Faculty of Civil Engineering
WARSAW UNIVERSITY OF TECHNOLOGY

VDI on OpenStack: how to do it
… and is worth, anyway?

Tomasz Dubilis

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In the past @ WIL PW

~2005

First wannabe-HPC (with MPI and queue manager)

2010

First „real" HPC: RDMA, Infiniband, LustreFS…

 …and first problems – libraries and packages in dependency hell

In search of better technology

2015

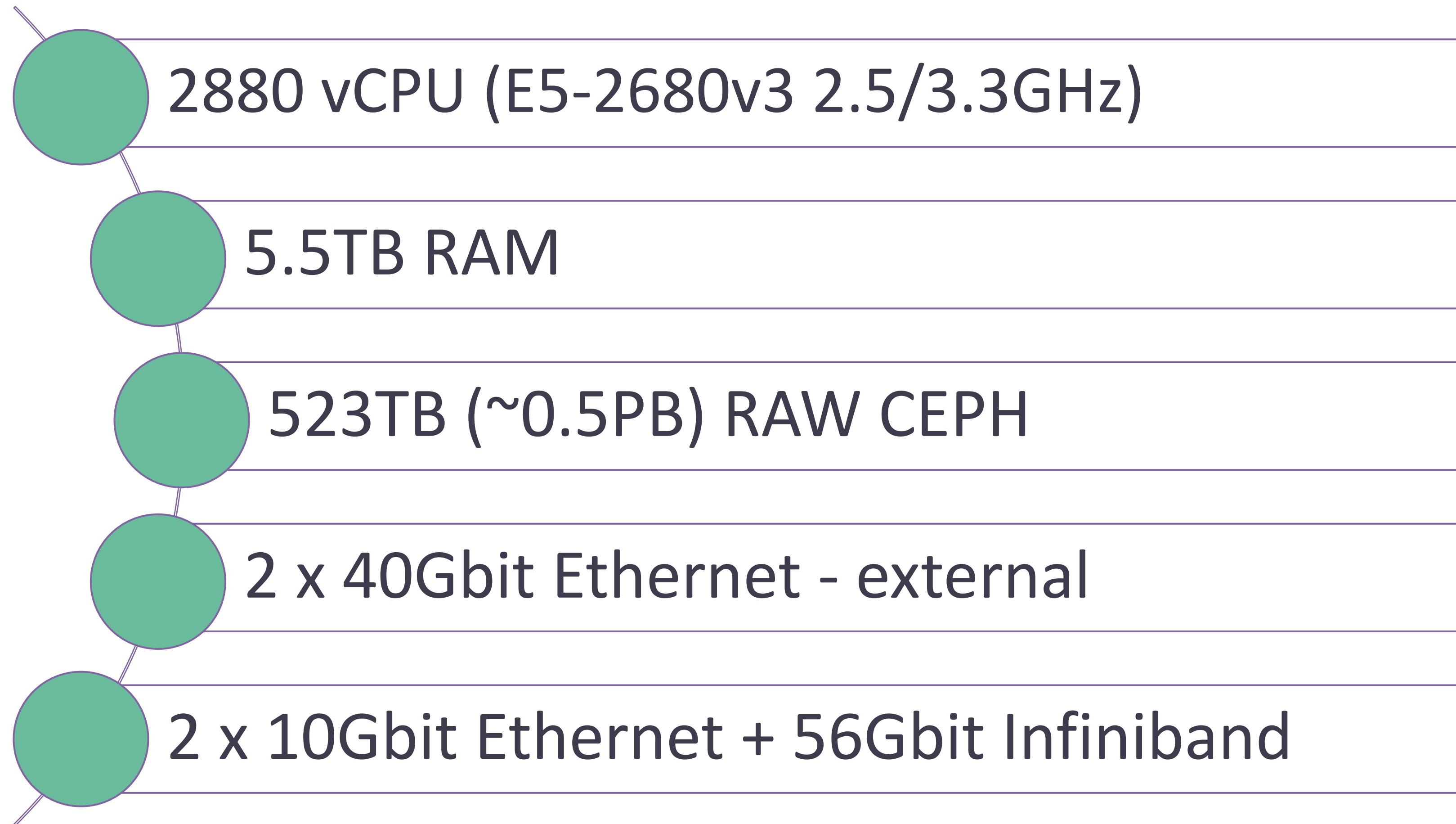First OpenStack (Mitaka, Hammer)

