

Using PDC's resources in Applied CFD



**PDC Center for
High Performance Computing**



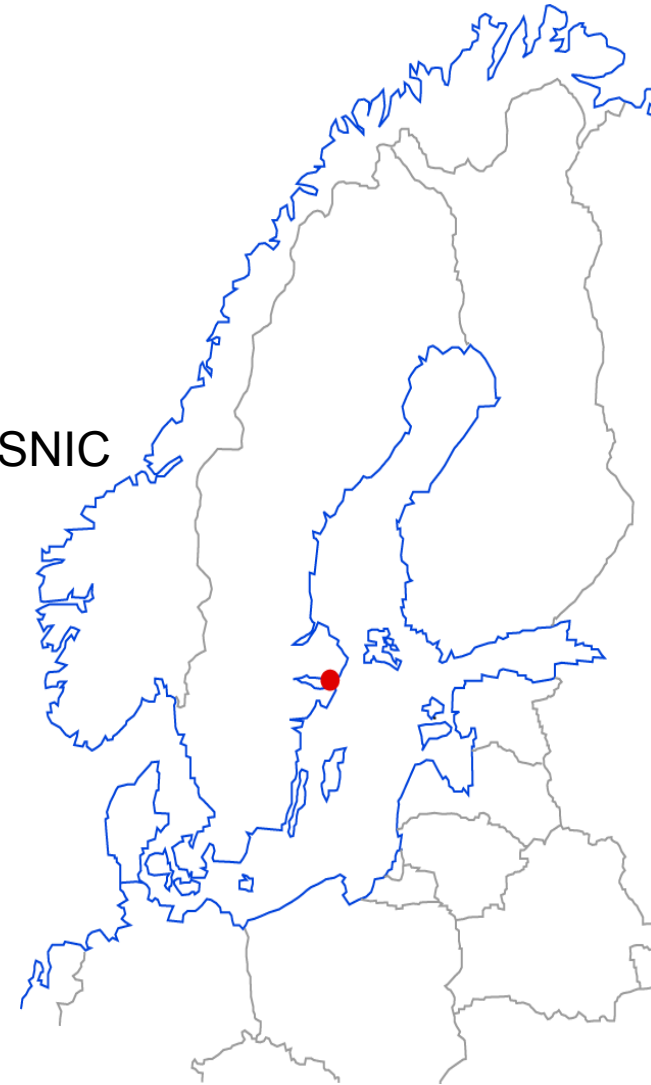
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What is PDC?

- ❑ National high-performance computing center
- ❑ Located at KTH, hosted by CSC
- ❑ Swedish National Infrastructure for Computing, SNIC



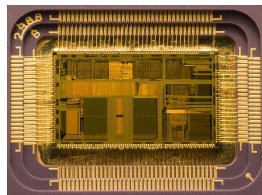
**PDC Center for
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What is a computer cluster?



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CPU/Core



Node



Rack



Cluster

Nodes

- ❑ Login nodes
- ❑ Interactive nodes
- ❑ Dedicated nodes (batch nodes)



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Never run on
login nodes!

Time allocations

- Many users
- One limited resources
- How to divide time and nodes fairly?

Time allocations and a jobs scheduler



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You belong to edu12.SG2224



Ferlin



**PDC Center for
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- 672 nodes
- Two Intel Harpertown quad-core CPUs per node, i.e. 8 cores in total
- 8 GB RAM per node
- **ferlin.pdc.kth.se**



Nils Ferlin, poet



PDC's user environment



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- AFS – home directory, project volumes
- /scratch – node local space
- Login – ssh with kerberos
- Software – module
- Queue system - EASY

Your account



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- NADA/CSC account with PDC access:
 - Home directory at NADA/CSC
 - `/afs/nada.kth.se/home-by-name/u/s/username`
- Without NADA/CSC-account, no PDC access.
- PDC account:
 - Home directory at PDC `/afs/pdc.kth.se/home/u/username`

