.KIST ยลสุขทดสมชาต

KISTI Site Report



Ahn Sang-Un for KISTI-GSDC @ ATCF6

KISTI

Korea Institute of Science and Technology Information

- Government-funded research institute founded in 1962 for National Information Services and Supercomputing
- National Supercomputing Center
 - Nurion Cray CS500 system
 - 25.7 PFlops at peak, ranked 11th of Top500 (2018) => 21 st (Nov 2020)
 - **Neuron** GPU system, 1.24 PFlops
 - **KREONet/KREONet2** National R&E network





GSDC Global Science experimental Data hub Center

- Government-funded project, started in 2009 • to promote Korean fundamental research through providing computing power and data storage
- Datacenter for data-intensive fundamental research
 - 16 staff: system administration, experiment support, external-relation, management and planning











LGO









REN



International **Cancer Genome** Consortium











Experiments Support





KISTI ALICE Tier-1 Structure Overview





Nov. 2021

 0
 0
0
0
 0
 0
0
0
 0
 0
 0
0
 0
0
0
0
 0
0
0
0
0
0
0

Essential Grid Services

- Grid services running on VMs provided by oVirt cluster
 - oVirt v4.3.8, GlusterFS v6.10
 - 3 oVirt hosts with 384 GB of RAM and 2.3TB of Gluster Storage (1.5 TB of HDDs, 0.8 TB of SSDs)
 - Live migration & load-balancing
- 15 VMs
 - VO-Box (ALICE Job Submission, JAliEn enabled)
 - 3 HTCondor-CEs (CE 5.1.5, Condor 9.0.14)
 - Site-BDII & Argus (AuthN & AuthZ)
 - EOS MGM nodes & XRootD redirectors
 - EOS QDB clusters (deployed upon SSD disk groups)
 - 3 Squid caches for CernVM-FS
 - APEL (Accounting)



=	OVIEL OPEN VIRI	IUALIZAT	IION MAN	AGEK											↓
6 26	Dashboard	Comp	oute » Hos	sts											
		Host	t:				x ☆ ∨ Q			New	Edit Ren	nove Manag	ement v lı	nstallation ~	Host Console
	Compute >	C	~												1 - 3 <
				Name	Comment	Hostname/IP	Cluster	Data Center	Status	Virtual Machine	Memory	CPU	Network	SPM	
a	Network >		🗑 w	alice-ovirt-01.sdfarm.kr		alice-ovirt-01.sdfarm.kr	Default	Default	Up	4	63%	3%	0%	Normal	
			🛜 w	alice-ovirt-02.sdfarm.kr		alice-ovirt-02.sdfarm.kr	Default	Default	Up	6	61%	2%	0%	SPM	
	Storage >		🛜 🛩	alice-ovirt-03.sdfarm.kr		alice-ovirt-03.sdfarm.kr	Default	Default	Up	5	78%	4%	0%	Normal	

=	oVirt	OPEN VIRTU	ALIZA	TION MANAGER						R							≡º ♦	⁰ ଡ~ ₽
æ	Dashboard		Stora	age » Volumes			* & × 0				N	Pemov	Start	Ston	Profiling	Snanshot	Georen	lication v
	Compute	>	C	~			· · · · ·					Kentov	Start	Stop	Froming V	Shapshot	deorrep	1-3 <
				Name	Cluster	Volume Type	Bricks	Info	Space Used	Activities	No of snapshots							
Æ	Network	>		data	Default	Replicate	▲ 3 ▼ 0		59%		0							
				engine	Default	Replicate	4 3 7 0		12%		0							
	Storage	>		ssd1	Default	Replicate	▲ 3 ▼ 0		52%		0							

Custodial Disk Storage (Tapeless Archiving)

- The first disk-based custodial storage replaced tape for ALICE experiment
- 12 PB of usable space with 12+4 erasure coding for data protection (powered by EOS)
- Fully automated deployment of EOS components using Linux containers