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OpenStack @ WIL PW in numbers

- 60 compute nods (Nova)
- 18 storage nodes (CEPH)
- 2 networking nodes (Neutron)
- 3 management nodes (oVirt HA)
- 10GBit Ethernet + 56Gbit Infiniband

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OpenStack @ WIL PW in numbers

- 2880 vCPU (E5-2680v3 2.5/3.3GHz)
- 5.5TB RAM
- 523TB (~0.5PB) RAW CEPH
- 2 x 40Gbit Ethernet - external
- 2 x 10Gbit Ethernet + 56Gbit Infiniband

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OpenStack @ WIL PW – use cases

Civil Engineering:

- Simulations (Finite element method – FEM)

- Deploying ad-hoc computing environments for specific tasks (nanostructures researchs, load simulations, construction disasters)

Cooperation with other units:

- Faculty of Physics – collaboration with CERN (Alice project)

- Other: neuron network simulations, weather forecast

HPCaaS, still searching for other use cases

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OpenStack @ WIL PW – profs

- Dynamic allocation of resources

- Easy environmental management

- Allowing users to fully manage of resources in their tenants

- Speed and efficiency

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VDI – Virtual Desktop

Why VDI on University?

- The possibility of providing licensed software to students

- Image management

How University differs from Business?

- More diversified environment – hardware & software

- Greater hardware requirements (3D, GPU intensive)

- Clock is ticking faster – frequent login/logoff, shorter session TTL, 1.5h of lecture when everything should go smooth

University vs Business – easier or harder?

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VDI – Virtual Computation Laboratory

We have some experience with „classic" VDI

• Commercial software from leading vendor

• License cost

• Strong recommendation of having flash only storage

• But... they are supporting vGPU

On the 8-node cluster only several dozen of „weak" or dozen of „strong" sessions

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Hey, we've got OpenStack!

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KVM!

VirtIO drivers

• Storage

• Network

…

What about generalizing of the image?

• Linux - cloud-init tools

• Windows - Sysprep?

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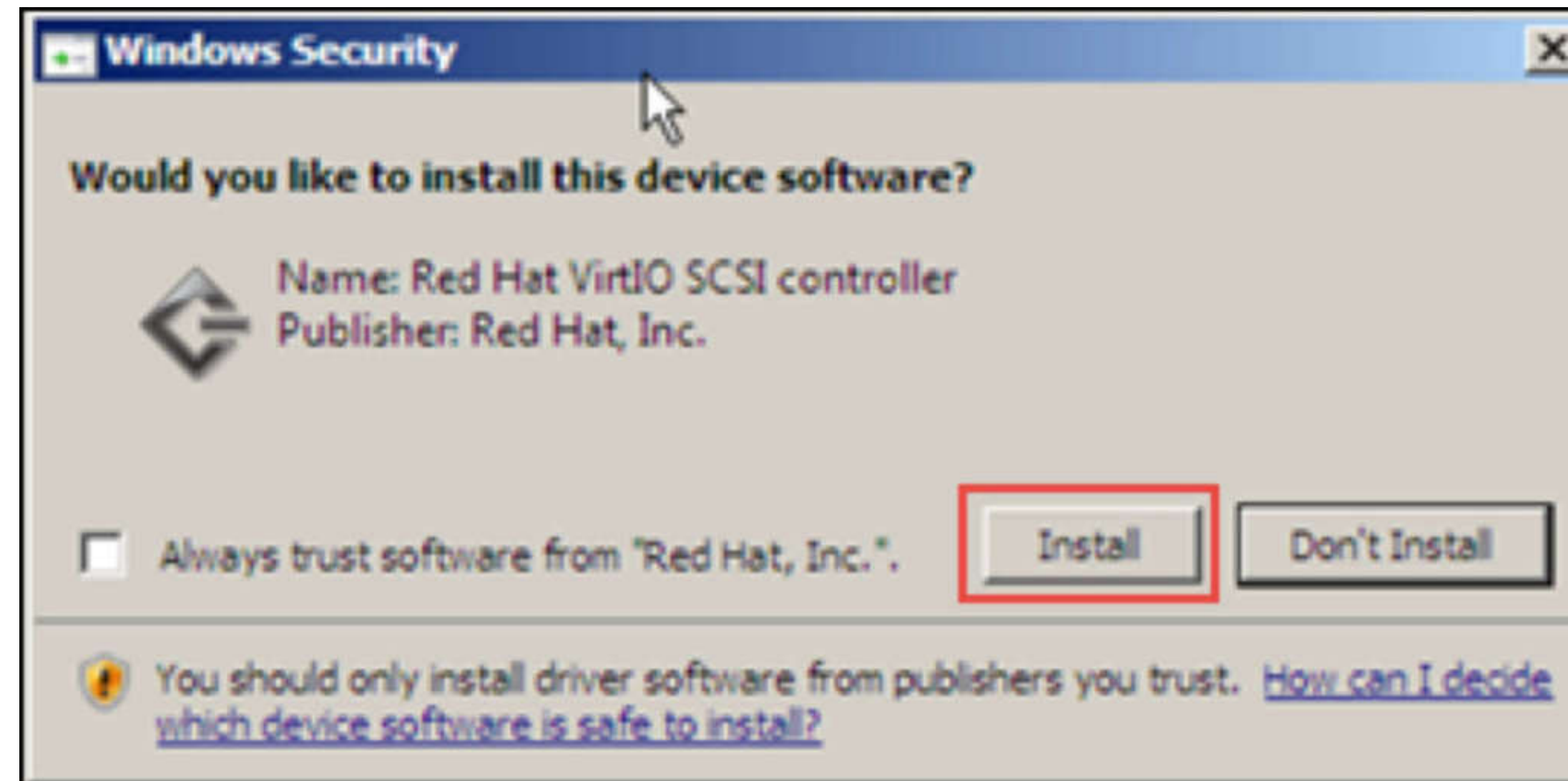
Cloudbase – for the PoC

