A beginner's guide to UNIX system

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UNIX Documentation Series - Version 1.0
 March 2011

Contents

1   Proxy server

Before you connect to the internet, it is necessary to input the information of proxy server set up by the computer center. The information is as follows,

- Address: proxy.noc.titech.ac.jp

- Port: 3128

For help regarding the setup of proxy server in <u>Windows 7</u>, click <u>here</u>.
For help regarding the setup of proxy server in <u>Ubuntu Linux</u>, click <u>here</u>.

2   UNIX supercomputers

In Kanae lab, there are two UNIX supercomputers. Lab-members can freely use the powerful machines for their research. The two machines are named as hydro and aqua.

2.1   Hydro:

- Hydro is a Intel(R) Itanium(R) 9140M Processor based machine.

- It has 4 CPUs, each with speed of 1669 MHz.

- Running on SUSE Linux Enterprise Server 10 (ia64) operating system.

- It is connected to two hard disks with combined storage of 20 TB. Out of 20 TB,

  - 10 TB is used as home directory, where each user is given a maximum space of 500 GB.

  - 10 TB is used as work directory (named as workh), where each user can use more space needed for their computation.

2.2 Aqua:

- Aqua is a Intel(R) Xeon(R) X7560 Processor based machine.

- It has 32 CPUs, each with speed of 1064 MHz.

- Running on SUSE Linux Enterprise Server 11 (x86_64) operating system.

- Shares the same home directory as Hydro but it is connected to separate work hard disk with a storage of extra 20 TB (named as worka).

  - Each user is provided a work directory in worka.

  - The workh disk of Hydro can also be accessed from Aqua and data can be easily transferred between two servers.

Since, Aqua is much powerful than Hydro, all users are advised to carry out heavy computational work in Aqua. Both servers can only be accessed from inside the Kanae lab due to the restrictions imposed by proxy server.

3 Login to the system

To use the servers, you need to have a username and password. All newcomers should contact Sujan for username and password. A username will be created and password will be username123. You can use this username and password to login to the server.

3.1 Softwares required

The connection to the server can be accomplished by using terminal program. Depending on the operating system, the terminal program can be different. If you are using Mac OS or any Linux distribution, you can just open the terminal program that is installed by default.

Before moving on to login process, a explanation of softwares required for convenient login to server for Windows is provided. To have terminal program working in

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Windows, there are two ways, first is using light installations of Xserver and terminal program separately, and the second is slightly heavier installation of Linux Virtual Machine Appliance which is better in performance.

3.1.1 Method 1: XServer and Terminal Program

In this case we need to install the Xserver, which is necessry to use GUI while connected to the remote server.

<u>Installation</u>

1. A free version of Xserver commonly used is Xming, which is available <u>here</u>.

2. To install Xming, run the file downloaded in step 1 and follow the on-screen instructions.

3. Also, some extra fonts are necessary for smooth operation, and it is available <u>here</u>.

4. Install Xming Fonts running file downloaded in step 3. Follow on-screen instructions and choose all the fonts when it asks.

5. Last, a terminal program should be installed. A free terminal program called Tera Term is available <u>here</u>. Follow on-screen instructions to install Tera Term.

6. If you cannot download files, ask Sujan.

<u>Setup</u>

To setup Tera Term to use Xserver, open Tera Term, and then click cancel in pop-up window titled 'Tera Term: New Connection'.

1. Go to Setup → SSH Forwarding.

2. Check the button showing 'Display remote X applications on local X server'

3. Go to Setup → Save setup.

- In pop-up window, just click save.

<u>Execution</u>

- First go to programs and run Xming.

  – When Xming is run, you can see 'X' logo on bottom right of your computer screen (in System Tray).

- Then go to programs and run Tera Term.

3.1.2   Method 2: Virtual Installation of Ubuntu Linux

This method is a bit heavy to install but very convenient for use and consistent in performance. To accomplish this, we need a virtual device player and an Ubuntu virtual installation. VMware Player is a free software and Ubuntu image for VMware Player is also free. Since, the file size is huge, ask Sujan for the files.

