Minimum intrusion Grid

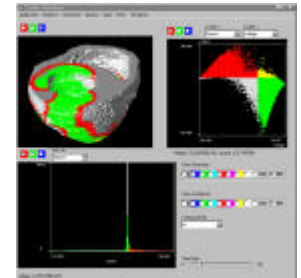## P-Cubed and CINEMA workshop

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NBI eScience
University of Copenhagen

The Grid

- 'Internet' mainly allows access to separate information, resources
- The Grid should provide unified access to **any** desired resource
  - Processing
  - Storage
  - Applications
  - People
- Sharing, collaboration
  - Virtual organizations

Problems in Classic Grid Models?
(not every problem in every middleware)

- Single point of failure
- Lack of scheduling
- Poor scalability
- No means of implementing privacy
- No means of utilizing 'cycle-scavenging'
- Firewall dependencies
- Highly bloated middleware
- Cumbersome user collaboration
- Steep learning curve
- Ad-hoc application access
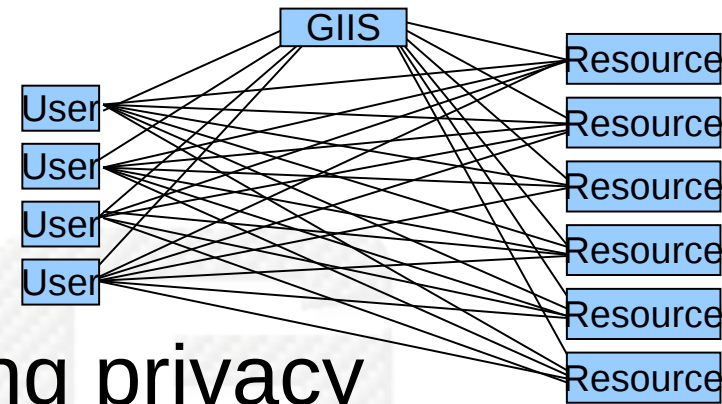
Minimum intrusion Grid - Idea

- Address 1st gen. problems
- GRID should be a system
  - not just a protocol
  - servers that **are** GRID
  - coordinated upgrade
- Users and resources do not have to maintain anything
- Appears as big virtual computer to users
- Appears as group of users to resources
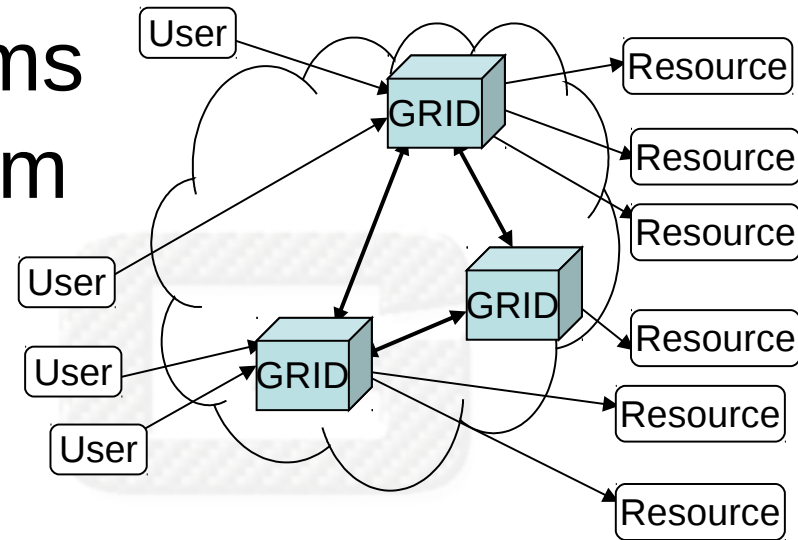
Why is GRID Needed?

- Science & business go virtual
  - A lot of areas turn to computer simulations
  - More, bigger and cheaper experiments
  - Data mining
- Computer power is consolidated in data centres
  - Avoid user maintenance
  - Better utilization $\rightarrow$ cheaper
  - Users need easy access
  - Providers need access control
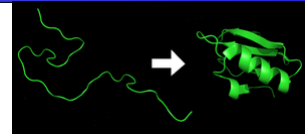
MiG Rules

i. Nothing produced by MiG can be **required** to be installed on either the resource or client end

ii. Everything within MiG must be implemented in Python unless another language is absolutely required

iii. Any design and implementation decision must optimize towards transparency for the users

iv. Anything that is not right must be thrown away
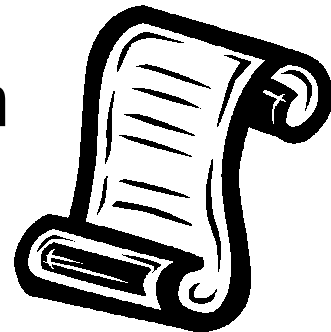
MiG Requirements - User

