

# Access to ECMWF resources

## Computer user training course 2016

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User Support

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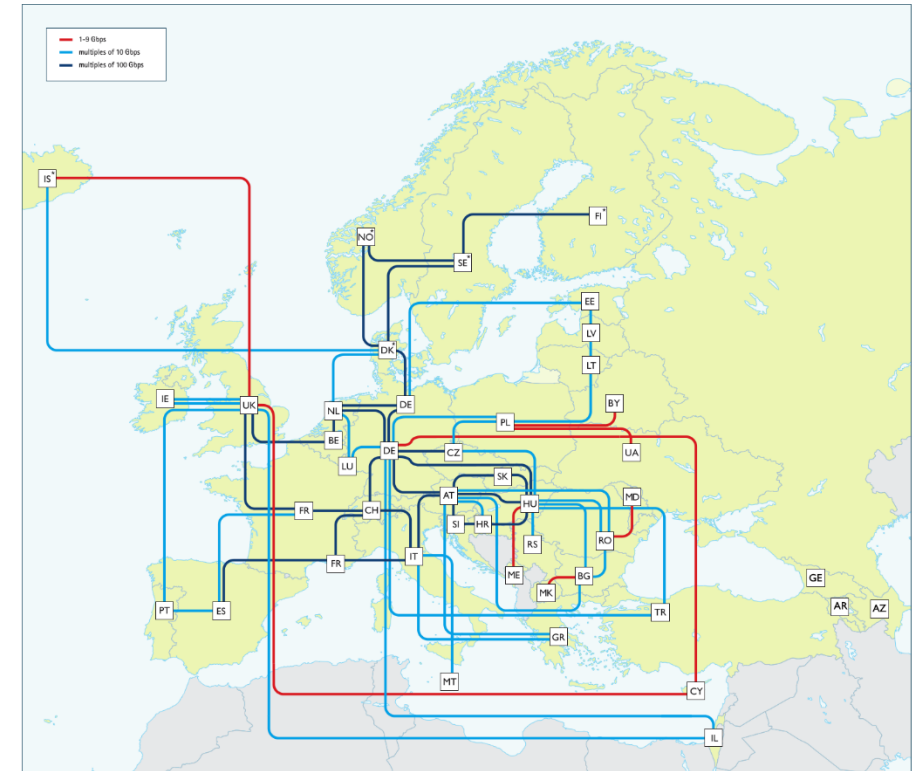
# Content

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# Wide Area Network - Internet

- Between ECMWF and Internet 2 x 10Gb/s (redundant)
- European Research Network
- At your end ...?
  - Often several Mb/s to Gb/s
- Much higher bandwidth than RMDCN
- Suitable for users for (large) data transfers
- Increasingly used for research data dissemination
- Could be used as backup for RMDCN

GÉANT's pan-European research and education network interconnects Europe's National Research and Education Networks (NRENs). Together we connect over 50 million users at 10,000 institutions across Europe.



