

KIAF Operation Status Report

KoALICE National Workshop 2018-2 @ High1 Resort
2019-01-07

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Korea Institute of Science and Technology Information



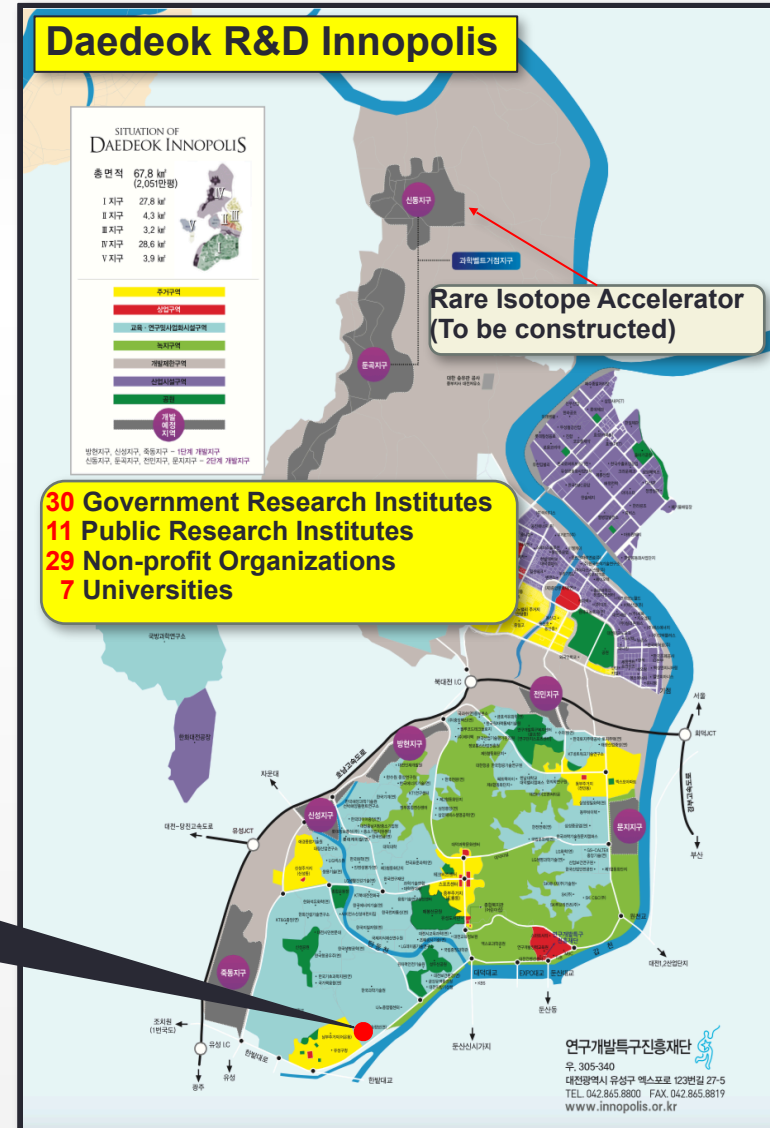
Content

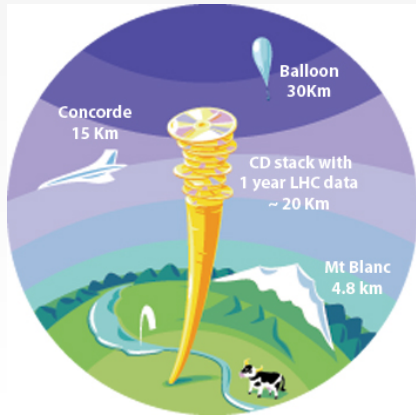
- **GSDC Introduction**
- **ALICE Analysis Farm**
- **HTcondor Integrated Pool**
- **Operation Status**
- **Summary**

GSDC Introduction

Korea Institute Science and Technology Information

- Government-funded research institute founded in 1962 for National Information Service and Supercomputing
- National Supercomputing Center
 - Nurion System (~25.7 PFlops at Peak), ranked 11th of Top 500(2018)
 - KREONet National R&E Network





