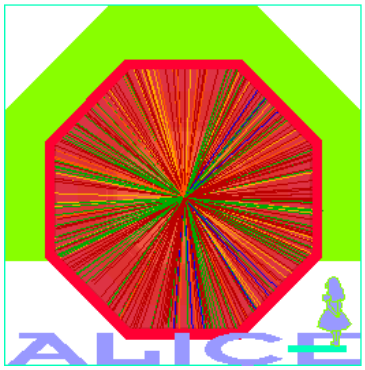
ALICE GRID Project



By

Bjørn S. Nilsen

ALICE GRID Project

Outline

Why is ALICE interested in the GRID/MONARC?

MONARC

The Computational GRID

ALICE GRID Project

Pb-Pb running 1 PBytes/year

p-p running 1 PBytes/year

Total Data 2 PBytes/year

Simulations 2 PBytes/year

Total Data storage 4 PBytes/year

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Computing Requirements

Assuming 500 MHz cpu + 1 GByte of ram

Simulations	10 000 pc-years
Data Reconstruction	10 000 pc-years
Analysis	????? pc-years

CERN will supply less than 33% maybe as low as 10%.

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A Solution — MONARC

Models of Networked Analysis at Regional Centers for LHC Experiments

Center Level	Relative Size	Typical Region Served
0	1	CERN full collaboration
1	~1/3	Multiple Counties or Large Country
2	~1/9	Country or Large Group
3	Dept. Size	Typical Single Group
4	Work station	Full time Analysis User
:	?	?

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Pros. and Cons.

Cost more in both man power and resources
Requires duplication of data
Requires additional tape and/or network resources
More difficult to administer
All software will need to run on many different platforms

Easier to get additional money when it is spent within a country
Easier to travel to a more local regional center then CERN
Costs may be minimized by sharing facilities with other LHC exps.
Extra Data safety by distributing data over many different places
May allow for additional use of resources otherwise not available

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An Improved Solution — GRID

1) Connect "high performance" computers from around the world with a high speed secure network.
2) Define and implement **ONE** unique virtual environment that is easy for the "user" to use.
3) Make it almost as easy to use as that **ONE** computer down the hall.

For example: Like with the electric power where you don't care which power plant actually produced the electric power, you don't care which actual computer did your computations. You just plug your microwave and use it. The computational grid you would just submit your computing job via your local internet tap and get the results.