System Architecture

Details will be presented in EOS session (Day 3)

	sys.forced.layout="qrai sys.forced.nstripes="16	0" "							FI	LE								DI DI	<mark>sk</mark> d sk p
2	f	st-000	<mark>)1</mark>				******		16 st	ripes	······································	· · · · · · · · · · · · · · · · · · ·	****					DI	SK S
		FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST	FST
	scheduling group	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK
Uplink	derault.o	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK
		DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK
		DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK
	scheduling group default.83	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK	DISK

QRAIN(12+4) Layout

- Thanks to spare FSTs,
- Data are still accessible if 6 FSTs are offline
- Data can be written if 2 FSTs are offline
- One node (= 2 FSTs) can be turned off for maintenance at any time
- Data loss rate in a year is \approx 8.6 \times 10⁻⁵%, where 5 disks are failed simultaneously, considering 1.17% of AFR in practice
- cf. vendor published AFR is 0.35% (AFR = Annualized Failure Rate)

Data Parity spare



7

ALICE Tier-1 Operations Summary 2022

2.65% Contribution to Total(T0+T1+T2+AF) ALICE Computing





Job Efficiency





SE Usage





LHCOPN 20G Upgrade (2021)



- Data transfer tests along with the OPN upgrade to 20Gbps in April
- Reached almost 20Gbps peak (> 1GB/s) during the tests

WLCG Tape Tests Challenge - 11 ~ 15 October 2021



- Joined efforts of WLCG collaboration for LHC RUN3 data taking
- Successful results to meet the target transfer performance (150MB/s)
- Stable and smooth operations of CDS during the challenges

Avg 3.714 GB/s 562.7 MB/s 1001 MB/s 743.9 MB/s 169.9 MB/s 458.9 MB/s 193 MB/s 561.2 MB/s 112.6 MB/s

KISTI Tier-1 Pledges for 2023-2024 10% Contribution to ALICE Tier-1 Computing Requirements

KISTI Tier-1 Pledges (Planned) for ALICE experiment



Installed (Planned)	2020	2021	2022	2023
CPU (cores)	3,880	3,880	3,880	8,680
DISK (TB)	4,000	4,500	4,500	6,500
TAPE (TB)	5,500	12,000	12,000	12,000

AHN SANG-UN @ ALICE T1/T2 WORKSHOP, 26-28 SEPTEMBER 2022



Pledges for 2023 = 60.0kHS06 / 6,500 / 12,000

(Original plan = 57.2 kHS06 / 6,300 / 12,000)* Additional pledges to contribute the mitigation of Ukraine war

(CPU) New 30 workers (4,800 threads) to be deployed (Exact HS06 scores will be measured at late 2022) ; in addition to current installed CPUs (3,880 threads, which will be phased-out as their warranty ended, fully

- replaced by 2025)
- (Disk) 2.5 ~ 3.5 PB of Disks will be added in late 2022 or early 2023

2024 8,680 7,100 12,000

9

6

3

0

Capacity (PB)

(**Tape**) Plan to expand the CDS in 2025 (tentatively) (or a small amount (1.5 ~ 2 PB) of expansion possibly foreseen in 2023 depending on remaining budget)











KISTI CMS Tier-2

《 * \$ T * 한국과학기술정보연구원

- WLCG Tier-2 site for CMS experiment
- KISTI CMS Tier-2 focuses on providing resources for CMS experiment rather than supporting domestic users
 - Due to the presence of separate CMS Tier-3 site (T3_KR_KISTI)
- CMS Tier-2 History •
 - 2017 Mar. : Register as an EGI site (KR-KISTI-GSDC-02)
 - 2017 Aug. : Register as a CMS Site (T2_KR_KISTI)
 - 2017 Sep. : Enable CMS PhEDEx Link (Joining CMS Data Transfer system)
 - 2017 Nov. : Starting CMS T2 Testbed after passing the SAM test stably
 - 2018 Apr. : KISTI-CERN MOU Signing Ceremony for CMS Tier2

About KISTI CMS Tier-2





T3_KR_KISTI





Main Component – CE : HTCondor-CE 5

- LRMS : HTCondor 9
 - 1,424 logical cores
 - RAM 3,000MB per core
- SE : dCache
 - 1 SAN Pool + 9 NFS Pools / 1600TB
 - Protocol
 - XRootD, GridFTP(+SRM), pNFS, WebDAV
- Etc.

