

Nordic Grid Infrastructure Strategy Workshop

3-4 March 2008, Hilton, Copenhagen Airport



Nordic Grid Infrastructure Now and in the Future

Input from DCSC, also the Danish National Grid Initiative (NGI)

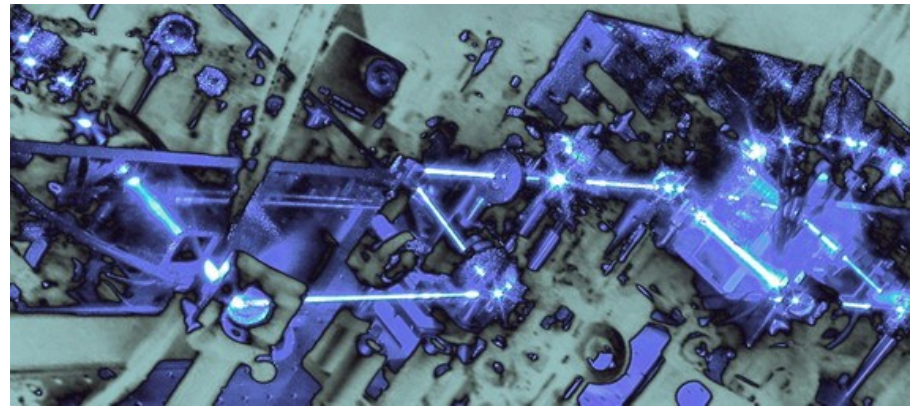
Rene Belsø

Dansk Center for Scientific Computing (DCSC)

Blegdamsvej 17; DK - 2100 Copenhagen Ø, Denmark
+45.35325453; info@dcsc.dk; www.dcsc.dk

Danish Center for Scientific Computing (DCSC):

- DCSC Aim, Background and Status
- DCSC Organisation Specifics
- DCSC Budget
- DCSC Open Calls for Tender
- Gridifying DCSC
- DCSC Grid Strategy Basics
- Conclusion



Aim – HPC & Grid for elite academia, by elite academia

DCSC is a national research infrastructure organisation under the Ministry of Science, Technology and Innovation with the aim of:

- **Providing** the best Danish research activities with the best possible HPC infrastructure, as seen by the research communities.
- **Fostering** current or potential HPC user communities, into producing strong and successful HPC based research teams
- **Building** and **operating** Grid Infrastructure (being the Danish NGI)
- **Danish node/member**: EGI; Sirene; e-IRG, NDGF (2009)

Background – From Centralisation to Decentralisation

< 2001: Dissatisfaction with centralised HPC organisation

- Little university engagement
- Funding to computer centre, investing centralised
- Focus on support and add-ons (overheads) vs. cycles

>2001: DCSC established ==>

- University/Ministry **consortium** and co-funding
- Funding to researchers, investing in **university facilities**
- Focus on **hardware**