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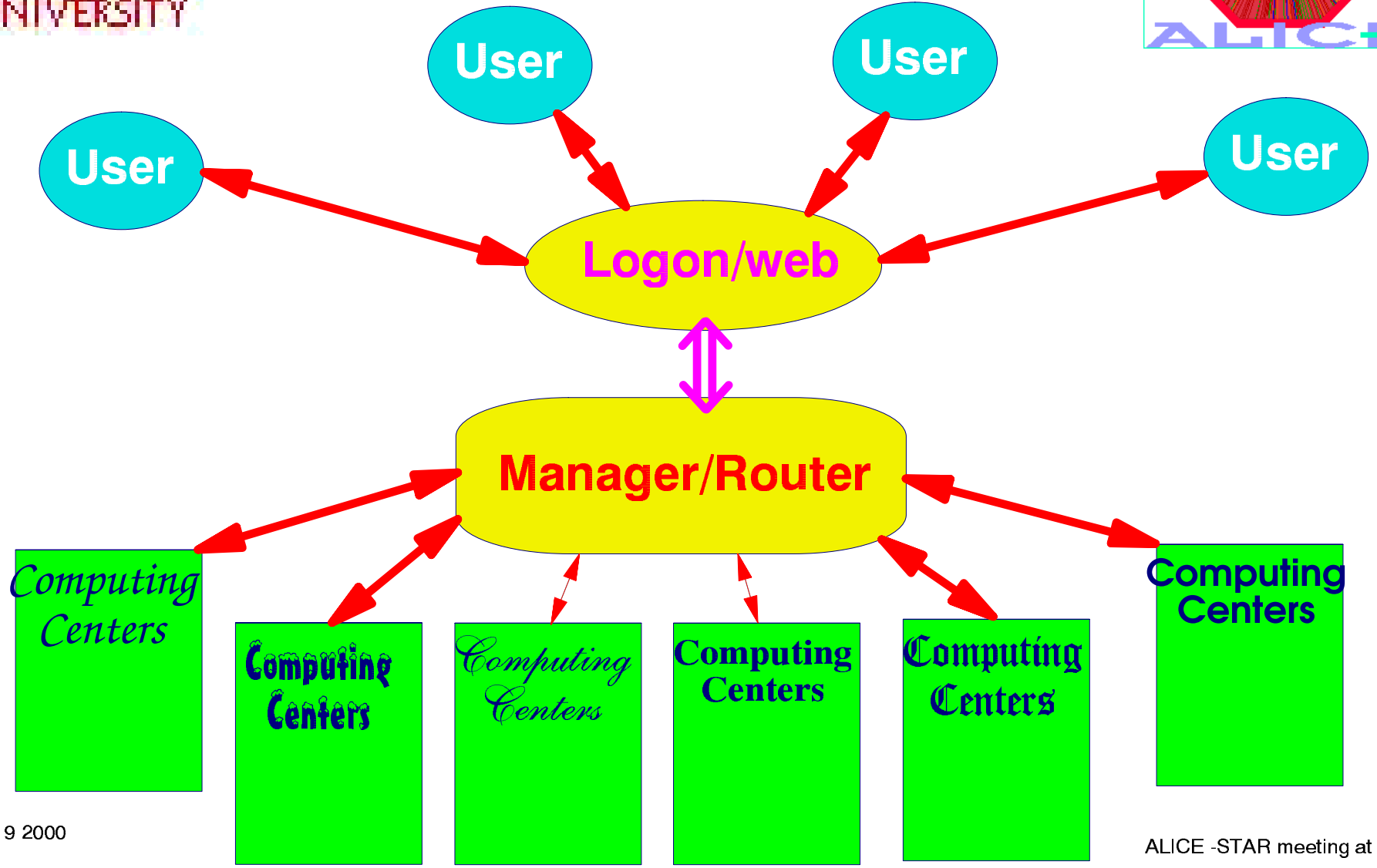

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USA
Computational Grid

Globus
Argon National Laboratory,
University of Southern California,
Cal. Tech.,
Northern Illinois University,
Kungliga Tekniska Hogskolan,
Indiana University,
Lawrence Berkeley National Lab.,
Los Alamos National Laboratory,
NASA Ames Research Center,
University of California at San Diego,
University of Houston,
University of Texas,
University of Illinois at Urbana-Champaign,
University of New Mexico,
University of Wisconsin

Europe
GRID

EGRID
Gridware (GENIAS),
Albert Einstein Institute Potsdam,
Paderborn Center for Parallel Computing,
Kungl Tekniska Högskolan,
Poznan superconducting and Networking Center,
High-Performance Computing-Center Stuttgart,
Laboratory of Parallel and Distributed Systems,
ZIB Berlin,
Masaryk University, Czech Republic
University of Lecce, Italy