- Users **don't need** to install Grid software
  - A web-browser is enough
  - X.509 certificate for identification/access
- **Optional** advanced interfaces
  - User scripts
  - Client APIs
  - Remote file system
  - Native clients

Request User Certificate

Install User Certificate

Certificate mail
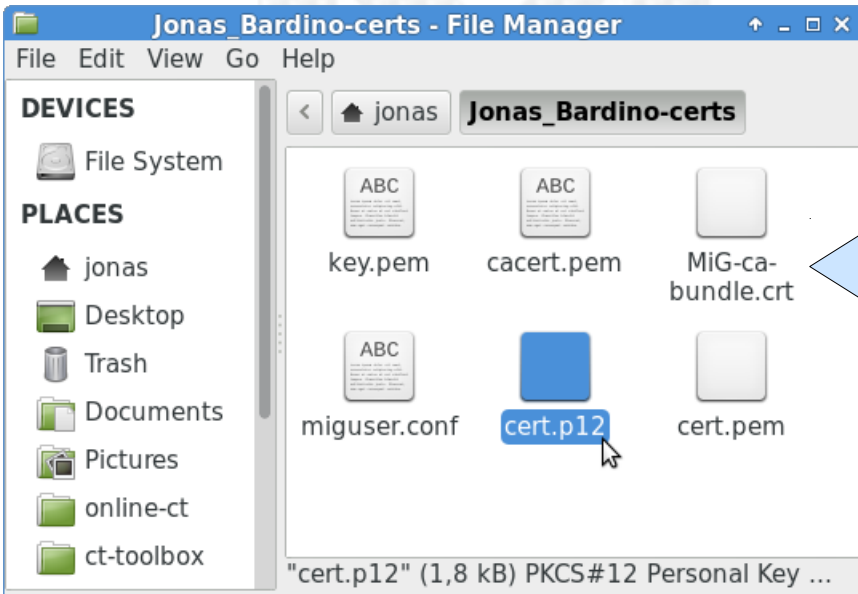
Import .p12 in browser

User View of MiG

MiG Requirements - Resource

- Resources **don't need** to install Grid software
  - Only create MiG user(s)
  - Provide limited remote access
    - ssh inbound
    - https outbound
- System administrators use ordinary X.509 user certificates to manage resources
- Sandboxed systems have even fewer requirements

Resource Owner View of MiG

Files

Private user home on MiG

All file refs are relative to user home

File Editor

Jobs

- The Grid work unit is jobs
  - Typically batch command(s)
  - Including resource specs
  - User input/output files
- Users send jobs to MiG queue
  - Replication (if enabled)
  - Execution when a suitable resource is ready
  - All job handling is done by MiG
  - User may override jobs: hold, cancel, resubmit
- Grid apps typically wrap jobs to create flow
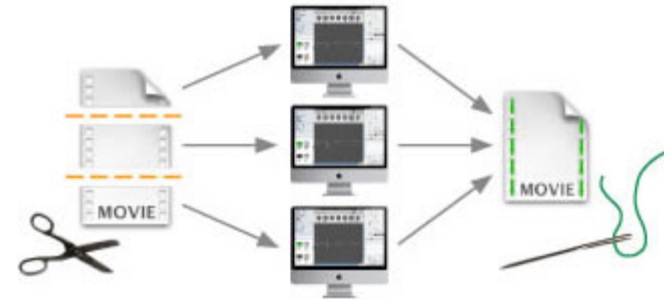
Submit Job I

File   Edit   View   History   Bookmarks   Tools   Help

https://dk-cert.migrid.org/cgi-bin/submitjob.py

Google Encrypt

MiG   Minimum intrusion Grid

- Dashboard
- Submit Job
- Files
- Jobs
- VGrids
- Resources
- Downloads
- Runtime Envs
- People
- Settings
- Docs

Submit Job

This page is used to submit jobs to the grid.

There are 3 interface styles available that you can choose among: fields style , textarea style , files style

Please note that changes to the job description are *not* automatically transferred if you switch style.

Please fill in your job description in the fields below:

Please fill in one or more fields below to define your job before hitting Submit Job at the bottom of the page. Empty fields will simply result in the default value being used and each field is accompanied by a help link providing further details about the field.

