

SPIRAL2 Control Command : First High level JAVA application based on the XAL library

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High level applications

XAL standard applications used

Scan 1D 2DApplication standard XAL : Scans one PV (or two PVs) and mesures other PVs

<u>گ</u>	Scan1D - /home/spiral2mgr/Untitled.Scan1d*	
File Edit View Window Help		
Scan Analysis & Management Select PVs S	elect Accelerator Select Predefined Config.	
SCAN CONTROL PANEL	Make PV Logger Snapshot No Snapshot Clear Snapshot	
OPhase. This is a Read Back Value: 30.688	SCAN : Measured Values vs. Scan PV's Values	
50 30.694 180	9.26E2	
GCAN with step: 5 [a.u.]		_
fime delay after settings [sec]: 2	9.25E2	_
STARY PAUSE STOP	9.25E2	
🔾 Use Beam Trigger, Delay [sec]: 0.2	9.24E2	
Average for N read out with T delay N= 5 T delay [sec]= 0.2	9.24E2	
Validation: low= 0 upp= 100	> 9.23E2 1	
→ Scan PV	9.23E2	
→ ∠ LBE2-SOL11:ICons → PV Read Back	9.22E2	
└ V LBE2-SOL11:IAct → Measured PVs └ V LBE2-CF12:IMesCret	9.22E2	
├ Validation PVs └ ☑ LBE2-SOL11:Rdy	9.21E2	
	9.21E2	
	9 20 62	

Cavities tuning (preliminary version)

- Do a phase or voltage scan to optimize tuning on extension phase diagnostics
- Use XAL PLOT and an adaptation of XAL SCAN

ár Regroupeur - ? File Edit Accelerator View window help										
Tableau de bord Scan phase ou tension Analyse / fit phase	e ou tension									
-Scan								_		_
Choix de la variable scannee : Scan en phase Scan en ter	io 🔽 Cocher si vous voulez l'extension en phase pour chaque mesure		-	Largeur te	empore	lle 1rn	is (ns)e	n foncti	on de	e la
Choix de la cavite Gr1 💌	Choix du diagnostic CFR 💌		2						_	-
Positionner la tension 🗆 (kV): O Tension maxim	ale Minimum pour l'extension temporelle (ns): -27,4651		t			++-	+++			-
Positionner la phase 🗆 (🗆): 0	Largeur en phase lue sur l'equipement : 1,177		t							
🗹 Cocher si vous voulez un choix automatique du diag			1							
Choix du diagnostic PhaseCF 💌		(su)	1							
Valeur lue sur le diagnostique : -0,02		n) st	ł		N		_		_	-
-180 180 180	-	1rms	ł	/	ł	+			*	
		elle	t	1 4		4	ī —		1	
Pas du scan: 10 🗆 ou V		temporelle	°t		1	ŭ –	1	A		
DEBUT Ajouts de points	\Rf	ir tei	÷			A	4		1	1
		-argeur	ł			HN-	<u>H –</u>			4
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The Profils application

Display and command of the beam wires harps

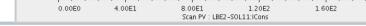
itter Accelerator Placement	taille Echelle Offset Gel Profils Insertion Imprimer Aide	View	
O TEST IOC	D3-FIL-PR21	D3-FIL-PR212	D3-FIL-PR41
O TST-PROFILGNL D2 G1		Hors Test	Hors Nor
G2	TI 1 ms	Ti 91 ms	TI 735 ms
G3 G3-FIL-PR21 G3-FIL-PR22 G3-FIL-PR23 G3-FIL-PR24 G3-FIL-PR31 G3-FIL-PR31 G3-FIL-PR32 G4	A 5 4 5 4 7 4 7 4 7 4 7 4 7 4 7 4 7 6 7 7 7 7 7 7 7 7 7 7 7 7 7	$ \begin{array}{c} A \\ A $	A 2.5 A 2.0 + 1.5 - 0.5 H0 0.0 -20 -10 0 10 20
 D3 D3-FIL-PR21 D3-FIL-PR222 D3-FIL-PR22 D3-FIL-PR31 D3-FIL-PR41 D3-FIL-PR42 D3-FIL-PR42 	A 7.5 Cdg=-0,06 H 2.5 - - 0.0 - Ve -2.5 -	A 2 500 M 1500 + 1500 - 500 Ve -500 -i0 0 10 20	Cdg=12,00 + -1 -2 -3 -4 -4 -2 -20 -10 0 10 20
- OD3-FIL-PR44 - OD3-FIL-PR61	D3-FIL-PR22	D3-FIL-PR31	D3-FIL-PR42
O D3-FIL-PR63	K K T O O A A T Mors Test	Hors Test	LI II O O O O II Mors Sim
	A 2 000 Cdg=0,00 H/2> =9,00 M 1500 + 1000 - 500 0 H/2> =9,00	 ▲ M 2 000 - Cdg = 0,00 + 1750 - 1500 - 1250 - 	A M + -

