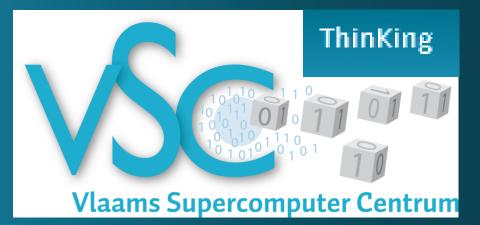






NoMachine NX for HPC

Mag Selwa ICTS, Leuven



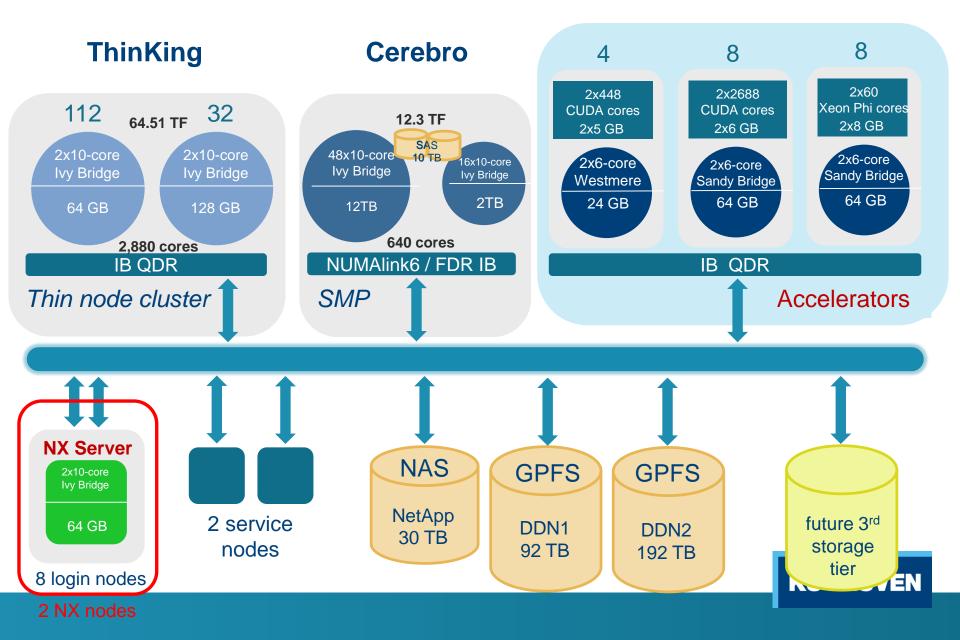


Overview

- What is NX?
- Who should use it?
- How to install NX?
- How to configure NX?
- Mobile version
- System tools
- Available software
- What's next?
- Example



HPC Tier-2: 2014



Software

- Operating system
 - Red Hat Enterprise Linux ComputeNode release 6.4 (Santiago), 64 bit
 - Kernel 2.6.x
- Applications
- For development
 - \circ Compilers & basic libraries = tool chains
 - Libraries
 - Tools: debuggers, profilers

Use modules

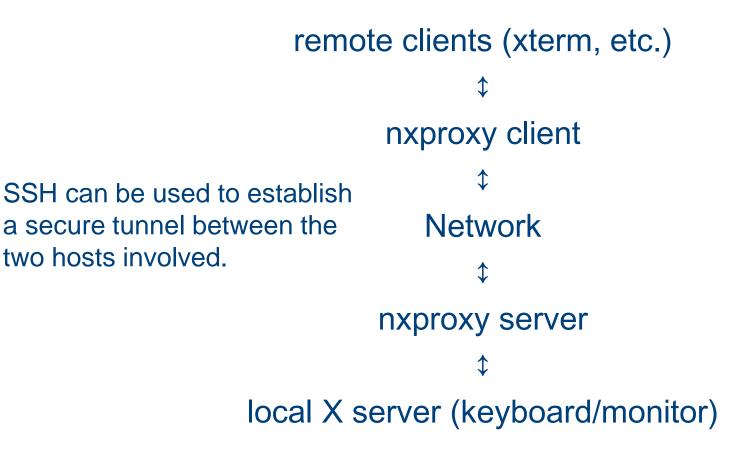
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NX technology:

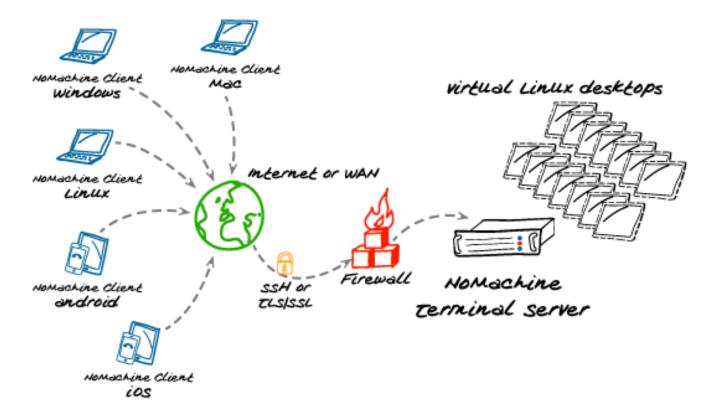
- Handles remote X Window System connections, and attempts to greatly improve on the performance of the native X display protocol to the point that it can be usable over a slow link such as a dial-up modem.
- Wraps remote connections in SSH sessions for encryption.
- NX software is currently available for Windows, Mac OS X, Linux, and Solaris.
- The two principal components of NX are nxproxy (both on remote and local - server machines simulating an X server on the client) and nxagent (started on the remote - client machine, thus avoiding most X11 protocol round trips).

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Typical NX setup:



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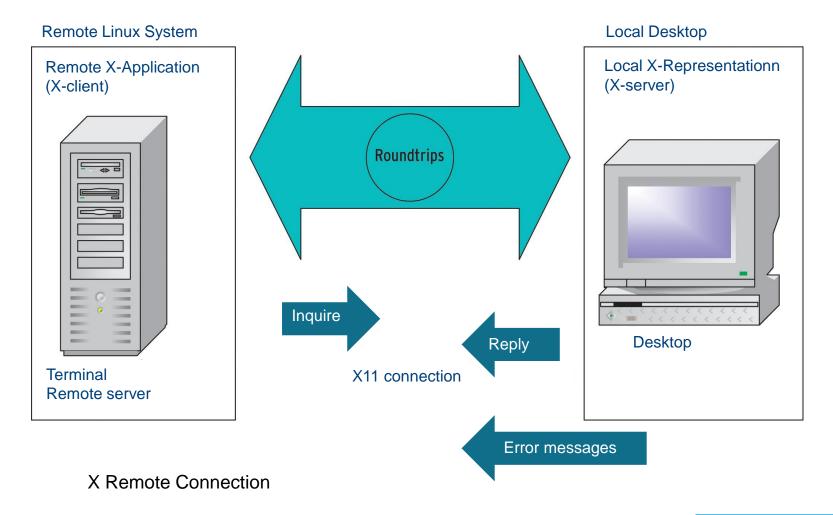


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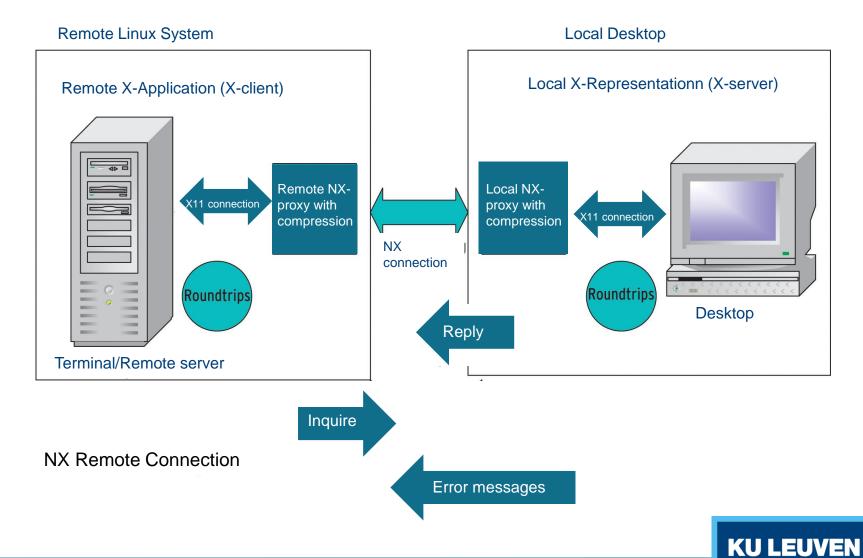
NX works by creating an nx-user on the server machine whose shell is executed any time a remote NX user connects to SSH using NX Client.