Ready to use images with Windows Server 2012 – for free

Preconfigured Powershell scripts, which generates images for any current Microsoft Windows 10 (with updates, drivers, .msi add-ons etc.), this scripts requires working Windows system (Hyper-V).

Community/suport

RTFM - https://cloudbase-init.readthedocs.io/en/latest/

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Yup! Sysprep! Cloudbase-init

HTTP and ConfigDriveV2 metadata

Capabilities:

• Managing users (creating)

• Password setting

• Static network configuration

• Hostname setting

• Script-based configuration

Written in Python

Open source, Apache 2 license

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Cloudbase - template

- Sysprepping

- Configuration file

- File execution

- Services

  - OpenStack

  - but also Amazon EC2 or OpenNebula

- Plugins

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Cloudbase - Plugins

- Setting host name (main)
- Creating user (main)
- Setting password (main)
- Static networking (main)
- Saving public keys (main)
- Volume expanding (main)
- WinRM listener (main)

- WinRM certificate (main)
- Scripts execution (main)
- Licensing (main)
- Clock synchronization (pre-networking)
- MTU customization (pre-metadata-discovery)
- User data (main)
- Configuring selected plugins

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Lot of components, how to MANAGE them?

Let us never speak of this again

Let's make IT better!

- The only provider of LeoStream solutions in Poland

- OpenSource Solutions Leader

- Specialist in cloud, container and automation solutions

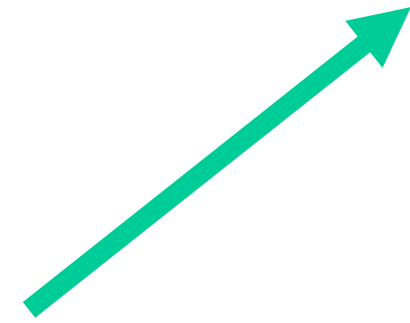- Awarded many times by commercial providers of OpenSource solutions

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Leostream!

