CTRL: Desktop Visualization

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EGO European Gravitational Observatory

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Advance Virgo requires new control workstations with high performance and new use cases

New technologies show us how to simplify things, increasing the benefits and reducing the costs.

CTRL: Desktop Visualization

SUMMARY

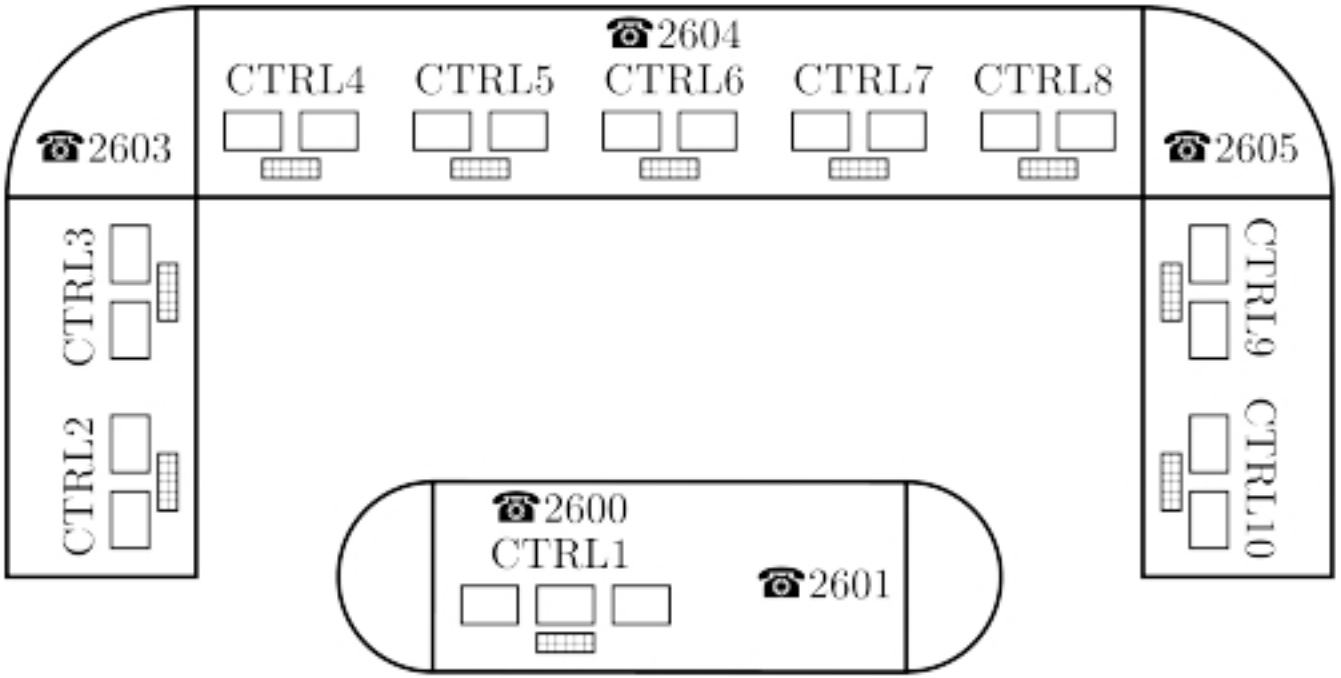
- Requirements
- Approaches
- Software
- Hardware
- Benefits
- Realization Plan

Requirements

DAQ and Commisioning requirements speak about CTRLs with these characteristics:

CTRL: Control Room

Overall layout



Requirements

• The operator workstation will have the most stringent requirements. It should have enough computing power to have simultaneously opened several tens of dataDisplays and other interfaces to monitor and control the interferometer. It should have extended amount of screen space, either 4 standard screens, or 2 ultra-wide screens.
It should be 'highly reliable' (better than 99.9% uptime??) because relaunching and reconfiguring the full set of running programs in case of a crash/reboot might take lot of time.

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• The 5 central workstations will probably be the main machines being used by people actively working with the interferometer. These should be 'powerful' machines, which should for example be able to simultaneously run a handful of dataDisplays, a heavy Matlab session, a browser and be able to smoothly play a video, without any problems. Two screens are needed per workstation.

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• The 4 workstations on the side might be 'standard grade', i.e. good enough to use for standard desktop work, prepare for shift work, do off-line analysis, run 1 or 2 dataDisplays. Two screens per workstation.

