NSLS II Middlelayer Services*

G. Shen, Y. Hu, M. Kraimer, S. Kunal, BNL, Upton, NY 11973, U.S.A. Dejan Dezman, Cosylab, Ljubljana, Slovenia

Abstract

A service-oriented architecture has been designed. It will be used for commissioning and daily operation of the NSLS II project. Middle layer services are being developed, and some have been deployed into NSLS II control network to support our beam commissioning. The services are primarily based on 2 technologies: web-service/RESTful and EPICS V4. The services provide functions to take machine status snapshot, convert magnet setting between different unit systems, and provide lattice information and simulation results. This paper presents the latest status of services, and our future development plan.

System Architecture

MASAR Service

•Take a machine snapshot with pre-configuration, archives a snapshot, and retrieves data back for post analysis, and/or to restore machine to a particular state.

•An EPICS V4 service



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Syst	em all	_	We	Icome to MASAR 🛛 🛛 LN-LTB-Phase	I-All_20120511: 338:	2012-06-14 16:13:23 🛽	Compare Snaps	nots: snapshotIDs_331	_338_335_330	×		
Con	fig Filter 🕴			PV name	Saved Value 1 (in snapshot 331)	Saved Value 2 (in snapshot 338)	Saved Value 3 (in snapshot 335)	Saved Value 4 (in snapshot 330)	Live Value 0	Delta21	∇	Delta33
Se	ect Config(s)		1	LN-BI{VF:5}cam1:Gain	5.0	12.0	12.0	24.0		NotEqual(7.0000	00)	NotEqual(7.00
	Config Name	Config Id _	2	LTB-BI{VF:1}caml:Gain	2.0	5.0	1.0	2.0		NotEqual(3.0000	00)	NotEqual(-1.00
1	BR_RF_SC_20130426	12 BF	3	LTB-MG{Quad:1}I:RampEnd1-SP	0.0	16.0	0.0	18.0		NotEqual(16.000	000)	Equal
2	BR_MG_SCR_20130419	11 BF	4	LN-RF:1 {Cav}Drv:PhaCtrl-SP	0.5	15.0	1.4	1.2490009027e-16		NotEqual(14.500	000)	NotEqual(0.90
3	LN_LTB_BPM_Expert_20120621	10 Ex	5	LN-RF:1 {Cav}Drv:ValD-SP	0.5	15.0	1.4	1.2490009027e-16		NotEqual(14.500	000)	NotEqual(0.90
4	LN-LTB-Phasel-All_20120511	9 Lir	6	LN-BI {BPM:1 } Trig:AdcDelay-SP	0	1173200	0	0		NotEqual(117320	00)	Equal
5	LN-LTB-Phasel-SBM-All_2012042	26 8 Lir	7	LN-RF:PB {Cav} Drv:PhaCtrl-SP	18.9	29.85	9.45	23.95		NotEqual(10.950	000)	NotEqual(-9.45
6	LN_Phasel_SCR_All_20120402	7 Lir	8	LN-RF:PB{Cav}Drv:ValD-SP	18.9	29.85	9.45	23.95		NotEqual(10.950	000)	NotEqual(-9.45
7	LN_Phasel_SCR_All	1 Lir	9	LTB-BI {ES} cam1: AcquireTime	0.02	0.08	0.02	0.02		NotEqual(0.0600	00)	Equal
8	LN_PhaseI_SC_All	2 Lir	10	LN-RF:3{Cav}Drv:ValC-SP	0.326	0.345	0.344	0.347		NotEqual(0.0190	00)	NotEqual(0.01
9	LTD1_PhaseI_SCR_All	3 LTI	11	LN-RF:3{Cav}Drv:AmpCtrl-SP	0.326	0.345	0.344	0.347		NotEqual(0.0190	00)	NotEqual(0.01
10	LTD1_PhaseI_SC_All	4 LTI	1 12	LTB-BI{VF:1BD2}cam1:AcquireTime	1.2e-05	0.002	0.002	1.2e-05		NotEqual(0.0019	88)	NotEqual(0.00
1			13	LN-RF:3{Cav}Drv:ValD-SP	-8.55	-16.15	-8.9	-9.05		NotEqual(-7.6000	000)	NotEqual(-0.35
Sna	napshot Desc *			LN-RF:3{Cav}Drv:PhaCtrl-SP	-8.55	-16.15	-8.9	-9.05		NotEqual(-7.6000	000)	NotEqual(-0.35
- ι	Use time range:			LN-BI{VF:6}caml:Gain	24.0	20.0	20.0	24.0		NotEqual(-4.000	000)	NotEqual(-4.00
ror	om: 2013-09-23 12:03:34			LN-RF:BUN {Cav} Drv:ValD-SP	30.25	-8.1	31.2	-114.6		NotEqual(-38.350	0000)	NotEqual(0.95
