

Automatisation and Elog

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DHH Sequence

- Reminder:
 - DHH Sequence is used to power up and steer the modules in a controlled and easy way (state machine)
 - OFF: DHE configured, ASICS and Matrix off
 - STANDBY: ASICS powered and configured, Matrix off
 - PEAK: Matrix powered
 - The sequence was used in the labs for a long time now (during complete mass testing)
 - For documentation look here: https://confluence.desy.de/display/BI/dhh-sequence



- At the beginning of phase 2 it was not possible to power all 4 modules simultaneously (PXD was not part of the HV control)
 - Manual intervention from shifter needed \rightarrow no *on-call* shifts possible
 - PXD was slowest subsystem regarding
 STANDBY ↔ PEAK transition
- Issue was solved after a few weeks by Michael with new PS firmware



- During phase 2 we extended the functionality (Special thanks to Simon Reiter!)
- Initially ACMC was not included in the sequence
 - From beginning of June on ACMC and offests were used for normal operation, which required a change in the sequence
 - From v0.2.7.2 on, ACMC is included in the sequence, it is activated after the analog part of the DCD is switched on



- During STANDBY state the pedestals were not well defined which caused issues with Null Runs/DAQ Tests (occupancy too high → trigger mismatch → crashed DAQ)
 - To fix this we implemented Standby Pedestal which mask all Pixel \rightarrow 0% occupancy
 - These pedestal are stored in the second previously unused pedestal memory
 - The active pedestal memory is switched during the STANDBY ↔ PEAK transition



- Issues/problems:
 - Sometimes (randomly) one DHP was not configured, no explanation found until the end of phase2. The epics PVs were set correctly but the configuration was not written into the DHP register
 - The upload of the pedestals and offsets failed sometimes. We tried to use the "memory access failed" PV, but this was not 100% reliable
 - Sometimes one DCD did not switch off, which caused to sequence to stop



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ELOG and BonnDAQ

- During the operation of phase 2 we used **two** different ELOGs, one for calibration measurements (pedestal, offsets, ...) and one for the global Belle 2 runs
 - https://elog.belle2.org/elog/Beast-II-Calibration/
 - https://elog.belle2.org/elog/Beast-II-PXD-Runs/
- These ELOGs were filled automatically but manual input from the operator/shifter was still possible



Calibration IOC

- Since pedestals have to be recorded regularly we used the Calibration IOC
 - Easy control over multiple modules via CSS
 - Prevents faulty operation of the system by the shifter
 - Performs measurement, analysis and upload of the pedestals (including elog entries)



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Calibration IOC





BEAST II PXD Runs ELOG

- An 'elog_server' script was running and handled the opening/closing of the DAQs and the creation of the elog entries
 - At startup the shifter had to enter his DESY credentials
 - accelerator/detector information gathered via PVs and the local Archiver \rightarrow stored in the elog entry as xml file
- Start of run and end of run triggered by the global Belle 2 run status PV
- At the end of each run 100 pedestals frames were recorded
- Later during phase 2 the regular DAQ elog was also filled automatically by this ,elog_server'



BEAST II PXD Runs ELOG

- All Belle 2 runs recorded automatically
 - BonnDAQ data saved to disk
 - At end of run an elog entry was created with some additional information about the run (run type, trigger, type, length of run, number of events, ...)