Requirements

• Spread around the experimental buildings will be a number of workstations (2x laserlab, 2x detection lab, 1xDAQ room, 1x TCS room, 1xEE room, 2x end-buildings, 1x MC building, ...).
These are typical used to observe a limited number of signals from the interferometer, e.g. for aligning an optical beam on a bench. These could be 'standard grade' computers. One screen should be enough in standard condition, but it might be good if a second screen can temporarily be added during periods of intensive activity in a lab. At least for the laser lab, it should be considered to keep one workstation movable, for example using a laptop on a cart.

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• It should be possible to monitor most of the interferometer from the office or from home, so that on-call people can investigate a problem from remote, before deciding to come to the site.
Some additional latency is unavoidable, but they should remain usable.

Requirements

• the ctrl machines should have multiple sessions in order to limit the amount of data in the network, sent from the DAQ machines to the ctrl machines.
The number of desktops in the control room should be 10 as it used to be in Virgo.
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In conclusion, ~ 5 ctrl machines with 8 cores, 50 GB to 100 GB memory and at least four graphical outputs are needed.

Requirements

We are speaking of ~6 class-server and ~20 PC-grade machines

Spread around the experimental buildings

Powerful, with ~8 cores and 50GB to 100GB of Ram

Able to be connected up to 4 screens

Approaches

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We need:

- Software technology
- Physical client device

Software

There are a lot of desktop visualization softwares, both commercial and free.

We tryed two of them:

- **Google NeatX (similar to the commercial NX Server of NoMachine)**
- **Cendio ThinLinc**

Software: NeatX

History

Neatx was developed by Google for an internal project. That project is now finished, and the source was released for the community to use/develop/benefit from. There is no active development at this time.

The lastest release is in 2009.

Software: NeatX

What Works

- ✓ Session creation
- ✓ Session suspension
- ✓ Session resumption
- ✓ Session shutdown
- ✓ Gnome/KDE/Application/Console sessions
- ✓ Floating Window/Virtual Desktop sessions
- ✓ Fullscreen/Resolution/Keyboard preferences
- ✓ Session shadowing (though only sessions belonging to you)

What Doesn't Work

- ✓ Terminating a session from the session list
- ✓ Windows/VNC sessions
- ✓ Sound, printer tunneling, Samba tunneling
- ✓ Local session sharing
- ✓ Load balancing

Software: ThinLinc

What's Cendio ThinLinc

ThinLinc Linux Remote Desktop Server is a product which enables applications and/or desktops to be deployed, managed, supported and executed from a central server. Users connect remotely using the ThinLinc client, and have their desktops and applications published as if they were being run locally.

Data, desktops and applications reside on a few central servers rather than on hundred or thousands of PCs. PCs can be replaced by simpler, less expensive and most importantly easier to manage devices. This simplifies hardware and software upgrades, desktop and application deployment, technical support, data storage and backup in a large, or even moderately sized organization.

Software: ThinLinc

What Works

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- ✓ Session resumption
- ✓ Session shutdown
- ✓ Gnome/KDE/Application/Console sessions
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- ✓ Fullscreen/Resolution/Keyboard preferences
- ✓ Session shadowing from any/selected user
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What Doesn't Work

- ✓ ICEwm Sessions

Software: ThinLinc

Protocols

ThinLinc uses SSH for transport encryption and authentication, and VNC for graphics, keyboard and mouse. Access to client devices is provided through different open protocols such as PulseAudio for sound (playback and recording), NFS for file system access (using a user space NFS server), andTelnet/RFC2217 for serial port access. Access to a client side Smart Cards is provided via the PC/SCinterface using a proprietary protocol

Software: ThinLinc

High Performance Graphics

Starting with version 3.0.0, JPEG compression and decompression has been accelerated using the SIMD extensions present in modern CPUs. Given a reasonable fast server, client, and network, it is possible to play back motion graphics in full screen mode. This can be done without any client side video decoder software or specialized handling of video. These performance enhancements also means that ThinLinc works very well in conjunction with the VirtualGL software, which provides hardware accelerated OpenGL on the server side. This allows 3D applications such as Google Earth to run with good performance. For example the National Supercomputer Centre in Sweden (NSC) is using ThinLinc to run applications in their cluster remotely.

Software: The choice

For what we need to do the best choice is Cendio ThinLinc.

