

Links to SAGA is additionally listed in reference slide (end of presentation file)

Institutes list is a bit revised (in slide: Institutes)

HIGH ENERGY ACCELERATOR  
RESEARCH ORGANIZATION

# Current Status and Plan on Grid at KEK/CRC

Go Iwai, KEK/CRC

On behalf of KEK Data Grid Team



# Outline

- ▶ Introduction
  - ▶ Deployment
  - ▶ VO specific operational statistics
- ▶ Recent activities
  - ▶ Unified user–interfaces using SAGA\*
- ▶ Summary

\* SAGA: A Simple API for Grid Applications



KEK



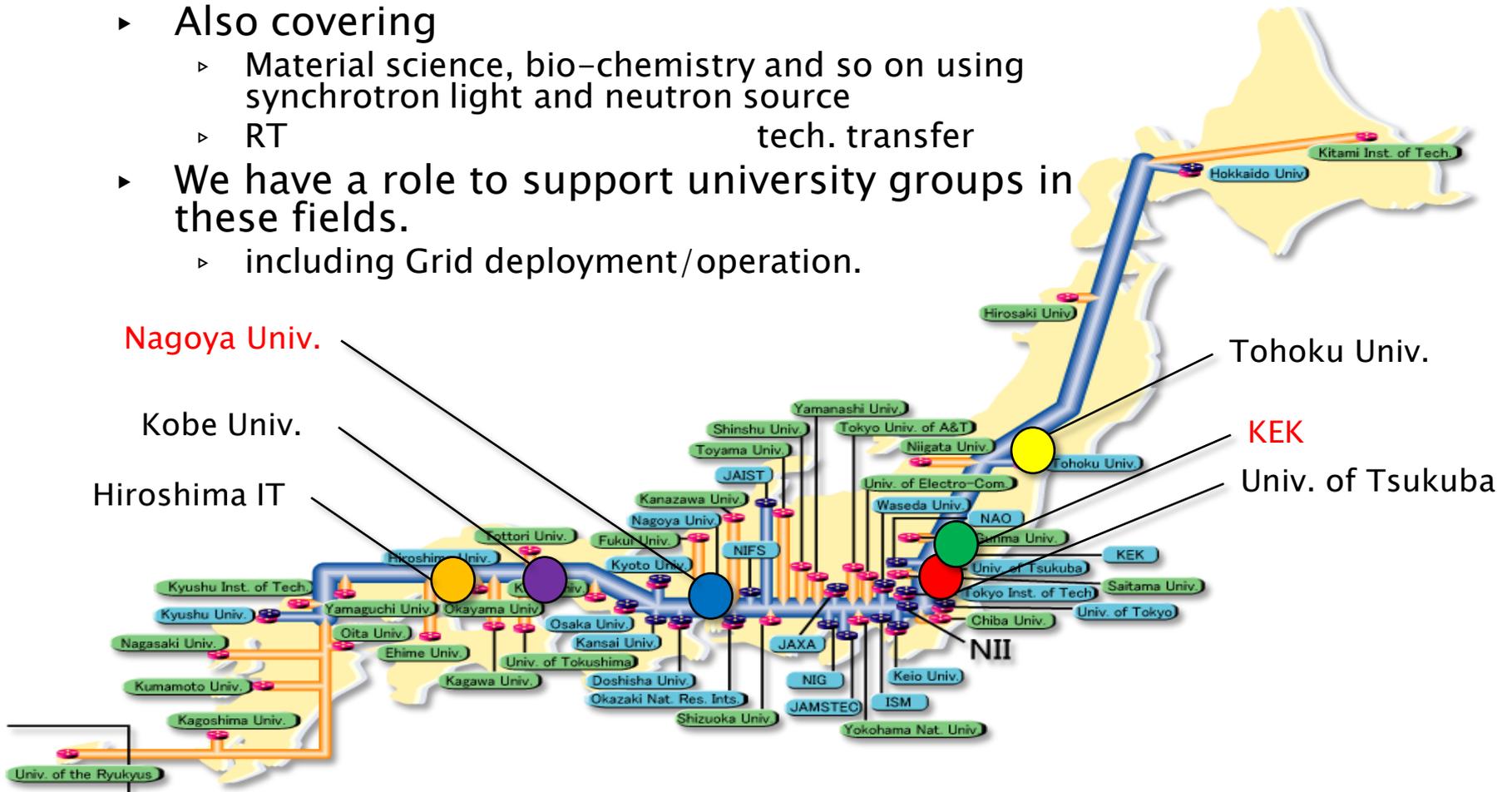
HIGH ENERGY ACCELERATOR  
RESEARCH ORGANIZATION

## Introduction

- ▶ Our role
- ▶ Deployment status
- ▶ VO scale
  - ▶ Resources
  - ▶ Institutes
  - ▶ Members
- ▶ Ops stats
  - ▶ # of jobs
  - ▶ CPU consumption

# Introduction

- ▶ Major HEP projects:
  - ▶ Belle, J-PARC, ATLAS                      ongoing projects
  - ▶ ILC, Super-Belle                              future projects
- ▶ Also covering
  - ▶ Material science, bio-chemistry and so on using synchrotron light and neutron source
  - ▶ RT    tech. transfer
- ▶ We have a role to support university groups in these fields.
  - ▶ including Grid deployment/operation.



Nagoya Univ.

Kobe Univ.

Hiroshima IT

Tohoku Univ.

