

The most recent version of this document is always at: <http://opt-fs.discovery.wisc.edu/ClusterDocumentation.pdf>

Cluster Machines

- All machines mount shared, backed up nfs space under /data and /progs.
- Hosts in discovery.wisc.edu mount a building-wide Working Storage gluster space under /mnt/ws for shared project files and a unified home directory.
- Each machine has local disk space available in /scratch that is NOT backed up.
- All cores are Hyper-Threaded. Machines will display twice the number of processors listed.

Host Name	Hardware Description	Notes
Compute Nodes		
opt-a001.discovery.wisc.edu	<u>Dell R810</u>	2T /scratch
opt-a002.discovery.wisc.edu	256G Memory	
opt-a003.discovery.wisc.edu	4 2G E7-4850 Xeon Chips	
opt-a004.discovery.wisc.edu	40 Cores	
opt-a005.discovery.wisc.edu*	<u>Dell R710</u>	1.4T RAID1 /scratch *opt-a005 runs Windows VM <u>opt-vm-1.discovery.wisc.edu</u> (must request access from support)
opt-a006.discovery.wisc.edu	2 3.46G X5690 Xeon Chips 12 Cores	
opt-a007.discovery.wisc.edu	<u>Dell R510</u>	16T RAID5 /scratch
opt-a008.discovery.wisc.edu	128G Memory	
opt-a009.discovery.wisc.edu	2 2.66G X5650 Xeon Chips 12 Cores	
opt-a010.discovery.wisc.edu		
opt-a011.discovery.wisc.edu		
opt-a012.discovery.wisc.edu		
opt-a013.discovery.wisc.edu	<u>Dell R420</u>	Priority for Alagoz' Research
opt-a014.discovery.wisc.edu	128G Memory	200G RAID1 /scratch
opt-a014.discovery.wisc.edu	2 2.30G E5-2470 Xeon Chips 16 Cores	
hazy-01.discovery.wisc.edu	<u>Dell R510</u>	Priority for Re's Research
hazy-02.discovery.wisc.edu	128G Memory	2T Disk3: /scratch 2T Disk4-12: RAID0 /raid
hazy-02.discovery.wisc.edu	2 2.66G X5650 Xeon Chips 12 Cores	
Service/Submit Nodes		
opt-submit.discovery.wisc.edu	<u>Dell R510</u>	WID Condor Pool Submit Machine 1.8T RAID1 /scratch
opt-fs.discovery.wisc.edu	32G Memory	File and License Server (admin logins only) 9.1T RAID5 /share: serves /data and /progs
opt-fs.discovery.wisc.edu	2 2.66G X5650 Xeon Chips 12 Cores	
Optimization Lab Machines		
funny.discovery.wisc.edu	<u>Dell R910</u>	Non-DiscoverIT Supported Machines
games.discovery.wisc.edu	256G Memory	For Re's Research
games.discovery.wisc.edu	2 2.00 E7-4850 Xeon 20 Cores	

Reboots are scheduled for all machines at 8am on the second Monday of each odd month.

Visualizing Usage/Available Hosts

Please view the ganglia page at <http://opt-fs.discovery.wisc.edu> to see which hosts are currently being utilized.

Compute Nodes other than opt-a001, opt-a012, hazy-01, and hazy-02 can be reserved at <http://opt-fs.discovery.wisc.edu/reservations.cgi>.

For new services or questions, please email researchcomputing@discovery.wisc.edu
For outages or problems with existing services, please email support@discovery.wisc.edu

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Basic Description for Grant Proposals

The optimization cluster has 16 dell servers hosted in the lower level of the Wisconsin Institutes for Discovery in Madison, WI. The cluster is segmented into 5 server hardware configurations to satisfy the 3 primary purposes of computation, Condor job submission, and support service provider. There are 4 Performance Sandbox nodes for major computing with the configuration: 4 2G E74850 10 Core Xeon, 256G memory, 4 2T disk Dell R810 servers. There are 2 Advanced Bulk Compute nodes with the configuration: 2 3.4G X5690 6 Core Xeon 288G memory, 2 600G disk, 2 2T disk Dell 710 servers. There are 6 Bulk Compute nodes with the following configuration: 2 2.66 X5650 6 Core Xeon, 128G memory, 12 2T disk Dell R510 servers. There are 2 additional Bulk Compute nodes with the following configuration: 2 2.30G E5-2470 8 Core Xeon, 128G memory, 2 600G disk Dell R420 servers. The dedicated file and license server as well as the dedicated Condor submit machines both run on identical hardware: 2 2.66G X5650 6 Core Xeon, 32G memory, 8 2T disk Dell R510 servers.

Condor

Getting Started:

CHTC provides an introductory page on running condor jobs at:

<http://chtc.cs.wisc.edu/helloworld.shtml>

Running a Condor Job on the Discovery Condor Pool:

Condor jobs to the Discovery Condor Pool should be started from opt-submit.discovery.wisc.edu. Add the following line to your submit file to get the highest priority for your job:

```
+group = "WID"  
+WIDsTheme = "Optimization"
```

See also: <http://intranet.discovery.wisc.edu/IT/FAQs/WID%20Compute%20Cluster%20HOWTO.pdf>

Submit File Configuration Information:

Further Condor configuration directives including request_memory, request_cpu, and request_disk can be found at:

http://research.cs.wisc.edu/htcondor/manual/current/condor_submit.html

Cluster Software

All servers are running RedHat 6.1. Email support@discovery.wisc.edu if you need additional software installed.