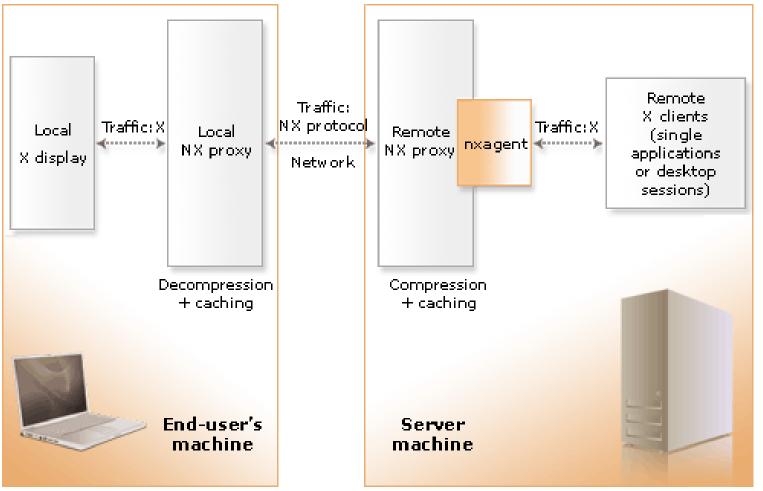
NX technology:

- The initial login between client and server requires DSA keypair.
- The public key-part is provided during the installation of the server.
- The private key-part is distributed together with NX Client.
- The NX key forces the SSH server to execute the nxserver shell and enables SSH X11 forwarding.
- After the server has authenticated the client NX establishes an SSH secure channel.



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NX technology:

- Authentication of the user on the system and negotiation of session parameters happen on the established SSH secure channel.
- By default, NX Client is configured with encryption of all traffic enabled, i.e. NX tunnels all the session traffic over the encrypted SSH channel used to authenticate and negotiate the session with the server.
- Current version of NX allows system login as an alternative method so that users can choose if they want to rely on NX or SSH authentication (available only on enterprise-version servers).

NX allows the user:

- To log in remotely (over a slow internet) to a server,
- Login is graphical (GUI serves as development environment),
- NX also allows to suspend and resume sessions,
- During suspension, the processes invoked inside the session continue to run,
- Therefore NX can be used as a graphical alternative to **SSH+screen** application.

Main advantages of NX

- Keeps session open,
- Alternative for people using screen,
- More interactive jobs,
- Easy in use for editing, file management, developing software,
- Different limits of CPU (regular login node 36 min, NX node extended to 2 hrs).

What NX is not?

- Not a possibility to get linux tools and access to graphical linux interface without connection to HPC.
- Not a possibility to get Matlab for free (HPC related jobs only).

Who should use it?

- HPC users that prefer GUI,
- HPC users that have no/little experience with command line,
- HPC Linux users that are used to certain settings and shortcuts,
- HPC researchers that would like to display results easily,
- HPC users that are in a process of interactive job and do not want to loose the session when taking laptop home,
- HPC users that often use screen,
- HPC users that need to work from mobile devices.

How to install NX?



NoMachine Enterprise Client

- MoMachine Enterprise Client for Windows
- MoMachine Enterprise Client for Mac OS X

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MoMachine Enterprise Client for Linux

🛓 Learn more

https://www.nomachine.com/download-enterprise#NoMachine-Enterprise-Client

How to install NX?



NoMachine for Android

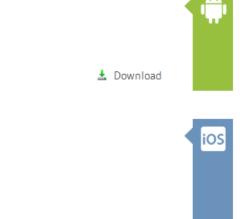
Tablets running Android 3.0 Honeycomb or later.



NoMachine for iOS

Compatible with iPad running iOS 5 or later.







Enterprise Products Evaluation

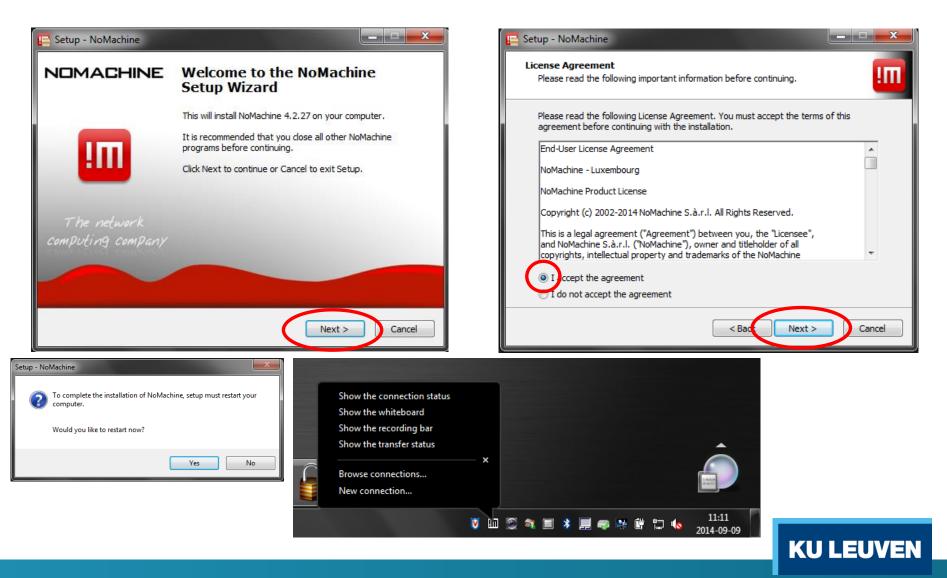
All products of the NoMachine for the Enterprise range are available as evaluation software without registration for 30 days, and install with all corresponding features available with the exception of H.264 support. This will be activated upon purchasing the relevant product. Simply click the download button for the product you wish to evaluate.

🛓 Download

App store



How to install NX?



How to configure NX? – convert key

- NoMachine NX requires keys in OpenSSH format,
- Default keys generated with Putty are not in OpenSSH format,
- Windows users: key can be converted with Putty Key Generator,
- Linux/Mac users:

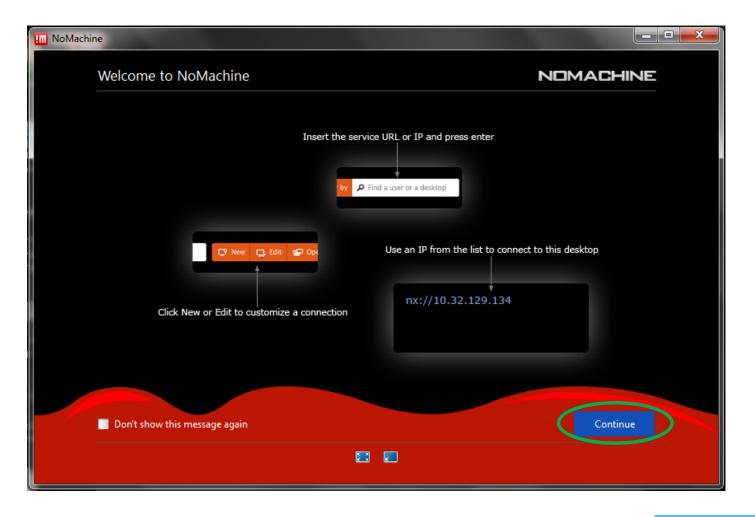
\$ ssh-keygen -i -f key-in-ssh2-format > key-in-openssh-format

How to configure NX? – convert key

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| Key fingerprint: | | ssh-rsa 2048 84:cc:5f:af:e4:1b:bb:fd:ad:0d:a8:e0:c5:e6:26:8c | | | | | | |
| Key com | iment | rsa-key-20140911 | | | | | | |
| Key passphrase: | | ••••• | | | | | | |
| Confirm passphrase: | | | | | | | | |
| Actions | | | | | | | | |
| Generate a public/private key pair Generate | | | | | | | | |
| Load an existing private key file | | | | Load | | | | |
| Save the generated key | | | Save public key | Save private key | | | | |
| Parameters | | | | | | | | |
| Type of key to generate: SSH-1 (RSA) SSH-2 RSA SSH-2 DSA | | | | | | | | |
| Number of bits in a generated key: 2048 | | | | | | | | |

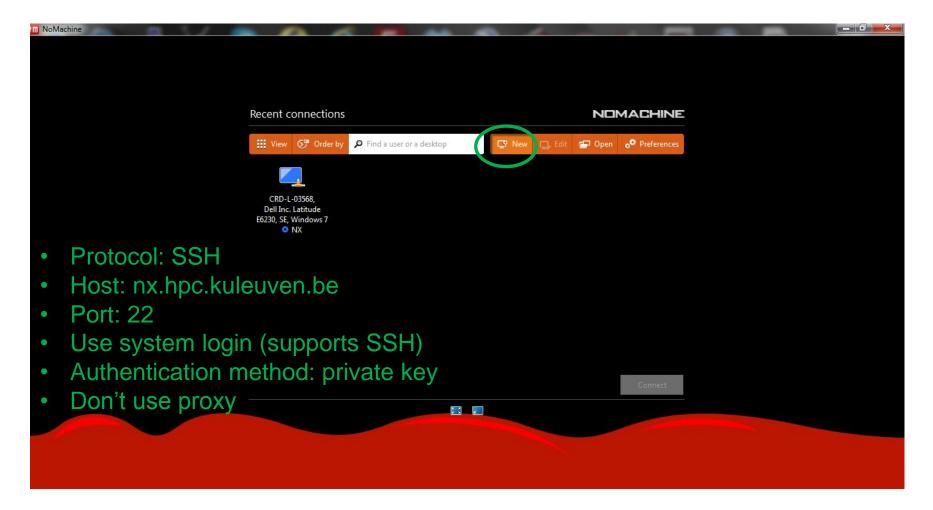
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How to configure NX?





