

# **Data Access Layer for CSS**

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## DAL Design Goals

- Common API for accessing data from different CS sources
  - Based on interfaces rather than abstract classes
  - Covers both narrow and wide style access and both device and channel based CS
- Consistent OO and wide API design
  - simple access to the data (JavaBean style)
  - programming aids (auto-completion)
  - compile time error checking
  - easy debugging
- Narrow style access with introspection
  - metadata
  - for generic applications

## Terms Used

- Device
  - Container for properties and commands
- Property
  - Container for dynamic remote data channel
  - Channel in EPICS
- Characteristics
  - Key-value pairs
  - Rather static description of device or property (min,max,units,etc.)



## DAL Device Features

- Access to commands
  - As objects in generic device
  - As methods for particular device API
  - Synchronous/asynchronous execution
- Access to properties (channels)
  - By name in generic device
  - By API for particular device
- Access to characteristics
  - Synchronous, asynchronous, group
- Connection state (connected, disconnected, failed)
- Property grouping

## DAL Property Features

- get/set for values
  - Synchronous and asynchronous
- Get for characteristics
  - Synchronous, asynchronous, as a group
- Data quality (condition), enum set of codes: error, alarm, timeout, etc.
- Events
  - Value update, change
  - Data quality
  - Custom events (blue beam)
- Concious data types
  - Double, Long, String, BitSet, Object and sequences of these
  - multi-type-casting



## Pluggable Implementation of DAL

- Interfaces, no abstract classes
- Implementation from scratch
  - Full control
- By using common plug (glue) classes
  - More convenient
  - Easier to ensure DAL compliance
  - You have to extend from some common abstract classes or implement minimized set of interfaces

## Plug Design

- Provides common plug (glue) code
- device/property proxies
- Thin (minimalistic) as possible
  - Easier maintenance
  - Less performance overhead
  - Set of helper classes, must not be framework of it's own
- Features
  - Connection catching
  - Lifecycle management



# DAL Layers

Wide style API with many methods and interfaces for programming convenience

## CSS and other DAL applications

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*DAL API*

### Common DAL glue code

Collaborating set of common helper classes. Can be replaced by case or completely by DAL implementation.

Simple API concentrated on data transfer and simplicity when implementing DAL .

*Proxy API*

## Proxy implementation (communication specific)

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*Communication API*

### Communication libraries

So far supported Simulator (internal), EPICS, Tine and GSI.

When common glue code does all the work, then this layer is thin, simple and oriented around communication particularities.





## DAL Implementations

- Simulation
  - Side defect of design testing
- EPICS
  - Used at DESY
- TINE
  - In prototype stage, should work for most TINE channels
- GSI
  - Virtual accelerator number
  - First Java panels already build and used for commissioning of beamline



Tools

Log Viewer...

PowerSupply Select Custom ... Add all Remove all Refresh

Beamline E08 ESR-TR-HTR 152... 15:21:05 23.03.2007

Device	CurrentI	FieldI	VoltI	CurrentS	FieldS	VoltS	Infostat	Status
TR1MU0	397,7673	-0,6068	8647	397,7620	-0,6068	8647		
TR1MU1	96,2340	-0,1467	2092	96,2320	-0,1467	2092		
TR1QD11	145,7349	-0,6229	3275	145,7375	-0,6229	3275		
TR1QD12	89,6287	-0,2018	2044	89,6230	-0,2018	2044		
TR2KX1	11,9782	-0,0522	269	11,9789	-0,0522	269		
TR2KY1	0,0000	0,0000	0	0,0000	0,0000	0		
TR2KX2	138,1297	-0,5903	3104	138,1280	-0,5903	3104		
TR2KY2	0,0000	0,0000	0	0,0000	0,0000	0		
TR2QT21	0,0000	0,0000	0	0,0000	0,0000	0		

All Accelerators Active Inactive On Off Reset Init

# DAL based application in GSI 1

**TR1QD12**

VOLTS

2044,00000 [mV]

VOLTS

2044.00000 [mV]

VOLTS

2044.00000 [mV]

VOLTS

0,0

2044,00000 [mV]

2044 [mV]

VOLTS

2044 [mV]

VOLTS

2044.00000 [mV]

10000,0 -5000,0 0,0 5000,0 10000,0

CURRENTS

89.6230 [A]

VA 0 VA 1 VA 2 VA 3  
VA 4 VA 5 VA 6 VA 7  
VA 8 VA 9 VA 10 VA 11  
VA 12 VA 13 VA 14 VA 15

Power Remote/Local Emergency  
Interlock HW Error SW Error  
Power Voltage Temperature PS  
Cooling Water PS Current Inverter  
Temperature Ma... Cooling Water M... Current Ip2  
Current Ip1 Transistor T1-T4 Transistor T5  
Voltage Ud1 Voltage Ub0 Stromwandler  
Erdschluss Remote/Local Magnet 1  
Magnet 2 Magnet 3 Magnet 4  
Magnet 5 Actual Value

CURRENTS

89.6230 [A]

-400,0 -200,0 0,0 200,0 400,0

FIELDS

-0.2018 [T/m]

-1,0 -0,5 0,0 0,5 1,0

active inactive On Off Reset Init MagnInfo >>



Tools



## CosyBoard HITRAP

Type

PowerSupply

Select Custom ...

Add all

Remove all

Refresh

Beamline

E08 ESR-TR-HTR ...

15:09:36 23.03.2007

TR1MU1

- |                                    |  |   |  |  |
|------------------------------------|--|---|--|--|
| <input type="radio"/> Power        | <input type="radio"/> Remote/Local     | <input type="radio"/> Emergency         | <input type="radio"/> Interlock          | <input type="radio"/> HW Error         |
| <input type="radio"/> SW Error     | <input type="radio"/> Power            | <input type="radio"/> Voltage           | <input type="radio"/> Temperature PS     | <input type="radio"/> Cooling Water PS |
| <input type="radio"/> Current      | <input type="radio"/> Inverter         | <input type="radio"/> Temperature Ma... | <input type="radio"/> Cooling Water M... | <input type="radio"/> Current Ip2      |
| <input type="radio"/> Current Ip1  | <input type="radio"/> Transistor T1-T4 | <input type="radio"/> Transistor T5     | <input type="radio"/> Voltage Ud1        | <input type="radio"/> Voltage Ub0      |
| <input type="radio"/> Stromwandler | <input type="radio"/> Erdschluss       | <input type="radio"/> Remote/Local      | <input type="radio"/> Magnet 1           | <input type="radio"/> Magnet 2         |
| <input type="radio"/> Magnet 3     | <input type="radio"/> Magnet 4         | <input type="radio"/> Magnet 5          | <input type="radio"/> Actual Value       |  |



active

inactive

On

Off

Reset

Init

MagnInfo &gt;&gt;

# DAL based application in GSI 2