KEK

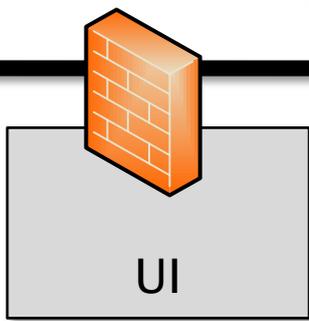
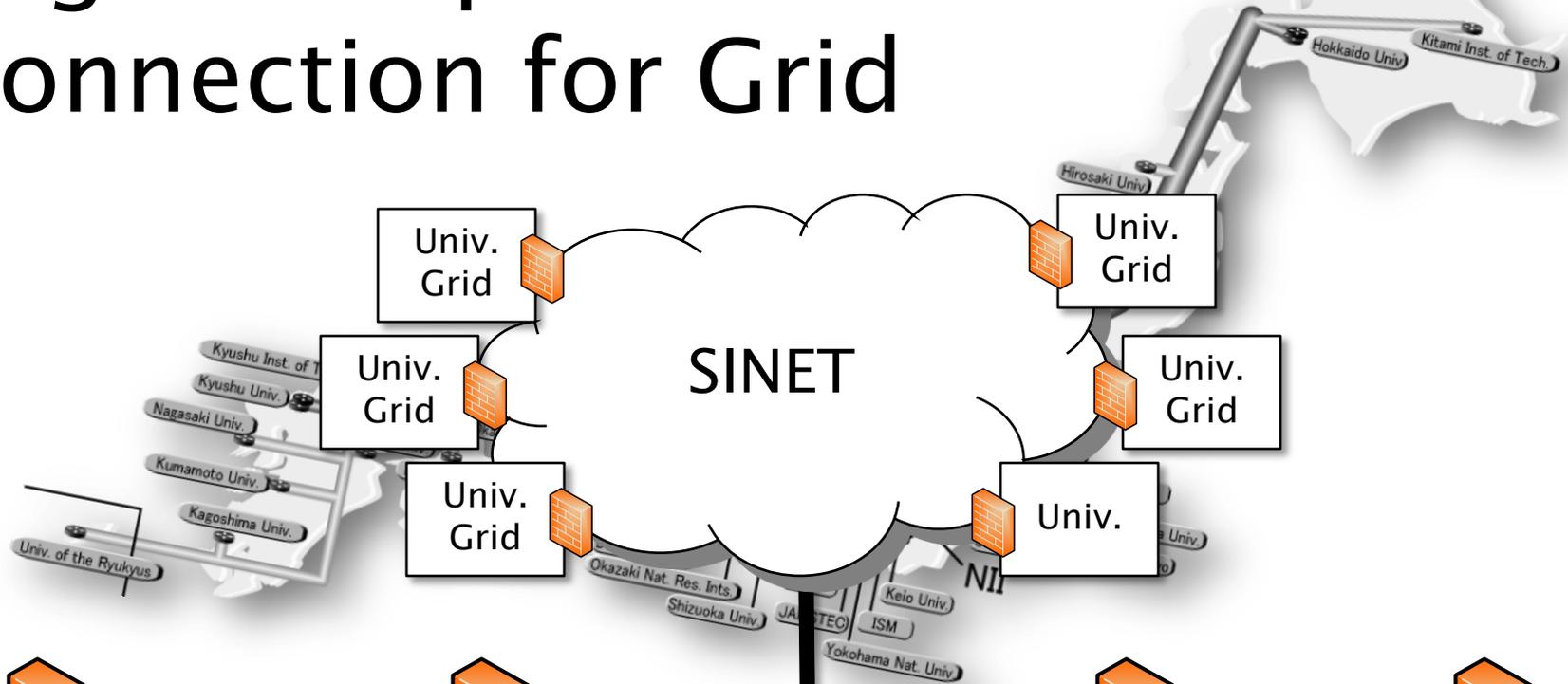
Univ. of Tsukuba

# KEK's Contribution in EGEE-III

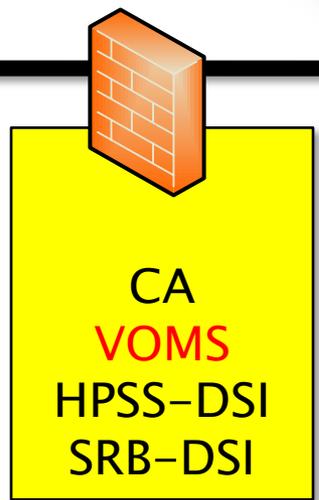


- ▶ TSA1.1: Grid Management
  - ▶ Interoperability and collaboration
- ▶ TSA1.2: Grid operations and support
  - ▶ 1st line support for operations problems
  - ▶ Middleware deployment and support
    - a) Coordination of middleware deployment and support for problems.
    - b) Regional certification of middleware releases if needed (outside of PPS and SA3 involvement).  
This is anticipated to be very rare and will require specific justification.

