NoMachine NX for HPC

Mag Selwa
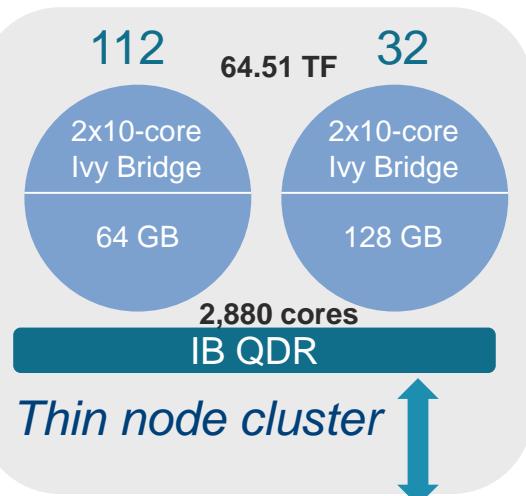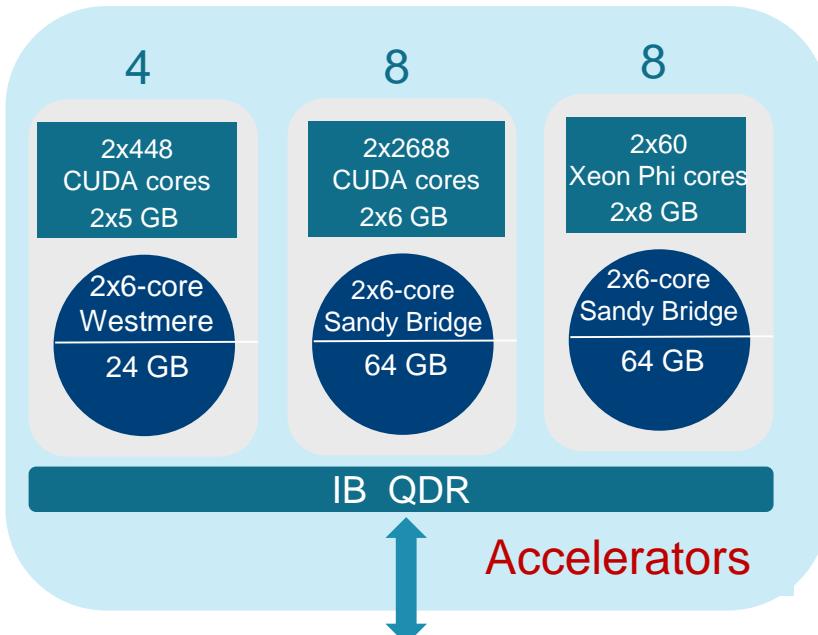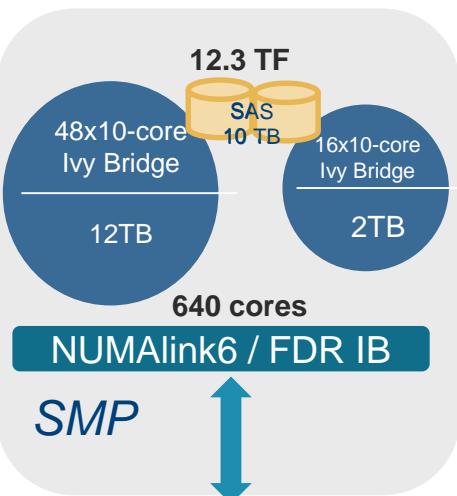
ICTS, Leuven

2 October 2014

Overview

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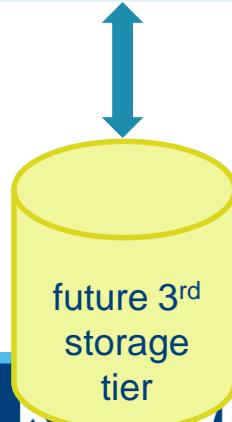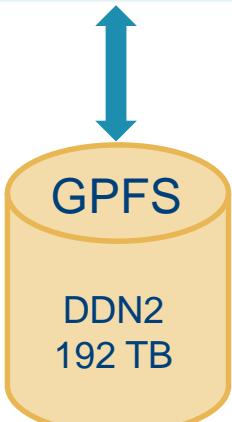- System tools
- Available software
- What's next?
- Example

KU LEUVEN

HPC Tier-2: 2014
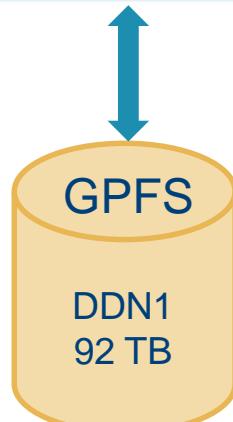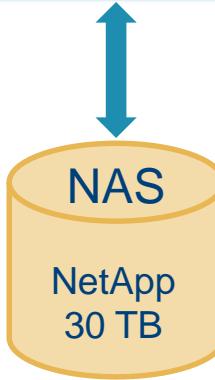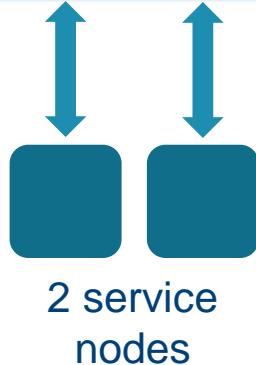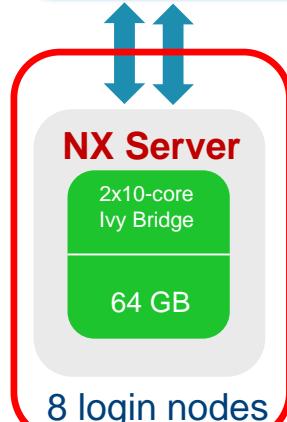
Software

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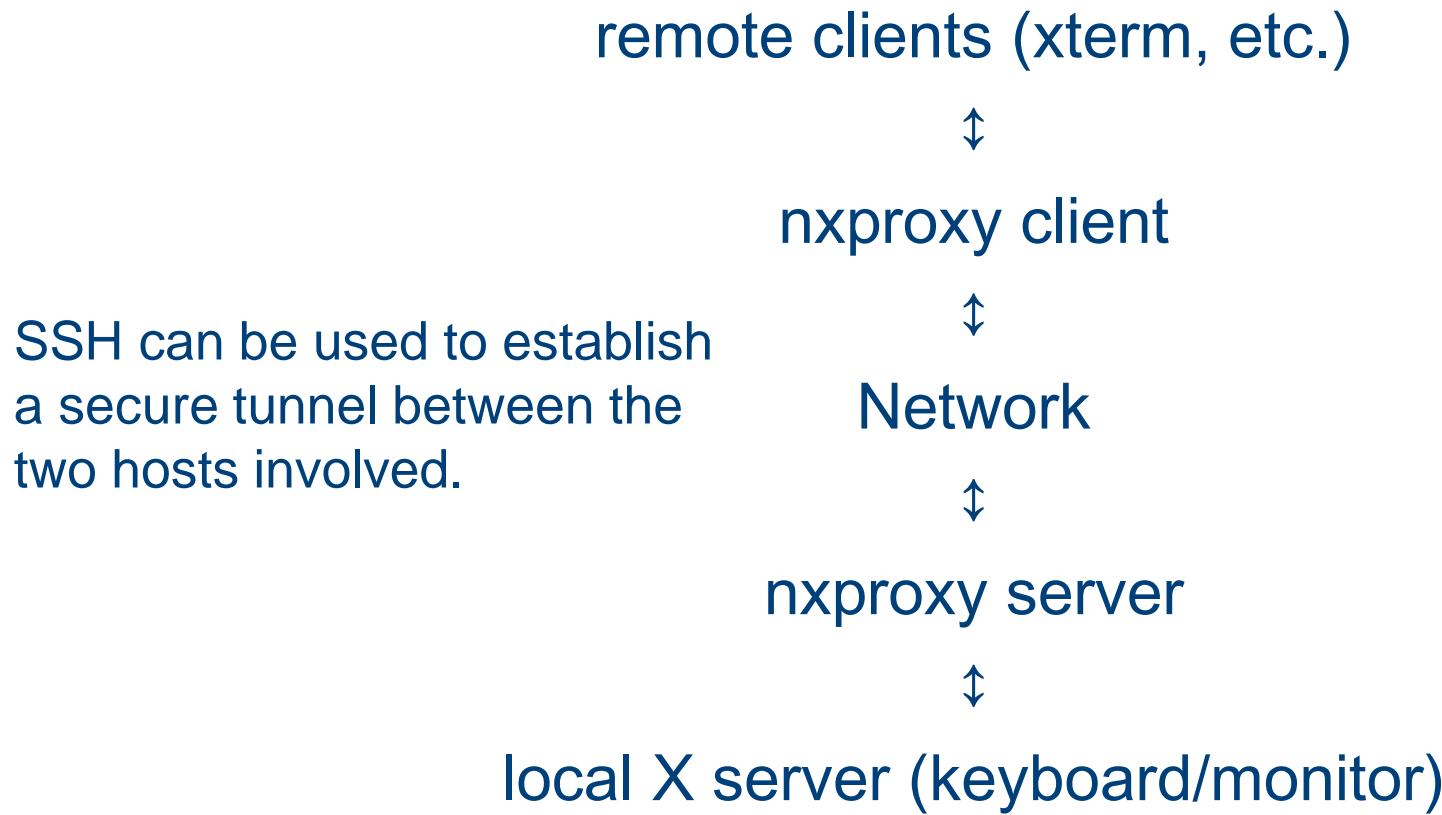
Use modules

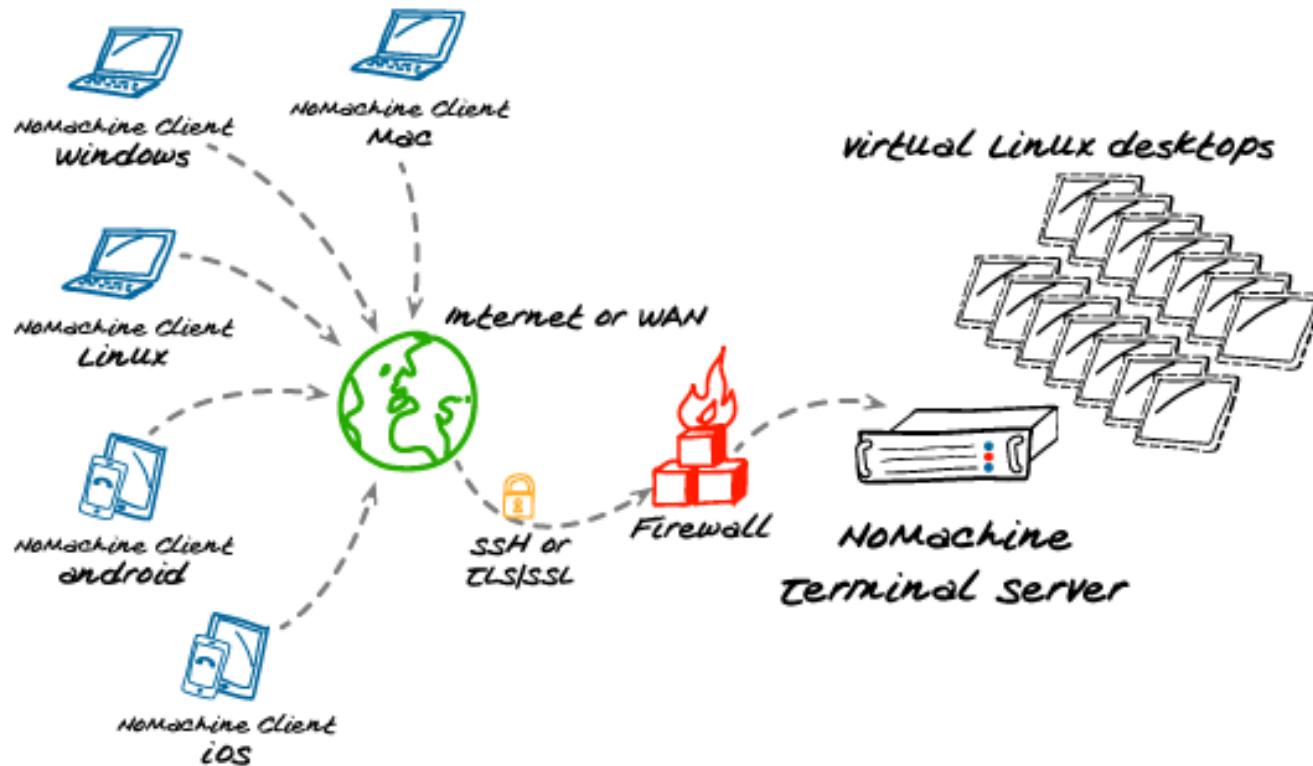**KU LEUVEN**

What is NX?

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).

KU LEUVEN

What is NX?

Typical NX setup:

<div align="center">

remote clients (xterm, etc.)

↕

nxproxy client

↕

Network

↕

nxproxy server

↕

local X server (keyboard/monitor)

</div>

SSH can be used to establish
a secure tunnel between the
two hosts involved.

KU LEUVEN

What is NX?
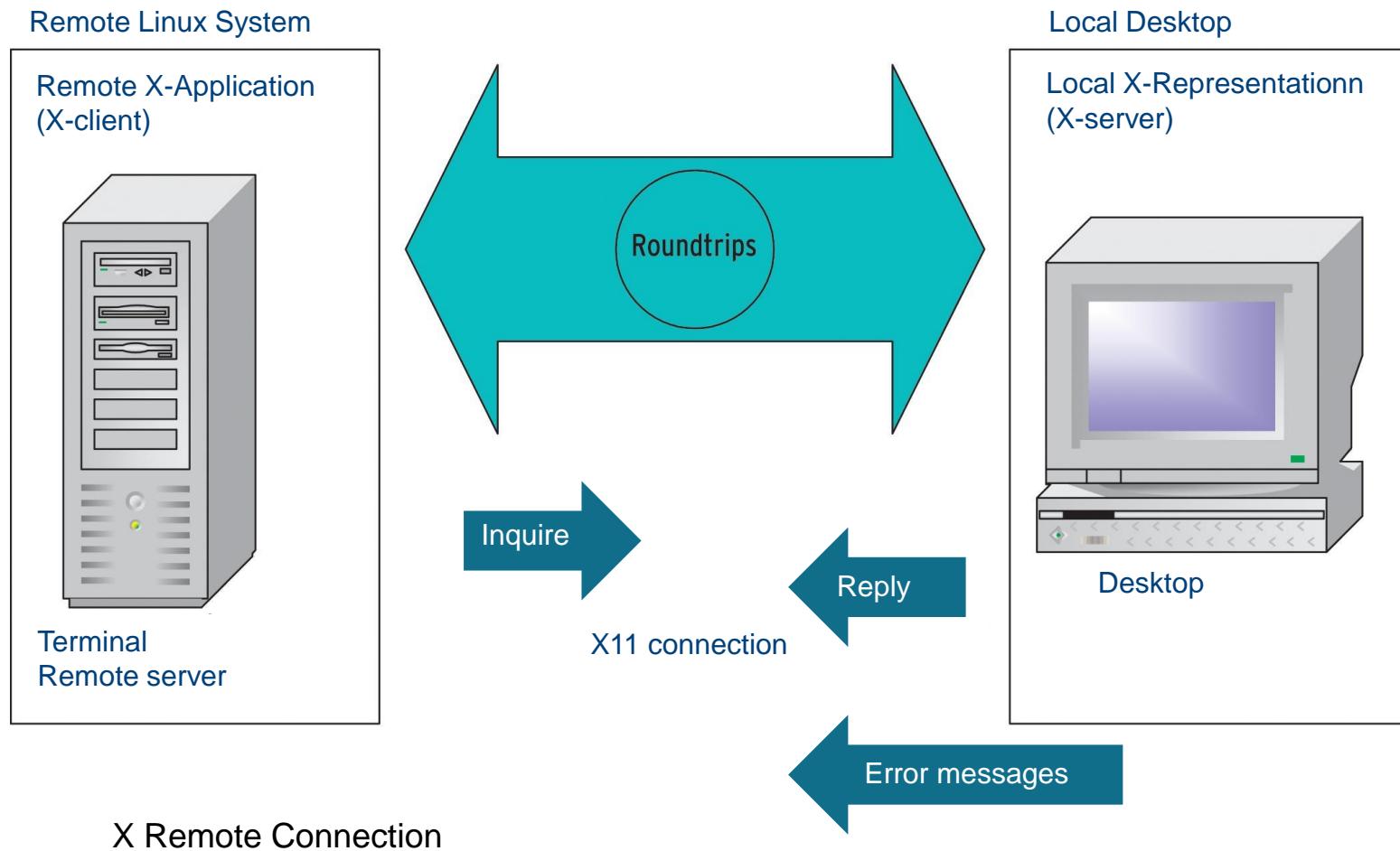

NX works by creating an nx-user on the server machine whose shell is executed any time a remote NX user connects to SSH using NX Client.
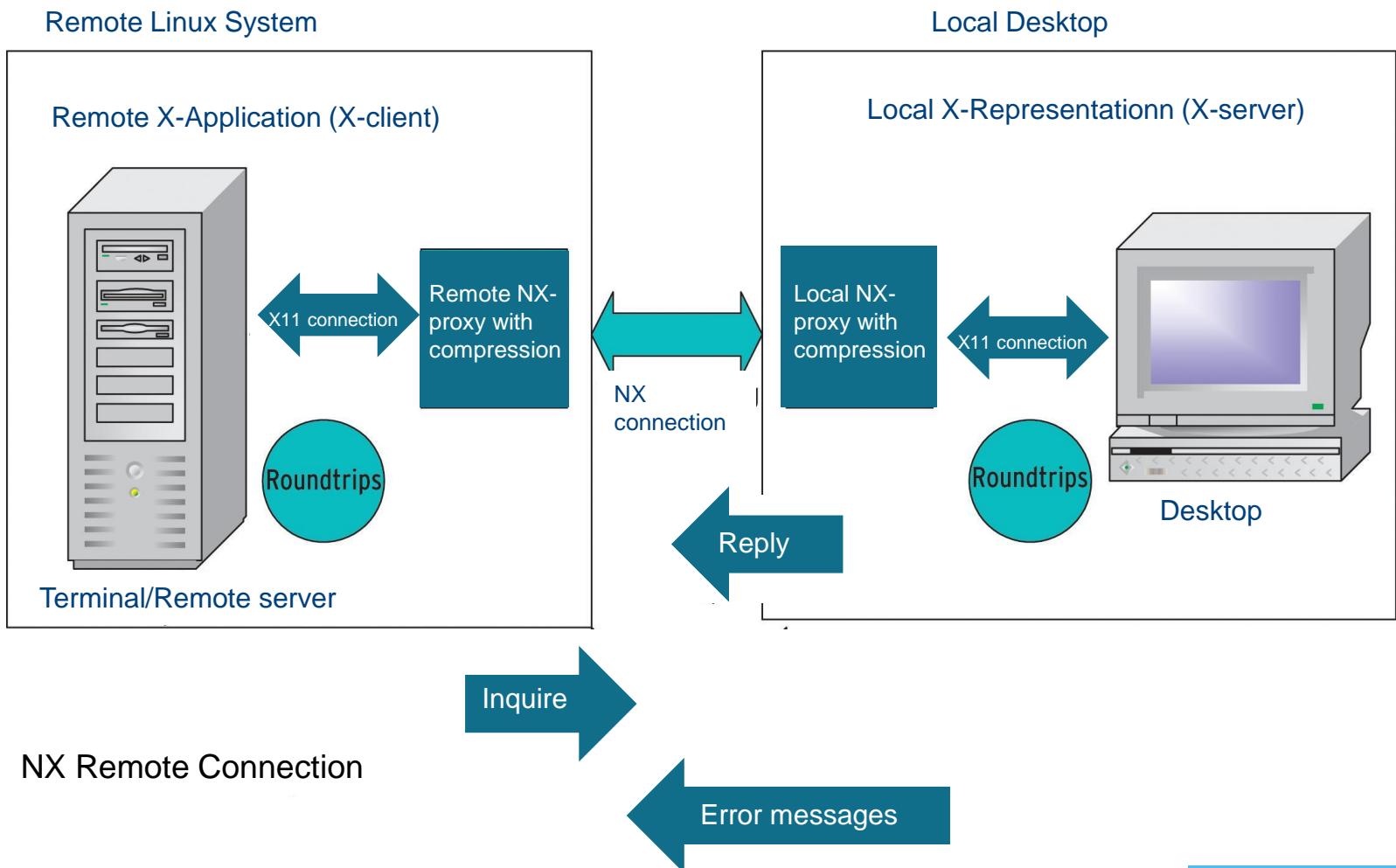
KU LEUVEN

What is NX?