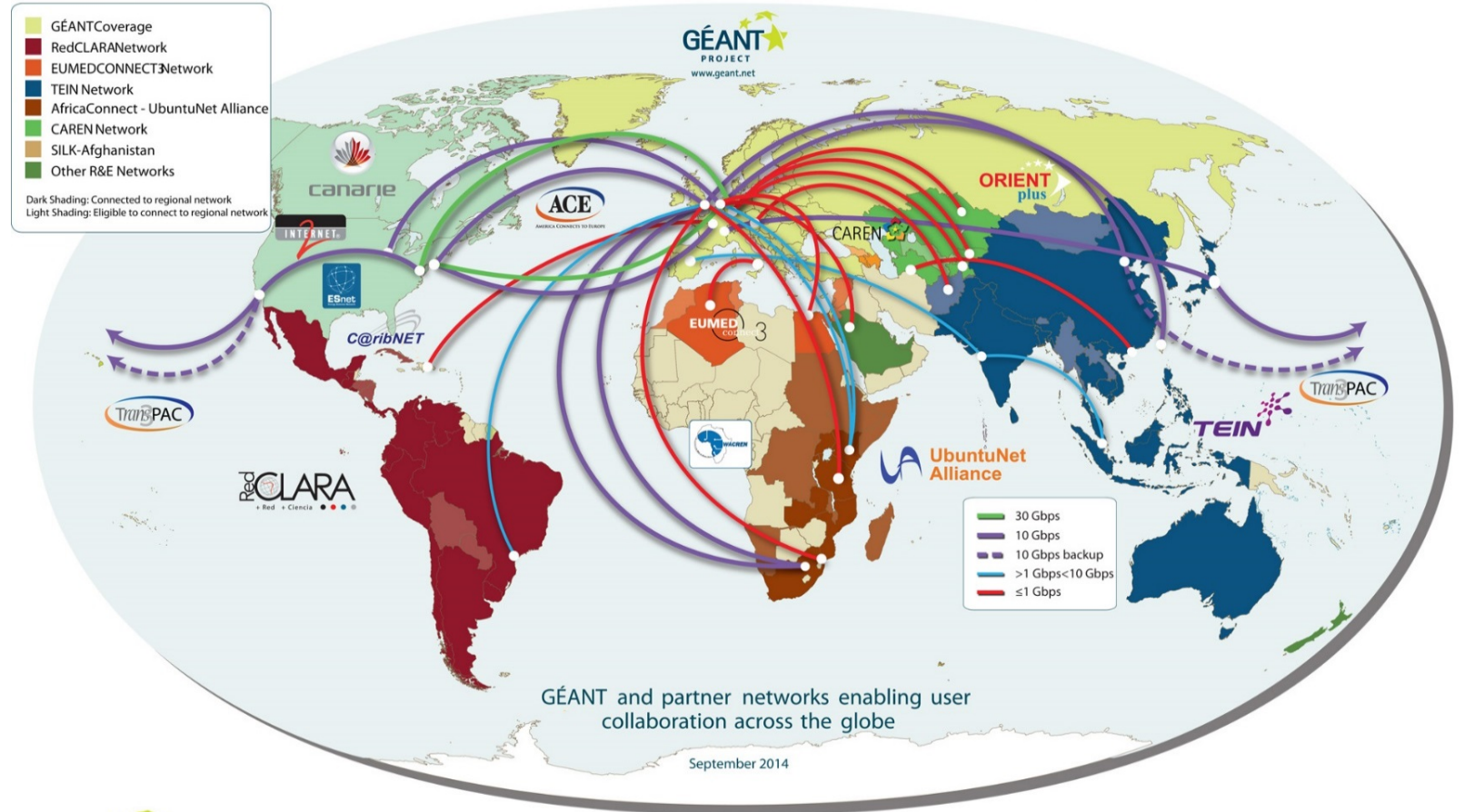
GÉANT's pan-European network is funded by the GÉANT Project (GN4-1). This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 691567. The map shows topology as at October 2015. The GN4-1 partners are listed below.



# Wide Area Network - Internet



## At the Heart of Global Research and Education Networking



connect • communicate • collaborate  
GÉANT is co-funded by the European Union within its 7th R&D Framework Programme.



# Wide Area Network - RMDCN

- **Regional Meteorological Data Communication Network**
  - Includes ECMWF members, WMO region VI and GISC sites
  - In 1999 29 sites; today 53 sites connected to RMDCN as of February 2015
  - 500 Mb/sec ECMWF uplink
  - Access speed ranges between 1 Mbps up to 50 Mbps
  - Member states basic package: 4 Mbps (redundant connections)
  - Different service levels with well defined compensations when failures
- **Additional 100 Mbps leased line between ECMWF and the UK Met Office in Exeter**
- **RMDCN available for world wide meteorological community (WMO RA VI and WMO GISC)**
- **RMDCN mainly reserved for operational data dissemination and GTS. If in doubt, check with your Computing Representative**

# Access to ECMWF - Security Token

- **The following external access to ECMWF requires a Security Token for validation**
  - Interactive logins
  - ECaccess website
  - File transfers
  - Access to restricted areas on website
  - Webmail
  - Creation of X509 certificates
- **Some access possible with certificates, either for the web or ECaccess services**



