

### **FESA and LSA at GSI**

### Jutta Fitzek





#### **Current Software Stack at GSI**

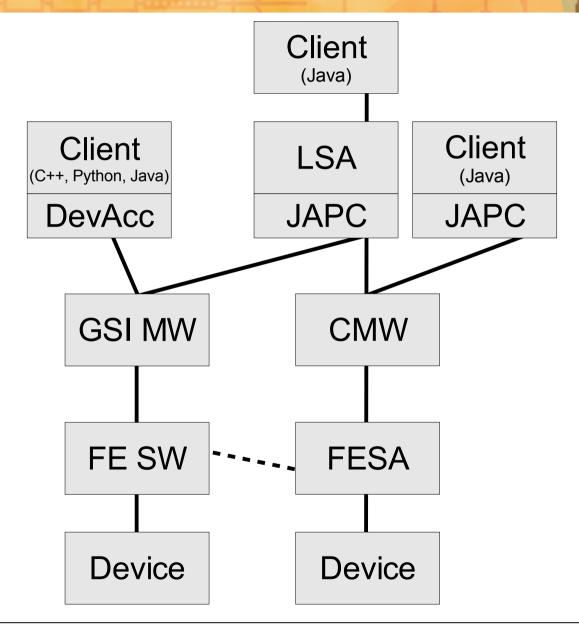
What is FESA? (framework at frontend level)

What is LSA? (framework for settings management)



## Architecture

#### **GSI – different ways of accessing devices**



Overview LSA and FESA



#### **Current Software Stack at GSI**

#### What is FESA? (framework at frontend level)

What is LSA? (framework for settings management)

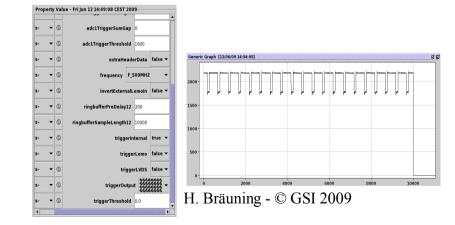


# What is FESA?

K. Höppner - © GSI 2009

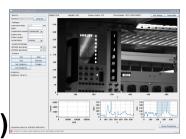
- core component of the CERN control system at Frontend level
- integrates realtime and non-RT actions on one CPU
- easy design and deployment of FESA device classes with FESA shell and code generation tools
- supports multiplexed operation of accelerators
- well developed framework, broad equipment support
- supports Intel and PowerPC architecture, easy integration of upcoming FAIR controller assumed





# **FESA at GSI**

- FESA 2.10
  - prototype installation, several SD use cases running (BPM, Ablass 2, Prosilica CCD Camera, Readout of a digitizing VME ADC, first version for PLCs)



- enhanced by the beam diagnostics group: GSI timing converter
- FESA class development is done using linux machines from the blade cluster (developing 32bit FESA classes on a 64bit machine)
- FESA 3.0
  - major refactoring of the FESA framework
  - enhanced class modelling features (aggregation, composition)
  - currently under development, expected to be ready spring 2010
  - modular concept, support of "lab packages" ( $\rightarrow$  better integration)
  - the FESA version to be supported for production usage at GSI
  - development of FESA classes will also take place on the linux cluster
  - support of a "FESA development package" planned





#### **Current Software Stack at GSI**

What is FESA? (framework at frontend level)

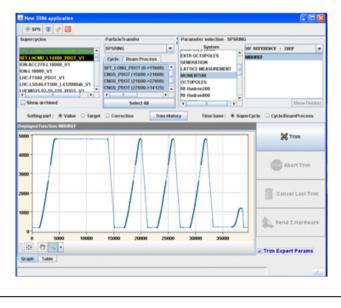
What is LSA? (framework for settings management)



## What is LSA?

- LSA core component of the CERN control system at operating level
- highly data driven, DB is the master and contains all needed information about optics, devices, cycles etc.
- ONE DB for all accelerators
- parameters are organized in hierarchies (from physics to hardware)
- consistent settings generation and management for all levels
- devices are accessed using an abstraction layer called JAPC, that hides the middleware
- with LSA, machines are operated on physics level in a consistent way

S DHC 🔶			
Particle Transfer URCEOPejection	Parameter selection - LHCRING		
LHCRING	System System	MUSICS 1.0	
UIC,FESA SAHU	SOLEW SEXTUPOLES TRIPLET CORRECTION TRIPLETS	ENCEEAMOR ENCEEAMOV	
	TUNE CORRECTION TUNE CORRECTION TUNE SHIFT GUAD WINIM OUNEY SEPTUM WUNIM MUNICIPE		Geore Facilities
Dependent para	emeters		
1	ROFASEN	POF ASKE	PPHELIAKS.PGF.ASKIPET
	PLO.M?N.	R00.8678	PPHELINAT POD ANT INT
	Red ANTH	BOF AN78	RPHEJJME7.RGF.ME7.WEF
	ACD ASHK	> R00.4344	> RP4EURASJRGDASHREF
	// NOR AND K	> ROFARIE	PENELINAT ROF AN UNET
	RED APSK	R00.8234	IPNEJIA27.PG0.A23/PEF
	RODAISK	P RODARSI	PPHELIAAT.ROD.AJS.RKE RPHELIAAT.ROD.AJS.RKE RPHELIAAT.ROD.AJS.RKE
	ROFASHK	ROFASHI	PENELUMUROF ASHIPET
LHCBEARED	RED.ATEK	P R00.4781	PPHE.UARS.POD.A78/PEF
	RODAT2N	P R00.4121	RPHE.UA21.ROD.A12.WEF
	ROF AZOK	ROF A238	PENELIAST ROFASSINET
	RODAPIK	PIG6.4814	IPHEURITINGCARTINET
	ROFARSK	ROFA454	PPNEJMAT/ROF Address
	ROD ASE N	R00.8564	PPHELIMATAGO ASS PET
	ROFATER	> ROFA128	RPHELMD3.R0F.A12.REF
	FIGEA78K	BOF ATER	REVELIARS ROLATEREE