Large-scale Scientific Data:
20Km CD stack with data
produced per year in CERN

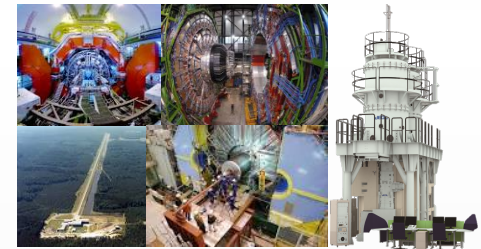
Global Science

experimental Data

hub Center



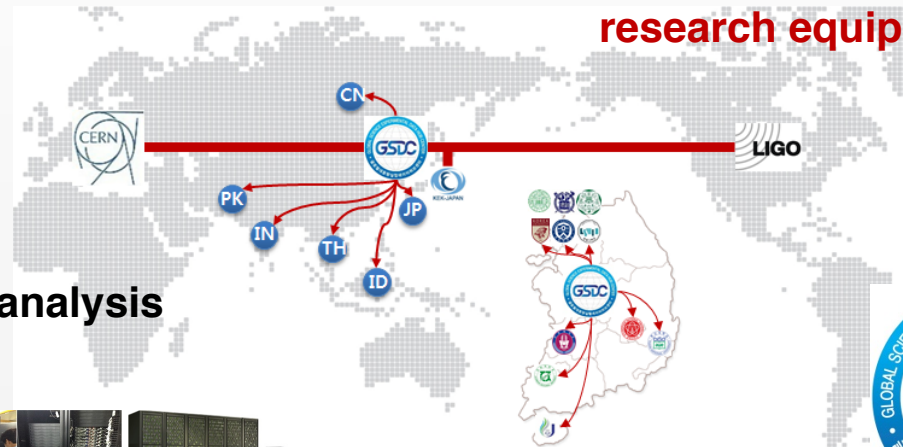
Collaboration with global laboratories



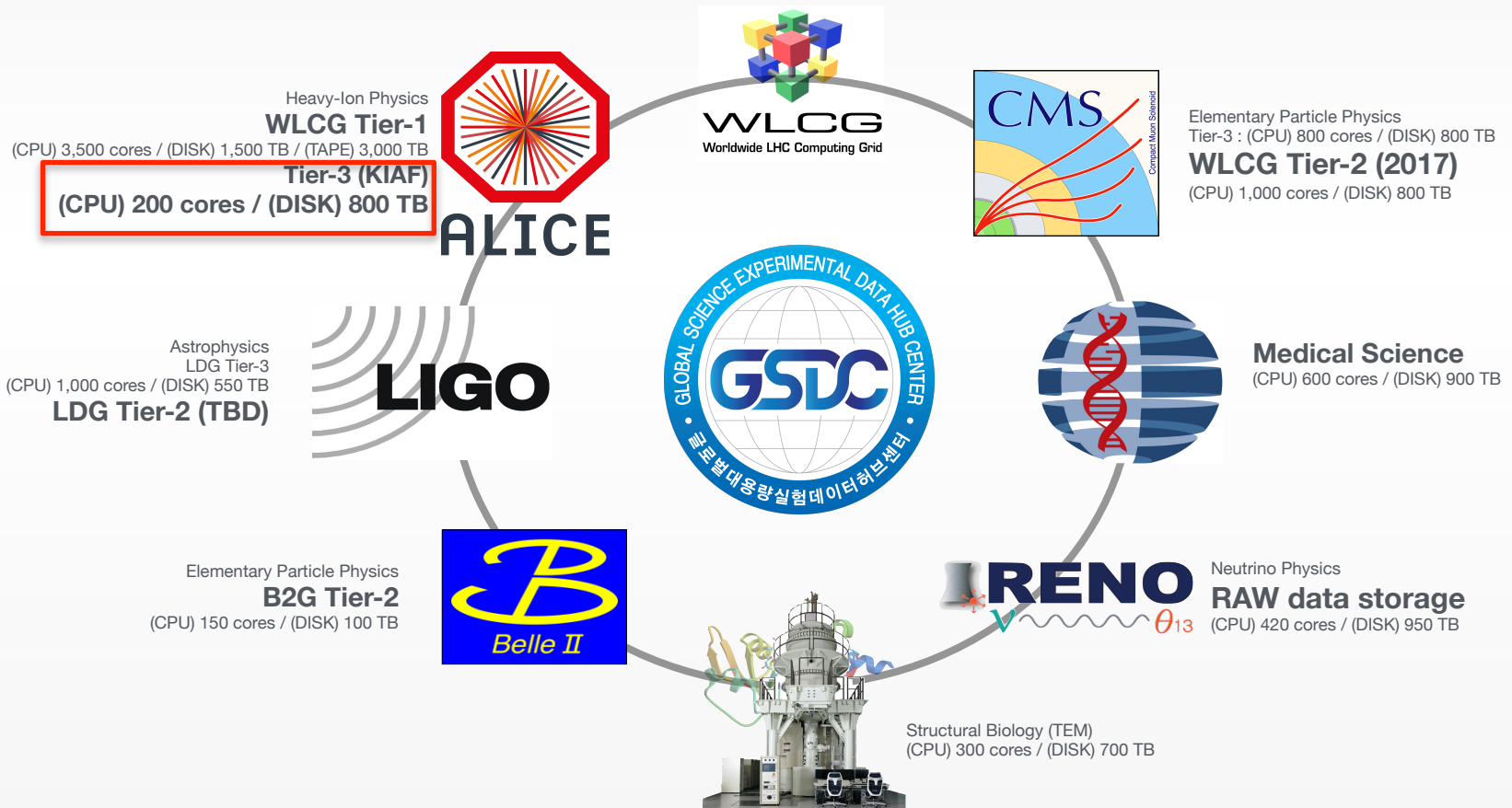
Data from large and high-valued research equipment

➤ **(Global)**
Asia representative **Data Hub**

➤ **(Domestic)**
Scientific data management and analysis platform service



Experimental Support



3-4 more domestic experiments under preparation
 e.g. volcanic hazard mitigation, brain research, disease control, etc.

ALICE Analysis Farm

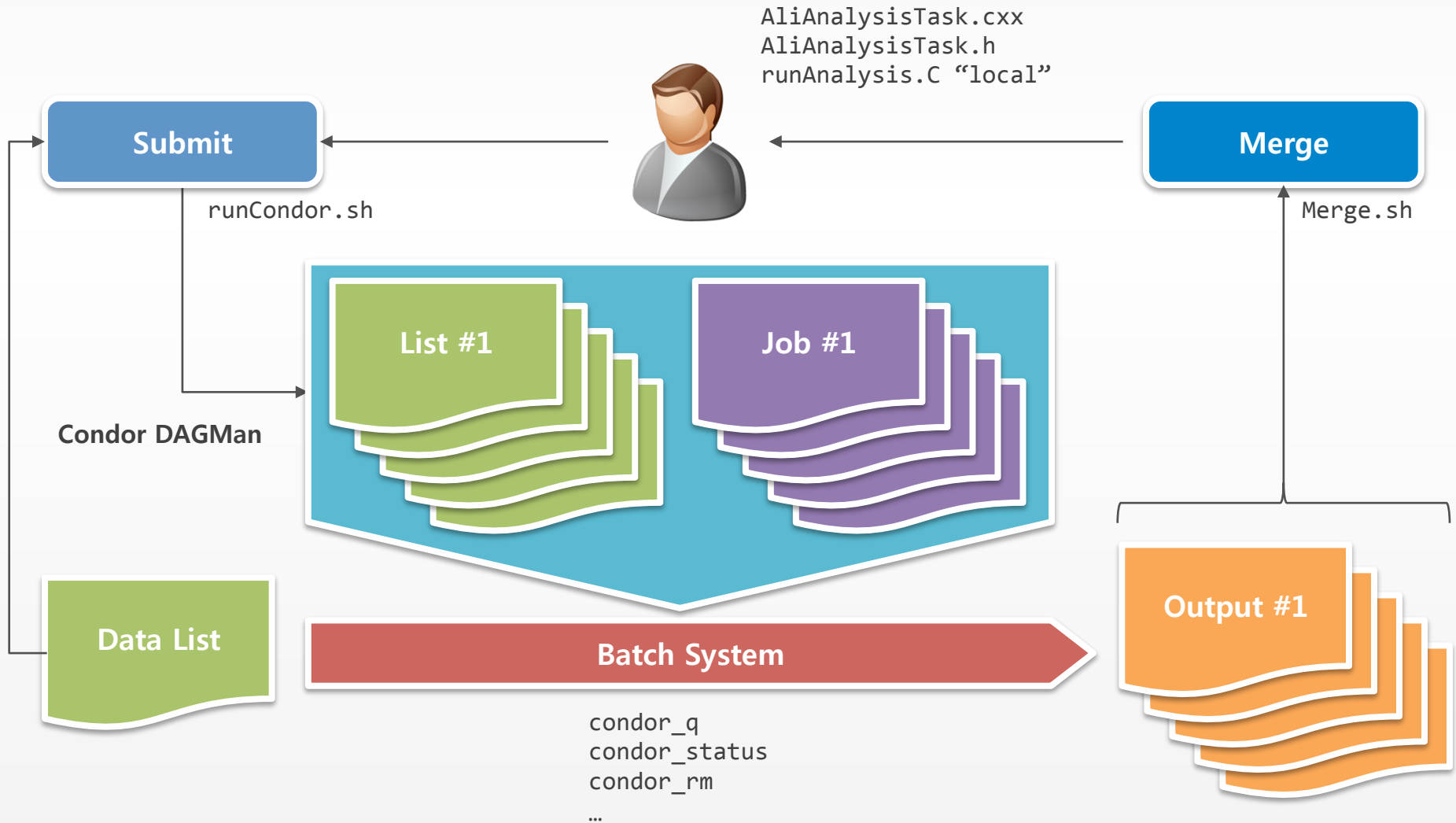
KIAF System

- **Dedicated Computing farm for KoALICE**
- **Basic configuration**
 - HTCondor batch system
 - XRootD data management system
(coupled with AliEn for ALICE dataset transfer)
 - Scientific Linux 7.6
- **Additional software**
 - XRootD Filesystem for local file access
 - PROOF on Demand enabled
 - Ganglia for monitoring (Admin only)