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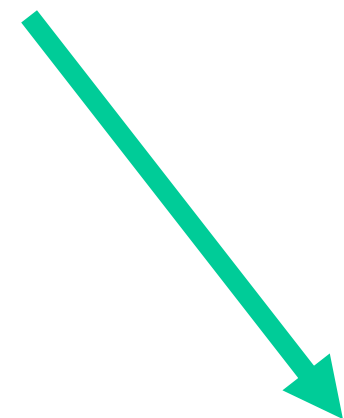
OpenStack – 2018-2019 VDI hardware expansion

- 4 compute nodes (Nova) CPU-only
- 2 x Intel Xeon Gold 6140 @ 2.3GHz
- 3 compute GPU-nodes (Nova)!
- 2 x Tesla M10 (2560 CUDA, 32GB RAM)

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OpenStack – 2018-2019 VDI hardware expansion

- 3 storage nodes (CEPH)
- SSD only
- 6 x 3,84TB
- ~70TB flash total

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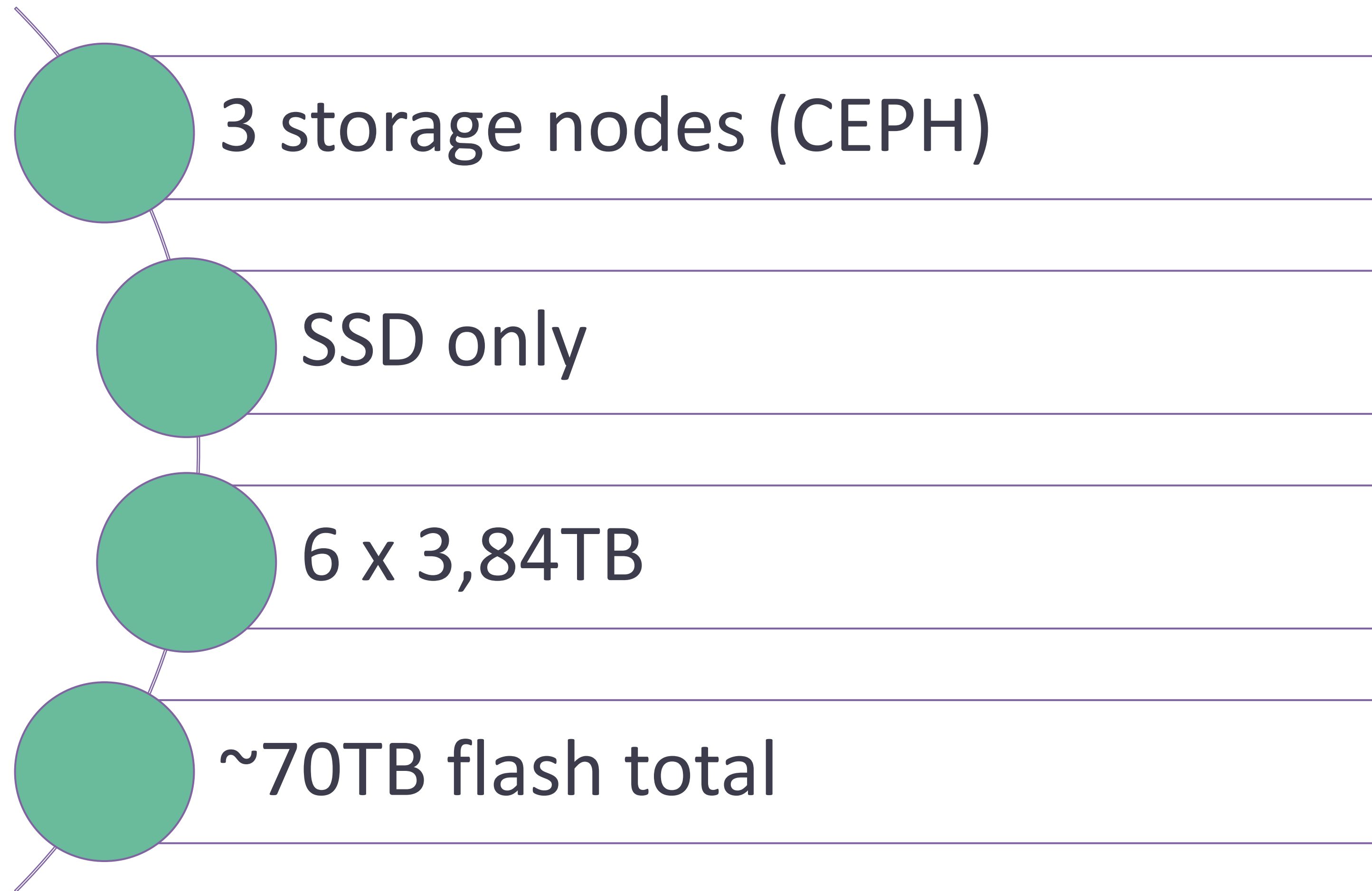
Server side