<u>Installation</u>

- First, the VMware Player should be installed.

  – Run the exe file (VMware-player-3.1.3-324285.exe) in the folder, and follow the on-screen instructions to install the VMware Player.

- Copy the folder, Ubuntu-1010 - EN for English version of Ubuntu or Ubuntu-1010 - Jp for Japanese version of Ubuntu.

<u>Setup</u>

Since, both the Ubuntu versions have been customized to fit the settings of Kanae lab, no additional setup is necessary.

<u>Execution</u>

For running Ubuntu inside Windows,

1. Open VMware Player.

2. Click on 'Open a Virtual Machine'.

3. Browse to show the path for the Ubuntu (.vmx) file. This is the same file that you copied.

   - If there is a window asking how you got VMware Appliance, click 'I copied it'.

4. Click on 'Play Virtual Machine'.

5. When you see the login screen. Hit 'Enter' in Keyboard

6. The login for Ubuntu is:

   (a) Username: user

   (b) Password: password

   To run terminal in Ubuntu, go to Applications $\rightarrow$ Accessories $\rightarrow$ Terminal

3.2 Connecting to Servers

Once the terminal program is installed with Xserver support, you can use your username and password to login to Hydro or Aqua. Same username and password can be used to login to both Hydro and Aqua.

3.2.1 Using Xming and Tera Term

1. First go to programs and run Xming and then open Tera Term as explained in Execution part of Section 3.1.1.

2. In 'Tera Term: New Connection' window,

   - To connect to Hydro, enter 131.112.42.40 in 'Host:' box.

   - To connect to Aqua, enter 131.112.42.41 in 'Host:' box.

3. Type 22 in 'TCP port#:' box.

4. Click OK.

5. In 'SSH Authentification' window, enter your username in 'user name:' box and your password in 'passphrase:' box.

3.2.2 Using Ubuntu Linux in VMware Player

1. First open Ubuntu and open terminal program inside Ubuntu as explained in Execution part of Section 3.1.2.

2. To connect to Hydro, type

   - ssh -X username@131.112.42.40
   - Enter password to login.

3. To connect to Aqua, type

   - ssh -X username@131.112.42.41
   - Enter password to login.

4 Basic Steps for New Users

4.1 Changing Password

All the new users are advised to change the password for Hydro and Aqua. Tips for choosing strong password can be found here. Following is the process to change password.

1. Login to Hydro (131.112.42.40) following steps described in Section 3.2.

2. Type **passwd** in terminal. Help for **passwd** command can be found here.

3. First enter the old password.

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4. Enter new password.

5. Reenter new password for confirmation.

6. Once the password is changed in Hydro, inform Sujan to update the password change in Aqua also. This step should be followed whenever a user changes password. Password change is Hydro is **not reflected automatically** in Aqua.

4.2   Setting Environmental Variables

It is important for new users to make some initial setup of environmental variables. Environment variables are a set of dynamic named values that can affect the way running processes will behave on a computer/server (Wikipedia). Unix systems are highly customizable as the way each program runs for each user can be different depending on the setup of environmental variables. Explanation of environmental variables, available in UNIX, can be found here.

- The environmental variables for each user are saved in a text file named '.bashrc' in home directory of each user.

- When a user logs into the system, the setup from '.bashrc' file is loaded automatically.

- Since, setup of '.bashrc' file is tricky for newcomers, all newcomers of Kanae lab are recommended to copy '.bashrc' file from home directory of Sujan by typing

    – **cp -f** */home/sujan/.bashrc .*

5   Useful UNIX Concepts/Commands

In this section, some commonly used UNIX commands are introduced. A detailed guide to using UNIX by Dr. Naota Hanasaki is available and users are recommended to go through the tutorials provided with the guide. Ask Sujan for the guide.

5.1 UNIX File Structure

Before using unix commands, it is necessary to understand unix file structure.

