A Large Ion Collider Experiment



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ALICE Status Report

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LHCC Referees meeting, 4 June 2019



Processing progress summary

- p-p data
 - All 2018 periods processed in Pass 1 and passed detailed QA
 - General and special MC productions completed
- 2018 Pb-Pb data:
 - Pass1 reconstruction completed
 - General and special MC productions completed
- Focus on physics analysis for major summer conferences
 - SQM June
- Pass 2, Pass 3 RAW of various p-p periods ongoing
 - As per production plans
 - Pb-Pb pass 2 later in 2019



Resources utilization

- Continuous high utilization
 - Stable resources delivery at all tiers, no major incidents
- Several sites/regions pledges for 2019 installed
 - Gradual migration of sites to CentOS 7 (ALICE software fully compatible)
 - Migration from CREAM CE to others ARC, HTCondor



Resources utilization in 2019 (April-May)

- Average 125K parallel jobs from 1 April 2018 to today
- Larger fraction of CPU for RAW data reconstruction and organized analysis
 - Related to ongoing RAW data reconstruction and preparation for conferences
- CPU efficiency stable



Analysis traffic

- Passed Exabyte of read data in 2018
 - 95% of it is organized analysis
- CPU Efficiency of analysis continues to be about 80%
 - Improvements of analysis framework, consolidation of tasks
- Site infrastructure is in general not overloaded
- Sharing plans with sites and gradual infrastructure upgrade helps a lot



Data volume used for analysis

Volume PB



Changes in Computing Management

- New O2 project structure
 - O2/FLP (Pierre Vande Vyvre),
 - O2/EPN (Volker Lindenstruth)
 - O2/PDP (Andreas Morsch)
 - Computing Technical Coordination (Massimo Lamanna)

	New	Computing	Coordinator
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 Needs to be endorsed by the Collaboration Board

	Milestone	End date	2019				2020						
			Milesto	one		Activit	y I	tt		11			
38 02.4	O2 global commissioning (all detectors) finished	Mar.21											_
37	O2 global commissioning (all detectors)									+	1		
36 02.3	Vertical slice test (simulated data) finished	Mar.21					ļ.ļ.	ļ.ļ.					
35	Vertical slice test (simulated data)				11								
34 02.2	Vertical slice test (with dummy data) finished	Sep.20											
33	Vertical slice test (with dummy data)			ų				11	ļ				
32 02.1	Vertical slice test system ready	Jul.19											_
31	Vertical slice test system preparation												
	Global												



Focus on upgrade for Run 3



O2 Vertical Slice

- Vertical Slice
 - Continuous integration tests
 - Performance evaluation
 - Support detectors commissioning
 - Test for the final O2 deployment



- Status of O2.1 milestone
 - New containers wiring advancing (EPN+FLP) + necessary connectivity to the Computer Centre
 - ~10% capacity, recycling Run2 computing equipment
 - On-track to have all the elements on the floor by July



Simulation - status of detector implementation

	4			rð:		#
	Start	Planning	Geometry	Hits	Digits	Ready
Passive*				na	na	₹
ITS						1
TPC						₽.
MFT						1
EMCAL						₽ ,
TOF						₽ <u>́</u>
FIT(T0+)				\checkmark		Þ
FIT(V0+)				4		Q2/'19
TRD					🔽 🔧	Q2/'19
PHOS					V	Q2/'19
MUON					🔽 ⊀	Q2/'19
HMPID						₽ L
ZDC				1		Q2/'19

• Excellent progress, main parts ready for Vertical Slice Test (next slides)

ALICE

Simulation

- On-going efforts to optimize impact of simulation on computing needs in Run 3
 - Embedding techniques
 - Computing time reduction digitisation and avoid redundant calculation steps
 - \circ AOD size reduction by factor 10
 - Review of O2 TPC digitization code
 - Substantial improvement in CPU performance while keeping constant physics quality
 - Largely simplified GEM Amplification scheme
 - Optimization of transport time (G3/G4)
 - Transport cuts and geometry configuration depending on physics
 - Virtual MC supports simulation using several transport engines
 - Integrate fast and slow simulation
 - Physics models from different (or the same) transport engines
- More information and specific details on in the September report



Reconstruction

Major reconstruction tasks

		CPU	GPU]
	Tracking (*)	done	done	(*) TPC, ITS, T0 reconstruction,
TPC	dE/dX	In validation (Q2/2019)	In validation (Q2/2019)	ITS-TPC matching are
	Compression	Q2/2019	Q3/2019 <mark>(*)</mark>	operational as DPL devices,
	Tracking finding (*)	done / extra passes: Q2/2019	done	DPL.
170	Track fitting	done	Q2/2019	
115	ITS-TPC matching	done / afterburner: Q2/2019	Q3/2019	(*) Feasibility of entropy
	Compression	Q2/2019	Q3/2019 <mark>(*)</mark>	study so far promising results are
TRD	Matching to ITS-TPC	done ("HLT", simulation progressing)	done	obtained (CHEP abstract)
TOF	Matching to ITS-TPC	done	Q2/2019	1
EMCAL	Clustering	Q2/2019	-	1
PHOS	Clustering	Q2/2019	-	1
MUON	MCH clustering, tracking	Q4/2019	-	1
MUON	MID	done (in validation)		1
мет	Tracking (standalone)	PR pending	-	1
MET	Matching to MCH	Depends on MCH schedule		
EIT.	T0+ reconstruction	done	done	
FII	V0+ reconstruction	(simulation progressing)	-	
HMPID	Clustering, matching	Q2/2019	-	1
ZDC	ZDC reconstruction	Sim/Rec sprint planned for May 2019]

