STRUCTURE AND DEVELOPMENT OF SESAME'S CONTROL SYSTEM CLIENT

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Abstract

SESAME is a third-generation 2.5 GeV synchrotronlight source based in Allan, Jordan. The Pre-injector (Microtron) and Injector (Booster Ring) have been commissioned while the commission of the storage ring began in January 2017 and we expect machine operation in late 2017. The current components of the control systems software side are IOCs developed using EPICS software tools, Operator Interfaces (OPI) designed using Control System Studio (CSS) software tools, process variables archiving using CSS BEAUTY toolkit, alarm handling using CSS BEAST toolkit and tools to help in automation and reporting. This paper will present the current design of the client system which includes what was needed for the active commissioning period as well as upgrades that are under research including EPICS Qt framework as a client replacement for CSS and the pros and cons of this replacement and upgrading the archiver engine to a scalable and higher performance engine.

INTRODUCTION

SESAME consists of a 22 MeV Microtron, an 800 MeV Booster Synchrotron and a 2.5 GeV Storage Ring. Control System Implementation uses (EPICS) base R3.14.12. Servers are implemented as EPICS Input/ output Controllers (IOCs). Clients are implemented using a custom build of Control System Studio (CSS) based on V.3.16. CSS version 4.5 is under testing. Siemens S7 PLC controllers are used for the machine interlocks. An Allen Bradley PLC controller is used for the Personal Safety System (PSS). VME hardware is used for the timing system. Development and administration platforms use Scientific Linux 7.3 while maintaining version 6.4 for legacy support. A Git version control is used to track development. All clients, servers, and controllers are connected to an isolated machine network. There are twelve virtual servers are reserved to run the IOCs, archive system, alarm system and Git repositories.

The control systems have been implemented for the entire machine from Microtron all the way to the Storage Ring. Both the Booster and Storage Ring's control system is divided into seven subsystems: vacuum, power, RF, diagnostics, cooling, timing and Personal Safety System (PSS). Each control subsystem consists of one or more clients, servers, and controllers [1].

CLIENT SYSTEM STRUCTURE

The control system client at SESAME is divided based on the machine stages as a first level, then each stage is divided based on the stage's subsystems. Examples of the subsystem's divisions are

- 1. Power supplies.
- 2. Vacuum.
- 3. Diagnostics.
- 4. Radio-Frequency.

Figure 1 shows the main interface OPI of the control systems.

	Main Menu	- CS-Studio	- • ×
් Main Menu 🛛			- 8
SESAME	Main C	ontrol System	
Startup Sequence			
	Startup/Shut	down Sequence	
Microtron		Transfer Line (1)	
Operation	Actuating Motors	Power Supplies	Vacuum
Power Supplies	Analog Signals	- ower supplies	vacuum
Booster		Transfer Line (2)	
Vacuum	RF	Power Supplies	Vacuum
Power Supplies	Diagnostics	Diagnostics	Cooling
Cool	ing	Diagnostics	
Storage Ring		Timing System	Tools
Vacuum	RF	Event Generator	Archiver
Power Supplies	Diagnostics	Event Receiver 1	Alarm Handler
Cool	ing	Event Receiver 2	
Machines Manager	Profiles	DCCT	Close

Figure 1: Main interface for the control system client.

Storage-Ring DC Power Supplies

The Storage-ring power supplies system consists of the following:

- 1. One power supply for bending magnet.
- 2. 64 power supplies for quadrupole magnets.
- 3. 4 power supplies for sextupoles magnets.
- 4. 64 power supplies for corrector magnets.
- 5. 8 power supplies for skew quad magnets.

With a total of 141 power supplies making it the largest GUI in the client system. Figure 2 shows the main OPI of the power supplies system.