# Logical Map Focused on Network Connection for Grid



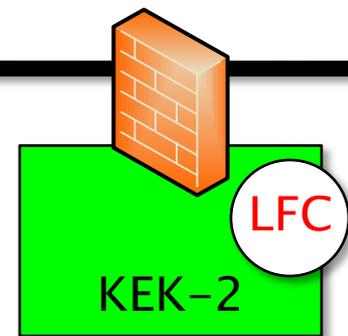
Intranet



DMZ



CC-GRID

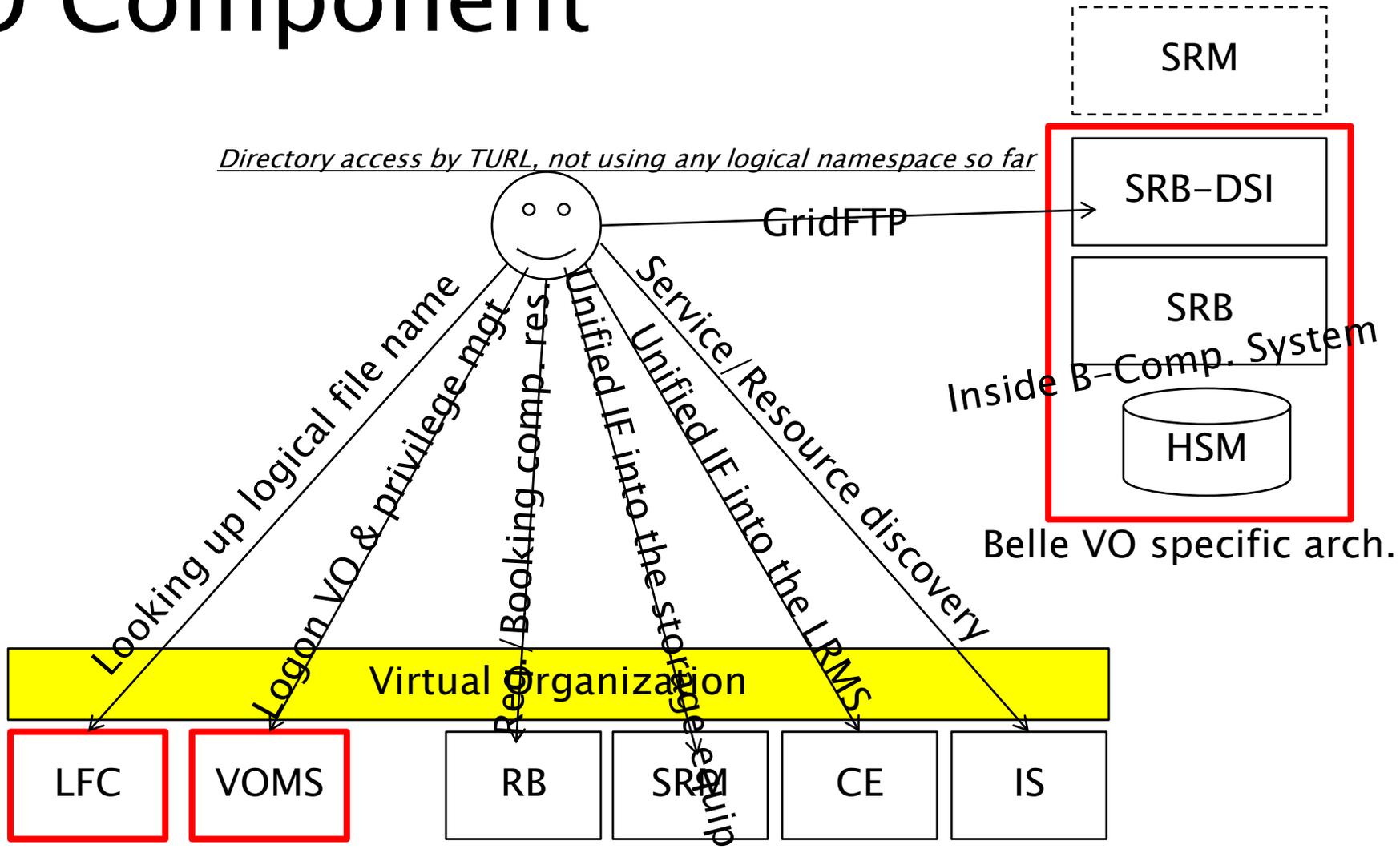


GRID-LAN



# VO Component

*Directory access by TURL, not using any logical namespace so far*



Central Services for Belle



# Brief Summary of LCG Deployment

## JP-KEK-CRC-01 (KEK-1)

- ▶ Production in GOC since Nov 2005
- ▶ Mainly operated by KEK staffs
- ▶ Site Role:
  - ▶ Practical operation for KEK-2
  - ▶ Getting' started for university groups
- ▶ Resource and Component:
  - ▶ SL-3x or SL-4x
  - ▶ gLite-3.X
  - ▶ CPU: 14
  - ▶ Storage: ~7TB for disk and DSI for HSM, HPSS
  - ▶ Fully functional services
- ▶ Supported VO:
  - ▶ belle apdg ail g4med dteam ops ppj ilc calice naokek

*In plan to upgrade  
In Q1 of FY2009*

## JP-KEK-CRC-02 (KEK-2)

- ▶ Production in GOC since early 2006
- ▶ Site operation:
  - ▶ Manabu and Kohki
- ▶ Site Role:
  - ▶ More stable services based on KEK-1 experiences.
- ▶ Resource and Component:
  - ▶ SL-3x or SL-4x
  - ▶ gLite-3.X
  - ▶ CPU: 48
  - ▶ Storage: ~1TB for disk
  - ▶ Fully functional services
- ▶ Supported VO:
  - ▶ belle apdg ail g4med dteam ops ppj ilc calice naokek

*Fully upgrade and up soon!*

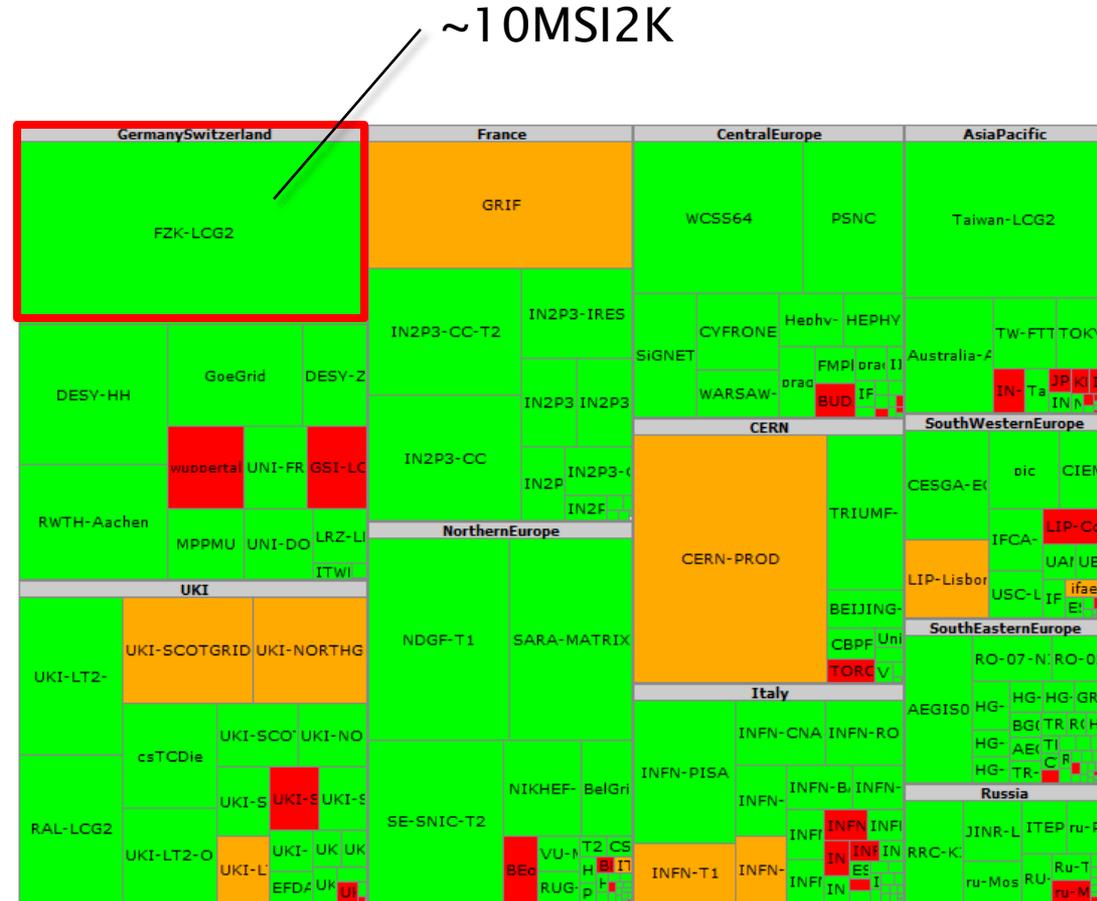


- ✓ 10WNs x 8CPUs x ~4kSI2K
- ✓ Storage capability on demand basis
  - ✓ HPSS virtually works as the backend disk of SE
  - ✓ ~200USD/1TB
- ✓ VM (Xen) technologies are widely supported in whole site
  - ✓ Higher availability & more robustness
- ✓ Old blade servers (B-Comp) are now being integrated with KEK-2
  - ✓ 250 x 2CPUs

# LCG Infrastructure Deployment Status



- ▶ 55 countries
- ▶ 265 sites
- ▶ 88K CPUs
- ▶ 130M SI2K
- ▶ 480 PB available
- ▶ 580 PB in use



Latest SAM results, Site Status, for 'OPS' VO, 09 Dec 2008 03:16 GMT.  
 Size of site rectangles is site kSI2k of CPUs from BDII.  
 Certified Production sites, grouped by regions.