NX technology:

- The initial login between client and server requires DSA key-pair.

- 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.
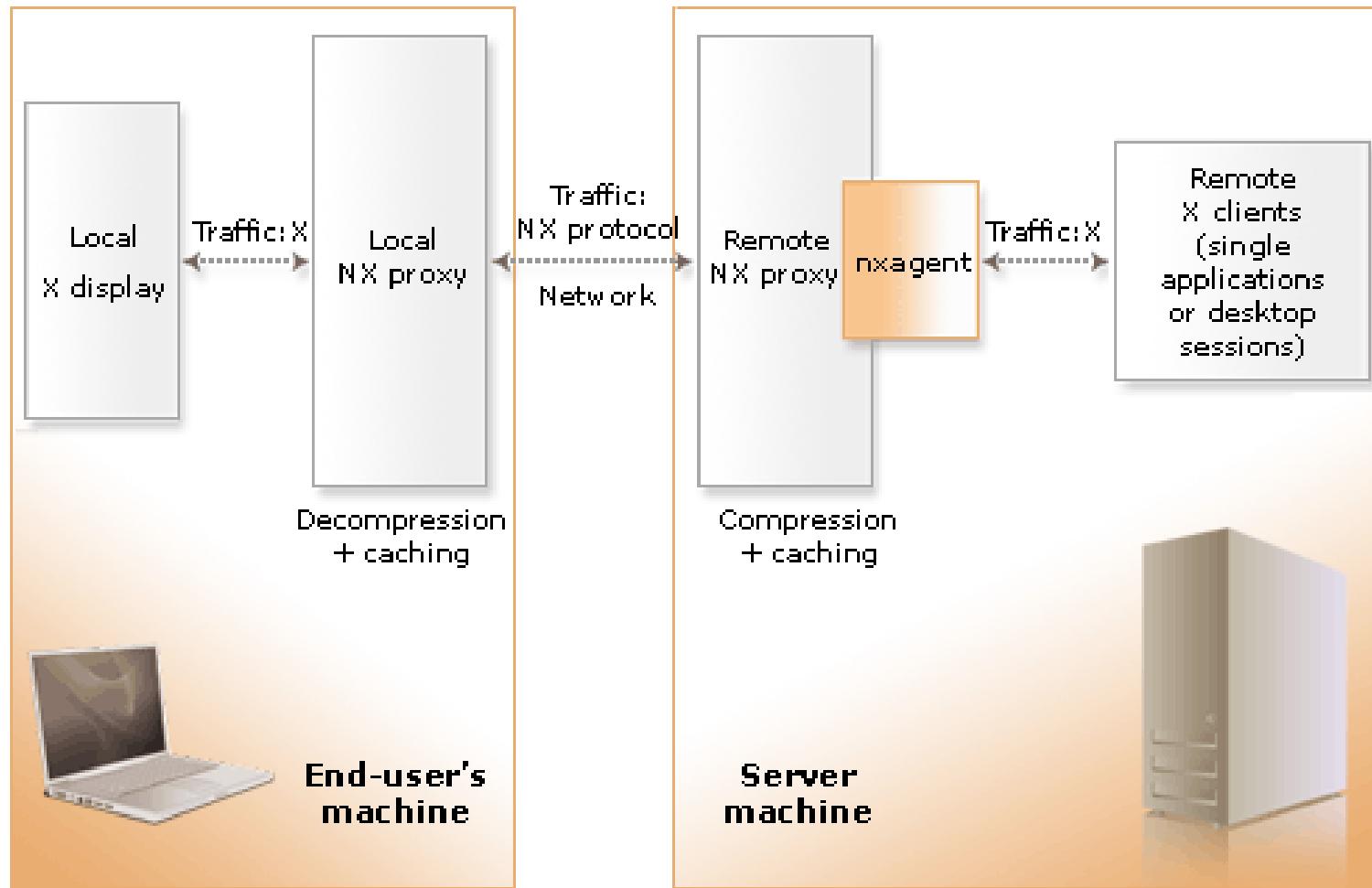
What is NX?

What is NX?

Remote Linux System

Local Desktop

Remote X-Application (X-client)

Local X-Representationn (X-server)

X11 connection

Remote NX-proxy with compression

NX connection

Local NX-proxy with compression

X11 connection

Roundtrips

Roundtrips

Terminal/Remote server

Desktop

Reply

Inquire

NX Remote Connection

Error messages

KU LEUVEN

What is NX?

Local X display — Traffic: X — Local NX proxy — Traffic: NX protocol / Network — Remote NX proxy — nxagent — Traffic: X — Remote X clients (single applications or desktop sessions)

Decompression + caching

Compression + caching

End-user's machine

Server machine

KU LEUVEN

What is NX?

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).

KU LEUVEN

What is NX?

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.

KU LEUVEN

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).

KU LEUVEN

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.

KU LEUVEN

How to install NX?

NoMachine Enterprise Client

- NoMachine Enterprise Client for Windows
- NoMachine Enterprise Client for Mac OS X
- NoMachine Enterprise Client for Linux

- Learn more

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

KU LEUVEN

How to install NX?

NoMachine for Android

Tablets running Android 3.0 Honeycomb or later.

GET IT ON
Google play

NoMachine for iOS

Compatible with iPad running iOS 5 or later.

Available on the
App Store

⬇ Download

iOS

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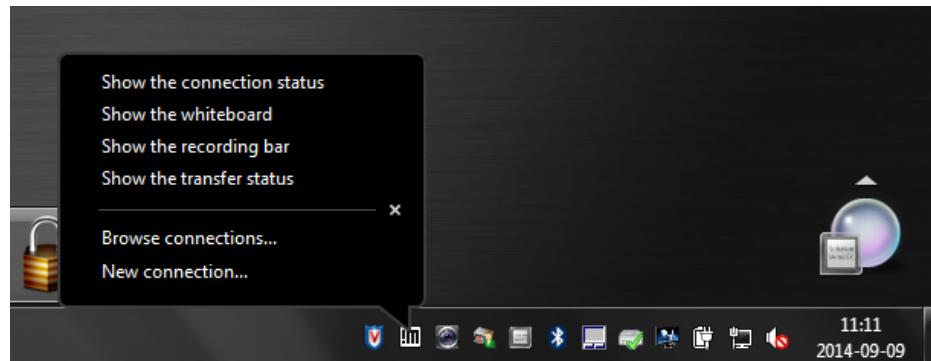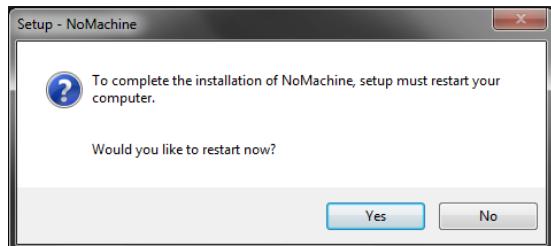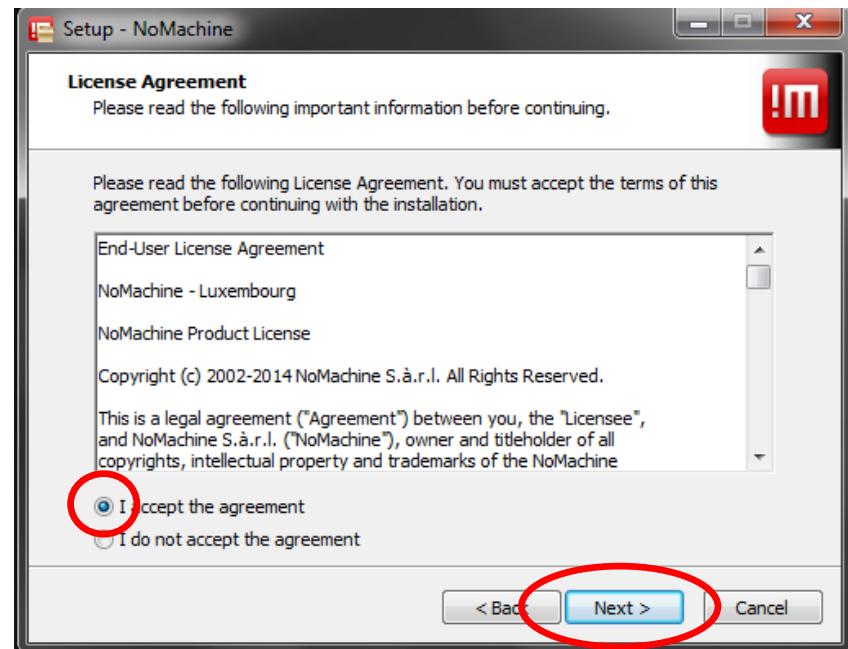
All products of the NoMachine for the Enterprise range are available as evaluation software without registration for 30 days, and install with all corresponding features available with the exception of H.264 support. This will be activated upon purchasing the relevant product. Simply click the download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

⬇ Download

App store

KU LEUVEN

How to install NX?
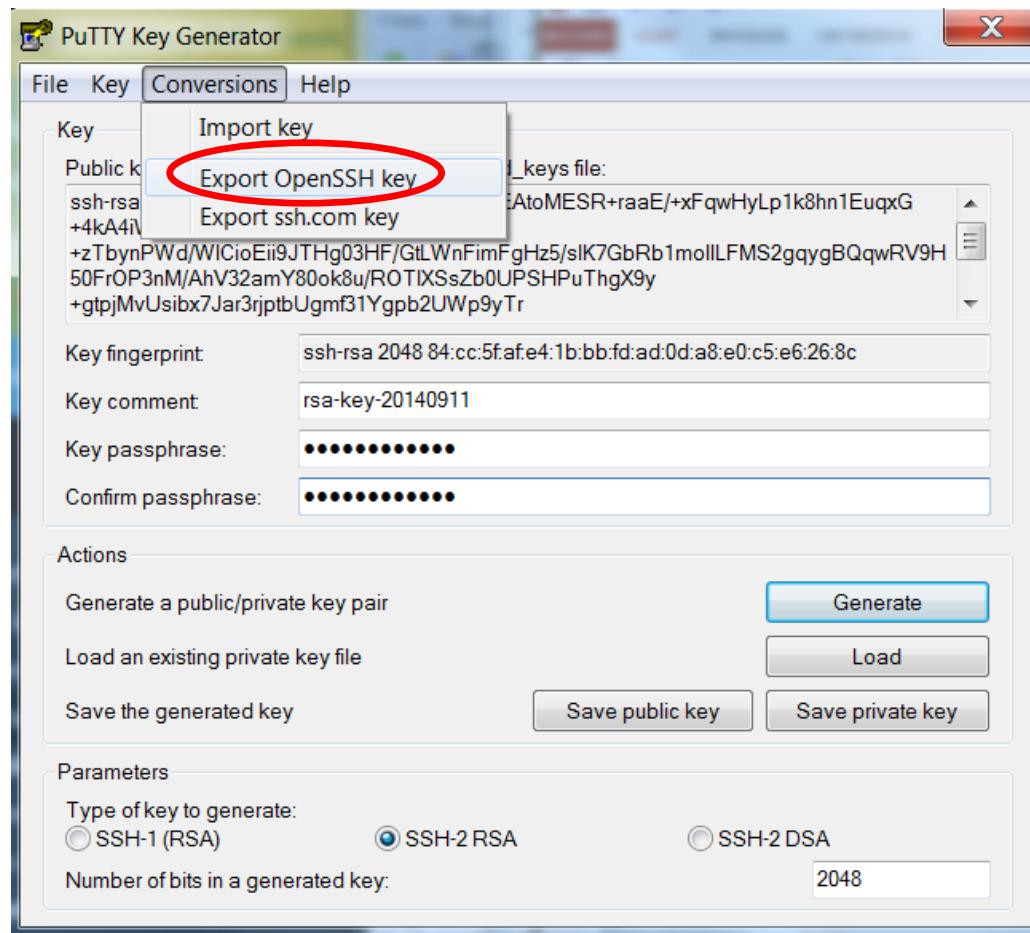
How to configure NX? – convert key
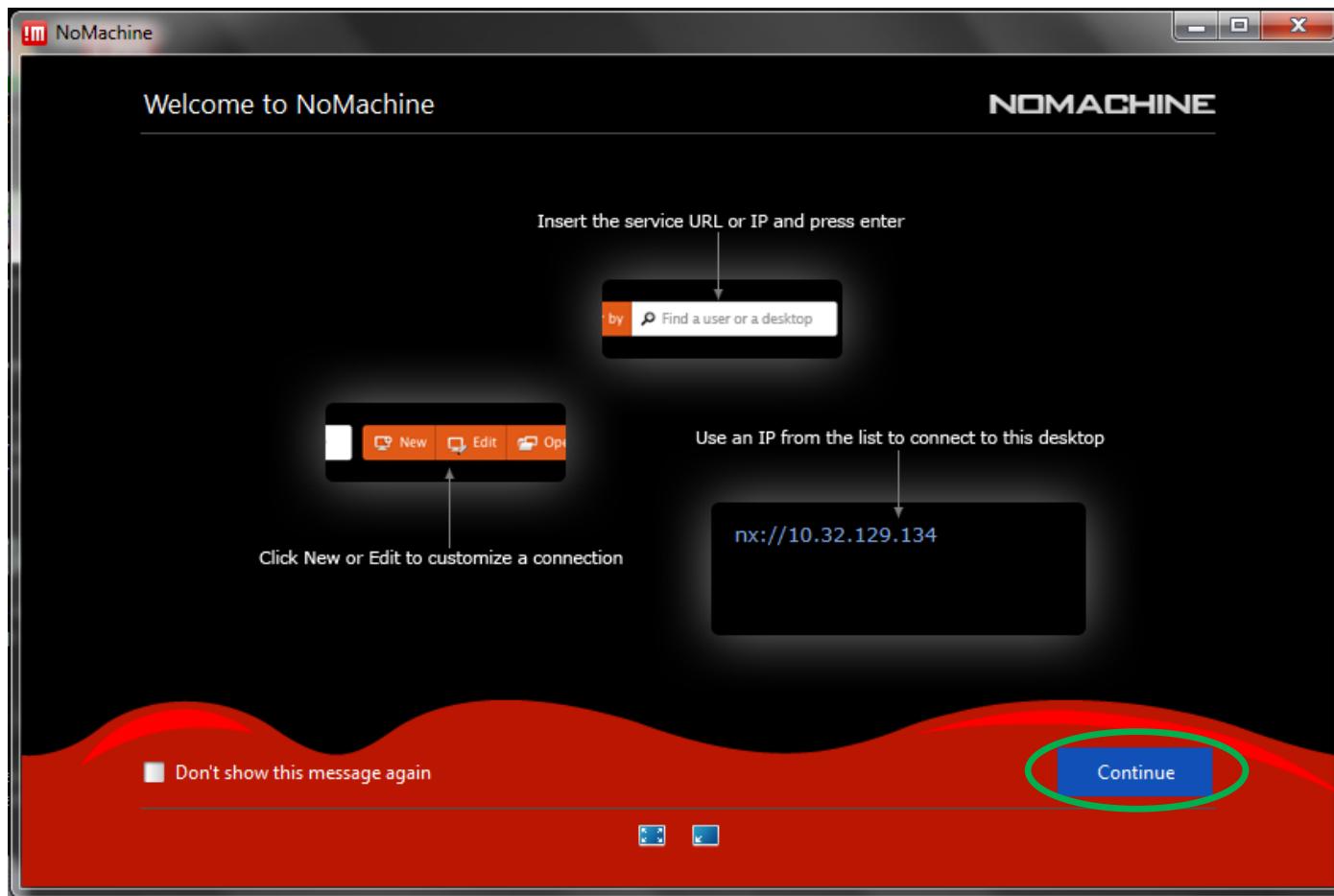
- NoMachine NX requires keys in **OpenSSH** format,

- 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*
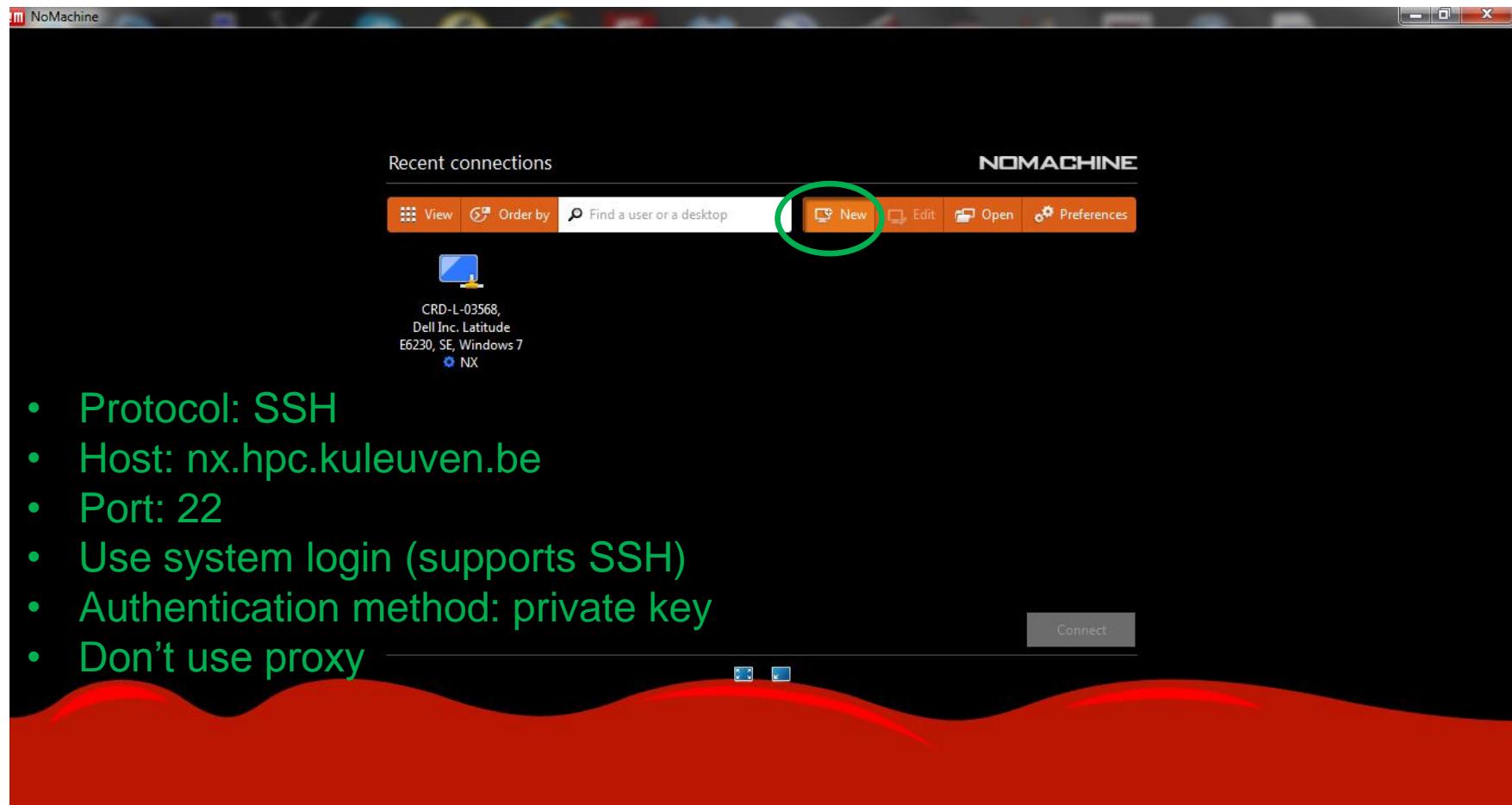
KU LEUVEN