But XAL isn't the only technology used

CSS BOY

- December 2011 : The choice to use BOY or not will be made.
- Some apprehension about operator interface, not access to preference, only access to boy runtime
- Below an example of application : emittance viewer

000	Control System Studio (NSLSII)	\Box
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😭 🔛 OPI Runtime		
🔛 Intensity Graph 🔀		



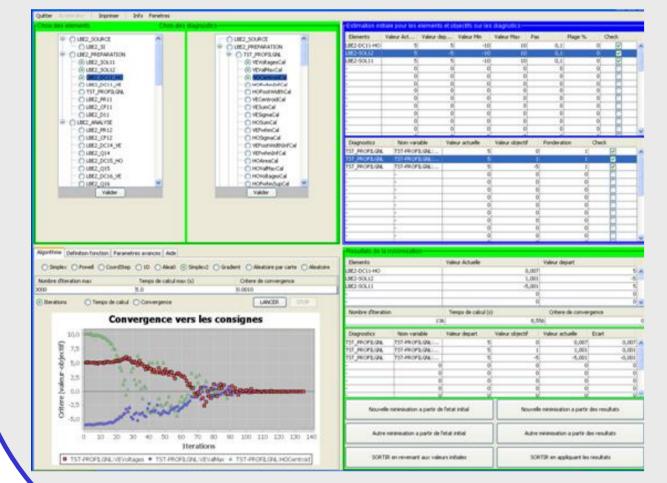
General usage of the XAL Framework

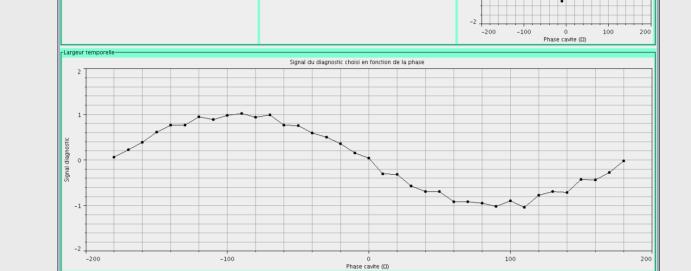
- XAL menu and window management.
- XAL EPICS channel access library.
- XAL tools (scan, plot, virtual accelerator).
- Ressources management. •