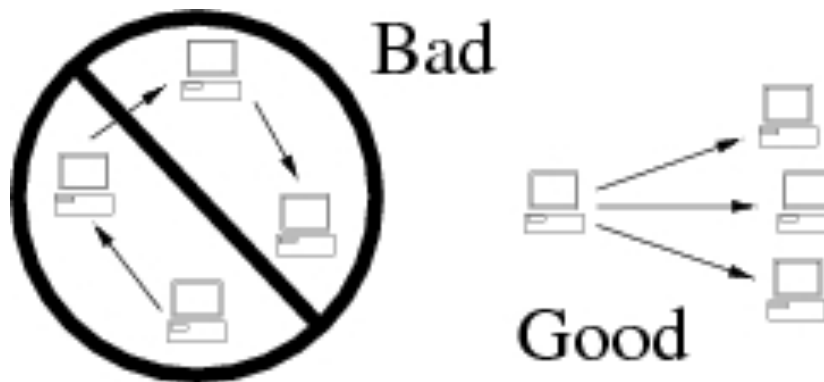
Note: u is the first letter in your username (s is the second).

Don't!

- **NEVER write your PDC password on a computer which you are not able to touch!**
- Never disclose your PDC password. Keep it secret. Keep it safe.
- Don't e-mail passwords to anyone.



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Kerberos

*Now this Cerberus had three heads of dogs,
the tail of a dragon, and on his back
the heads of all sorts of snakes.*



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- Communication on **unsafe networks**
- Kerberos — authenticating users and services on a network.
- A Kerberos **principal** (username@NADA.KTH.SE) is a user's or service's username for a certain **Kerberos realm** (NADA.KTH.SE).

Login to PDC from anywhere



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Install:

- Kerberos software
- Install Kerberos enabled ssh (GSSAPI key exchange)
- Install AFS client (optional)

<http://www.pdc.kth.se/resources/software/login-1>

<http://www.pdc.kth.se/resources/software/file-transfer>

Login to PDC in SAM

1. Start Cygwin X11 server; Programs -> Cygwin-X -> XWinServer
2. Start xterm; Programs -> Cygwin-X -> xterm

3. In the Cygwin xterm window write:

```
export PATH=/usr/heimdal/bin:$PATH
```

4. Login on Ferlin's login node by typing:

```
pdcllogin -Y username@ferlin.pdc.kth.se
```

5. When asked, type in your PDC/CSC password (not the KTH one)

6. The prompt will change, showing that you are now on Ferlin:

```
a07c01n08$
```

7. Check the life time of your Kerberos tickets:

```
module add heimdal
```

```
klist -Tf
```

```
Credentials cache: FILE:/tmp/krb5cc_V12580
```

```
Principal: username@NADA.KTH.SE
```

Issued	Expires	Flags	Principal
Mar 28 11:38:46	Mar 28 21:38:04	Ff	krbtgt/NADA.KTH.SE@NADA.KTH.SE



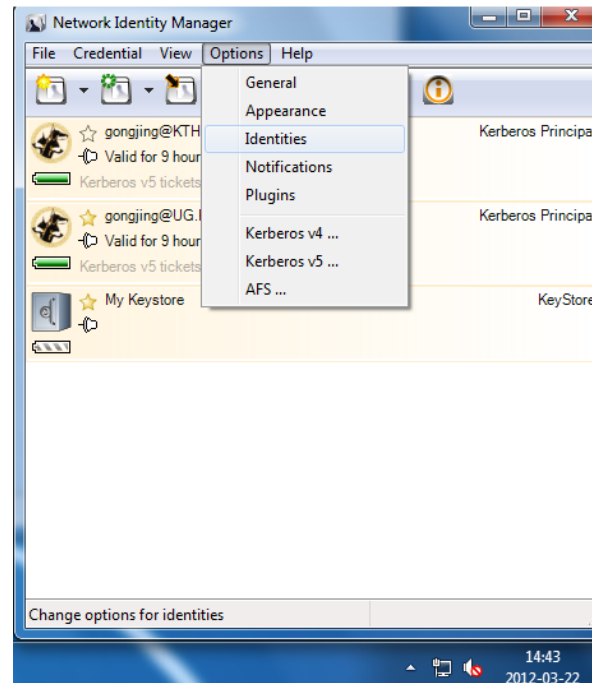
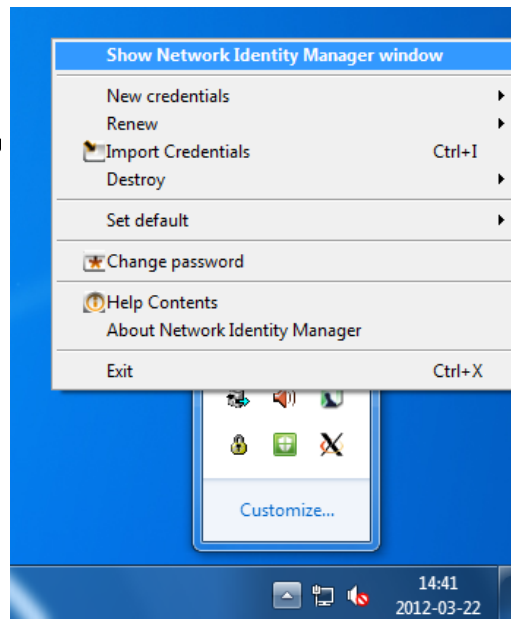
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Setup file transfer in SAM

