



# Alice tier 1 testbed in KISTI-NSDC

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NSDC / KISTI

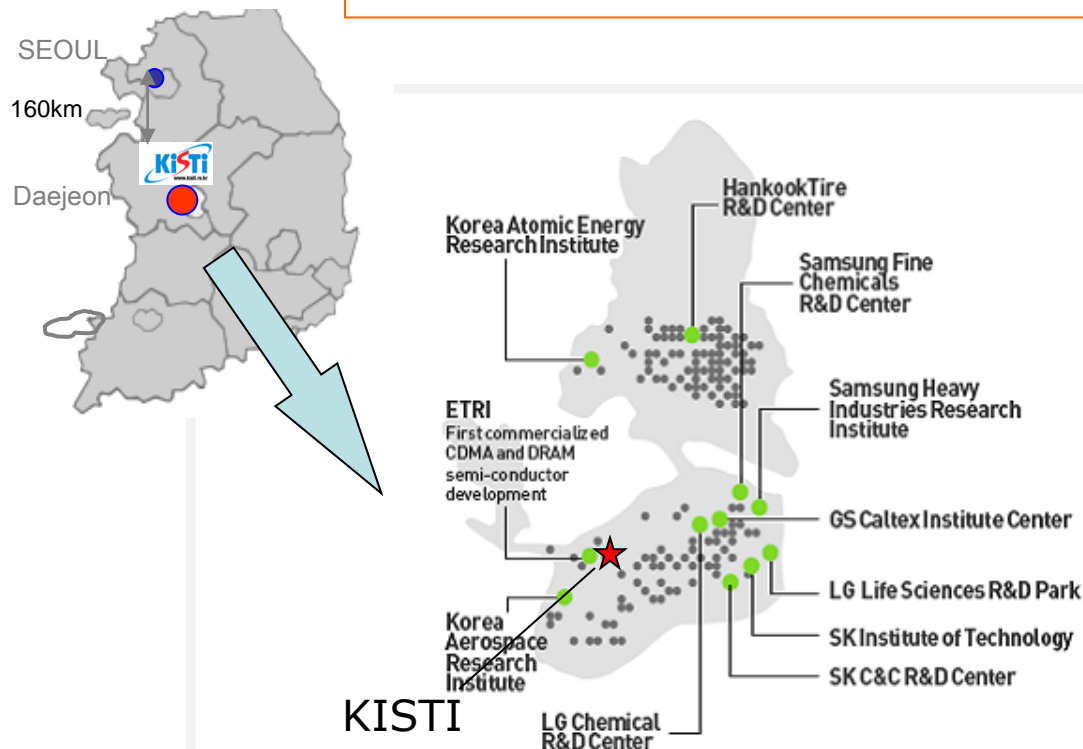
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# **Introduction to KISTI**

