Access to ECMWF resources

Computer user training course 2016

Carsten Maass

User Support

advisory@ecmwf.int

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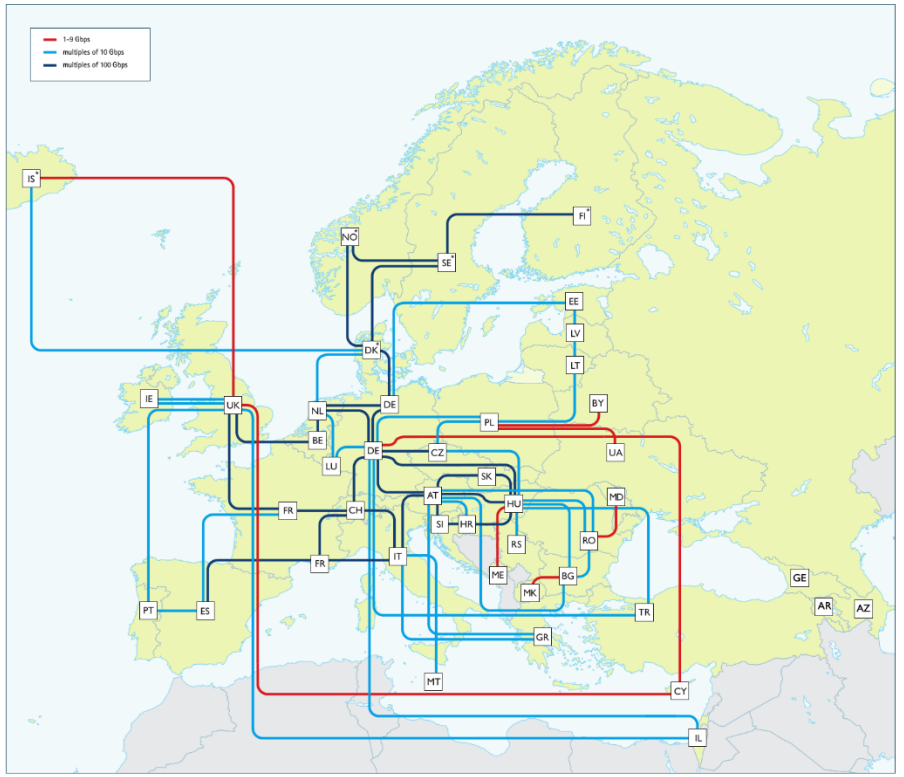
Wide Area Network - Internet