1. Setup Kerberos using NIM
(only needed ones). Right click on the NIM icon (next to the clock)
2. Select Identities.



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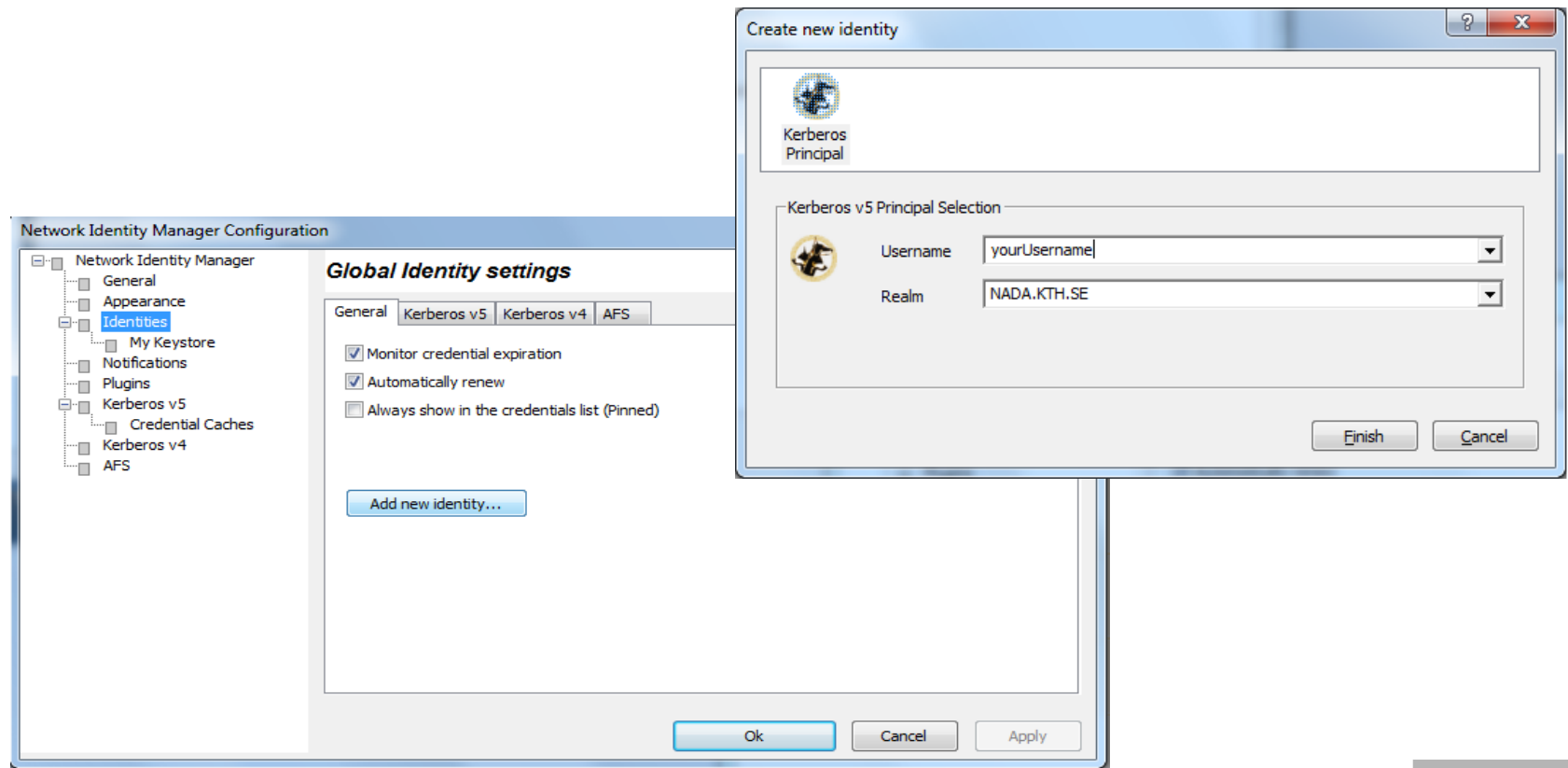