How to configure NX?

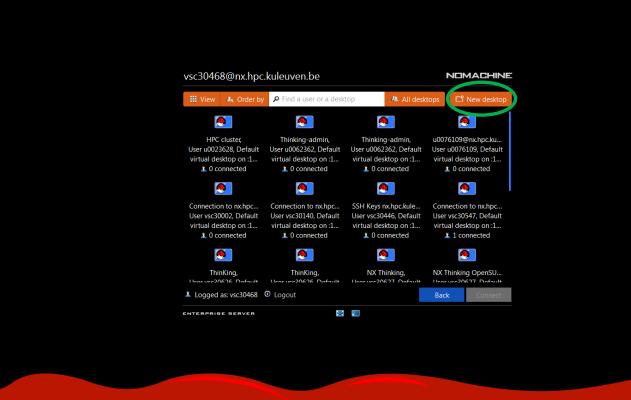




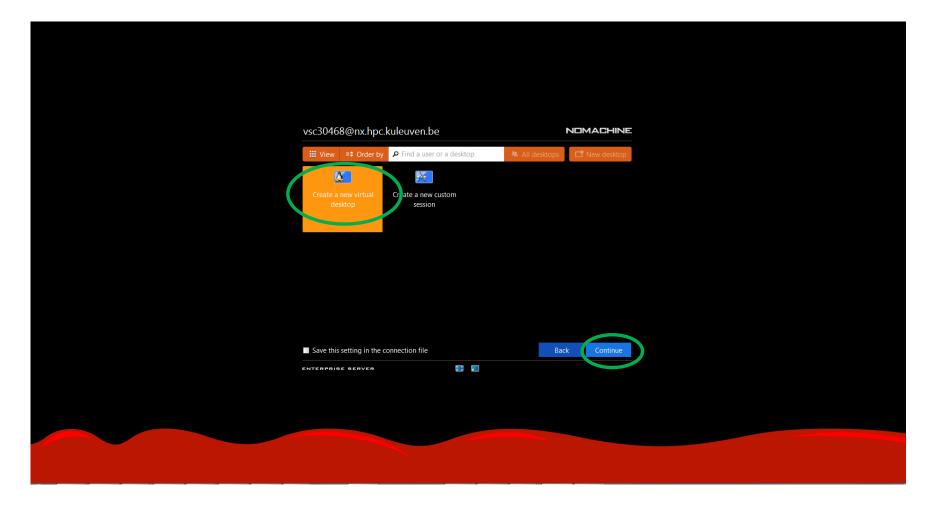
How to configure NX?







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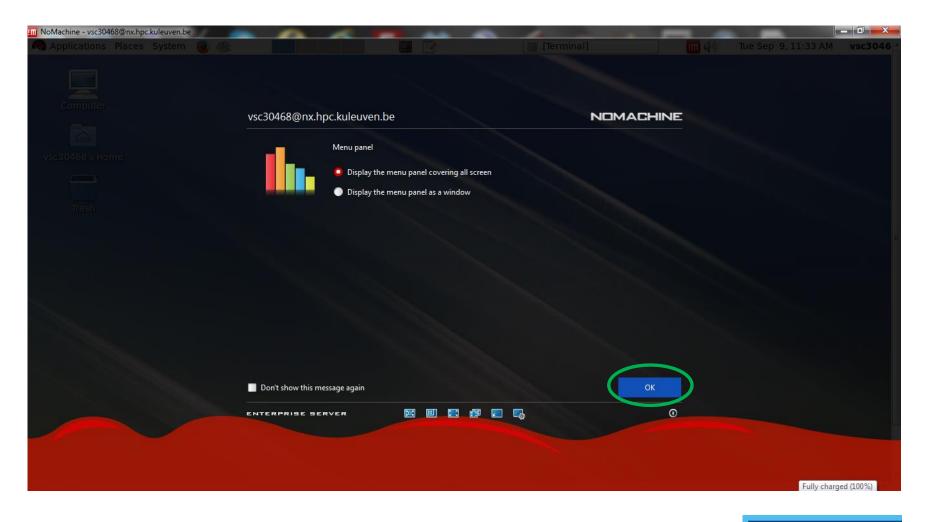