© CERN openlab / EDS

Down Degraded Ok

As of Dec 2008

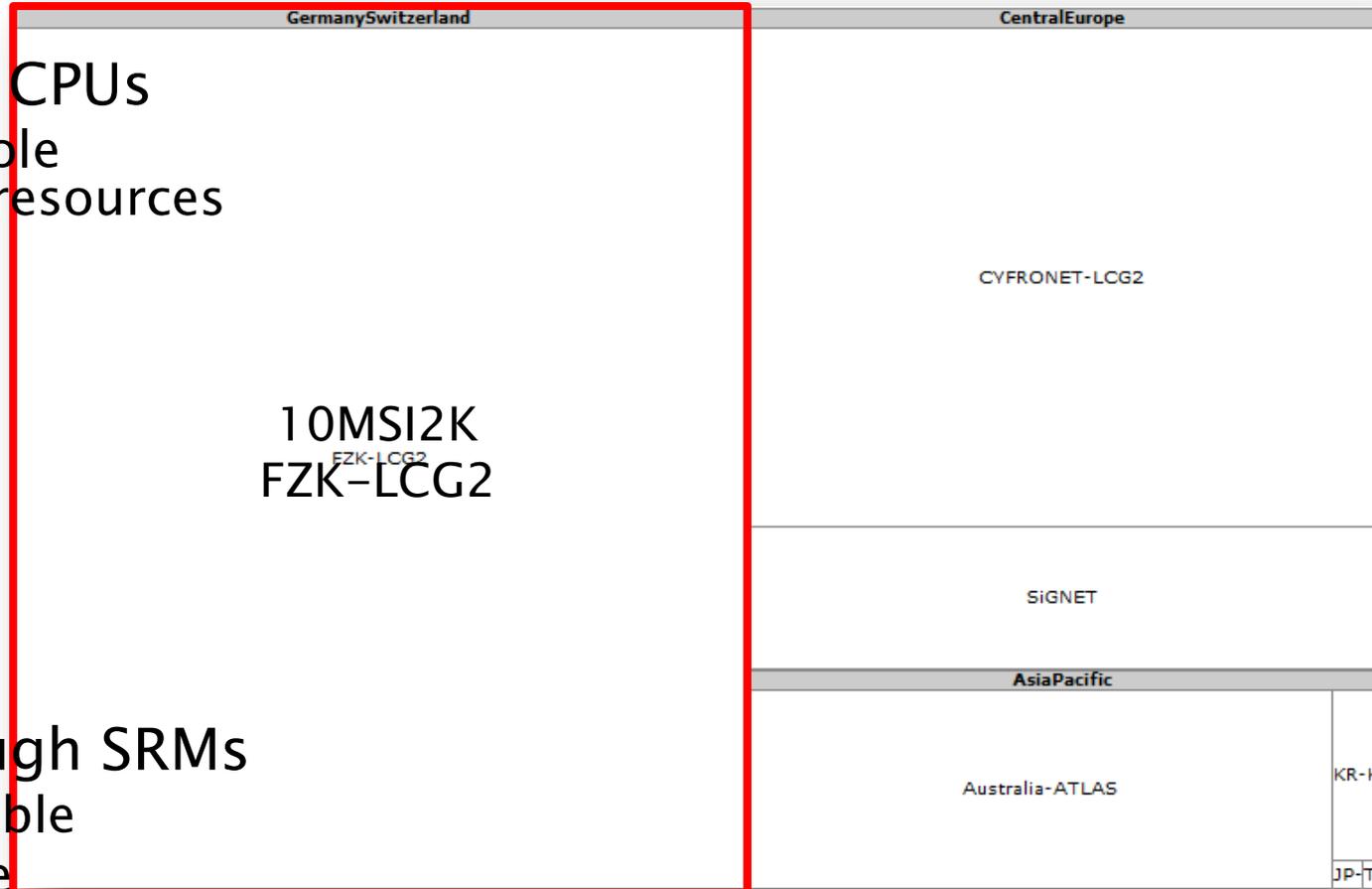
# Resource Deployment over belle



## VO

Note: Still missing KEK-2

- ▶ 1.8M SI2K/9k CPUs
  - ▶ ~10% of whole production resources



- ▶ Storage through SRMs
  - ▶ 27 TB available
  - ▶ 83 GB in use
- ▶ HSM storage in KEK Belle Computing System through SRB
  - ▶ ~100 TB (ask Nakazawa-san in detail)



# Institutes

VO-scale is being expanded slowly

- ▶ IFJ PAN (CYFRONET) (Poland)
- ▶ Univ. of Melbourne (Australia)
- ▶ KEK (Japan)
- ▶ National Central Univ. (Taiwan)
- ▶ ASGC (Taiwan)
- ▶ Nagoya University (Japan)
- ▶ KISTI (Korea)
- ▶ Univ. of Karlsruhe (Germany)
- ▶ Jozef Stefan Institute (Slovenia)
- ▶ Panjab Univ. (India)
- ▶ Virginia Polytechnic Inst. State Univ. (US)
- ▶ Univ. of Hawaii (US)
- ▶ Wayne State University (US)
- ▶ Korea Univ. (Korea)
- ▶ Univ. of Sydney (Australia)