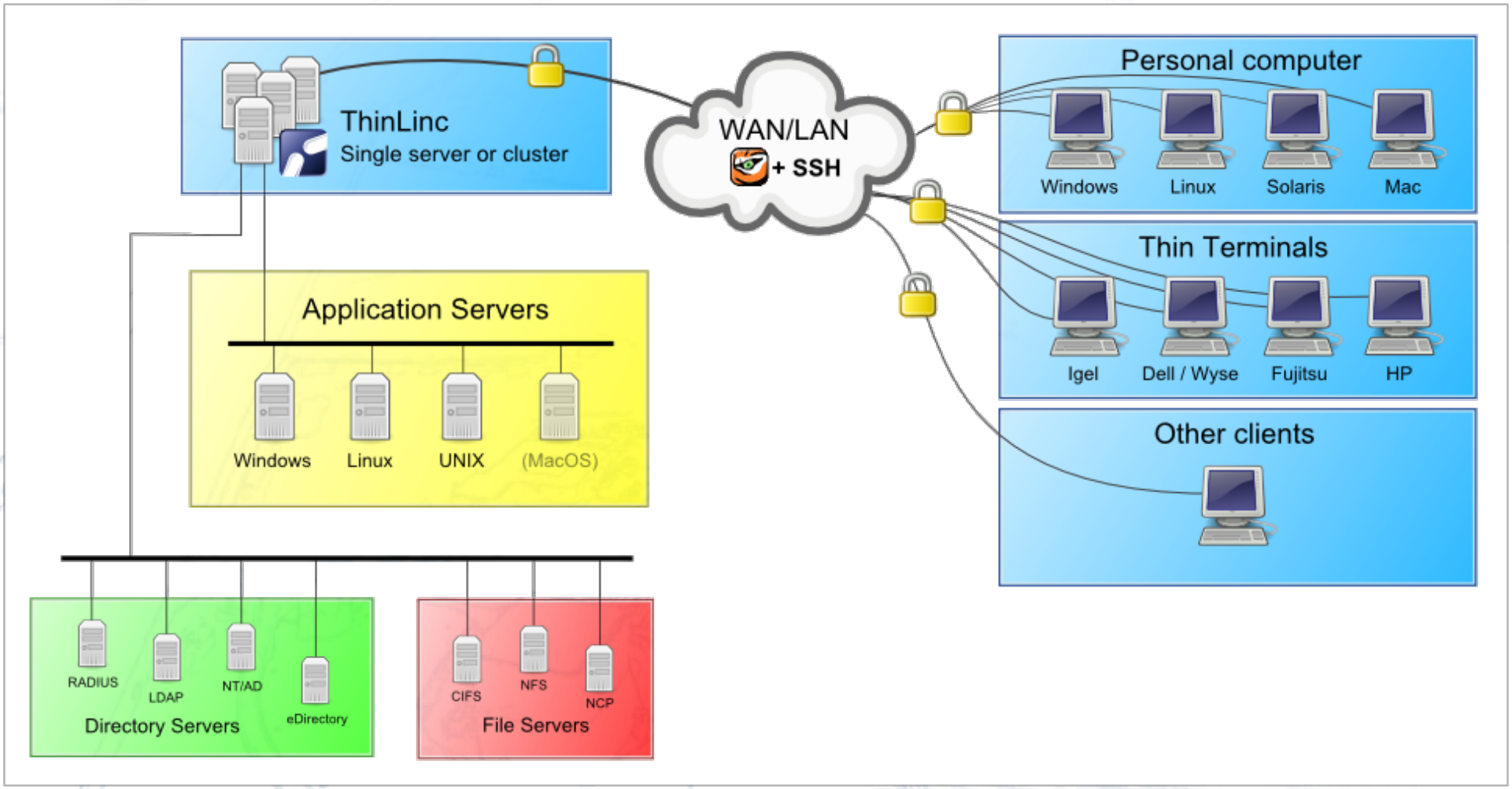
It offers features that others haven't as shadowing (interactive/ passive) a session from another client or load balancing and so on.

Cendio ThinLinc server is free for max 10 connections per server.

The latest release is april 2014. (actually release 4.1.1)

Software client are developed for Windows, Mac OS X, Linux

Software: ThinLinc Schema



Hardware

Starting from the devices suggested by Cendio we investigated some of them:

- HP t510
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- IGEL D5 and D3

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They need proprietary software to deploy thin client configurations.

Management software are not included in the costs.