- 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

www.geant.org

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

GÉANT PROJECT
www.geant.net

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

Co-funded by the European Union

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)**

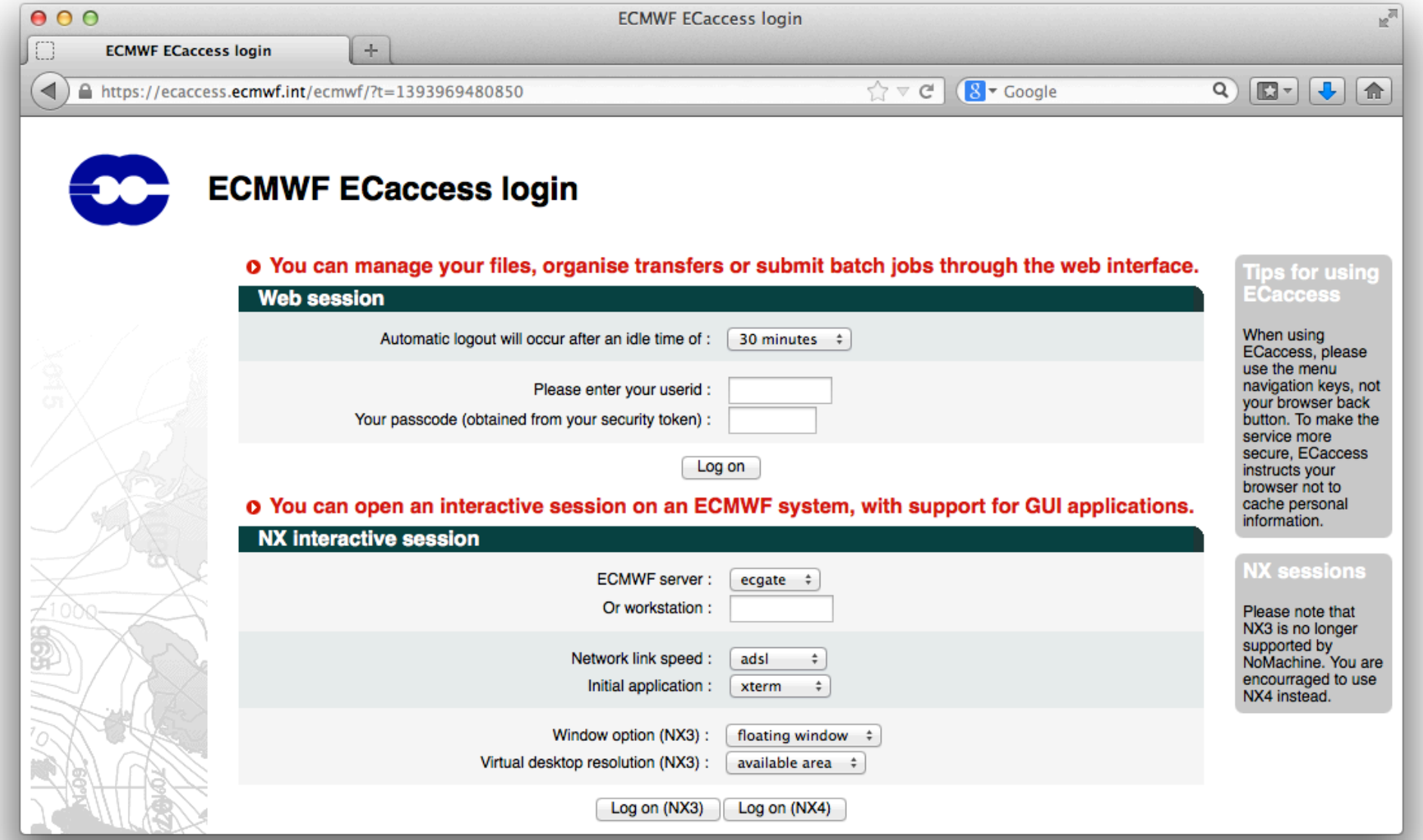
- **ssh session via RMDCN:**

  $ 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/ *



* 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:**

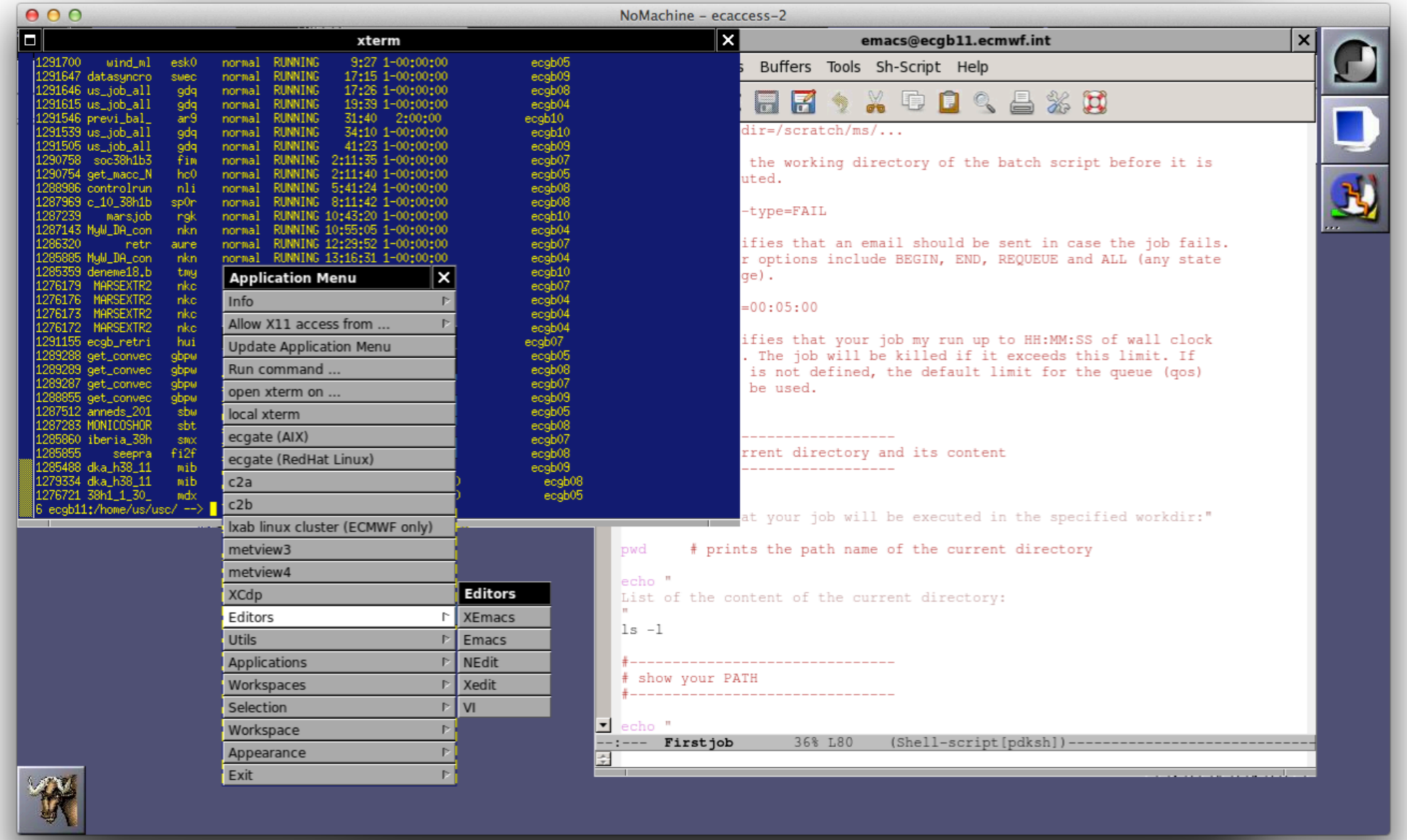
  http://www.nomachine.com/

  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



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

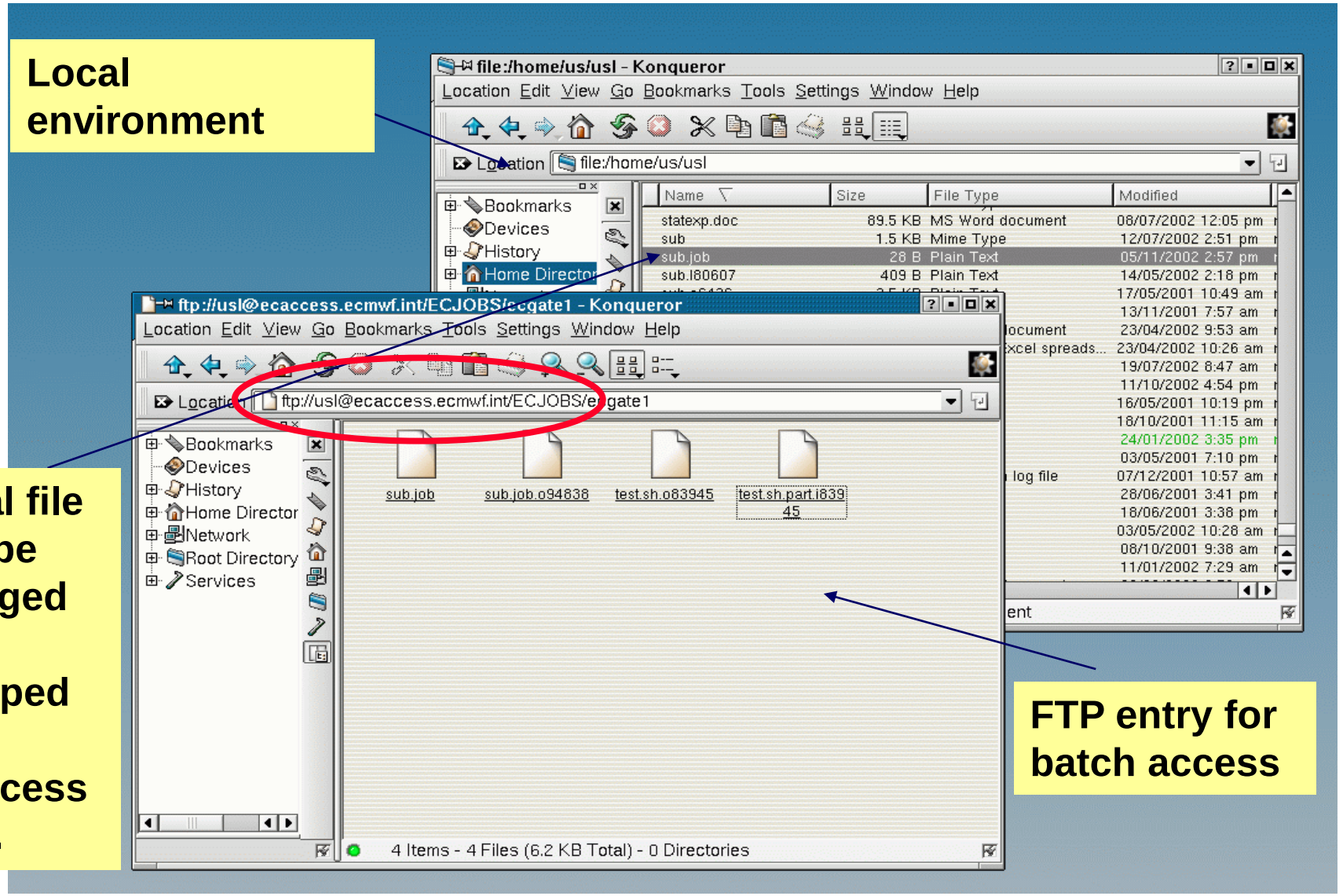
- **Enter your UID and passcode from security token**
- **Direct access to limited number of file systems**
  - **ECHOME ($HOME)**
  - **ECSCRATCH ($SCRATCH)**
  - **ECFS (ec:)**
  - **ECTMP (ectmp:)**
  - **ECHOST (e.g. ecgate, cca)**
- **ECaccess Web Toolkit offers similar access via command line tools**
  - **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  hdfeos
drwxr-x---   1 uid      gid           4096 May 01 2014  hdfeos2
-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



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 then 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 RMDCN

  and which protocol
  - ftp, sftp, dissftp, 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 preseted files to be retrieved on ecpds.
(******) 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

- **User documentation**

  software.ecmwf.int/wiki/display/UDOC/User+Documentation

- **ECaccess documentation and releases**

  software.ecmwf.int/wiki/display/ECAC/ECaccess+Home

- **Networks**

  www.ecmwf.int/en/computing/our-facilities/networks

  www.ecmwf.int/en/computing/our-facilities/rmdcn