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Similar Efforts

Condor
University of Wisconsin

Legion
University of Virginia

Gateway
NPAC Syracuse University
OSC Ohio State University

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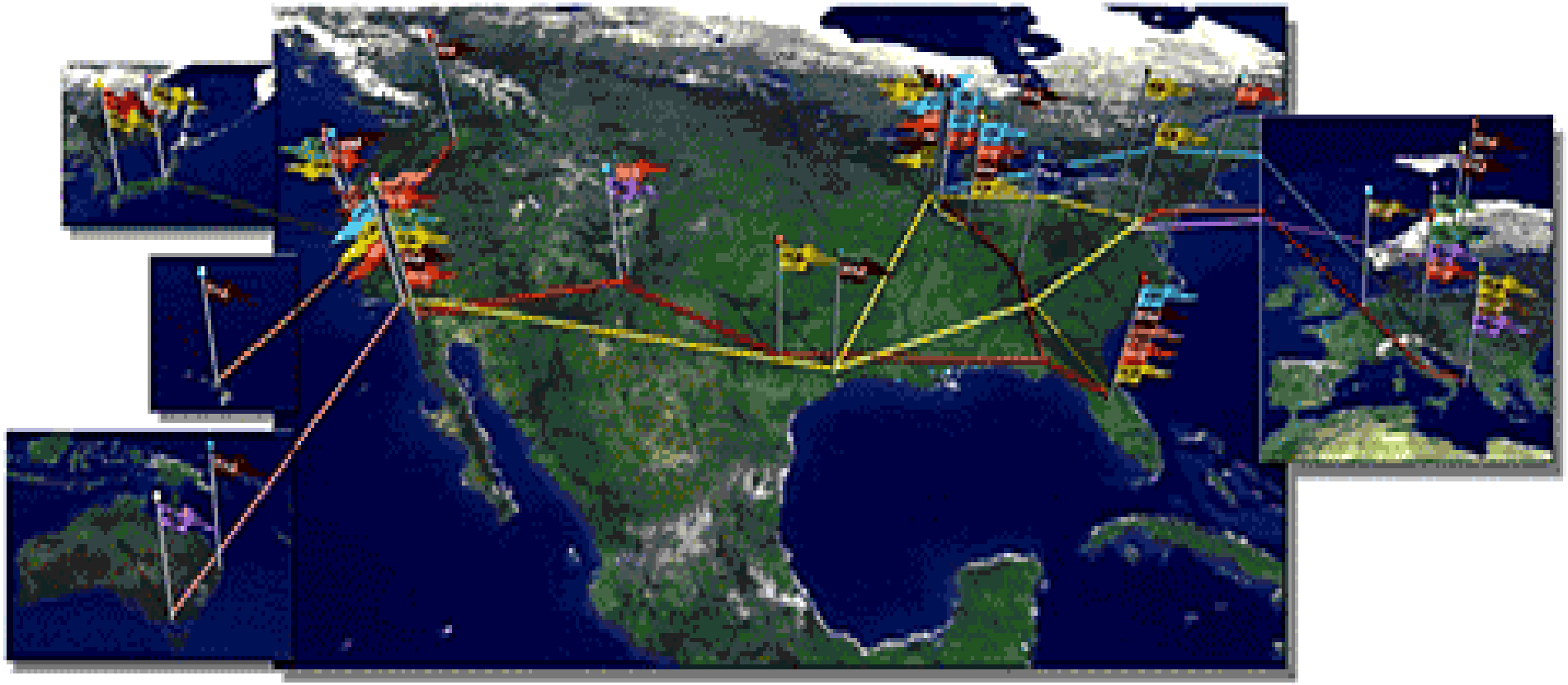
Globus Tests

GUSTO

Globus Ubiquitous Supercomputing Testbed



ALICE GRID Project

Tools

Resource Management

Information Infrastructure

Security

Communications

Fault Tolerance

Remote Data Access

Applications

Distributed Supercomputing

Smart Instruments
access to data archives and
on-line processing-visualization

Desktop Supercomputing

Teleimmersion
simulations + virtual reality in
a collaborative environment

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How ALICE Sees Things

Create ALICE/LHC Regional Centers

Add them to the GRID Infrastructure

Use GRID Software for access and distributed computing

Use GRID Networking for Data Transfers

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What are the Pitfalls

ALICE has limited resources, we really can't afford to contribute to the GRID infrastructure.

There is no Guarantee that the GRID will help a data challenged experiment like ALICE.

Resources expected to be available for ALICE may be siphoned off towards GRID development or other projects.

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What are the Advantages

The GRID may help to supply badly needed networking improvements in and between countries.

This networking would be better for data distribution than "tapes".

GRID developed software may greatly improve access to ALICE regional centers and possibly additional resources without additional or minimal "costs" for ALICE.

Obtaining additional "money" for ALICE computing should be easier if it would be spent in the same country and not sent off to CERN.

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Conclusions

MONARC + GRID should greatly improve HEP and RHI computing hopefully at a minimal additional investment.

We must work to make sure that HEP and RHI physics, described as "a GRID application *par excellence*", remains so.