How to configure NX? – convert key

How to configure NX?
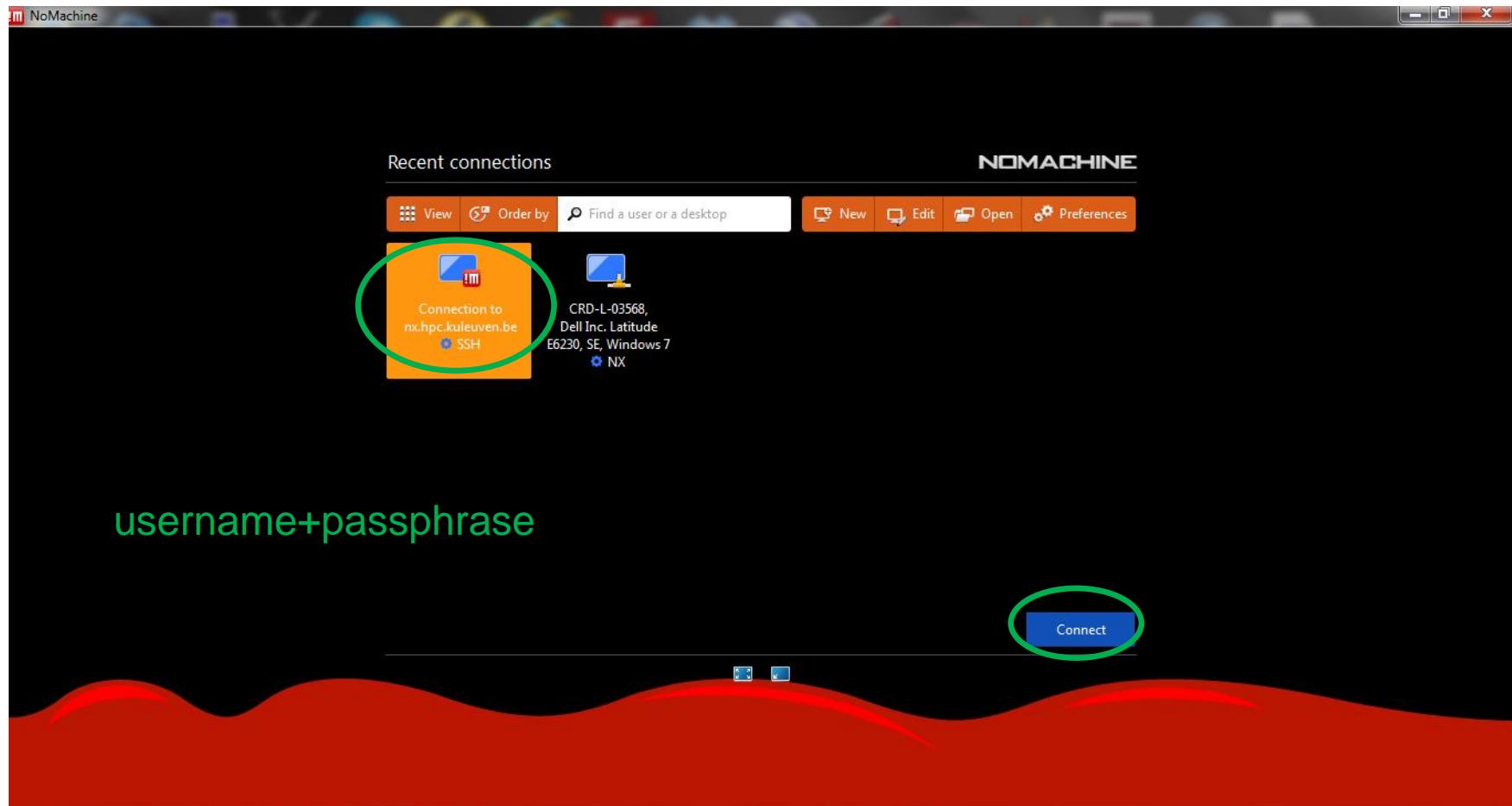
How to configure NX?
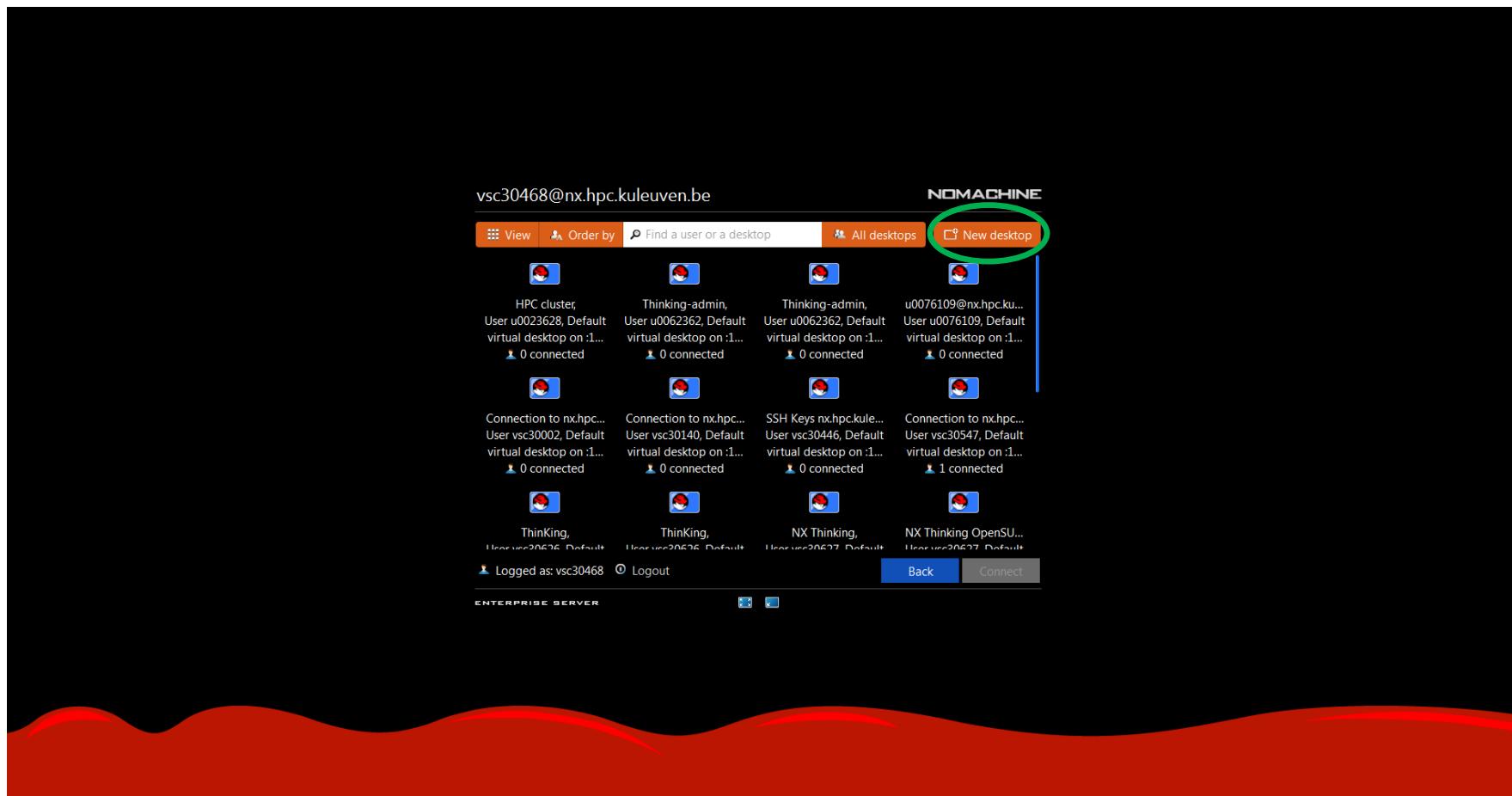
- Protocol: SSH
- Host: nx.hpc.kuleuven.be
- Port: 22
- Use system login (supports SSH)
- Authentication method: private key
- Don't use proxy

KU LEUVEN

How to configure NX?

username+passphrase

How to configure NX? – first connection

How to configure NX? – first connection

How to configure NX? – first connection

How to configure NX? – first connection
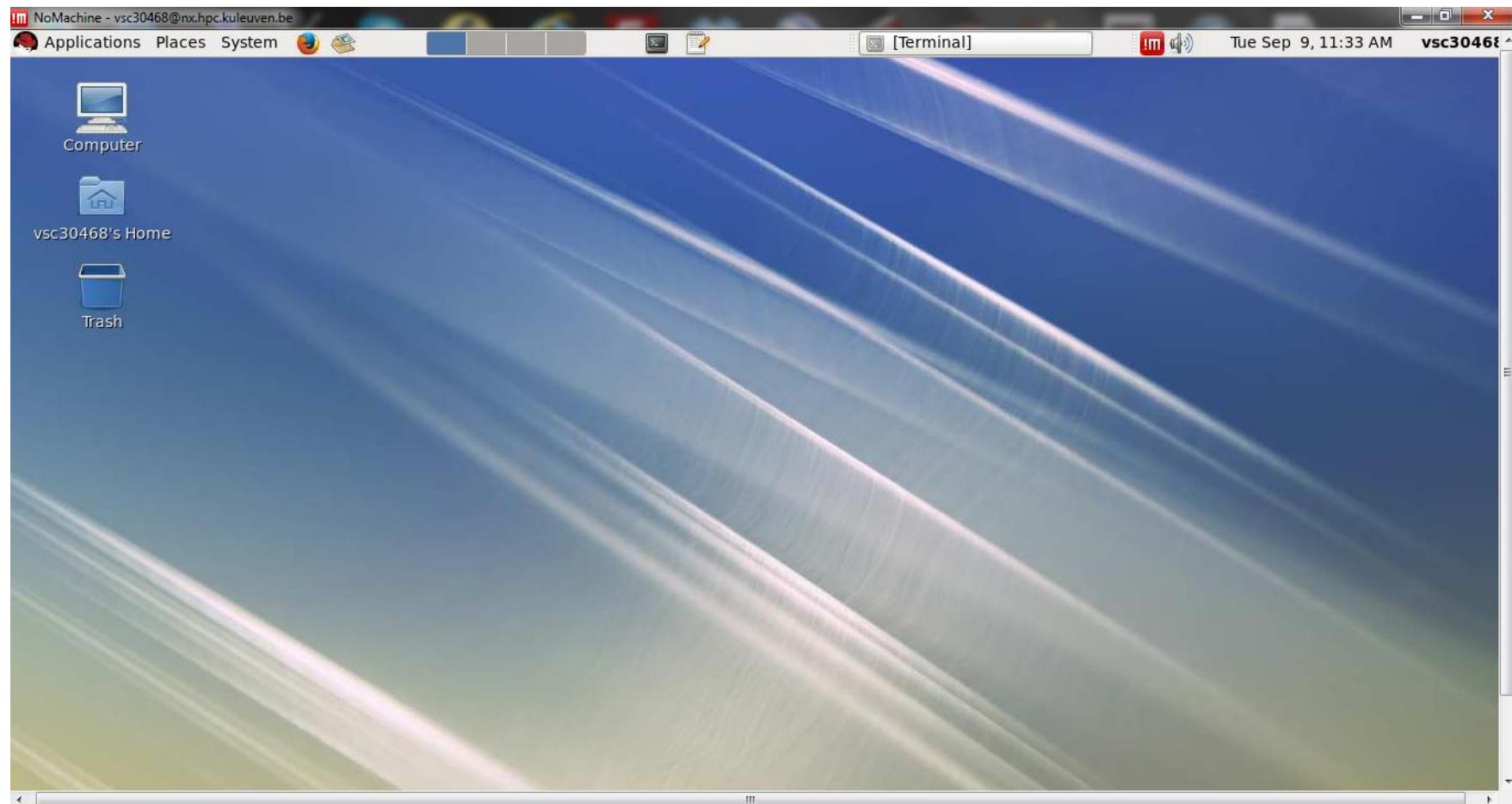
How to configure NX? – first connection
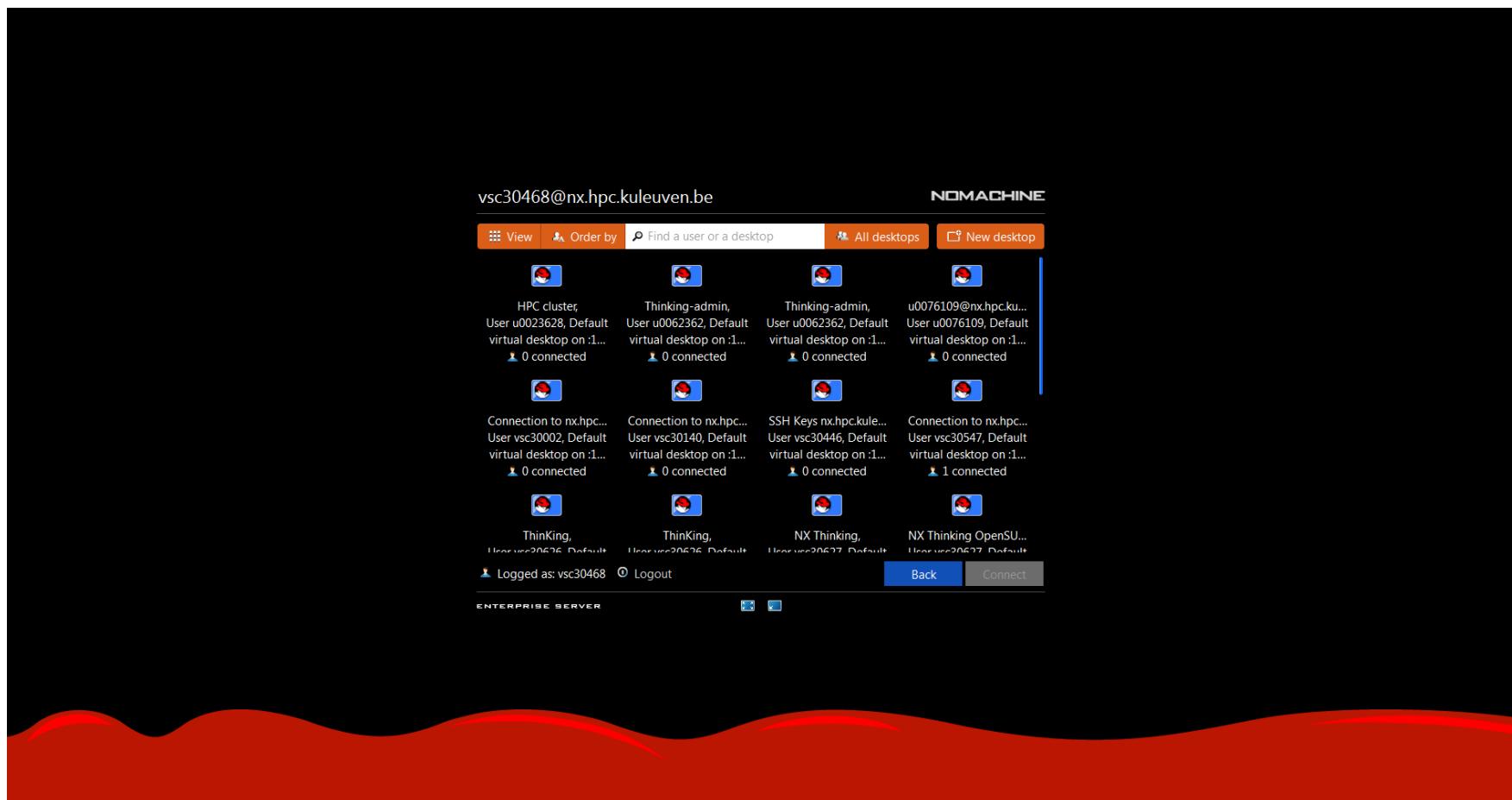
How to configure NX? – first connection
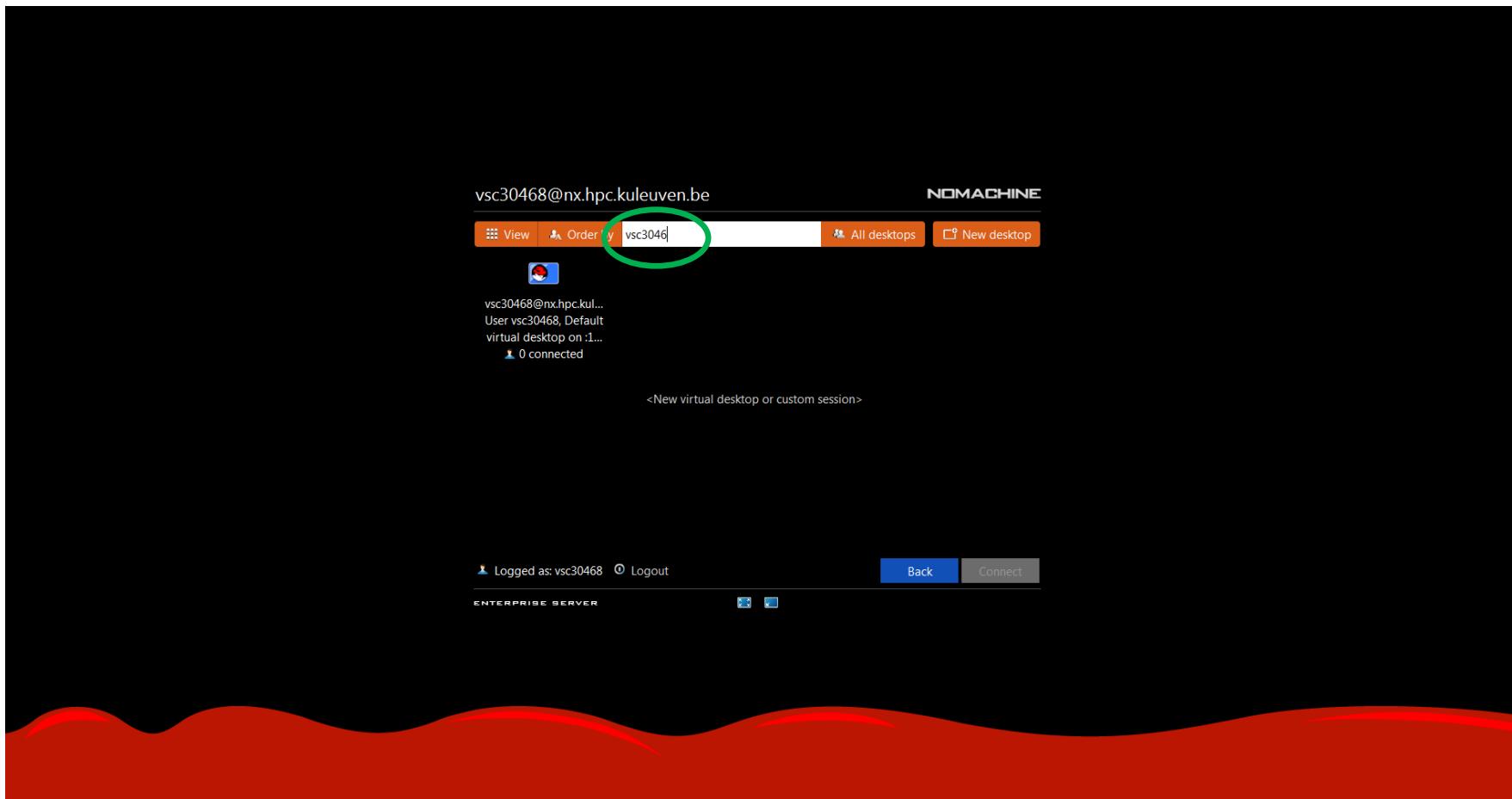
How to configure NX? – first connection
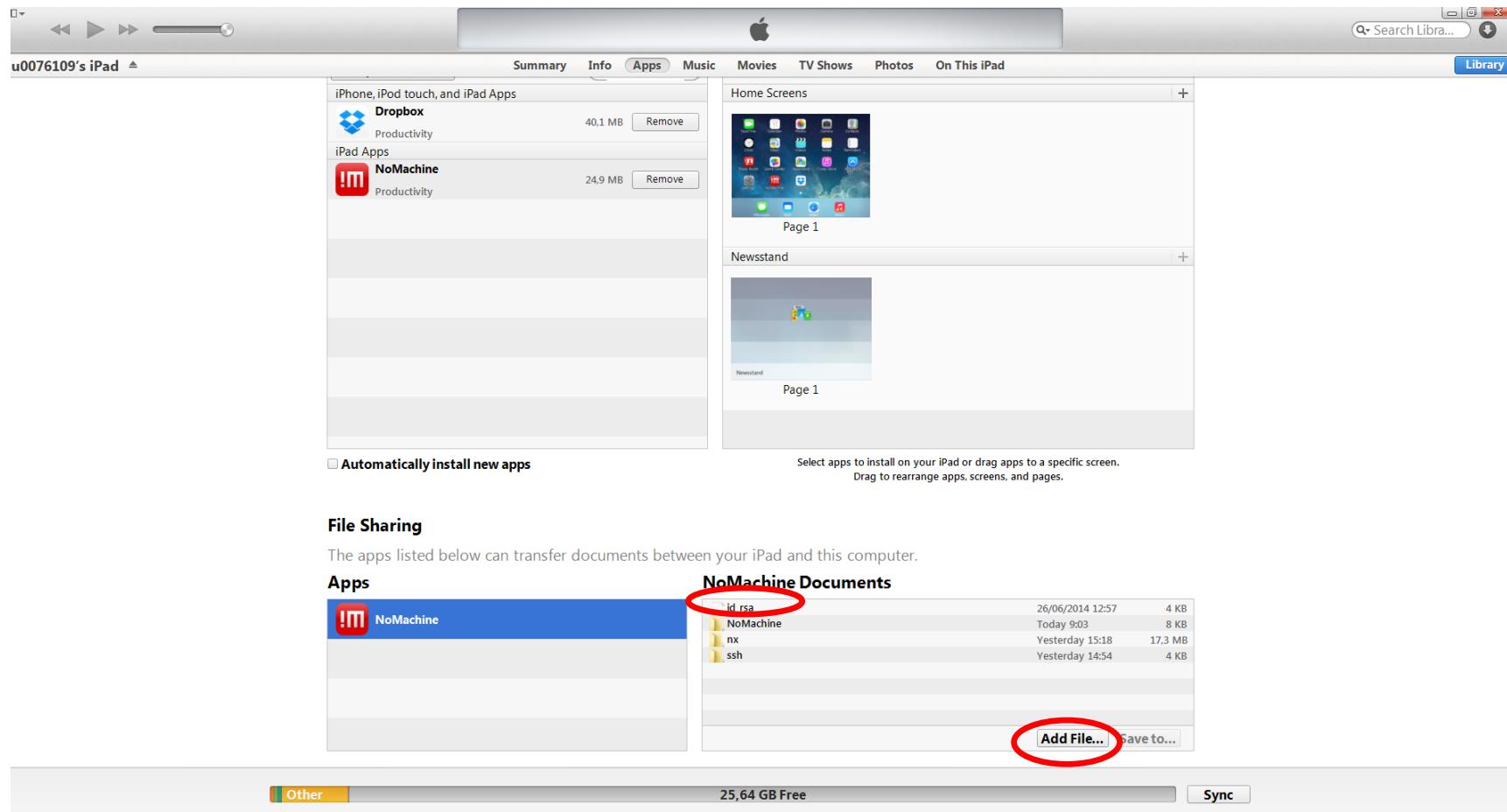
How to configure NX? – reconnecting