			Magn	ets Power	Supplies - CS-Studi	D		
2	Magnets Power Suppli	es 83						
_	SESAME			Storag	e Ring DC Powe	r Supplies		
Γ	State	Voltage	Current		Cycle Magnets	Open Loop	o Off	Wavefor
	SR-PS-BM On	196.195 15	2.450 152.450	Details 🔘	PS Ramping	Standby	ON ON	DC
					s	tate Voltage	Current	
	Guadropoles Power S	uppues	68.876		Defension Ounde		15.49	-
	SPC01-PS-OE10n	20194 68	6864 68 686	Dotaile la	SPC01-PS-OD/or	opoles	24.628.4 24.62	8 Dotaile
	SPC01-PS-OFIOn	2.911 1 68	500 A 68 501	Details	SPC01-PS-ODIO	0.465 V	25 431 4 25 43	2 Details
	SPC02-PS-OF10n	3 122 V 68	795 4 68 793	Details	SPC02-PS-OD/or	0.486 V	23.295 A 23.29	5 Details
	SPC02 PS OFIOn	3.040 V 68	433 4 69 434	Details	SRC02 PS ODIO	0.483 V	24.138 A 24.13	Details
	SRC02-FS-GF201	3.049V 08	716 A 69 71E	Details	SRC02-PS-QDIO	0.463 V	24.120 A 24.12	2 Details
	SRC03-F3-GFJ0I	2.917 00	10A 08.715	Details	SRC03-PS-QDIO	0.430 V	25.402 A 25.40	2 Details
	SRC03-F3-GF201	2.031 00	437A 08.437	Details	SRC03-P3-QD.OI	0.431 V	23.433 A 23.43	2 Details
	SRC04-PS-QFJOh	2.777 08	.493 A 08.490	Details	SRC04-PS-QD.0r	0.374 V	23.413 A 23.41	3 Details
	SRC04-PS-QF20h	2.702 0 68	545 A 08.545	Details	SRC04-PS-GD.OF	0.381V	25.250 A 25.24	9 Details
	SRC05-PS-QFJOn	2.954 V 68	569 A 68.569	Details	SRC05-PS-QD.Or	0.446 V	23.989 A 23.98	9 Details
	SRC05-PS-QF20n	2.877 08	487A 68.487	Details	SRC05-PS-QD.Or	0.414 V	23.582 A 23.58	3 Details
	SRC06-PS-QFJOn	2.830V 68	.708 A 08.707	Details	SRC06-PS-QD.or	0.417 V	25.056 A 25.05	/ Details
	SRC06-PS-QF20n	2.762 V 68	.692 A 68.692	Details 🧶	SRC06-PS-QDIOr	0.409 V	25.791A 25.79	2 Details
	SRC07-PS-QF10n	2.696 V 68	.829 A 68.828	Details 🧶	SRC07-PS-QD:or	0.372 V	25.578 A 25.57	8 Details
	SRC07-PS-QF20n	2.674 V 68	.348 A 68.348	Details 🧶	SRC07-PS-QD:or	0.385 V	26.284A 26.28	5 Details
	SRC08-PS-QF10n	2.776 V 68	.674A 68.672	Details 🧶	SRC08-PS-QD:or	0.389 V	24.608 A 24.60	8 Details
	SRC08-PS-QF20n	2.820 V 68	.425 A 68.422	Details 🧶	SRC08-PS-QD1or	0.438 V	26.325 A 26.32	5 Details
	SRC09-PS-QF10n	2.751V 68	.988 A 68.987	Details 🧶	SRC09-PS-QD:or	0.371 V	24.436 A 24.43	5 Details
	SRC09-PS-QF20n	2.669 V 69	.153 A 69.152	Details 🔍	SRC09-PS-QDlor	0.474 V	22.016 A 22.01	5 Details
	SRC10-PS-QF10n	2.714 V 68	.895 A 68.896	Details 🧶	SRC10-PS-QD.or	0.374 V	24.265 A 24.26	7 Details
	SRC10-PS-QF20n	2.758 V 68	.516 A 68.515	Details 🧶	SRC10-PS-QD;or	0.392 V	24.346 A 24.34	7 Details
	SRC11-PS-QF10n	2.870 V 68	.960 A 68.959	Details 🔍	SRC11-PS-QD:Or	0.452 V	25.938 A 25.93	6 Details
	SRC11-PS-QF2On	2.919 V 68	.621A 68.622	Details 🔍	SRC11-PS-QD.or	0.464 V	25.786 A 25.78	5 Details
	SRC12-PS-QF10n	2.971V 68	.635 A 68.635	Details 🔘	SRC12-PS-QD or	0.454 V	23.863 A 23.86	4 Details
	SRC12-PS-QF2On	3.037 V 68	.544A 68.543	Details 🥥	SRC12-PS-QD:Or	0.496 V	25.198 A 25.19	7 Details
	SRC13-PS-QF10n	3.145 V 68	.882 A 68.882	Details 🧶	SRC13-PS-QD:Or	0.548 V	26.079 A 26.08	0 Details
	SRC13-PS-QF20n	3.062 V 68	.605 A 68.604	Details 🔘	SRC13-PS-QD:or	0.531 V	26.448 A 26.44	7 Details
	SRC14-PS-QF10n	3.032 V 68	990 A 68.990	Details 🔘	SRC14-PS-QD:or	0.504 V	25.816 A 25.81	6 Details
	SRC14-PS-QF20n	2.950 V 68	849A 68.849	Details	SRC14-PS-QDior	0.495 V	26.702 A 26.70	2 Details
	SRC15-PS-QF10n	2.881V 68	805 A 68.804	Details	SRC15-PS-QD:or	0.452 V	25.613 A 25.61	2 Details
	SRC15-PS-QE20n	2.817 V 68	745 A 68 746	Details	SRC15-PS-QD.or	0.422 V	25.635 A 25.63	5 Details
	SRC16-PS-QE10n	2.771 V 68	330 A 68.332	Details	SRC16-PS-QD or	0.363 V	23.049 A 23.04	8 Details
	SRC16-PS-QF20n	2.737V 68	485A 68.485	Details	SRC16-PS-QD/or	0.367 V	23.847 A 23.84	8 Details
	Sextupoles Focusing Sextupoles SR-PS-SF1 On CR DS CF2 Or	7.836 V 18	62.410 .840 A 18.840	Details	Defocusing Sextu SR-PS-SD1 On	poles	96.70	0 5 Details
	Correctors Power Sup	plies (Gateways Health	Gi	eneral Control	Pulsed Elements	Reset All	Clos