Status – A new Danish HPC reality as of 19 December 2007

DCSC Expansion Plan approved by Minister ==>

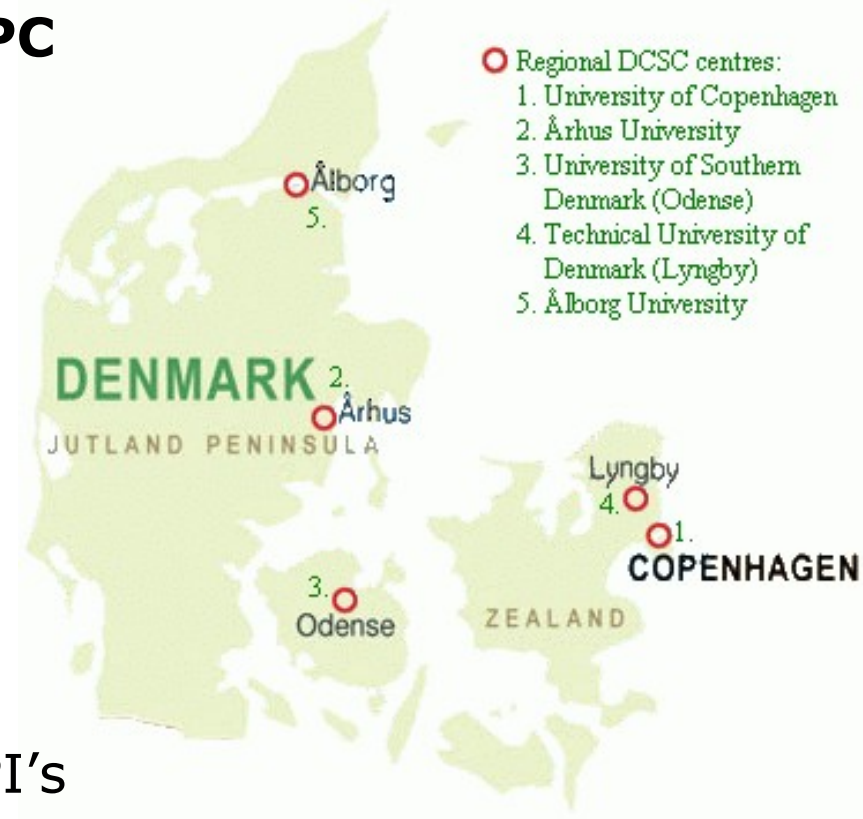
- 80% increase in annual budget (2008-2010) to MEUR 3.7
- Merges with Danish Center for Grid Computing (DCGC)
- National Grid Initiative (NGI) formed
- Taking over commitment to NDGF (as of 2009)

DCSC issues Gridification call ==>

- The Danish NGI is currently being formed

Decentralised organisation of HPC resources in Denmark

- University-Ministry partnership
- 5 decentralised regional operating centres
- 1 centralised (slim) coordinating administration
- Board: 5 of 10 members represent universities
- Majority of board members: User PI's



- Universities host and pay HPC **operations** (i.e. buildings, cooling, electricity, staff etc.) = estimated 50% co-funding
- Budget for HPC **hardware** (2007=89%; 2008=76%)
- Funding to **research** teams (not computer centres)
- Hardware determined by researchers (advised by operating centres)
- Hardware purchased by, located at, and run by operating centres
- 10% of hardware reserved for ***pool of free resources***
- Young researchers or new areas can also apply pool of free resources

DCSC Organisation PRO's:

- **Researchers** decide which HPC resources are best for their research
- **Resources are focused** – i.e. not invested on dubious additions
- **Close-to-lab utilization:** System administrators know their customers and researchers know and control the hardware
- **Synergy** between research, instrument setup and utilization
- **University engagement:** Legitimacy HPC investments as well as for DCSC
- Strong **elite users spearhead** development HPC infrastructure
- **High output** of high quality research

DCSC Organisation CON's:

- Presumes **substantial HPC experience**. Researchers must know what they want, why and how. *However.....:*
- Frail **critical mass** within user support and research community cooperation. *However.....:*
- Deficient **economy of scale**. *However.....:*
- Vague **synergy, specialization and division of labor**. *However.....:*

Concluding PRO's and CON's

as to a

decentralized vs. centralized organization

of national HPC for research:

PRO's clearly outweigh CON's

when opting for decentralization

DCSC Budget (2008 – 2010)



DCSC Activities (Million EUR)	% 2008-2010	2008	2009	2010	Annual Average
Calls for HPC proposals (Hardware)	75.6%	2.39	3.69	2.25	2.77
Call for CAUS proposals (Support & Grid)	9.7%	1.07	0.00	0.00	0.36
International cooperation (NDGF)	8.5%	0.00	0.47	0.47	0.47
DCSC Secretariat	6.2%	0.23	0.23	0.23	0.68
Total*	100.0%	3.69	4.38	2.95	3.67