Execute Commands: ⓘ help

```
echo 'hello grid!'
```

Input Files: ⓘ help

Output Files: ⓘ help

Executable Files: ⓘ help

Submit Job II

Submit Job III

Job Status

Job Result

Runtime Environments

- **Resource and user 'contract'**
  - without them almost nothing is guaranteed
  - used to negotiate apps and libs in a generic fashion
  - anyone can define them, but only resource owners can specify which ones they implement and how
  - no spec update is possible, always create new
- **Examples**
  - PYTHON-2.X-1 (any Python 2.X interpreter)
    - resource owner specifies PYTHON=/path/to/python
    - user knows that $PYTHON contains actual path in job
  - Local files, devices or markers
- **Managed by resource owners**

Runtime Environments: ⓘ help
- ☐ AMBER-10.X-1
- ☐ AMDGPUPERF-1.X-1
- ☑ BASH-ANY-1
- ☐ BIBTEX-ANY-1
- ☐ CIL-2.0.X-1
- ☐ CT-TOOLBOX-1.X-1

Viewing Runtime Environments

Python Job using Runtime Env

Execute Commands: ⓘ h

```
$PYTHON fib.py 26
```

Executable Files: ⓘ help

```
fib.py
```

CPU/Wall Time (s): ⓘ help

```
300
```
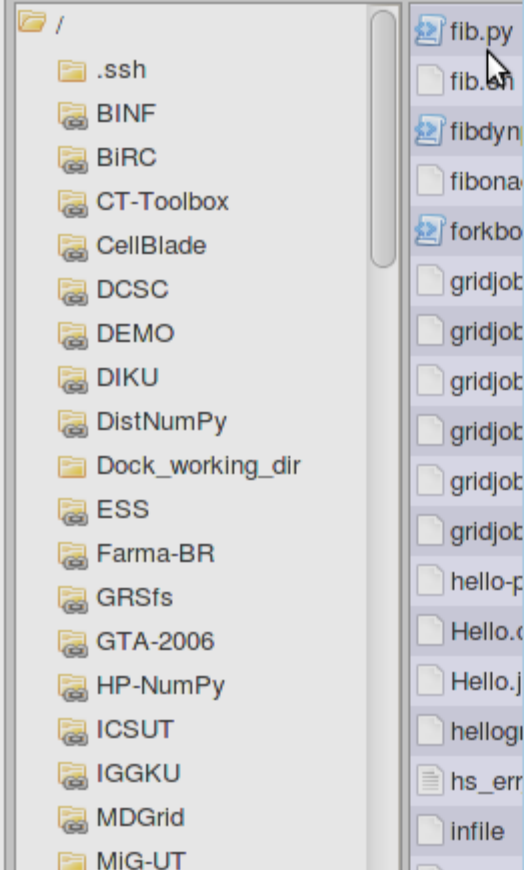
Memory (MB): ⓘ help

```
256
```

Disk (GB): ⓘ help

```
1
```

Runtime Environments: (

- ☐ PYRO-3.8.X-1
- ☐ PYTHON-2.5.X-1
- ☐ PYTHON-2.6.X-1
- ☐ PYTHON-2.7.X-1
- ☑ PYTHON-2.X-1

Minimum intrusion Grid

File Manager

/

- 📂 /
  - 📁 .ssh
  - 📁 BINF
  - 📁 BiRC
  - 📁 CT-Toolbox
  - 📁 CellBlade
  - 📁 DCSC
  - 📁 DEMO
  - 📁 DIKU
  - 📁 DistNumPy
  - 📁 Dock_working_dir
  - 📁 ESS
  - 📁 Farma-BR
  - 📁 GRSfs
  - 📁 GTA-2006
  - 📁 HP-NumPy
  - 📁 ICSUT
  - 📁 IGGKU
  - 📁 MDGrid
  - 📁 MiG-UT

- fib.py
- fib.sh
- fibdyn
- fibona
- forkbo
- gridjob
- gridjob
- gridjob
- gridjob
- gridjob
- gridjob
- hello-p
- Hello.c
- Hello.j
- hellogi
- hs_err
- infile

Editor ✕

Select file:

```
./fib.py
```

Edit contents:

```python
#!/usr/bin/python
# -*- coding: utf-8 -*-
"""Simple recursive Fibonacci"""

import sys

def fib(arg):
    """Naive, recursive Fibonacci number calculator"""
    if arg < 2:
        return arg
    return (fib(arg-1) + fib(arg-2))

if __name__ == "__main__":
    if len(sys.argv) < 2:
        print "Usage: %s VALUE" % sys.argv[0]
        sys.exit(1)
    val = 1
    try:
        val = int(sys.argv[1])
    except ValueError:
        print "Illegal input value: %s" % sys.argv[1]
        print "Usage: %s VALUE" % sys.argv[0]
        print "falling back to %s" % val
    print "fib %s is %s" % (val, fib(val))
```

