CERN openlab
for DataGrid applications

openlab-II: where are we, where are we going

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What is the openlab?

- A **framework** for
  - IT R&D
  - in collaboration with Industry

openlab framework

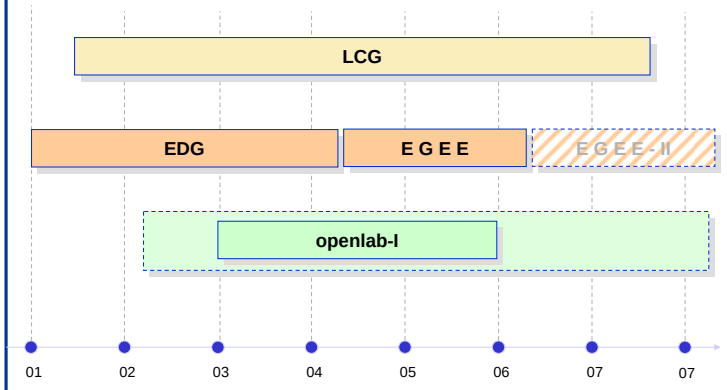
Partnership principles

- A framework for "R&D" in collaboration with Industry

openlab framework

- ***Partner*** commitment
  - 3 years
  - Contributions may be a mix of
    - In-kind (HW, SW, services, …)
    - In-cash (in general for fellows)
- ***Contributor*** commitment
  - 1 year
  - Lower level

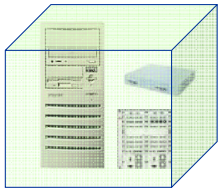
LCG, EGEE, openlab



What are we doing?

- **Evaluate** and **Integrate** cutting edge **technologies**
- 1st project: **opencluster**
  - Focus: **HPCN**

openlab framework



opencluster project

opencluster objectives

- Build an ultrahigh performance computer cluster
- Link it to the DataGrid and test its performance

Partners

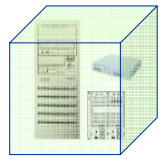
IBM, intel, hp invent, ORACLE, enterasys Networks that Know

opencluster partner solutions

Partner **solutions** evaluated

64b Processors	Itanium2 (HP + Intel) *Xeons – only recently*
SAN FS	StorageTank (IBM))
Databases	10g servers (Oracle)
Networking	10 Gb Ethernet (Enterasys + Intel) *Infiniband* *(Voltaire, contributor)*

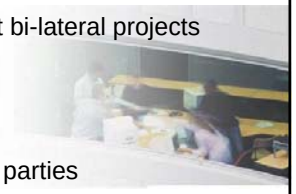
openlab framework



opencluster project

openlab is about Collaboration

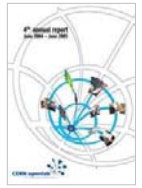
- Different from conventional **joint projects with industry, field tests?**
- openlab is **not** a collection of disjoint bi-lateral projects
- Implies
  - Common technical objectives
  - Active **collaboration** between all parties



openlab is an innovative structure for multi-lateral collaborative R&D

openlab is Open

- **Results published** *Annual Report*



- **Technical documentation available on-line** *cern.ch/openlab*

openlab results are open-access

openlab trains the younger generation

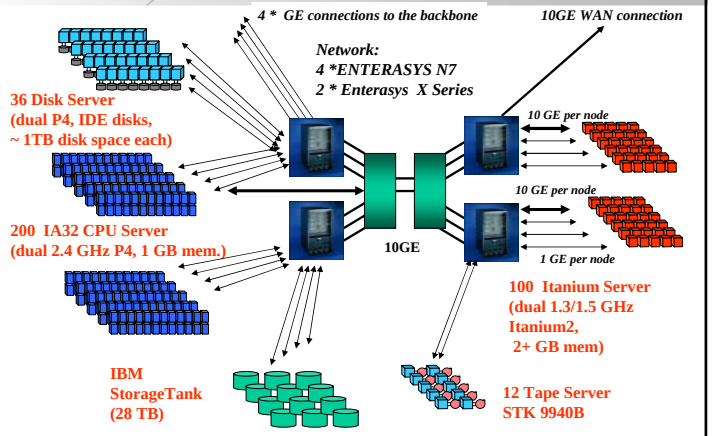
- openlab **student programme**

- **Grid café** for Grid education

GridCafé
www.gridcafe.org

openlab is also a Training Ground for a new generation of engineers

openlab-I Achievements: cluster



High Througput Prototype (opencluster + LCG prototype)