# Located in the heart of Science Valley, “Daedeok” Innopolis

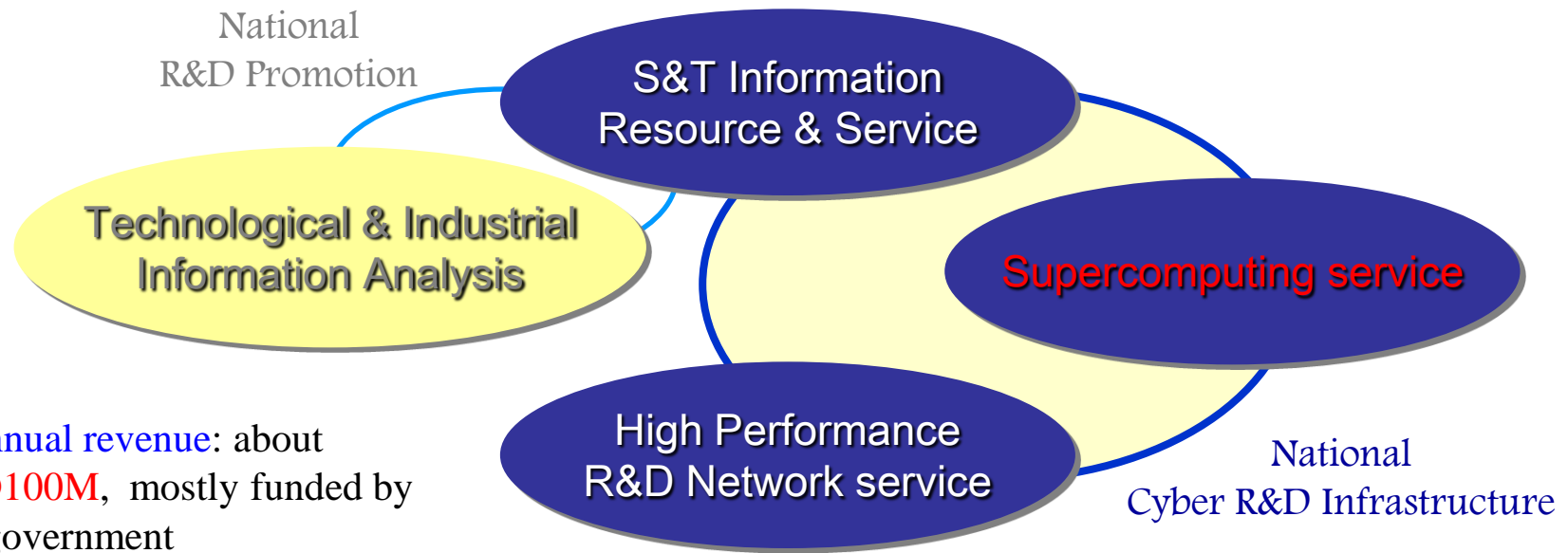
The DAEDEOK INNOPOLIS complex consists of a cluster of firms that represents a cross-section of Korea's cutting-edge industries, including information technology, biotechnology and nanotechnology.



- 6 Universities
- 20 government research institutes
- 10 government-invested institutes
- 33 private R&D labs
- 824 high-tech companies

# We are the pioneer of building Cyber-Infrastructure of Korea!

a Government supported Research Institute  
to serve Korea Scientists and Engineers with  
Scientific/Industrial **Data Bases**,  
**Research Networks** & **Supercomputing Infrastructure**



# History of KISTI Supercomputers

2 GFlops

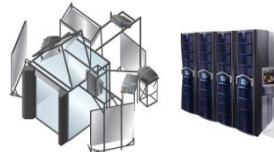


Cray-2S  
1<sup>st</sup> SC System  
in Korea  
until 1993

115 GFlops



Cray T3E  
until 2002



CAVE &  
SGI Onyx3400



NEC SX-5



SC 45

240 GFlops



NEC SX-6

2.85 TFlops



TeraCluster

1988 1993 1997 2000 2001 2002 2003 2007 2008  
2GF 16GF 131GF 242GF 786GF 5.2 TF 8.6TF 35TF 280TF

Cray C90  
2<sup>nd</sup> SC System  
in Korea  
until 2001



16 GFlops

HP GS320  
HPC160/320



111 GFlops

PC Cluster  
128node



435 GFlops

IBM p690



4.36 TFlops

IBM p690+  
3.7TF



# World Class Facilities at KISTI

## KISTI's 4<sup>th</sup> Supercomputer

- **MPP System** (1<sup>st</sup> phase)