# Interactive Access

- **ssh sessions via Internet:**

\$ ssh [-X] <uid>@ecaccess.ecmwf.int or

\$ ssh [-X] <uid>@ecaccess.meteo.ms

meteo.ms - domain name of your Meteorological Service

- **X11 forwarding supported (option -X)**

- **ssh session via RMDCN:**

\$ ssh [-X] <uid>@msaccess.ecmwf.int or

\$ ssh [-X] <uid>@msaccess.meteo.ms

- **Available to Meteorological Services only**

- **RMDCN may be reserved for operational activities, check with your Computing Representative**



# ECaccess – Web Access – <http://ecaccess.ecmwf.int/> \*

**ECMWF ECaccess login**

**You can manage your files, organise transfers or submit batch jobs through the web interface.**

### Web session

Automatic logout will occur after an idle time of :

Please enter your userid :

Your passcode (obtained from your security token) :

**You can open an interactive session on an ECMWF system, with support for GUI applications.**

### NX interactive session

ECMWF server :

Or workstation :

Network link speed :

Initial application :

Window option (NX3) :

Virtual desktop resolution (NX3) :

**Tips for using ECaccess**

When using ECaccess, please use the menu navigation keys, not your browser back button. To make the service more secure, ECaccess instructs your browser not to cache personal information.

**NX sessions**

Please note that NX3 is no longer supported by NoMachine. You are encouraged to use NX4 instead.

\* Also available on msaccess or on local gateways



# ECaccess – Web Session

- **Manage files located in**
  - HOME
  - SCRATCH
  - ECFS (ec: and ectmp:)
- **Submit jobs**
- **View batch queues**
- **View your own submitted and/or running jobs**
- **Manage ECtrans associations and file transfers**
- **Download ECaccess certificate**
  - Can be used in conjunction with ECtools

## ECaccess – Web - NX

- **Secure remote access (ssh) and desktop virtualization (VNC like)**
- **Based on the NX software from NoMachine:**

**<http://www.nomachine.com/>**

**Version 4 is recommended**

- **Improved technology, much faster than X11 or VNC**
- **Local client available, that can be customised via session configuration files**
- **NX available on local gateways starting from ECaccess release 3.3.0 onwards**

## ECaccess – Web - NX

- Graphical sessions available on ecgate and cca
  - WindowMaker window manager
  - Xterm in floating window
- You can start several graphical applications from a virtual desktop or an xterm

# ECaccess – Web - NX

The screenshot shows a terminal window titled "NoMachine - ecaccess-2" with two panes. The left pane, titled "xterm", displays a list of jobs with columns for ID, name, user, priority, status, start time, end time, and host. The right pane, titled "emacs@ecgb11.ecmwf.int", shows the Emacs editor interface with a menu bar and a text area containing shell script code. An "Application Menu" is overlaid on the terminal, listing various system and application options.