Figure 2: Storage-ring main power supplies OPI.

There are functions provided in the power supplies OPI which can be done per power supply or as a general control:

- 1. Power supply mode.
- 2. Waveform settings.
- 3. Monitor faults, readings and tuning adjusting.
- 4. Firmware upgrade.

2017). Any distribution of this Storage-Ring RF Control Q

5	層 RF SSA Current 部													
	SESAM	Ē				Storage	Ring RF	Solid-S	tate Am	plifier 1	Current	and Power		
		DIS 01	DIS 02	DIS 03	DIS 04	DIS 05	DIS 06	DIS 07	DIS 08	DIS 09	DIS 10			
	March 11 01	0.491 A	0.531 A	0.723 A	0.474 A	0.452 A	0.491 A	0.367 A	0.593 A	0.553 A	0.474 A	Pre-Driver		
	Module 01	0.485 A	0.48 A	0.615 A	0.525 A	0.452 A	0.44 A	0.457 A	0.61 A	0.525 A	0.491A	The Driver		
	Mar 4 14 02	0.593 A	0.57 A	0.519 A	0.519 A	0.429 A	0.44 A	0.452 A	0.514 A	0.491 A	0.452 A	Forward Amplifier Power (Kw)		
21	Module 02	0.502 A	0.542 A	0.497 A	0.514 A	0.474 A	0.519 A	0.452 A	0.519 A	0.525 A	0.463 A	20 40 60		
	March 14, 02	0.615 A	0.615 A	0.468 A	0.542 A	0.423 A	0.497 A	0.44 A	0.519 A	0.587 A	0.57 A	0 11 0 00 11 10 00		
	module 03	0.548 A	0.553 A	0.497 A	0.548 A	0.474 A	0.519 A	0.474 A	0.485 A	0.57 A	0.525 A	0.38		
	Madula 04	0.536 A	0.553 A	0.474 A	0.576 A	0.48 A	0.412 A	0.474 A	0.531 A	0.536 A	0.497 A	V .		
	module 04	0.514 A	0.525 A	0.508 A	0.519 A	0.452 A	0.452 A	0.423 A	0.463 A	0.632 A	0.502 A			
	Module 05	0.497 A	0.508 A	0.519 A	0.519 A	0.468 A	0.457 A	0.514 A	0.542 A	0.531 A	0.435 A	Reflected Amplifier Power (Kw		
	1000018 05	0.468 A	0.536 A	0.463 A	0.548 A	0.491 A	0.446 A	0.48 A	0.485 A	0.491 A	0.44 A	10 20		
	Madula 06	0.508 A	0.497 A	0.48 A	0.474 A	0.463 A	0.452 A	0.378 A	0.531 A	0.502 A	0.48 A	0		
	Module 00	0.474 A	0.491A	0.491A	0.548 A	0.463 A	0.389 A	0.406 A	0.559 A	0.519 A	0.446 A	0.01		
	Module 07	0.508 A	0.531 A	0.468 A	0.508 A	0.395 A	0.418 A	0.485 A	0.604 A	0.429 A	0.44 A	V .		
	induce of	0.514 A	0.502 A	0.593 A	0.565 A	0.48 A	0.406 A	0.452 A	0.514 A	0.502 A	0.452 A			
	Module 08	0.446 A	0.502 A	0.519 A	0.446 A	0.463 A	0.429 A	0.519 A	0.429 A	0.615 A	0.525 A	Forward Power 1.228 kW		
	iniodate oo	0.474 A	0.502 A	0.468 A	0.423 A	0.452 A	0.474 A	0.497 A	0.519 A	0.519 A	0.491 A	Relfected Power 0.063 kW		
