

VTD Configuration Issues

Installation Procedure
Overview
Hardware
VTD Software Installation
Repositories
VTD Base Package
Pedestrian Add-On
Basic Installation / Single-User System
Multi-User Installation
VTD 2.x, new installation
VTD 1.4.x
Verifying the Installation
Operating System
General
Network Configuration
Host Registration
Interface Labeling
Supported Systems
Installation Procedure
Operating System - OpenSuSE
Operating System (Kubuntu 18.04 LTS - 64bit)
A) Get the package
B) Basic Installation
C) Extensions
D) Graphics Driver
F) Font Installation
G) Finalize OS installation
H) Environment Variables
Operating System (Kubuntu 16.04 LTS - 64bit)
ROD with KDE Plasma 5
GNOME 3
Unity Desktop - Tool Tip Visibility
Virtual Machine under Windows 64bit
Ready-to-go OpenSuSE Installation
Custom Installation, Ubuntu 12.04
Material System Issues (VTD 2.0.1+)
Video Generation
Firewall
Trouble-shooting the boot loader
Other Packages
License
Bulk License
License File (node-locked)
Version VTD 2.0.3 and later
Version VTD 2.0.2 and earlier
License Server (node-locked and floating)
Network license with license file
Network / node-locked license with dongle
License on Virtual Machine
Road Designer Standalone with License Server
Pedestrian Package (DI-Guy)
Repositories
Run-time Software
License Server
Installation and Configuration
VTD 2.x and higher
VTD 1.1 to VTD 1.4.3
Graphics Driver
CUDA Issues
XServer Configuration
Multiple Graphics Cards in one PC
Compensating wrong EDID information / Overriding EDID information
Increasing frame rate stability
Recommended Settings
System Settings
Print the Hosts System Settings
Hyperthreading
NICs
Shared Memory
User Configuration
Compositor Settings for Desktop effects
Virus Scanner
Unity Desktop
Remote Operation
Remote Desktop with DCV
Operation with X forwarding from a Windows System
Display Settings
VTD 2.0.3+
VTD.2.0.2 and earlier
General Settings
Image Generator

Installation Procedure

Overview

The installation of a system and VTD is performed in the following steps. You will only have to follow the ones applicable to your case.

1. get the right hardware
 - follow this link: [Hardware](#)
2. install the operating system
 - follow this link: [Operating System Installation](#)
3. verify or install the accelerated graphics driver (NVIDIA)
4. download and install the VTD software in user space

- follow this link: [VTD Software Installation](#)
- 5. install the license
 - follow this link: [License Installation](#)
- 6. convert the installation to a multi-user installation
 - follow this link: [Multi-User Installation](#)
- 7. get your system settings right
 - follow this link: [Recommended Settings](#)

Hardware

In order to run the standard distribution of VTD, your hardware should at least provide the following features:

- quad core CPU
- 8GB RAM (64bit system)
- nVIDIA graphics card (the faster the better, e.g. 1080 GTX or quadro P5000 / P6000)

For a **DUAL** gfx card configuration, we use (as of March 2018, for OS OpenSUSE 42.3 and later):

```
* Motherboard:  ASUS X99-Deluxe 2011-3
* CPU:           Intel Core i7 6850K, 3.6 - 3.8GHz 15MB Cache
* Main memory:   DDR4 32GB (4x8GB) PC2400
* CPU Cooler:    Cooler SCYTHE Mugen 5 Rev. B (desktop)
                  NOCTUA NH-L12 (rack mount)
* SSD:           Samsung SSD 860 Series 256GB
* HDD:           WD Black WD1005FBYZ 1TB SATAIII 7200
* Case:          Fractal Refine R5 (desktop)
                  Chenbro RM42200 4U (rack mount)
* Graphics card: 2x Asus Geforce GTX 1080TI
* Power supply:  Seasonic Prime Platinum 850W modular
* Opt. drive:    DVR SATA ASUS_DRW-24D5MT
```

For a **SINGLE** gfx card configuration, we use (as of March 2018, for OS OpenSUSE 42.3 and later):

```
* Motherboard:  ASUS Prime Z370-A, 1151 v2, ATX
* CPU:           Core i7-8700K, 6 core, 3.6 - 4.7 GHz 12MB cache
* Main memory:   DDR4 32GB (4x8GB) PC2400
* CPU Cooler:    Cooler SCYTHE Mugen 5 Rev. B (desktop)
                  NOCTUA NH-L12 (rack mount)
* SSD:           Samsung SSD 860 Series 256GB
* HDD:           WD Black WD1005FBYZ 1TB SATAIII 7200
* Case:          Fractal Refine R5 (desktop)
                  Chenbro RM42200 4U (rack mount)
* Graphics card: Asus Geforce GTX 1080 8G-GAMING
* Power supply:  Seasonic Prime Platinum 850W modular
* Opt. drive:    DVR SATA ASUS_DRW-24D5MT
```

Note: the first three components together with the graphics card are the key elements; the other components are listed only in order to make this setup a complete workstation. The recommended configuration may change without notice!

Notebook

Running VTD on a laptop has some issues related to the graphics hardware support under Linux. Intel laptops have normally a built in graphics card and an additional NVIDIA card. On the consumer models the graphics output from the NVIDIA card is copied into the framebuffer of the Intel card. By this one loses some important functionality like the sync to the screen refresh frequency. There are techniques to get the NVIDIA card running (Bumblebee, NVIDIA-prime), but you have to be an expert and we really don't recommend this. **We will give no support to this HW configuration!**

There are laptops on the market which allow to switch off the integrated Intel card in the BIOS. By this the NVIDIA graphics output connects directly with the display and the laptop works like a normal desktop machine.

Examples are the Dell Precision Series or other vendor's "workstation laptop series".

VTD Software Installation

Repositories

VTD Base Package

VTD is delivered as a single archive file or a collection of archive files. Please refer to your individual delivery notes for details and the download address of your repository.

Pedestrian Add-On

For the repositories of DI-Guy, please see below:

Starting with VTD 2.2.0, users may choose between two solutions, **VIRES Pedestrians** and **DI-Guy Pedestrians**. Existing users who have purchased DI-Guy pedestrian licenses with a VTD license (VTD 2.1.x or earlier version), the VIREs pedestrians are available free-of-charge for the purchased license.

For new licenses, users have to choose between **VIRES Pedestrians** and **DI-Guy Pedestrians**.

