

Grid Computing

DCC/FCUP

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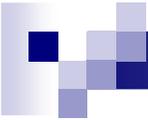
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Organization

- **url:** <http://www.dcc.fc.up.pt/~ines/aulas/1213/CG/CG.html>

- **Program:**
 - Introduction
 - Review of parallel and distributed programming
 - Review of distributed systems
 - Definitions and concepts
 - Grid architectures
 - Grid taxonomy
 - Grid applications taxonomy
 - “Gridification”
 - Task management
 - Data management
 - Resource and Task scheduling
 - Grid Middleware
 - Job Description Languages
 - The middleware gLite



Organization

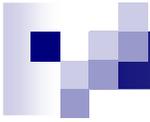
- **Evaluation:** 1 exam and 4 assignments (?) + short presentations
- Evaluation metric and criteria

- **Bibliography:**
 - *Grid Computing: Making the Global Infrastructure a Reality*, F. Berman, G. C. Fox and A. J. G. Hey editors, Wiley, 2003, ISBN 0-470-85319-0.
 - *The Grid 2: Blueprint for a New Computing Infrastructure* (The Elsevier Series in Grid Computing) by Ian Foster and Carl Kesselman (Hardcover - Nov 18, 2003)
 - *The Grid Technology Cookbook*, Mary Trauner and Mary Fran Yafchak
 - [Introduction to Grid Computing \(Chapman and Hall/CRC Numerical Analysis and Scientific Computation Series\)](#) by Frederic Magoules, Jie Pan, Kiat-An Tan and Abhinit Kumar , 2009
 - Various articles (will be available in the webpage of the discipline)



Organization

- Communication alternatives
 - Favorite: email (ines@dcc.fc.up.pt)
 - Sigarra web page of the discipline
 - Internal DCC mailing list:
 - grid1213@alunos.dcc.fc.up.pt



Let's start from the beginning 😊

What is a grid?



Let's start from the beginning ☺

What is a grid?

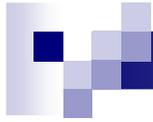
Is it a cluster?



Let's start from the beginning ☺

What is a grid?

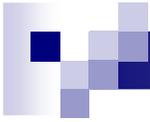
Is it a collection of data?



Let's start from the beginning 😊

What is a grid?

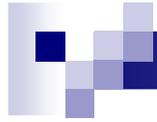
Is it a collection of machines?



Let's start from the beginning 😊

What is a grid?

Is it superman? 😊



What is a grid?

- Several definitions...



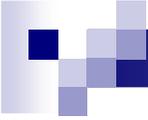
What is a **grid**?

- The **infrastructure** used by utility companies to **distribute** power to its consumers.
www.borregosolar.com/resources/glossary.php
- A system of **transmission** lines which interconnect the generating stations and **distribution** centres of local electricity authorities.
www.ergon.com.au/energyed/glossary.asp
- A **distribution network**, including towers, poles, and wires that a utility uses to deliver electricity.
www.sunpowercorp.com/homeowners/solar_basics_glossary.html
- A **network** of power lines or pipelines used to **move** energy.
www.windustry.org/resources/glossary.htm



What is a computational **grid**?

- Originally used to denote a **hardware and software infrastructure** that enables applying the **resources of many computers** to a single problem.
- Now increasingly used to denote more broadly a **hardware and software infrastructure** that enables **coordinated resource sharing** within dynamic organizations consisting of individuals, institutions, and resources.



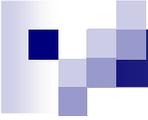
What is a computational grid?

- A set of clusters?
- More than that:
 - Virtual Organization that allows clustering of resources that are geographically apart
 - Resources can be machines, data, instruments etc



Sites of interest

- GGF, www.gridforum.org
- Links to grid projects and initiatives
 - Globus, www.globus.org
 - OSG, www.opensciencegrid.org
 - EGEE, www.eu-egee.org
 - DEISA, www.deisa.org
 - EGI, www.eu-egi.org
 - Gridbus, www.gridbus.org
 - Grid Computing Info Centre, www.gridcomputing.com
 - ...



Main conferences and journals

- Grid Computing
- Super Computing
- High performance and distributed computing
- Cluster and grid computing
- Grid and Pervasive Computing
- Global and Peer-to-Peer Computing
- Journal of Grid Computing
- Journal of High Performance applications
- Journal of Parallel and Distributed Computing
- Concurrency and Computation: Practice and Experience



Research Challenges

- Applications
- Programming models and tools
- System architecture
- Algorithms and problem solving methods
- Resource management
- Data management
- Security
- Instrumentation and performance analysis
- End systems
- Network protocols and infrastructure

Fonte: [The Grid: Blueprint for a New Computing Infrastructure](#), by [Ian Foster](#) and [Carl Kesselman](#)



Motivation

- **Scientific:** allow coordinated and organized access to remote resources
- **Political:** allow coordinated and organized access to non-confidential and confidential data
- **Financial:** justify investment on HEP
- **Social:** helps to fill the digital divide gap