- All the files in UNIX file system are organized into a multi-leveled hierarchy called a directory tree. The UNIX file system might also be envisioned as an inverted tree or the root system of plant.

- At the very top of the file system is single directory called "root" which is represented by a / (slash). All other files are "descendents" of root. Example of UNIX directory structure is presented in Fig. 1.
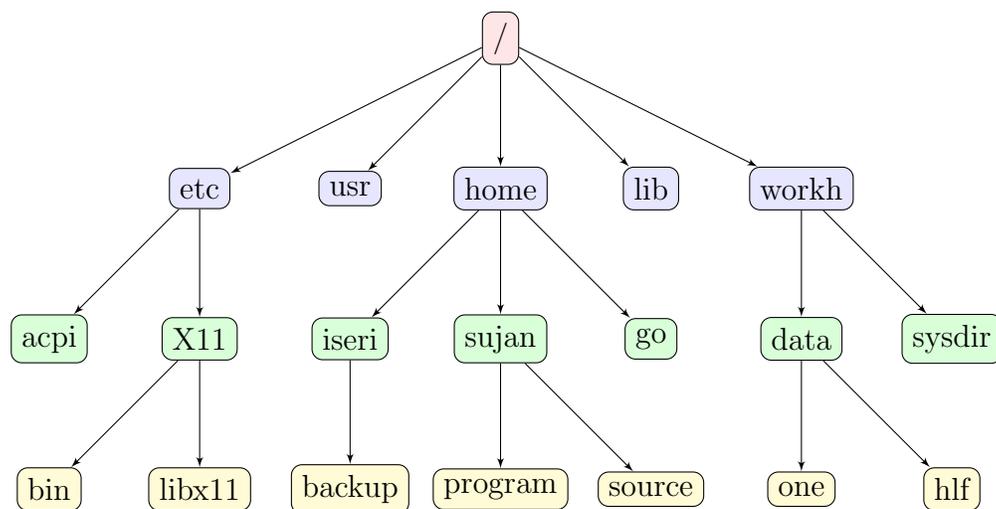

Figure 1: An example of UNIX directory structure

Inside, the main root directory (/), many directories can be created and inside each directory many more can be created. For individual users, a directory is created inside the home directory. An user is freely allowed to create as many directories and files inside his/her own home directory. However, normal users are not allowed to create files/directories in other peoples home directory or system directory. These controls are provided by changing the permission of a file/directory. A discussion on understanding and setting permission is provided in Section 5.4.

A path to a directory specifies its unique location in a file system. Users can use either absolute or relative paths.

- A *full path* or *absolute path* is a path that points to the same location on one file system regardless of the working directory. It is usually written in reference to a root directory.

- A *relative path* is a path relative to the working directory of the user so that absolute path may not need to be given.

For example, in Fig. 1, the absolute path of home directory for sujan is '*/home/sujan*'. It means, inside root directory (denoted by '*/*'), there is a directory named '*home*', and inside '*home*' directory there is directory named '*sujan*'. Similarly, absolute path of lib directory is '*/lib*'. You can use absolute path to access any file from any location.

But, in some cases, it is easy to use relative path. For e.g., if you are in '*/home/iseri*' and you want to access source directory inside sujan's home directory. The absolute path to source directory is '*/home/sujan/source*'. But, if relative path is used, your current location is very important. The location of source directory relative to iseri's home directory is '*../sujan/source*'. The '*../*' in the path denotes a directory that is one level up in the hierarchy from '*/home/iseri*', i.e. '*/home*' directory, and '*sujan/source*' indicates '*source*' directory inside '*sujan*'. One more example is

- The absolute path to '*libx11*' is '*/etc/X11/libX11*' in all cases.

- A relative path to '*libx11*' from '*/home/iseri*' is '*../../etc/X11/libx11*'

- A relative path to '*libx11*' from '*/home/iseri/backup*' is '*../../../etc/X11/libx11*'.

Hence, users should be careful while using the relative paths.

5.2   File and Directory Commands

A tutorial useful for beginners in UNIX can be found here.