For installing DI-Guy pedestrians, please download and install the corresponding archive(s) from the [DI-Guy Repositories](#)

Basic Installation / Single-User System

1. Create a target directory
2. Copy the software archive(s) into the target dir
3. Open a terminal in the target directory
4. Execute "tar -xzf <archiveName>" for each archive file
5. Remove the archive(s)
6. Create a symbolic link VTD pointing to your version of VTD (e.g. ln -s VTD.2.0 VTD)
7. Install the [license](#) (if applicable, see below)
8. Check the system installation again (unless you are sure everything is fine):
 1. Go to the directory VTD/Runtime/Tools/Installation
 2. run the script checkLibs.sh in a shell (e.g. ./checkLibs.sh)
 3. install any missing dependencies
9. If applicable: proceed with the installation of the pedestrian package: [Pedestrian Package](#)
10. If applicable: proceed with the installation of the multi-user environment: [Multi-User Installation](#)

11. Verify that your installation is working: [Verifying the Installation](#)

Multi-User Installation

If VTD shall be used by various users on a single computer, we recommend to install the binaries and basic data at a common location and only place user-specific data (Setups, Projects) in the respective user's directories.

Here's a quick guide to achieve this (note: this installation should be performed by a user with root privileges)

VTD 2.x, new installation

1. Assumptions
 - you have **not** installed a multi-user environment before
 - you have root privileges
2. Preparation
 1. make sure you have a backup of your existing installation
 2. follow the first eight steps of the [Basic Installation Instructions](#)
 3. Installation Script
 1. download the script for your VTD version:
 1. *VTD.2.2*: [instMultiUser.2.2.sh](#)
 2. *VTD.2.1*: [instMultiUser.2.1.sh](#)
 3. *VTD.2.0*: [instMultiUser.sh](#)
 2. copy the script to your target directory (see above)
 3. make sure the script is executable
3. Execution
 1. execute the script as follows:
 1. *VTD.2.2*: `sudo ./instMultiUser.2.2.sh -r VTD.2.2`
 2. *VTD.2.1*: `sudo ./instMultiUser.2.1.sh -r VTD.2.1`
 3. *VTD.2.0*: `sudo ./instMultiUser.sh -r VTD.2.0`
 2. follow the instructions
4. Result
 1. VTD core components will be installed at
 - `/var/VIRES/VTD.2.x`
 - `/opt/VIRES/VTD.2.x`
 2. user-specific components will reside in the target directory specified by the user

VTD 1.4.x

The instructions for 1.4.x are identical to the ones for 2.0+ (see above and put 1.4 instead of 2.0) but you should use the script [instMultiUser.1.4.sh](#)

Note: if you want to use multiple versions of VTD in parallel, then link to the respective sub-directories from your user's account.

Verifying the Installation

Check whether VTD is running correctly:

- VTD.2.x:
 1. Go to the directory VTD
 2. Start VTD (execute `bin/vtdStart.sh`)
 3. In the GUI, select "Apply" (green check mark in top area)
 4. When components are up, press the "PLAY" button (note: depending on the configuration, the IG may restart)
- VTD.1.x:
 1. Go to the directory `VTD/Data/Setups/Current/Bin`
 2. Start VTD (execute `./startGui.sh`)
 3. In the GUI, select "Components->Load Components"
 4. When components are up, press the "PLAY" button (note: depending on the configuration, the IG may restart)

Operating System

General

VIRES develops software under *OpenSuSE* and tests under *Ubuntu* and *OpenSuSE*.

Legacy Systems:

VTD is 64bit only. For 32bit compatibility libraries, the following remarks apply:

- VTD 2.0+: 64bit only; **no 32bit libraries** are required for new system installations
- VTD 1.4.x: except for the Image Generator *vIG*, all components of VTD are compiled on 32bit computers; therefore, you will have to install various 32bit libraries even on a 64bit system

End-of-Life Systems:

- Versions prior to VTD 1.4.2 are no longer supported
- VTD 2.2.0 is the last version running under RedHat 6.x

Network Configuration

Host Registration

In order for VTD to work correctly in terms of network communication, please make sure that your system has a valid **hostname** and a valid **host address**. If you are not connected to any network, please set a static address for your system. You may also just edit the file `/etc/hosts` and add the entry

```
127.0.0.2 nameOfYourHost
```

Don't forget to replace *nameOfYourHost* with the name that you can retrieve by executing the command *hostname* in a shell.

Interface Labeling

Preface: if the Ethernet device for which your VTD or DI-Guy versions are licensed is labeled *eth0* you may skip this chapter.

With newer versions of the operating systems listed here, the naming convention for the Ethernet interfaces has changed. Whereas in previous versions you would find *eth0*, *eth1* etc. you may nowadays find more cryptic names. This implies the following:

- VTD
 - VTD 2.2+ is agnostic to the name of the Ethernet device (exceptions for DI-Guy apply, see below)
 - VTD 2.1 and earlier: either rename the Ethernet device for which the license file has been issued to *eth0* or set the environment variable

VI_LIC_DEVICE to the name of your device. See also [here](#).

- DI-Guy 13.x and earlier (i.e. up to and including VTD 2.2):
 - it is **mandatory** that the Ethernet device for which the license file has been issued be called **eth0**.

Supported Systems

The following systems are officially supported by VIREs:

- VTD 2.2
 - openSuSE 42.3, 64bit
 - openSuSE 13.2, 64bit
 - Kubuntu 18.04, 64bit
 - Kubuntu 16.04, 64bit
 - Kubuntu 14.04, 64bit
- VTD 2.1
 - openSuSE 42.3, 64bit
 - openSuSE 13.2, 64bit
 - Kubuntu 14.04, 64bit
 - Kubuntu 16.04, 64bit
- VTD 2.0
 - openSuSE 42.3, 64bit
 - openSuSE 13.2, 64bit
 - openSuSE 13.1, 64bit
 - Kubuntu 14.04, 64bit
- VTD 1.4.3
 - openSuSE 13.2, 64bit
 - openSuSE 13.1, 64bit
- VTD 1.4.2 and earlier: no longer supported

Installation Procedure

Operating System - OpenSuSE

When installing a new system, we recommend to follow our established procedure:

1. boot from the DVD and select "Installation of the 64-bit image".
2. select KDE (gnome might work but has not been tested)
3. enable the ssh services
4. disable the firewall or allow UDP communication
5. keep the standard SW selections and add the selections:
 1. Console Tools
 2. FileServer
 3. Network Administration
 4. Base Development
 5. KDE Development
 6. C/C++ Development
 7. Linux Kernel Development
6. add the packages (select "search")
 1. xosview
 2. MesaGLw
 3. MesaGLw-devel
 4. libpng12-0
 5. xterm
 6. qt3
 7. liblirc
 8. tcsh (only for VTD 2.0.2 and lower)
 9. xorg-x11-fonts
7. for VTD 1.4.x you will also have to install the following 32bit components:
 1. 32-bit Runtime Environment
 2. MesaGLw-32bit
 3. libpng12-0-32bit
 4. qt3-32bit (on 64bit systems)
 5. xterm
 6. libGLw.so.1, 32bit (for ROD only)
 7. libqt4-X11-32bit
 8. libusb-0_1-4-32bit
8. select *install*
9. perform an online update
10. reboot!!!
11. install the graphics driver
 1. use graphics driver installation from YaST **OR**
 2. install the driver manually (if e.g. installation via YaST fails)
 1. Download the NVIDIA driver from <http://www.nvidia.com>
 1. Select your card and OS
 2. When you come to the button ACCEPT AND DOWNLOAD do a right click and use "save link as" to store the file.
 2. Login as root
 3. Modify the boot menu.
 1. Edit */boot/grub/menu.lst*
 2. Add to the first boot entry the string *nouveau.modeset=0* in the line:
kernel /boot/vmlinuz.....quiet nouveau.modeset=0 showopts...
 4. Perform an *init 3*
 5. login to the console and go to the directory where you've stored the driver.
 6. call *sh NVIDIA-Linux-x86-xxxxxx.run* (replace with the name of the file that you downloaded) answer the questions with yes and the installation routine says that the nouveau driver is installed and it will automatically disable it.
 7. Perform a reboot again and when you see the boot menu enter 3 in the command line. This will boot up to runlevel 3 and you can directly login to the console as root again.
 8. Call the driver installation again and answer with yes, when the installation asks for modifying xorg.conf.
 9. When finished do an *init 5* and you should have a perfectly installed system.

Operating System (Kubuntu 18.04 LTS - 64bit)

A) Get the package

- Download from <http://www.kubuntu.org/getkubuntu> (64bit Version)

B) Basic Installation

- install kubuntu with language English and local Keyboard

C) Extensions

- VTD.2.x:
 - sudo apt-get install xterm freeglut3 openssh-server synaptic nfs-common mesa-utils xfonts-75dpi libusb-0.1-4 libpng12
 - sudo apt-get update
- Since libpng12 is no longer available in the Ubuntu repository archives, here is the workaround to get it for Ubuntu 18.04
- You need to download the libpng12-0 package for your system.
<https://packages.ubuntu.com/xenial/amd64/libpng12-0/download>
- VTD 2.0.x (up to 2.0.2)
 - sudo apt-get install tcsh
- VTD 1.4.x
 - sudo apt-get install tcsh xterm freeglut3 openssh-server synaptic nfs-common mesa-utils xfonts-75dpi
 - sudo dpkg --add-architecture i386
 - sudo apt-get update
 - sudo apt-get install libc6:i386
 - sudo apt-get install libncurses5:i386
 - sudo apt-get install libstdc++6:i386
 - sudo apt-get install libsm6:i386
 - sudo apt-get install libxrender1:i386
 - sudo apt-get install libfontconfig1:i386
 - sudo apt-get install libxext6:i386
 - sudo apt-get install libglu1-mesa:i386
 - sudo apt-get install libusb-0.1-4:i386
 - sudo apt-get install libxi6:i386
 - sudo apt-get install libxrandr2:i386
 - sudo apt-get install libxcursor1:i386
 - sudo apt-get install libxft2:i386
 - sudo apt-get install libsm6:i386
 - sudo apt-get install libXinerama1:386

D) Graphics Driver

Standard Method

- download the graphics from the NVIDIA website
 - it is assumed that the download is stored in Downloads/NVIDIA-Linux-x86_64-aaa.bbb.run
- install the driver
 - sudo /etc/init.d/lightdm stop
 - sh Downloads/NVIDIA-Linux-x86_64-aaa.bbb.run
 - follow instructions of driver installation package
 - sudo /etc/init.d/lightdm start

Alternative Method:

The following method has been tested by one of our users. We put it here for reference without explicit endorsement. It may help if you experience trouble when trying to get rid of the default *nouveau* driver.

- sudo nano /etc/default/grub
- add nomodeset into GRUB_CMDLINE_LINUX="quiet splash nomodeset"
- sudo update-grub
- restart.
- Install Nvidia graphic driver
 - sudo sh Nvidia*.run
 - sudo /etc/init.d/kdm stop (or start)

Note: For Ubuntu, the final call would be sudo /etc/init.d/lightdm stop (or start)

F) Font Installation

The RoadDesigner ROD requires 75dpi fonts (we are working on getting rid of them). After the NVIDIA driver has been installed, you may have to explicitly enable the fonts in your X-Server configuration:

- Edit /etc/X11/xorg.conf and add a FontPath entry in the section "Files":

```
Section "Files"
FontPath "/usr/share/fonts/X11/75dpi"
EndSection
```

- In case you do not have an xorg.conf file, the following command may also help:

```
xset +fp /usr/share/fonts/X11/75dpi
```

- Restart the X-Server after the above changes or reboot the system

G) Finalize OS installation

- call the systemsettings from the KDE startmenu and switch off the desktop effects.

H) Environment Variables

The environment variable handling has changed with Ubuntu 14.04. This may cause problems with the interpretation of environment settings in the GUI. Therefore, please make sure you set the variable

```
setenv LC_NUMERIC C
```

in the VTD context or in your user's default settings.

Operating System (Kubuntu 16.04 LTS - 64bit)

Kubuntu 16.04 has been used since VTD 2.1.x and is officially supported starting with VTD 2.2.x. We recommend using the newer system 18.04 LTS though. When operating VTD 2.1.x with Kubuntu 16.04, some issues came up.

ROD with KDE Plasma 5

You have to disable VSYNC. So, one solution is to call ROD in the following way:

```
vb1ank_mode=0 ./ROD
```

GNOME 3

GUI elements (VtGui, ROD) will be screwed up. You may fix this by editing

```
~/config/Trolltech.conf
```

and adding the following lines in this file

```
[Qt]
style=Platinum
```

Unity Desktop - Tool Tip Visibility

Tool tips may disappear in certain configurations of the desktop (see ticket [#6737](#)). Here's a workaround:

- Start Qt 4 Settings using qtconfig-qt4
- In the Appearance tab of the Qt Configuration application, locate the "Select GUI Style" menu and choose e.g. the "Plastique" option.
 - This is a workaround to prevent errors in VTD of the following kind later on "[...]: GdkPixbuf-CRITICAL **: gdk_pixbuf [...] (pixbuf)' failed"
- In case tooltips are not shown properly after VTD-installation do the following: Click on the "Tune Palette..." button and choose "ToolTipText" from the dropdown in "Central color roles". Afterwards set the color in "Select Color" to black. Confirm and save everything.