ID	Name	User	Priority	Status	Start	End	Host
1291700	wind_ml	esk0	normal	RUNNING	9:27	1-00:00:00	ecgb05
1291647	datasyncro	swec	normal	RUNNING	17:15	1-00:00:00	ecgb09
1291646	us_job_all	gdq	normal	RUNNING	17:26	1-00:00:00	ecgb08
1291615	us_job_all	gdq	normal	RUNNING	19:39	1-00:00:00	ecgb04
1291546	previ_bal_	ar9	normal	RUNNING	31:40	2:00:00	ecgb10
1291539	us_job_all	gdq	normal	RUNNING	34:10	1-00:00:00	ecgb10
1291505	us_job_all	gdq	normal	RUNNING	41:23	1-00:00:00	ecgb09
1290758	soc38h1b3	fim	normal	RUNNING	2:11:35	1-00:00:00	ecgb07
1290754	get_macc_N	hc0	normal	RUNNING	2:11:40	1-00:00:00	ecgb05
1288986	controlrun	nli	normal	RUNNING	5:41:24	1-00:00:00	ecgb08
1287969	c_10_38h1b	sp0r	normal	RUNNING	8:11:42	1-00:00:00	ecgb08
1287239	marsjob	rgk	normal	RUNNING	10:43:20	1-00:00:00	ecgb10
1287143	MyM_DA_con	nkn	normal	RUNNING	10:55:05	1-00:00:00	ecgb04
1286320	retr	aure	normal	RUNNING	12:29:52	1-00:00:00	ecgb07
1285885	MyM_DA_con	nkn	normal	RUNNING	13:16:31	1-00:00:00	ecgb04
1285359	deneme18_b	tmy					ecgb10
1276179	MARSEXTR2	nkc					ecgb07
1276176	MARSEXTR2	nkc					ecgb04
1276173	MARSEXTR2	nkc					ecgb04
1276172	MARSEXTR2	nkc					ecgb04
1291155	ecgb_retri	hui					ecgb07
1289288	get_convec	gbpw					ecgb05
1289289	get_convec	gbpw					ecgb08
1289287	get_convec	gbpw					ecgb07
1288955	get_convec	gbpw					ecgb09
1287512	anneds_201	sbw					ecgb05
1287283	MONICOSHOR	sbt					ecgb08
1285860	iberia_38h	smx					ecgb07
1285855	seepra	f12f					ecgb08
1285488	dka_h38_11	mib					ecgb09
1279334	dka_h38_11	mib					ecgb08
1276721	38h1_1_30_	mdx					ecgb05
6	ecgb11:/home/us/usc/ -->						

**Application Menu**

- Info
- Allow X11 access from ...
- Update Application Menu
- Run command ...
- open xterm on ...
- local xterm
- ecgate (AIX)
- ecgate (RedHat Linux)
- c2a
- c2b
- lxab linux cluster (ECMWF only)
- metview3
- metview4
- XCdp
- Editors**
- XEmacs
- Emacs
- NEdit
- Xedit
- VI
- Workspace
- Appearance
- Exit

```
dir=/scratch/ms/...

the working directory of the batch script before it is
uted.

-type=FAIL

ifies that an email should be sent in case the job fails.
r options include BEGIN, END, REQUEUE and ALL (any state
ge).

=00:05:00

ifies that your job my run up to HH:MM:SS of wall clock
. The job will be killed if it exceeds this limit. If
is not defined, the default limit for the queue (qos)
be used.

-----
urrent directory and its content
-----

at your job will be executed in the specified workdir:"

pwd # prints the path name of the current directory

echo "
List of the content of the current directory:
"
ls -l

#-----
# show your PATH
#-----

echo "
---:--- Firstjob 36% L80 (Shell-script[pdksh])-----
```

# File Transfers to ECMWF – FTP or SFTP

- **Through Internet, using `ecaccess.ecmwf.int`**
- **To login, use**
  - `$ ftp ecaccess.ecmwf.int` **OR** `sftp <uid>@ecaccess.ecmwf.int`
- **Enter your UID and passcode from security token**
- **Direct access to limited number of file systems**
  - **ECHOME (\$HOME)**
  - **ECSCRATCH (\$SCRATCH)**
  - **ECFS (ec:)**
  - **ECTMP (ectmp:)**
  - **ECHOST (e.g. ecgate, cca)**
- **ECaccess Web Toolkit offers similar access via command line tools**
  - **ECtools may already be installed on your organisation's desktop or can be installed by yourself**

# File Transfers to ECMWF – FTP

```
--> ftp uid@ecaccess.ecmwf.int
ftp> ls
227 Entering Passive Mode. (136,156,66,24,219,252)
150 Opening ASCII mode data connection
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECHOME
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECHOST
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECMARS
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECFS
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECSCRATCH
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECJOBS
drwxr-x--- 1 uid ecaccess 2048 Dec 18 2014 ECTMP
226 Transfer complete
ftp> cd ECHOST
250 CWD command successful
ftp> ls
227 Entering Passive Mode. (136,156,66,24,204,2)
150 Opening ASCII mode data connection
drwxr-x--- 1 uid ecaccess 2048 Feb 11 17:06 frutiger
drwxr-x--- 1 uid ecaccess 2048 Feb 11 17:06 ecgate
drwxr-x--- 1 uid ecaccess 2048 Feb 11 17:06 cca
drwxr-x--- 1 uid ecaccess 2048 Feb 11 17:06 c2a
226 Transfer complete
```