openlab-I Technical Achievements

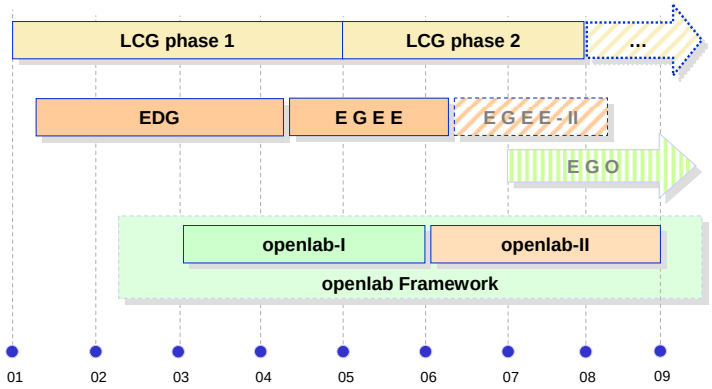
- Significant role in **data and service challenges**
  SC1, SC2, SC3
- Fully supported LCG-2 Software on **64-bit**
  - Grid enriched with 64-bit nodes
  - Three external centres joined the LCG
- Computational Fluid Dynamics
- Internet-2 **land-speed records**
  - Autumn 2004 : memory-to-memory
  - spring 2005 : disk-to-disk

openlab-I Lessons

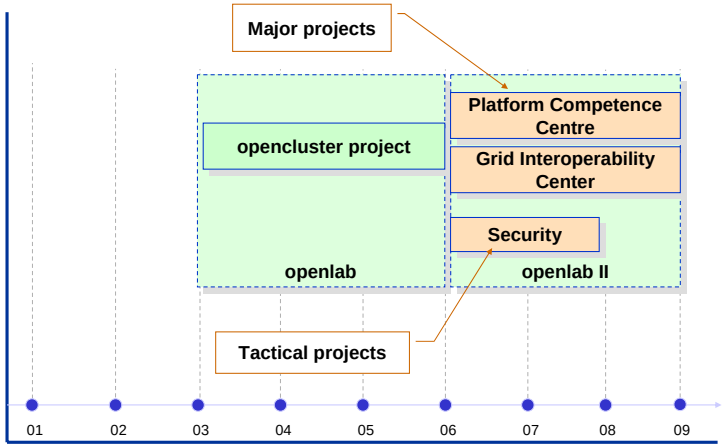
- openlab now established as a **brand name**
  - Innovative collaboration model is working
- Structure appropriate for achieving technical objectives
- Choice of evaluated technologies should adapt to changing prospects and better reflect LCG priorities
- Partner contributions should bring more manpower

Entering openlab-II

Timelines



openlab-II Projects



openlab-II PCC Project

Platform Competence Centre

- **Areas of work**
  - Virtualization
    - PC-based virtualization
  - Optimization
    - Software and hardware optimization
- **Technical Objectives**
  - Support users in adopting 64-bit technology
  - Provide expertise on compilers, code optimization
  - Support multi-core technology
  - Push high-performance I/O

openlab-II GIC Project

Grid Interoperability Centre

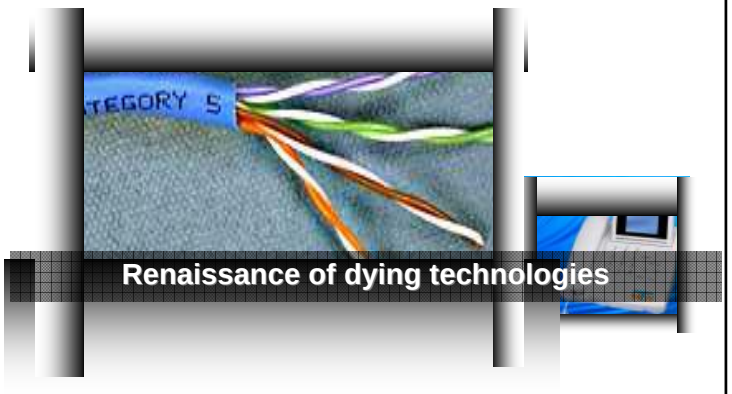
- **Positioning**
  - Collaboration with EGEE-II
  - Involvement of partners in Grid middleware
- **Technical Objectives**
  - Testing and certification
  - Support, analysis, debugging, problem resolution
  - Interoperability

openlab-II participants

- **Partners**
  - Intel
  - Oracle
  - *Agreement underway with others*
- **Contributor** (Security)
  - F-Secure (Finland)
  - Stonesoft (Finland)

On virtualization

On virtualization



Virtualization renaissance

- Triggered by increasing power of commodity hardware
- Supported by future processors
  Itanium, Pentium 4, Opteron, …
- Multiple guest OSs run simultaneously
  - Different distributions / versions provided simultaneously
  - Flexibility in choices of libraries and toolkits
  - Upgrades performed without replacing existing distribution
- Isolated execution environment
  - VM software does not affect execution of other VMs

Virtualization and Grid

A vision from Sverre Jarp, openlab TCO

- Grids may be much more flexible, secure when using virtualization
- Examples of applications
  - Create a simple server test environment under Xen
  - Allow multiple Linux distributions to be used
  - Allow VOs to run “foreign daemons” in a VO box

Conclusion

Capitalizing on experience gained from openlab-I …

… *en-route* for a challenging openlab-II programme