Setup file transfer in SAM, part 2

4. Click on Add new identity
5. Stat your *username* and the realm NADA.KTH.SE



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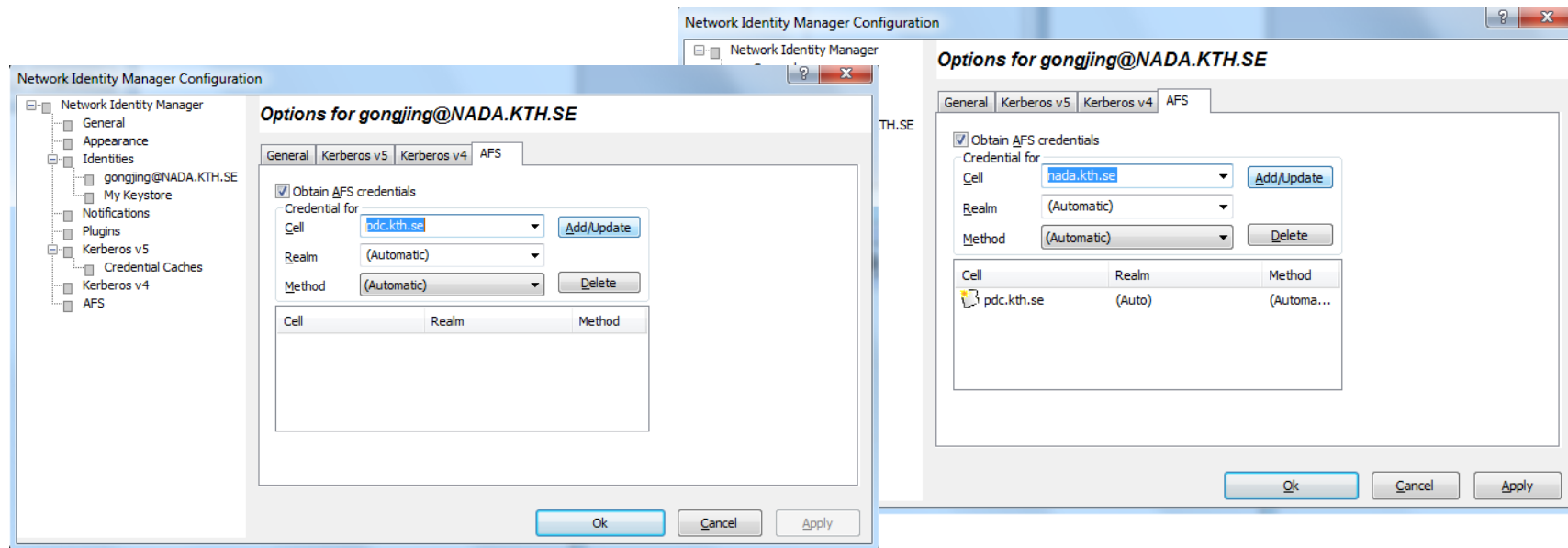


Setup file transfer in SAM, part 3

6. Click on [username@NADA.KTH.SE](#) and select the AFS tab.
7. Write pdc.kth.se in the field Cell and press Add.
8. Write nada.kth.se in the field Cell and press Add.