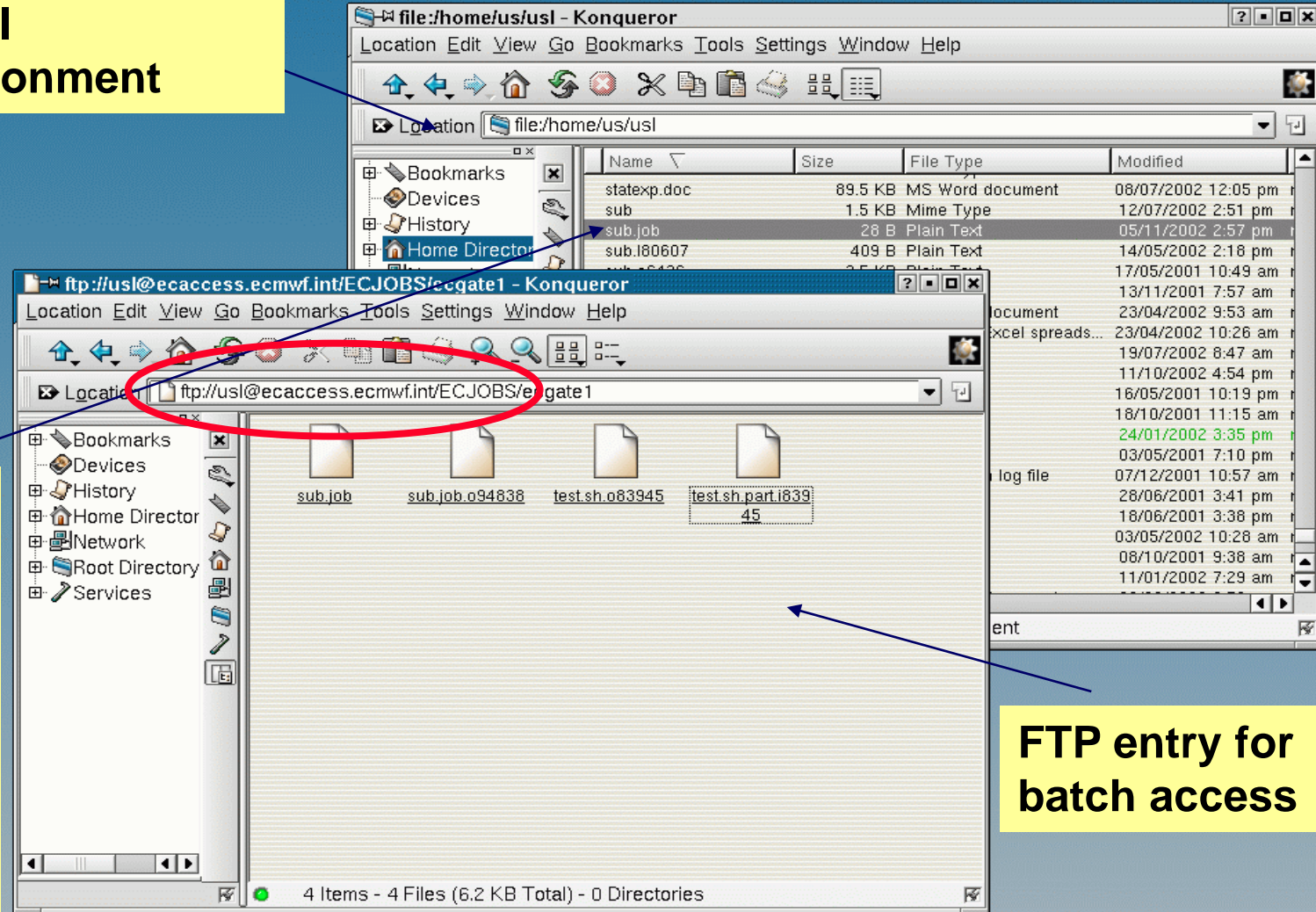
```
ftp> cd ECHOST/cca$PERM
250 CWD command successful
ftp> ls
227 Entering Passive Mode. (136,156,66,24,226,191)
150 Opening ASCII mode data connection
drwxr-xr-x 1 uid gid 24576 Sep 12 14:31 FLEXPART82
drwxr-xr-x 1 uid gid 24576 Sep 30 08:06 FLEXPART90
-rw-r--r-- 1 uid gid 5150720 Sep 05 12:30 flexpart82.tar
drwxr-xr-x 1 uid gid 4096 May 01 2014 hdfsos
drwxr-x--- 1 uid gid 4096 May 01 2014 hdfsos2
-rw----- 1 uid gid 112524 Mar 25 2014 hello_world.err
-rw----- 1 uid gid 371 Mar 25 2014 hello_world.out
drwxr-x--- 1 uid gid 4096 Sep 05 16:38 idl
drwxr-x--- 1 uid gid 4096 Aug 10 2013 vim74
226 Transfer complete
ftp>
```



