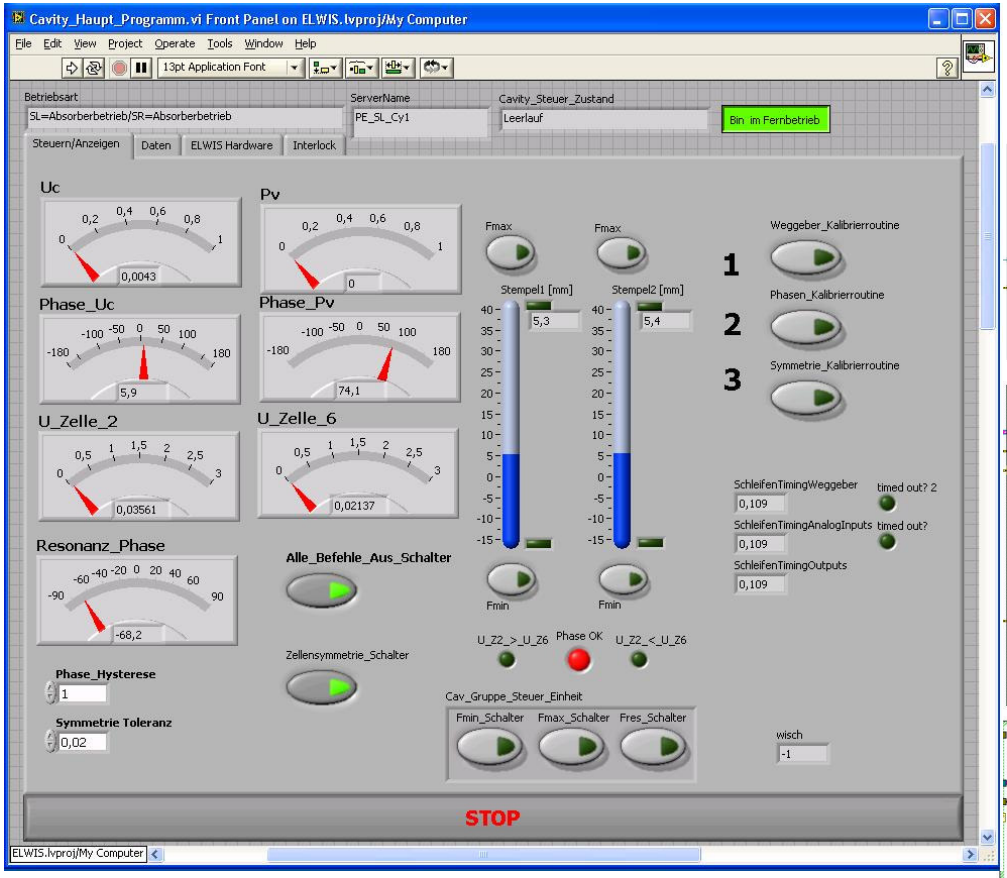
C, VB or LV

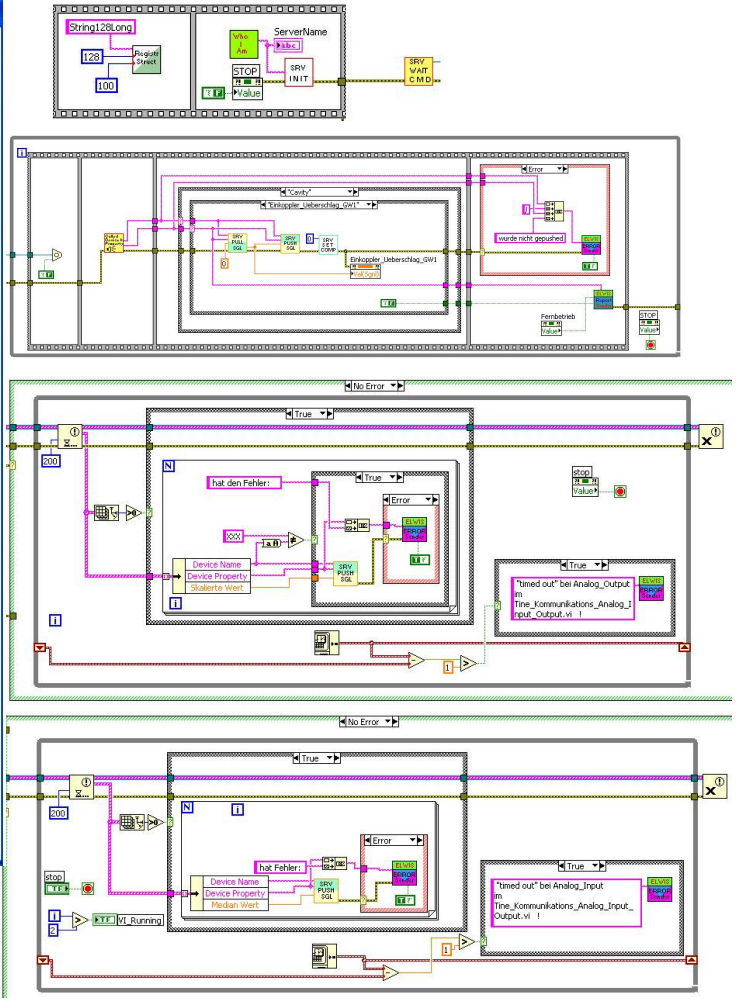
(leave unchecked)