	P.I. 1	0.02	0.025	0.02	0.016	0.013	0.012	0.023	0.028	0.028	0.018			
	P.R. 1	0.0	0.0	0.0	0.004	0.005	0.0	0.002	0.0	0.0	0.0	Statistics		
	P.I. 2	0.016	0.013	0.017	0.011	0.012	0.008	0.015	0.003	0.008	0.02	Minimum Current 0.339 A		
	P.R. 2	0.0	0.006	0.002	0.0	0.01	0.002	0.0	0.007	0.0	0.003	Maximum Current 0.429 A		
		0.468 A	0.508 A	0.57 A	0.519 A	0.508 A	0.395 A	0.35 A	0.508 A	0.44 A	0.406 A	Average Current 0.447.4		
	Module 09	0.429 A	0.474 A	0.57 A	0.514 A	0.497 A	0.502 A	0.355 A	0.474 A	0.44 A	0.429 A	The off Content		
		0.457 A	0.429 A	0.44 A	0.485 A	0.435 A	0.474 A	0.429 A	0.446 A	0.559 A	0.44 A	Total PI Power 0.320 KW		
	Module 10	0.474 A	0.48 A	0.553 A	0.559 A	0.372 A	0.463 A	0.474 A	0.423 A	0.565 A	0.418 A	Total PR Power 0.041 kW		
		0.474 A	0.531 A	0.48 A	0.565 A	0.468 A	0.468 A	0.412 A	0.423 A	0.485 A	0.401 A			
	module 11	0.412 A	0.525 A	0.429 A	0.553 A	0.457 A	0.435 A	0.406 A	0.485 A	0.435 A	0.435 A	Inlet Water Flow 211.9 L/M		
		0.463 A	0.429 A	0.48 A	0.463 A	0.491 A	0.531A	0.35 A	0.423 A	0.435 A	0.468 A	Outlet Water Flow 188.4 L/M		
	Module 12	0.463 A	0.355 A	0.44 A	0.446 A	0.48 A	0.497 A	0.367 A	0.429 A	0.406 A	0.446 A			
	Mar 4 1 - 17	0.361 A	0.514 A	0.593 A	0.497 A	0.457 A	0.452 A	0.355 A	0.463 A	0.474 A	0.361 A	Mains		
	module 13	0.378 A	0.502 A	0.519 A	0.542 A	0.457 A	0.401 A	0.423 A	0.48 A	0.446 A	0.361A	Start Stop Interlock		
	Mandala 1.4	0.446 A	0.463 A	0.497 A	0.497 A	0.423 A	0.468 A	0.406 A	0.452 A	0.502 A	0.412 A			
	module 14	0.452 A	0.485 A	0.491A	0.497 A	0.429 A	0.435 A	0.361A	0.468 A	0.435 A	0.435 A			
	Mar 4 1 - 2 F	0.418 A	0.474 A	0.542 A	0.508 A	0.44 A	0.514 A	0.423 A	0.485 A	0.497 A	0.406 A			
	module 15	0.485 A	0.452 A	0.519 A	0.446 A	0.44 A	0.548 A	0.491A	0.457 A	0.435 A	0.406 A			
	Madula 16	0.378 A	0.463 A	0.559 A	0.446 A	0.463 A	0.463 A	0.418 A	0.468 A	0.452 A	0.457 A			
	module 10	0.339 A	0.497 A	0.553 A	0.57 A	0.474 A	0.457 A	0.457 A	0.457 A	0.446 A	0.446 A			
	Minimum	0.339 A	0.355 A	0.429 A	0.423 A	0.372 A	0.389 A	0.355 A	0.423 A	0.406 A	0.361 A			
	Maximum	0.548 A	0.553 A	0.615 A	0.57 A	0.497 A	0.548 A	0.497 A	0.61 A	0.632 A	0.525 A			
	Average	0.440 A	0.469 A	0.475 A	0.480 A	0.428 A	0.432 A	0.404 A	0.455 A	0.466 A	0.420 A			