- **SUN C48** :188 Nodes

- Target Tflo

- Inter Flash or Micro Drive

- Infiniband 4x DDR 20Gbps

- External Storage : 200TBytes

- 2<sup>nd</sup> phase

- **300 TFllops Target performance**

- About 25,600 cores

- 3.4 PBytes external storage

- **SMP System**

- **IBM p595 & p6**

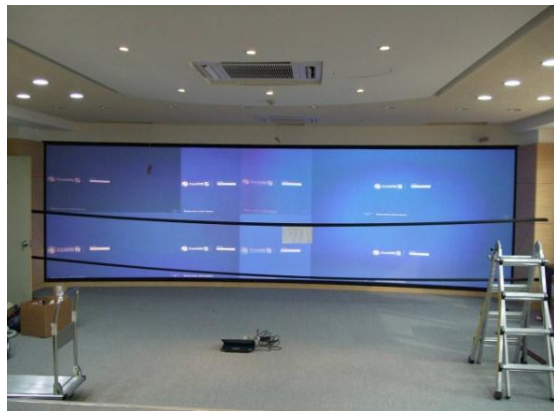
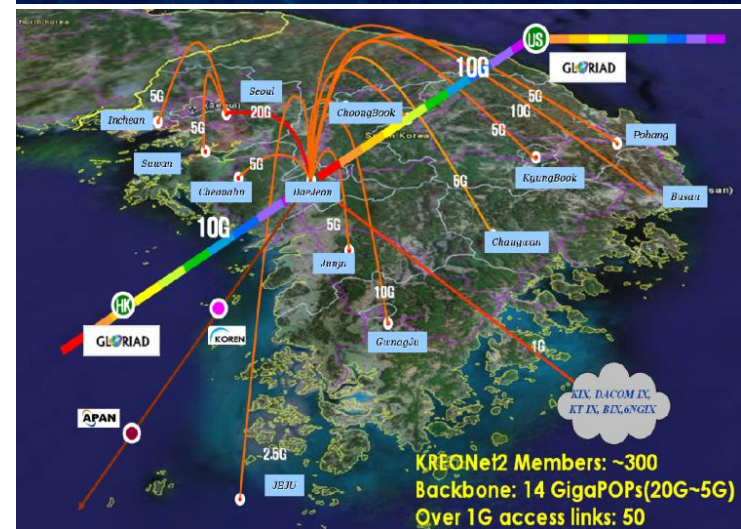
- Internal Disk : 1,17 GB

- External Storage : 63TB(1<sup>st</sup>), 273 TB(2<sup>nd</sup>)

- HPS(1<sup>st</sup>) interconnect network & Infiniband 4x DDR (2<sup>nd</sup>)



**Ranked 15<sup>th</sup> in TOP500, 2010**



# National Research Network

**KREONET** is the national science & research network of Korea, funded by MOST since 1988  
*20Gbps backbone, 1 ~ 20Gbps access networks*



- ❑ **GLORIAD (GLoBal RIng Network for Advanced Applications Development) with 10/40Gbps Optical lambda networking**