Directories

Directories are like folders in Windows, which are used to group files or directories together in a hierarchical structure as shown in Fig. 1.

- **pwd** $\Rightarrow$ stands for present working directory and displays the absolute path to the current directory.

- **mkdir** *dirname* $\Rightarrow$ makes a new directory. *dirname* can be absolute or relative path to the directory you want to create.

- **rm -r** *dirname* $\Rightarrow$ removes a directory with confirmation. If '**rm -rf**' is used, there is no confirmation. Users should be careful while using '**-f**' because deleted files are impossible to recover in UNIX.

- **cp -r** *dirname1 dirname2* $\Rightarrow$ copies *dirname1* to *dirname2*.

- **mv** *dirname1 dirname2* $\Rightarrow$ moves *dirname1* to *dirname2*.

- **cd** *dirpath* $\Rightarrow$ change directory to the location shown by *dirpath*. *dirpath* can be absolute or relative. '**cd**' without *dirpath* changes the location to home directory. '**cd ..**' will change the location by one level up from your current directory.

- **ls** *dirpath* $\Rightarrow$ lists all files in a directory located at *dirpath*.

- **ls -l** *dirpath* $\Rightarrow$ lists all files in a directory located at *dirpath* in 'long format', which contains lots of useful information, e.g. the exact size of the file, who owns the file and who has the right to look at it, and when it was last modified.

- **ls -a** *dirpath* $\Rightarrow$ lists all files in a directory located at *dirpath*, including system and hidden files (files with name beginning in a dot).

Files

- **touch** *filename* $\Rightarrow$ creates a file.

- **more** *filename* $\Rightarrow$ shows the first part of a file, just as much as will fit on one screen. Hit the *space bar* to see more or '*q*' to quit. You can type **/pattern** to search for a pattern.

- **mv** *filename1 filename2* ⇒ moves a file (i.e. gives it a different name, or moves it into a different directory.

- **cp** *filename1 filename2* ⇒ copies a file.

- **rm** *filename* ⇒ removes a file. It is wise to use **rm -i**, which will ask for confirmation before deleting. **rm -f** deletes file without confirmation.

- **diff** *filename1 filename2* ⇒ compares files, and shows the difference between two files.

- **wc** *filename* ⇒ shows how many lines, words, and characters are there in a file.

5.3   Text Editor

There are various editors installed in UNIX system that can be used to edit text files. Here, a basic explanation of gVim text editor is provided. A free book dedicated to gVim editor can be found here.

- **gvim** *textfile* ⇒ opens the *textfile* in gVim text editor.

- gVim is a modal editor. It behaves differently depending on mode. If the bottom of the screen displays the file name or is blank, gVim is in normal mode. In insert mode, the indicator displays '- - INSERT - -'; and in visual mode, the indicator shows '- - VISUAL - -'.

- The file can be edited in insert mode only. After opening the *textfile*, hit '*i*' in keyboard to enter insert mode.

    – Edit the text file.

- To go to normal mode from insert mode, press '*Esc*' key of the keyboard.

- In normal mode, various commands can be used for various operations. Here are some of the most useful ones.

- **:w** *filename* ⇒ Save changes to a file. If '**:w**' is used without *filename*, gVim saves the file with same file name.

- **:q** ⇒ Quit Vim. If you have unsaved changes, gVim refuses to exit.

- **:q!** ⇒ Quit Vim without saving changes.

- **:wq** ⇒ Save the file and exit.

- **:e** *filename* ⇒ Opens a new file.

- **?** *sometext* ⇒ searches for *sometext* in current file.

- **:se nu** ⇒ Displays line number.

- **u** ⇒ Undo the last change.

- **ctrl+r** ⇒ Redo the last change.

- **D** ⇒ Deletes all text after the cursor in a line.

- *pressing* **d** *twice* ⇒ Deletes the current line.