# File Transfers to ECMWF - Browser– ftp/sftp

**Local environment**

**Local file can be dragged and dropped into ecaccess area.**



**FTP entry for batch access**



# File Transfers from ECMWF to MS

- A straight FTP to Meteorological Services **via RMDCN** lines from ecgate is theoretically possible
  - This may only be available for operational purposes!
- For transfers **via Internet** connections one has to use ectrans, FTP via the ECMWF FTP-gateway or sftp/scp.
  - ectrans is recommended; it will be covered later, during the session on ECaccess

# File Transfers from ECMWF – FTP interactive

```
--> ftp proxy
Connected to proxy.ecmwf.int.
220- 136.156.64.10 PROXY-FTP server (DeleGate/9.9.5) ready.
...
220-
220-extended FTP [MODE XDC][XDC/BASE64]
220
Name (proxy:uid): username@ms-host
331 Password required for username.
Password: XXXXXX
230-- PASS for username@ms-host.
220-Welcome to Pure-FTPd.
220-You are user number 2 of 50 allowed.
220-IPv6 connections are also welcome on this server.
220 You will be disconnected after 15 minutes of inactivity.
331 User username OK. Password required
230-User username has group access to: 500
230-OK. Current directory is /
230 \(-)/ -- { connected to 'ms-host' }
ftp>
ftp> get filename
...
ftp> quit
```

# File Transfers from ECMWF – Batch FTP (1/2)

## ~~FTP script with plain text password possible~~

```
#!/bin/ksh  
HOST=proxy.ecmwf.int  
USER=username@myserver.org  
PASS=anonymous@myserver.org  
  
ftp -inv $HOST << EOF  
user $USER $PASS  
dir  
put myfile  
bye  
EOF
```

Not recommended!  
Use .netrc file or  
ssh instead.

## File Transfers from ECMWF – Batch FTP (2/2)

- **.netrc file can be used for automated login**

```
machine proxy login anonymous@kernel.org password test@test.org
```

- **FTP in shell scripts**

```
ftp proxy <<EOF  
dir  
put myfile  
quit  
EOF
```

- **Limitation of .netrc**
  - **Only one entry for one host !**
  - **Must be readable only to the owner**

# File Transfers from ECMWF - sftp/scp

- sftp/scp commands are part of the ssh package
- sftp is a more secure replacement for the ftp command
- scp is a more secure replacement for the rcp command
- ssh commands offer different authentication mechanisms
- sftp/scp transfers can be slightly slower than ftp/rcp transfers due to the encryption of the connection
- sftp with password:  
    \$ sftp user@host.meteo.ms  
    user@host.meteo.ms's password: xxxxxx  
    sftp>
- scp example:  
    \$ scp localfile user@host.meteo.ms:/home/user/destinationfilename

# File Transfers from ECMWF - sftp/scp

- Transfers can be automated with the use of private/public keys
- Use ssh-keygen command to generate private/public keys
- **Add** contents of ~/.ssh/id\_rsa.pub to ~/.ssh/authorized\_keys on all remote machines where you wish to transfer files to, using public key authentication
- If successful sftp, scp and ssh commands to these remote machines will not prompt for a password anymore
- This allows the use of these commands in batch mode