Java Device Server Wizard …

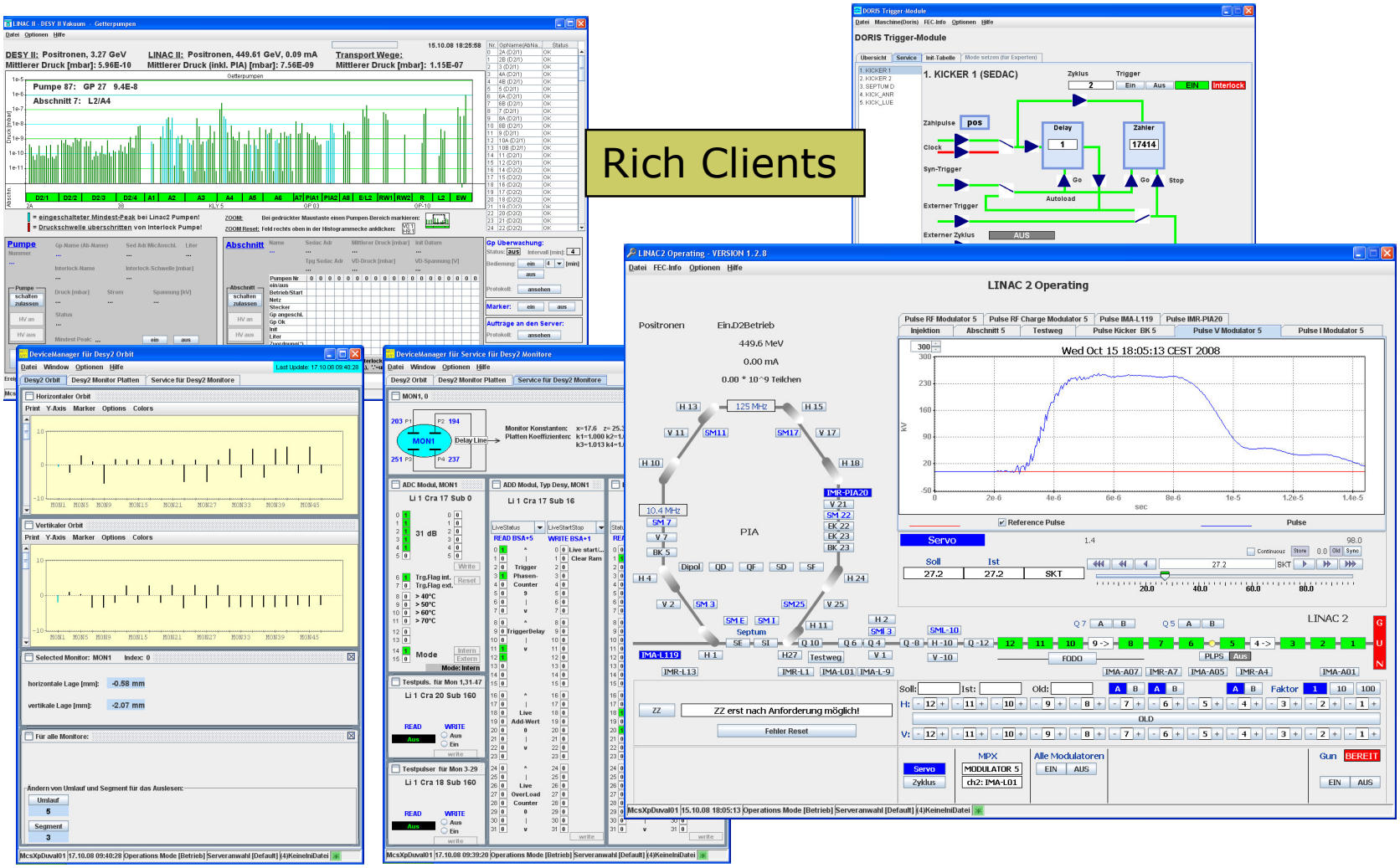


LabView Servers (RF Cavities)