5.4   File Permissions

Every directory and file on the system has an owner, and also an associated group. It also has a set of permission flags which specify separate read, write and execute permissions for the 'user' (owner), 'group', and 'other' (everyone else with an account on the server). The '**ls**' command shows the permissions and group associated with files when used with the '**-l**' option. An example of the output produced by '**ls -l**' is shown in Table 1.

Table 1: An output of **ls -l** command in UNIX

Field						
1	2	3	4	5	6	7
drwxr-xr-x	18	go	labo	4096	2011-03-12 01:40	go
drwxr-xr-x	26	hagiwara	labo	4096	2011-03-04 04:15	hagiwara
drwxr-xr-x	13	hana	labo	4096	2011-03-29 17:55	hana
drwxr-xr-x	29	hjkim	users	4096	2011-03-01 03:58	hjkim

Understanding how to read this output is useful especially when you want to execute a file or when your data/programs can be used by all members for some purpose. For e.g., when you make a data, you can allow all lab members to read data from your directory.

A brief explanation of output of **ls -l** is as follows,

- **Field 1:** a set of ten permission flags.

- **Field 2:** link count (don't worry about this).

- **Field 3:** owner of the file/directory.

- **Field 4:** associated group for the file/directory.

- **Field 5:** size in bytes.

- **Field 6:** date and time of last modification.

- **Field 7:** name of file/directory.

The permission flags (Field 1 in Table 1) are read as follows (left to right). Table 2 shows the meaning of entry in each position.

Table 2: Meaning of ten permission flags

Position	Meaning
1	directory flag, 'd' if a directory, '-' if a normal file
2,3,4	read, write, execute permission for User (Owner) of file
5,6,7	read, write, execute permission for Group
8,9,10	read, write, execute permission for Other

The read/write/execute flags for user/group/other can take the values as shown in Table 3.

Table 3: Meaning of read/write/execute flags

Value	Meaning
-	in any position means that flag is not set
r	file is readable by owner, group or other
w	file/directory is writeable. On a directory, you can add or delete files
x	file/directory is executable. On a directory, you can list the files

Changing File Permissions

To set/modify a file's permissions you need to use the '**chmod**' command. Only the owner of a file and system administrator can use '**chmod**' to alter a file's permissions. '**chmod**' has the following syntax:

- **chmod** *[options] mode filename*

- The '*mode*' part specifies the new permissions for the file(s) that follow as arguments. A mode specifies which user's permissions should be changed, and afterwards which access types should be changed. Let's say for example:

  - **chmod** *a-x filename*

  - This means that the execute bit (denoted by x) should be cleared (denoted by -) for all users (denoted by a).

  - **chmod** *a+x filename*

  - This means that the execute bit (denoted by x) should be set (denoted by +) for all users (denoted by a).

- The permissions start with a letter specifying what users should be affected by the change, this might be any of the following:

  - **u:** the owner user

  - **g:** the owner group

  - **o:** others (neither u, nor g)

- **a:** all users

- This is followed by a change instruction which consists of a *+(set bit) or -(clear bit)* and the letter corresponding to the bit that should be changed (*r for read, w for write, and x for execute*).

- Sometimes '**chmod**' is used as

  - **chmod** *755 filename*

- You can change the entire permission pattern of a file in one go using one number like 755 in this example.

- Every one of the three digits on the mode number (7, 5, and 5) corresponds to one of the three permission triplets. 7 corresponds to permission for user(u), 5 correspnds to that for group(g), and 5 corresponds to that for others(o).

- Every permission bit (read, write, and execute) in a triplet corresponds to a value:

  - 4 for read (r)

  - 2 for write (w)

  - 1 for execute(x)

- What does 755 mean?

  - Triplet for user: rwx $\Rightarrow 4 + 2 + 1 = 7$

  - Triplet for group: r-x $\Rightarrow 4 + 0 + 1 = 5$

  - Triplet for other: r-x $\Rightarrow 4 + 0 + 1 = 5$

  - Which makes : 755

  - So, 755 is a way to say 'Every one can read or run this file, but he/she will not be able to modify it'.

- 777 means 'Every one can do anything with this file'.