VGrids

- VGrids are Virtual Organizations in MiG
- Straight forward collaboration
  - Share files
  - Share resources
  - Private web page / portal
  - Public web page / portal
  - Private Wikis
  - Private SCM repositories
  - Private blogs / forums
  - Private issue tracking
- Completely user managed

View VGrids

Manage VGrids

VGrid Private Homepage

VGrid Public Homepage

VGrid Private Wiki

File   Edit   View   History   Bookmarks   Tools   Help

https://dk-cert.migrid.org/cert_redirect/vgrid_share

Google Encrypt

M i G

Search

Login | Preferences | Help/Guide | About Trac

Wiki | Timeline | Roadmap | Browse Source | View Tickets | Search

Start Page | Index | History | Last Change

Cph CT

This is the CPH CT toolbox members project tracker used for internal development of the Cph CT Toolbox.

We store internal information about development and documentation here.

Public information should be published on the google code and google sites pages.

Meetings

- PlanningMeeting04102011
- PlanningMeeting12042012

Feature Map

italic items are not finished

X-Ray source \ z-motion	Step-n-shoot	Spiral
Fan	*Center FDK Numpy+CUDA*	*?*
Cone	*FDK Numpy+CUDA*	Katsevich Numpy+CUDA

Repository Layout

The actual toolbox code for release is available inside the cphcttoolbox sub directory of the repository. Files outside that directory are for internal purposes like storing temporary implementations of algorithms before porting them to the final release format.

Documentation

All central documentation should be listed here eventually

- CodeStructure : the proposed code structure for the toolbox release
- ReleaseInstructions : how to make a new release
- README : important information included in the release

Look and feel

https://dk-cert.migrid.org/cert_redirect/vgrid_shared/CT-Toolbox/.vgridtracker/cgi-bin/trac.cgi/login

VGrid Private SCM Repository

VGrid Private Issue Tracker

File Edit View History Bookmarks Tools Help

https://dk-cert.migrid.org/cert_redirect/vgrid_share

Google Encrypt

MiG

Search

logged in as bardino@nbi.ku.dk | Logout | Preferences | Help/Guide | About Trac

Wiki | Timeline | Roadmap | Browse Source | **View Tickets** | New Ticket | Search

Available Reports | Custom Query

{1} Active Tickets (47 matches)

- List all active tickets by priority.
- Color each row based on priority.

Ticket	Summary	Component	Version	Milestone	Type	Owner	Status	Created
#116	AMD OpenCL pointer offset	application			defect		new	08/15/13
#18	Multicore Katsevich	application			enhancement		new	05/29/12
#19	Multicore FDK	application			enhancement		new	05/29/12
#70	Flexible angle and progress in katsevich	application			enhancement		new	12/06/12
#25	implement low/high pass filters for Katsevich	application			feature	bardino@...	accepted	06/08/12
#30	Move 'scene meta data' to plugins	library			task		new	07/13/12
#94	Occasional CUDA LaunchErrors on nvidia gtx (nelson/marge)	library			task	bardino@...	assigned	03/22/13
#99	Timelog and gpu sync	library		Release version 1.1.0	defect		new	06/26/13
#1	OpenCL Katsevich	application	1.1.0	Release version 1.1.0	enhancement	rehr@...	assigned	12/01/11
#104	Document OpenCL Katsevich	documentation	1.1.0	Release version 1.1.0	task	rehr@...	new	07/10/13
#76	Flexible pixel interpolation for all apps	library	1.2.0	Release version 1.2.0	enhancement		new	01/11/13
#43	Move save_filtered_projections to tool scripts	application			enhancement		new	09/03/12
#47	FDK latency hiding	application			enhancement	rehr@...	new	09/11/12
#48	Katsevich latency hiding	application			enhancement	bardino@...	new	09/11/12
#78	Robustness when insufficient hardware specs are available	application			enhancement		new	01/18/13
#107	Automatic chunk size selector	application			enhancement		new	07/12/13
#113	Support for multiple GPU queues	library			enhancement		new	08/02/13
#114	loadzeros plugin -> loadscalar	library			enhancement		new	08/02/13
#115	npy-preprocess plugins: Projection boundingboxes	library			enhancement		new	08/02/13
#4	Port our FBP code to cphct	application			task	bardino@...	accepted	12/01/11
#7	Document FBP	documentation			task	bardino@...	accepted	12/01/11
#39	Stand-alone prefilter tool	application			task		new	08/01/12
#56	Investigate try / except performance	application			task		new	10/04/12
#65	FDK performance (flat vs curved)	application			task	rehr@...	accepted	11/29/12
#92	Investigate artifacts on big examples with big filter chunks	application			task	bardino@...	new	03/15/13