Federation done





# Members

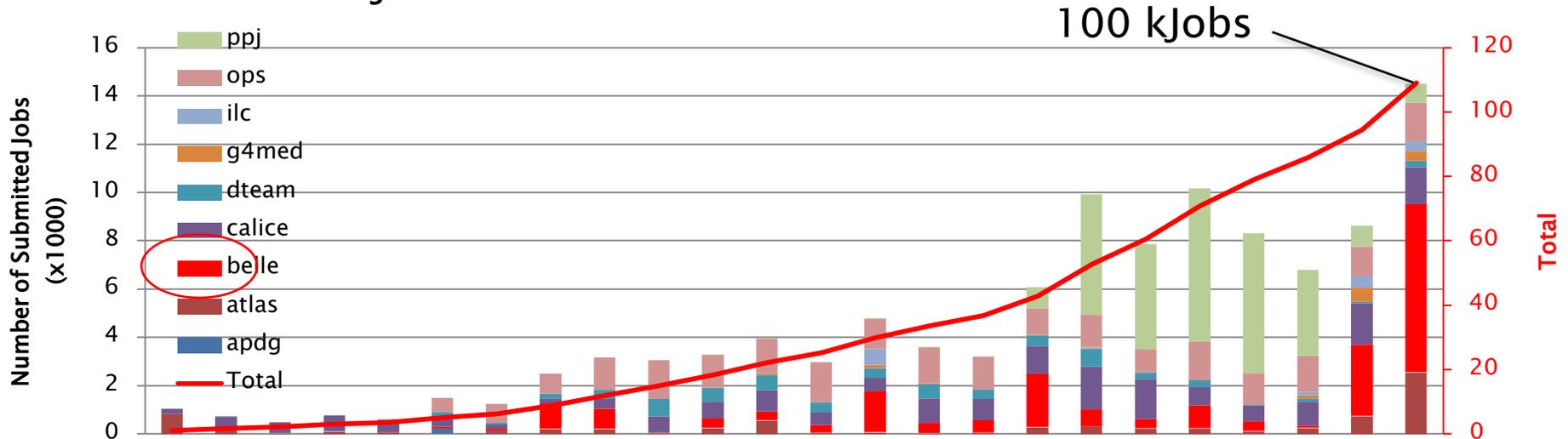
90% of 22 persons is ops staff

- ▶ /C=JP/O=KEK/OU=CRC/OU=KEK/CN=Nishida Shohei
- ▶ /C=JP/O=KEK/OU=CRC/OU=KEK/CN=Yoshimi Iida
- ▶ /C=JP/O=KEK/OU=CRC/CN=Go Iwai
- ▶ /C=JP/O=KEK/OU=CRC/OU=Nagoya/CN=Yuko Nishio
- ▶ /C=AU/O=APACGrid/OU=The University of Melbourne/CN=Glenn R. Moloney
- ▶ /C=JP/O=KEK/OU=CRC/OU=Korea University/CN=Hyuncheong Ha
- ▶ /C=JP/O=KEK/OU=CRC/CN=Yoshiyuki WATASE
- ▶ /C=JP/O=KEK/OU=CRC/CN=Hideyuki Nakazawa
- ▶ /C=JP/O=KEK/OU=CRC/CN=YAMADA Kenji
- ▶ /C=JP/O=KEK/OU=CRC/OU=Nagoya university HEPL/CN=kenji inami
- ▶ /C=JP/O=KEK/OU=CRC/OU=Nagoya university HEPL/CN=Mitsuhiro Kaga
- ▶ /C=JP/O=KEK/OU=CRC/CN=Jun Ebihara
- ▶ /C=JP/O=KEK/OU=CRC/OU=Korea University/CN=Soohyung Lee
- ▶ /C=JP/O=KEK/OU=CRC/CN=Manabu Matsui
- ▶ /C=SI/O=SiNET/O=IJS/OU=F9/CN=Marko Bracko
- ▶ /C=JP/O=KEK/OU=CRC/CN=Kenn Sakai
- ▶ /C=JP/O=KEK/OU=CRC/CN=Yugawa Takahiro
- ▶ /C=JP/O=KEK/OU=CRC/CN=Yamada Chisato
- ▶ /O=GermanGrid/OU=Uni Karlsruhe/CN=Thomas Kuhr
- ▶ /O=GermanGrid/OU=FZK/CN=Dimitri Nilsen
- ▶ /C=KR/O=KISTI/O=GRID/O=KISTI/CN=84035421 Beob Kyum Kim
- ▶ /C=JP/O=KEK/OU=CRC/CN=Shunsuke Takahashi