5.5 Disk Space Management

For efficient use of resources, it is necessary to periodically remove un-necessary files from the system. Also, various compressor are available in UNIX system to reduce the disk usage. Files that are no longer being used should be compressed and stored. Following are some useful commands for this purpose.

- **du -h** *dirname* ⇒ Shows the disk space being used by a directory *dirname* and all of its contents.

- To compress a file,

  - **gzip** *filename* ⇒ A file *filename.gz* will be automatically created.

- To un-compress a file,

  - **gunzip** *filename.gz*

- To compress all the files in a directory,

  - **gzip -r** *dirname*

- To un-compress all the files in a directory,

  - **gunzip -r** *dirname*

- To compress the whole directory,

  - **tar -zcvf** *filename.tar.gz dirname* ⇒ *dirname* should be manually deleted after being compressed to *filename.tar.gz*.

- To un-compress a *tar.gz* file,

  - **tar -zxvf** *filename.tar.gz*

5.6   Data Back-up

All users are recommended to periodically back-up their most important data by copying it to external hard drive. There are various programs to copy files from servers to your local computer (Desktop/Notebook PC).

<u>Windows</u>

There are various FTP client softwares which also support SSH connections. These softwares can be used to exchange/copy files from/to Hydro and Aqua. One of the softwares, that is freely available, is Core FTP. It can be downloaded from <u>here</u>. To copy files from/to servers, follow the procedure below:

1. Download and install Core FTP.

2. Go to programs and run Core FTP Lite.

3. In the 'Site Manager' window, enter name of the site in 'Site Name' box. For e.g, enter Hydro for Hydro and Aqua for Aqua.

4. In 'Host/IP/URL' box, enter 131.112.42.40 for Hydro and 131.112.42.41 for Aqua.

5. Enter your username for the server in 'Username' box and your password in 'Password' box.

6. Choose 'SSH/SFTP' in 'Connection' dropdown box.

7. Click 'Connect'. You will be taken to your home directory in the server.

8. Use drag and drop to copy files from/to server.

9. From next use, when you open the Core FTP Lite, select the saved site (Site Name in step 3) in the top left side and click 'Connect'.

Ubuntu Linux

If you are using Ubuntu Linux (through VMware Player also), there is no need for additional installation of softwares to view the data in servers. Follow the steps to copy data from/to servers:

1. Go to Places → Connect to Server

2. In 'Connect to Server' window, select SSH in 'Service type:' dropdown box.

3. In 'Server:' box, enter 131.112.42.40 to connect to Hydro or 131.112.42.41 to connect to Aqua.

4. Enter username in 'User Name:' box.

5. Check the 'Add bookmark' button and enter a Bookmark name.

6. Click 'Connect' and enter the password for the server. Check 'Remember Password Forever' button to avoid re-typing the password everytime in future.

7. You will be taken to the top (root) directory of the server. Browse through the directory where your data is stored. You can copy any data from server in the same way as you copy data in your local PC.

8. From next time, you can directly go to server, by going to Places → Bookmarks → Bookmark Name (that you provided in step 5 above).

6 Data and Programs

6.1 Global Forcing Data

There are many global forcing datasets that have been created and archived in Kanae lab. These data can be used by lab members for their research purpose. For using the disk space effectively, all the data are stored in /workh directory of Hydro. Table 4 lists all the global datasets available in Kanae-lab and their locations.