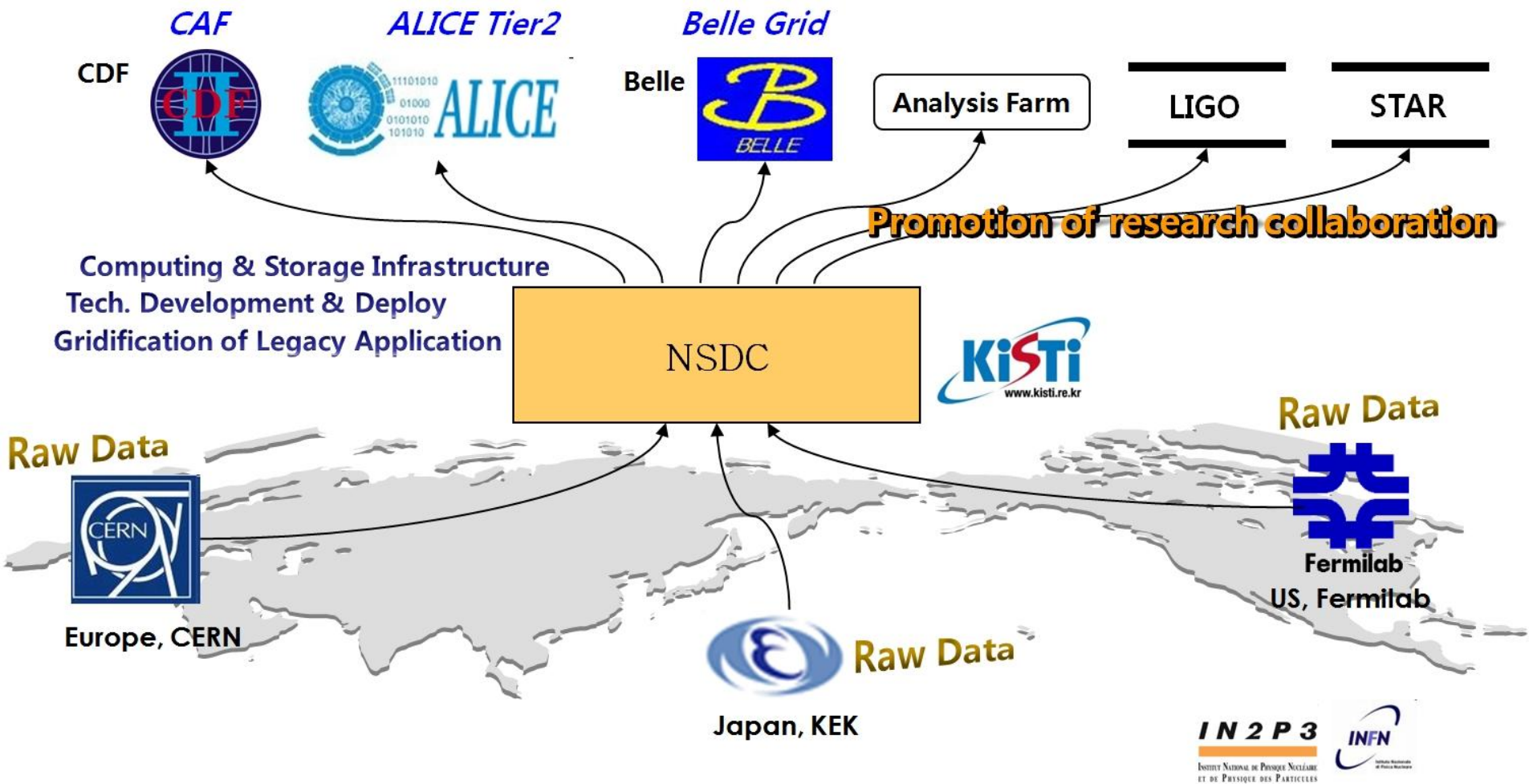
  - Global Ring topology for advanced science applications
  - GLORIAD Consortia : Korea, USA, China, Russia, Canada, the Netherlands and 5 Nordic Countries (11 nations)

- ❑ **Essential to support advanced application developments**  
: HEP, ITER, Astronomy, Earth System, Bio-Medical, HDTV etc.
- ❑ **National GLORIAD project (funded by MOST of KOREA)**



# **Introduction to NSDC project**

# Introduction



# Introduction

2009 ~

High Energy Physics

CDF  
Belle  
ALICE

Next ~

**Data Intensive Researches**

Bio-informatics  
Astrophysics  
Earth Science

# History

- Planned by Government
  - A project to build a strategic plan and a model of NSDC
    - MEST (Ministry of Education, Science and Technology)
    - 2008. 02 ~ 2008. 05
    - “사이버 R&D 인프라 구축 · 활용방안 기획연구”

This project is a part of  
**GOVERNMENT'S MASTER PLAN  
FOR SCIENCE AND TECHNOLOGY DEVELOPMENT**  
(과학기술기본계획, 2009~)

- Most important things for this project is:
  - The contribution to Korean researchers' study

# Activities in 2009

ALICE Tier2 Center  
Belle  
CDF  
DMRC & Neuroimaging

# KISTI ALICE Tier2



## Resources

- 10 services for ALICE  
(WMS+LB, PX, RGMA, BDII, VOMS, LFC, VOBOX, CREAMCE, UI)
- 120 core, 218.88 kSI2k
  - HP Blade (2.5GHz Quad \* 2) x 15 set

	2008	2009	Provided	Comments
CPU (kSI2K)	100	150	219	CREAM-CE
Storage (TB)	30 TB	50 TB	30	56TB Physical
Network (Gbps)	10	10	10	