Virtual Machine under Windows 64bit

VTD may also run on Windows operating systems using a virtual machine. Depending on your graphics hardware, it may also show decent performance (e.g. 25Hz in full color / texture on a Dell Precision M4800 notebook).

Ready-to-go OpenSUSE Installation

We have a ready-to-go virtual machine with an OpenSUSE 13.2 installation including VTD available for download. It can be imported into Oracle's Virtual Box and will give you instantaneous access to a running VTD installation. Please contact us for access to the download portal.

Custom Installation, Ubuntu 12.04

Here's a complete installation description for a virtual machine using Ubuntu 12.04 LTS:

- Prerequisites: powerful PC with Nvidia card and Nvidia driver
- Download and install Virtualbox from the Oracle website
 - Create new machine
 - set Memorysize to 4GB
 - create harddisk (VDI, dynamic, 12GB)
 - modify Settings/System/Processor to >= 2
 - modify Settings/Display/Graphicsmemory to 128MB and enable 3d acceleration
 - modify Settings/Network/Adapter1 (bridged mode)
- Install Ubuntu 12.04 from downloaded image in the virtual machine
 - boot from disk
 - select English language module and press "Install Ubuntu"
 - press continue without selecting "download updates"
 - select "Erase disk and install Ubuntu" and press continue
 - press "Install Now"
 - select timezone and press continue
 - select keyboard and press continue
 - enter user data, computername, select autologin and press continue
 - press "Restart Now", remove the DVD and press Enter
- Ubuntu starts and shows the desktop
 - press Ctrl-Alt-t to open a terminal
 - for VTD.2.x
 - enter "sudo apt-get install synaptic openssh-server freeglut3 libgl1-mesa-dri virtualbox-guest-additions mesa-utils"
 - for VTD.2.0.x (up to 2.0.2)
 - enter also "sudo apt-get install tcsh"
 - for VTD.1.4.x
 - enter "sudo apt-get install synaptic tcsh ia32-libs ia32-libs-multiarch openssh-server freeglut3 libgl1-mesa-dri virtualbox-guest-additions mesa-utils"
 - accept the changes made by the installer
 - logout and select Ubuntu2D as desktop before you login again
 - reboot the machine
- Install VTD and run it
 - press Ctrl-Alt-t to open a terminal
 - check whether accelerated graphics are active (glxinfo | grep "glx version string") - the version must be "1.3 Chromium"
 - install VTD and set link (ln -s VTD.1.4 VTD)
 - install libqt-mt.so.3 from addon package
 - open VTD/Data/Setups/Common/Scripts/configureDisplay.sh
 - add the <Graphics> tag following attribute: threadingModel="SingleThreaded"
 - modify within the <Graphics> tag following attribute: isLocalLightingEnabled="0"
 - startGui and press Init
 - Restart components
 - VTD should run (Update rate depends on number of CPUs)

For **ROD** it will be necessary to use software rendering, otherwise the editor windows will flicker. Please perform the following steps:

- Go to Runtime/Tools/ROD
- Rename ROD into ROD.bin
- Add the following script to the directory and name it ROD

```
#!/bin/bash
export LIBGL_ALWAYS_SOFTWARE=1
./ROD.bin $*
```

If you want to use tcsh instead of bash, the script will be

```
#!/bin/tcsh
setenv LIBGL_ALWAYS_SOFTWARE 1
./ROD.bin $*
```

- Make sure the script is executable (set the permissions if necessary)
- That's it!

Material System Issues (VTD 2.0.1+)

Depending on driver support for your virtual machine, you may see a black road surface in your IG output window. This may be overcome by disabling some material assignments within VTD. Please copy the following two files to your current setup (VTD.2.0/Data/Setups/Current/Config/ImageGenerator). The road surfaces and some other surfaces should appear in a more natural way then - but not as nice as on a native system, of course.

[MaterialsHCS_VM.xml](#)
[AutoCfg.xml](#)

Video Generation

For video generation via VTD you may also have to install the *menocoder* package and depending packages

Firewall

VTD may use UDP ports. Therefore, please open the firewall for this sort of communication or disable it completely. If are not using UDP ports within VTD, then the firewall may remain closed.

Trouble-shooting the boot loader

The following problem occurred only once in a single system but fixing it took some time. Therefore, here are some hints.

Problem: System refuses to boot and shows the message

```
Reboot and Select proper Boot device
or Insert Boot Media in selected Boot device and press a key
```

Board: GIGABYTE x79-up4

Hard Disk: SAMSUNG 840, SSD, 128 GB

Partition Table:

```
#fdisk -l
/dev/sda1 156M Microsoft basic data
/dev/sda2 2G Linux swap
/dev/sda3 117.1G Microsoft basic data
```

Analysis: BIOS does not find EFI boot entries on first partition of the hard disk (no reason could be determined how it got into this situation).

How to fix it:

1. Boot rescue system from DVD in **EFI** mode (the mode is very important!)
2. login as root
3. execute `efibootmgr -c -d /dev/sda -p 1 -l \\EFI\\opensuse\\grubx64.efi -L opensuse`
4. reboot
5. be happy!

Note: after the login I also executed `"mount /dev/sda3 /mnt"` and `"mount --bind /dev /mnt/dev"` but this may not actually be required.

Other Packages

License

Depending on your distribution, the licensing may be handled in various ways.

Bulk License

Please contact us directly.