• On track for Reconstruction Barrel Detectors EDR (Q2 = end of June)



O² major milestones and planned reviews

• Done 🕈

- FLP.1 (Ready for FLP tender) review D.
 Francis, F. Mejers, N.Neufeld + input from IT-CF/E. Bonfillou and IPT-PI/H. Gerster and F. Najeh
- Concluded on May the 9th, Tender being validated
- Imminent ⁺
 - PDP.1 (Reconstruction for barrel detectors) review S. Ponce, F. Pantaleo and G. Stewart
- Upcoming <---
 - PDP.2 Out-of-Barrel detectors (Dec 2019)
 - PDP.4 Ready for disk buffer tender" (Nov 2019) - Collaboration with IT restarted (based on the 2018 disk-buffer for HI daq)
 - EPN.1 Dimensioning of computing nodes and network (Dec 2019)

vity		End date		2019				2020				20	21
Milesto	ne			6 7	8 9 10 11 1	12 1 2	3 4 5	6 7	8 9 2	11 12	-1	2	3 4
	FLP												
	Qualification of FLP nodes		I. J. J.										
FLP.1	PRR: Ready for FLP tender	May.19									1.1	1	
	FLP call for tender and purchase			L		1 1 1							11
	FLP Delivery & Installation				L			TT				1	1
FLP.2	FLP ready for detector commissioning	Dec.19											
	FLP & individual detector commissioning		TITI			4	1		1			_	11
FLP.3	Individual detector commissioning finalized	Sep.20											T
	PDP											1	TI
	Development of barrel detector reconstruction										TT	T	TI
PDP.1	EDR: Reconstruction barrel detectors	Jun.19					1		TT	1.1.	1.1		11
	Development of out-of-barrel detector reconstruction								 C 				T
PDP.2	EDR: Reconstruction out-of-barrel detectors	Dec.19							1	1.11	101	- 1	TT
	Development & integration of calibration SW						111			111	11	1	111
PDP.3	PRR: Reconstruction & calibration SW ready	Feb.20					-				П		T
	Disk buffer tests		11111			-				1	11	1	11
PDP.4	PRR: Ready for disk buffer tender	Nov.19									H	T	T
0.500.000	Disk buffer tender and delivery						11				11	1	11
PDP.5	Disk buffer installed and ready for commissioning	Dec 20	2				L			111	trt	1	10.00
	Detector description digitisation										H		11
	Baw data creation					****				-	H	1	1
PDP 6	Ready for simulation challenge	Dec 19	1							11	H	T	11
101.0	Reconstruction of simulated data	Dec.15							1		ht	+	1
	Rup Apphris Challenge					1111	L.				++	-1-	-
PDP 7	Analysis Challenge result ready	Ind 20									H		11
101.7	EDM	301.20									+-+		+
	CFN Dimensioning of Computing pades 8, actuarly						11		~ _				-
	Market computing hodes & network								1				+
	Narket survey	0 10									++		++
EF N.L	Tandas 50N 8. astwark	Dec.19	HHH								H		
CON 2	Tender EPN & network	· · · · 20									-		-
EPN.2	Delivery EPN & network	Jun.20					-				+	÷	++
	EPN & network installation						1				+	-	+
EPN.3	EPN and network ready for comm.	Aug.20											
	Giobal						-				H	+	+
~ *	vertical slice test system preparation										++		++
02.1	Vertical slice test system ready	Jul.19									$\left \cdot \right $	-+-	-
22.2	vertical slice test (with dummy data)												
02.2	Vertical slice test (with dummy data) finished	Sep.20									++	-	
	Vertical slice test (simulated data)					- 11							
02.3	Vertical slice test (simulated data) finished	Mar.21				+ + + + +				10700			
	O2 global commissioning (all detectors)									+			
02.4	O2 global commissioning (all detectors) finished	Mar.21							++-		++	-	4
						.1.1.1			-				
			Miles	stone		Activity		III.		1	hul		أسلم
	Milestone	End date		2019				2020				20	21

Figure 5.1: O2 milestones.



Summary

- The Pass 1 RAW data reconstruction of all 2018 data is completed
 - MCs are completed for the entire collected data sample
- Current activities physics analysis and Pass 2/3 of RAW data
- Focus on upgrade activities and preparation for Vertical Slice Test of O²
- Internal reviews in progress
- Long term outlook for computing resources remains unchanged
 o compatible with fixed funding until end of LS3