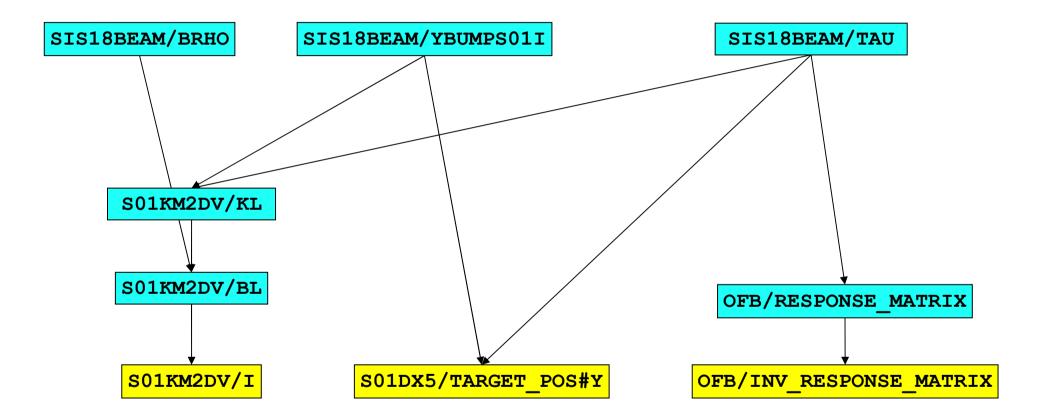


27.11.2009 - Slide 8

J. Fitzek

Overview LSA and FESA

## LSA: example BPM hierarchy

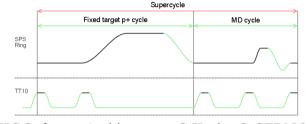




# LSA: "Context" and "Setting"

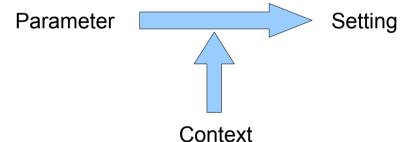
Context in LSA represents something, that can be executed in the machine, i.e. BeamProcess, Cycle, SuperCycle.

Contexts can be part of each other, e.g. a BeamProcess in a Cycle.



LHC Software Architecture - G.Kruk - © CERN 2007

#### **Setting** is a scalar/function for a parameter depending on a context



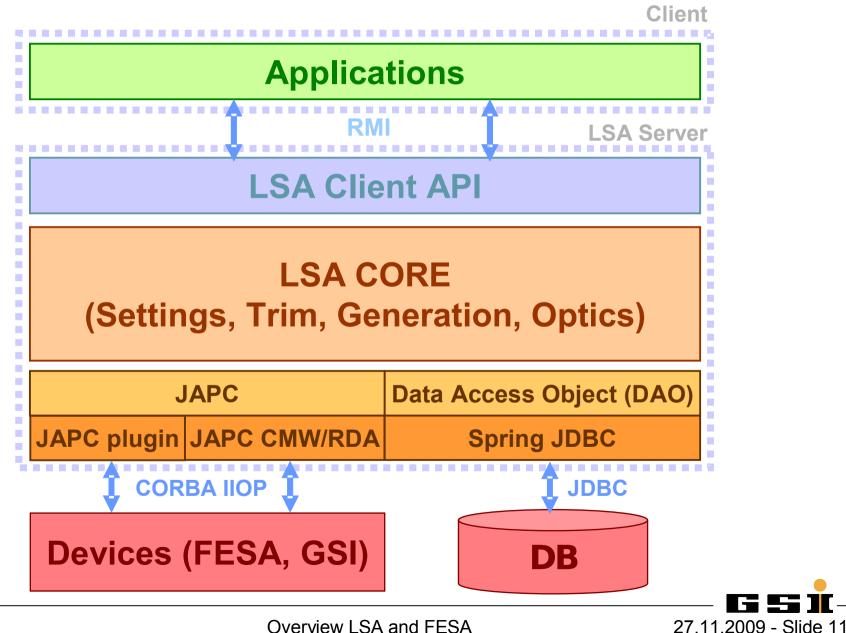
#### A setting consists of target and correction value

- Target values are usually calculated using the accelerator model
- Correction values are applied by operators or calculated by applications

#### Settings are stored for ALL levels of the parameter hierarchy



### **Architecture** LSA



**Overview LSA and FESA** 

## **LSA: Benefits**

- Supporting realistic model of the world: trimming and measuring on those levels that are relevant for physics
- Big and complex machines, resulting in complex parameter space: Mapping to few high level parameters makes it manageable
  - CERN Collimators: trimming one Nsigma, 96 functions are calculated
- The LSA Trim mechanism allows:
  - coherent modification of settings
  - propagation down the parameter hierarchy using MakeRules
  - trims are archived and can be reverted
- Totally data driven, same model for all accelerators



## LSA @ GSI

- LSA is at the moment used in a prototype state to model the SIS18
- LSA is being enhanced in collaboration with CERN, to make some parts of it more flexible
- Will be the central part for settings management within the future control system