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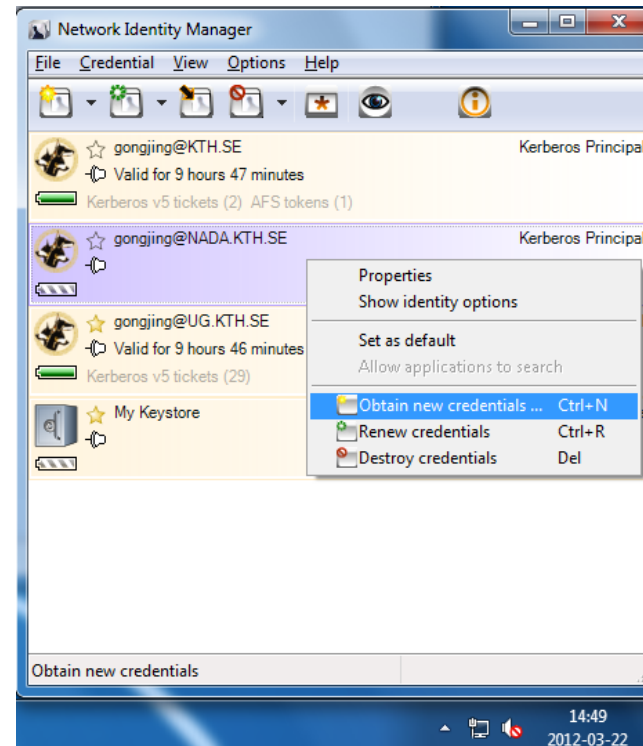
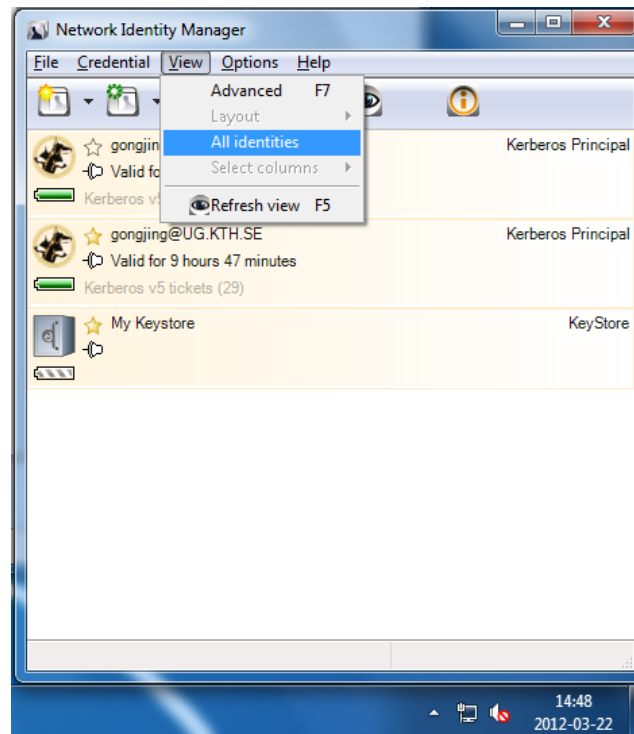


Transfer files between SAM and PDC

1. Make sure that you show all identities.
2. Right click on [username@NADA.KTH.SE](#) and select Obtain new credentials.



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Transfer files between SAM and PDC part 2