Hardware History

	2012	2013	2014	2015	2016	2017	2018	2019
CPU	54	54	54	98	98	100	200	200
Disk (TB)	180	180	200	200	200	500	600 (700)	800
Network (Gbps)	1	2	2	10	10	10	10	10

User Analysis Workflow



User Analysis Workflow

AliAnalysisTask.cxx
AliAnalysisTask.h
runAnalysis.C "local"



Submit

Merge

runCondor.sh

Merge.sh

Condor D

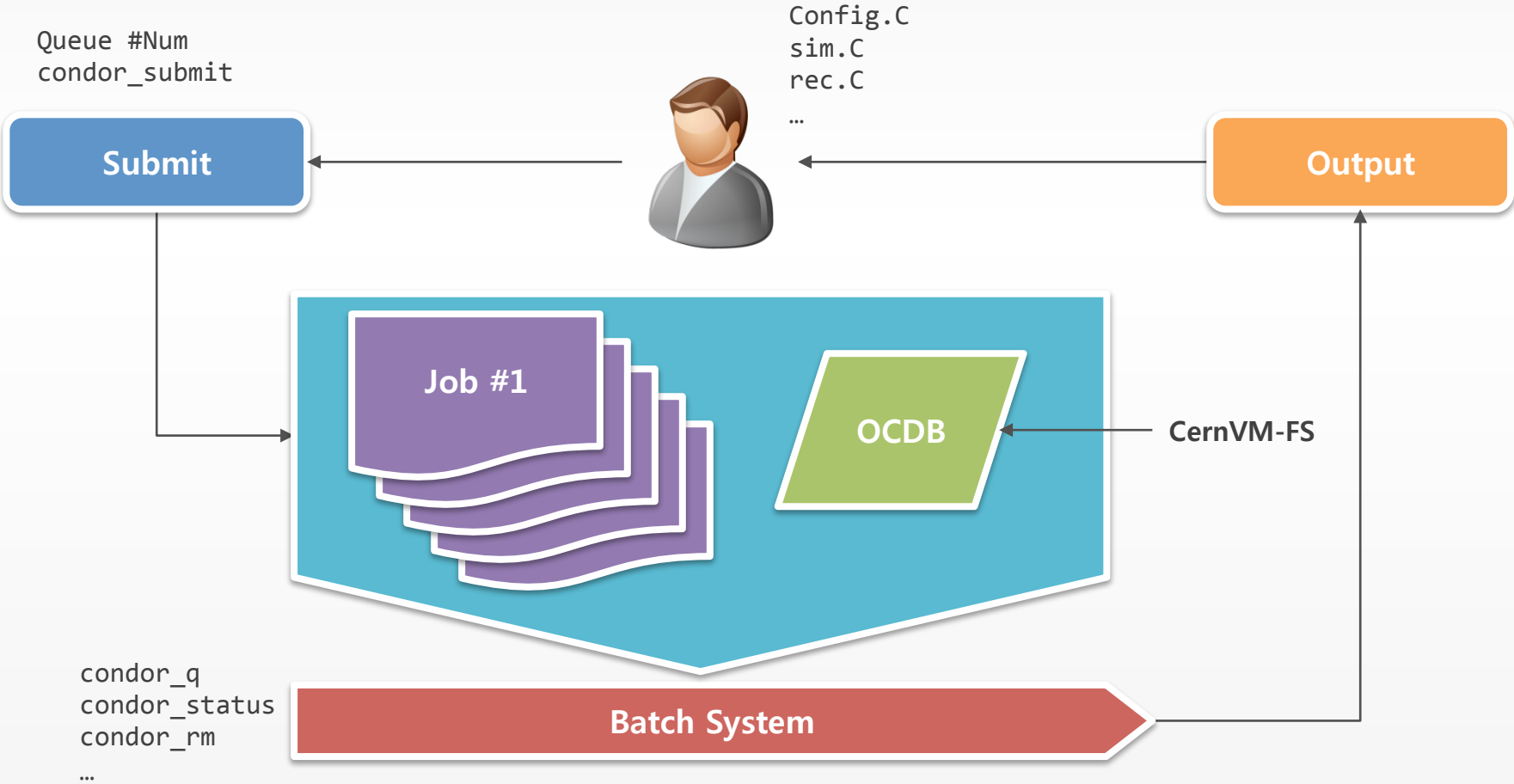
Data

```
#!/bin/bash
condor_slot=40
nfile=2
merge=1 #0=nomerge, 1=merge
work_dir=`date +%Y%m%d%H%M%S`
run_macro="runAnalysis.C"
data_file="sim_LHC13d3_195675_A0D159.txt"
input_files="AddMyTask.C,AliAnalysisTaskMyTask.cxx,AliAnalysisTaskMyTask.h"
out_file="AnalysisResults.root"
USER_MAIL=""
main_dir=`pwd`
source /pool/macro/runScript.sh
```

condor_rm

...

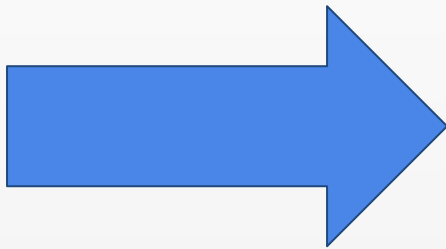
MC Workflow



HTCondor Integrated Pool

Introduction of Integrated System

- **Temporary idle resource generation due to system crowded according to the research schedule in the community**
 - Example) Workshop, Conference, Presentation
- **As the resource demand of the community continues to grow, a method for efficiently utilizing limited resources is required.**



Solution :

Increase resource utilization efficiency by integrating resources between communities