SPIRAL2 applications derived from XAL

Optimisation

• Achievement of the minimization of objectives on a set of diagnostics



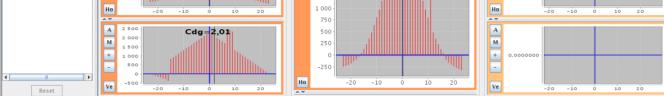


• Tuning six slits to adjust emittance

🔗 Apply

SPIRAL2 applications

Emittance limitation



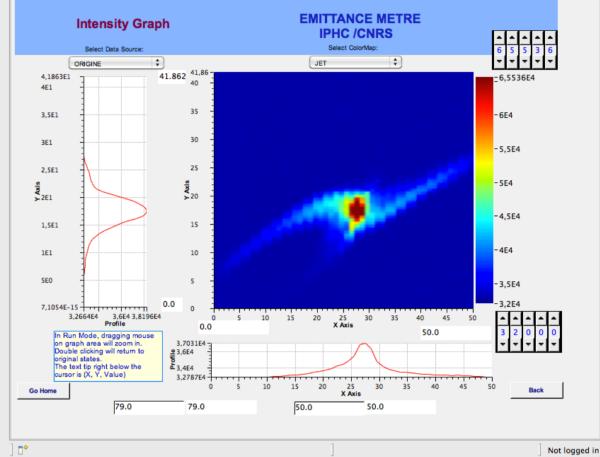
The server profils

- Uses XAL portable Channel Acces Server
- Enables other applications to access calculation realized by java Profil component on a beam wires harps.
- Actively used by Tracewin Software for optimization

The Hook application

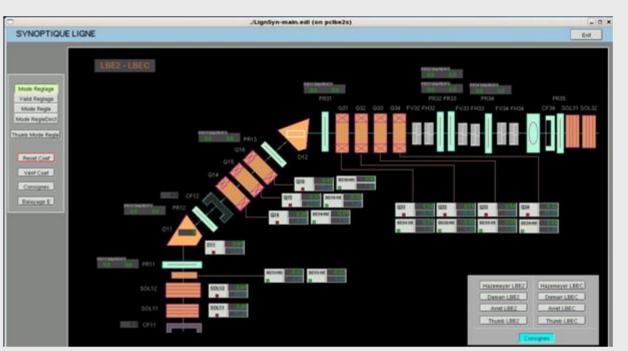
- Directly interacting with equipment
- Hook and Profil HMI rely on the same grid component •

BE2-Q16			
BE1-DC14-VE			
BE2-Q14			
BE2-Q15			
TUB-MOT			
BE1-DC13-HO	TST-ALIM1	TST-ALIM1	4
BE2-D12			
BE2-D11	On Off	On Off	
3E1-PR14-PO			
BE1-DC11-HO	Consigne A	Consigns	A
BE1-FH13-JG	Consigne A	Consigne	A
BE1-PR12-PO			
BE2-DC11-VE		You character that the second	
BE1-D12-COR	20 66 112 158 204 250	20 66 112 158	
BE1-DC16-VE			1977 (1988)
BE2-CF12-PO BE1-FH13-ID	IAct A	IAct	A
BE1-FV11-JB	VAct	VAct	v
BE1-SOL11	VAU	VAL	v
BE2-DC15-HO	ICons A	ICons	A
BE2-PR13-PO			
BE2-PR11-PO			
BE2-PR12-PO	Rampe Infos Defauts Etat Mot Etat	Rampe Infos Defauls Et	at Mot Etat
ST-ALIM1			
BE1-D12	Alim Hzr Defaut Temperature Aima 📤		
BE1-SI-BP	Alim Hzr Defaut Eau Aimant	Consigne	
BE1-D11	Alim Hzr Defaut Arret Urgence Aim 🗧		
BE2-SI-BP	Alim Hzr Defaut Debit Eau Alim		
BE1-HX11	Alim Hzr Defaut Portes Ouvertes	RAct 5.0	
BE1-HX12			



EDM

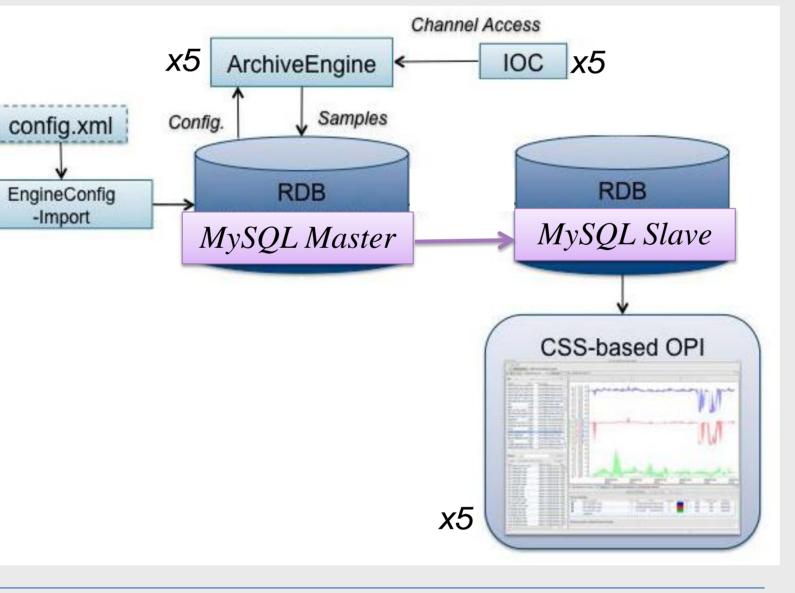
- Widely used
- Below an example of application : LBE2 synoptic