* **Universities fund HPC operations**, being buildings, cooling, electricity, support staff etc. (\approx 50% co-financing)

DCSC funds researchers, *not* computer centres

Hence:

- The computer centres are secured an existence only at the mercy of the researchers success
- DCSC issues, to researchers, at least one call for proposals every year, the current 2 calls being:
 - EUR 2.39 million for, or access to, Scientific Computing **hardware**
 - EUR 1.07 million for Centres for Advanced User **Support** (CAUS)
- Both with closing date 1 April 2008

Gridification through *Centres for Advanced User Support (CAUS)*

Call aim is to co-fund CAUS staff:

... to make the DCSC pool of free HPC resources (10 % of all DCSC HPC resources) accessible via one or more Grid middleware frontends. HPC jobs should be submitted and executed in a user friendly way, seamlessly joining DCSC HPC resources in one virtual unified resource, servicing high quality research projects.

Full call text and guidelines: www.dcsc.dk/grant_applications.html

Gridifying DCSC (why, how) is outlined in the application, now granted by Minister ==>

- Call for *Grid operating centre* issued – I.e. Gridifying *pool of free resources*
- Grid operating centre to act as a *binding node* between DCSC and:
 - regional *operating* centres (i.e. executing queued jobs)
 - international *Grid production* efforts (NDGF, possibly EGI)
- Grid operating centre should support a variety of middleware (e.g. ARC, gLite, MIG...)

Gridification: an international endeavour ==>

- Nordic Grid **scene is unclear** and uncoordinated (EGEE, KnowARC, NDGF, NorduGrid, Nordunet3 ...)
- DCSC is committed to:
 - the pursuit of international Grid cooperation through intermediate **Nordic cooperation** – I.e. through NDGF (only)
 - supporting an NDGF with a **broader role** – I.e. more user communities and NDGF as Nordic node for international cooperation (the *NORDUnet-model*)
- DCSC is very opposed to:
 - the pursuit of **two parallel Grid infrastructures** within the Nordic region (EGEE vs. NDGF)

DCSC suggests:

- **One Nordic Grid Initiative** – Merger of existing Nordic Grid efforts (NDGF, EGEE etc.) via a (*repeated*) joint principle decision within the Nordic Research Councils
- that the **primary stakeholders seek consensus** (NGI's, elite users, NDGF) on the Nordic Grid cooperation's scope and content, hence for what and how NDGF funding and secretariat support is best utilised
- that **Grid middleware** development and implementation (ARC?) is recognised as the core activity, and markedly strengthened, hence effecting NDGF's focus, call structure and international activities

- that Nordic Grid cooperation is subsequently, **gradually broadened**, within NDGF, as *confidence* and agreement can be built within and between Computer centres, NGI's and elite users
- that "**confidence**" is understood as **two-sided**:
 - ∅ Computer centres and NGI's constitute the *de facto* National Grid infrastructure, as opposed to being decoupled or a sub-department of NDGF
 - ∅ NDGF must prosper and expand its proven success, as opposed to being held back by conservative computer centres and NGI's clinging to funding opportunities and power
- that NDGF is *gradually* given the task to act on behalf of the Nordic countries in international Grid questions, following the **NORDUnet model**

DCSC concludes:

- That DCSC is a **strong supporter of NDGF**, and would like to see it do more on the Nordic as well as international Grid scene
- That NDGF should, however, first:
 - Focus on the **two-sided confidence building**
 - **Work directly with stakeholders** (computer centres, NGI's and the national HPC initiatives/organisations)
 - **Coordinate** and strengthen activities within and among the national stakeholders
 - **Fund decentralised cooperation** initiatives from stakeholders
 - **Follow the NORDUnet example** of a prospering bottom-up Nordic cooperation, acquiring significant Nordic added value and international influence

Thank you, for your interest and attention

www.dcsc.dk