Integration Target Selecting

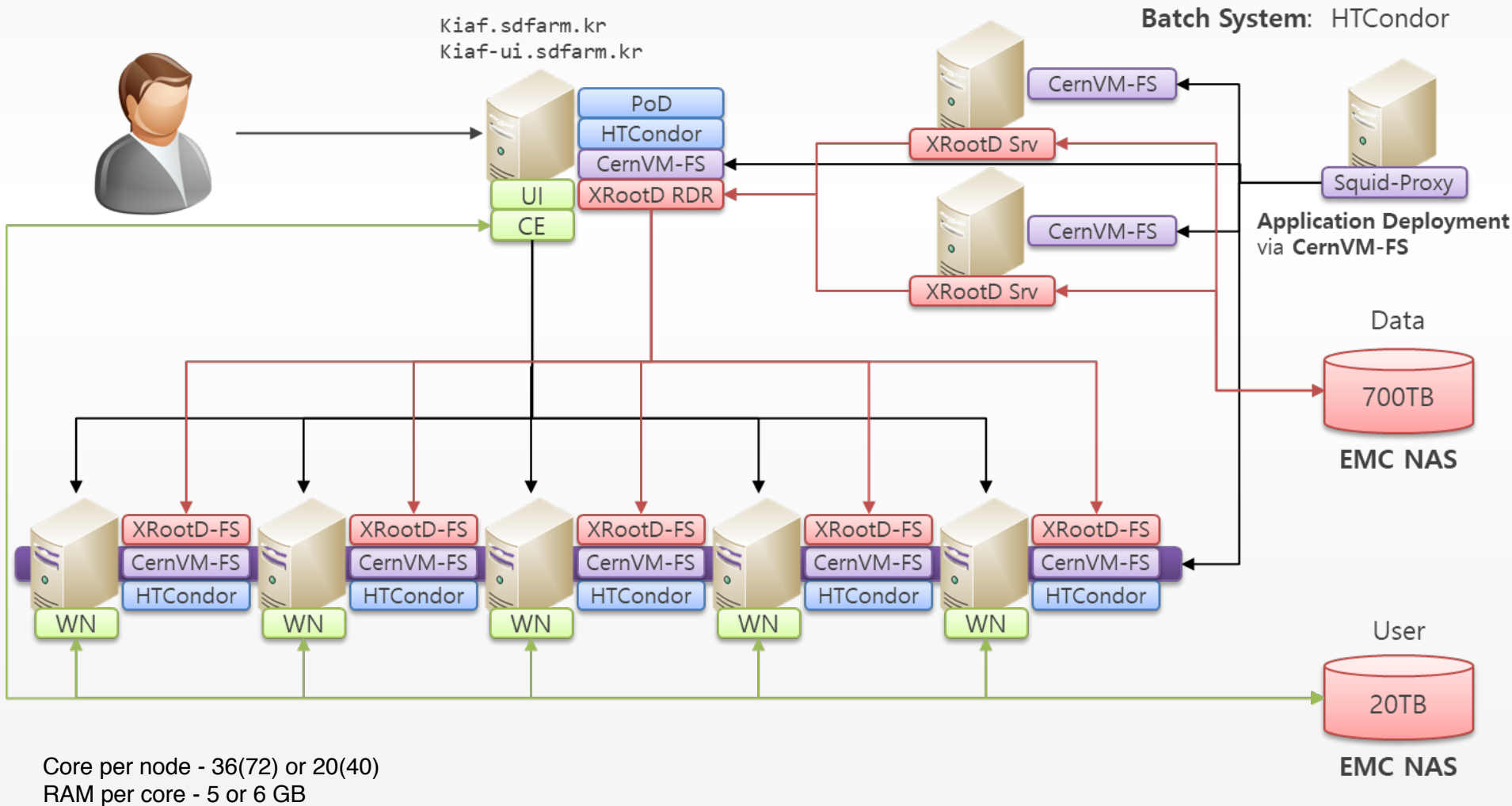
- **Integration Target**

- KIAF(ALICE Tier-3)
 - Batch System - HTCondor
 - Analysis Tool - AliROOT via CVMFS
- CMS Tier-3
 - Batch System - HTCondor
 - Analysis Tool - ROOT via CVMFS

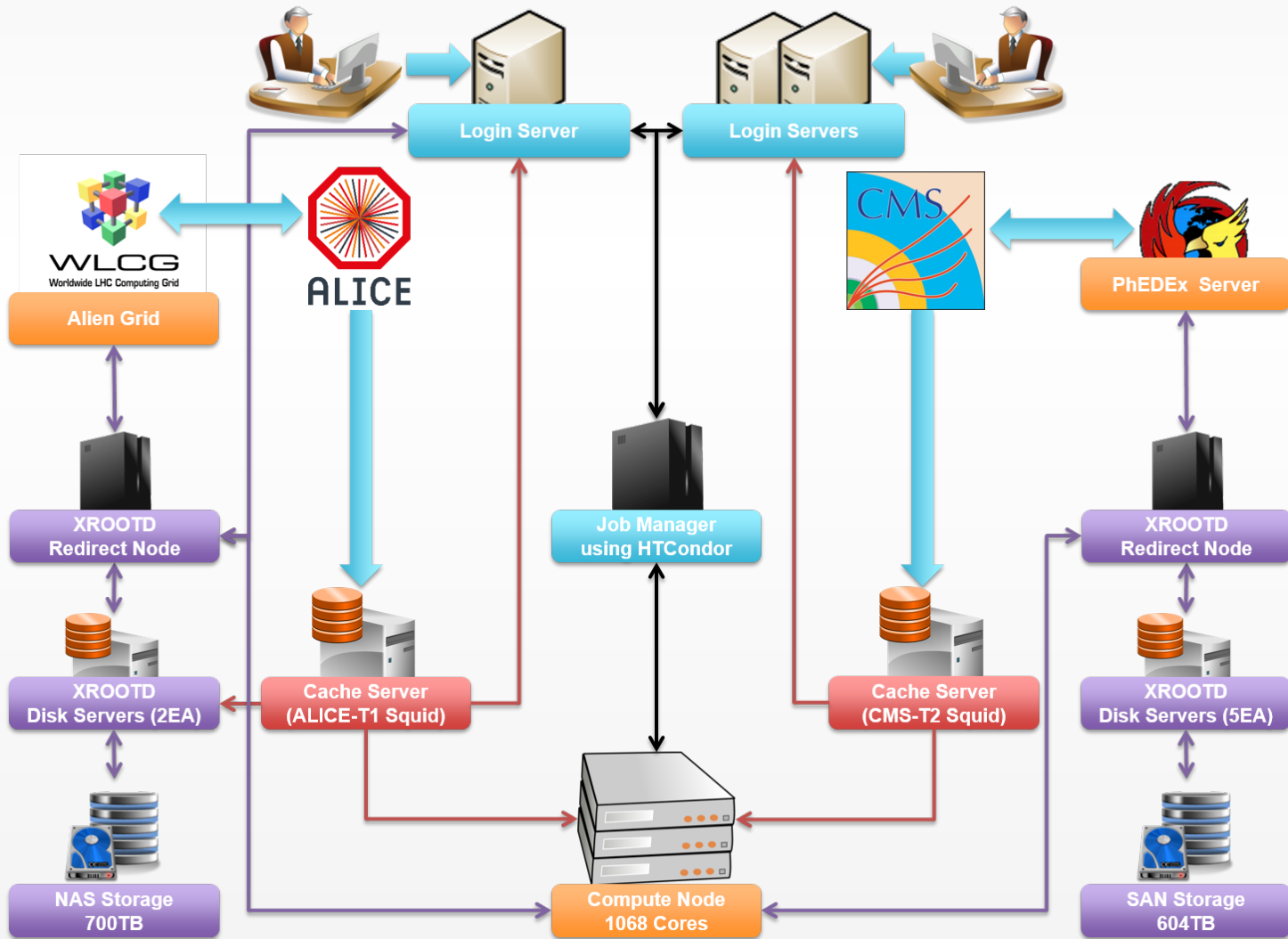
- **Reason for Selection**

- Services using the same batch system HTCondor
- Easy to provide integrated analysis environment due to similar analysis environment such as analysis package and resource requirement per work

