Make IT

2022

Moderna infrastruktura za Oracle

Speakers:

- **Urh Srečnik** <urh.srecnik@abakus.si>
- **Sergej Rožman** <sergej.rozman@abakus.si>
- **Boris Oblak** <boris.oblak@abakus.si>

AS Abakus As na disku.

ORACLE Gold Partner

Abakus Plus d.o.o.

- Infrastructure Team
  - Services
    - OS & NET admin
    - DBA, Programming
  - Applications
    - **APPM**
    - **Backup Server & Deja Vu**
    - Arbiter
- Development Team
  - Enterprise Applications
  - Document Management
  - Newspaper Distribution
  - Flight Information System

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Ljubljana Airport
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Ekspresno. Ekonomično.
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MINISTRSTVO ZA OBRAMBO
NOVA BANKA
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KONTROLA ZRAČNEGA PROMETA SLOVENIJE
Iskra
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LON
triglav
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jata emona
LJUBLJANA
UNIVERZITETNA PSIHIATRIČNA KLINIKA LJUBLJANA
University Psychiatric Clinic Ljubljana
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MERKUR
TRELLEBORG
Trelleborg Slovenija, d.o.o.
SODO
SISTEMSKI OPERATER DISTRIBUCIJSKEGA OMREŽJA Z ELEKTRIČNO ENERGIJO