License File (node-locked)

If you have received a license file for your node,

1. Perform the [Basic Installation](#)
2. Perform the following steps according to the version of your software

Version VTD 2.0.3 and later

New: With VTD 2.0.3, we introduced two major improvements:

- the license mechanism will try to identify automatically the device for which the license file has been issued (i.e. it will try to locate the one with the matching MAC address). If you want the license mechanism to use a specific device (**or** if your device is **NOT** connected to the network and has **no** static address assigned), then set the environment variable **VI_LIC_DEVICE** as explained in the following chapter. Otherwise just make sure it is not set.
- the license file has to be installed only once at a central location instead of various locations

Here's what you have to do

1. Copy your license file to VTD/bin
2. Open a terminal in this directory
3. Either re-name the license file into `license.dat` or set a symbolic link on it (`ln -s license.aabbccddeeff.dat license.dat`)
4. Open the file `vtdStart.sh`
5. Add a line `export VI_LIC_DEVICE=name_of_your_device` (replace `name_of_your_device` with the actual name, e.g. `enp0s3`)
6. Save the file
7. Start VTD (as shown in the [Basic Installation Instructions](#))

Version VTD 2.0.2 and earlier

1. Copy your license file to VTD/Data/Setups/Current/Bin (note: if you activate a different setup, the file also has to be there)
2. Open a terminal in this directory
3. Either re-name the license file into `license.dat` or set a symbolic link on it (`ln -s license.aabbccddeeff.dat license.dat`)
4. For ROD, copy the license file to Runtime/Tools/ROD and make sure, its name is also `license.dat` or it is linked to this name
5. Start VTD (as shown in the [Basic Installation Instructions](#))

Per default, the license mechanism will look for the MAC address of your device **eth0**; if you want it to look for another device or if your primary Ethernet device is named different, then please do the following:

VTD.2.x:

1. Retrieve the name of the Ethernet device for which you have received the license file (in a shell, type `/sbin/ifconfig` and check the output)
2. Open the file `Data/Setups/Current/Config/SimServer/simServer.xml`
3. Add an environment variable: `<EnvVar name="VI_LIC_DEVICE" val="ed8sf0" />` (replace `ed8sf0` with the name of your device)

VTD.1.4.x:

1. Retrieve the name of the Ethernet device for which you have received the license file (in a shell, type `/sbin/ifconfig` and check the output)
2. Open the file `Data/Setups/Current/Config/Simulation/envSettings.cfg`
3. Add an entry specifying your device: `setenv VI_LIC_DEVICE ed8sf0` (replace `ed8sf0` with the name of your device)

NOTE: you may change the default location of the license file, so that you become independent of copying it to the current setup. Just set the environment variable **VI_LIC_FILE** to your license file's location (e.g. `/var/VIRES/VTD/license.dat`).

ANOTHER NOTE: usually, ROD is started via the VTD GUI and if you follow the previous instructions, everything will be fine. In the exceptional case that you want to start ROD directly from within its installation directory **AND** your Ethernet device's name whose MAC address has been used for the license key is different from `eth0`, then perform the following steps:

1. Go to Runtime/Tools/ROD
2. Create a text file named `startROD.sh`
3. Copy the following lines into this file (replace `ed8sf0` with the name of your device)

```
#!/bin/bash
export VI_LIC_DEVICE=ed8sf0
./ROD
```

4. Make the script executable: `chmod a+x startROD.sh`
5. Start ROD by typing in the shell: `./startROD.sh`
6. That should be it!

License Server (node-locked and floating)

The license server must be installed for

- network licenses
 - the server will run on a remote machine for which you have either received a license file or a dongle
 - make sure that your firewall does not prevent the license server from establishing TCP connections.
 - on the client side, either set the variable "VI_LIC_SERVER" to the name of the license server or set the variable "VI_LIC_SERVER_ADDRESS" to its IPv4 address (this may be done as a global variable in your environment or in `Data/Setups/Current/Config/SimServer/simServer.xml` as an explicit `<EnvVar .../>` assignment.
 - Examples:

```
<EnvVar name="VI_LIC_SERVER" val="knut" />
```

```
<EnvVar name="VI_LIC_SERVER_ADDRESS" val="192.168.100.110" />
```

- the default port for communication between the license server and a client is **51235**
- starting with VTD 2.1, a custom port may be specified on the server and client side by setting the environment variable `VI_LIC_SERVER_PORT` accordingly.
- use of a dongles on a local machine
 - the license server must run on the machine where you wish to use VTD in connection with a dongle

Network license with license file

- extract the package for the license server that you have received (it may also be part of your VTD distribution)
 1. Become *root* user
 2. Go to the directory `VTD/Runtime/Tools/LicServer`
 3. copy *viLicServer* to the location where you wish to install the license server
 4. copy the license file to the same location and rename it as *license.dat*
 5. start `./viLicServer` in this directory
 1. HINT: on some systems using "sudo nohup ./viLicServer &" has also done this job
 6. the license server is up and running
 7. additional step (perform as necessary)
 1. install as daemon as required by your system (we may provide scripts for this)

Important Note: the license server must be run with root permissions!

If you're using our license server scripts located in `/etc/init.d` and `/etc/sysconfig`, you have to set the path to the license file within the script `/etc/sysconfig/viLicServer`. This is done by declaring the environment variable `VI_LIC_FILE`. Example:

```
## Path:          /etc/sysconfig/viLicServer
## Description:   VIRES License Server daemon options\n
## ServiceRestart: viLicServer

:

## Type:          string
## Default:       ""
#
# Other options:
```



```
# -n
#         run as daemon
LS_OPTIONS="-n"

:

export VI_LIC_FILE=/home/marius/Xfer/license_ECF4BB2F6120_20170614_20170624.dat
```

Just replace the string /home/marius/Xfer/license_ECF4BB2F6120_20170614_20170624.dat with the full path to your license file. Then execute

```
/etc/init.d/viLicServer stop
```

followed by

```
/etc/init.d/viLicServer start
```

Network / node-locked license with dongle

For the license server installation, perform the following steps:

1. Perform the [Basic Installation Instructions](#)
2. Become *root* user
3. Go to the directory VTD/Runtime/Tools/LicServer
4. Execute ./install.sh
5. Execute chkconfig viLicServer on
6. Execute /etc/init.d/viLicServer start
7. That's it. The license server will always be started upon system start.
8. Start VTD (as shown in the [Basic Installation Instructions](#))

License on Virtual Machine

For evaluation purposes VTD is also provided as ready-to-go Virtual Machine (VM). A download link will be provided upon request. The license file of the VM tends to expire (this is by design) and the user will be requested to update the license files. Here's what you'll have to do:

1. Send us a request for a new license file via e-mail
2. You will receive a file named e.g. license_080027CC92A3_20170827_20180223.dat
3. Become root user (pw: "vtd")
4. Copy the license file to /var/opt/VIRES/VTD/license.dat
5. Make sure you are using the name "license.dat". The old file may be overwritten.
6. Have fun!

Road Designer Standalone with License Server

If you have a license server running but wish to start the Road Designer (ROD) as a standalone software from command line, please do the following.