How to configure NX? – reconnecting
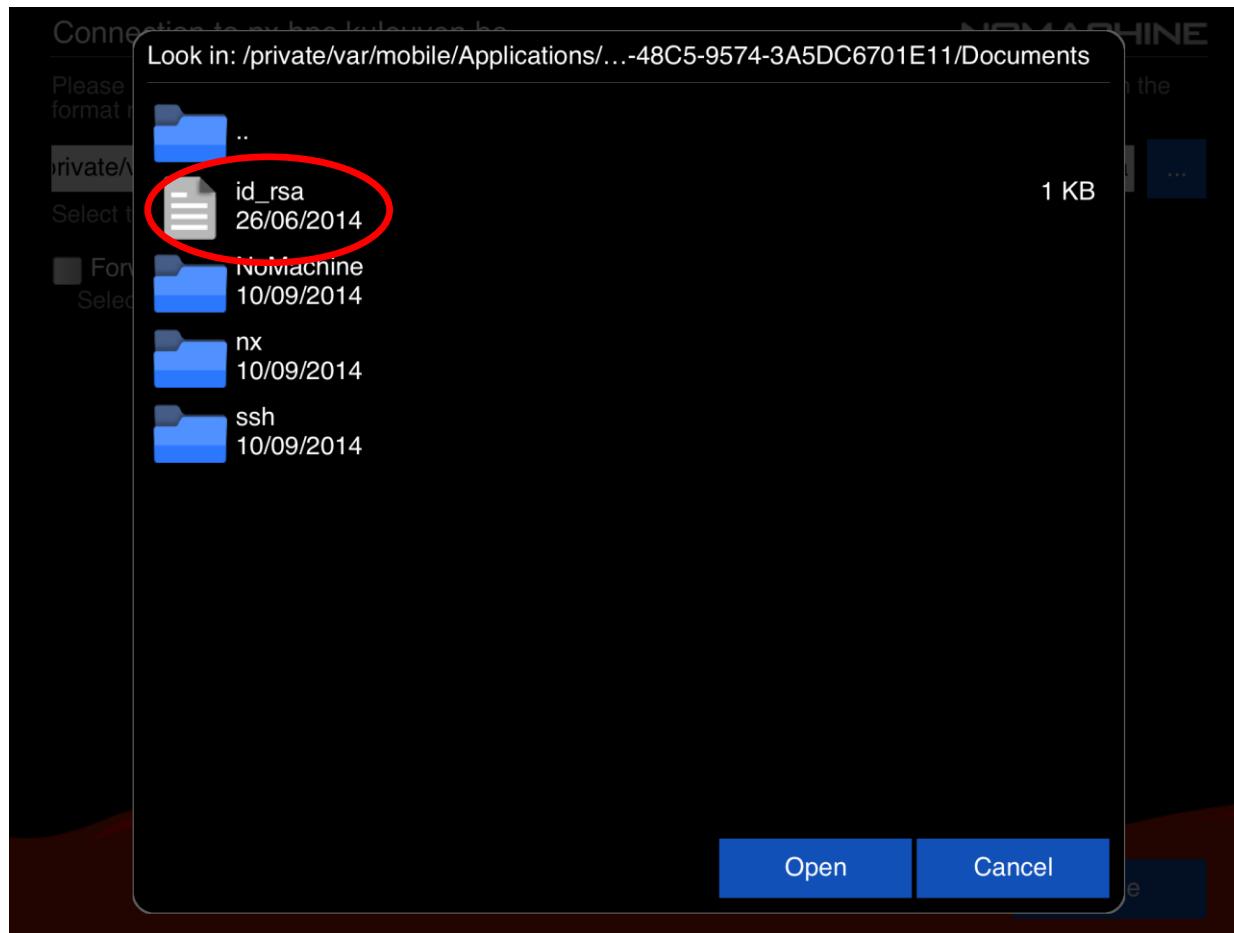
Mobile version
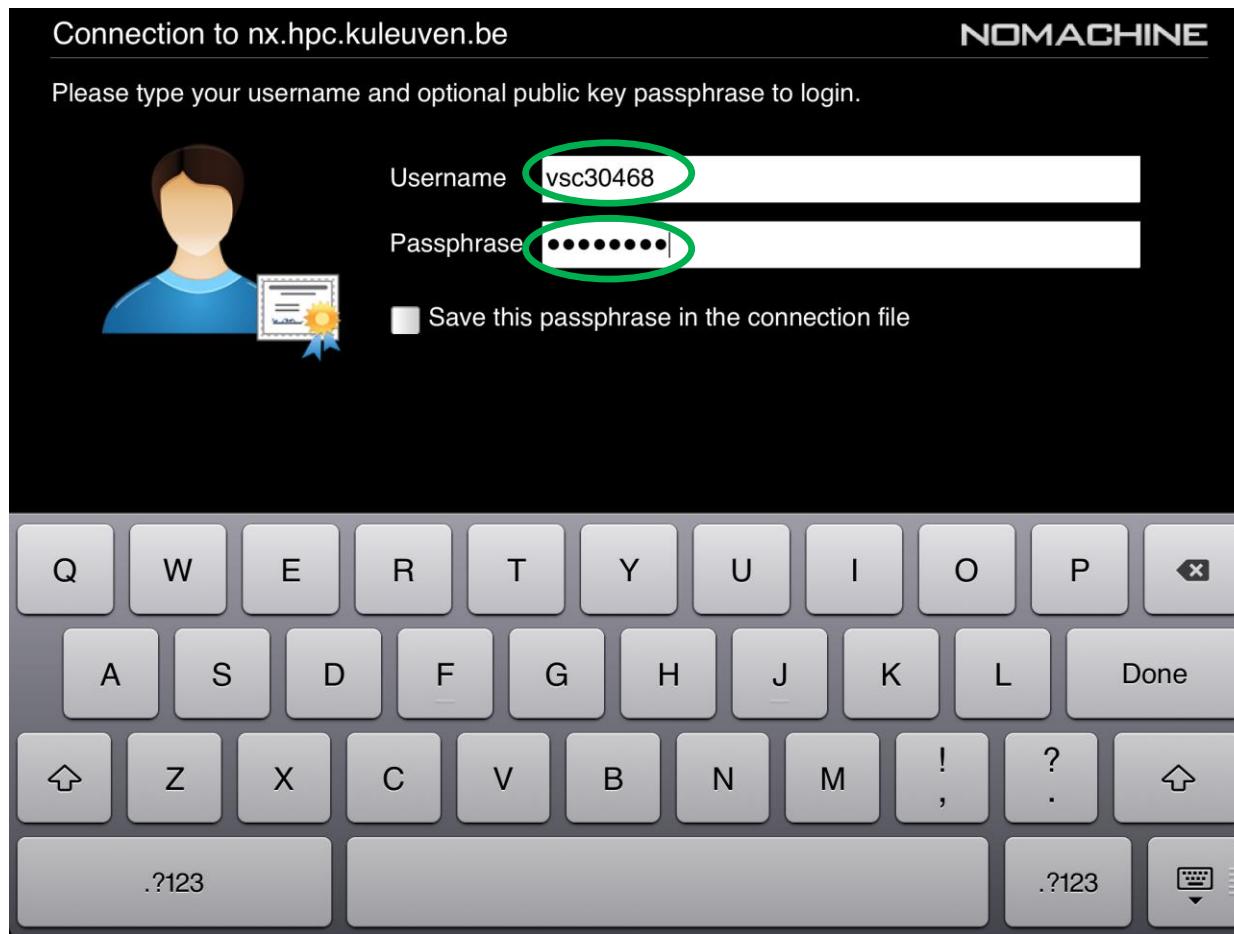
Android – transfer files e.g. with Box (KU Leuven) or Dropbox (others)
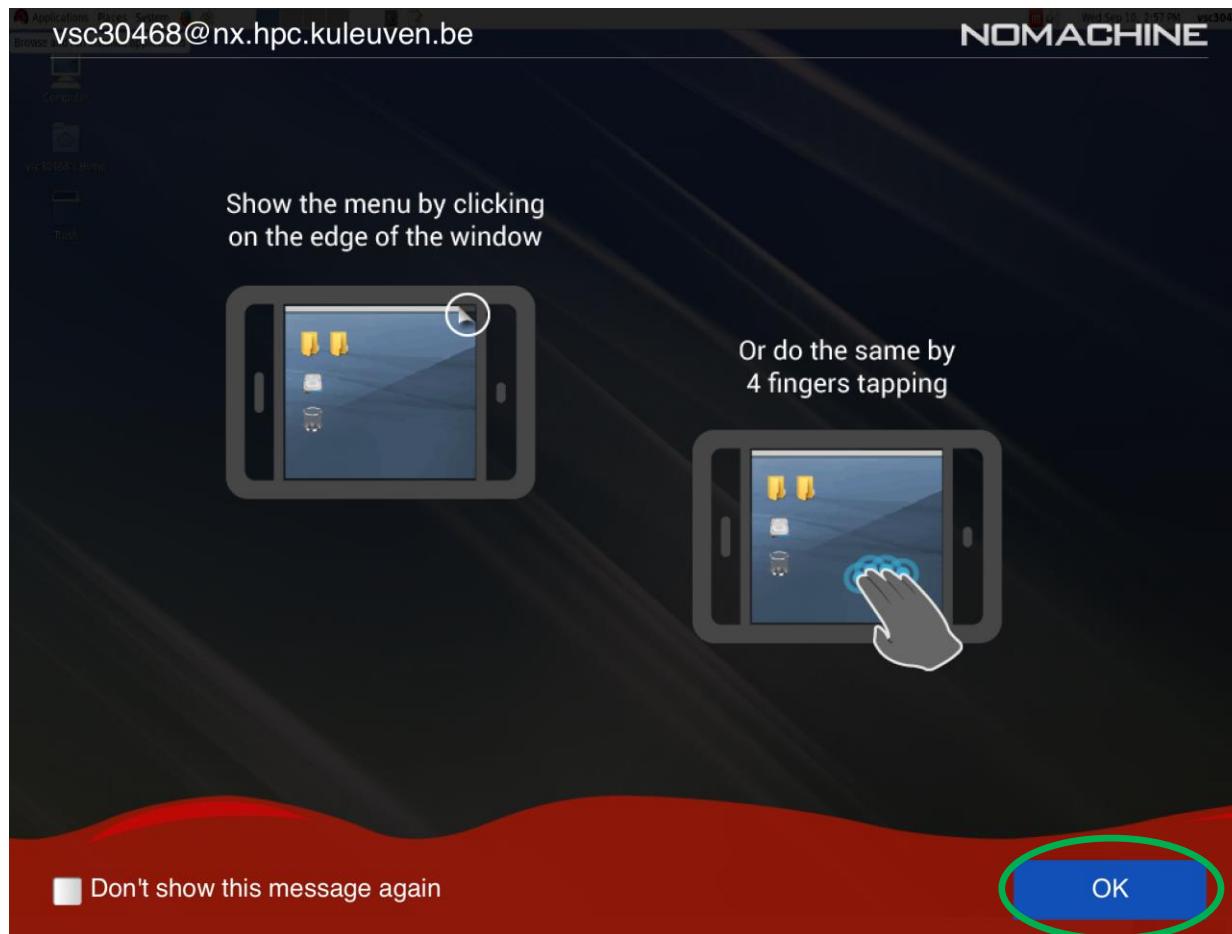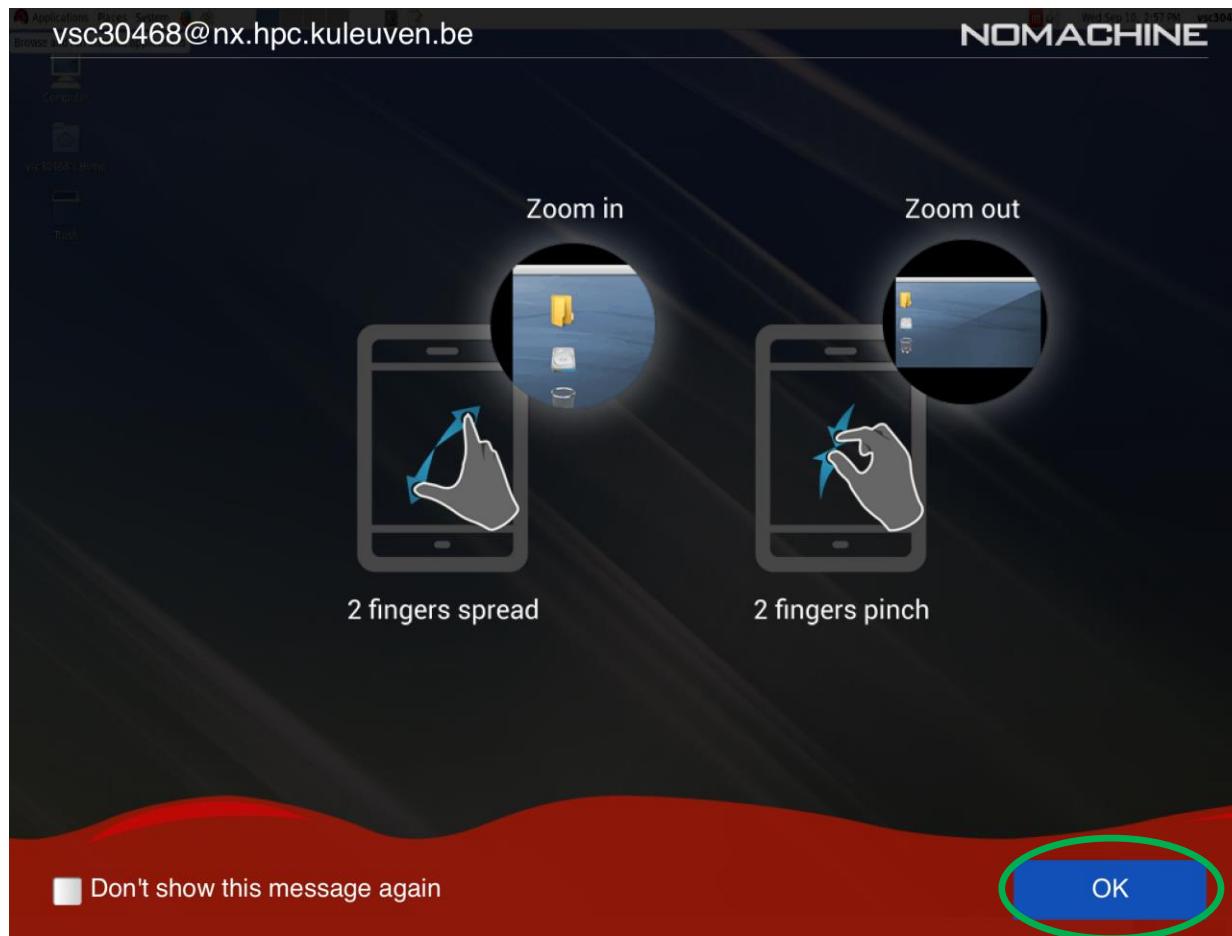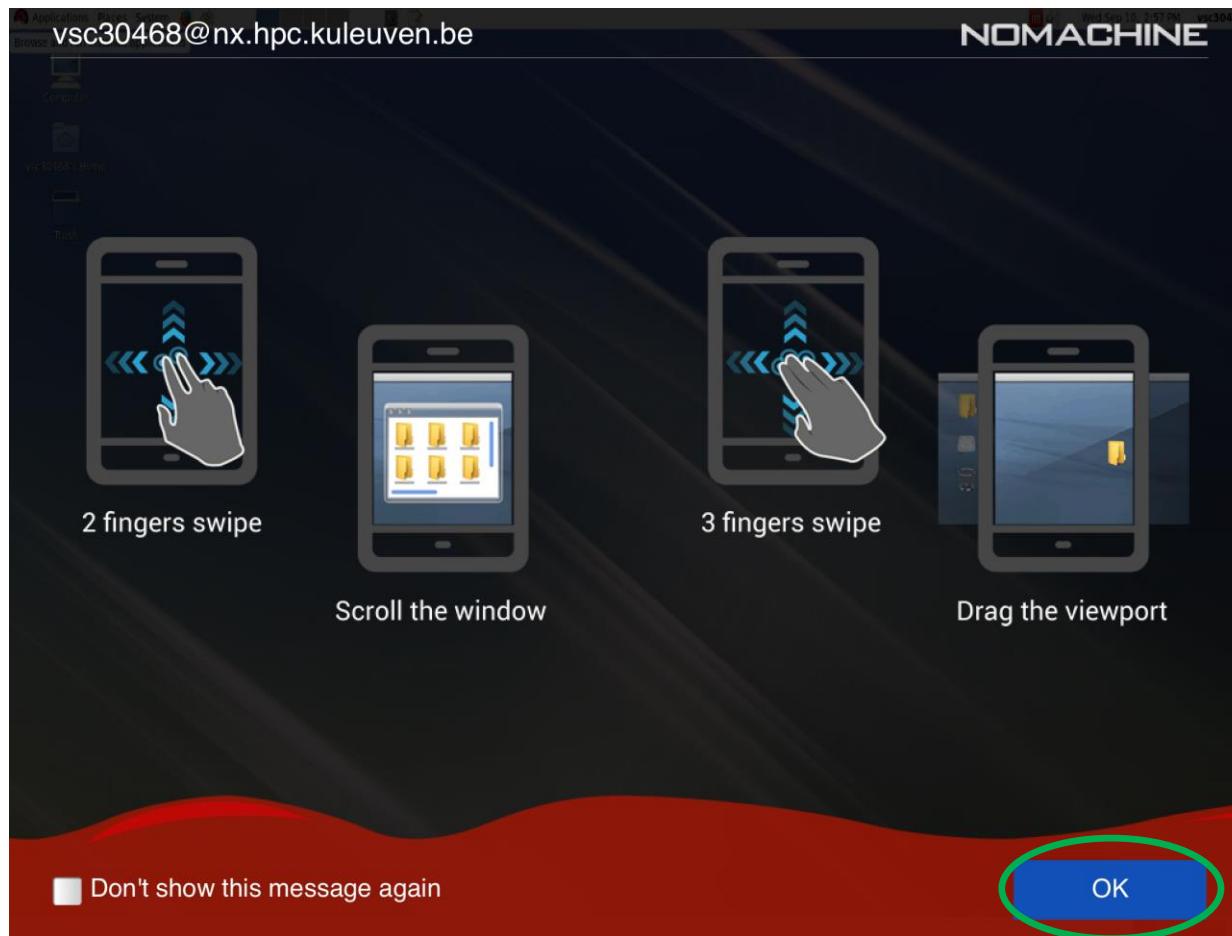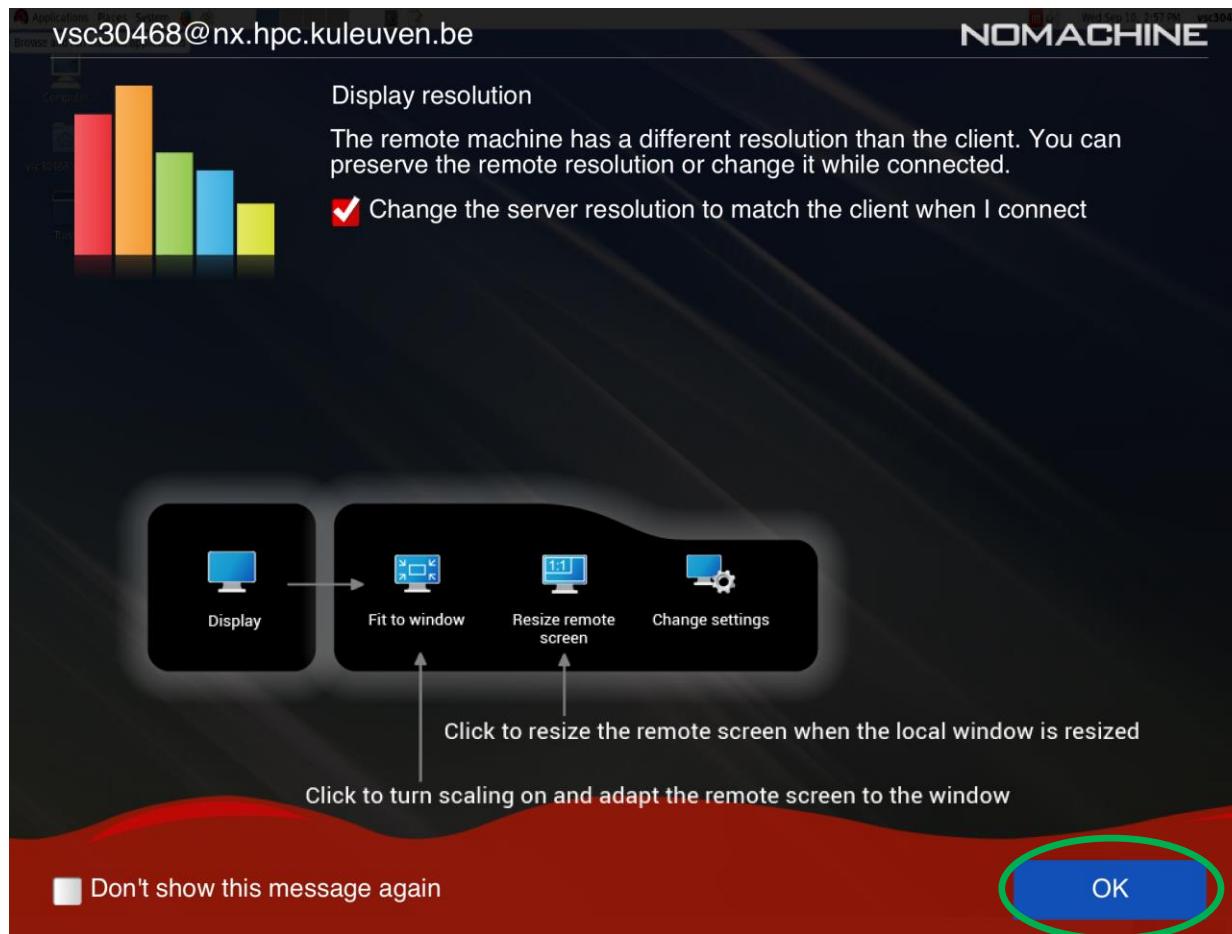
Mobile version