Figure 3: Storage-ring RF amplifier OPI.

In the storage ring we have 4 RF cavities, each cavity is connected to a Solid State Amplifier (SSA). Each SSA consists of 10 dissipaters reporting forward and reflected power, each one containing 16 modules, with 5 for the supervising dissipater, which report temperature and current information to the controlling dissipater. The dissipaters are being controlled through SNMP protocol. Figure 3 shows the storage ring RF amplifier OPI.

Storage-Ring Vacuum Control

The storage-ring vacuum system is divided into what is called "vacuum cell" which groups every two magnet cells together. The vacuum equipment for the storage-ring consists of 106 ion-pumps and 27 gauges. Figure 4 shows the storage ring vacuum OPI.

SESA	ME				Stora	ge F	Ring V	acuum Ov	review									
	IP1	IP2	IP3	IP4	IMG	V1	V2											
Vacuum	Cell 1							Vacuum	Cell 2									
CO1L	1.21E-9	1.55E-9	8.81E-10		3.153E-10			C03L	4.86E-10	1.12E-9	4.88E-10	5.63E-10	3.328E-10					
01B	3.09E-10	1.26E-10	2.74E-11	1.86E-10	9.437E-12			C03B	1.41E-10	6.64E-11	1.67E-11	1.58E-10	3.328E-10					
C025	1.61E-9	1.49E-9				-		C045	OEO	OEO]			•				
C02B	3.24E-10	3.87E-10	2.94E-11	7.17E-10	8.281E-11			C04B	5.99E-11	3.49E-11	1.36E-11	2.24E-10	7.502E-12					
Vacuum	Cell 3							Vacuum	Cell 4									
051	3.85E-10	8 19F-10	2 07F-9		6.332E-11			C07L	3.09E-10	3.84E-10	1E-11		1.438E-10					
058	1.66E+10	2 78E-11	1.05E-11	2 79E-10	3.887E-11	-		C078	3.49E-11	1.69E-11	1E-11	4.34E-11	1.237E-11					
065	3.2E-10	1.73E-9				•		C085	6.48E-11	7.88E-10				•	0			
206B	9.68E-11	5.55E-11	1.96E-11	2.94E-10	2.148E-10			C08B	16-11	7.55E-11	2.98E-11	8.11E-11	1.4518-11					
Vacuum	Cell 5							Vacuum	Cell 6									
CO9L	2.26E-10	6.55E-10	3.17E-9		1.209E-10	1.209E-10		CIIL	2.16E-10	6.47E-10	4.65E-9		1.428E-9					
CO9B	6.79E-11	4.09E-11	1.22E-11	1.35E-10	8.661E-12			C11B	5.298-10	2.43E-10	6.11E-11	1.91E-10	1.1168-9					
C105	1.45E-10	1.23E-9				•	•	•	•	•	C125	1.91E-10	1.25E-9				•	9
C10B	5.86E-11	4.07E-11	1.68E-11	1.57E-10	2.807E-11			C12B	1.1E-10	7.13E-11	5.47E-11	3.18E-10	3.919E-11					
Vacuum	Cell 7							Vacuum	Cell 8									
C13L	2.22E-10	6.798-10	9.75E-9		1.791E-10			C15L	3.4E-10	6.88E-10	6.47E-10		2.026E-10					
C13B	1.2E-10	6.14E-11	2.09E-11	1.34E-10	6.495E-11	-	-	C15B	8.18E-11	4.96E-11	2.24E-11	2E-10	4.427E-11	-				
C145	1.72E-10	1.6E-9				•	•	C165	2.61E-10	16-11				•	1			
C148	1.4E-10	8.36E-11	1.17E-11	3.2E-10	3.413E-10			C16B	1.26E-10	5.82E-11	3.09E-11	4.61E-10	1.802E-10					

Figure 4: Storage-ring vacuum OPI.