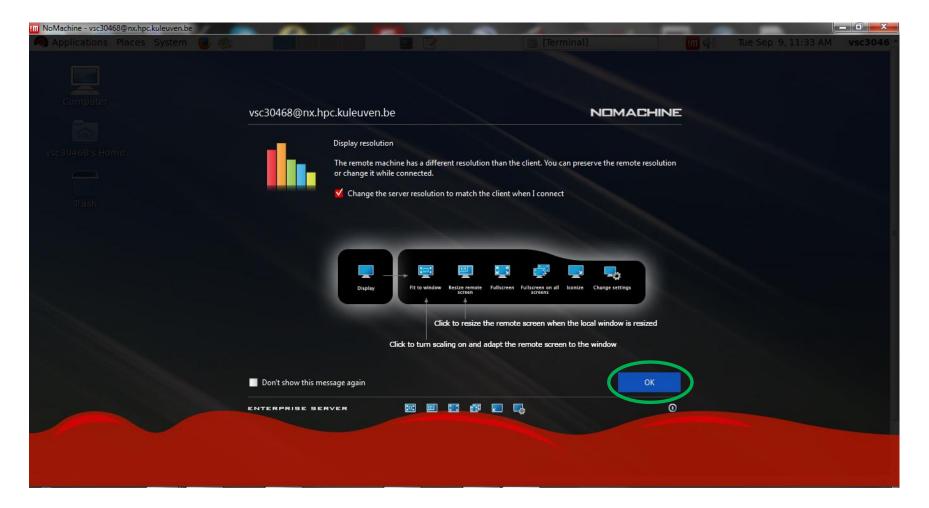




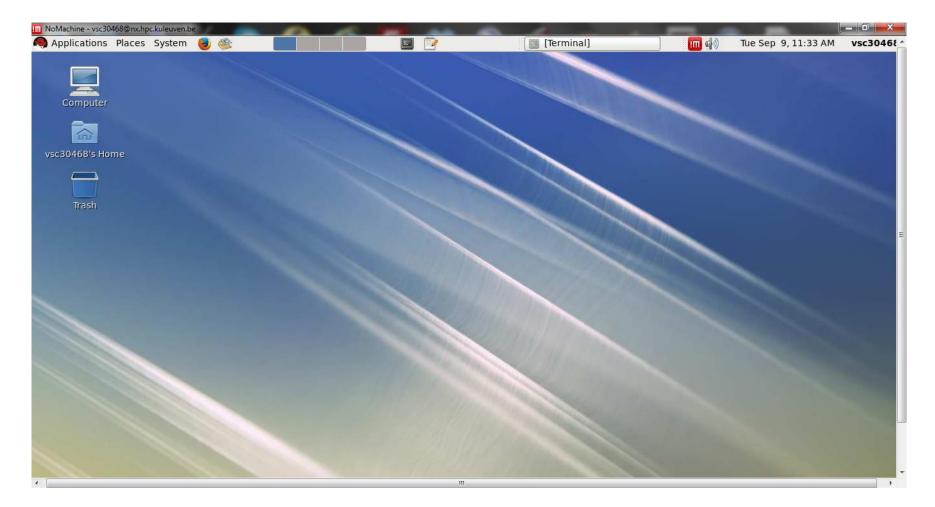






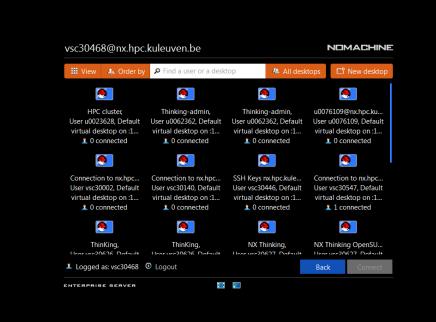








How to configure NX? - reconnecting



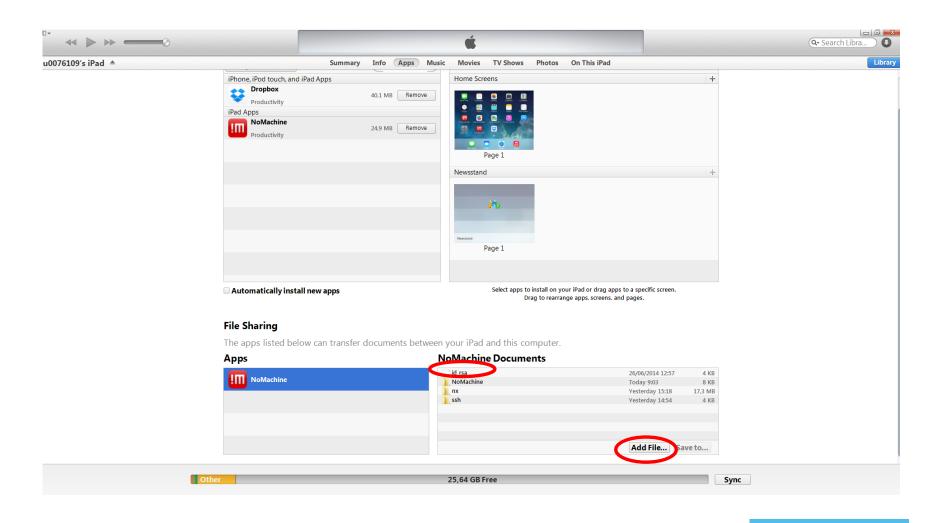


How to configure NX? – reconnecting

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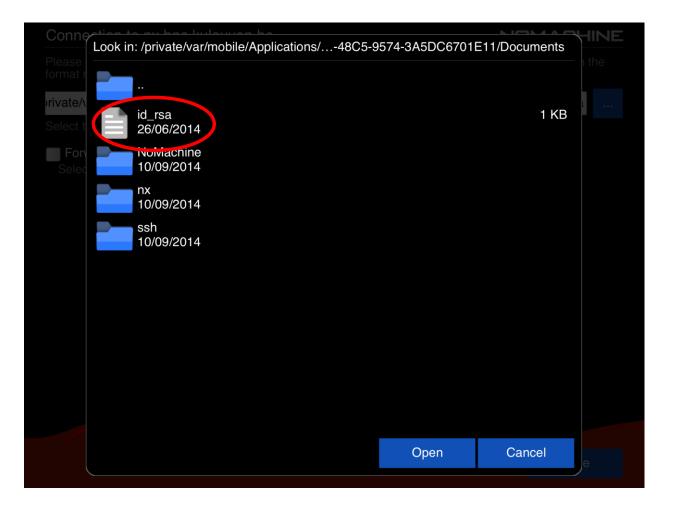
Mobile version



Android – transfer files e.g. with Box (KU Leuven) or Dropbox (others)

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Mobile version

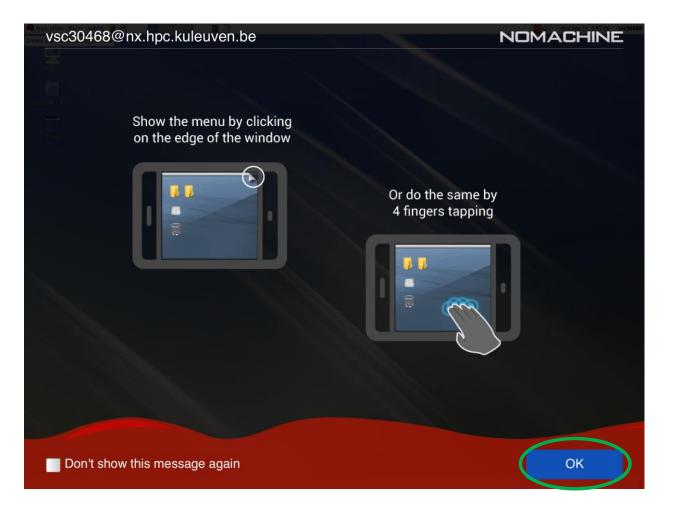


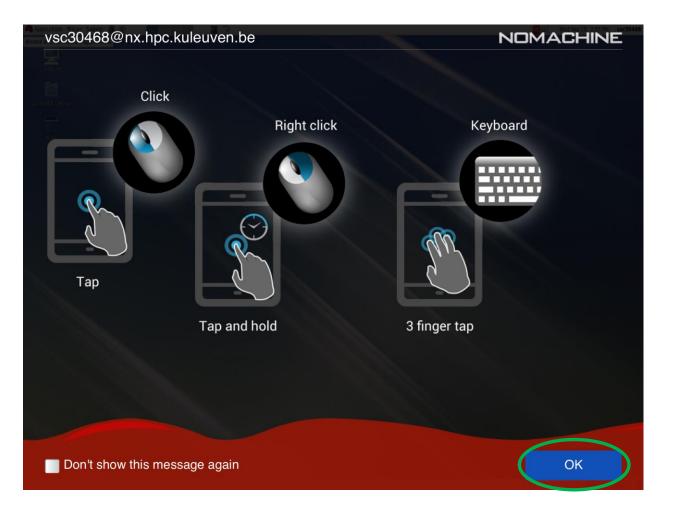


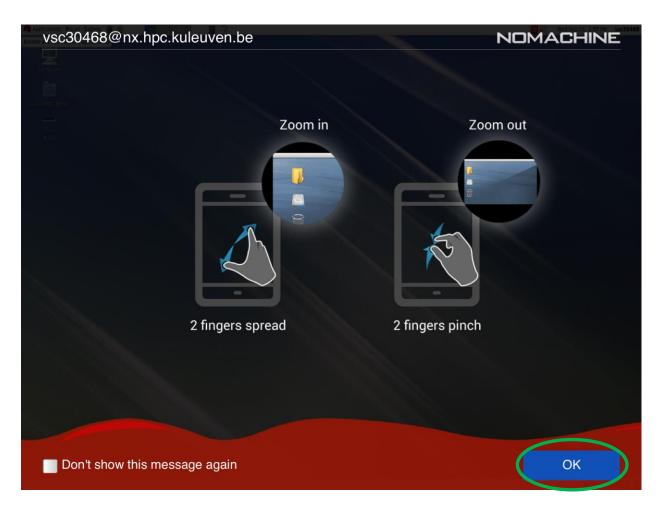
Mobile version

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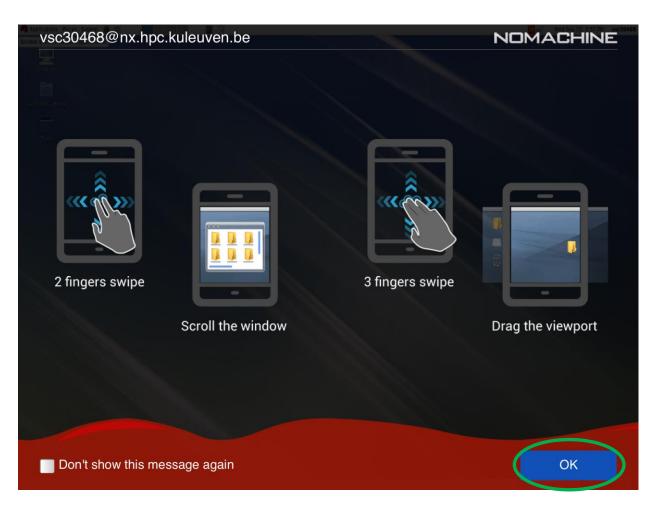
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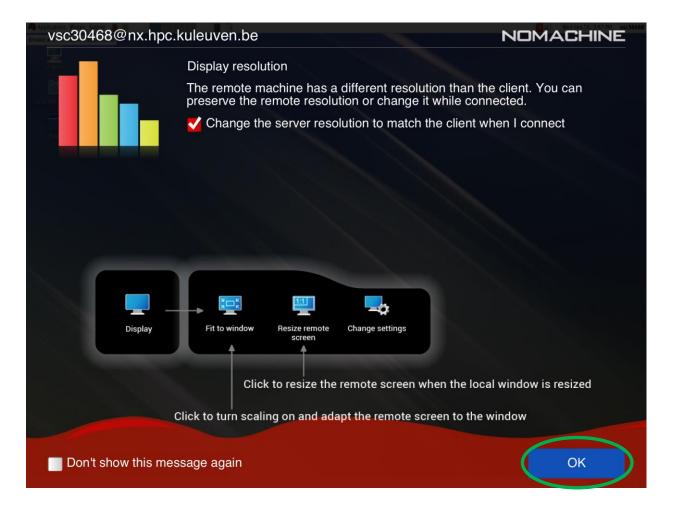