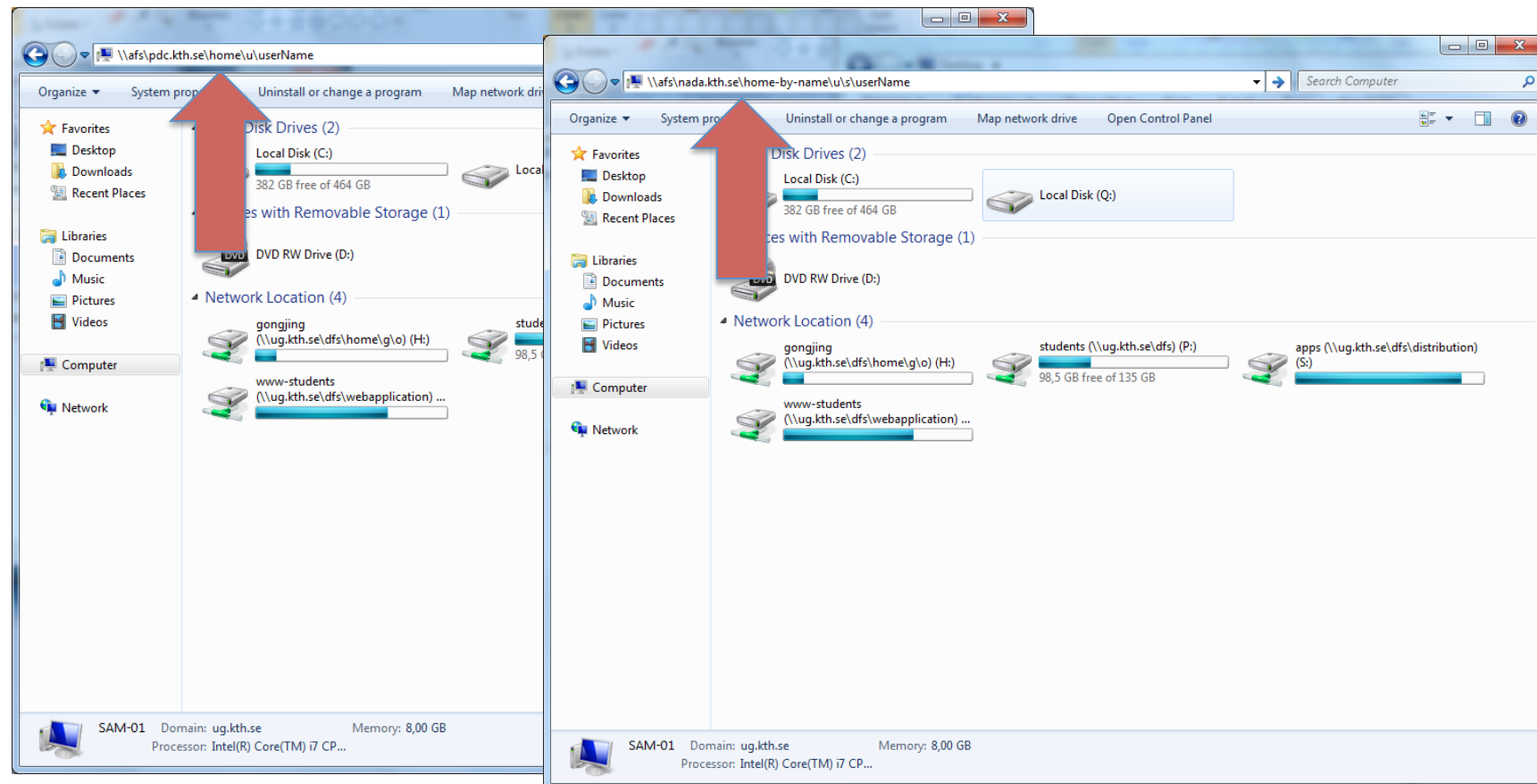
3. Write your PDC password.
4. Now, you can access AFS using Explorer.

For instance:

`\\afs\pdc.kth.se\home\s\swallin\SG2224`



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Kerberos enabled login



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- ❑ Get local Kerberos ticket
- ❑ Connect using ssh – forward Kerberos ticket
- ❑ Check the lifetime of your Kerberos tickets
- ❑ Load software needed (module)
- ❑ Submit your job (queue system)

Get software: module command



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```
module avail  
module add moduleName  
module show moduleName  
module list
```

- **afsws** – AFS commands
- **heimdal** – Kerberos commands
- **easy** – queue system and time allocation
- **fluent/student** – ANSYS 14.0 CFX & Fluent

Queue system (EASY)



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- `module add easy`
- `esubmit -n N -t T ./scriptName.sh arguments`
- *N number of nodes*
- *T time to run **in minutes***
- *scriptName.sh executable script*
(what to do on the node)
- *arguments are input arguments to the script*

Running Fluent script



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- Script for Fluent called `fluent-pdc.sh` on the PDC web.
- Script – executable textfile
- Fluent journal file `test.jou`
- `./fluent-pdc.sh 8 3ddp ./test.jou`
- 8 – use all 8 cores (Ferlin has 8)
- 3ddp – solver wanted (3D double precision)

<http://www.pdc.kth.se/resources/software/restricted-software/fluent/user-information>

Submitting a Fluent job



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1. Transfer your Fluent files and fluent-pdc.sh script to PDC.
2. Get local Kerberos ticket and login on Ferlin.
3. Check your ticket lifetime (on Ferlin):

```
module add heimdal  
klist -Tf
```

4. Make your script executable:

```
chmod u+x fluent-pdc.sh
```

5. Submit your script to the queue system:

```
module add easy fluent/student  
esubmit -n 1 -t 5 ./fluent-pdc.sh 8 3ddp ./test.jou
```

6. Check the queue and wait for emails:

```
spq -u yourUsername
```

Finding information



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- <http://www.pdc.kth.se/>
- Sign up to mailinglists:
<http://www.pdc.kth.se/about/mailling-lists>
- The course web:
<https://www.kth.se/social/course/SG2224/>
- Your lab assistants and examiner
- support@pdc.kth.se