BANKA SLOVENIJE
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PEST MANAGEMENT SOLUTIONS
Mercator
NLB Vita
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GOODYEAR DUNLOP
SAVA TIRES
MM KARTON
studio ritem
Blubit
TKO
TOVARNA KOVINSKE OPREME
ZAVOD ZA ŠPORT RS PLANICA
SAVA
HOTELS & RESORTS
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Kranjska Gora
LASERLINE
ORACLE
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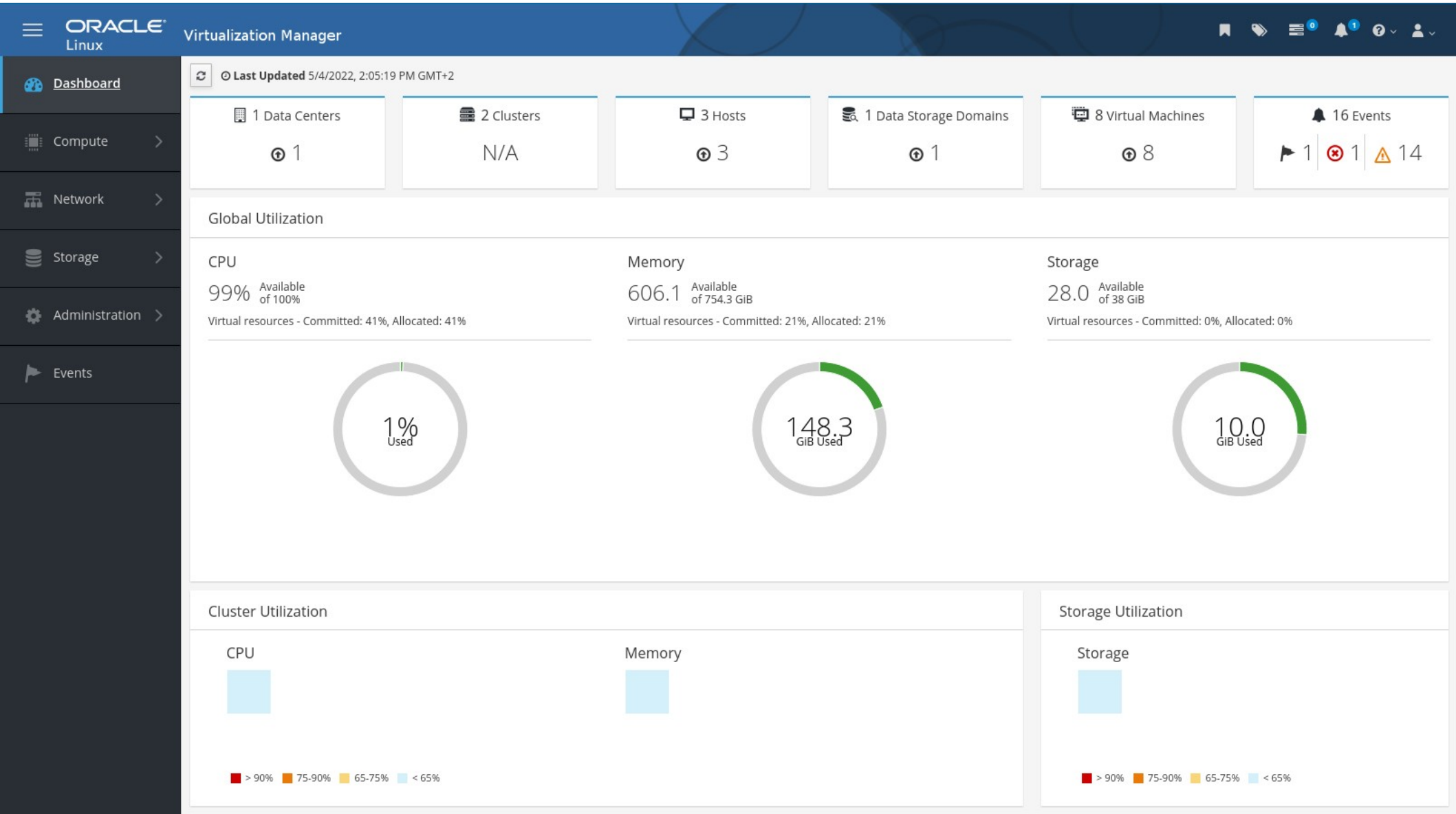
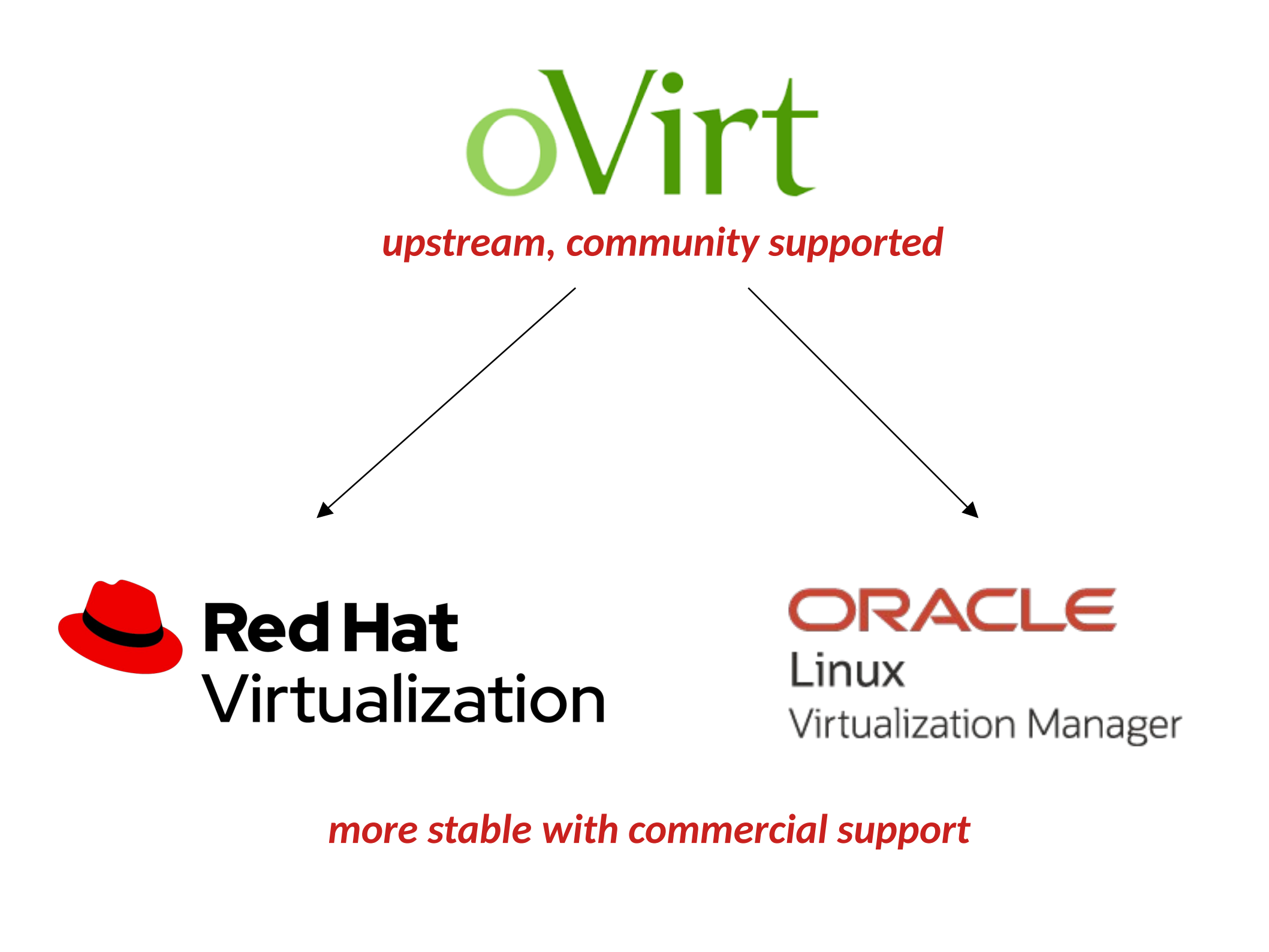
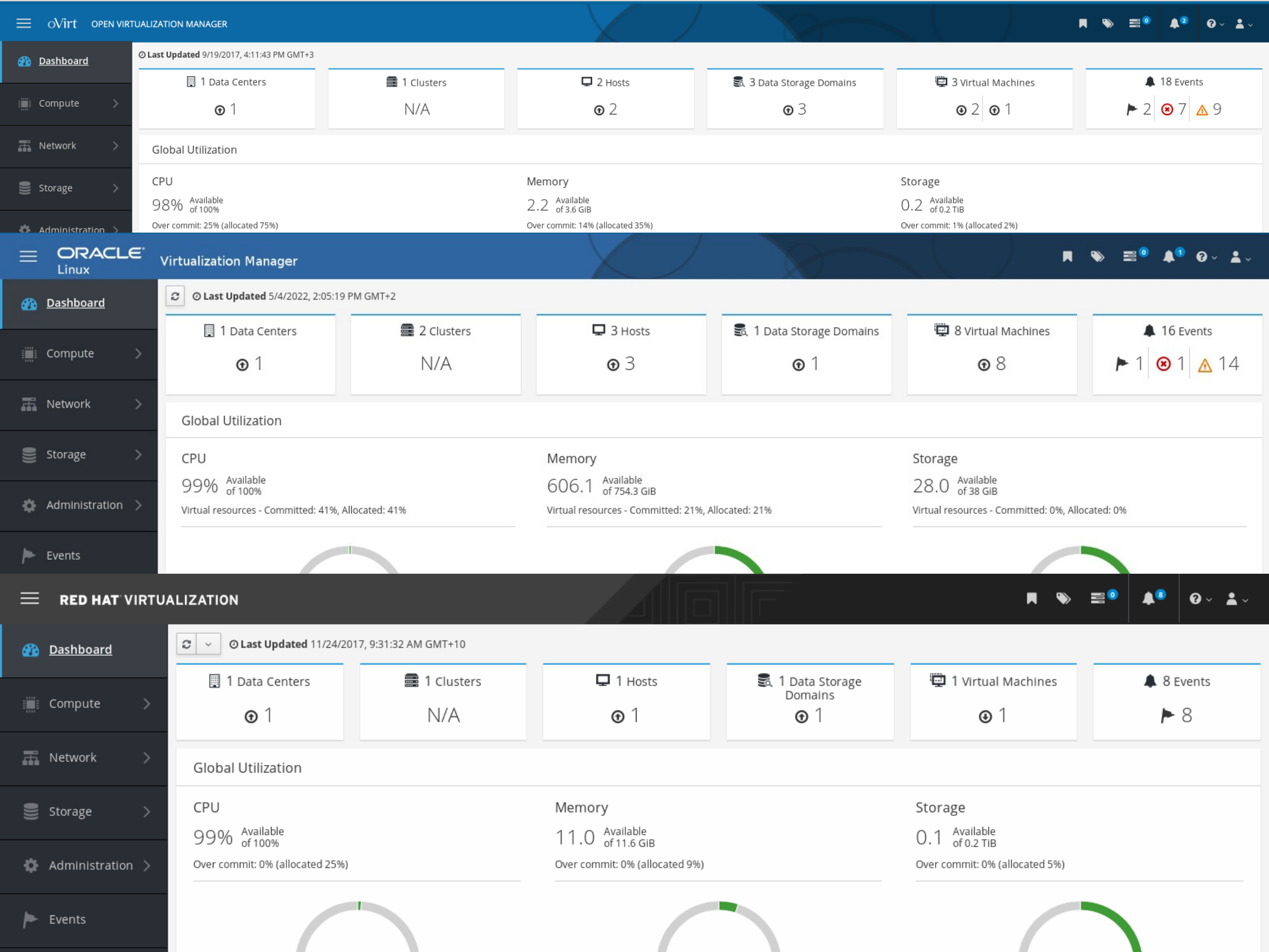
INFOTRANS
PARK POSTOJNSKA JAMA
ADRIA ANKARAN
HOTEL & RESORT