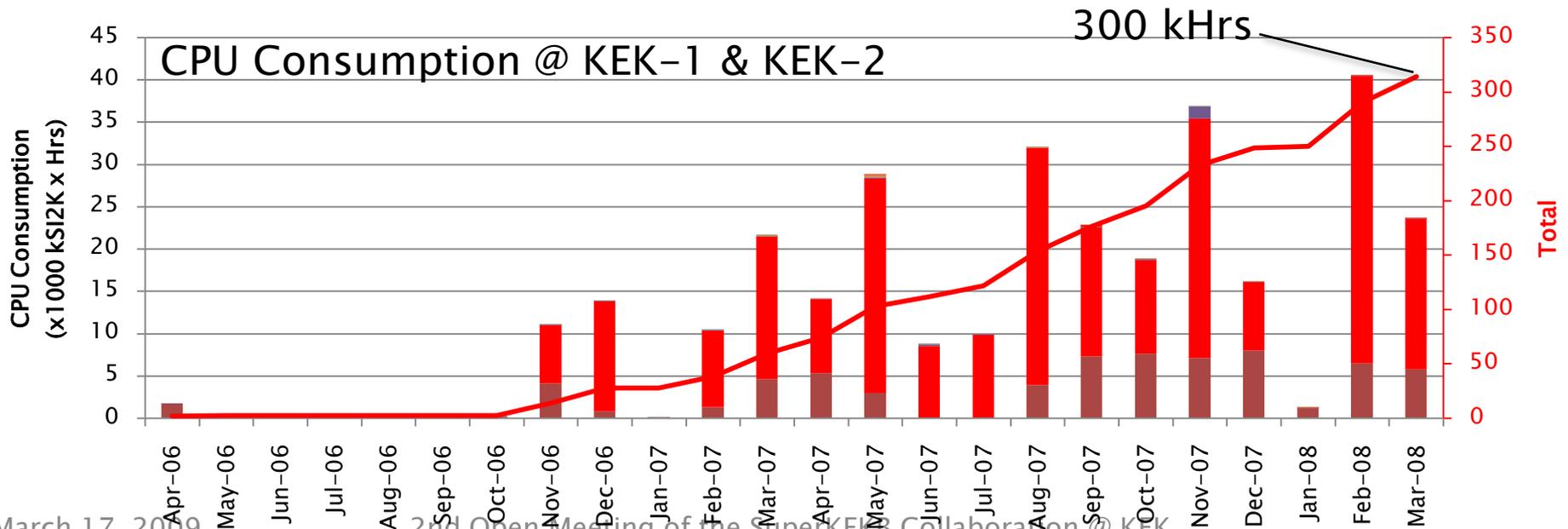
# Ops Stats: JFY2006 & JFY2007



## Submitted Job @ KEK-2 & KEK-2

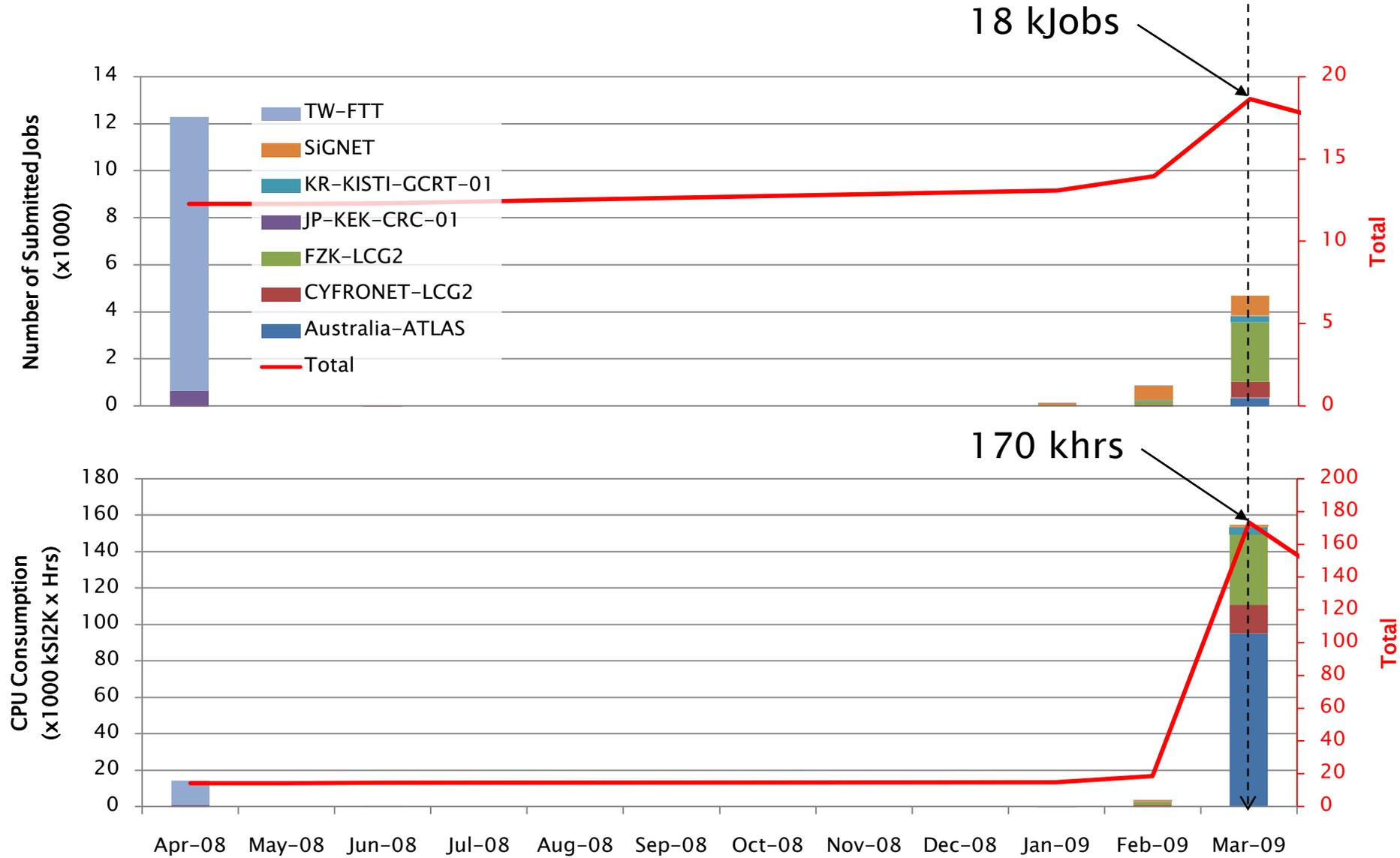


## CPU Consumption @ KEK-1 & KEK-2





# Ops Stats: JFY2008

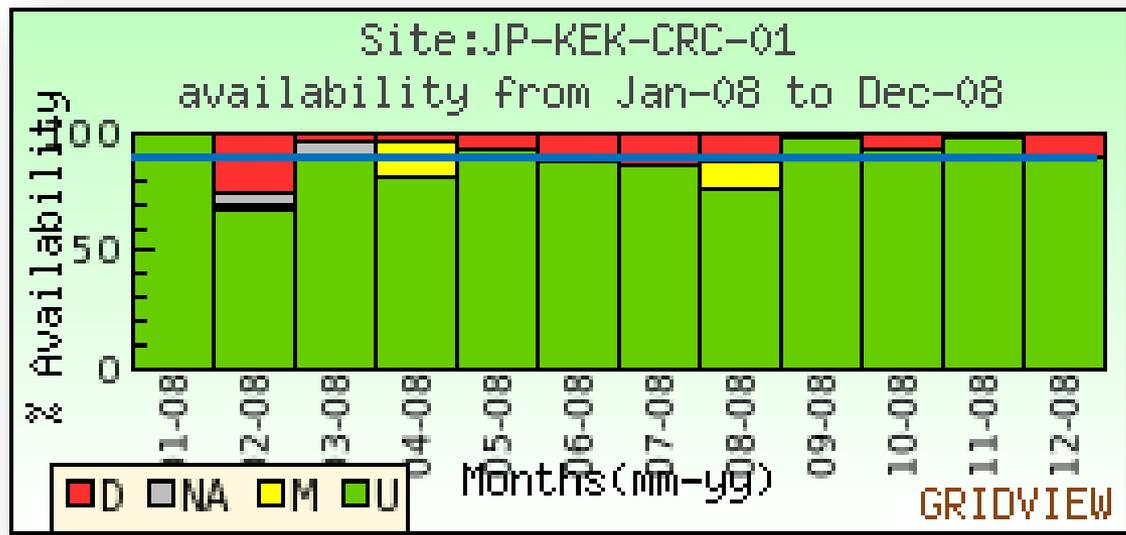


# Service Availability

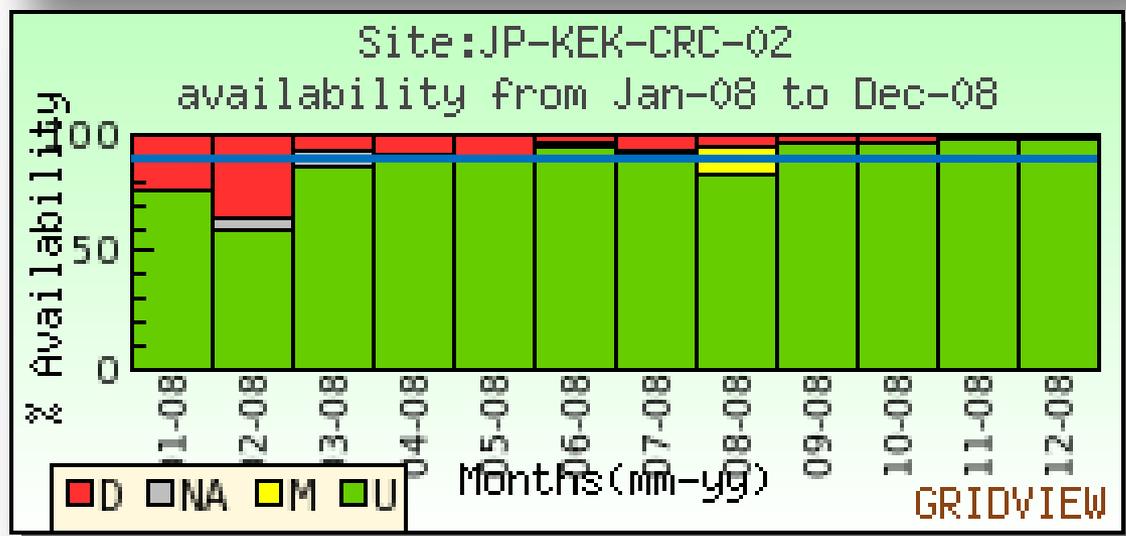
## Jan-Dec 2008



More than 90% availability in 2008 !