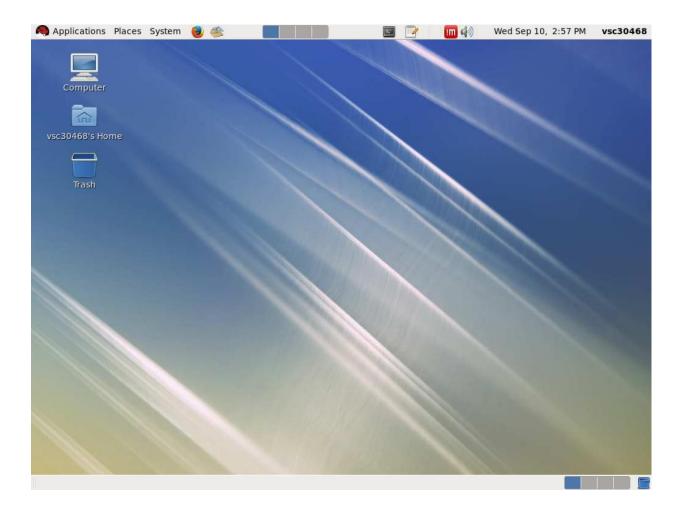






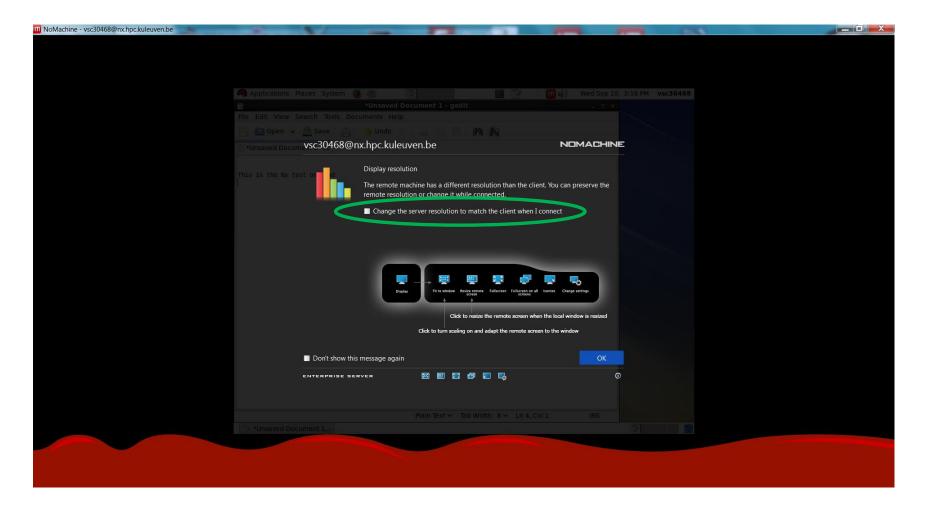




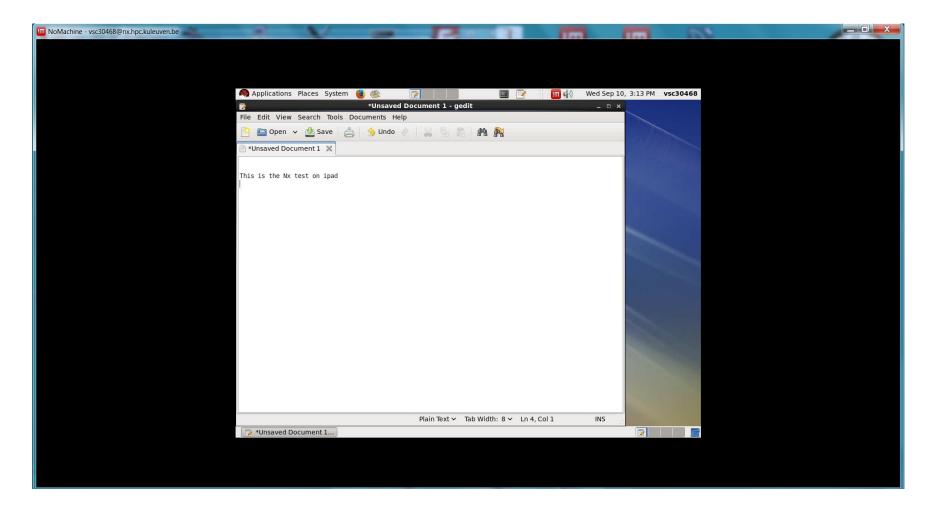


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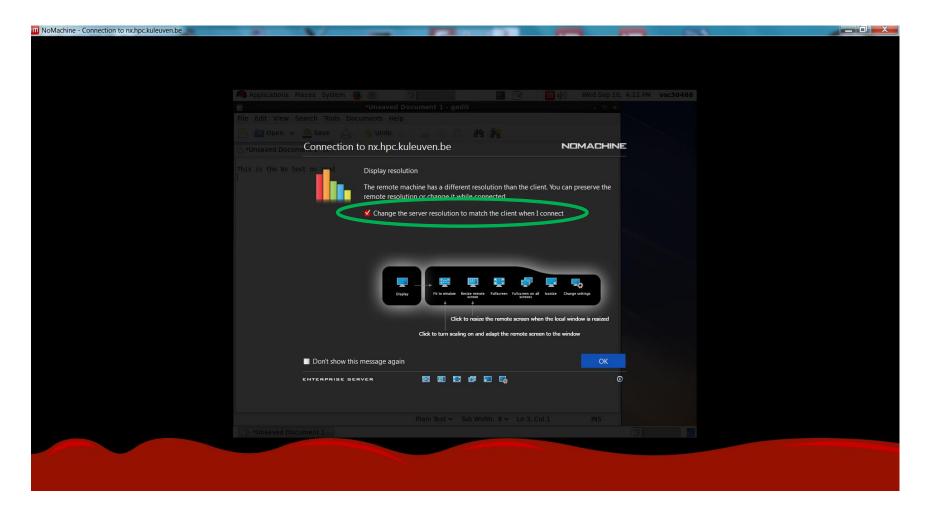