New Java Applications …



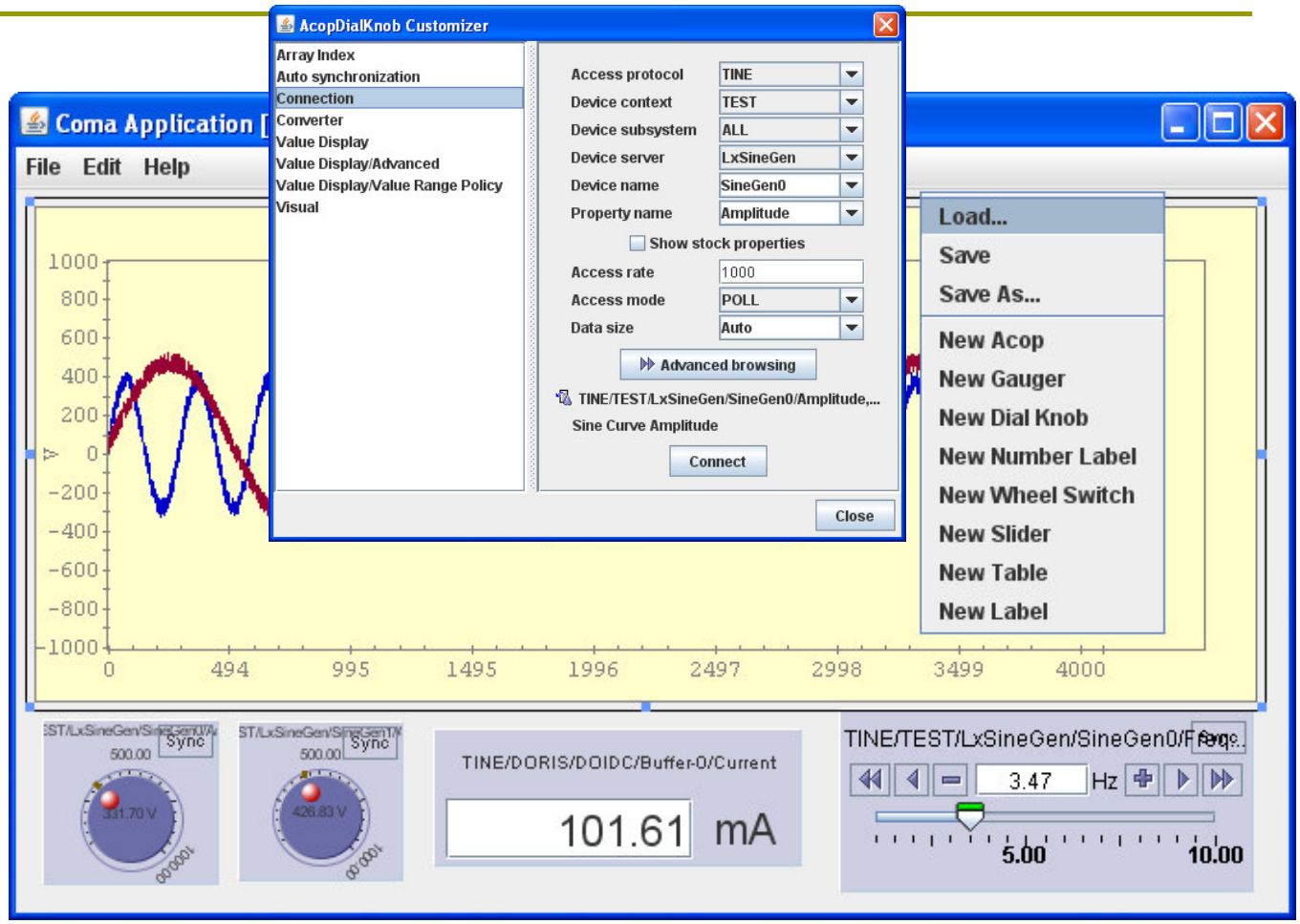
TINE and Java ACOP + COMA
(for simple clients)