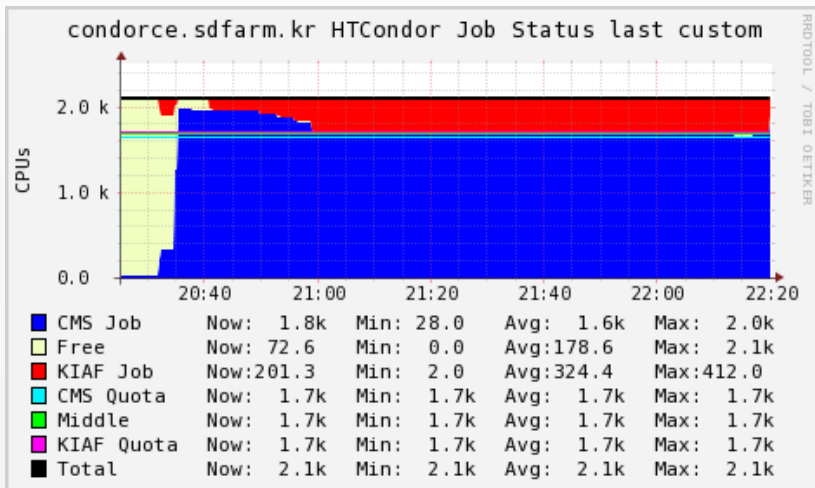
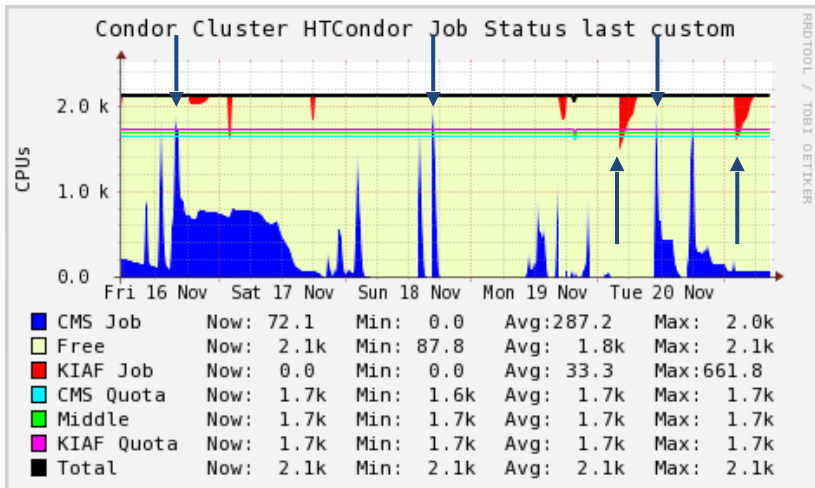
Old System Structure



Integrated Pool Structure



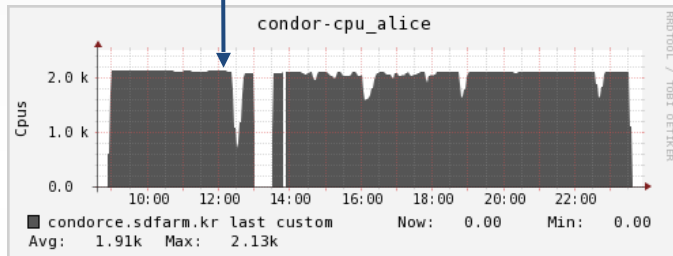
Job Processing Policy



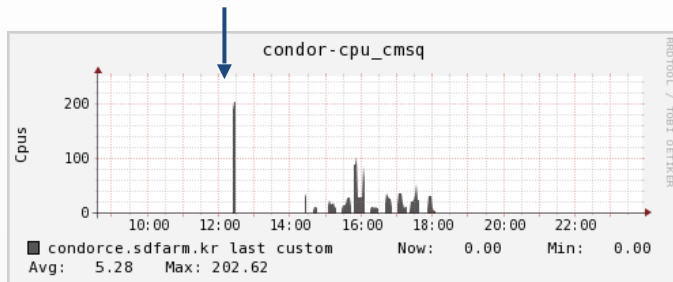
- **Unused resources can be used without restriction of any group**
 - Increase temporary idle resource efficiency
- **Ensuring the use of existing allocated resources among the consolidated resources**
 - Re-assigning by canceling the most recent operation among other use addition activities
- **Assign allocation priority according to slot memory size**
 - Increase dynamic allocation machine efficiency