Local Python Libraries: Cython, Ipython, numexpr, scipy, pytables, matplotlib

Some of the Optimization software in the shared /progs directory:

ampl	Epsilon	MATLAB
coin	Gams	
CPLEX	Gurobi	

Needed Environment Variables:

```
# For CPLEX  
export ILOG_LICENSE_FILE=/progs/CPLEX_Studio/access.ilm  
PATH=${PATH}:/progs/CPLEX_Studio/cplex/bin/x86-64_sles10_4.1
```

For new services or questions, please email researchcomputing@discovery.wisc.edu
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```
# For Gurobi
export GUROBI_HOME="/progs/gurobi/linux64"
export PATH="${PATH}:${GUROBI_HOME}/bin"
export LD_LIBRARY_PATH="${LD_LIBRARY_PATH}:${GUROBI_HOME}/lib"
export GRB_LICENSE_FILE="/progs/gurobi/gurobi.lic"
```

Turning off Condor:

If you need to utilize all the resources on an optimization machine, you are able to turn off condor by running:
`/usr/sbin/condor_off -peaceful`

If you need to stop all currently running condor jobs NOW, you can leave off `-peaceful` but that may kill very long running jobs. Once you are done with your work, please remember to run:
`/usr/sbin/condor_on`

Windows Virtual Machines

There is 1 windows virtual machine running on the optimization cluster, `opt-vm-1`. Email support for access.

WID Services

VPN

In order to access the WID network from outside the building, you need a VPN account. If you do not already have one, you can request one by emailing support@discovery.wisc.edu. Once you have an account, you can access the VPN by going to:

<https://vpn.wid.wisc.edu>

Intranet

The Discovery Center's intranet is available at: <http://intranet.morgridge.net>

Printing

All WID people have access to the 44" HP Designjet printer located in the Lower Level. Herman Stampfli (hstampfli@wisc.edu) has the drivers installed on his computer and can print posters once they've been exported to PDF. To get the drivers installed on your own computer, email support@discovery.wisc.edu.

Tickets/WID IT

To view your current and past tickets with support, computer information, and the IT knowledge base, please access: <http://kbox.morgridge.net>

Password Changes

To change your password for either the shared drive/cluster/wireless/email or the VPN, access the following URL from inside the WID network:

<https://click.wid.wisc.edu/cgi-bin/change-password>

Shared Drive Access

To access your personal WID Share or the optimization WID Share, you must be connected to one of the WID networks. To access the Cluster Share, you must be connected to the WID wired or VPN networks. **You cannot access the Optimization Cluster Share (/data and /progs) via the wireless.** The mount points are:

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For Windows:

WID Shares:

\\r2d2-fs3.morgridge.net\optimization\shared for the group shared drive
\\r2d2-fs3.morgridge.net\optimization\home\\\gfs.discovery.wisc.edu\ws for the Working Data Storage gluster share

Optimization Cluster:

\\opt-fs.discovery.wisc.edu\share to mount the progs and data directory in one directory
\\opt-fs.discovery.wisc.edu\share\data or \\opt-fs.discovery.wisc.edu\share\progs to mount individually

For Mac:

WID Shares:

smb://r2d2-fs3.morgridge.net/optimization/shared for the group shared drive
smb://r2d2-fs3.morgridge.net/optimization/home/<username> for the personal share
smb://gfs.discovery.wisc.edu/ws for the Working Data Storage gluster share

Optimization Cluster:

smb://opt-fs.discovery.wisc.edu/share to mount the progs and data directory in one directory
smb://opt-fs.discovery.wisc.edu/share/data or //opt-fs.discovery.wisc.edu/share/progs to mount individually

NON-WID Machines:

You must set your user domain to MORGRIDGE. On a WID machine, this is the default. From a home or other machine, your username will be **MORGRIDGE\.**

SVN/GIT

SVN and GIT Repositories are available on svn1.discovery.wisc.edu and git1.discovery.wisc.edu.

To use an existing repository via svn+ssh, use your WID username/password to access:

svn+ssh://svn1.discovery.wisc.edu/data/svndata/optimization/<repo name>

If you have a collaborator who needs access via svn (not svn+ssh), the path is:

svn://svn1.discovery.wisc.edu/optimization/<repo name>

SVN repository configuration is modifiable on a case-by-case basis. To create your own repository:

```
ssh <wid username>@svn1.discovery.wisc.edu  
mkdir /data/svndata/optimization/<new repo name>  
svnadmin create /data/svndata/optimization/<new repo name>
```

SVN Configuration: By default, svnadmin allows anonymous read access to repositories. Remember to edit the conf/svnserve.conf and set 'anon-access = none' if you want to turn this off. To set up a non-WID user to be able to access the repository, uncomment the line 'password-db = passwd' in the svnserve.conf and add the (clear text) username and password to the passwd file.

To allow other people svn+ssh access to the repository, you need to modify the unix permissions. Everyone in the optimization group is in the group 'optimization'.

```
chmod 0770 /data/svndata/optimization/<new repo name>  
chmod -R g=u /data/svndata/optimization/<new repo name>  
find /data/svndata/optimization/<new repo name>/ -type d -exec chmod g+s {} \;
```