No Frameworks !

Lightweight!

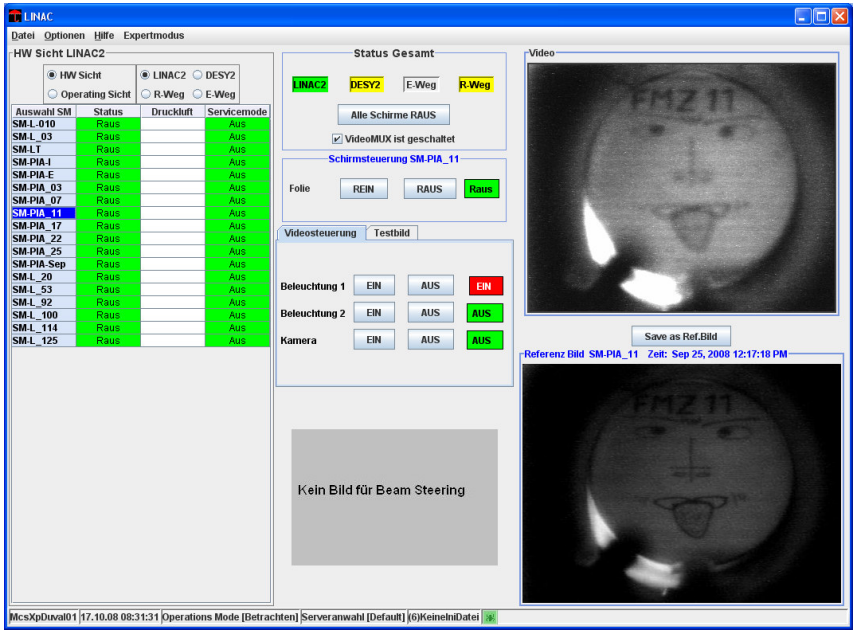
Just start a coma application (e.g. an empty coma application)