Job Processing Scenario

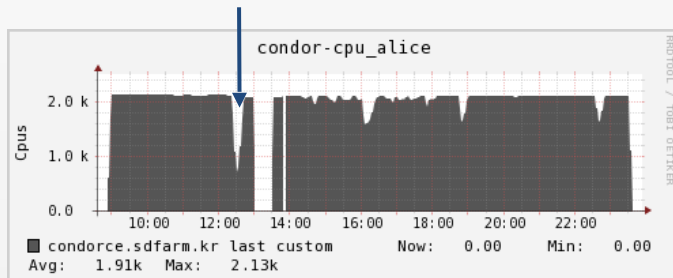
0. Run ALICE job



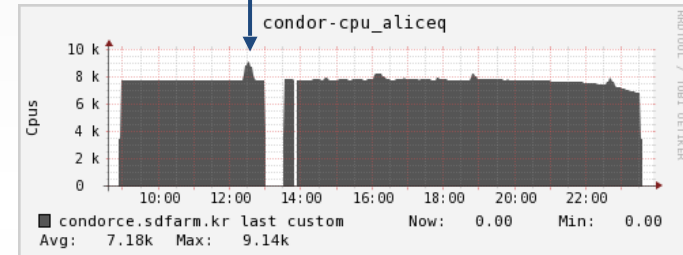
1. Submit a new CMS job



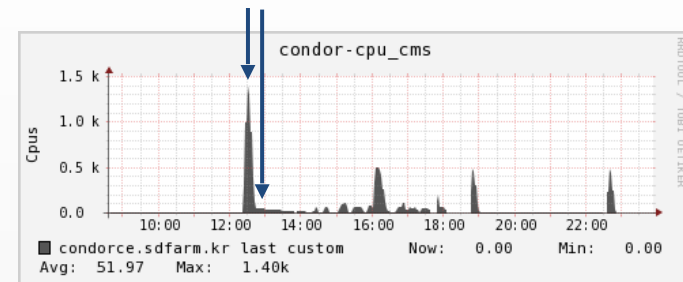
2. Canceling an existing ALICE job



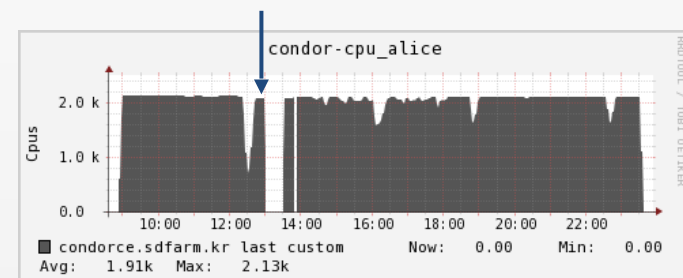
3. Canceled ALICE job are queued



4. Execute and terminate the CMS job



5. Restart the ALICE job

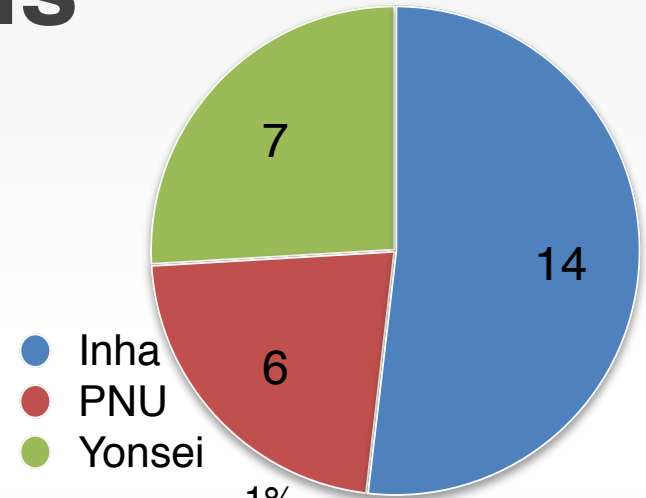


Operation Status

User Status

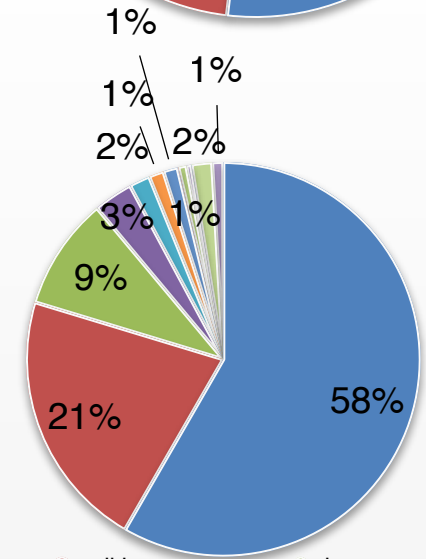
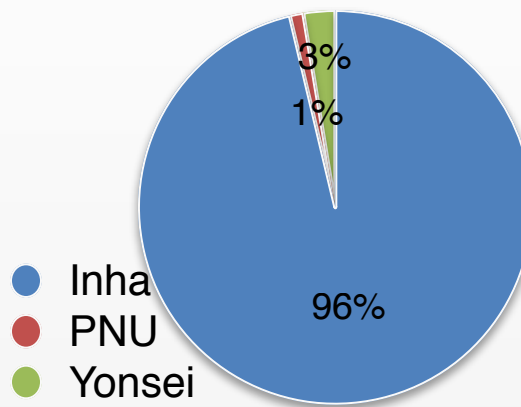
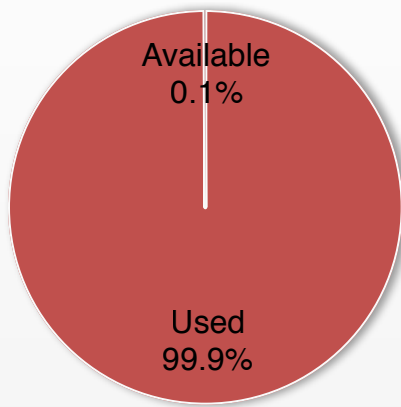
User Accounts

Inha	Pusan	Yonsei	Total
14	6	7	27



User Home Directory

– 20TB / 20TB (100%)



- jonghan
- nirbhay
- kbhuh
- sechae
- phortion
- qiulian_yang
- dan_liu
- mjkim
- jseo
- luxtau
- giko
- sanghyeonlee137
- tallyho
- ghkdalsrl222
- hyesun
- scho
- baek
- blim
- pkl5889
- ikje_noh
- ykwon
- jkwon
- mjkweon
- hjkim
- jisong
- aborriso
- taejun_kim

Job History

2017	July	August	September	October	November	December
Number of Jobs	35,539	17,334	9,459	8,798	3,837	16
Total CPU time (s)	58,346,549	52,556,634	10,891,807	93,016,894	17,109,650	115
Mean Queue time (s)	8	4	4,070	124,551	8	10

2018	January	February	March	April	May	June
Number of Jobs	48,202	9,468	18,788	52,649	23,672	140,416
Total CPU time (s)	50,321,614	7,711,279	27,730,970	110,502,537	125,511,172	29,562,516
Mean Queue time (s)	11,818	6	525	3,632	411	1

2018	July	August	September	October	November	December
Number of Jobs	4,836	5,044	16,346	17,501	75,361	38,554
Total CPU time (s)	4,107,058	1,265,083	293,047,102	4,070,143	166,400,203	163,993,577
Mean Queue time (s)	13	17	9	8	6,853	37,551

User Usage (Total)

	JobCount	Total Wall time (yy:ddd:hh:mm:ss)	Total CPU time (yy:ddd:hh:mm:ss)	Total Queue time (yy:ddd:hh:mm:ss)
Inha	370,226	54y:233d:17h:00m:11s	50y:250d:2h:24m:12s	54y:272d:18h:41m:11s
jkwon	89,425	3y:265d:18h:00m:47s	2y:30d:22h:56m:56s	1y:4d:0h:55m:53s
jonghan	106,047	47y:305d:16h:55m:18s	45y:223d:7h:49m:29s	29y:125d:6h:04m:26s
jseo	104	0y:0d:1h:15m:47s	0y:0d:0h:07m:00s	0y:0d:0h:08m:45s
nirbhay	83,141	0y:137d:13h:08m:45s	0y:115d:22h:58m:53s	0y:7d:3h:07m:53s
scho	91,509	2y:254d:15h:39m:34s	2y:244d:20h:31m:54s	24y:136d:8h:24m:14s
Pusan	80,234	0y:206d:23h:16m:37s	0y:162d:4h:17m:28s	0y:155d:3h:19m:44s
blim	80,234	0y:206d:23h:16m:37s	0y:162d:4h:17m:28s	0y:155d:3h:19m:44s
Yonsei	367	0y:0d:19h:36m:09s	0y:0d:9h:56m:26s	0y:0d:9h:24m:21s
ikje_noh	293	0y:0d:10h:58m:31s	0y:0d:1h:19m:24s	0y:0d:0h:46m:31s
taejun_kim	74	0y:0d:8h:37m:38s	0y:0d:8h:37m:02s	0y:0d:8h:37m:50s
Total	450,827	55y:76d:11h:52m:57s	51y:47d:16h:38m:06s	55y:63d:7h:25m:16s

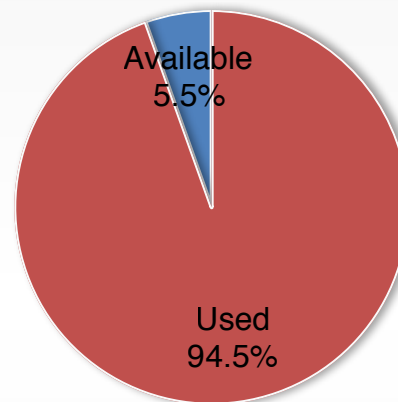
User Usage (Mean)