ELOG fo	PXD Beast II runs, Page 40 of	262																				ELOG
List New	Edit Delete Reply Dupli	cate Find Help	Config Logo	out																		
Full Sum	nary Threaded																				🗔 Type 🔻	5240 Entries
Goto page Pr	avious 1, 2, 3 39, 40, 41 260, 2	61, 262 Next																				
ID	StartTime	Author	Туре	Run Type	Trigger Type	RunNumber	Num events	RunDuration	HER Current	LER Current	Solenoid	Subdetectors	CommitID	ModuleStatus	PXD	SVD CDC	тор	ARICH	ECL KLM	I TRG HI	T Text	Ű
4474	2018/07/ 6 Fri 11:57 JST	lutticke		null	poisson	5342	1059297	0:21:03	43.48	38.48	ON	PXD CDC TOP ECL KLM TRG HLT	125	STANDBY	ING.	aa. <mark>Ind</mark>	inci.	EXCI.	inci. inci	inci. in	Run was started at 2018/07/06 11:57 JST Run was stopped at 2018/07/06 12:18 JST Experiment: 3	00
4473	2018/07/ 6 Fri 11:54 JST	lutticke		null	poisson	5341	51	0:00:42	44.00	40.57	ON	PXD CDC TOP ECL KLM TRG HLT	125	STANDBY	INCL						Run was started at 2018/07/06 11:54 JST Run was stopped at 2018/07/06 11:55 JST Experiment: 3	0.0
4472	2018/07/ 6 Fri 11:45 JST	lutticke		null	poisson	5340	369964	0:07:19	45.63	46.81	ON	PXD CDC TOP ECL KLM HLT	125	STANDBY	INO.						Run was started at 2018/07/06 11:45 JST Run was stopped at 2018/07/06 11:52 JST Experiment: 3	00
4471	2018/07/ 6 Fri 11:40 JST	lutticke		null	poisson	5339	0	0:00:03	46.61	50.02	ON	PXD CDC TOP ECL KLM HLT	125	STANDBY	INCL	5XG. 1XG	INCL.	EXCL.	INCL. INCL	EXCL. IN	Run was started at 2018/07/06 11:40 JST Run was stopped at 2018/07/06 11:40 JST Experiment: 3	0.0
4470	2018/07/ 6 Fri 11:32 JST	lutticke		null	poisson	5338	194665	0:05:48	48.21	41.50	ON	PXD SVD CDC TOP ECL KLM HLT	125	STANDBY	INCL.		DMCL.	EXCI.		EXCL. IB	Run was started at 2018/07/06 11:32 JST Run was stopped at 2018/07/06 11:38 JST Experiment: 3	00
4469	2018/07/ 6 Fri 11:15 JST	lutticke		null	poisson	5331	259235	0:11:26	-0.03	33.31	ON	PXD SVD CDC TOP ECL HLT	125	STANDBY	INGL		ING.	EXCL.	INGE EXG	EXCL.	Run was started at 2018/07/06 11:15 35T Run was stopped at 2018/07/06 11:26 35T Experiment: 3	0.0
4468	2018/07/ 6 Fri 11:10 JST	lutticke		null	poisson	5330	35414	0:01:59	-0.02	9.33	ON	PXD SVD CDC TOP ECL KLM HLT	125	STANDBY	INGL		DVO.				Run was started at 2018/07/06 11:10 35T Run was stopped at 2018/07/06 11:12 35T Experiment: 3	00
4467	2018/07/ 6 Fri 11:07 JST	lutticke		null	poisson	5329	17325	0:00:48	-0.03	-0.04	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	STANDBY	INCL						Run was started at 2018/07/06 11:07 35T Run was stopped at 2018/07/06 11:08 35T Experiment: 3	0.0
4466	2018/07/ 6 Fri 10:26 JST	lutticke		physics	aux	5326	377142	0:35:32	154.22	123.00	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INGL	NOL INCL	INCL.	INCL	INCL INC	Exci. In	Run was started at 2018/07/06 10:26 JST Run was stopped at 2018/07/06 11:02 JST Experiment: 3	0.0
4465	2018/07/ 6 Fri 09:51 JST	lutticke		physics	aux	5325	800725	0:33:06	212.66	249.59	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INCL.	NGI ING	DNG.	INCL.	INCL. INCL	EXCL.	Run was started at 2018/07/06 09:51 JST Run was stopped at 2018/07/06 10:24 JST Experiment: 3	0.0
4464	2018/07/ 6 Fri 01:00 JST	Botho Paschen	Shift Report			5313-5324							125								[B]owl shift 2018-07-06 1-9 JST[/B] [B]Redestals[/B] still unloaded from run	0
4463	2018/07/ 6 Fri 08:47 JST	lutticke	Run	physics	aux	5324	1056766	0:55:27	204.70	246.95	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	ING.	NGL INCL	ING.	INCL	INCL INC	EXCL. IN	Run was started at 2018/07/06 08:47 JST Run was stopped at 2018/07/06 09:42 JST Experiment: 3	0.0
4462	2018/07/ 6 Fri 07:47 JST	lutticke		physics	aux	5321	642976	0:44:49	192.13	180.26	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	ING.						Run was started at 2018/07/06 07:47 JST Run was stopped at 2018/07/06 08:32 JST Experiment: 3	0.0
4461	2018/07/ 6 Fri 07:37 JST	lutticke	Run	physics	aux	5320	196	0:01:58	208.65	225.23	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INCL.	NGL INCL	DICE.	INCL	INCL SUCI	exci. in	Run was started at 2018/07/06 07:37 JST Run was stopped at 2018/07/06 07:39 JST Experiment: 3	0.0
4460	2018/07/ 6 Fri 07:32 JST	lutticke		physics	aux	5319	386	0:03:25	218.57	253.67	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INCL.	NGL INCL	INCL.	INCL	INCL. INC.	EXCL. IN	Run was started at 2018/07/06 07:32 JST Run was stopped at 2018/07/06 07:35 JST Experiment: 3	0.0
4459	2018/07/ 6 Fri 06:32 JST	lutticke	Run	physics	aux	5318	106558	0:11:01	133.79	89.69	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INCL.	NGE ING	INCI.	INCL	INCL INCL	EXCL. SIN	Run was started at 2018/07/06 06:32 35T Run was stopped at 2018/07/06 06:43 35T Experiment: 3	0.0
4458	2018/07/ 6 Fri 05:47 JST	lutticke		physics	aux	5317	344431	0:12:45	212.68	229.18	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INO.	NGL INCL	DXCL.	INCL	INGL INC	EXCL. IN	Run was started at 2018/07/06 05:47 35T Run was stopped at 2018/07/06 06:00 3ST Experiment: 3	0.0
4457	2018/07/ 6 Fri 05:06 JST	lutticke	Kun	physics	aux	5316	206589	0:19:46	105.71	65.86	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	ING.	NG. ING.	DWD.	INCL	INCL INCL	EXCL. IN	Run was started at 2018/07/06 05:06 3ST Run was stopped at 2018/07/06 05:26 3ST Experiment: 3	0.0
4456	2018/07/ 6 Fri 05:03 JST	lutticke		physics	aux	5315	0	0:00:01	110.74	68.31	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INGL -	NGL INCL	INCL	INCL	INCL. JUCI	EXCL. 100	Run was started at 2018/07/06 05:03 JST Run was stopped at 2018/07/06 05:03 JST Experiment: 3	0.0
4455	2018/07/ 6 Fri 04:48 JST	lutticke		physics	aux	5314	262483	0:12:55	131.70	81.95	ON	PXD SVD CDC TOP ARICH ECL KLM HLT	125	PEAK	INCL.	NG. INCL	INCL.	INCL	INCL INCL	EXCL. IN	Run was started at 2018/07/06 04:48 JST Run was stopped at 2018/07/06 05:01 JST Experiment: 3	0.0