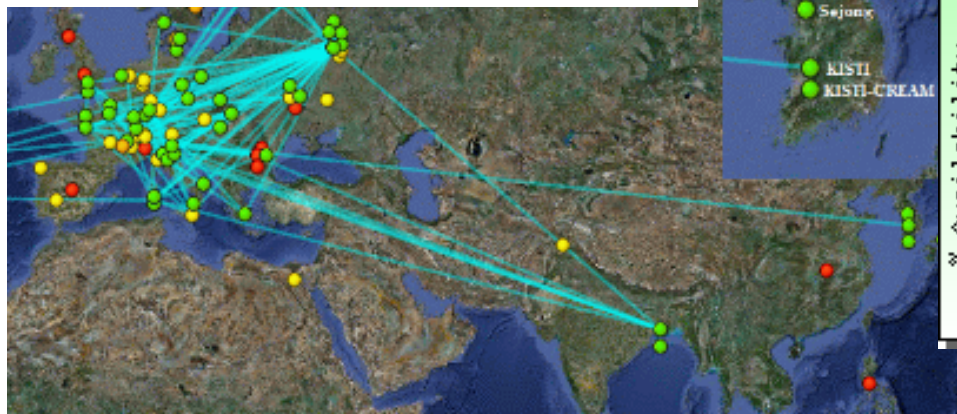
# KISTI ALICE Tier2

## CREAM-CE STATUS FOR ALICE: 18/02/09

Site	queues	Status of the queues	2 <sup>nd</sup> VOBOX	VOBOX with clients	General Status
FZK	4	OK	YES	YES	READY
KOLKATA	2	OK	YES	YES	READY
ATHENS	1	OK	NO	NO	NOT READY
KISTI	1	OK	YES	YES	READY
GSI	1	OK	NO	YES	READY*
IHEP	1	NOT OK	NO	NO	NOT READY
RAL	1	NOT OK	NO	YES	NOT READY
CNAF	1	NOT OK	YES**	NO	NOT READY

\* ONLY 1 VOBOX IS NOT THE REQUIRED SITUATION, ALTHOUGH THE SITE IS READY FOR CREAM PRODUCTION

\*\* VOBOX PROVIDED BUT STILL SUFFERING OF SOME CONFIG ISSUES

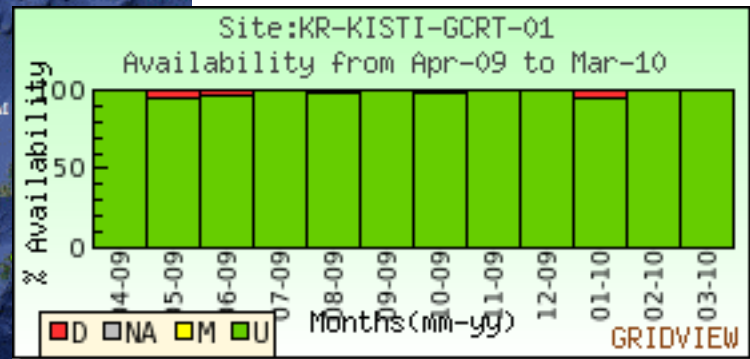
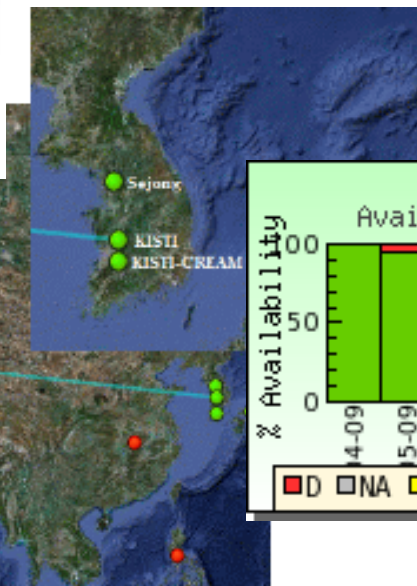


## ● Site Availability to EGEE

98.3% (Feb.2009~)