1. Go to Runtime/Tools/ROD
2. Create a text file named startROD.sh
3. Copy the following lines into this file (replace server name or server address with the values applicable for your installation)

```
#!/bin/bash
export VI_LIC_SERVER=knut
./ROD $*
```

or

```
#!/bin/bash
export VI_LIC_SERVER_ADDRESS=192.168.100.110
./ROD $*
```

4. make the script executable
5. execute the script (./startROD.sh)

Pedestrian Package (DI-Guy)

The package for the animation of pedestrians (including bicycles, wheelchairs, animals etc.) is furnished by the 3rd party company VT-MÅK. We are providing adapted packages of their software which may be used within the VTD environment.

Note: with VTD 2.x we upgraded to DI-Guy 13. This DI-Guy version uses a new licensing mechanism so that all existing users are requested to apply for new license keys. The old ones will **not** work with DI-Guy 13. Obtaining the new keys is free of charge but may involve a tiny bit of paperwork. We will assist you in this process, so that it's typically only two e-mails going forth and back until we have finished the license migration.

Repositories

Run-time Software

For downloading the pedestrian software, please use the applicable repository in our public download area. For **node-locked** licenses, this will be all you'll have to download.

DI-Guy 13.1 for VTD 2.2+

<https://www.vires.com/vtd/3rdParty/vtd.2.2.0.addOns.DIGuy13.1.20181230.tgz>
<https://www.vires.com/vtd/3rdParty/vtd.2.2.0.addOns.DIGuy13.1.20181230.tgz.md5>

DI-Guy 13.1 for VTD 2.1+

http://www.vires.com/vtd/3rdParty/vtd.2.1.0.addOns.DIGuy13.1_part1.20170926.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.1.0.addOns.DIGuy13.1_part1.20170926.tgz.md5
http://www.vires.com/vtd/3rdParty/vtd.2.1.0.addOns.DIGuy13.1_part2.20170926.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.1.0.addOns.DIGuy13.1_part2.20170926.tgz.md5

DI-Guy 13.1 for VTD 2.0.2+

http://www.vires.com/vtd/3rdParty/vtd.2.0.2.addOns.DIGuy13.1_part1.20160517.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.0.2.addOns.DIGuy13.1_part1.20160517.tgz.md5
http://www.vires.com/vtd/3rdParty/vtd.2.0.2.addOns.DIGuy13.1_part2.20160517.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.0.2.addOns.DIGuy13.1_part2.20160517.tgz.md5

DI-Guy 13.0 for VTD 2.0.1

http://www.vires.com/vtd/3rdParty/vtd.2.0.1.addOns.DIGuy13_part1.20160216.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.0.1.addOns.DIGuy13_part1.20160216.tgz.md5
http://www.vires.com/vtd/3rdParty/vtd.2.0.1.addOns.DIGuy13_part2.20160216.tgz
http://www.vires.com/vtd/3rdParty/vtd.2.0.1.addOns.DIGuy13_part2.20160216.tgz.md5

DI-Guy 10.x for VTD 1.x

http://www.vires.com/vtd/3rdParty/DI-Guy_10.0.14_64bit_basic.tgz
http://www.vires.com/vtd/3rdParty/DI-Guy_10.0.14_64bit_basic.tgz.md5

License ServerDI-Guy 13.x:

Only if you purchased a **floating license** will it be necessary to install a DI-Guy license server on one of your machines. The license server may be obtained here:

<http://www.mak.com/support/licenses>

A copy of the user manual for the license server (as of May 1st, 2016) is also available within our wiki:

[MAKLicenseManagement.pdf](#)

Important note: The DIG 13 license server running under Linux requires the 1sb package. Make sure it is installed on your machine.

DI-Guy 10.x:

As noted, DI-Guy 10 is considered legacy. Therefore, if you need a license server for this version (Windows only!), please get in contact with us.

The following excerpt of the DI-Guy manual will guide you through the license installation process for node-locked and floating licenses:

[DI-Guy_LicInstall.pdf](#)

If you have already installed the DI-Guy software on your computer, you can access the full user manual at

/usr/local/DI-Guy_10.0.14_64bit/doc/diguy_sdk_user_guide.pdf. Please refer to pages 164ff.

Installation and Configuration

After having installed your base software of VTD, you may add the pedestrian software.

VTD 2.x and higherBasic Procedure:

1. download the DIG 13.x packages from the repositories given above
2. cd into the directory that also contains VTD.2.0 as sub-dir
3. unpack the downloaded packages
 - result: DI-Guy software resides in VTD.2.x/Runtime/AddOns/DI-Guy-13.x.0
4. install the license
 - request your individual license file from us
 - node-locked
 1. copy the license file to VTD.2.x/Runtime/AddOns/DI-Guy-13.x.0/flexlm
 - floating
 1. install the license server software as indicated above
 2. on the client side edit install a license file (same location as for node-locked license) with the following contents

```
SERVER struppi 00133B000166
USE_SERVER
```

note: in this example "struppi" is the name of the license server and "00133B000166" is its MAC address. Replace with the values applicable for your infrastructure.

Activation within VTD:

1. in each setup where you wish to use DI-Guy, do the following:
 - open Data/Setups/_nameOfSetup_/Config/SimServer/simServer.xml
 - set the DI-Guy activation variable to true:

```
<EnvVar name="HAS_DIGUY" val="true" />
```

2. That's it.

Additional tasks for VTD 2.0.1 only:

1. open Data/Setups/_nameOfSetup_/Config/SimServer/simServer.xml
 - overwrite the already existing entries with the following lines:

```
<EnvVar name="VI_ADDON_DIR" val="$VI_RUNTIME_DIR/AddOns" />
:
<EnvVar name="DIGUY" val="$VI_ADDON_DIR/DI-Guy-13.0.0" />
```

2. open Data/Setups/Common/Config/ImageGenerator/CommonIGConfig.xml
 - remove the following line:

```
<EnvVariable value="/usr/local/DI-Guy-13.0.0" var="DIGUY" />
```

VTD 1.1 to VTD 1.4.3

For VTD 1.1 to VTD 1.4.3 it is highly recommended to use DI-Guy 10.0.14. If you have a license for a previous version (i.e. DI-Guy 8 or 9) please contact VIRES to upgrade your license to this version (or go directly to DIG 13 when upgrading to VTD 2.x). On 32bit systems, DI-Guy 10.0.9 will be used but it is already contained in the package described hereafter.

Prerequisite:

In order for you DI-Guy license to work it is **mandatory** that the Ethernet device for whose MAC address you requested the license key be called **eth0**.

Please instruct your system administrator accordingly.