08/10/18



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BEAST II PXD Runs ELOG

Home general Software/Computing DAQ Beast PXD VXD CDC SVD ECL ARICH KLM PXD-SVD testbeam													
ELOG for PXD Beast II runs													
N V N LIST New Edit Delete Reply Duplicate Find Help Config Logout													
Message ID: 4465 Entry time: 2018/07/ 6 Fri 01:25 JST													
Author:	lutticke												
Type:	Run												
ExperimentNumber:	3												
RunNumber:	5325												
HER Current:	212.66												
LER Current:	249.59												
StartTime: 2018/07/ 6 Fri 09:51 JST													
EndTime:	2018/07/ 6 Fri 10:24 JST												
RunDuration:	0:33:06												
CommitID:	125												
ModuleStatus:	JeStatus: PEAK												
RunStatus:	us: ABORTED												
PXD:	INCL												
SVD:	INCL												
CDC:	INCL												
TOP:	INCL												
ARICH:	INCL												
ECL:	INCL												
KLM:	INCL												
TRG:	EXCL												
HLT:	INCL												
Run Type:	physics												
Trigger Type:	aux												
Solenoid:	ON												
Subdetectors:	PXD SVD CDC TOP ARICH ECL KLM HLT												
Num events: 800725													

Run was started at 2018/07/06 09:51 JST Run was stopped at 2018/07/06 10:24 JST Experiment: 3 Runnumber: 5325 Run type: physics Trigger type: aux HLT Script: beam_reco_monitor

HV state: PEAK Subsystems in PEAK: CDC BKLM SVD TOP ARICH PXD Subsystems masked:

HER/LER current at the start: 212 / 249 mA Luminosity at start [10^30 /cm^2/sec]: 1594.79638672 Rate (Trig. output) at start [Hz]: 0.0 Solenoid: ON (1.5 T, 4097 A) Total events: 800725 Integrated Luminosity [10^33 /cm^2]: 1823.0169677734375

Stopped because of:

Belle II PXD Workshop

13/15



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seed charg

H2012

Exp: 3 Run: 5325 Number of trigger: 803051 Run started at: 2018-07-06 09:51:44.655689 Run stopped at: 2018-07-06 10:24:51.252956 Duration: 0:33:06

Data stored in /data2/ELOGSERVER_RUNS/all/EXP0003/Run5325-0.dat









BEAST II PXD Runs ELOG

- Issues/Problems:
 - If something goes wrong during the transmission of the elog entry (e.g. Elog at DESY down), all information about the run is lost
 - Maybe dump the entry to disk and submit later
 - It is not possible to change the stored DESY credentials while the server is running, a restart is required
 - Was good enough for phase 2, but we would need another solution for phase 3



Summary

- DHH Sequence worked stable apart from some minor issues
- The Calibration IOC made it rather easy to record and upload pedestals
- The elog_server made it easy to record all runs without shifter intervention