## ● CREAM-CE support

- First 3 sites in the world



# **NSDC system architecture**

Hardware  
Grid Middleware Deployment



# Resources

## Cluster

Cluster	Spec. / node	# nodes	# cores	kSI2k
ce-alice	Dell, Intel Xeon E5405 x2 (2.0GHz Quad), 16GB	6	48	48
ce01	HP, Intel Xeon E5420 x2 (2.5Ghz Quad), 16GB	15	128	219
ce02	IBM, Intel Xeon E5450 x2 (3.0GHz Quad), 16GB	38	304	650
***	Intel Xeon X5650 x2 (2.66GHz Hex), 24GB	36	432	--
Total		114	976	--

## Storage

Model	Capacity Physically	Capacity Usable
NetApp FAS2050 (SAN only, RAID6, HA)	48TB	30TB
NetApp FAS6080 (SAN & NAS, RAID6, HA)	334TB	200TB
Hitachi (SAN only) + IBRIX	950TB	600TB
Total	1.3PB	830TB

- Service nodes for Grid & Application : ~20 nodes (including VM)

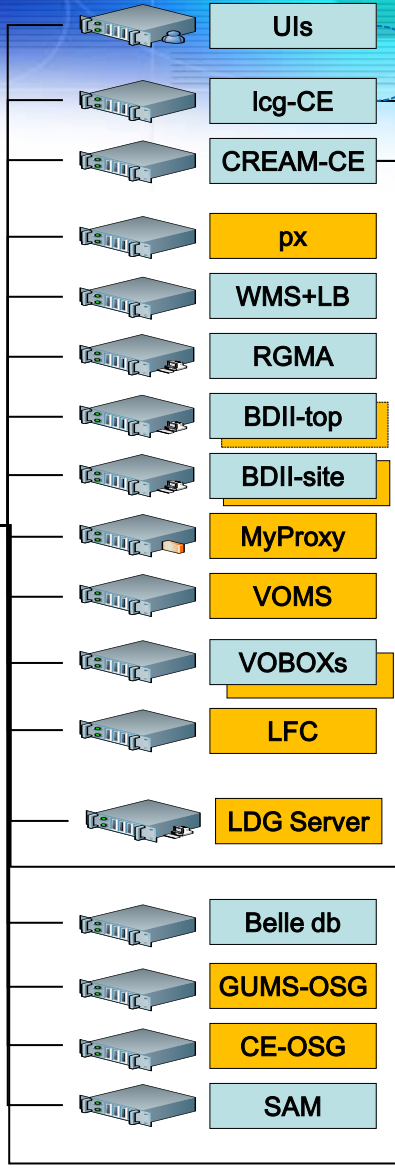
GLORIAD

10G



NSD

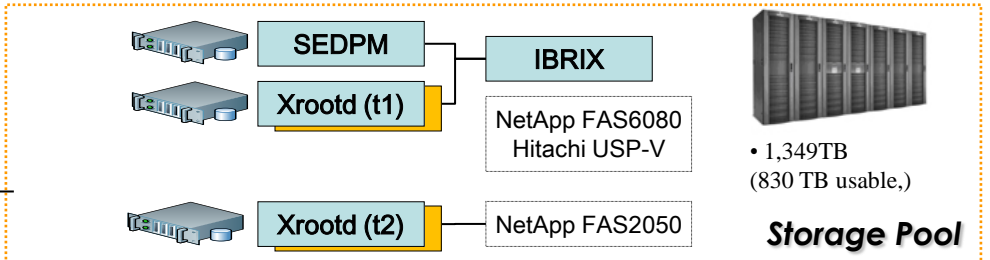
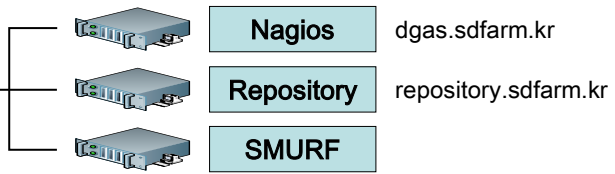
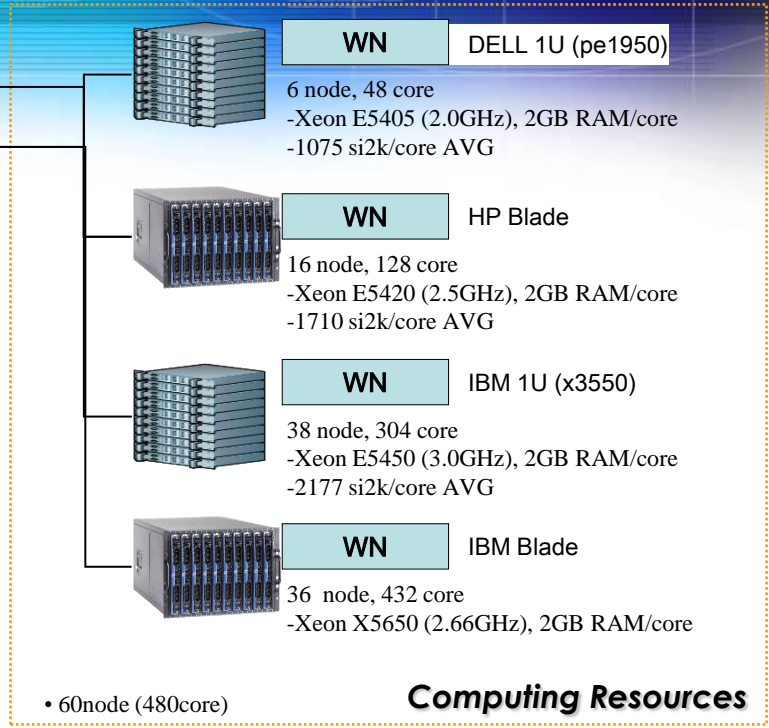
NATIONAL SCIENCE DATA CENTER



Belle

ALICE

LIGO



# Resource Plan in 2010

## Storage

- 600TB usable space is being configured (Total, 830TB Usable)
  - ALICE, Belle, LIGO, STAR, GBRAIN, ...