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We decide to concentrate on the IGEL solution

Hardware

IGEL UNIVERSAL DESKTOP IGEL ZERO

PROFILE

Our affordable, compact, versatile mid-range hardware platform. The IZ3/UD3 series is available with an optional integrated smartcard reader and a connectivity foot that offers two additional serial ports for legacy peripherals and wireless network connectivity or an anti-theft USB port.

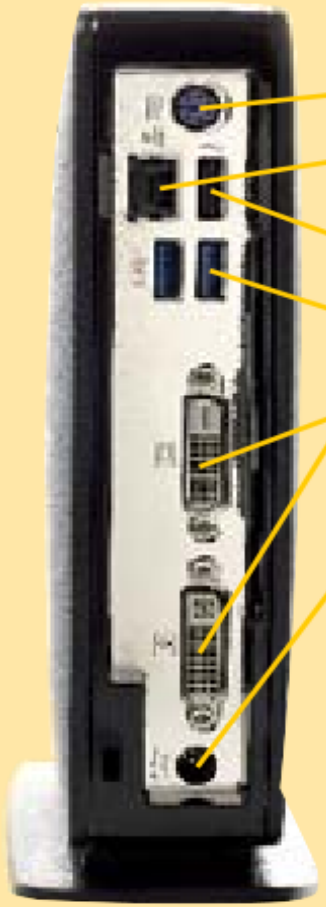
FEATURES AND BENEFITS

- **Affordable**
  A low price and high energy efficiency guarantee low TCOs and a fast ROI.
- **Dualview support**
  Dual DVI Port allows users to operate two digital monitors simultaneously. The DVI-I and DVI-D port allow one digital and one analog monitor to be connected via adapter.
- **Integrated smartcard reader** (optional)
  Excellent for highly secure two factor authentication and fast login.
- **Connectivity foot** (optional)
  The unit can be enhanced with two additional serial ports and wireless network connectivity or an anti-theft USB port. Compatible with VESA mount.
- **VESA mountable** (optional)
  Mountable on the back of a monitor with the optional VESA bracket, ideal for space constraint environments.
- **No moving parts, e.g. cooling fans**
  The absence of moving parts means the devices are almost noiseless and fail-safe with minimal heat generation.
- **FREE** Evaluation unit: **www.igel.com/evaluation**

Hardware

PERIPHERAL INTERFACES

Connectivity foot:
Optional connectivity for two serial ports and wireless networking or an anti-theft USB port.



PS/2-Keyboard
RJ45 Ethernet
1 x USB 2.0
2 x USB 3.0
DVI-I / DVI-D
Power

Front:
USB 2.0, Line-out and Mic-in

Hardware: Servers

The solution designed is very flexible.

Servers can run on:

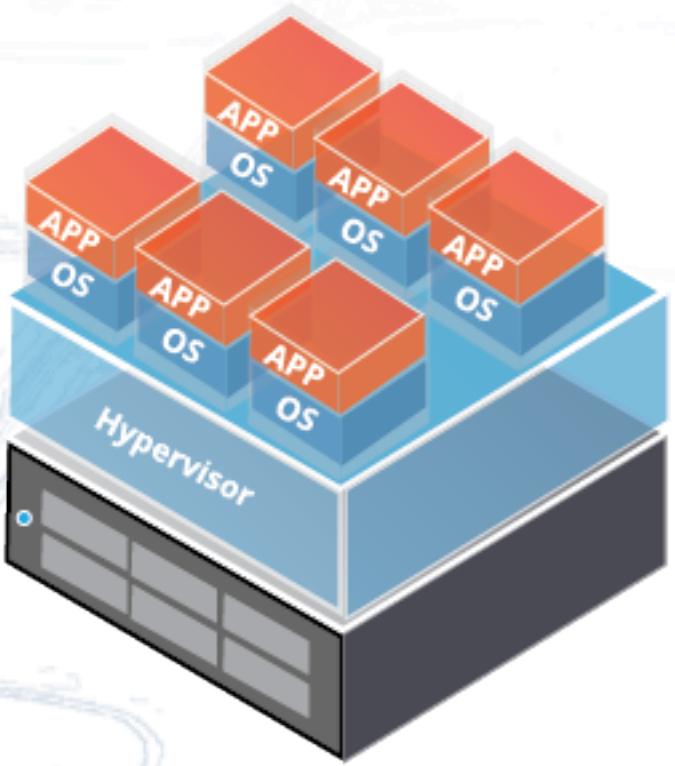
Blade olserver

Rack olserver

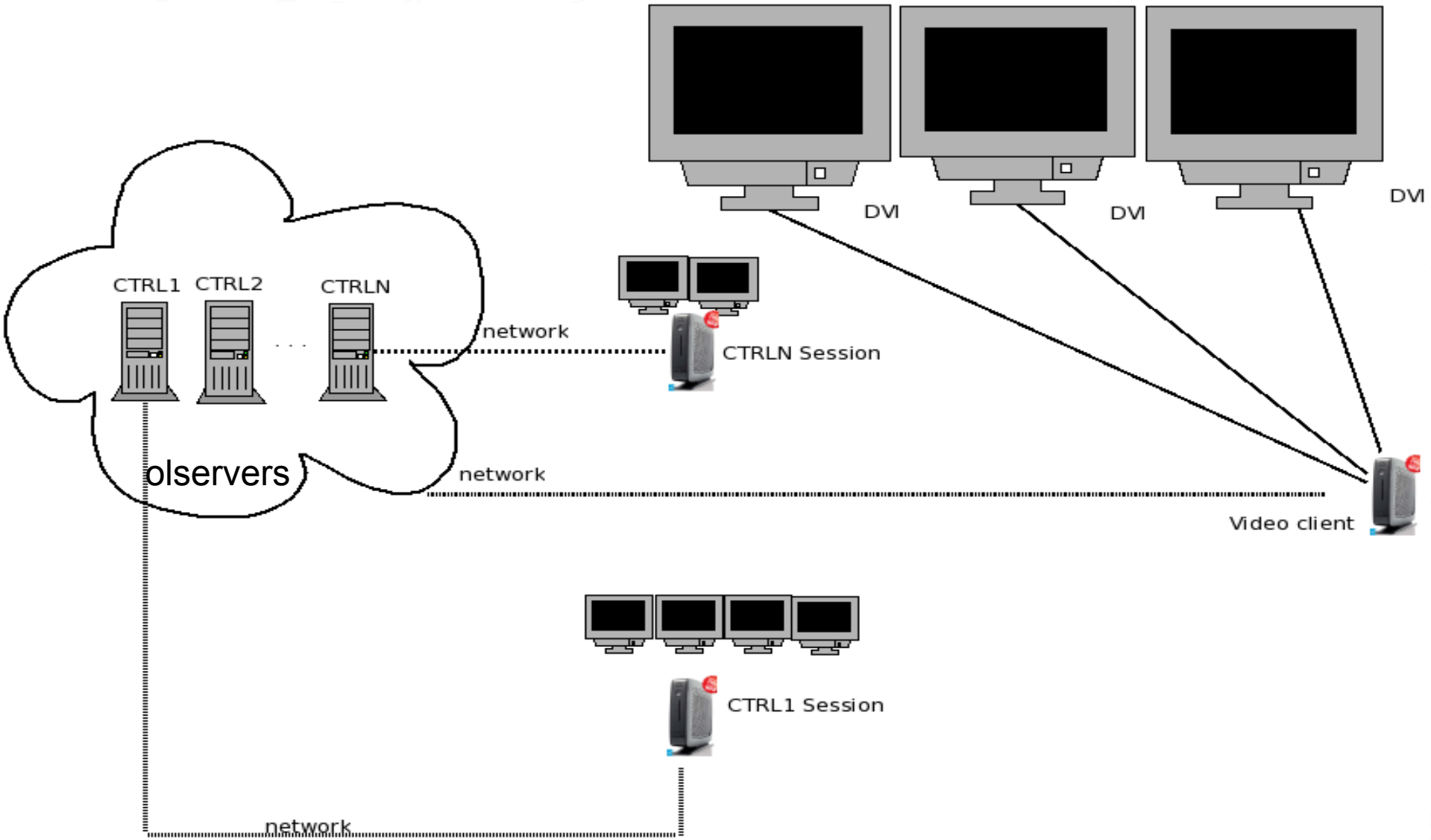
Hardware: Servers

Virtual olservers

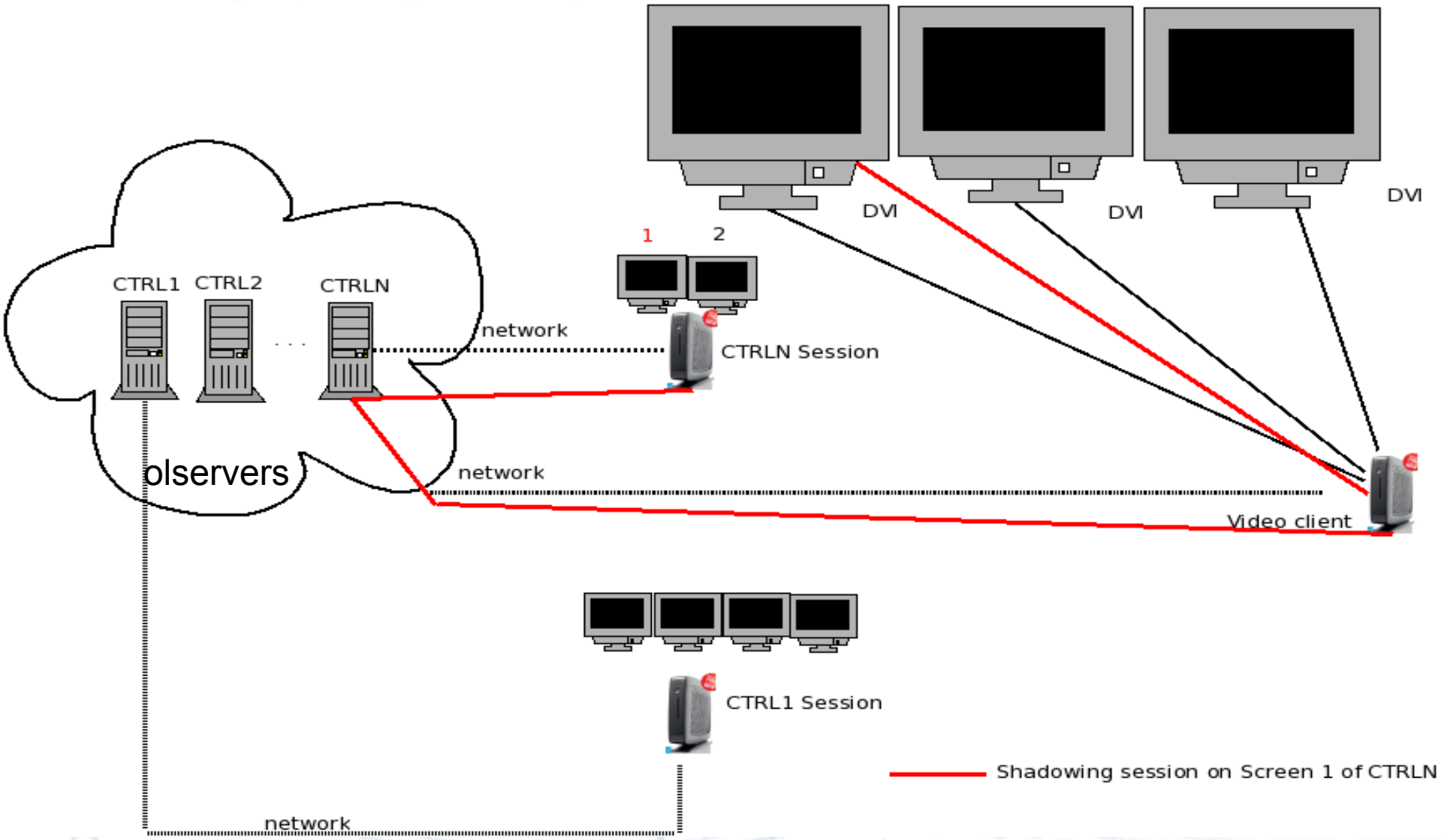
Desktop Virtualization



Benefits


DVI
DVI
DVI
CTRL1
CTRL2
CTRLN
network
CTRLN Session
olservers
network
Video client
CTRL1 Session
network

Benefits


DVI
DVI
DVI
1
2
CTRL1
CTRL2
CTRLN
network
CTRLN Session
olservers
network
Video client
CTRL1 Session
network
Shadowing session on Screen 1 of CTRLN

Benefits

- **Flexibility**
- **High availability**
- **Manageability**
- **Costs**

Realization Plan

We already tested the solution proposed in control room

A prototype was deployed

We individuated screens

We have an offer of purchase for thinclient

In the coming months we will buy servers

Realization Plan

To be operative it's important that the Virgo Environment Applications will be ready to run on Scientific Linux 6.x or 7.x and with GNOME as desktop manager.

The end

That's all