- ▶ 931H/12SD
- ▶ 13 tickets were opened, but solved all



- ▶ 127H/4SD
- ▶ 12 tickets were opened, but solved all



KEK



HIGH ENERGY ACCELERATOR  
RESEARCH ORGANIZATION

## Recent Activities *SAGA*—A Simple API for Grid Applications

- ▶ Motivation
- ▶ Goal
- ▶ Current Status

# Grid Deployment at KEK

## Middleware / Experiment Matrix



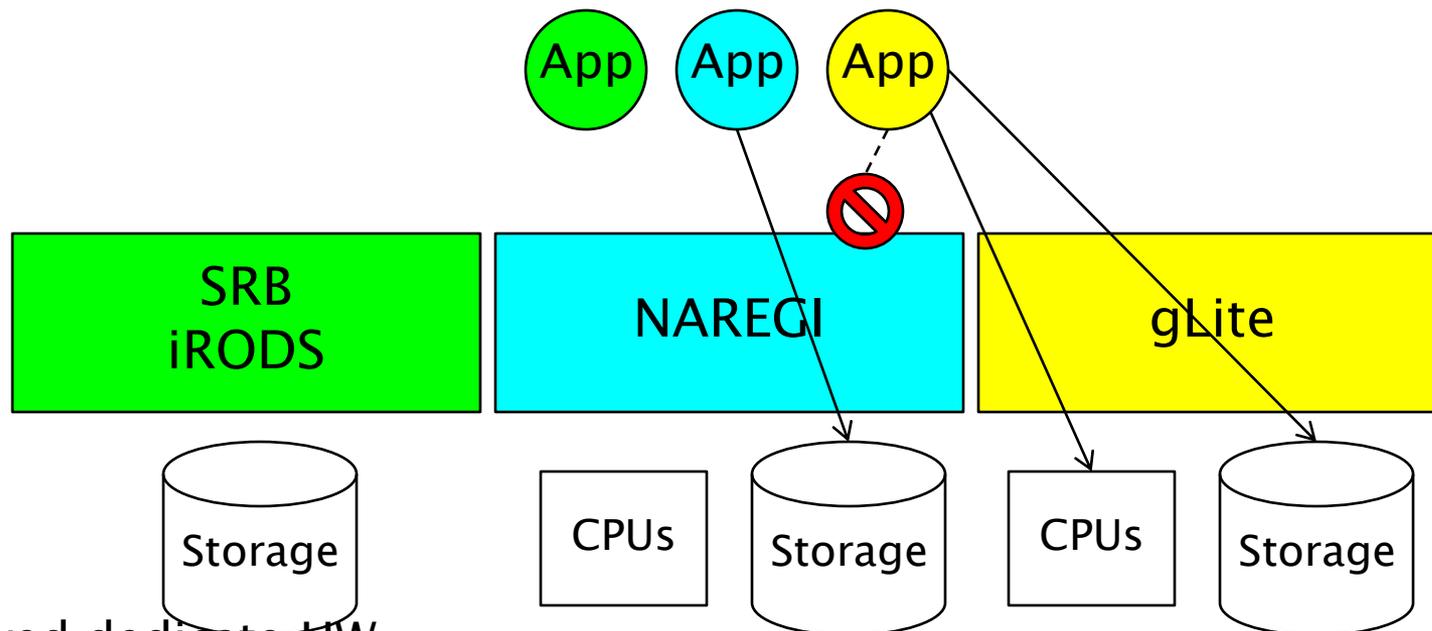
- ▶ Commonly most of experiment or federation are using gLite as the Grid middleware.
- ▶ NAREGI middleware is being deployed as the general purpose e-science infrastructure in Japan
  - ▶ Difficulties: e.g. human costs, time differences
  - ▶ Both interops among MWs are mandate for us (next a few slides)
    - To provide higher availability, reliability and to keep prod. quality

|               | gLite                 | NAREGI     | Gfarm    | SRB   | iRODS   |
|---------------|-----------------------|------------|----------|-------|---------|
| Belle         | Using                 | Planning   | Using    | Using |         |
| Atlas         | Using                 |            |          |       |         |
| Radio therapy | Using                 | Developing | Planning |       |         |
| ILC           | Using                 | Planning   | Planning |       |         |
| J-PARC        | Planning              | Planning   | Planning |       | Testing |
| Super-Belle   | To be decided by 2010 |            |          |       |         |

# Issues on Multi Middleware Apps

- ▶ For site admins:
  - ▶ Dedicate HW is deployed in each middleware
    - LRMS
    - OS
- ▶ For end users:
  - ▶ By ordinal way, same apps for each middle are developed to be enabled on Grid
  - ▶ They have to know which middleware they are using.

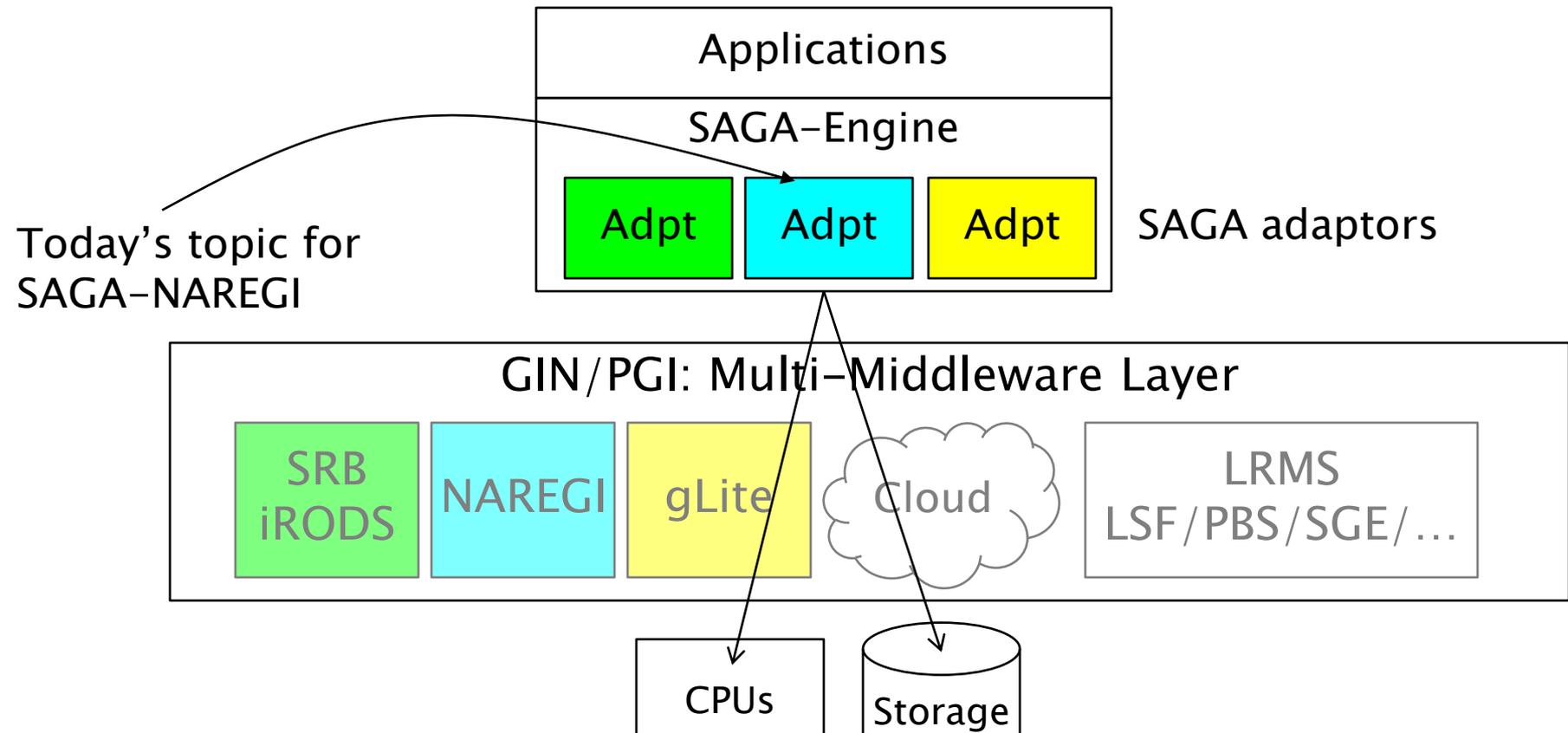
Users should be aware the underlying middleware-layer and hardware deployed