Mobile version

Mobile version

Mobile version
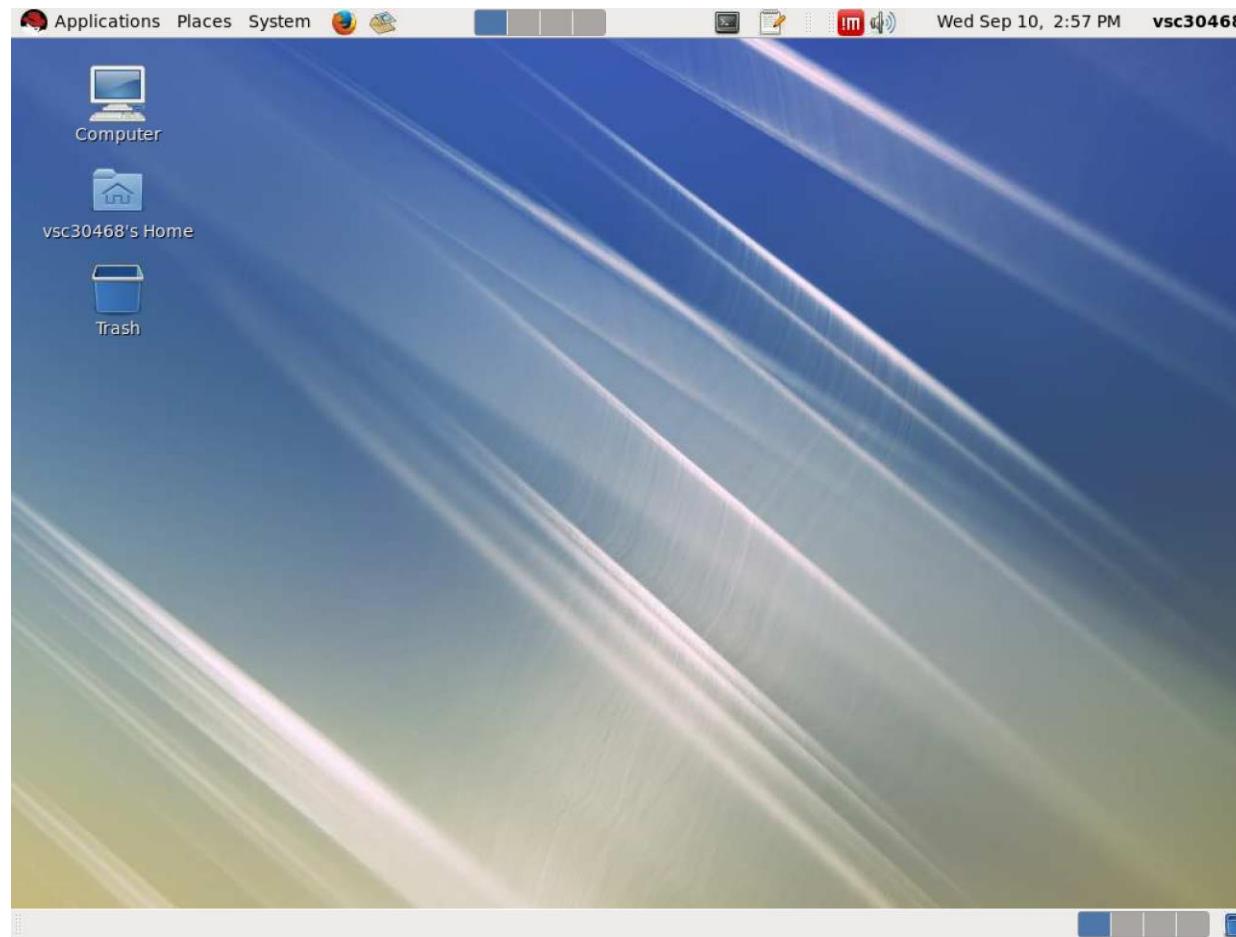
Mobile version

Mobile version
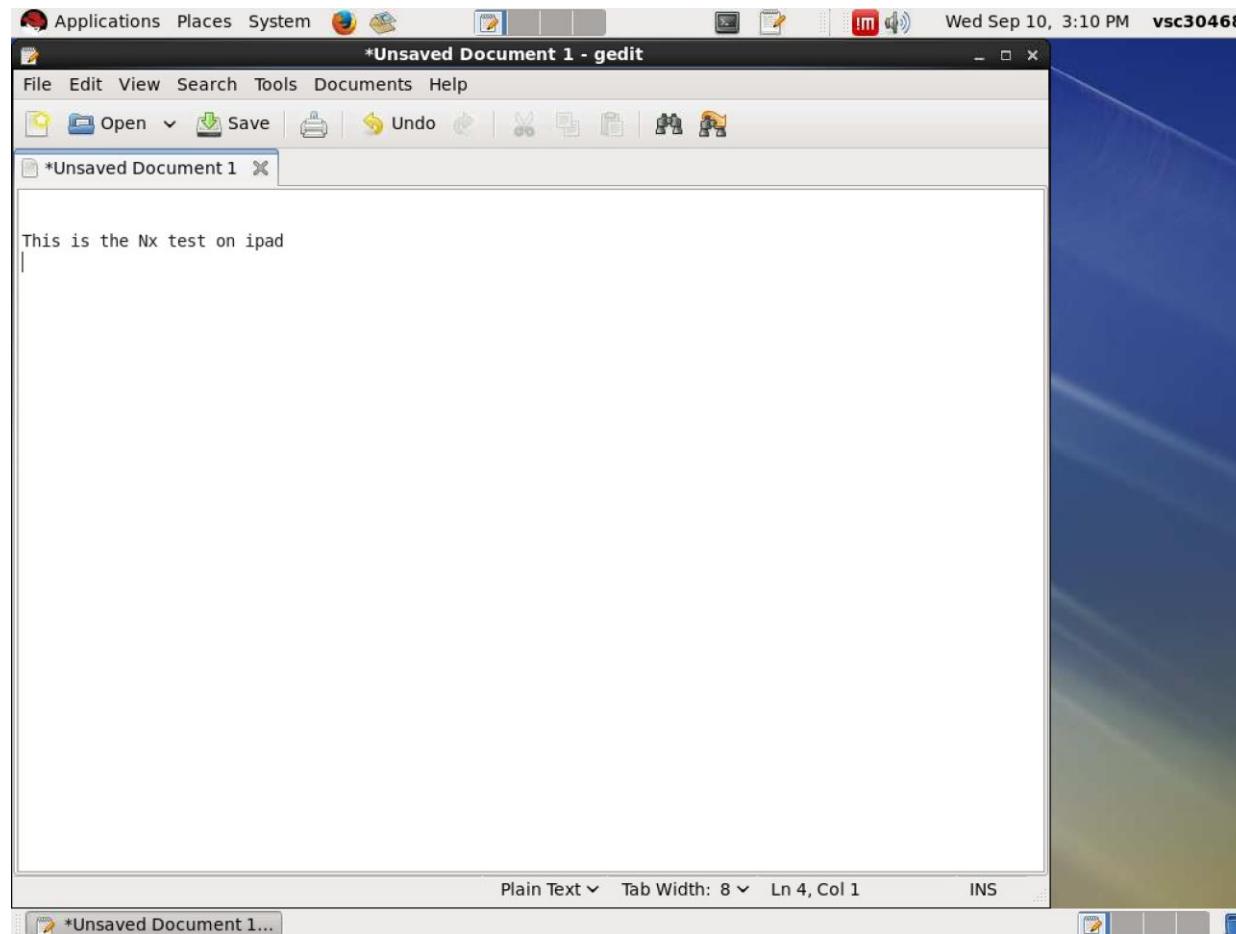
Mobile version
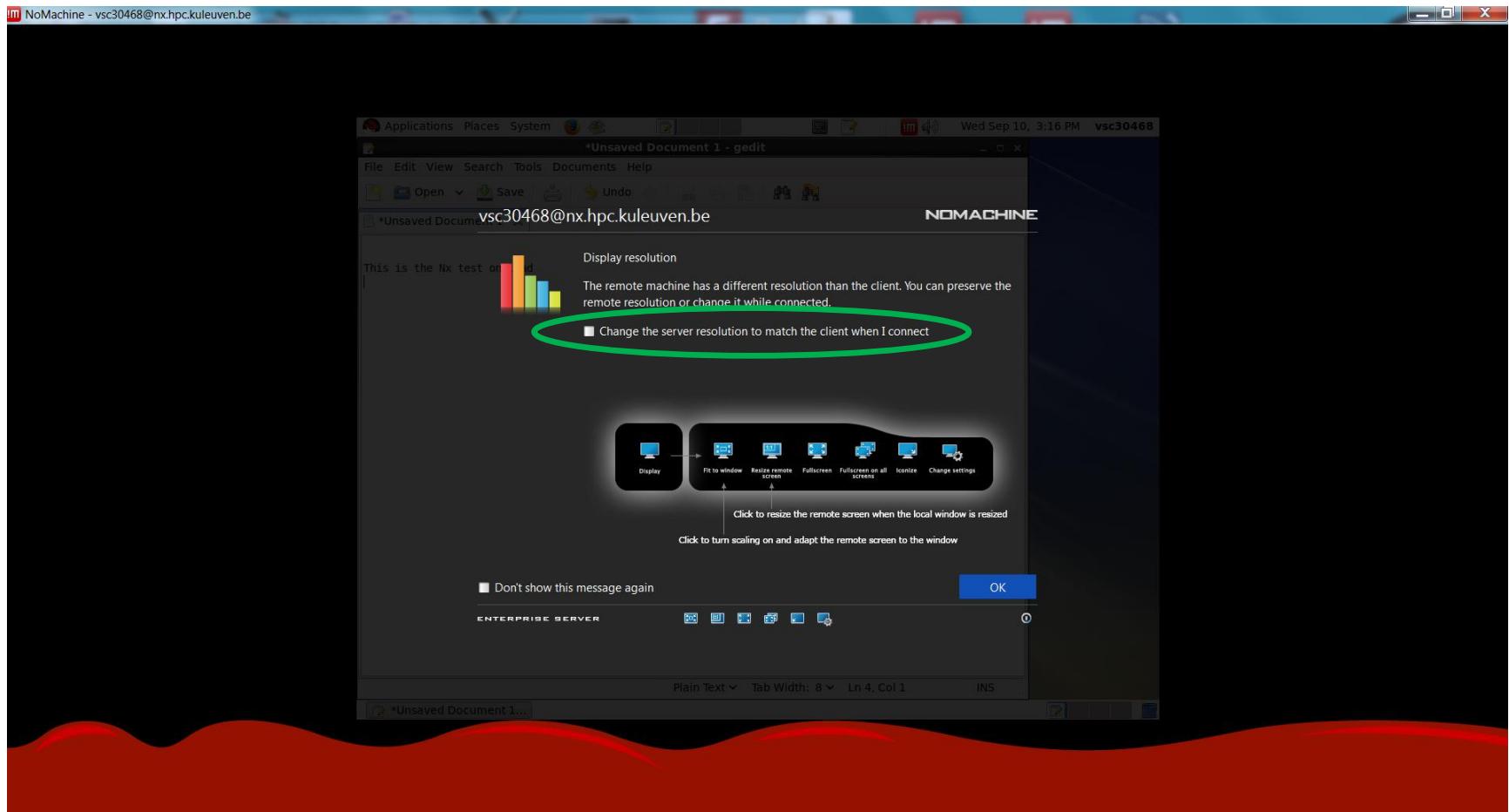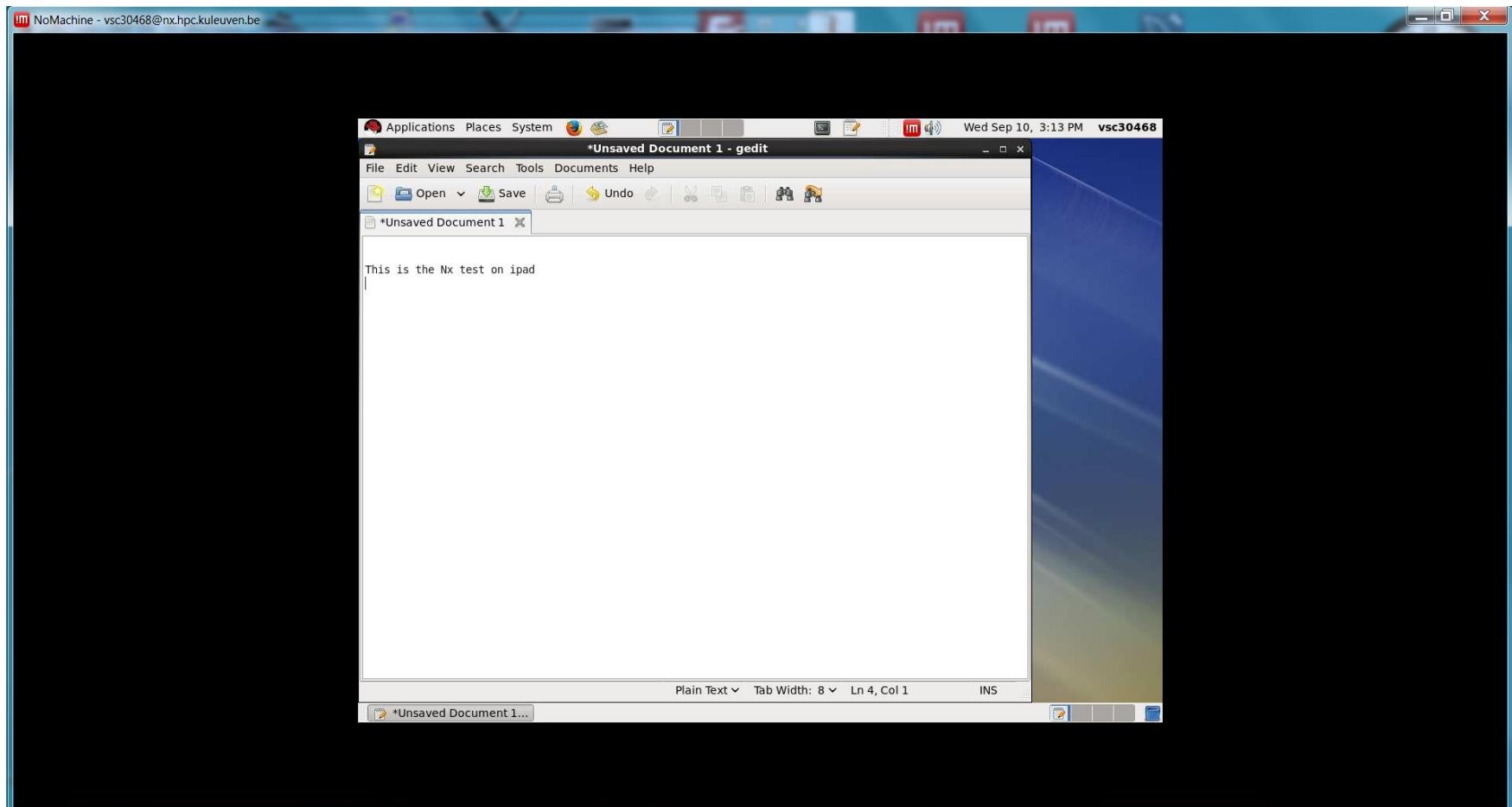
Mobile version
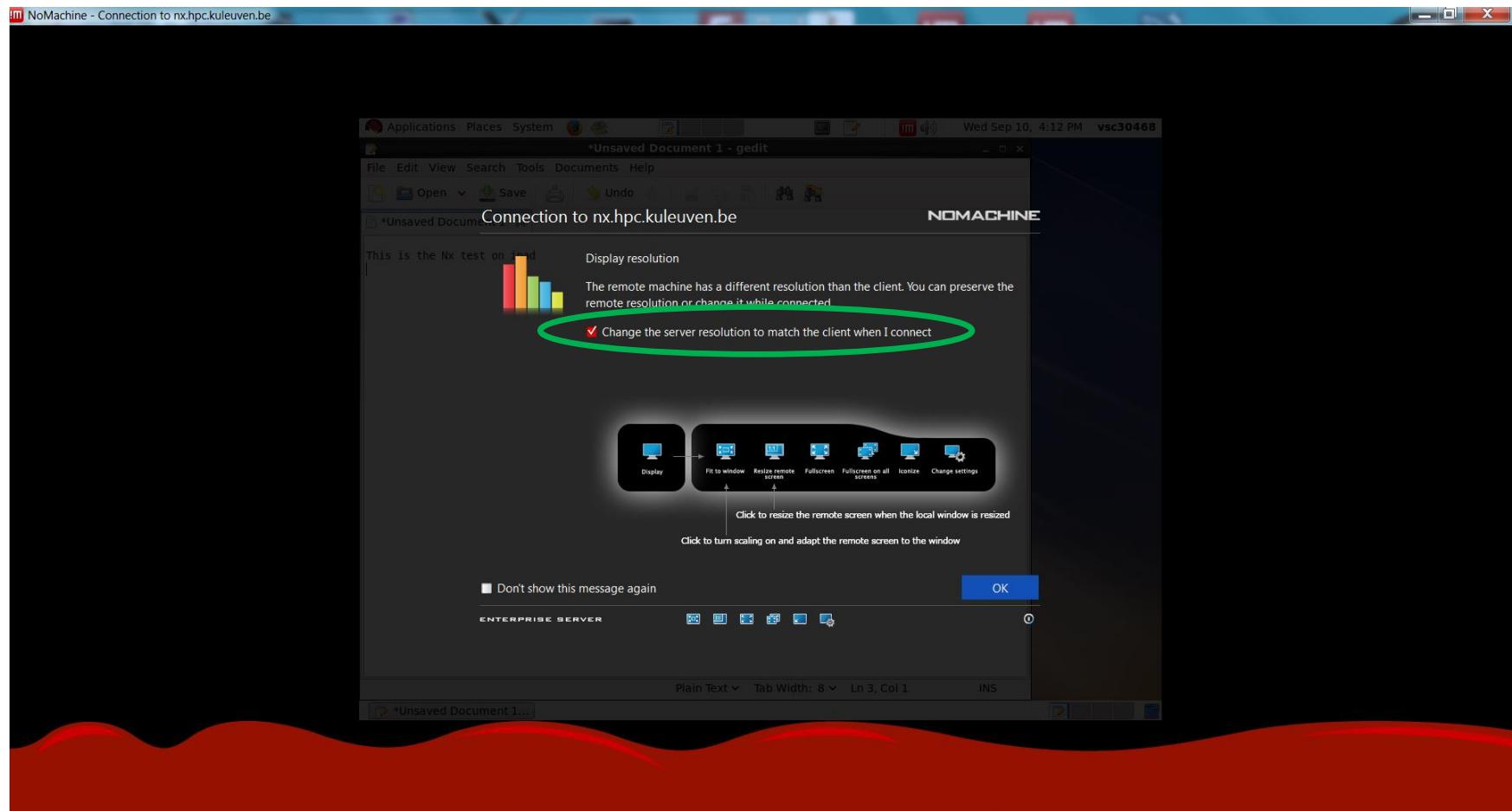
Mobile version
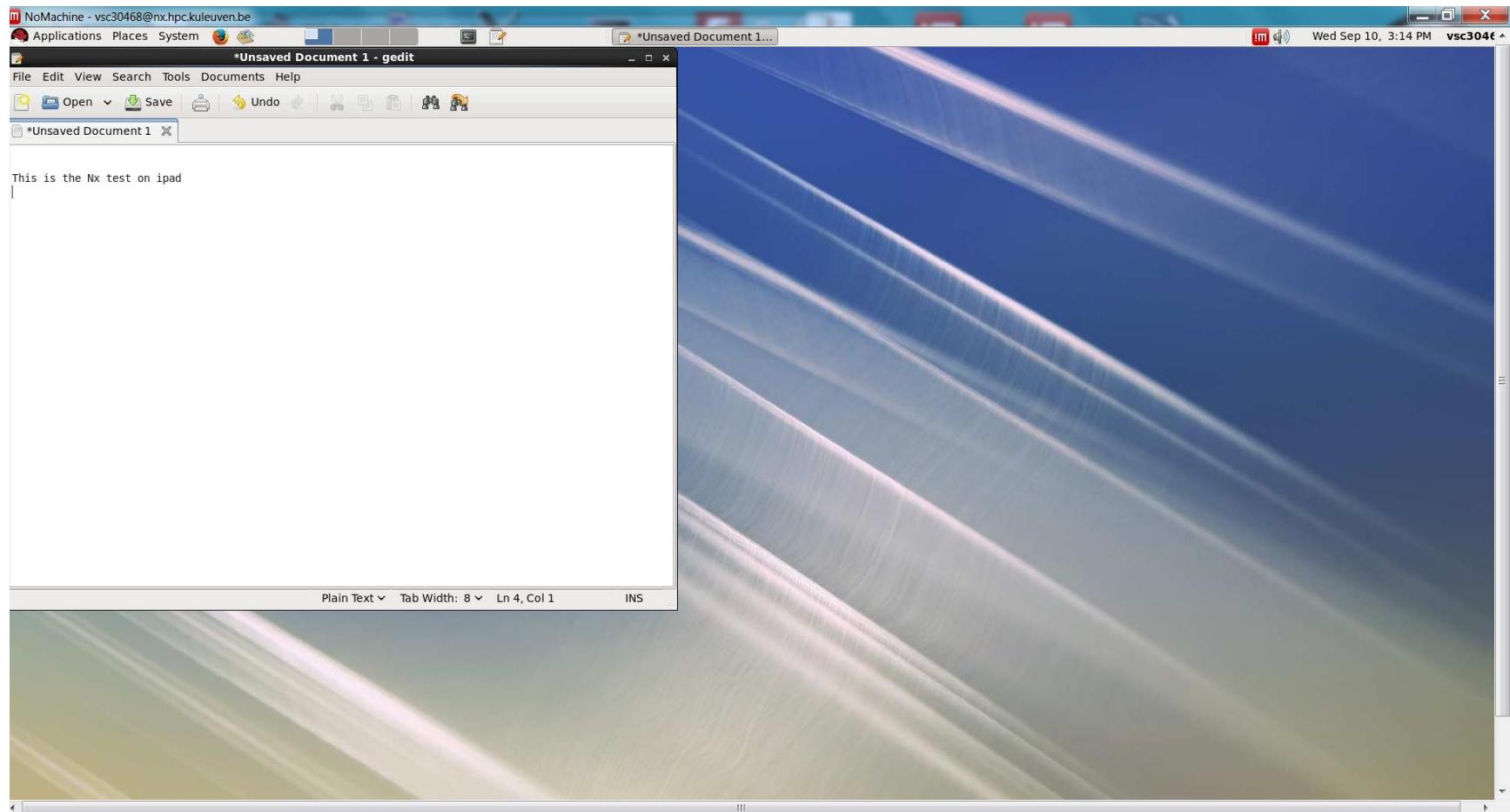
Mobile version
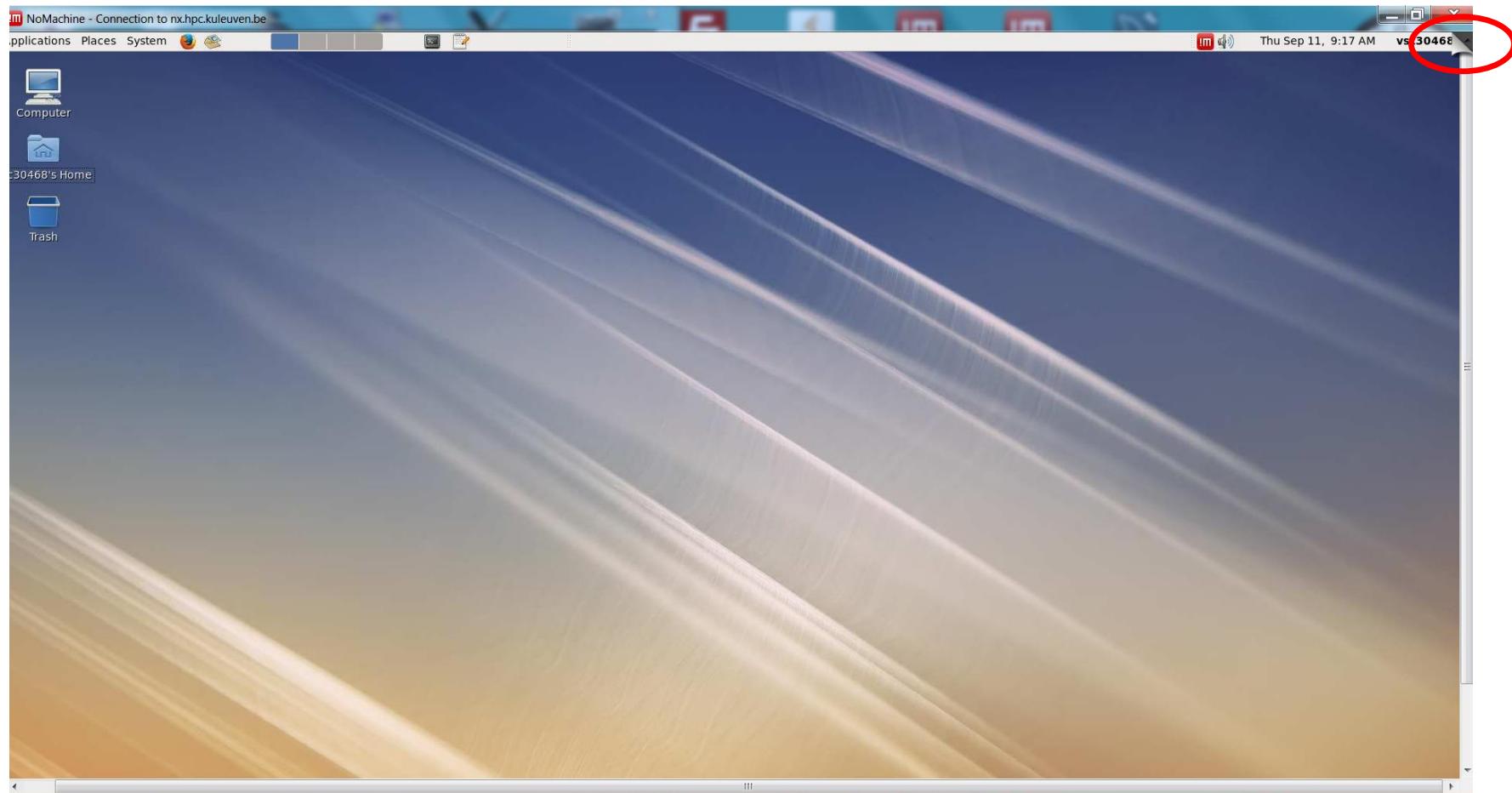
Mobile version