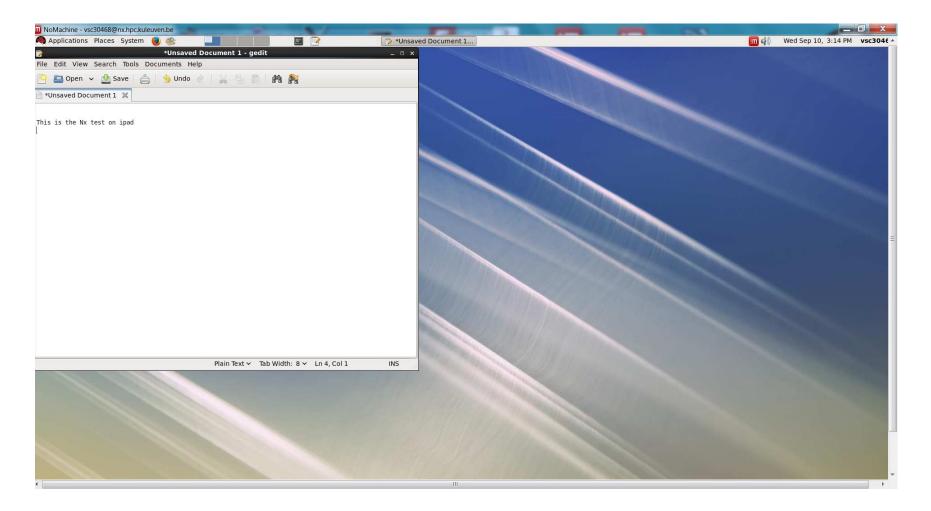




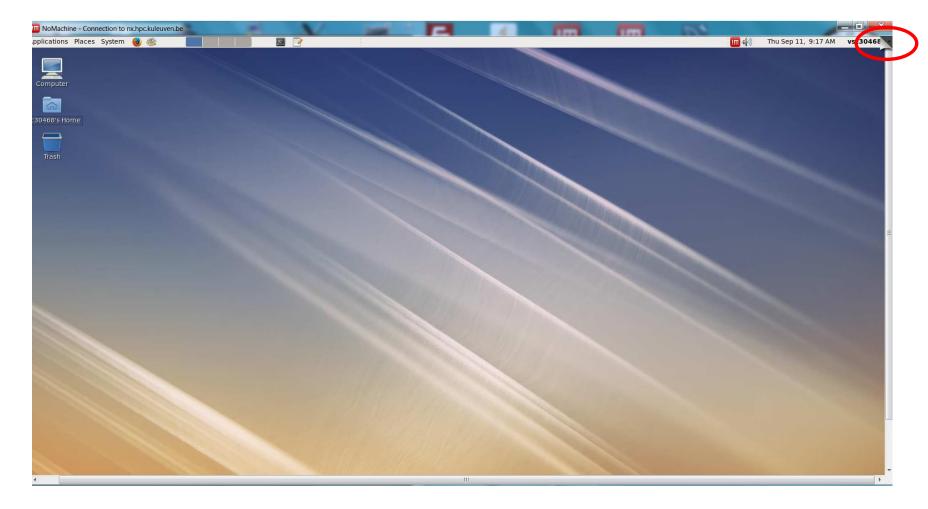




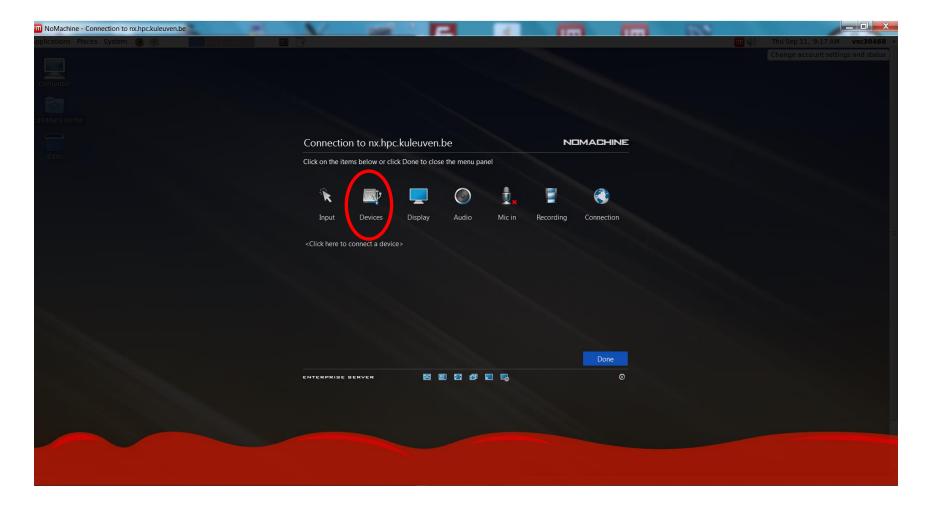




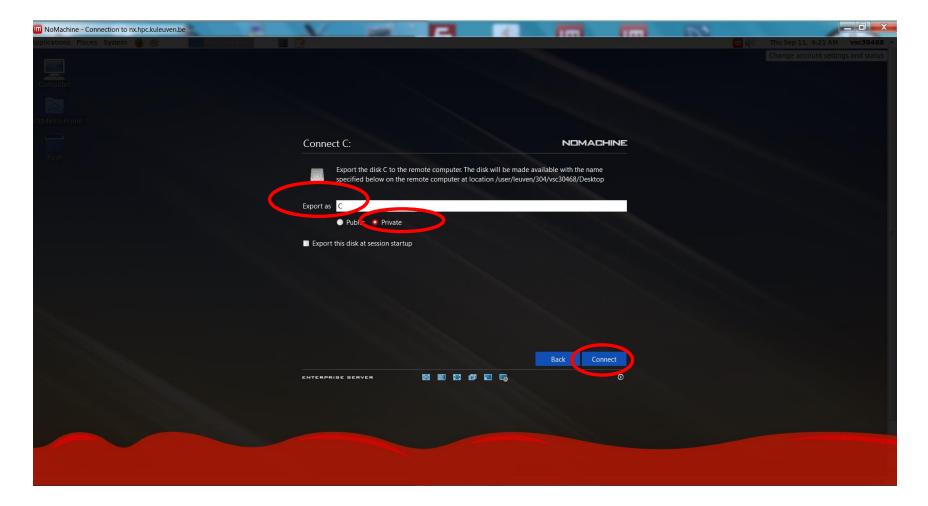
System tools



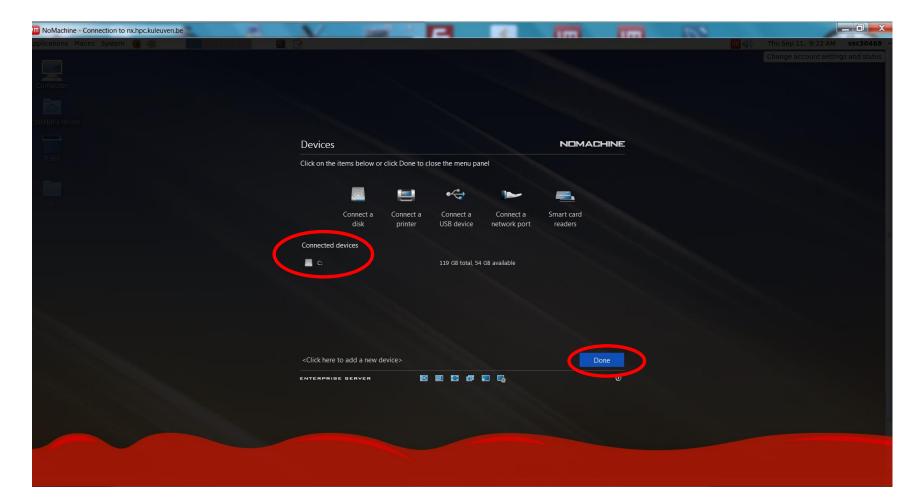




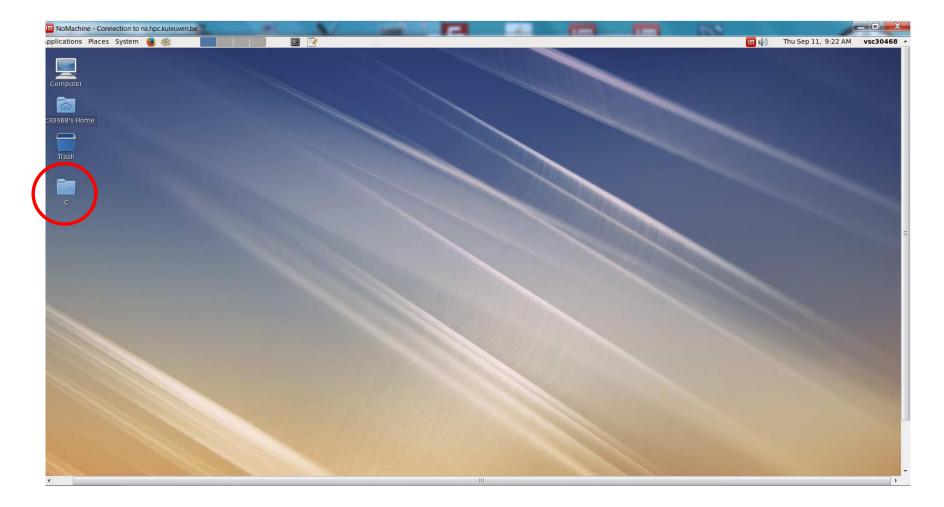




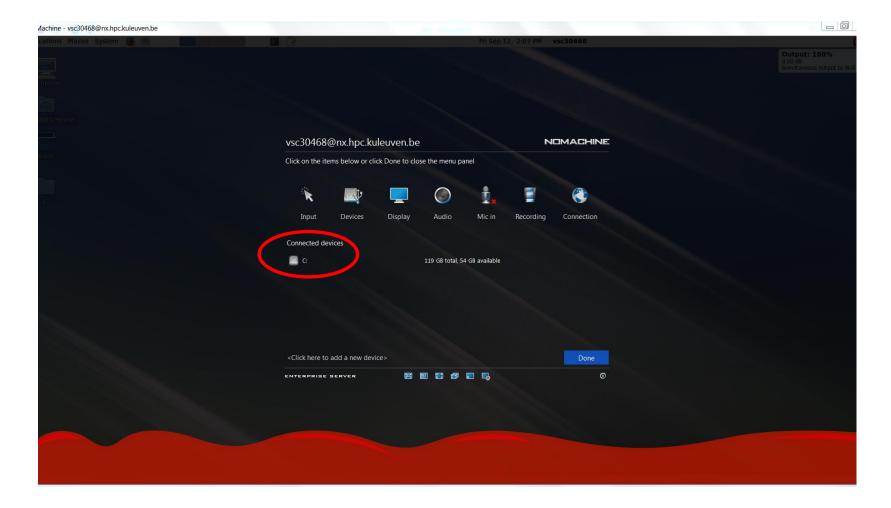








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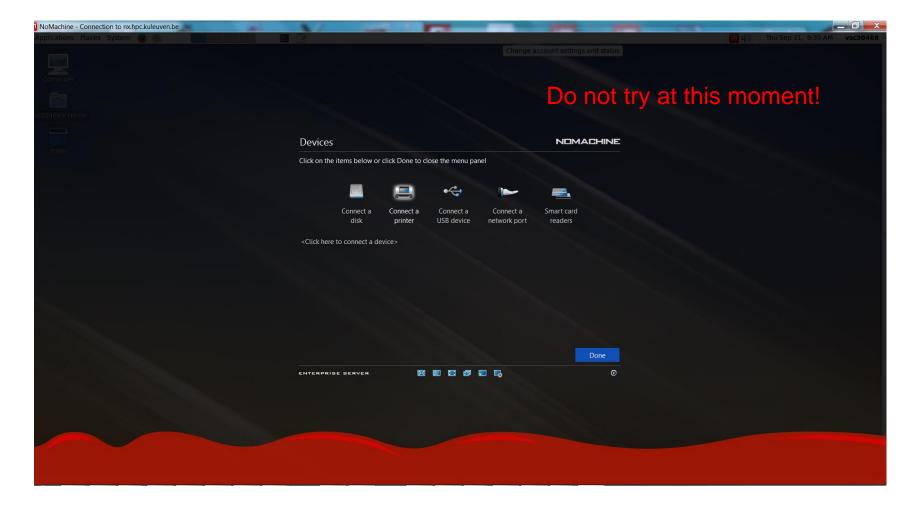