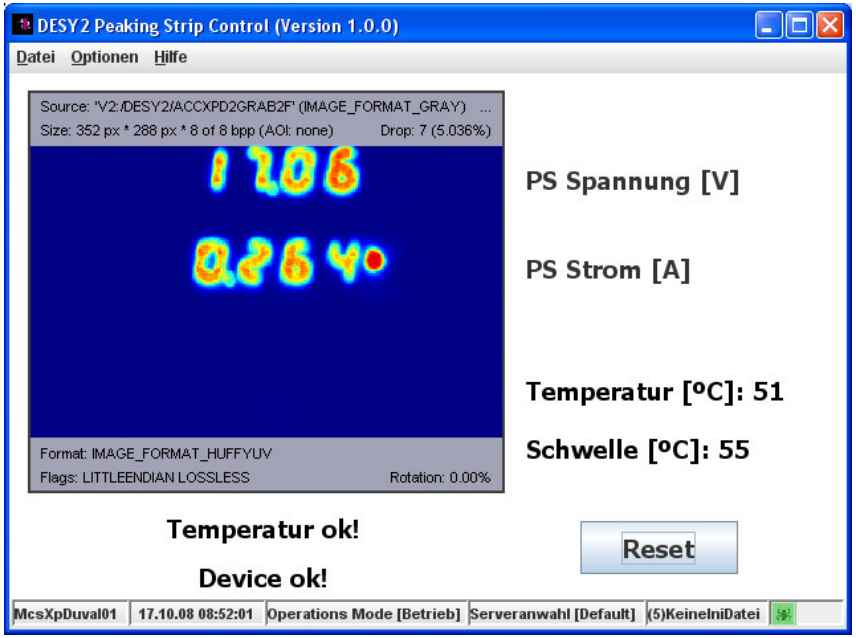
Browse Control system at **run-time** with *customizer* …



ACOP Video bean

(the new kid on the block)





Commissioning …

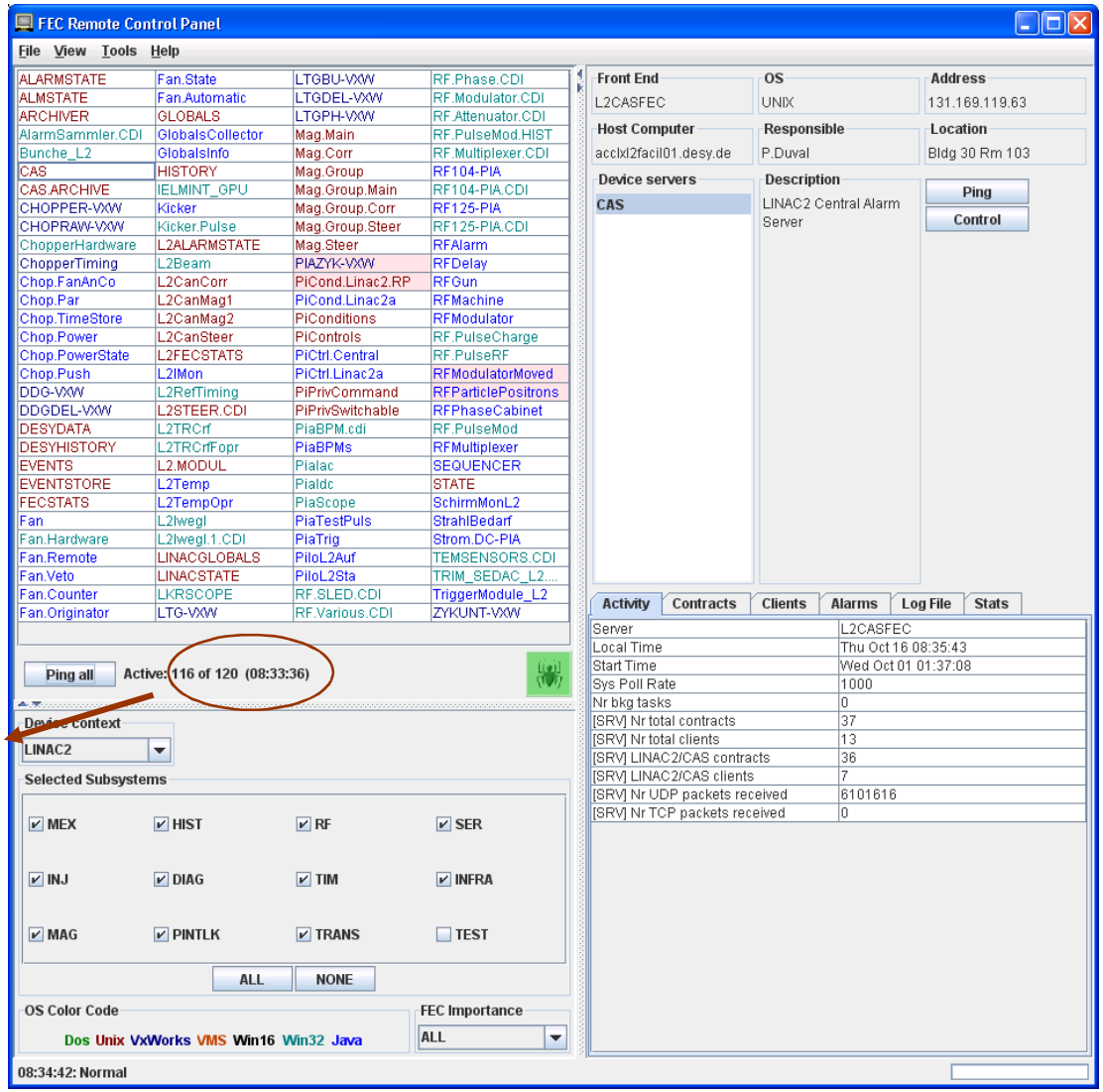
- July 2008: LINAC2
  - Mostly new hardware components
    - CAN bus replaces SEDAC in many cases
  - CDI gets its first real test !
    - Windows XP, Linux, ELINOS (+ WindowsCE @ EMBL)
  - TINE 3.31.x -> TINE 4.0.x
  - Most Client Apps: Windows -> Java
  - Many Server Apps: Windows -> Java
- Anyone panicking yet?