Archiving

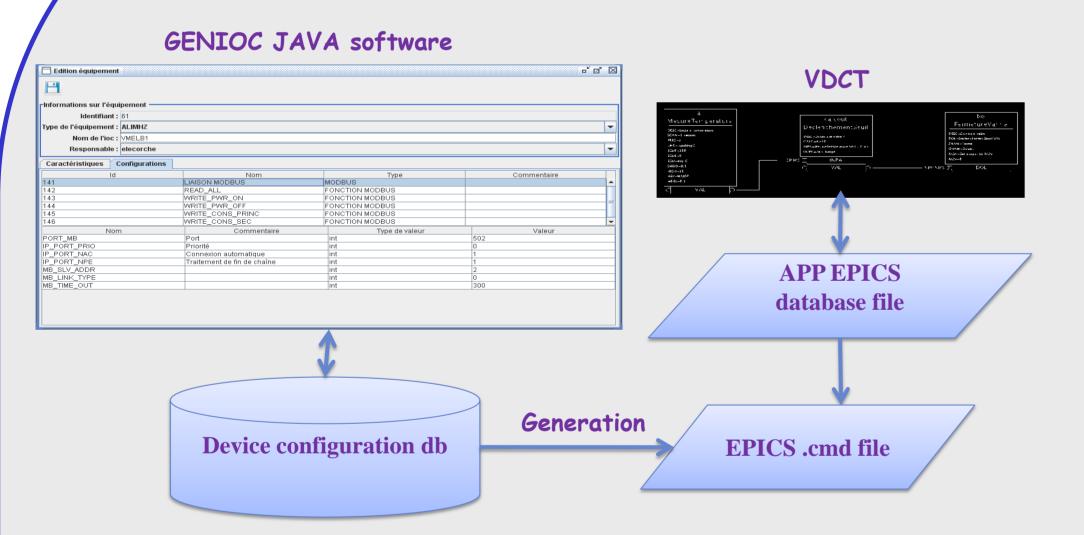
• Software architecture use for test



Software development

Functional anlysis

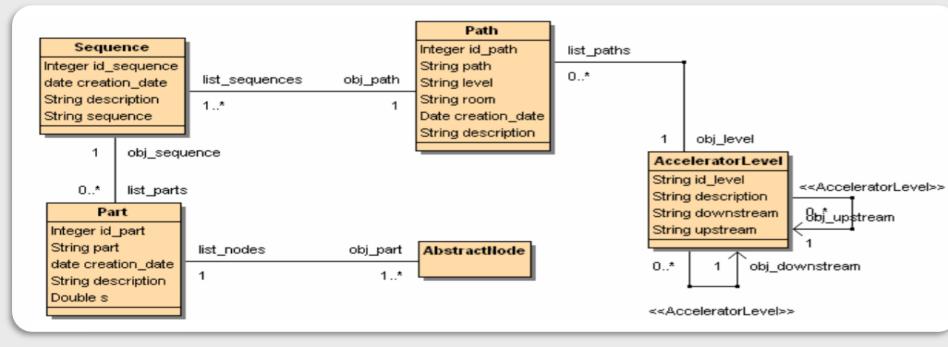
• Defines functions from coarse-grained granularity to fine-grained