Basic Procedure:

1. Download the DIG 10.x package from the repository given above
2. Become *root* user of your computer
3. Go to the directory */usr/local*
4. Unpack the package that you have downloaded
5. Make sure everyone can access the new directory *DI-Guy_10.0.14_64bit* that has been created upon unpacking the package.
6. Copy your license file into the directory */usr/local/DI-Guy_10.0.14_64bit/flexlm* and make sure its name is *license.dat* (you may have to rename or link your file accordingly)
7. Leave the *root* shell

Activation within VTD:

1. In *Data/Setups/ **Common** /Config/Simulation/envSettings.cfg* make sure that the variable *DIGUY* is set to */usr/local/DI-Guy_10.0.14_64bit*
2. In *Data/Setups/ **Current** /Config/ImageGenerator/Igbase.xml* you may override the variable *DIGUY* for the IG. This should only be done if you really want to deviate from the settings in *Data/Setups/ **Common** /Config/Simulation/envSettings.cfg*. Otherwise, please do not define the variable and leave the existing configuration line commented out as it is done in the delivery of VTD. However, if you want to override the basic environment settings, then insert an entry like `<EnvVariable value="/usr/local/DI-Guy_10.0.14_64bit" var="DIGUY" />`. Having a separate definition of the *DIGUY* variable in the IG configuration is a legacy feature which may be required for some installations but should become obsolete in the future.
3. In *Data/Setups/ **Current** /Config/Simulation/envSettings.cfg* make sure that the variable *HAS_DIGUY* is set to *true*
4. That's it.

Important Note: If you install DI-Guy in a directory different from the recommended directory and if you are using VTD 1.4.2 or VTD 1.4.3, then do the following:

1. In *Data/Setups/ **Common** /Config/Simulation/envSettings.cfg* make sure that the variable *DIGUY* is set to *your_path_to_DI-Guy*
2. In *Data/Setups/ **Common** /Config/ImageGenerator/CommonIGConfig.xml* make sure that the line `<EnvVariable value="/usr/local/DI-Guy_10.0.14_64bit" var="DIGUY" />` is removed or commented out

Graphics Driver

For nVIDIA graphics cards, please install the appropriate driver. Please select the version from the instructions given below and install as indicated above.

For graphics cards other than nVIDIA cards, we do not provide detailed support. Please be advised that if you use e.g. an on-board graphics card you must also install the corresponding driver and you **MUST** refer to this driver in your XServer configuration file (usually at */etc/X11/xorg.conf*)

The following rules apply to the NVIDIA graphics driver:

- VTD 2.2.0: OptiX requires 384.98 or higher, all other applications still run with 375.39 or higher
- VTD 2.1.0: same VTD 2.0.3
- VTD 2.0.3: we tested successfully with 375.39
- VTD 2.0.1: for simulations including OptiX, please use NVIDIA driver 352.79 or higher
- VTD 1.4.3+: please use the **latest** NVIDIA driver
- VTD 1.4 to 1.4.2: NVIDIA driver **343.36** is supported (see also ticket ~~#3007~~)
- VTD 1.3.x: Version **319.72** is the latest working driver version supported by VTD; please uncheck (i.e. deactivate) the 'UseConformantTextureClamping' flag at the OpenGL section of your nvidia-settings

CUDA Issues

There have been "strange" issues with VTD 2.1.x installations on the latest graphics hardware using Ubuntu systems. We are sharing the experience and solutions here. Please contact us in case you have any problems getting the OptiX packages to run. This relates to ticket ~~#5667~~ (accessible to authorized users only)

User Report

```
We changed back to KDE Plasma.
We would like to share our experiences with our system (GTX 1080, I7 6700K, Z170 Chipset, M.2 NVMe SSD)

1) Download Cuda 8 (e.g. to a USB Stick. Installing a debian package should be preferred over installing the nvidia driver vi
2) Install Kubuntu 14.04.
3) After Installation, boot into recovery mode and install cuda from recovery mode
(our system randomly crashed when booting regularly without nvidia driver being installed.)
4) Enjoy :)
```

XServer Configuration

Multiple Graphics Cards in one PC

When running multiple graphics cards in one machine with substantially different performance requirements per output channel, the graphics cards may interfere with each other in terms of their power settings. It is good practice to set all graphics cards to maximum power and avoid the adaptive mode which is the default upon installation of the drivers. In order to force maximum power, perform the following settings in your XServer configuration file (*/etc/X11/xorg.conf*):

```
Section "Device"
    Identifier "NVIDIA GeForce"
    Driver      "nvidia"
    Option      "RegistryDwords" "PerfLevelSrc=0x3322; PowerMizerDefaultAC=0x1"
EndSection
```

Compensating wrong EDID information / Overriding EDID information

With some range extension solutions which allow connecting far distant monitors to the graphics card via RJ45 cables or via fiber-optic cables, the EDID information originally provided by the target monitor may get lost so that the driver does not offer or activate the desired display resolution. In this case, you may override the EDID settings and provide your own EDID information file. Please perform the following steps:

1. directly connect the monitor or a similar one to a machine running the Nvidia driver (i.e. not using range extenders)
2. launch the program "nvidia-settings"
3. in the tree view: select the GPU and DFP to which you have connected the monitor
4. Press the *Acquire EDID* button on the right and save the EDID file
5. Edit the file */etc/X11/xorg.conf* and modify the Device section similar to the following example (adjust for correct file path and device identifier):

```
Section "Device"
    Identifier "nVidia"
    Driver      "nvidia"
    Option      "CustomEDID" "DFP-0:/etc/X11/L2410NM-modified.edid"
```

EndSection

Now restart your XServer and everything should be fine.

Increasing frame rate stability

On some systems, depending on graphics card, driver version etc. an effect may occur which - intermittently - reduces the frame rate of the IG. It seems to be caused by an overload due to the scene content but when running along the same database section again, the effect does not occur again. In this case, please adjust your Xserver settings in order to increase IG stability:

1. Open the file `/etc/X11/xorg.conf`
2. Add the following line to the Device section:

Option "ConstantFrameRateHint" "1"

Recommended Settings

System Settings

Print the Hosts System Settings

For printing the hosts system settings you can download and execute following bash script.

<https://redmine.vires.com/attachments/download/9317/showSystemSettings.bash>

Copy the file to the host you want to check or use ssh to execute it on a remote host. After download and copying make sure it is executable. If not use that command:

```
chmod a+x ./showSystemSettings.bash
```

Hyperthreading

We highly recommend that *hyperthreading* be **disabled** on your system in order to run VTD with graphical output at maximum performance.