- Connection broker

- Gateway

Guest host

- Agent

Client side

- Client apps
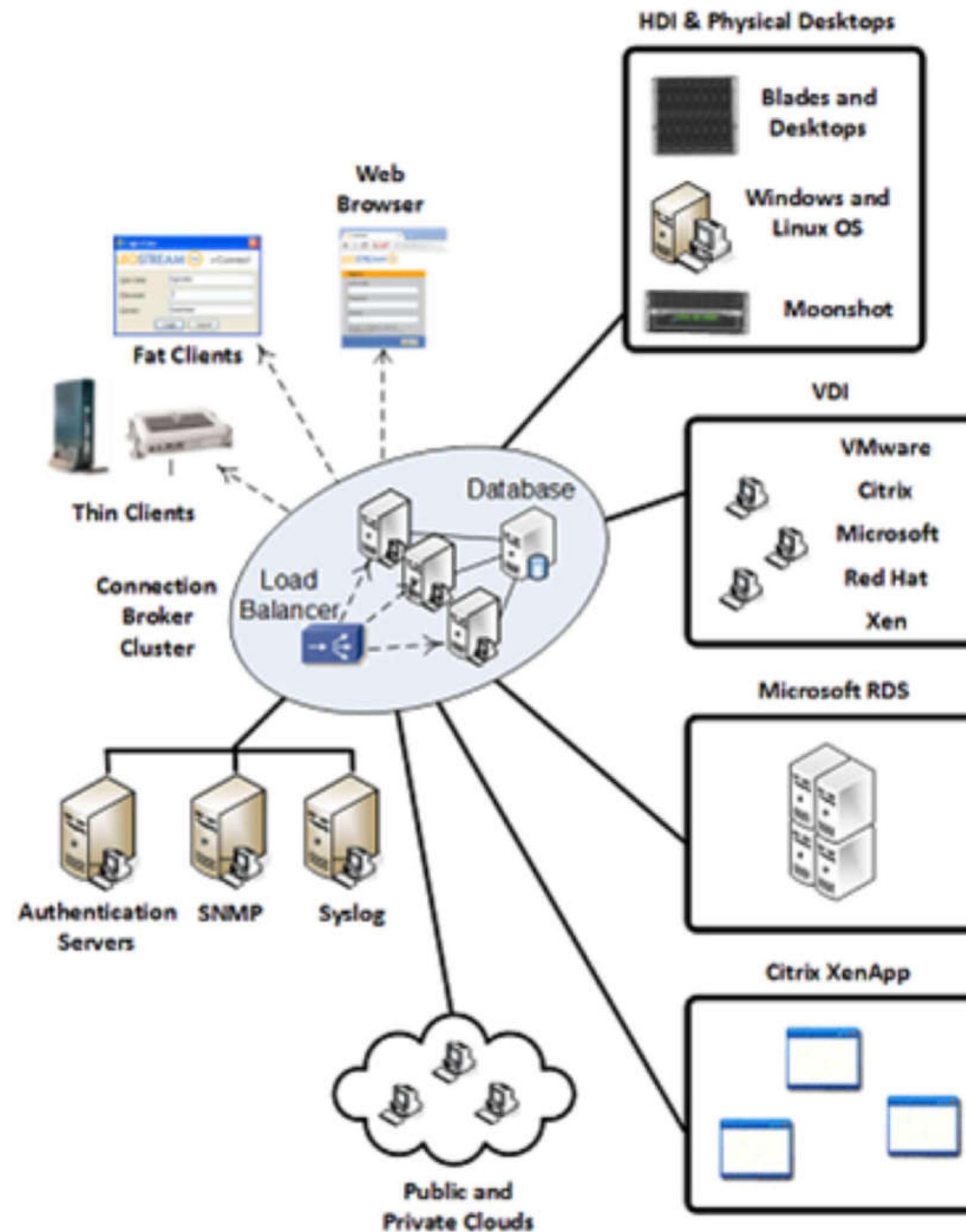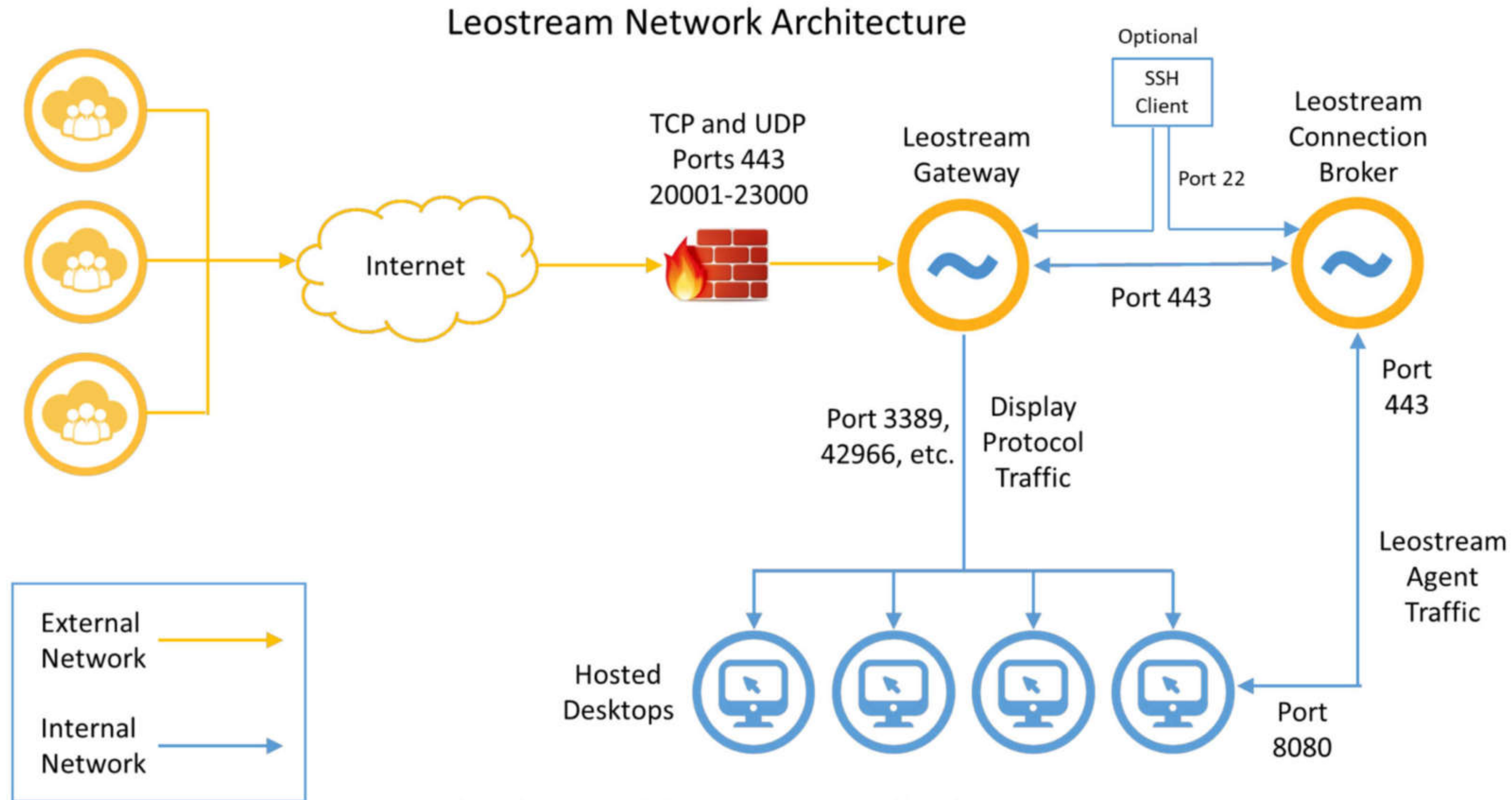
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Leostream Network Architecture

How to connect?

Standalone app

- Leostream Connect for Windows (native)

- Leostram Connect for Linux & Mac (Java)

Web browser

- HTML5 (guacd)

Thin Client

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What protocol could be used?

