

# Course summary



# Outline

- ❑ **Course summary**
- ❑ **Acknowledgements**

# Cluster vs. Grid computing

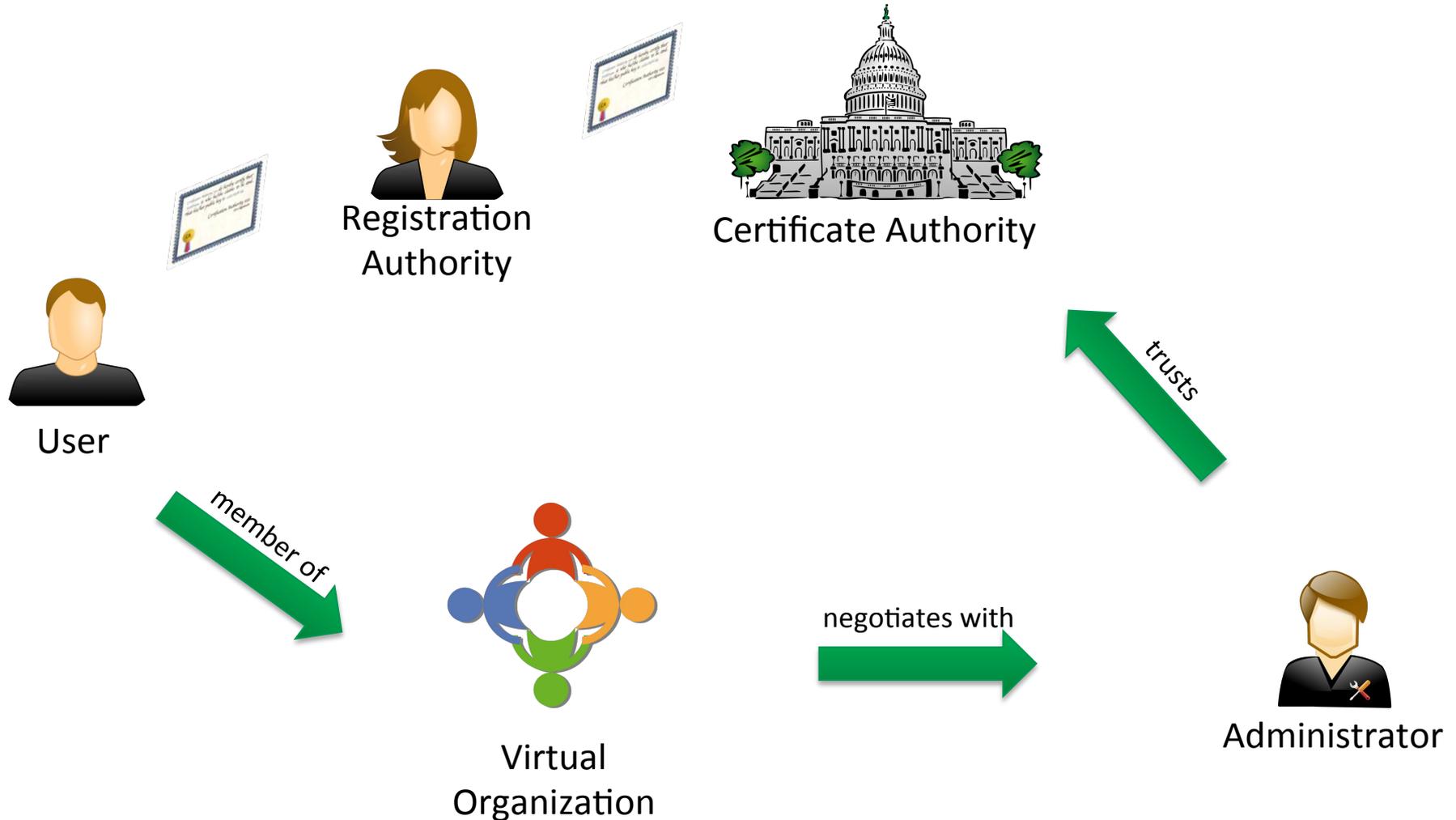
## ❑ Cluster

- One site
- Shared local storage with home account
- Username based authentication
- Relatively homogeneous hardware
- Direct job submission

## ❑ Grid

- Multiple sites
- No shared storage
- Certificate based authentication
- Heterogeneous hardware
- Job submission through middleware

# The grid security trust chain



# Certificates summary

- ❑ Certificates enable authentication
- ❑ VOMS extensions enable authorization
- ❑ Proxy certificates are used to shield your real certificate
- ❑ The MyProxy service enables longer life time jobs

# Job submission summary

- ❑ Jdl's define job properties
- ❑ Submit jobs using the WMS
- ❑ Use a script to setup environment
- ❑ Pilot job systems

# Storage summary

- ❑ In- & output sandbox
- ❑ SRM for large amounts of data
- ❑ Data staging

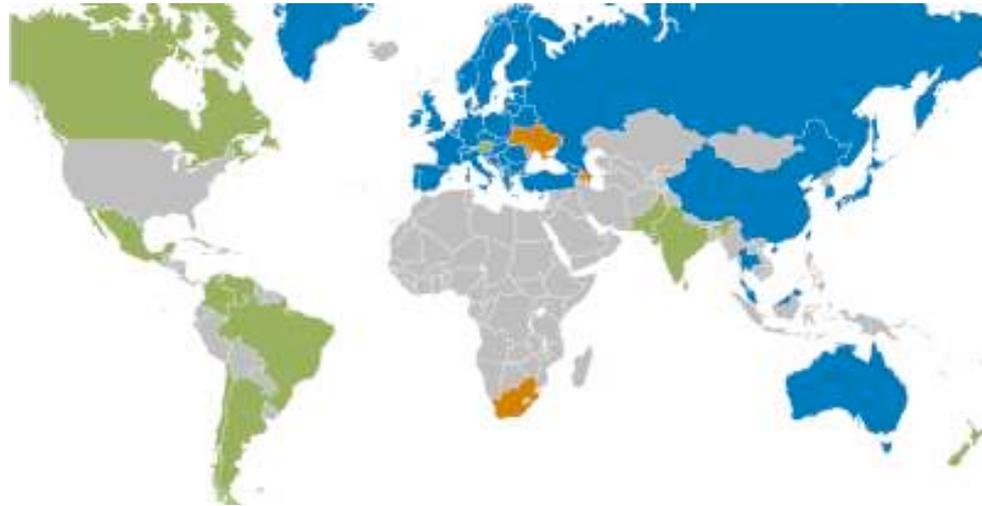
# Best practices

*Users have to do a lot of things themselves...*

- ❑ **Prepare the application**
  - What program? What data? Other requirements?
  - Don't rely on hard-coded paths. Program portably.
- ❑ **Submit a bunch of jobs**
  - Track status/Retrieve output
  - Deal with failures
- ❑ **Error handling is not easy**
  - Embed logging steps in your scripts for debugging
  - Use *Pilot jobs*
- ❑ **Adapt your implementation design considering**
  - memory, wall-clock times, available scratch space
- ❑ **Start small...scale up gradually; learn**



# Thanks



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# The team



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# Thanks

- ❑ **Gergely Sipos: The role of EGI**
- ❑ **Joeri van Leeuwen: Extreme physics in space**
- ❑ **Eleni Katragkou: Climate change over Europe**
- ❑ **Jeroen Schot: Data parallel processing with Hadoop**
- ❑ **Eva Sciacca: VisIVO Science Gateway**
- ❑ **Michiel van Galen: RNA-seq analysis with PiCaS**
- ❑ **Afonso Duarte: Structural Biology in the Grid**

# Thanks