- Rely on a Ingres database 10.1
- Describe type of equipments dynamically on database
- Describe «simple » equipments on database such as slits, motors or power supplies
- Enable generation of IOC configuration file. Three files are generated :
 - One for network connection configuration
 - One for macro substitutions
 - One for sequencer definition
- Each of this file are load by the .cmd file

Accelerator configuration

- Rely on a Ingres database 10.1
- Describes accelerator hierarchy



PV/s Number of Number of Number of Number **PV/IOC** Archive **PV/Archive** of IOC Engine Engine 80 10Hz 4000 80 5

- Rely on two MySQL 5.1.17 servers and Mysql Replication
- One Master for writings and one slave for readings

Archive Engine first results

- Needed to update mysql JDBC driver (5.1.17 in place of 4.04) and to set rewriteBatchedStatement property to true to enable bulk insert (BATCH).
- Use MySQL myISAM engine without index for sample table
- Used MySQL replication driver for read archive configuration on slave server

Data browser first results

- Use MySQL myISAM engine with index for sample table
- Partition sample table: Range partition on date/time and key subpartionning on channel_id

granularity, from operation to device.

IHM Listing :

- Classified by segment of the facility
- Around one hundred IHM listed

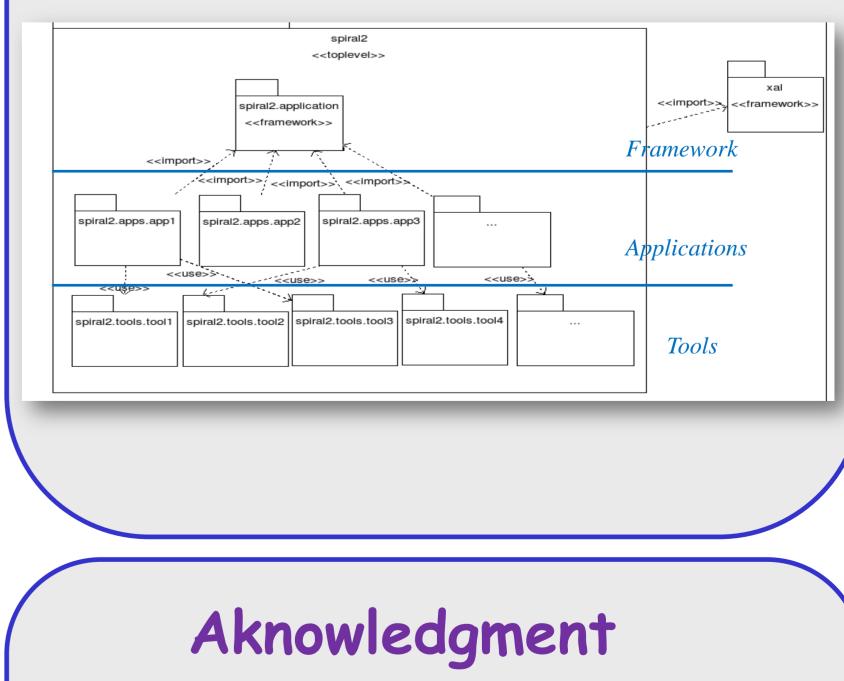
BVERSION Version Control with

Manage configuration of JAVA/XAL application

- Only one XML file
- A java singleton manage access to the configuration file
- Two modes : PRODUCTION(PROD) and DEVELOPMENT (DEV)
- Configure access to Logging configuration, log diretcory •
- Configure access to databases
- . . .

Logging System

- SLF4J : enables to change logging system
- Currently LOG4J logging system is used
- XAL JAVA Util Logging logs are redirected to SLF4J
- One XML configuration file
- Three levels