Mobile version

Mobile version
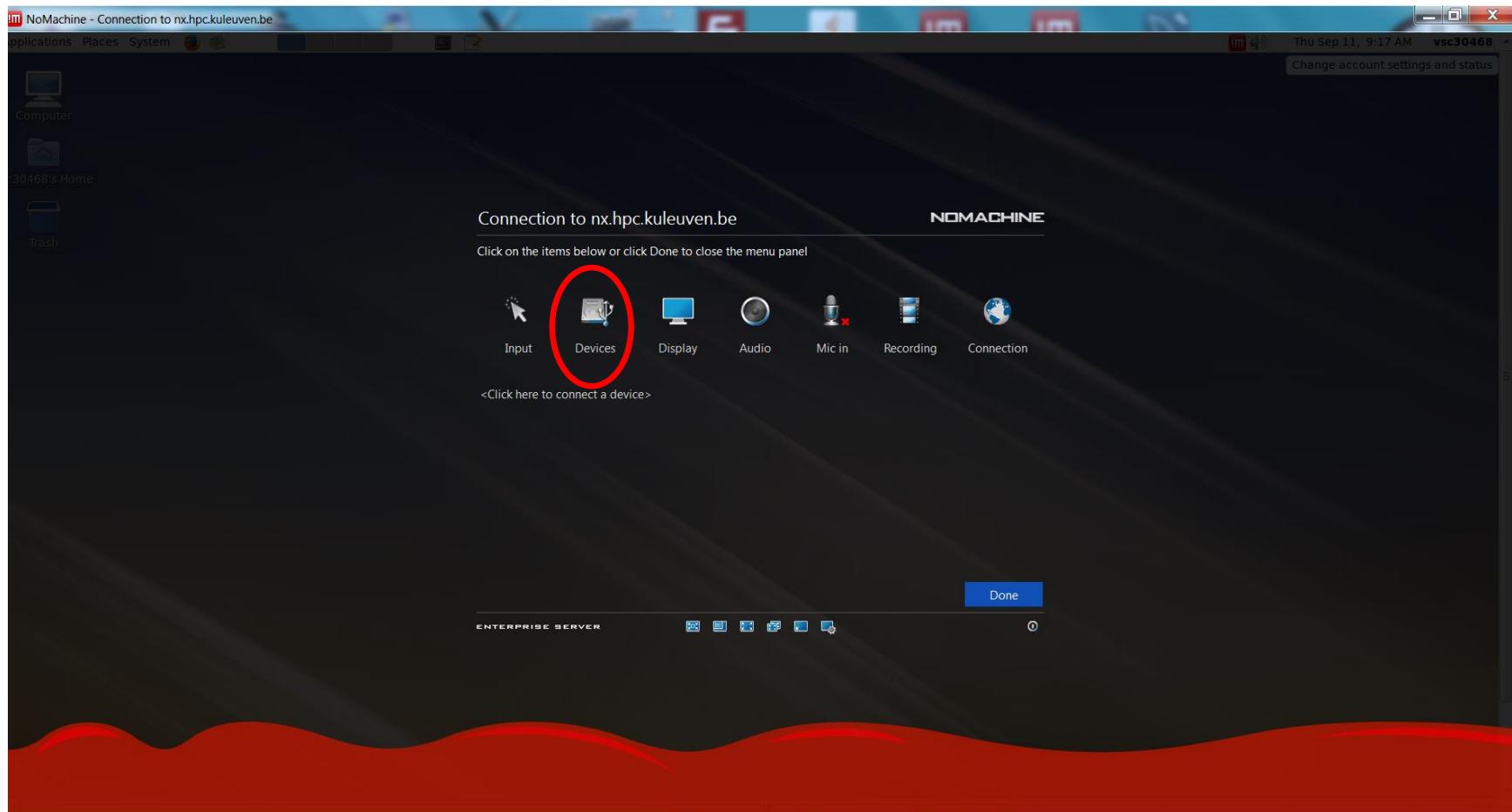
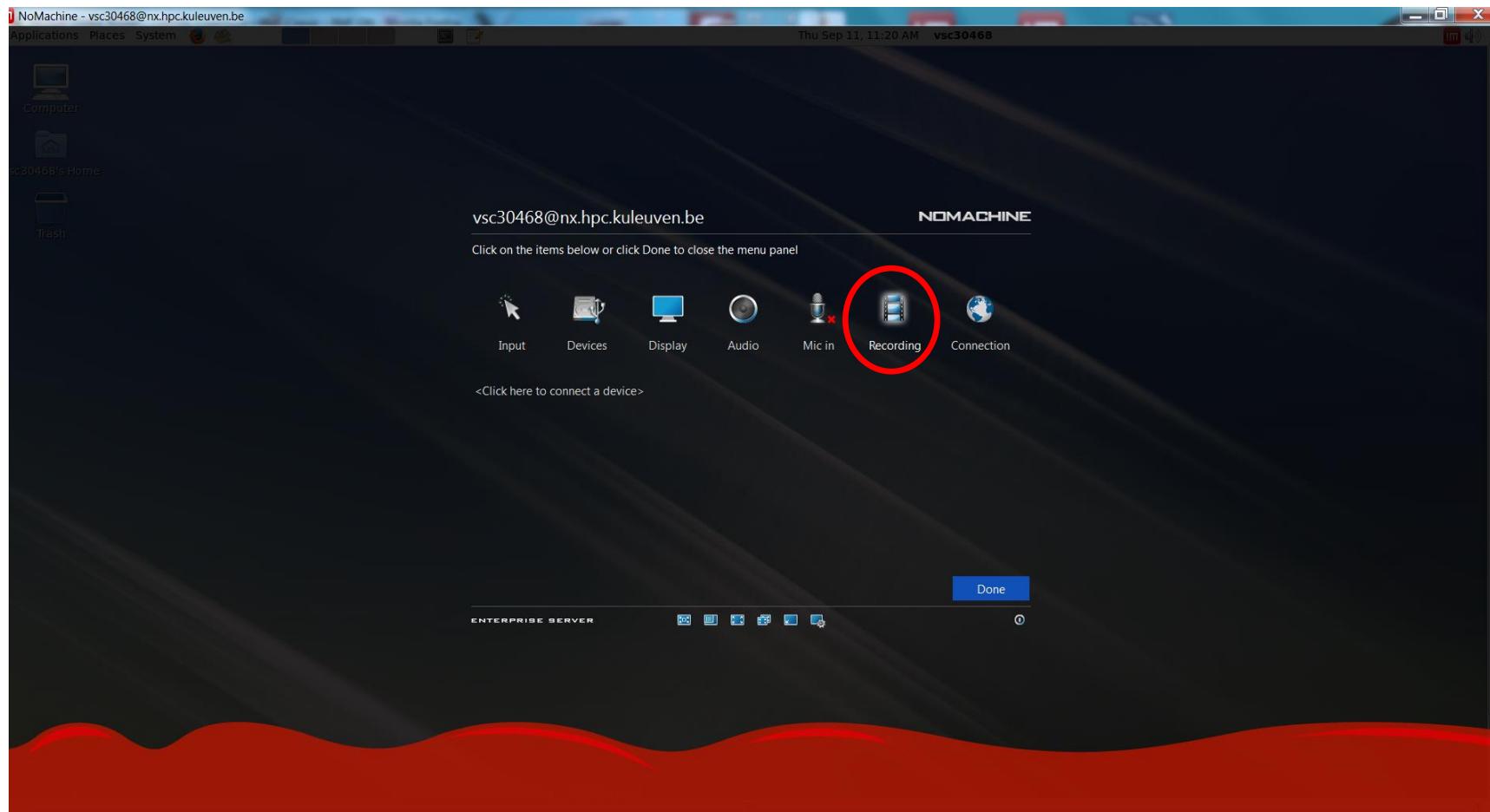# System tools
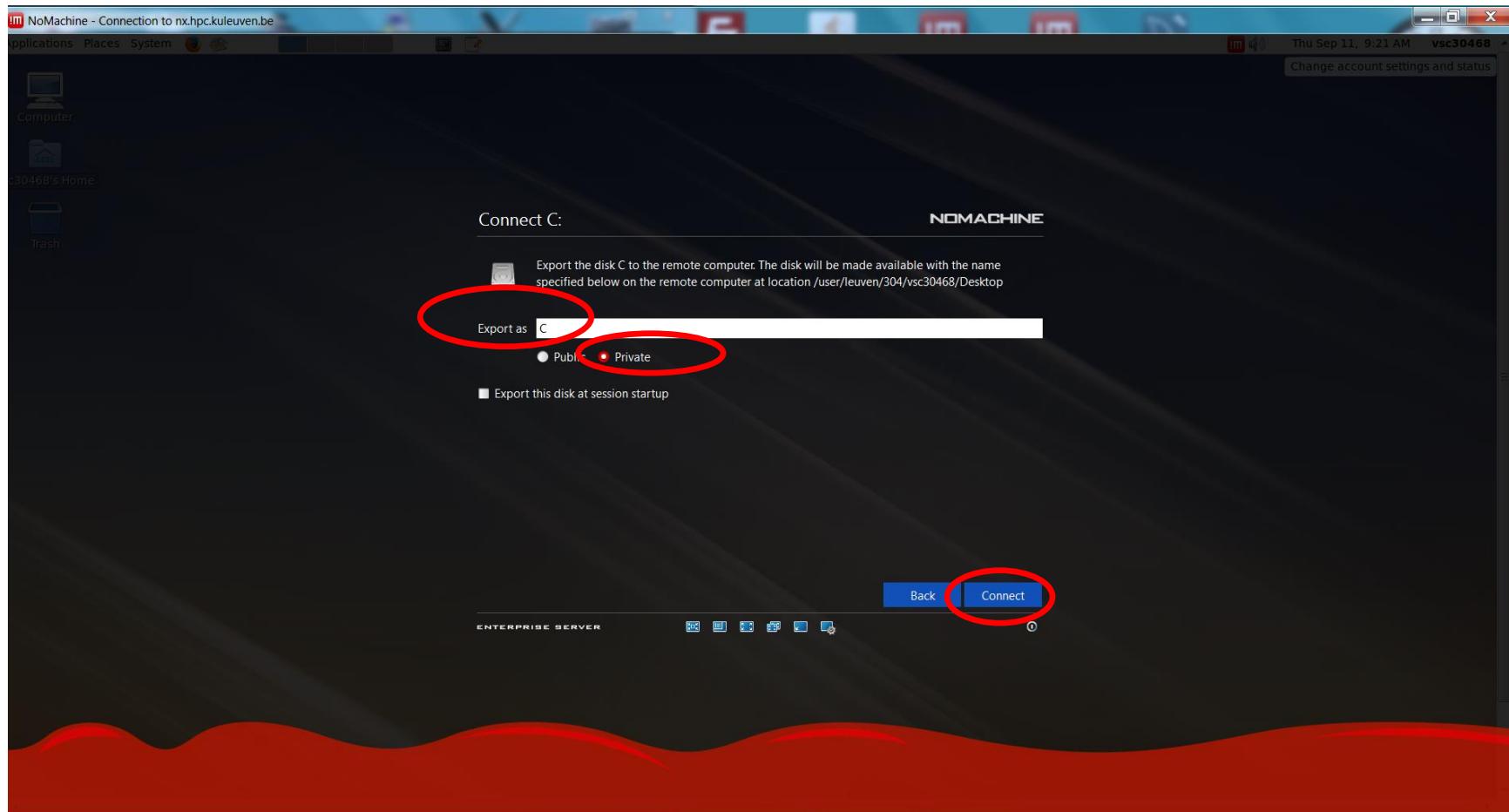