ſo:	2013-09-23 12:03:34			LN-RF:BUN {Cav} Drv:PhaCtrl-SP	30.25	-8.1	31.2	-114.6		NotEqual(-38.350	0000)	NotEqual(0.95
Se	Select Snapshot(s)			LN-BI{VF:3}cam1:Gain	20.0	1.0	1.0	20.0		NotEqual(-19.000	0000)	NotEqual(-19.(
	Config Name a	pshot _	19	LTB-BI{VF:2}cam1:Gain	5.0	4.0	0.0	5.0		NotEqual(-1.000	000)	NotEqual(-5.00
1	LN-LTB-Phasel-All_20120511 33	38 SBM 58&80ni	20	LN-BI{VF:6}cam1:AcquireTime	0.00015	1.2e-05	1.2e-05	0.00015		NotEqual(-0.000)	L38)	NotEqual(-0.00
2	LN-LTB-Phasel-All_20120511 33	35 SBM 60nm x/y	21	LN-BI{VF:3}cam1:AcquireTime	0.00015	1.2e-05	1.2e-05	0.00015		NotEqual(-0.000)	L38)	NotEqual(-0.00
3	LN-LTB-Phasel-All_20120511 33	31 Single Bunch	22	LN-BI{VF:2}cam1:AcquireTime	0.00015	1.2e-05	0.00015	0.00015		NotEqual(-0.000)	L38)	Equal
4	LN-LTB-Phasel-All_20120511 33	30 SBM with cha	23	LN-BI{VF:4}cam1:AcquireTime	0.0001	1.2e-05	0.0001	0.0001		NotEqual(-0.000	088)	Equal
5	LN-LTB-Phasel-All_20120511 32	27 MBM before k	24	LTB-BI {DIG:FC} Prescaler-SP	1	1	1	1		Equal		Equal
6	LN-LTB-Phasel-All_20120511 32	24 SBM-Kly3 cha	25	LTB-BI {ES-Ax:1 } Mtr. VAL	40.0	40.0	40.0	40.0		Equal		Equal
7	LN-LTB-Phasel-All_20120511 31	9 SBM-200MeV-	26	LN-RF:ES {MBM} FF: AmpCtrl-SP	0.65	0.65	0.65	0.65		Equal		Equal
8	LN-LTB-Phasel-All_20120511 31	.7 SPB Ampl=0.:	27	LN-BI {BPM: 4} Rate: Update-SP	10	10	10	10		Equal		Equal
9	LN-LTB-Phasel-All_20120511 30	3 SBM Emit X a	28	LN-BI {BPM: 3} Beam: Gain-SP	100.0	100.0	100.0	100.0		Equal		Equal
10	LN-LTB-Phasel-All_20120511 30	02 Single bunch	29	LN-MG{SOL}:PS-07:Cmd-Pwr	ON	ON	ON	ON		Equal		Equal
11	LN-LTB-Phasel-All_20120511 29	96 Kly1 only, SPE	30	LN-BI {BPM: 2} Trig: Strig-SP	Rdy	Rdy	Rdy	Rdy		Equal		Equal
12	LN-LTB-Phasel-All_20120511 29	93 MBM 17nC 0.	31	LN-BI {BPM:1 } Tbt: GateWidth-SP	10	10	10	10		Equal		Equal 🗸
•	•	· •						_1		1		Þ
	Display Snapsho	ot(s)		Restore Machine	Compare Live Mach	nine Save M	lachine Snapshot	Compare	Snapshots	Export	Snap	shot to File

MOPPC155

•3-tier's architecture

- Distributed front-end layer. This layer talks directly with physical device.
- Middle layer server layer. The middle layer service collects data from front-ends, and relational database such as IRMIS, organizes the data, publish to its upper layer.
- Application layer. Client application developed locates in this layer.







•Client API

Description					
Retrieve a list of system					
Retrieve a list of configuration					
Retrieve snapshot list w/o data					
Retrieve one snapshot with data					
Save/take a snapshot					
Update/Approve snapshot					
Get machine live data					

•Experience at NSLS II

Lattice/Model Service

A RESTful Django web service, consists of 2 parts:
Lattice: element geometric information (layout with misalignment), and magnetic strength of each element
Model: beam parameters (twiss parameters, closed orbit, and transfer matrix) for each element, and global parameters like tune, beam energy, chromaticity (up to 2nd order)





Conclusions

Middle layer services are being developed at NSLS II. Implementation details and status of the MASAR, MUNICONV, Lattice/Model, have been discussed. Experience using those services has been summarized. Future development plan has been discussed.

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