NICs

In order to avoid trouble with the pedestrian licenses (by 3rd party VT-MAK), we recommend that your *first Ethernet device* be called **eth0**.

Shared Memory

If you are rendering large images and transfer them to shared memory, the system's shared memory limit might not be sufficient. You may determine the current maximum shared memory size with the command

```
# cat /proc/sys/kernel/shmmax
```

The setting may be changed temporarily using

```
# sysctl -w kernel.shmmax=66123456
```

In order to permanently set the limit, add or edit the line in `/etc/sysctl.conf`

```
# echo "kernel.shmmax=66123456 >> /etc/sysctl.conf@"
```

User Configuration

When configuring your user, make sure you **disable desktop effects** since they interfere drastically with the performance of the IG. Also, they may cause tearing of the output even if you are synchronizing to the correct display.

Compositor Settings for Desktop effects

Since we do not use desktop effects, we also disable the launch of compositor settings on startup.

1. Click "Setting -> Configure Desktop" from openSUSE application launcher.
2. Click "Compositor"
3. Uncheck "Enable compositor on startup"
4. Click "Apply"
5. Restart PC

Virus Scanner

Virus scanners may interfere with the Image Generator's performance of loading databases. For reasons of liability, we will not recommend to disable your virus scanner but we highly recommend to set it up in a way that large trusted data files (e.g. `.osgb` and `.ive` files) of known origin be exempt from scanning.

So far, we have found virus scanners on Linux machines under the process names *nailsd* and *nailswebd*. If you also have these processes running on your system, please expect considerably longer database loading times.

Unity Desktop

If you tend to ignore our advice and use Unity desktop nevertheless ;-), ROD may have issues with the correct display of menus etc. In this case, please do the following:

- open the file `~/config/Trolltech.conf`
- add the following entry under the tag `[Qt]`

```
[Qt]
style=Plastique
```

Remote Operation

For remote operation, there are two general options:

- remote desktop operation
 - here you completely **operate** the software **on the remote machine** and you are just forwarding the desktop contents to your local screen, i.e. you just see the screen of the remote machine
- remote operation with X forwarding

- here you **run** the software **on the remote machine** and the contents are run on your local desktop, i.e. all **output windows** are running **on your local machine**

For the former, you will need remote desktop capability on your host system. This may be, for example, "DCV" - as a commercial option - or "anydesk" - as an open solution. We don't have a clear preference, so whatever works best for you should be fine.

Remote Desktop with DCV

When using the "DCV" virtualization environment, make sure you set the following environment variable:

```
export RVN_SKIP_DOUBLE_SWAP=1
```

Otherwise, ROD will get stuck or show flickering.

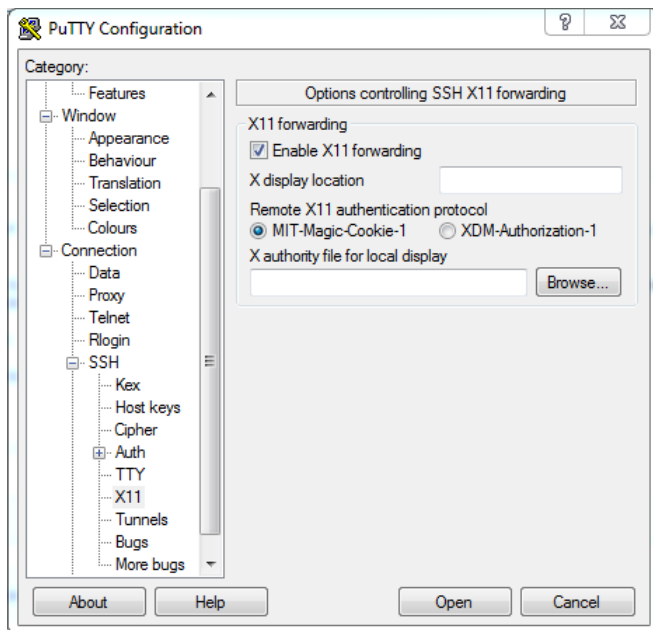
Operation with X forwarding from a Windows System

We have given this a try and succeeded with the following configuration.

On your Windows machine, install:

- SSH client
 - PuTTY
- XServer
 - Xming (note: it comes as a free and as a commercial version)
 - or VcXsrv (<https://sourceforge.net/projects/vcxsrv/>)

In the PuTTY configuration, enable X-forwarding.



For running VTD, do the following:

- start Xming
- start PuTTY
- log into your remote system
- go to the VTD directory
- execute "bin/vtdStart.sh"
- now you should see the GUI coming up
- press APPLY
- the IG will be started on your local machine after you pressed INIT since the display first has to be set correctly

That's it!

Display Settings

VTD 2.0.3+

Unless you are re-using a setup from a previous version, the display settings will be derived from your system environment's DISPLAY variable. If you want to apply different settings, please see the instructions in the next chapter.

VTD.2.0.2 and earlier

General Settings

The DISPLAY variable is set in Data/Setups/Current/Config/SimServer/simServer.xml. Either remove it here completely, so that the system's settings will be used or set it to whatever value is applicable to your purpose

Image Generator

Unless you have a custom configuration, the image generator will derive the display settings from the file Data/Setups/Current/Config/ImageGenerator/AutoCfgDisplay.xml. Here, look for the variables *displayNum* and *screenNum* and set them appropriately.

Note: the image generator's config file is created by a script, so if you have auto-configuration of the IG enabled, you will need to change the script instead of the config file. Please perform the following steps:

- create a directory Data/Setups/Current/Scripts
- copy the file Data/Setups/Common/Scripts/configureDisplay.sh to the newly created directory

- edit the new copy and set *displayNum* and *screenNum* accordingly
- next time you load and INIT the simulation, the new settings will be written to `Data/Setups/Current/Config/ImageGenerator/AutoCfgDisplay.xml`

[instMultiUser.1.4.sh](#) (6.72 KB) Marius Dupuis, 28.02.2016 07:25
[MaterialsHCS_VM.xml](#) (1.36 KB) Marius Dupuis, 01.03.2016 19:05
[AutoCfg.xml](#) (684 Bytes) Marius Dupuis, 01.03.2016 19:06
[MAKLicenseManagement.pdf](#) (379 KB) Marius Dupuis, 01.05.2016 07:48
[instMultiUser.2.1.sh](#) (6.72 KB) Stefan Fink, 26.09.2018 16:22
[putty.png](#) (22.9 KB) Marius Dupuis, 10.10.2018 14:59
[instMultiUser.2.2.sh](#) (6.72 KB) Marius Dupuis, 31.12.2018 09:17