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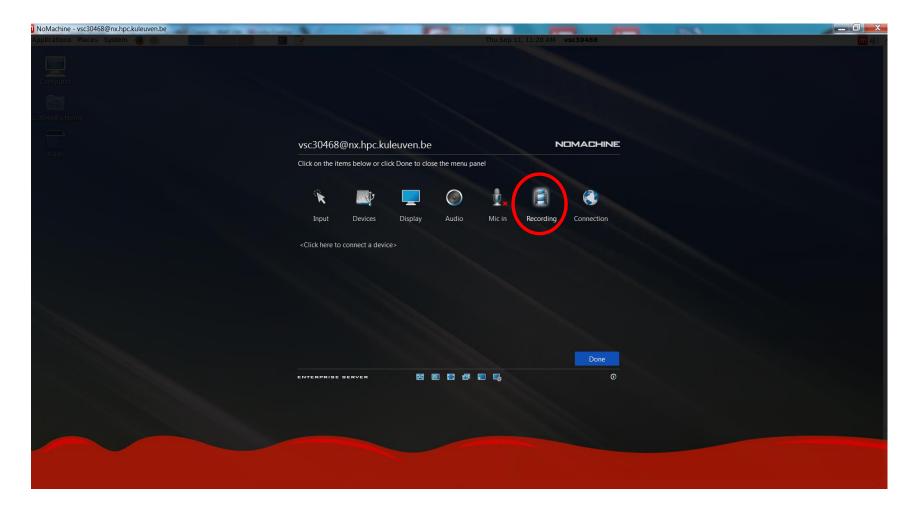


System tools - printer



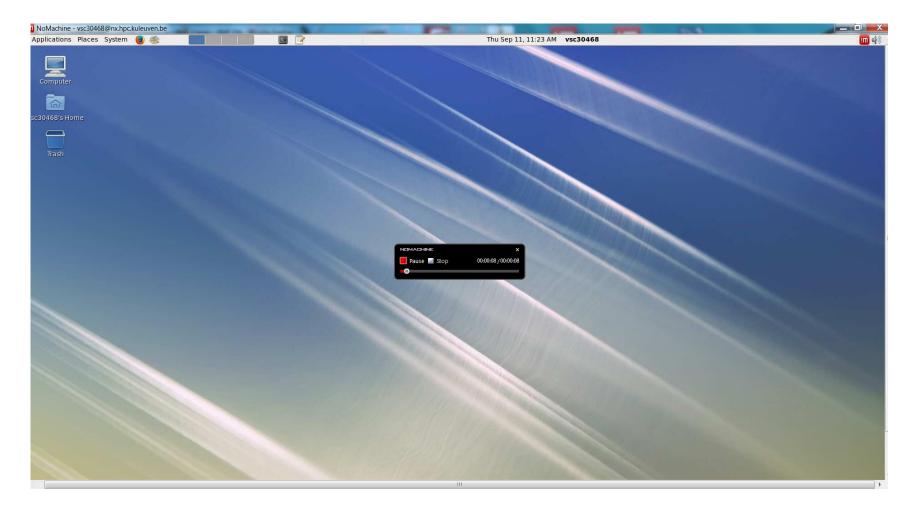


System tools - recording





System tools - recording





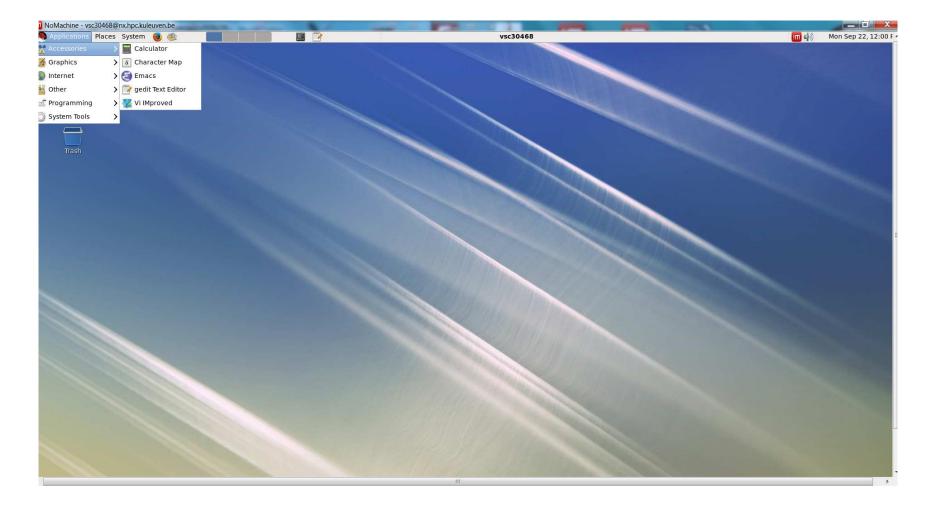
System tools - recording

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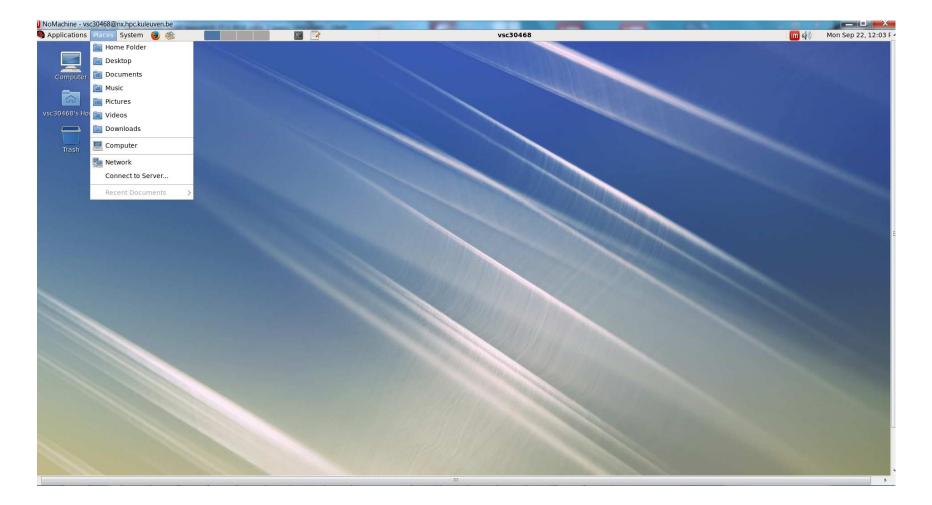


- Accesories: Gedit, Vi IMproved, Emacs (dummy version), Calculator,
- Graphics: gThumb (picture viewer), Xpdf Viewer,
- Internet: Firefox,
- Other: Matlab (2014a),
- Programming: Meld Diff Viewer (visual diff and merge tool),
- System tools: File Browser, Terminal,
- Additionally: Gnuplot (graphing utility), Filezilla (file transfer tool), Evince (PDF, PostScript, TIFF, XPS, DVI Viewer),
- Software launched through modules from Terminal.