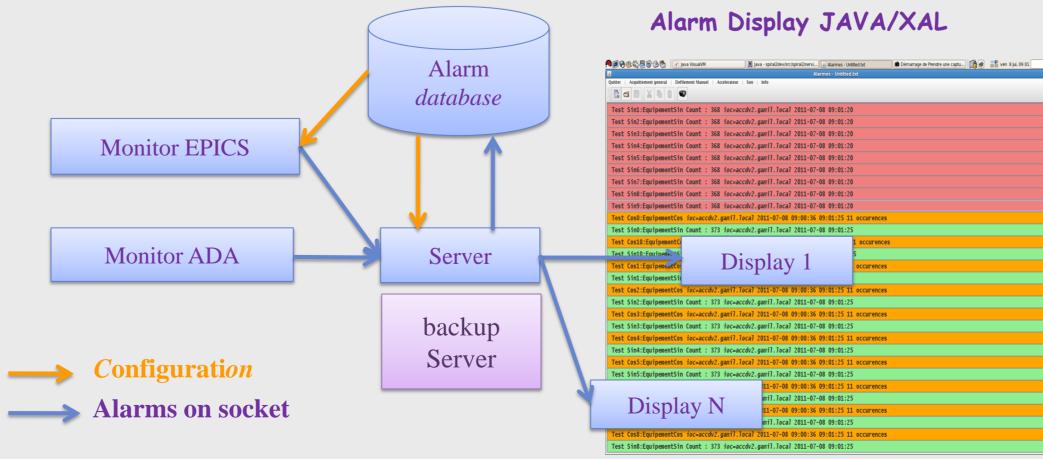


- Describe optics
- Enables generation a XAL file.xdf
- Offline usage : Set values for a new beam., either theoretical or extrapolated from beams realized previously .And schedule operation
- Online usage : Apply or save sets of values
- A new JAVA dedicated software, namely GestParam, interfaces the database

] Hiérarchie de l'accélérateur		o' 13
Litter Apouter Suppress	Composants de l'accélérateur n° 1	of 13
terrarchie accédinateur v LBE3 (Minteu) + LBE3 (Minteu) + LBE3 (SSURCE (Triongas)	Modification du noeud LBE2_CF11	i
♦ LBEIS (Partie)	10 de nored : UIC.011	
LIE1, PREPARATION (Transper) EE1, AMACYSE (Transper) EXELA (Partie)	Type : Cage de Faraday (CF)	
 LBE1, D11 [Moent] LBE1, DC14, VE [Norut] 	Sous-type : Faraday de type A	
+ LBE1_DC14_VE (Eace)		
 UE1,0C16,VE (News)() UE2,30C11 (Nosul) 	Stanut : 🕷 Activé 🔾 Désactivé	
 UE1,H012 (Noeut) UE1,PR12 (Noeut) 	Date de méation : 2011-02-21	1
⇒ L8E1, PE12 (https://) ⇒ L8E1, PE14 (https://)	Partie LHE2P	
+ L0C1, F9.2.1 (Normal)	Partie Add. 2	
 ■ LBE1,Q14 [Monual] ■ LBE1,Q15 (Monual) 	Position : Détails	
 LBE1_Q16 (Moevd) LBE1_TRANSPORT (Transport) 	rUste des handles	
LINE2 (Nove) the constant of the cons	Name Date Oath Acces Name du signal Harge régisse Harge thésinaue Type distribé Transformation PatricoNity A EPIG JAL2, (711 PatricoNity) Boulite (1) NO, Transformation FaireSNity A EPIG JAL2, (711 PatricoNity) Boulite (1) NO, Transformation FaireSNity A EPIG JAL2, (711 FaireSNity) Boulite (1) NO, Transformation FaireSNity A EPIG JAL2, (711 FaireSNity) Boulite (1) NO, Transformation FaireSNity A EPIG JAL2, (711 FaireSNity) Boulite (1) NO, Transformation	292 293
Accelerator		
Hierarchy	Node specification	

- Improve query *sample_sel_initial_time* for MySQL Dialect

Alarm Handling process



- Rely on A Ingres database for configuration and storage issues
- Don't use EPICS Alarm Handler
- Supports a throughput of 330 alarms per seconds

- Thanks to C.Haquin, E.Lecorché, D.Touchard and all the GANIL control command group.
- Thanks to the GANIL Computing Infrastructure group for hardware, software and network architecture.
- A special thanks to the XAL team for the software and support provided