Table 4: Global forcing data available in Kanae Lab

Data	Spat Res.	Temp. Res.	Time period	Location
WFD	half	3/6hr	1958-2001	/workh/data/WFD
NCC	half	6hr	1985-1999	/workh/data/NCC_hlf
NCC	one	6hr	1950-2000	/workh/data/NCC
CMAP	one	6hr	1979-2007	/workh/data/hjkim/ELSE/JL1/in/Prcp_CMAP
CU	one	6hr	1979-2007	/workh/data/hjkim/ELSE/JL1/in/Prcp_CU
GPCP	one	6hr	1979-2007	/workh/data/hjkim/ELSE/JL1/in/Prcp_GPCP
GPCC	one	6hr	1979-2007	/workh/data/hjkim/ELSE/JL1/in/Prcp_GPCC
PREC/L	one	6hr	1979-2007	/workh/data/hjkim/ELSE/JL1/in/Prcp_PRECL

WFD: Watch Forcing Dataset (Weedon et al., 2010), NCC: NCEP-NCAR Corrected for CRU dataset (Ngo-Duc et al., 2005), CMAP: CPC Merged Analysis of Precipitation dataset (Xie and Arkin, 1997), CU: CPC Unified dataset (Chen et al., 2008), GPCP: Global Precipitation Climatology Project version 2 dataset (Adler et al., 2003), GPCC: Global Precipitation Climatology Center dataset (Rudolf and Schneider, 2005), PREC/L: Precipitation REConstruction over Land dataset (Chen et al., 2002).

6.2 Installed Programs

Various programs have been installed in servers to facilitate the research work. A list of some major programs and their location as well as links for help are presented in Table 5. If you need to use some other program, ask Sujan for installation.

Table 5: List of some useful programs installed in Hydro and Aqua

Program	Description	Server	Version	Location	References
ifort	Intel fortran	Hydro	9.1.052	/opt/intel/fc/9.1.052	Intel Compilers homepage (hp)
		Hydro	10.1.021	/opt/intel/fc/10.1.021	
		Aqua	12.0.0.084	/opt/intel/composerxe-2011.0.084/bin/intel64	
icc & icpc	Intel C and C++	Hydro	9.1.052	/opt/intel/cc/9.1.052	Intel Compilers homepage (hp)
		Hydro	10.1.021	/opt/intel/cc/10.1.021	
		Aqua	12.0.0.084	/opt/intel/composerxe-2011.0.084/bin/intel64	
gfortran, gcc & g++	GNU fortran, C and C++	Hydro	4.1.2	/opt/intel/cc/9.1.052	gcc hp, gfortran hp
		Aqua	4.3.4	/opt/intel/cc/9.1.052	
NetCDF	Common data format	Hydro	3	/usr/local/netcdf/netcdf-3.6.2	NetCDF docs
		Aqua	3	/usr/local/netcdf/netcdf-3.6.2	
		Aqua	4	/usr/local/netcdf/netcdf-4.1.1	
ncview	NetCDF data visualization tool	Hydro	NA	NA	ncview hp
		Aqua	2.0beta4	/usr/local/ncview/ncview-2.0beta4	
GrADS	Data manipulation and Visualization	Hydro	NA	NA	GrADS docs
		Aqua	2.0.a9	/usr/local/grads/grads-2.0.a9	
GMT	Generic Mapping Tools	Hydro	4.4.0	/usr/local/GMT	GMT hp, GMT docs
		Aqua	4.5.5	/usr/local	
gtool	gtool format data manipulation tool	Hydro	3.5	/usr/local/gtool3.5	gtool hp
		Aqua	3.5	/usr/local/gtool3.5	
python	Programming and data manipulation/visualization	Hydro	2.6.5	/usr/local	python hp,python docs
		Aqua	2.7.1	/usr/local	
	Scipy- scientific tools	Aqua	0.9.0b1	python module	Scipy hp
	Scientific- read/write NetCDF file	Aqua	2.8	python module	Scientific python hp
	Pygrib- open WMO GRIB (.grb) data	Aqua	1.8.1	python module	Pygrib hp
	Pyproj- Cartographic projections	Aqua	1.8.7	python module	Pyproj hp
	mlpy- Machine Learning Python-wavelet analysis	Aqua	2.2.1	python module	mlpy hp
gFTP	FTP client with GUI	Hydro	2.0.19	/usr/local	gFTP hp
		Aqua	2.0.19	/usr/local	
Subversion	Version control system	Hydro	NA	NA	SVN hp
		Aqua	1.6.15	/usr/local/subversion-1.6.15	