	JobCount	Mean Wall time (yy:ddd:hh:mm:ss)	Mean CPU time (yy:ddd:hh:mm:ss)	Mean Queue time (hh:mm:ss)
Inha	370,226	0y:0d:1h:17m:34s	0y:0d:1h:11m:57s	1h:17m:43s
jkwon	89,425	0y:0d:0h:21m:55s	0y:0d:0h:12m:15s	0h:05m:57s
jonghan	106,047	0y:0d:3h:57m:06s	0y:0d:3h:46m:04s	2h:25m:26s
jseo	104	0y:0d:0h:00m:44s	0y:0d:0h:00m:04s	0h:00m:05s
nirbhay	83,141	0y:0d:0h:02m:23s	0y:0d:0h:02m:01s	0h:00m:07s
scho	91,509	0y:0d:0h:15m:30s	0y:0d:0h:15m:20s	2h:19m:60s
Pusan	80,234	0y:0d:0h:03m:43s	0y:0d:0h:02m:55s	0h:02m:47s
blim	80,234	0y:0d:0h:03m:43s	0y:0d:0h:02m:55s	0h:02m:47s
Yonsei	367	0y:0d:0h:03m:12s	0y:0d:0h:01m:38s	0h:01m:32s
ikje_noh	293	0y:0d:0h:02m:15s	0y:0d:0h:00m:16s	0h:00m:10s
taejun_kim	74	0y:0d:0h:06m:60s	0y:0d:0h:06m:59s	0h:06m:60s
Total	450,827	0y:0d:1h:04m:22s	0y:0d:0h:59m:37s	1h:04m:19s

Storage Usage (1/2)

- **DataSet Staging**

- 662TB / 700TB (Total 2,248 Runs)
- Staging speed (2 node, 200 stream)
 - Max 800MB/s, Avg.400MB/s



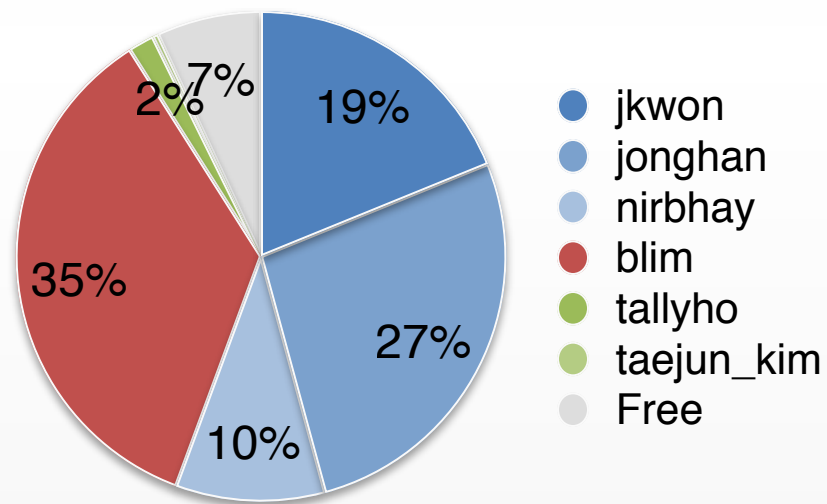
- **Staged Datasets**

Period	Run	Pass	# Datasets
LHC10b	114931-117222	pass4	31
LHC10c	119159-120829	pass4	36
LHC10d	122374-126437	pass4	54
LHC10e	127712-130848	pass4	113
LHC13b	195344-195483	pass4	8
LHC13c	195529-195677	pass4	14
LHC15o	245145-246994	pass1	112
LHC16k	256504-258537	pass1	406
LHC16l	258919-260014	pass1	144

Period	Run	# Datasets
LHC15h1i	193051-193189	4
LHC16i3b	245145-246994	110
LHC17c3b1	256504-258537	207
LHC17c3b2	258919-259888	140
LHC17d20a1_extra	256504-258498	207
LHC17d20a2_extra	258919-259888	70
LHC18d8	258962-259888	58
LHC18e1b	245683-246994	77
LHC18e1b_extra	245683-246994	77
LHC18f1	256941-258537	161
LHC18f4b	256941-259888	219

Storage Usage (2/2)

	TB
Inha	390.08
jkwon	129.03
jonghan	184.39
nirbhay	67.52
Pusan	242.07
blim	242.07
Yonsei	14.31
tallyho	11.70
taejun_kim	2.60
Total	652.62



Stage dataset list

- KIAF command (in shell)

- showdataList

- Google spreadsheet

- Link : https://docs.google.com/spreadsheets/d/1KrZ_YkPmGHoA4f2UQcjHSAcVSmTHcJMJJz9kIUkyZZo/edit?usp=sharing