# File Transfers from ECMWF – mspds command

Allows MS to use the dissemination system (ECPDS) for their own (time-critical) activities/data

- ECPDS is a distributed software system which allows users to specify which data should be delivered to which systems using which network
  - Internet or RMDCNand which protocol
  - ftp, sftp, disftp, ecaccess
- Transfers are monitored
- The data generated can be transmitted from ecgate or HPCF to ECPDS
- The data is transmitted to ECPDS synchronously or asynchronously
- Asynchronous retrieval through the Download Scheduler is more efficient as it can deal with parallel transmissions
- Can also be used for data discovery/acquisition



# File Transfers from ECMWF - mspds

```
ecgb11:120 --> mspds
MSpds-v4.0.0_2013110301
```

```
usage: mspds -destination name -source filename (*)
       mspds -expected[|-started|-completed|-reset] [-at arg] -metadata metadata (***)
       mspds -waitfor groupby (*****)
```

DataFiles unicity is based on the target, destination, version and standby flag association.

```
-destination {arg} - destination name
-source      {arg} - source file name (default: stdin)
-priority    {arg} - transmission priority 0-99 (default: 99)
-metadata    {arg} - metadata(s) (param=value,...)
-target      {arg} - target file name (default: source file name)
-identity    {arg} - identity of the product (default: target file name)
-lifetime    {arg} - lifetime of the data file (default: 2d) (*****)
-delay       {arg} - transmission delay (default: immediate transfer) (*****)
-at          {arg} - transmission date (default: immediate transfer)
-format      {arg} - define the date format (default: yyyyMMddHHmmss)
-group       {arg} - define the transfer group (default: random)
-version     {arg} - optional version associated with the DataFile
-reqid      {arg} - optional DataFileId for the requeue/purge option
-groupby     {arg} - organize transfers by groups
-noretrieval - file not retrieved in groupby mode (taken from source)
-expected    - the task is identified with the metadata(s)
-started     - the task is identified with the metadata(s)
-completed   - the task is identified with the metadata(s)
-reset       - the task is identified with the metadata(s)
-standby     - spool the data file only
-remove      - remove source when transfer successful
-requeue     - requeue a dataFile and reset the related transfer(s)
-purge       - purge the dataFile and the related transfer(s)
-force       - force a requeue when a duplicate dataFile is found
-buffsize    - buffer size for read and write (default: 65536)
-verbose     - verbose mode on
-help        - this message
-v           - version number
```

(\*) If successful, a DataFileID is returned, which can be used to keep track of the transfer requests through the web interface.

(\*\*\*\*\*) Wait for a group of preset files to be retrieved on ecgds.

(\*\*\*\*\*) Duration in weeks, days, hours, minutes or seconds (e.g. 1w|2d).

# Data transfer of large volumes

- To export/import “large amounts” of data (e.g. ERA, ENS or Seasonal FC) use your Internet connection whenever possible
- “large volume” depending on
  - Internet connection
  - Available time?
  - 10s of TBs
- If network transfer is not feasible check with User Support for alternatives, e.g. transfer via media

# Further Information

- **Access to computing facilities:**

[www.ecmwf.int/en/computing/access-computing-facilities](http://www.ecmwf.int/en/computing/access-computing-facilities)

- **User documentation**

[software.ecmwf.int/wiki/display/UDOC/User+Documentation](http://software.ecmwf.int/wiki/display/UDOC/User+Documentation)

- **ECaccess documentation and releases**

[software.ecmwf.int/wiki/display/ECAC/ECaccess+Home](http://software.ecmwf.int/wiki/display/ECAC/ECaccess+Home)

- **Networks**

[www.ecmwf.int/en/computing/our-facilities/networks](http://www.ecmwf.int/en/computing/our-facilities/networks)

[www.ecmwf.int/en/computing/our-facilities/rmdcn](http://www.ecmwf.int/en/computing/our-facilities/rmdcn)