VGrid Private Forum

File   Edit   View   History   Bookmarks   Tools   Help

https://dk-cert.migrid.org/cert_redirect/vgrid_share

MiG

Search

logged in as bardino@nbi.ku.dk | Logout | Preferences | Help/Guide | About Trac

Wiki | Timeline | Roadmap | Browse Source | View Tickets | New Ticket | Search | Pastebin | Stats | Admin | **Discussion** | Blog | Downloads

Forum List

ID	Forum	Moderators	Last Topic ▼	Last Reply	Founded	Tags	Topics	New Topics	Replies	New Replies
1	**Design discussions** All topics related to the eSciStore design	..	02/12/14 18:18:58 34 seconds ago	02/12/14 18:19:25 7 seconds ago	02/12/14 18:16:07 3 minutes ago		1	1	1	0
2	**Implementation details** For discussing implementation details	..	02/12/14 18:17:45 107 seconds ago	no replies	02/12/14 18:16:51 3 minutes ago		1	1	0	0

New forum

Powered by **Trac 0.11.7**
By Edgewall Software.

VGrid Monitor

View Resource

Resource Models

- ## Conventional resources

  - Like all other Grid systems, only easier
  - Basic user accounts with (restricted) ssh access from MiG servers
  - Compute and external storage nodes

- ## MiG-SSS

  - A very powerful screensaver
  - Virtualised minimal Linux distro

- ## PS3-live

  - Minimal Linux Live CD for PlayStation3

- ## One-Click

  - The simplest possible way to contribute
  - Web page with java applet

Managing Resources

Resource Administration

Storage Resources

Personal Settings

SFTP Settings

File Edit View History Bookmarks Tools Help

https://dk-cert.migrid.org/cgi-bin/settings.py?topic

Google Encryp

MiG — Minimum intrusion Grid

- Dashboard
- Submit Job
- Files
- Jobs
- VGrids
- Resources
- Downloads
- Runtime Envs
- People
- **Settings**
- Docs

Settings

general settings , job settings , style settings , profile settings , widgets settings , ssh settings

SSH/SFTP access to your MiG account

You can configure SFTP login to your MiG account for efficient file access. Login takes place with public key or password and your automatic username:

L0M9REsvU1Q9TkEvTD1OQS9PPU5CSS9PVT1OQS9DTj1Kb25hcyBCYXJkaW5vL2VtYWlssQWRkcmVzc2l1YXJkaW5vbG5iaS55rdS5kaw__

You can use any existing SSH/RSA key, including the key.pem you received along with your user certificate, or create a new one. In any case you need to save the contents of the corresponding public key (X.pub) in the text area below, before you can connect as described in the following sections.

Graphical SFTP access

The FireFTP plugin for Firefox is known to generally work for graphical access to your MiG home over SFTP. Enter the following values in the FireFTP Account Manager:

```
Host dk.migrid.org
Login L0M9REsvU1Q9TkEvTD1OQS9PPU5CSS9PVT1OQS9DTj1Kb25hcyBCYXJkaW5vL2VtYWlssQWRkcmVzc2l1YXJkaW5vbG5iaS55rdS5kaw__
Password YOUR_KEY_PASSWORD_HERE
Security SFTP
Port 2222
Private Key ~/.mig/key.pem
```

other graphical clients may work as well.

Command line SFTP/SSHFS access on Linux/UN*X

Save something like the following lines in your local ~/.ssh/config to avoid typing the full login details every time:

```
Host dk.migrid.org
Hostname dk.migrid.org
User L0M9REsvU1Q9TkEvTD1OQS9PPU5CSS9PVT1OQS9DTj1Kb25hcyBCYXJkaW5vL2VtYWlssQWRkcmVzc2l1YXJkaW5vbG5iaS55rdS5kaw__
Port 2222
IdentityFile ~/.mig/key.pem
```

From then on you can use sftp and sshfs to access your MiG home:

```
sftp dk.migrid.org
```

SFTP File Access

SSHFS Remote File Access

Application Platforms (VGrids)

Live I/O

Job Communication

Mobile/Tab Access

MiG Conclusions

- MiG is 'feature complete'
- Easy to use, transparency
  - users / resource owners
- Flexible resource sharing
- Dynamic collaboration tools
- Application platform

Further Information

www.migrid.org