[1KrZ_YkPmGHoA4f2UQcjHSAcVSmTHcJMJJz9kIUkyZZo/edit?usp=sharing](https://docs.google.com/spreadsheets/d/1KrZ_YkPmGHoA4f2UQcjHSAcVSmTHcJMJJz9kIUkyZZo/edit?usp=sharing)

```

[kong9@kiaf-test-01 macro3] showdataList
dataset Queue Down Success Fail TotalSize StagedSize
data/2011/LHC11a/000146686/ESDs/pass4_without_SDD 0 0 356 1 100.7GB 100.3GB 99%
data/2011/LHC11a/000146688/ESDs/pass4_without_SDD 0 0 459 3 130.0GB 129.2GB 99%
data/2011/LHC11a/000146689/ESDs/pass4_without_SDD 0 0 1136 0 312.2GB 312.2GB 100%
data/2011/LHC11a/000146746/ESDs/pass4_without_SDD 0 0 399 0 107.8GB 107.8GB 100%
data/2011/LHC11a/000146747/ESDs/pass4_without_SDD 0 0 1353 3 374.9GB 373.9GB 99%
data/2011/LHC11a/000146748/ESDs/pass4_without_SDD 0 0 554 0 151.3GB 151.3GB 100%
data/2011/LHC11a/000146801/ESDs/pass4_without_SDD 0 0 756 0 204.5GB 204.5GB 100%
data/2011/LHC11a/000146802/ESDs/pass4_without_SDD 0 0 1426 7 403.6GB 401.6GB 99%
data/2011/LHC11a/000146803/ESDs/pass4_without_SDD 0 0 157 1 37.0GB 36.8GB 99%
data/2011/LHC11a/000146804/ESDs/pass4_without_SDD 0 0 3265 13 923.2GB 919.4GB 99%
data/2011/LHC11a/000146805/ESDs/pass4_without_SDD 0 0 6997 32 1.9TB 1.8TB 99%
data/2011/LHC11a/000146806/ESDs/pass4_without_SDD 0 0 1193 3 331.3GB 330.5GB 99%
data/2011/LHC11a/000146807/ESDs/pass4_without_SDD 0 0 156 0 34.7GB 34.7GB 100%
data/2011/LHC11a/000146808/ESDs/pass4_without_SDD 0 0 875 0 219.5GB 219.5GB 100%
data/2011/LHC11a/000146812/ESDs/pass4_without_SDD 0 0 284 0 66.4GB 66.4GB 100%
data/2011/LHC11a/000146813/ESDs/pass4_without_SDD 0 0 958 2 246.0GB 245.4GB 99%
data/2011/LHC11a/000146814/ESDs/pass4_without_SDD 0 0 756 0 190.3GB 190.3GB 100%
data/2011/LHC11a/000146817/ESDs/pass4_without_SDD 0 0 672 4 181.9GB 180.7GB 99%
data/2011/LHC11a/000146824/ESDs/pass4_without_SDD 0 0 3453 8 9.9TB 9.9TB 99%
data/2011/LHC11a/000146855/ESDs/pass4_without_SDD 0 0 1189 1 312.3GB 312.0GB 99%
data/2011/LHC11a/000146857/ESDs/pass4_without_SDD 0 0 756 0 355.4GB 354.4GB 99%
data/2011/LHC11a/000146858/ESDs/pass4_without_SDD 0 0 2783 4 783.3GB 782.2GB 99%
data/2011/LHC11a/000146859/ESDs/pass4_without_SDD 0 0 1826 1 503.2GB 502.9GB 99%
data/2011/LHC11a/000146869/ESDs/pass4_without_SDD 0 0 672 1 173.6GB 172.8GB 99%
data/2013/LHC13b/000195344/ESDs/pass3 0 0 661 0 43.4GB 43.4GB 100%
data/2013/LHC13b/000195344/ESDs/pass3/A00154 0 0 72 0 9.3GB 9.3GB 100%
data/2013/LHC13b/000195351/ESDs/pass3 0 0 672 0 161.8GB 161.8GB 100%
data/2013/LHC13b/000195351/ESDs/pass3/A00154 0 0 73 0 37.6GB 37.6GB 100%
data/2013/LHC13b/000195389/ESDs/pass3 0 0 699 0 242.5GB 242.5GB 100%
data/2013/LHC13b/000195389/ESDs/pass3/A00154 0 0 76 0 49.8GB 49.8GB 100%
data/2013/LHC13b/000195391/ESDs/pass3 0 0 322 0 442.4GB 442.4GB 100%
data/2013/LHC13b/000195391/ESDs/pass3/A00154 0 0 117 0 71.7GB 71.7GB 100%
data/2013/LHC13b/000195478/ESDs/pass3 0 0 655 0 67.2GB 67.2GB 100%
data/2013/LHC13b/000195478/ESDs/pass3/A00154 0 0 59 0 15.2GB 15.2GB 100%
data/2013/LHC13b/000195479/ESDs/pass3 0 0 5921 0 2.3TB 2.3TB 100%
data/2013/LHC13b/000195479/ESDs/pass3/A00154 0 0 571 0 487.9GB 487.9GB 100%
data/2013/LHC13b/000195480/ESDs/pass3 0 0 1267 10 404.7GB 405.7GB 99%
data/2013/LHC13b/000195480/ESDs/pass3/A00154 0 0 154 0 92.2GB 92.2GB 100%
data/2013/LHC13b/000195481/ESDs/pass3 0 0 543 0 59.5GB 59.5GB 100%
data/2013/LHC13b/000195481/ESDs/pass3/A00154 0 0 57 0 13.4GB 13.4GB 100%
data/2013/LHC13b/000195482/ESDs/pass3 0 0 1997 0 727.6GB 727.6GB 100%
data/2013/LHC13b/000195482/ESDs/pass3/A00154 0 0 167 0 158.0GB 158.0GB 100%
data/2013/LHC13b/000195483/ESDs/pass3 0 0 10041 0 4.2TB 4.2TB 100%
data/2013/LHC13b/000195483/ESDs/pass3/A00154 0 0 938 0 0.9TB 0.9TB 100%
data/2013/LHC13c/000195529/ESDs/pass2 0 0 532 0 112.6GB 112.6GB 100%
data/2013/LHC13c/000195529/ESDs/pass2/A00154 0 0 56 0 26.2GB 26.2GB 100%
data/2013/LHC13c/000195531/ESDs/pass2 0 0 11422 0 5.9TB 5.9TB 100%
data/2013/LHC13c/000195531/ESDs/pass2/A00154 0 0 2049 2 2.1TB 2.1TB 100%
data/2013/LHC13c/000195566/ESDs/pass2 0 0 3596 0 1.4TB 1.4TB 100%
data/2013/LHC13c/000195566/ESDs/pass2/A00154 0 0 351 0 327.5GB 327.5GB 100%
data/2013/LHC13c/000195567/ESDs/pass2 0 0 3098 12 1.4TB 1.4TB 99%
    
```

KIAF DataSet List ☆

파일 수정 보기 삽입 서식 데이터 도구 부가기능 도움말 모든 변경사항이 드라이브에 저장됨

fx =row()-1

	A	B	C	D	E	L	M	N	O	P
	No	Dataset	Size	requester	using	jisong	jkwon	jonghan	kbhuh	luxtau
1										
2	1	data/2011/LHC11a/000146686/ESDs/pass4_without_SDD	100.7GB	jisong	NO					
3	2	data/2011/LHC11a/000146688/ESDs/pass4_without_SDD	130.0GB	jisong	NO					
4	3	data/2011/LHC11a/000146689/ESDs/pass4_without_SDD	312.2GB	jisong	NO					
5	4	data/2011/LHC11a/000146746/ESDs/pass4_without_SDD	107.8GB	jisong	NO					
6	5	data/2011/LHC11a/000146747/ESDs/pass4_without_SDD	374.8GB	jisong	NO					
7	6	data/2011/LHC11a/000146748/ESDs/pass4_without_SDD	151.3GB	jisong	NO					
8	7	data/2011/LHC11a/000146801/ESDs/pass4_without_SDD	204.5GB	jisong	NO					
9	8	data/2011/LHC11a/000146802/ESDs/pass4_without_SDD	403.6GB	jisong	NO					
10	9	data/2011/LHC11a/000146803/ESDs/pass4_without_SDD	37.0GB	jisong	NO					
11	10	data/2011/LHC11a/000146804/ESDs/pass4_without_SDD	923.2GB	jisong	NO					
12	11	data/2011/LHC11a/000146805/ESDs/pass4_without_SDD	1.8TB	jisong	NO					
13	12	data/2011/LHC11a/000146806/ESDs/pass4_without_SDD	331.3GB	jisong	NO					
14	13	data/2011/LHC11a/000146807/ESDs/pass4_without_SDD	34.7GB	jisong	NO					
15	14	data/2011/LHC11a/000146808/ESDs/pass4_without_SDD	219.5GB	jisong	NO					
16	15	data/2011/LHC11a/000146812/ESDs/pass4_without_SDD	66.4GB	jisong	NO					
17	16	data/2011/LHC11a/000146813/ESDs/pass4_without_SDD	246.0GB	jisong	NO					
18	17	data/2011/LHC11a/000146814/ESDs/pass4_without_SDD	190.3GB	jisong	NO					
19	18	data/2011/LHC11a/000146817/ESDs/pass4_without_SDD	181.9GB	jisong	NO					
20	19	data/2011/LHC11a/000146824/ESDs/pass4_without_SDD	0.9TB	jisong	NO					
21	20	data/2011/LHC11a/000146856/ESDs/pass4_without_SDD	312.3GB	jisong	NO					

Farm Management

- **Fortnightly KIAF User Meeting @ Vidyo**
 - Next Meeting January 16th 17:00(KST)
 - Link : <http://vidyo.kreonet.net/flex.html?roomdirect.html&key=8ZwjVJeEI1y9>
 - Agenda
 - KIAF Operation
 - User Feedback
 - Use policy
- **KIAF User Guide**
- **Contact**
 - kiaf-user-support@kisti.re.kr
 - dataset-request@kisti.re.kr

Summary

- **HTCondor Pool of KIAF system was integrated at 2018 November**
 - WorkerNode are shared between ALICE and CMS
 - The maximum available slots are 2136 slots
 - Expansion of disk nodes for data I/O is required

- **KISTI is at your disposal for supporting any kind of issues related Computing**
 - KIAF system and Technical support
 - Training program

THANK YOU