DB-CHECK TOOL

The db-check tool is a command line tool built at SESAME that automatically analyses, validates and aids in applying continually evolving in-house rules for EPICS records databases. It was primarily built to help in reviewing, unifying and maintaining the numerous EPICS databases present, besides that it creates XML files to be imported to the archiver and alarm handler systems. All of the tool's functions are done using an input file, consisting of a custom structure, passed to the program and then the resulting output is to be used for further processing.

The tool has been re-designed from the ground up using native C++. There has been some issues installing support for the D-language along some problems in parsing parts of input files which involves applying regular expressions. In order to make it easy deploy and use the tool we decided re-implementing it again using the C++ language with the powerful C++11 standard. The new version accepts the same files format and outputs the same data format as the previous one. Instead of relying on a separate module for parsing (Pegged dictionary)[2], we used C++11 regular expression library to parse record databases and extract information using regular expressions designed for parsing records to simple data structures to be used later for processing.

OT FRAMEWORK AND EPICS OT

built on top of EPICS to provide channel access

functionality within the Qt framework which allows for

community, we decided to take a look and experiment

with EPICS Qt as a possible replacement for Control

System Studio. It also provides an excellent and well

The decision for testing and developing with the Qt

Framework and EPICS Qt as a possible replacement for

the CSS came after careful consideration, testing and

comparison between both CSS and Qt. The main

advantage of CSS is it is easy to deploy, develop GUIs

and using them. The main disadvantage of CSS is its

structure which led to poor performance from time to time

and not allowing for custom versions through its open

source code. On the other hand the advantage of EPICS

Qt is it is lightweight, easy-to-use source code, widely

Currently for developing control systems GUI with Qt,

we use the latest Ot 5.9.1 along with EPICS Ot's latest

release from the maintainers' official git repository hosted

on github [4]. Figure 5 shows an example of the

microtron Qt GUI. Figure 6 shows an example of

Microtron Control System - Operation

ON

Filament Fault
Wayequide Pro

35.3989 A Ramp Up

Ramp Dow

ng Time

nd Hor

Close

used development experience and better GUI looks.

booster's vacuum Qt GUI.

OFF

Type Here SESAME

HV.

Reset

Modulator Fault
Door Fault

Due to its popularity and very wide ecosystem and

faster prototyping of control systems clients [3].

accepted world-wide development experience.

The EPICS Ot Framework is a high-level framework

before.

itself

and finalizing and operating the machine, the demand for archiving data has grown on a much larger scale than The CSS RDB Archiver we use stores data in PostgreSQL database. During booster operation we had a total process variables count of around 1800 which was very reasonable to an RDB database. Now with the storage-ring in operation we have a total of more than 1200 process variables with near 1200 in archiving having weekly data rate of 23 to 50 GB a week of storage (both data and indexes). This resulted in a week performance of the CSS data browser due to caching of the data on the server all the time by the RDB Archiver The choice to such a problem is to use a clustered, scalable data storage solution. We went for the EPICS Archiver Appliance due to its better EPICS community support and easy installation and deployment. Right now we are testing a proof-of-concept installation with one server in the cluster, the testing includes installation, data insertion and retrieval, performance testing, and client

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deployment. The archiver appliance aims for archiving millions of PVs with large focus on data retrieval performance. It uses 4 Tomcat webapps: Engine for data archiving, ETL for storage management, Mgmt for Web interface and retrieval for client data retrieval like CSS. Figure 7 shows the architecture of a single appliance [5].



Figure 7: Architecture of a single appliance.

CONCLUSION

The control system of SESAME is based on EPICS and CSS. Development of new tools and upgrading existing systems at SESAME is important to make the control systems up to date and more consistent. Standards are used for both EPICS databases and CSS client screens.

Figure 5: Microtron control system in Qt framework.

tput Curren Ramp Up Ready Ramp Dov

Emission
PSS Interloci



Figure 6: Booster vacuum control in Qt framework.

THE ARCHIVER APPLIANCE

The archiving system that is being used right now at SESAME is the standard CSS RDB Archiver. Initially, in the first stages of SESAME, there has not been much demand for the archiver due to low EPICS process variables implemented. Now with storage-ring is done

REFERENCES

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