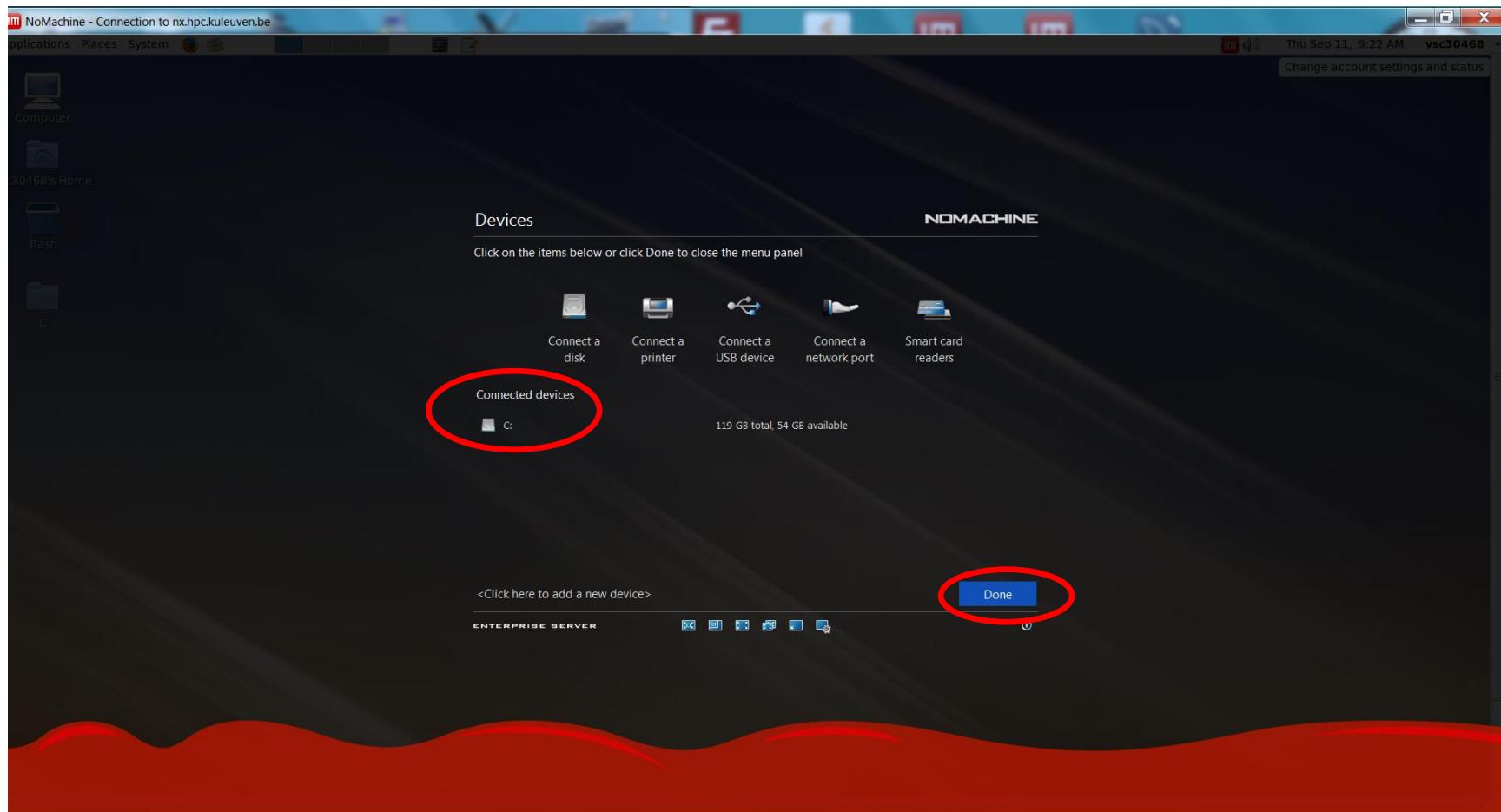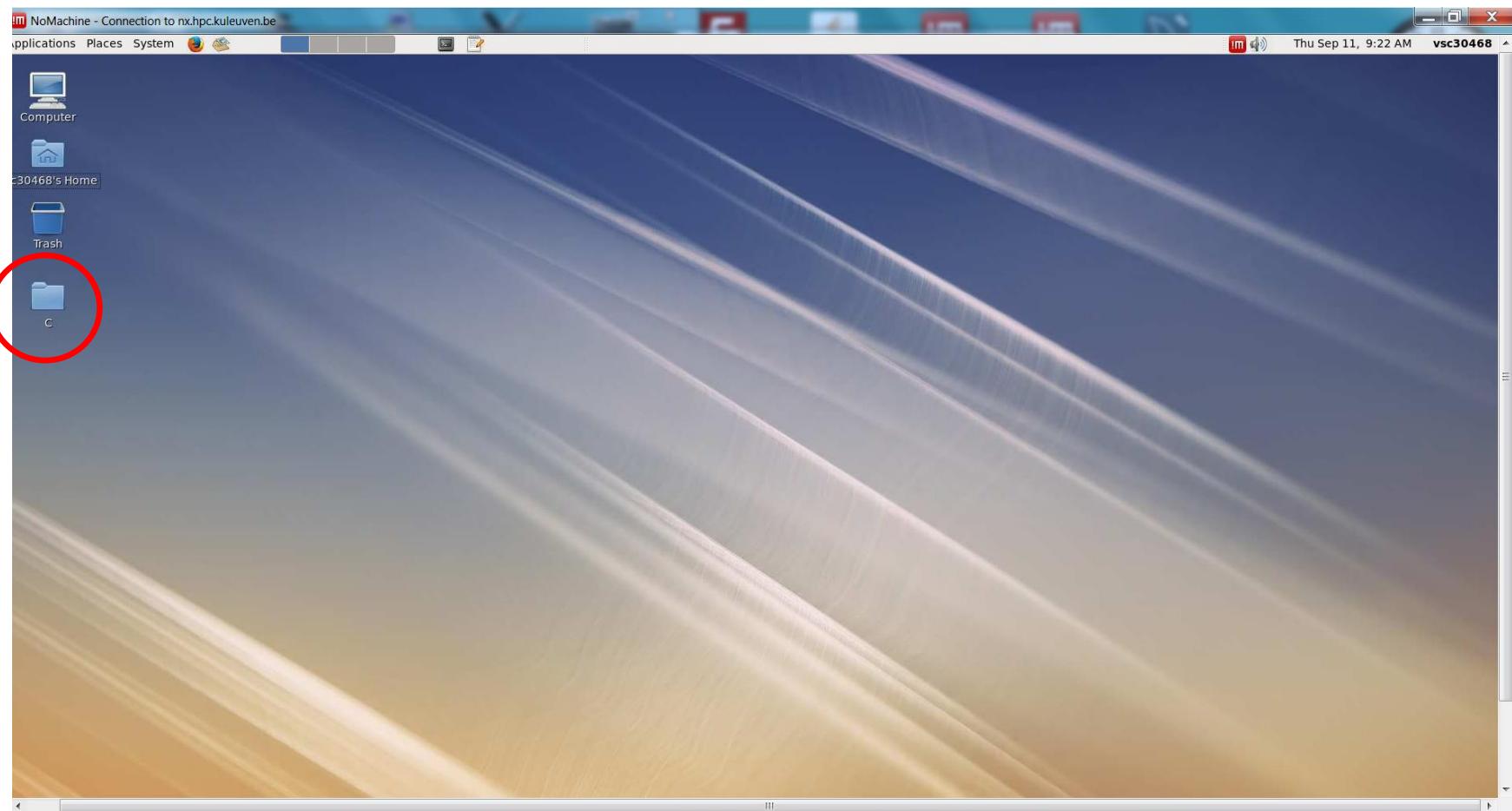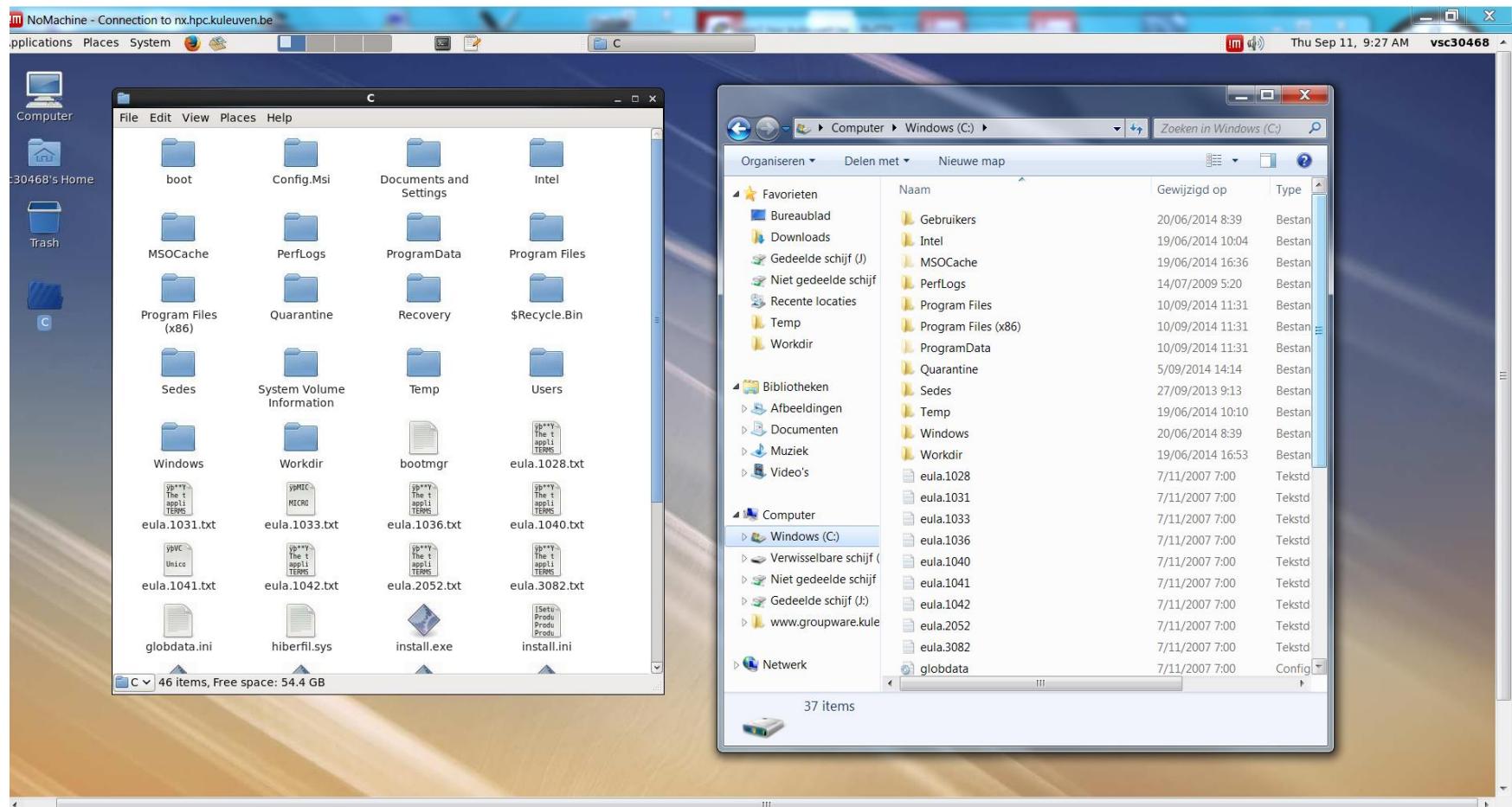
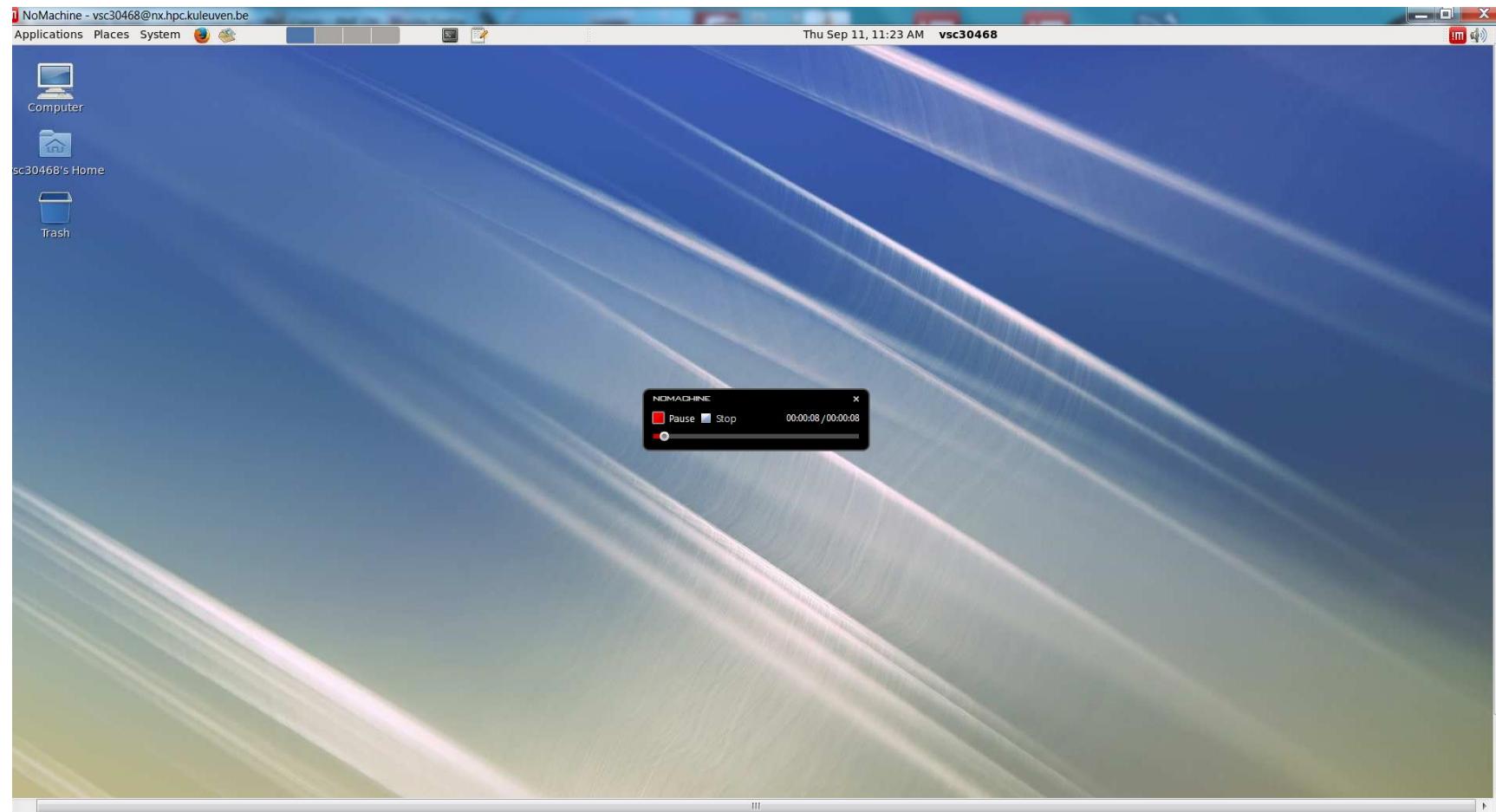# System tools - HDD