Commissioning …

- Fortunately …
  - FLASH (DOOCS) already using TINE 4.0.1 (since ~ March).
  - On-site help from COSYLAB
    - Igor Kriznar, Jaka Bobnar
- But some interesting 'hiccups' …
  - Concurrency bugs
    - was it CDI or TINE? (or the ELINOS Can Driver!)
  - Data swamping (some extreme cases)
    - Alarm viewer dealing with 1000s of alarms
    - Personnel Interlock dealing with 1000s of links
  - Interesting, never-seen-before use-cases
    - e.g. server redirecting to itself

LINAC2 Device Servers …

~ 65 FECs



Current Status (October 2008)

- All “known” bugs resolved
  - But there’s always that unexpected use-case …
- LINAC2, PIA, DESY2
  - Running stably with new hardware and software
- DORIS
  - Running stably with TINE 4.0.4
  - Still mostly windows and old hardware
- FLASH
  - Running stably with TINE 4.0.3 embedded in DOOCS (+some native TINE servers)
- PITZ
  - TINE 4.0.4 + DOOCS and TINE 4.0.2
- EMBL
  - TINE 4.0.4
- GKSS
  - TINE 4.0.4
- KEK PF Beam lines
  - Mostly STARS
  - Some TINE, now 4.03 (Thank you Nagatani san, who discovered one of those hiccups!)

Interoperability (current status …)

- DOOCS
  - TINE embedded; can run DOOCS via TINE
- Epics2Tine
  - Runs as in-process add-on
  - EPICS ioc can run over TINE instead of (or in addition to) CA
- Tango2Tine
  - Currently a gateway
  - Mappings 99% finished
- STARS
  - STARS bridge
  - Bridge to COACK

All available with TINE Release 4.0 !

Immediate TO DO List …

- Archive retrieval
  - Selections based on cycle or pulse numbers as well as timestamps
- http://tine.desy.de