## Computing

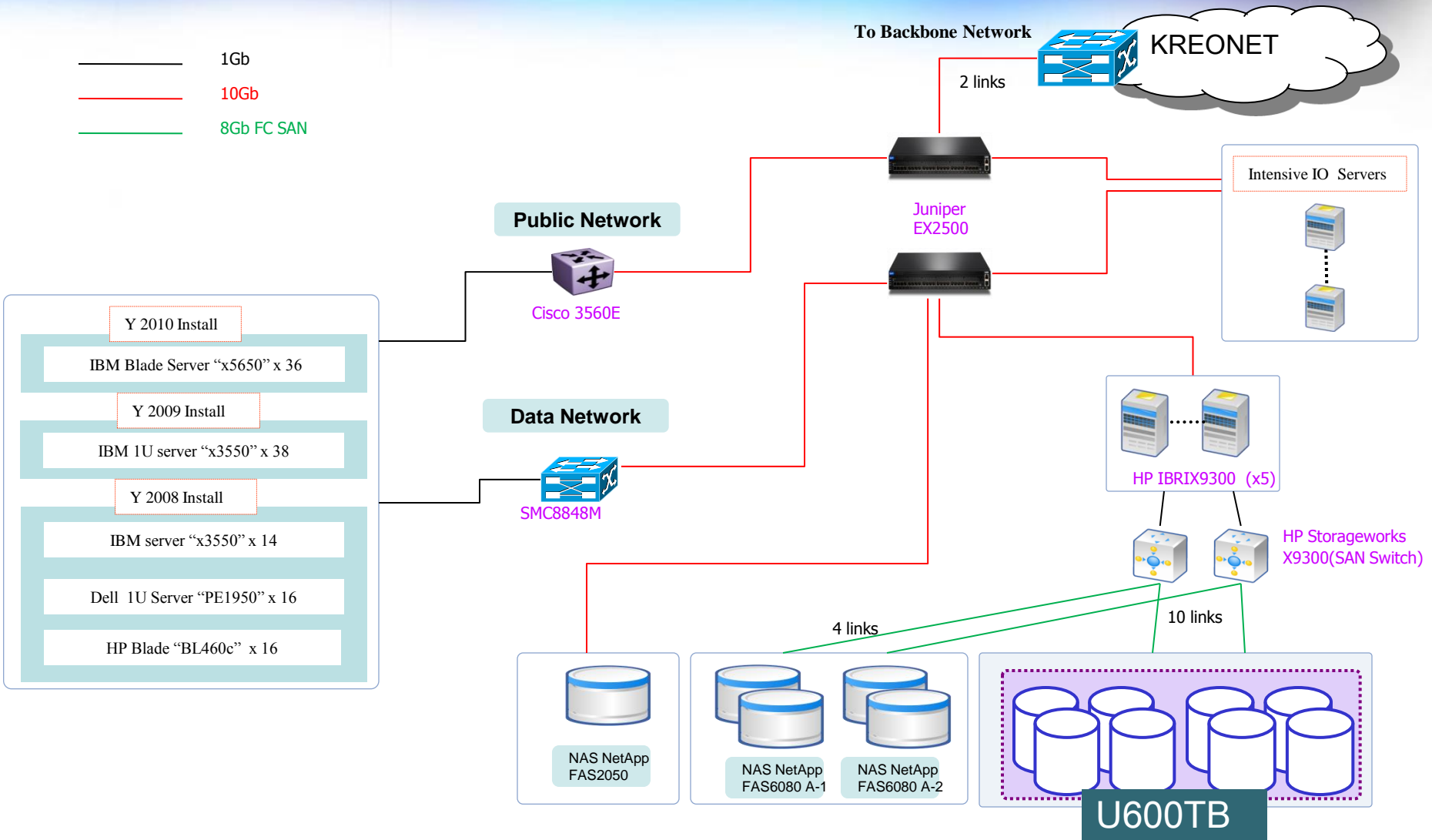
- 36 blade servers HS22 (Xeon X5650, 6 core x2, RAM 24GB, HD 146GB)

## Internal Networking

- Between storage and computing
  - Basically, all computing resource have 1G dedicated connection
  - To enhance access speed, Parallel File System is adapted
  - Special nodes, like storage, will have 10G connection to storage

# Resource Plan in 2010

-  1Gb
-  10Gb
-  8Gb FC SAN



# **Management plan for Alice tier-1 testbed**

Hardware  
Grid Middleware Deployment

# Resources

## Storage

- Disk: 100TB
  - Managed by Xrootd
    - One new redirector
- Tape: 100TB (Tape emulation on disk)

## Computing

- Shared resources

# Human resources

## Actual status

- 14 Members but only 9 for IT.
  - 4 members affected to Tier-1 testbed
- Network, power management and aircooling managed by other teams

## Future

- 1 more person with strong experience in Tier-1 management will be recruited from any other country.
- We will invite experts for Tier-1 management as many as possible

# Expected technical issues

Hardware  
Grid Middleware Deployment



# Resources

## Storage

- tape storage needed to become a real Tier-1
  - Which hardware
  - Which software (price seems critical)
  - Manpower/expertise?

## Farm

- How to deal with a single farm shared by many projects
  - 2 VOBOXs with same VO (Alice Tier-1 and Tier-2) issues?
    - queue name, Env. Variables (software, storage element ...)
  - How to control resources usages.

# Monitoring

## Current status

- Nagios for real time
- SMURF for historic
- **No production monitoring!**

## Existing Software

- What other sites use
- What is available

## Home made software

- Critical for time/manpower consumption
- Bugs hunt
- project on Mobile Phone development

# Thank you !!

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<http://nsdc.kr> , will be available in soon

# KISTI Supercomputing Center: Extending the horizon of science and technology

National headquarters of Supercomputing resources, e-Science, Grid and high performance research networks