System tools - HDD
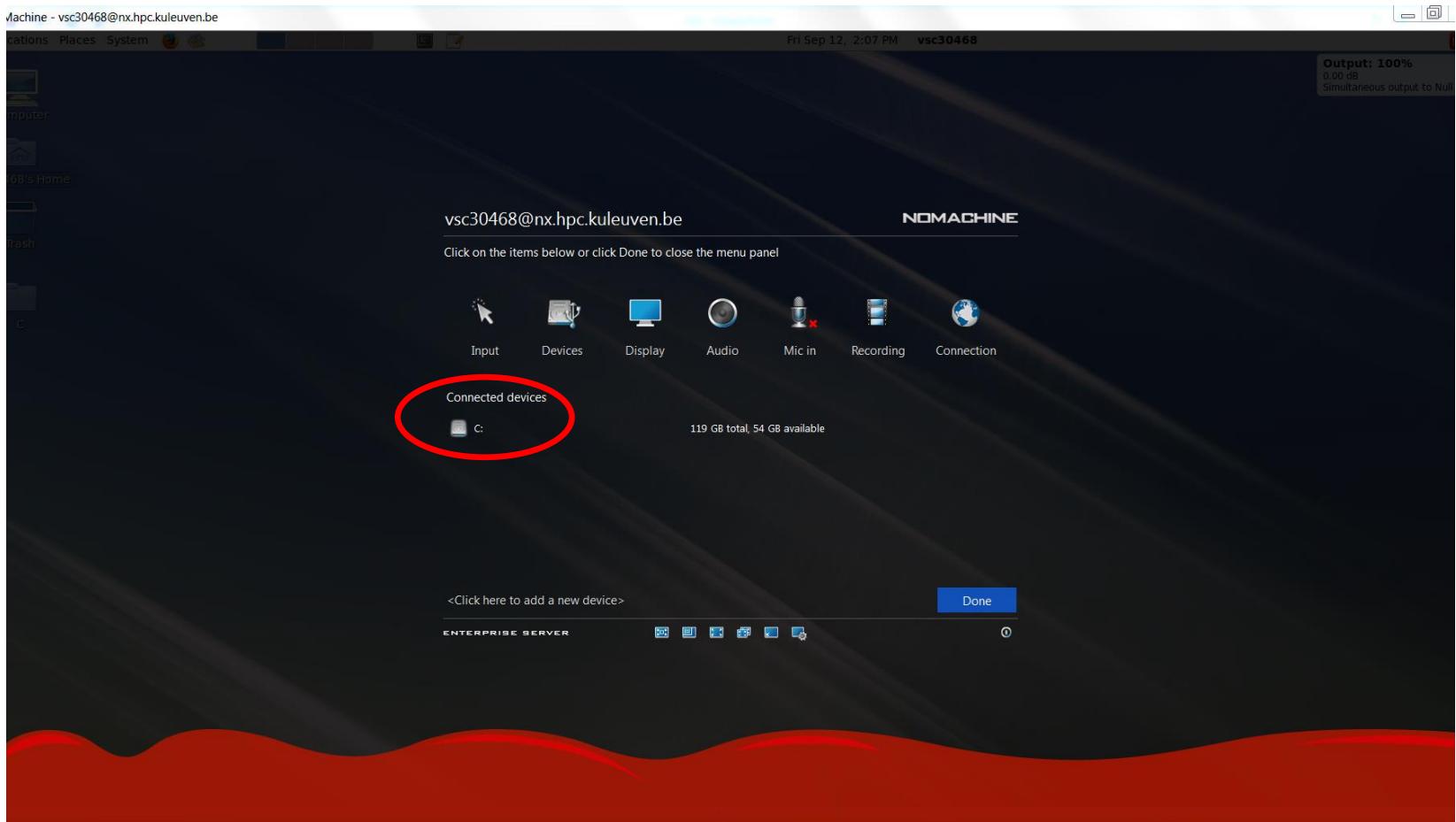
System tools - HDD
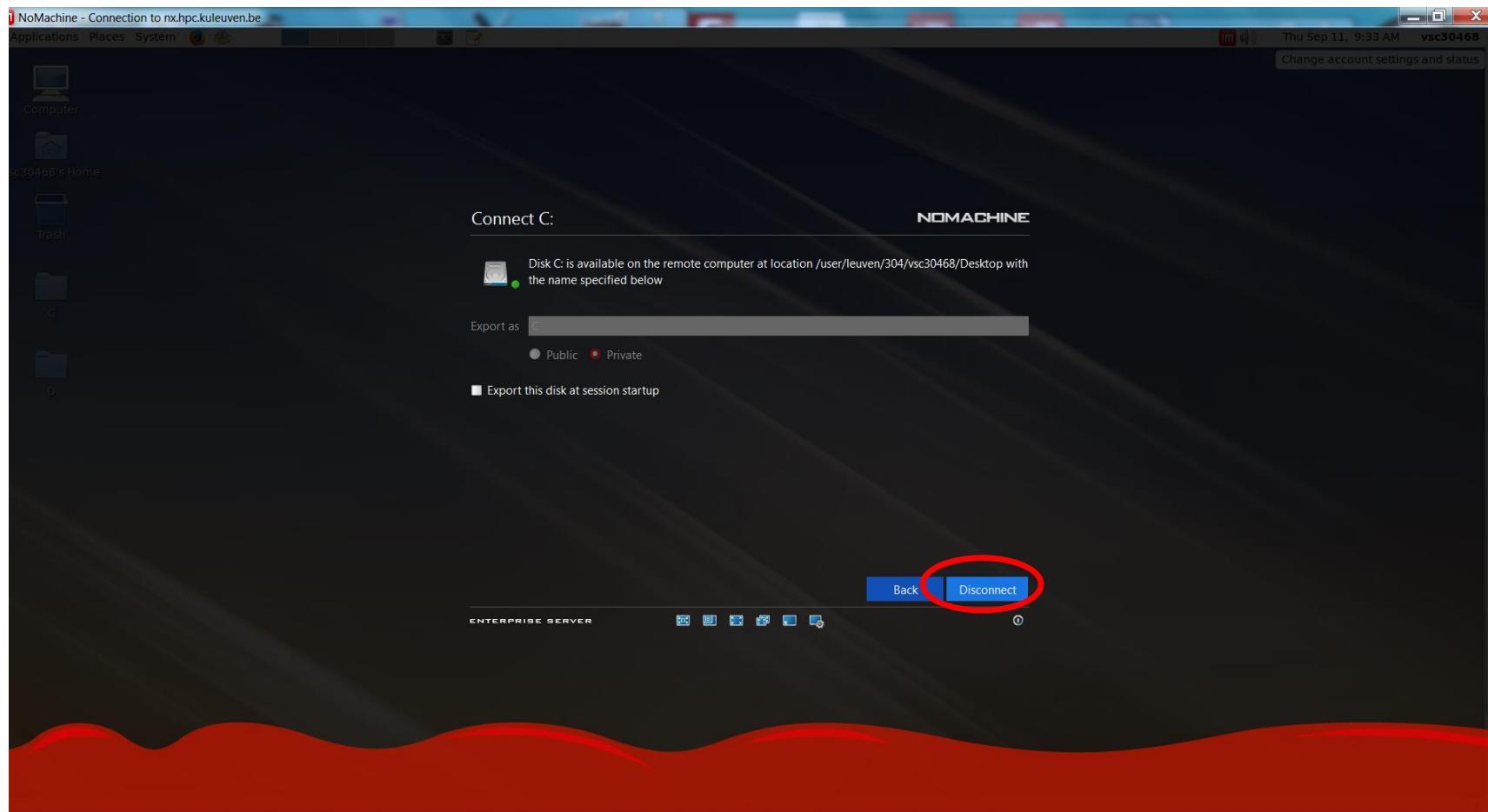
System tools - HDD
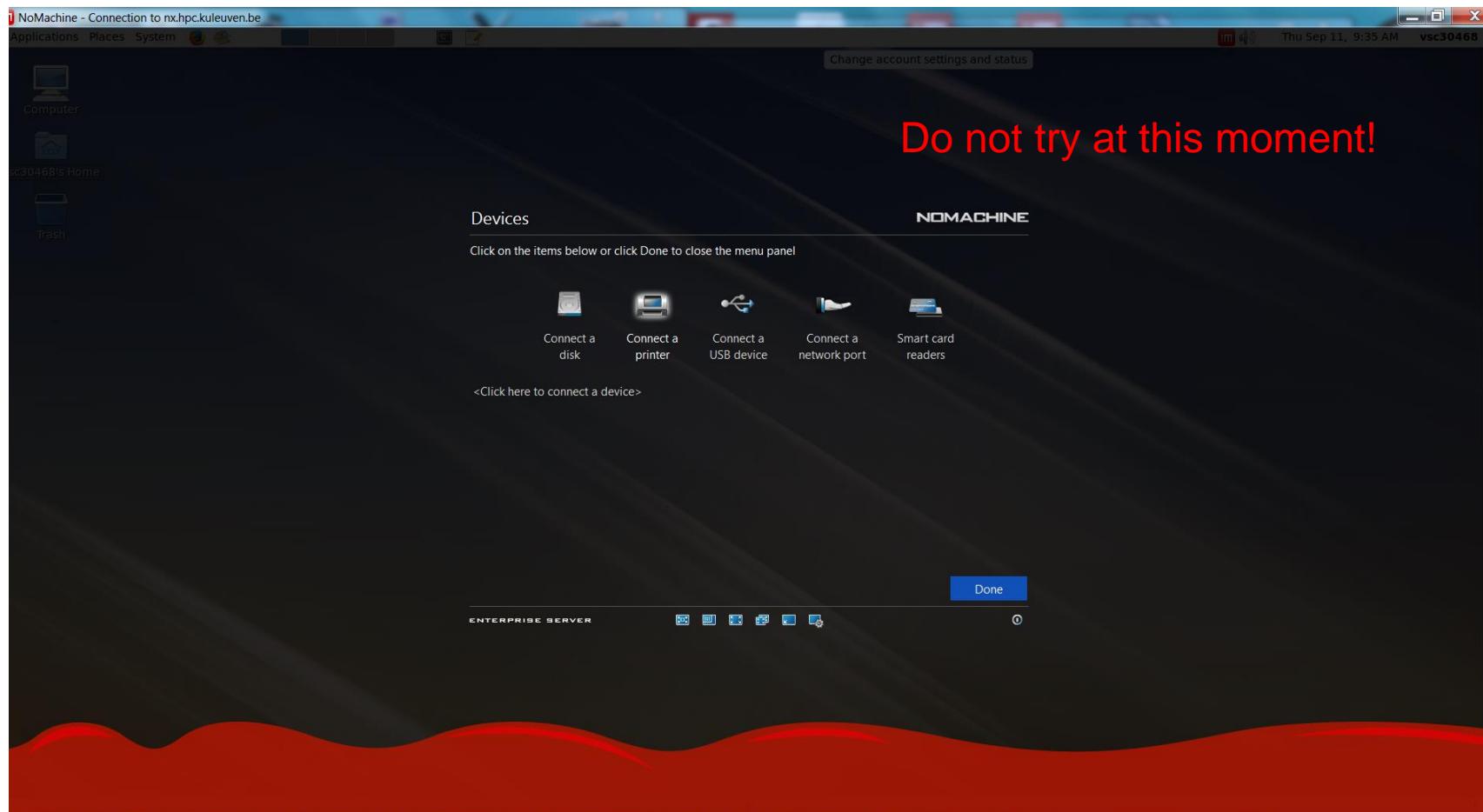
System tools - HDD

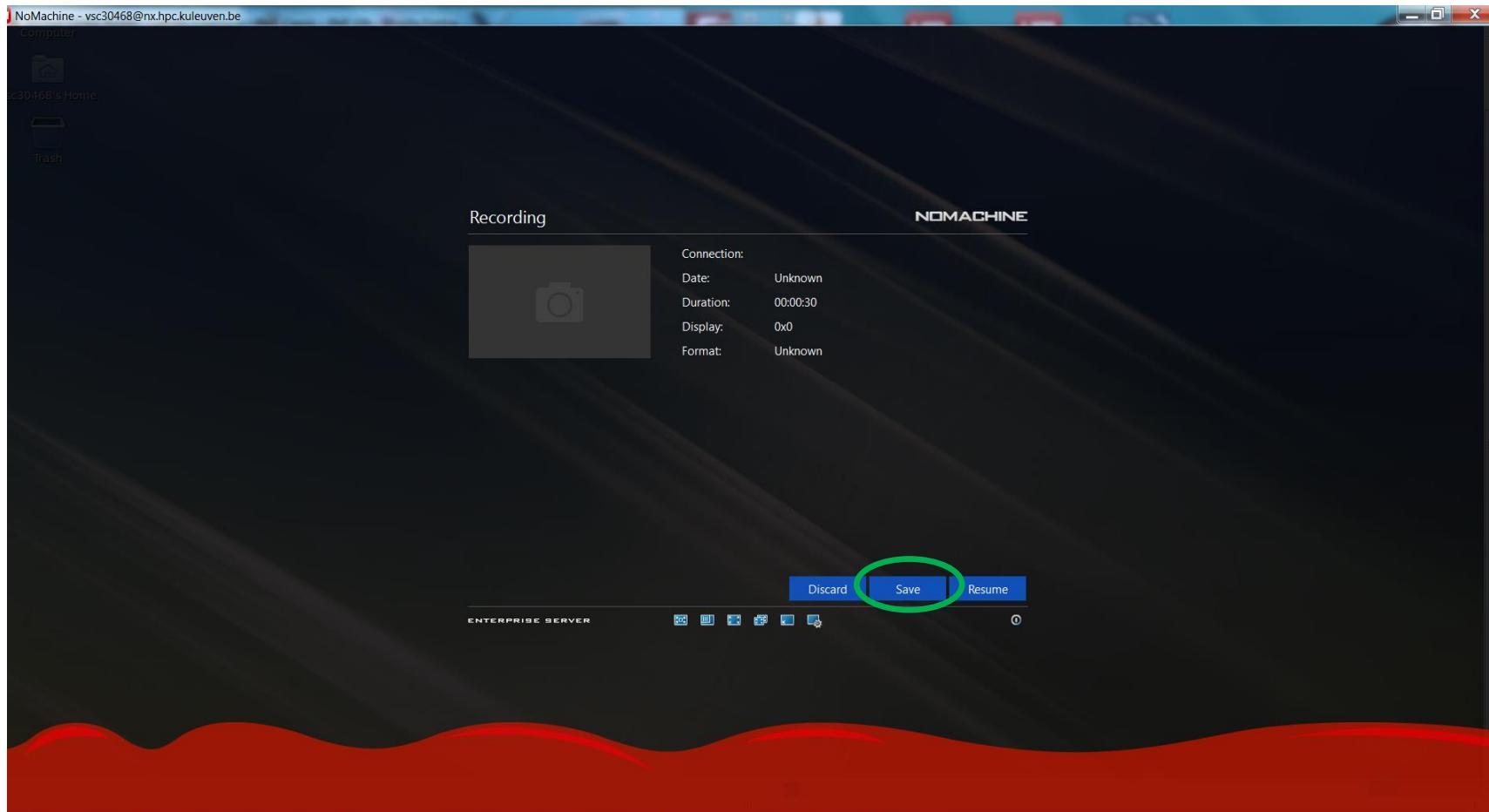# System tools - HDD

System tools - HDD

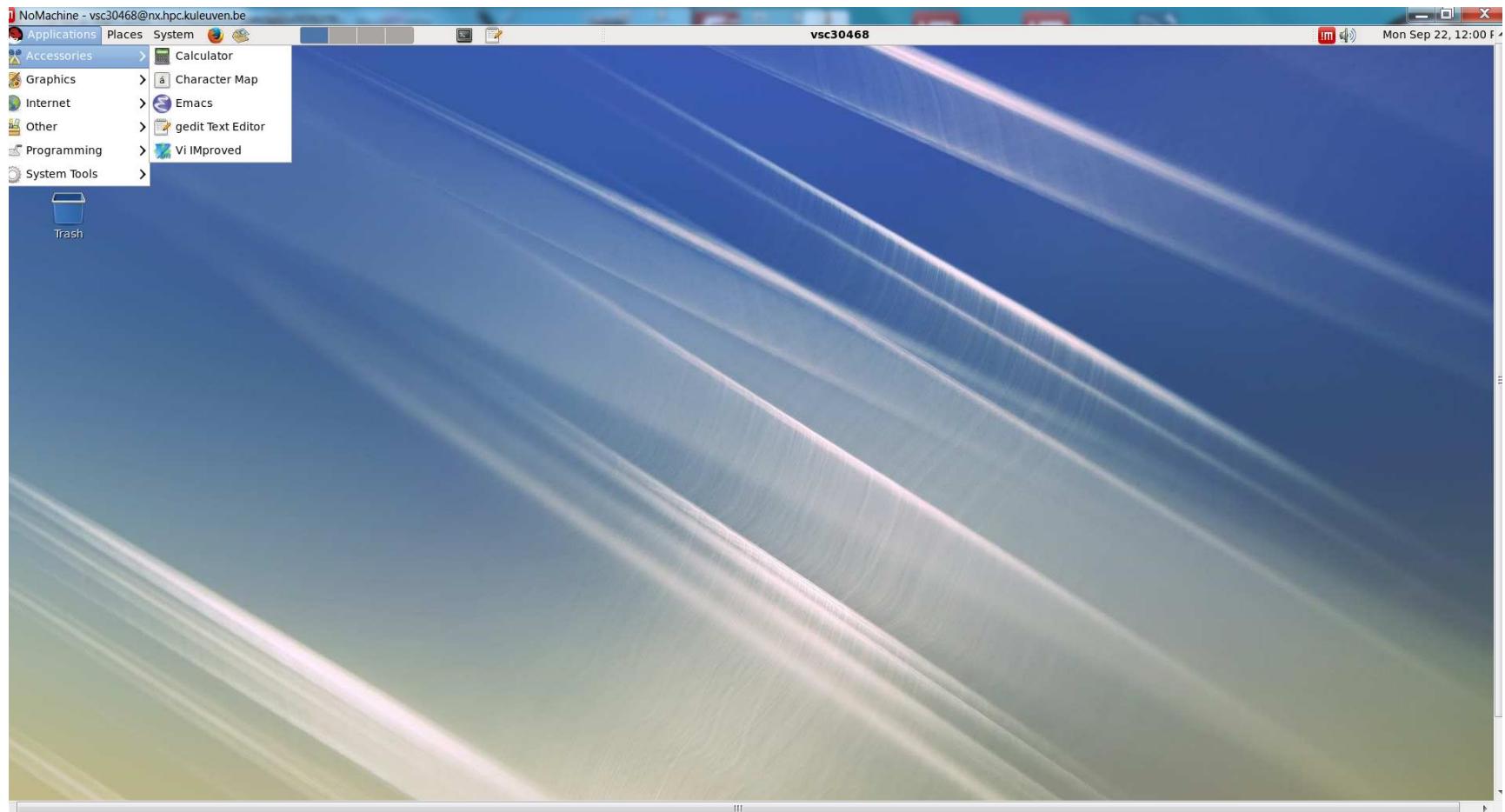# System tools - printer

System tools - recording

System tools - recording

System tools - recording

Available software

- **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.

Available software

Available software

Available software

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!

KU LEUVEN

Possible problems

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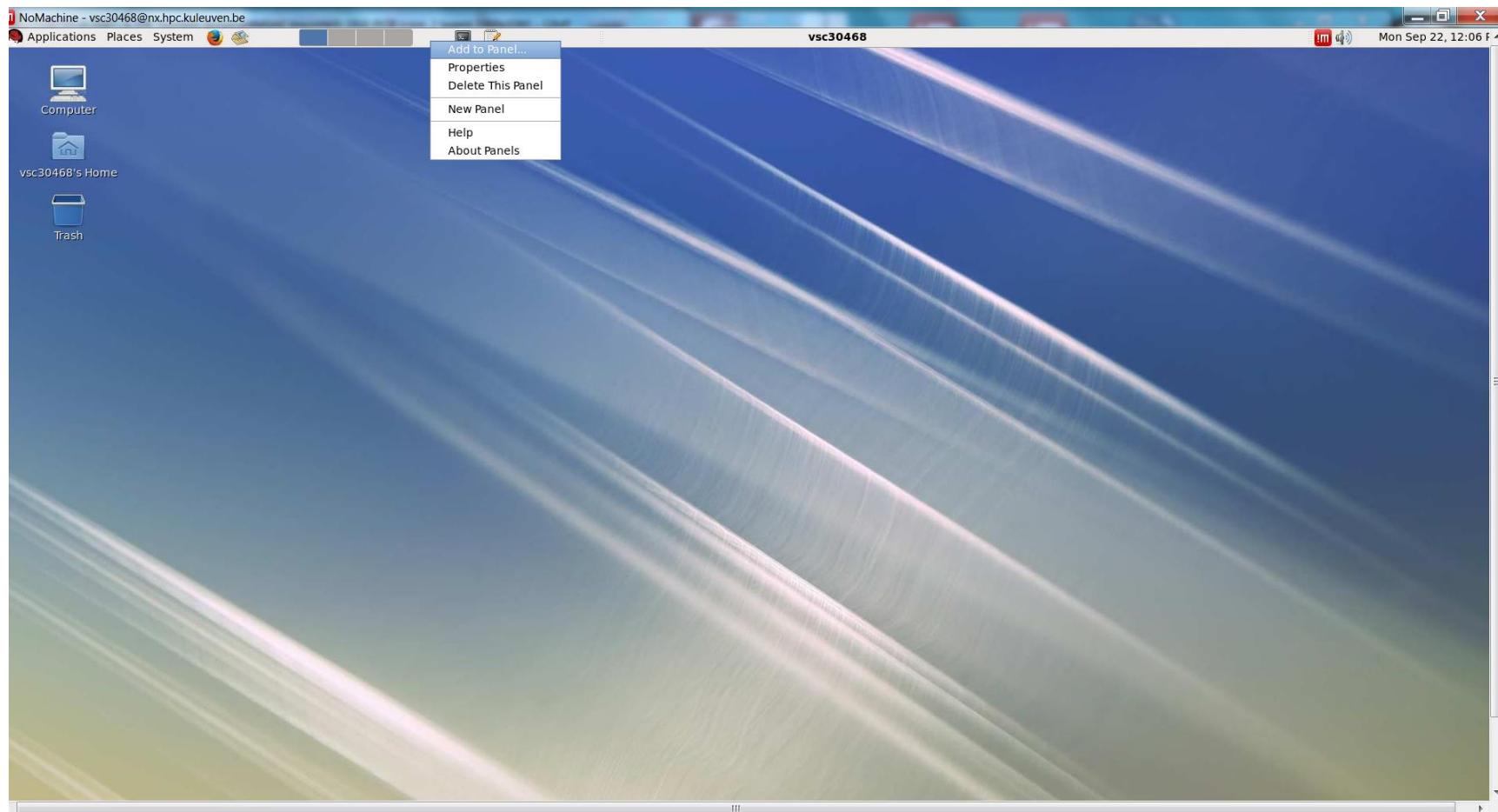- Attempt to remove directory from another session -> stale NFS handle
- Printer problem
- If you mount your hard/USB drive and remove files -> it's gone
- Don't process the same file on your local device and edit it with NX session
- Be carefull with shortcuts (Alt+F4)
- ...

KU LEUVEN

Test case

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

KU LEUVEN

Questions

- Now

- Helpdesk:
  hpcinfo@icts.kuleuven.be

- FOOCES-onderzoek:
  http://admin.kuleuven.be/icts/onderzoek

- VSC web site:
  http://www.vscentrum.be/

  o VSC documentation

  o VSC agenda: training sessions, events

- Systems status page:
  http://status.kuleuven.be/hpc

KU LEUVEN
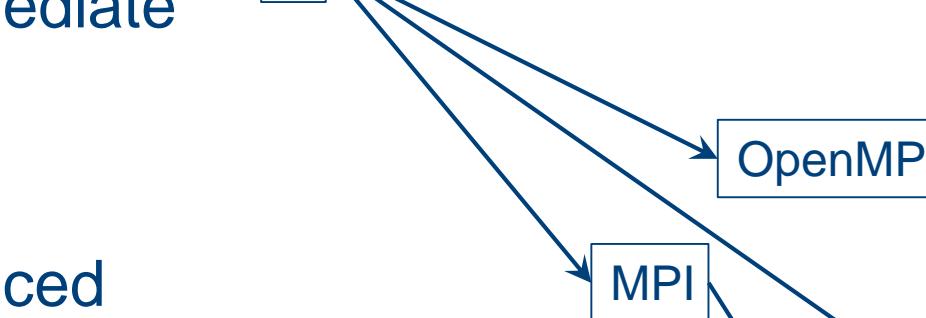
VSC training 2014/2015

- **Introductory**

Python

Matlab

Linux → HPC intro

Version control systems

C

- **Intermediate**

OpenMP

MPI

- **Advanced**

PGAS: GASPI

Lunchbox sessions
- NX
- Cerebro info session
- Version control systems

Code optimization

KU LEUVEN