Deployed dedicate HW

# Motivation

- ▶ We need to operate multi Grid middleware at the same time.
  - ▶ Resource sharing among them is mandate
    - We are also contributing to GIN
- ▶ Virtualization of Grid middleware is our wish
  - ▶ The best scenario for the application developers



Fair share resources among middles

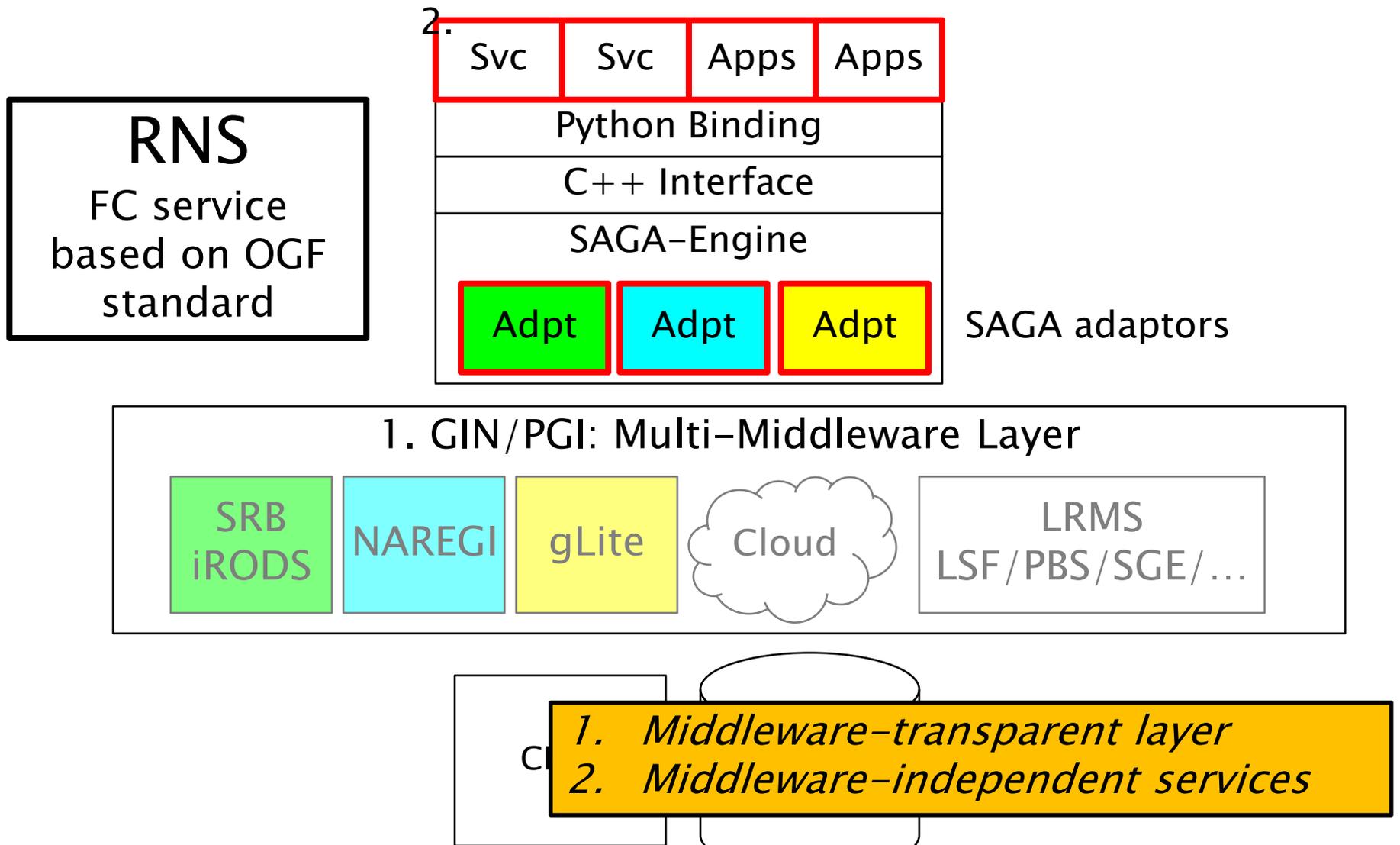
2nd Open Meeting of the SuperKEKB Collaboration @ KEK

# Project Goal

SAGA supports cloud & LRMS for local clusters



## (Funded collaboration with NII)





# Current Status

## SAGA-NAREGI Adaptor

- ▶ Only for the job adaptor
- ▶ Succeeded to submit a job in NAREGI and to retrieve results

```
saga::job::description jd;
jd.set_attribute(sja::description_executable, "/bin/hostname");
jd.set_attribute(sja::description_working_directory, "/some/where/work/dir");
jd.set_attribute(sja::description_output, "std.out");
jd.set_attribute(sja::description_error, "std.err");

std::vector <std::string> ft;
ft.push_back("gsiftp://gfarm.cc.kek.jp/my/file.in > file.in");
ft.push_back("gsiftp://gfarm.cc.kek.jp/my/file.out < file.out");
jd.set_vector_attribute(sja::description_file_transfer, ft);

saga::job::service js("naregi://nrgvms.cc.kek.jp");
saga::job::job j = js.create_job(jd);
j.run();
while (j.get_state() != saga::job::Done) {
    std::cout << j.get_attribute("JobID") << std::endl;
    sleep(1);
}
```

Job description

File stage-in/out

Job Submission



**KEK**



HIGH ENERGY ACCELERATOR  
RESEARCH ORGANIZATION

# Summary



# Summary

- ▶ Belle VO has being expanded
  - ▶ 9 institutes and 22 users
  - ▶ 18M SI2K/9k CPUs
  - ▶ 27 TB available, 83 GB in use through SRMs
    - HSM in KEK Belle Computing System Is used through SRB.
  - ▶ KEK-2 will come up very soon
    - Final state to pass certificate process
  
- ▶ SAGA-NAREGI ready for use
  - ▶ Only for job adaptor currently
  - ▶ SAGA-PBS is now being developed and will be released soon (in March 2009)
  - ▶ This project has been funded for 3.5 years and end in March 2012.



# References

- ▶ SAGA
  - ▶ <http://saga.cct.lsu.edu/>
  - ▶ <http://forge.ogf.org/sf/projects/saga-rg>
  
- ▶ VOMS end point
  - ▶ <https://voms.kek.jp:8443/voms/belle/webui/request/user/create>
- ▶ VO setting parameters
  - ▶ <https://voms.kek.jp:8443/voms/belle/webui/config>
- ▶ VO ID card
  - ▶ <https://cic.gridops.org/index.php?section=vo&page=homepage&subpage=&vo=belle>
- ▶ VOMS certificate
  - ▶ <http://voms.kek.jp/voms.kek.jp.10684>
  - ▶ <https://cic.gridops.org/downloadRP.php?section=database&rpname=certificate&vo=belle&vomsserver=voms.kek.jp>
- ▶ VOMS.kek.jp will move to VOMS.cc.kek.jp in next power cut August 2009.