한국과학기술정보연구원

- Report: Site-BDII, APEL
- Cache : Frontier-Squid
- CMS AAA
 - 1x Standalone XRootD Server (Forward 1095 ->1094)

Korea, Republic of	KR-KISTI-GSDC-02			KR-KISTI-GSDC-02
		129,000.00	3,913,000	Total

국가와 국민을 위한 데이터 생태계 중심기관 KISTI

T2_KR_KISTI Structure



XRootD

Pool Request	Queues																Gr	idf	tp	We	əbD	DaV	4	⊦pN	FS
CallNama	DomainNama		Mover	s		Restor	es		Store	s	Р	2 P-Ser	ver	Р	2P-Cli	ient	q	ueue_	ftp	qu	eue_we	bdav		regular	
	Domanne	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued
	Total	159	11340	0	0		0	0		0	0	110	0	0			4	220	0	4	1020	0	151	10100	0
SAMPool	dCacheDomain	0	140	0	0		0	0		0	0	10	0	0			0	20	0	0	20	0	0	100	0
cms-t2-wn1055-NFSPool	cms-t2-wn1055-NFSPool-Domain	16	1120	0	0		0	0		0	0	10	0	0			3	20	0	0	100	0	13	1000	0
cms-t2-wn1055-SANPool	cms-t2-wn1055-SANPool-Domain	13	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	13	1000	0
cms-t2-wn1056-NFSPool	cms-t2-wn1056-NFSPool-Domain	19	1120	0	0		0	0		0	0	10	0	0			0	20	0	2	100	0	17	1000	0
cms-t2-wn1057-NFSPool	cms-t2-wn1057-NFSPool-Domain	12	1120	0	0		0	0		0	0	10	0	0			0	20	0	1	100	0	11	1000	0
cms-t2-wn1058-NFSPool	cms-t2-wn1058-NFSPool-Domain	18	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	18	1000	0
cms-t2-wn1059-NFSPool	cms-t2-wn1059-NFSPool-Domain	9	1120	0	0		0	0		0	0	10	0	0			1	20	0	1	100	0	7	1000	0
cms-t2-wn1060-NFSPool	cms-t2-wn1060-NFSPool-Domain	10	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	10	1000	0
cms-t2-wn1061-NFSPool	cms-t2-wn1061-NFSPool-Domain	21	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	21	1000	0
cms-t2-wn1062-NFSPool	cms-t2-wn1062-NFSPool-Domain	30	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	30	1000	0
cms-t2-wn1063-NFSPool	cms-t2-wn1063-NFSPool-Domain	11	1120	0	0		0	0		0	0	10	0	0			0	20	0	0	100	0	11	1000	0
	Total	159	11340	0	0		0	0		0	0	110	0	0			4	220	0	4	1020	0	151	10100	0
CallNama	DomainNamo	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued	Active	Max	Queued



KISTI CMS Tier-2 Site Report





Job Activities

~1.36 million jobs during this year





ODisk 1,600 TB (Usage 85.71%)



	Reliability		Availability	
	Overall in 2022		Overall in 2022	
CMS	97.68%		97.65%	
	(1) Monthly target of WL	CG : 95	%	
	CMS Tier-2 Availab	oility/Relia	bility	
Site	Availability		Reliability ↓	
T2_FR_GRIF_IRFU		94.20%		99.11%
2_RU_JINR		98.74%		98.74%
T2_DE_DESY		98.69%		98.69%
Γ2_HU_Budapest		98.39%		98.56%
T2_IT_Legnaro		98.08%		98.53%
T2_DE_RWTH		97.89%		98.41%
T2_UK_London_IC		98.40%		98.40%
T2_FI_HIP		98.33%		98.38%
T2_US_Wisconsin		98.14%		98.14%
T2_KR_KISTI		97.65%		97.68%
T2_US_Caltech		97.42%		97.67%
T2_CH_CERN		97.59%		97.59%
T2_PT_NCG_Lisbon		96.86%		97.42%
T2_FR_GRIF_LLR		97.40%		97.42%
T2 UK London Brunel		97.20%		97 23%