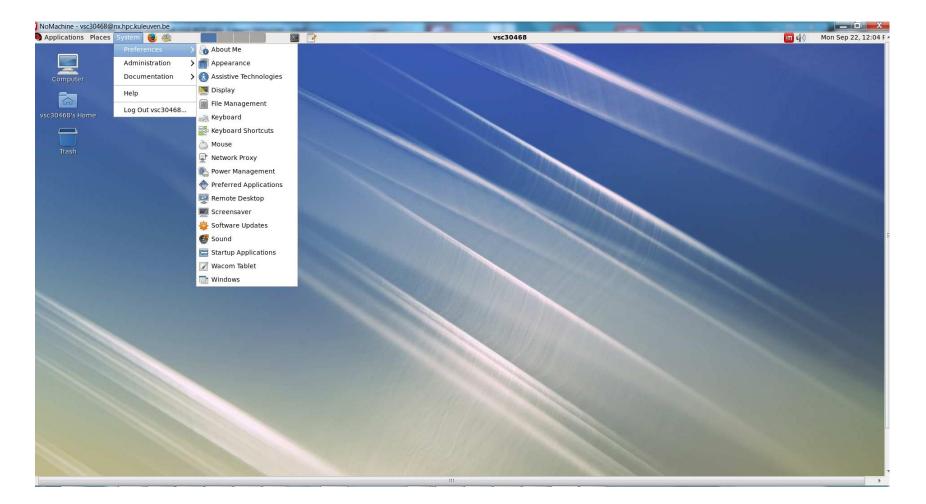




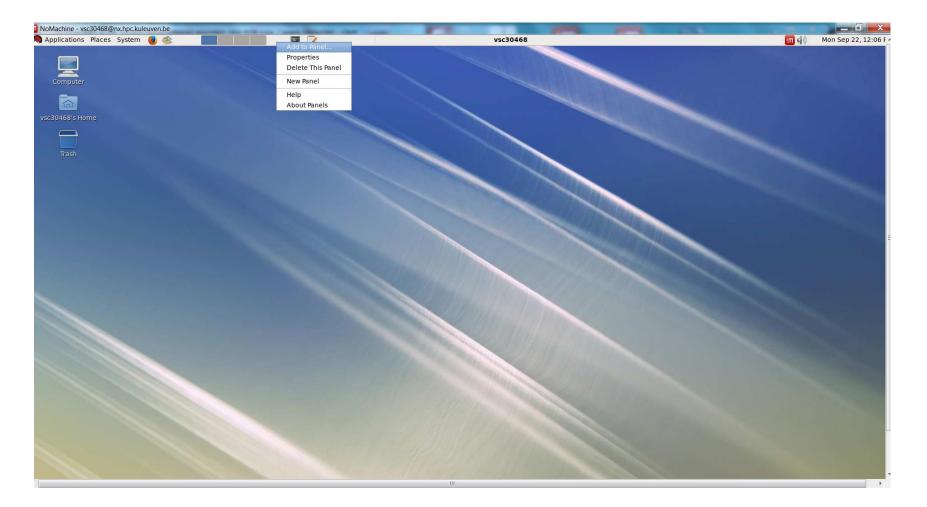
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| m -f jobs.txt | | | rm -f jobs.txt | | |
| m -f procs.txt | | | rm -f procs.txt | | |
| m -f jp.txt | | | rm -f jp.txt | | |
| m -f jpu.txt | | | rm -f jpu.txt | | |
| m -f multjobs.txt | | | rm -f multjobs.txt | | |
| m -f multijobs.txt | | - 7 | rm -f singjobs.txt | | |
| m -f singjobs.txt | | | | | |
| howa>list.txt | | | showq>list.txt ← gawk '(/2002/) {print \$1}' list.txt > jobs.txt | | |
| awk '(/200 <mark>3/ /200</mark> 2/) {print \$1}' list.txt > jobs.txt | | | gawk (/2002/) {print \$4}' list.txt > procs.txt | | |
| awk '(/2003/ /2002/) {print \$4}' list.txt > procs.txt | | | gawk (/2002/) {print \$4 " " \$1}' list.txt > jp.txt | | |
| wk '(/2003/ /2002/) {print \$4 " " \$1}' list.txt > jp.txt | | | gawk '(/2002/) {print \$4 " \$2 " \$1}' List.txt > jpu.txt | | |
| wk '(/2003/ /2002/) {print \$4 " " \$2 " " \$1}' list.txt > jpu.txt | | | gun () 2002/) (print \$1 \$2 \$43 \$25 Creater) particular | | |
| | | | while read procnr useridnr jobidnr | | |
| | | | do | | |
| OB PATH="/var/spool/torque/server priv/jobs/" | | | #echo \$procnr \$jobidnr | | |
| REPLY="bla bla bla" | | | if ((\$((procnr%20)) > 1)) | | |
| | | | then | | |
| hile read procnr useridnr jobidnr | | | echo \$jobidnr \$procnr | | |
| | | | echo job id: \$jobidnr, user id: \$useridnr, no procs: \$procnr >> multjobs.txt | | |
| echo \$procnr \$jobidnr | | | ← fi | | |
| - ((\$((procnr%20)) > 1)) | | - | | | |
| ien in | | | if (((\$((procnr%20)) == 1)) && ((\$((procnr)) < 2))) | | |
| cho \$jobidnr \$procnr | | | then | | |
| :ho job_id: \$jobidnr, user_id: \$useridnr, no_procs: \$procnr >> multjobs.txt | | | echo \$jobidnr single | | |
| <pre>:ho " " >> multijobs.txt</pre> | | → | echo single_proc job: \$jobidnr, user_id: \$useridnr >> singjobs.txt | | |
| echo job_id: \$jobidnr, user_id: \$useridnr, no_procs: \$procnr >> multijobs.txt | | | fi | | |
| cho job_id: \$jobidnr >> multijobs.txt | | | / done < jpu.txt | | |
| BID="\$jobidnr.icts-p-svcs-1.SC" | | | | | |
| PLY='aaaa' | | | <pre>#cat multjobs.txt wc -l >> \$nomjobs</pre> | | |
| PLY1='aaaa' | | | <pre>nomjobs=\$(wc -l < "multjobs.txt")</pre> | | |
| REPLY=`ssh -t -t icts-p-svcs-1 sudo cat "\${JOB_PATH}/\${JOBID}" 2> /dev/null` | | | echo number-multi-jobs: \$nomjobs | | |
| REPLY=`ssh icts-p-svcs-1 sudo cat "\${JOB_PATH}/\${JOBID}" < tmp/script.log` REPLY=` ssh -qtt icts-p-svcs-1 sudo cat "\${JOB_PATH}/\${JOBID}" tty <tmp script.log`<="" td=""><td></td><td></td><td><pre>nosjobs=\$(wc -l < "singjobs.txt") echo number-single-jobs: \$nosjobs</pre></td><td></td><td></td></tmp> | | | <pre>nosjobs=\$(wc -l < "singjobs.txt") echo number-single-jobs: \$nosjobs</pre> | | |
| PLY=` ssh -qtt icts-p-svcs-1 sudo cat \${JOB PATH}/\${JOBID}" tty <td></td> <td></td> <td>ecto tumber-strigte-jobs. anosjobs</td> <td></td> <td></td> | | | ecto tumber-strigte-jobs. anosjobs | | |
| EPLY1=REPLY | | | ← SUBJECT="jobs analysis" | | |
| <pre>KEPLY=`ssh -qtt icts-p-svcs-1 sudo cat "\${JOB PATH}/\${JOBID}" >/dev/null 2>&1`</pre> | | | TO="mag.selwa@kuleuven.be" | | |
| printf "\$REPLY\n" | | | MESSAGE="aaa" | | |
| printf "\$REPLY" grep "nodes" | | | echo "Time: `date`" >> \$MESSAGE | | |
| printf "\$REPLY" grep "np" | | | echo " " >> \$MESSAGE | | |
| cho -n "\$REPLY" grep "nodes" | | | echo "\$nomjobs multiple jobs" >> \$MESSAGE | | |
| | | | | | |
| cho -n "\$REPLY" grep "np" | | | cat multjobs.txt >> \$MESSAGE | | |
| cho -n "\$REPLY" grep "np" cho -n "\$REPLY" grep "mem" | | | cat multjobs.txt >> \$MESSAGE /echo " " >> \$MESSAGE | | |



Customize the system



Customize the system





What's next?

- Paraview
- chemistry visualization tools
- ANSYS
- R (GUI)
- Eclipse
- Galaxy (Keppler) workflow
- Matlab workflow
- profiling software (Allinea), Intel tools
- version contol software
- licenced software (Abaqus, Comsol)
- globus/gridFTP

Depends on user's requests!

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Possible problems

- Better to save your files even if server crash unlikely
- Attempt to remove directory from another session -> stale NFS handle
- Printer problem
- If you mount your hard/USB drive and remove files -> it's gone
- Don't process the same file on your local device and edit it with NX session
- Be carefull with shortcuts (Alt+F4)



https://vscentrum.be/neutral/documentation/client/multiplatfor m/nx-start-guide



Questions

- Now
- Helpdesk: <u>hpcinfo@icts.kuleuven.be</u>
- FOOCES-onderzoek: <u>http://admin.kuleuven.be/icts/onderzoek</u>
- VSC web site: <u>http://www.vscentrum.be/</u>
 - VSC documentation
 - VSC agenda: training sessions, events
- Systems status page: <u>http://status.kuleuven.be/hpc</u>



VSC training 2014/2015