Protocols:

- RDP

- HP RGS

- Teradici PCoIP

- Mechdyne TGX

But also

- SPICE

- VNC

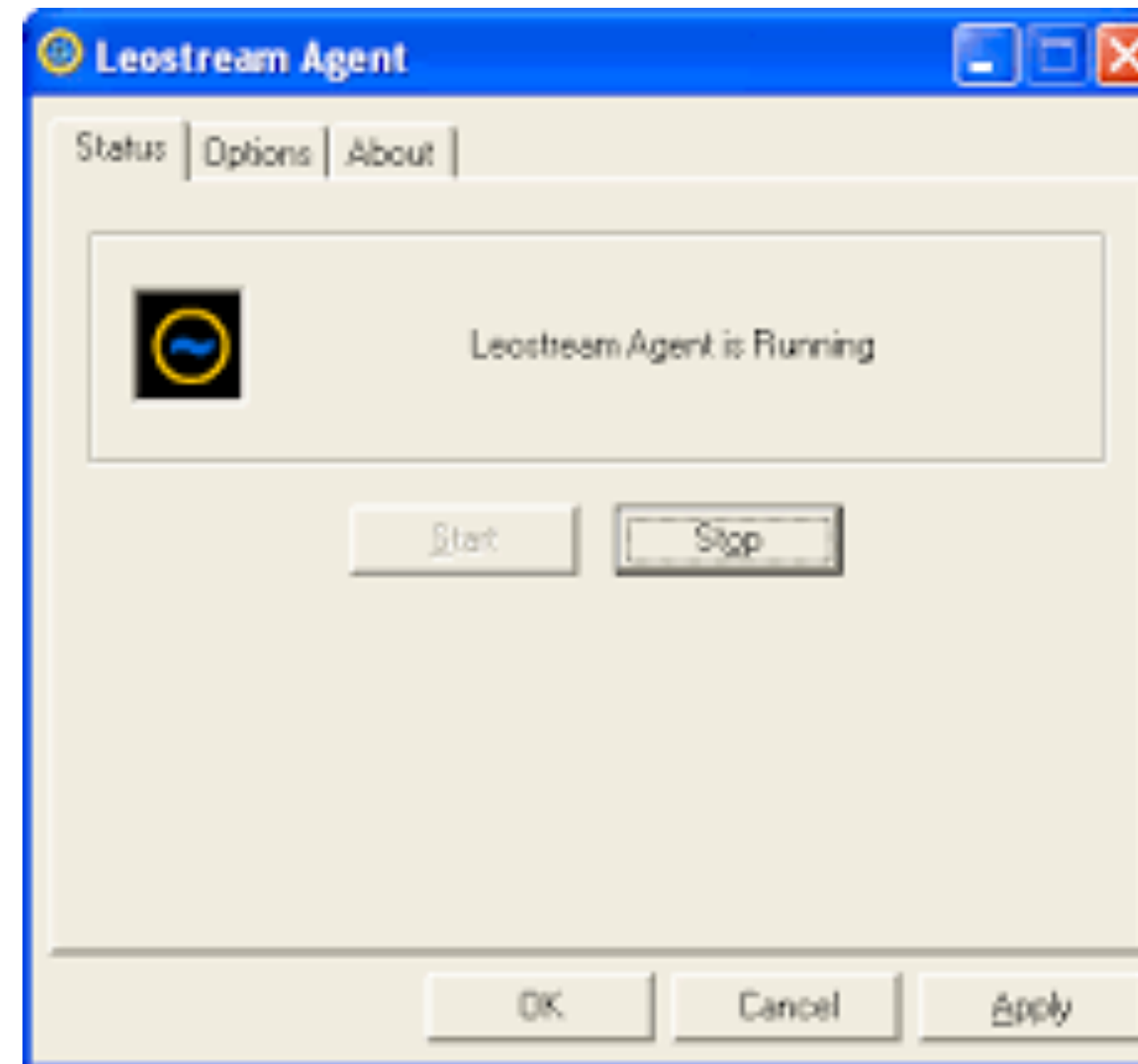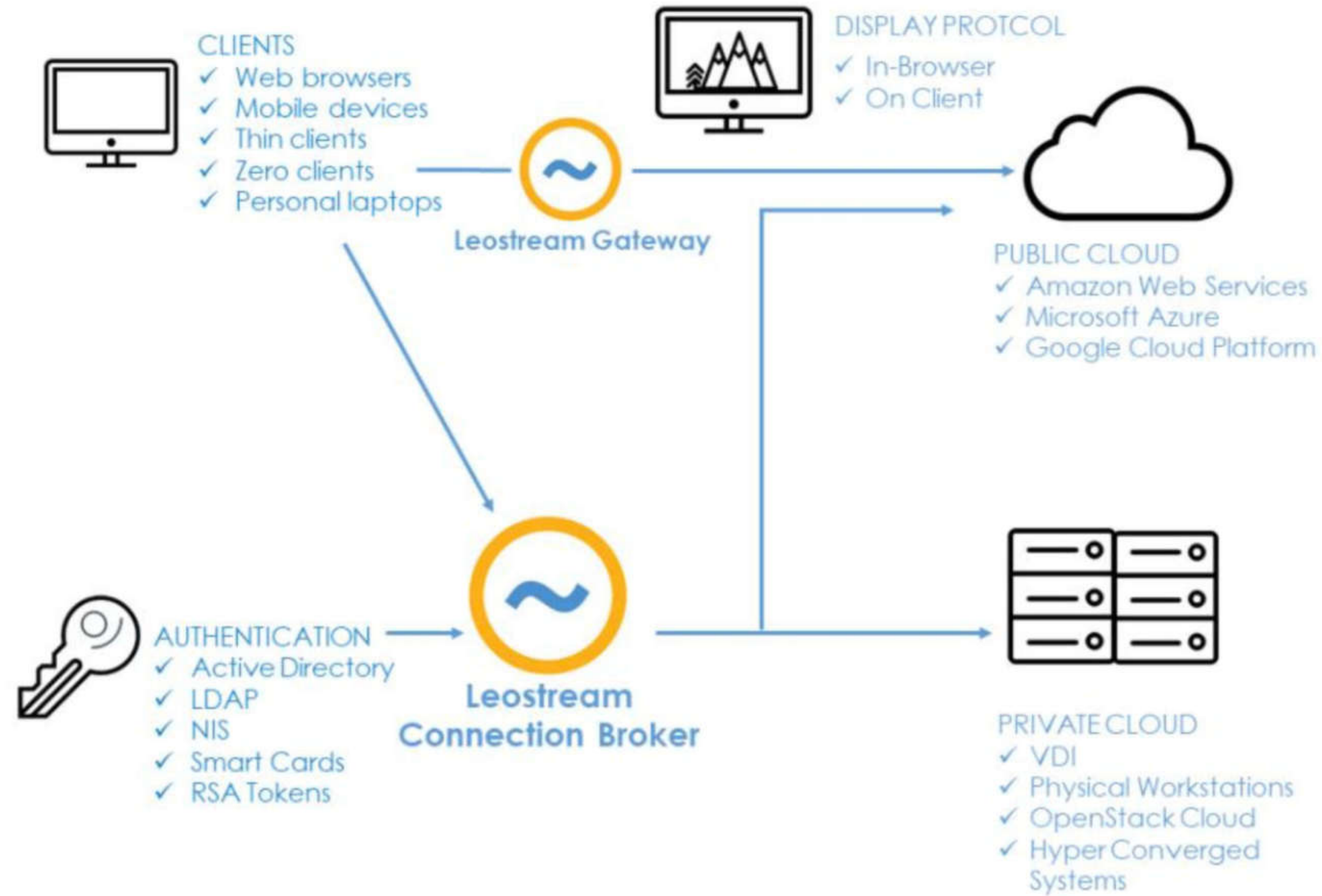- other...

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Guest agent

Capabilities:

• USB

• Monitoring

• Printing

Supported OS:

• Leostream Agent for Windows (native)

• Leostram Agent for Linux & Mac (Java)

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One more big picture

Workflow – how to make it works

Create and configure guest image on any hypervisor (VirtualBox, Vmware, Hyper-V)

Remember about VirtIO drivers

Cloudbase-init – generalize, sysprep

Converting image to RAW

Upload to OpenStacka

Configuration in Leostream

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LIVE DEMO*

- this presentation is already part of a live demo
- it is streaming on Leostream VDI ;)

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Thank you

Q & A