KiSTi 한국과학기술정보연구원



- Currently, the GSDC-LDG system operates as an global and domestic users.

 GSDC-LDG (LIGO Data Grid), a gravitational wave data analysis computing environment at the request of the Korea Gravitational Wave Research Foundation (KGWG) in 2010.

 In 2019, the International Gravitational-Wave Observatory Network (IGWN) computing environment was established.

integrated system that can be used simultaneously by









History







Dr. Bae, Sangwook



Status of GSDC-LDG







Computation Resource

	Physical Core	Memory
Work Node	996 (66 servers)	72GB X 27 96 GB X 33 384 GB X 6
UI,CE,LGM,LDAS,LDR	60 (5 servers)	24GB X 5
Total	1056	7416



Work Node (GPU)	3 Servers	6 GPU Cards (P40)

Storage Resources

	Mount on	Size	Used	Avail	Use	Total
LIGO	/data/ligo/	400T	337T	64T	85%	pool0.gsn.sdfarm.kr:/ifs/service/ligo
KAGRA	/data/kagra/	150T	102T	49T	53%	pool0.gsn.sdfarm.kr:/ifs/service/kagra

Dr. Bae, Sangwook





LDG central monitoring system ullet

Ganglia installed on all GSDC-LDG resource ullet

LIGO Data Grid Report at Tue, 01 Jun 2021 02:08:09 -0500 Last hour 2hr 4hr day week month year job or from to Go Clear Sorted ascending by name by hosts up by hosts down LIGO Data Grid >Choose a Source ▼ LIGO Data Grid (6 sources) (res view) CPUs Total: 53690 Hosts up: 4469 Hosts down: 43	
Last hour 2hr 4hr day week month year job or from to Go Clear Sorted ascending descending by name by hosts up by hosts down LIGO Data Grid > (Choose a Source V LIGO Data	
LIGO Data Grid (6 sources) (the view) CPUs Total: 53690 Hosts up: 4469 Hosts down: 43	
Hosts up: 4469 Hosts down: 43	
	LIGO Data Grid Load last hour
Current Laad Avg (15, 5, 1m): \$3%, 54%, 54% Avg Uilization (last hour):	
54% Localine 2021-06-01 02:08	20 k 10 k
	0 01.20 01.40 02.00 □ 1-sin New: 29.0k Nin: 29.1k Avg: 29.0k Nin: 29.1k Avg: 29.0k Nin: 29.1k Avg: 29.0k Nin: 29.0k Nin
	Excels New 2.5 No. 1.1. 3.05 Arg. 3.01 Fish. 3.1 Excels New 2.5 Th Num 2.5 B Excels New 2.5 Nam 6.2 Th CPUs New 2.5 No. 1.5 N
	LIGO Data Grid CPU last hour
	BO LLOO DATA GITIA NETWORK LAST HOUP
	■ def mor da 14 min 2.5 min 2.5 min 2.6 min 2.7 min 1.6 min 2.7 min 1.6 min 2.7 min 1.6 min 2.6 min 2
KISTI Grid (tree weet)	■ Sintr Non-orant Non-orant Non-orant Non-orant □ Late Non-07-06 Non-66-36 Aug-07-06 Non-68-06
CPUs Total: 2172 Hosts up: 67 Hosts down: 0	KISTI Grid Load last hour KISTI Grid Network last hour
Current Load Avg (15, 5, 1m): 22%, 23%, 23%	y 20 K
Avg Ulization (last hour): 21% Localitme:	
2021-06-01 02:07	0.0 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.20 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01
LIGO Hanford Grid (tree vee)	■ CHUS Nov: 2.2K Mgn: 2.2K Agg: 2.2K Mgn: 2.1 ■ Procs Nov:312.8 Mgn:141.4 Agg:285.9 Mgn:477. ■ Out Nov: 2.2M Mgn: 1.5M Arg: 2.0M Mgn: 2.5M
CPUs Total: 6525 Hoss up: 586 Hosts dwn: 0	LIGO Henford Grid Load last hour
Current Load Avg (15, 5, 1m): 21%, 21%, 21%	
Avg Ulization (last hour): 21% Localitme:	g sok g zok 10k 10k
2021-04-01 02:06	0.0 0120 0140 0200 0 0 0120 0140 0 0 0120 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
LIGO Livingston Grid (tree view)	Proce New: 1.3k Min: 1.2k Avg: 1.4k Max: 1
Hosts up: 1154 Hosts down: 39	LIGO Livingston Grid Load last hour
Current Load Avg (15, 5, 1m): 23%, 23%, 22% Avg Utilization (lash hour):	sock
23% Localima: 2021-06-01 02:07	
	0.1 20 0.40 0.200 0.0 0.0 0.0 0.4 0.200 0.0 0.4 0.2 0 0.4 0.2 0 0.4 0.2 0 0.4 0.2 0 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0.4 0
LIGO-Caltech Grid (me vivo) CPUs Total: 29020	LIGO-Caltech Grid Load last hour
Hosts up: 2316 Hosts down: 1	30 kt
Gette, Gette, Gette, Gette, Market, Gette, G	
Localime: 2021-06-01 02:08	
	□ 1-sin New: 19.9 kk Hin: 19.3 k Arg: 19.8 k Hin: 20 □ CPUs New: 18.6 k Hin: 17.5 k Arg: 18.5 k Hin: 19.5 h Hin: 19.5 h Hin: 19.5 k Hin:
NEMO Grid (tree view) CPUs Total: 48 Hosts up: 97	NEMO Grid Load last hour NEMO Grid Network last hour
Hosts down: 0 Current Load Avg (15, 5, fm):	
1855%, 1891%, 1991% Any Ultization (last hour): 1854%	100 monore the second of the s
Locauma: 2021-06-01 02:07	0.0 01.20 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 02.00 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01.40 01
	CPUS Nov: 0.24 High: 450 Min: 450 Min: 450 Min: 450 Min: 450 Min: 5.24 High: 6.04 Arg: 12.04 High: 53.14 Drocs Nov: 703.4 High: 450 Min: 450 Min: 450 Min: 450 Min: 5.04 High: 5.71 High: 5.
http://watchtower.phys.u	uwm.edu/dandlia/?
Current Load Avg (15, 5, 1m): 54%, 56%, 55%	
r=hour&cs=&ce=&m=lo	ad one&s=bv+name&c=8
	0.0 01.20 01.40 02.00 01.20 01.44 02.00 01.20 01.44 02.00 01.20 01.44 02.00 01.20 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01.45 01
m&vn=&hide-ht=talse	Precs New: 4.3k Min: 4.3k Arg: 4.3k Max: 4. Precs New: 29.0M Man: 15.1M Arg: 25.3M Max: 34.0M Snapshot of the LIGO Data Grid Legend
KISTI LI	GO Hanford LIGO Livingston LIGO-Caltech NEMO



Summary

- ٠ necessary computing power, storage and services
 - Tightly coupled with KISTI Supercomputer infrastructure and KREONet's global reachability
 - •
 - Expanding its contribution to global and domestic research communities

KISTI-GSDC is a dedicated datacenter to promote fundamental research in South Korea by providing

Currently supporting ALICE Tier-1, CMS Tier-2, LDG Tier-2 and related domestic communities

Detailed configuration and setup of HTCondor system will be presented in **HTCondor session in Day 3**

21