OLVM


ORACLE Linux
Virtualization Manager
Dashboard
Compute
Network
Storage
Administration
Events
Last Updated 5/4/2022, 2:05:19 PM GMT+2
1 Data Centers
1
2 Clusters
N/A
3 Hosts
3
1 Data Storage Domains
1
8 Virtual Machines
8
16 Events
1
1
14
Global Utilization
CPU
99% Available of 100%
Virtual resources - Committed: 41%, Allocated: 41%
1% Used
Memory
606.1 Available of 754.3 GiB
Virtual resources - Committed: 21%, Allocated: 21%
148.3 GiB Used
Storage
28.0 Available of 38 GiB
Virtual resources - Committed: 0%, Allocated: 0%
10.0 GiB Used
Cluster Utilization
CPU
Memory
> 90%
75-90%
65-75%
< 65%
Storage Utilization
Storage
> 90%
75-90%
65-75%
< 65%


oVirt
upstream, community supported
Red Hat
Virtualization
ORACLE
Linux
Virtualization Manager
more stable with commercial support


oVirt OPEN VIRTUALIZATION MANAGER
Dashboard
Compute
Network
Storage
Administration
Last Updated 9/19/2017, 4:11:43 PM GMT+3
1 Data Centers
1
1 Clusters
N/A
2 Hosts
2
3 Data Storage Domains
3
3 Virtual Machines
2 1
18 Events
2 7 9
Global Utilization
CPU
98% Available of 100%
Over commit: 25% (allocated 75%)
Memory
2.2 Available of 3.6 GiB
Over commit: 14% (allocated 35%)
Storage
0.2 Available of 0.2 TiB
Over commit: 1% (allocated 2%)
ORACLE Linux Virtualization Manager
Dashboard
Compute
Network
Storage
Administration
Events
Last Updated 5/4/2022, 2:05:19 PM GMT+2
1 Data Centers
1
2 Clusters
N/A
3 Hosts
3
1 Data Storage Domains
1
8 Virtual Machines
8
16 Events
1 1 14
Global Utilization
CPU
99% Available of 100%
Virtual resources - Committed: 41%, Allocated: 41%
Memory
606.1 Available of 754.3 GiB
Virtual resources - Committed: 21%, Allocated: 21%
Storage
28.0 Available of 38 GiB
Virtual resources - Committed: 0%, Allocated: 0%
RED HAT VIRTUALIZATION
Dashboard
Compute
Network
Storage
Administration
Events
Last Updated 11/24/2017, 9:31:32 AM GMT+10
1 Data Centers
1
1 Clusters
N/A
1 Hosts
1
1 Data Storage Domains
1
1 Virtual Machines
1
8 Events
8
Global Utilization
CPU
99% Available of 100%
Over commit: 0% (allocated 25%)
Memory
11.0 Available of 11.6 GiB
Over commit: 0% (allocated 9%)
Storage
0.1 Available of 0.2 TiB
Over commit: 0% (allocated 5%)

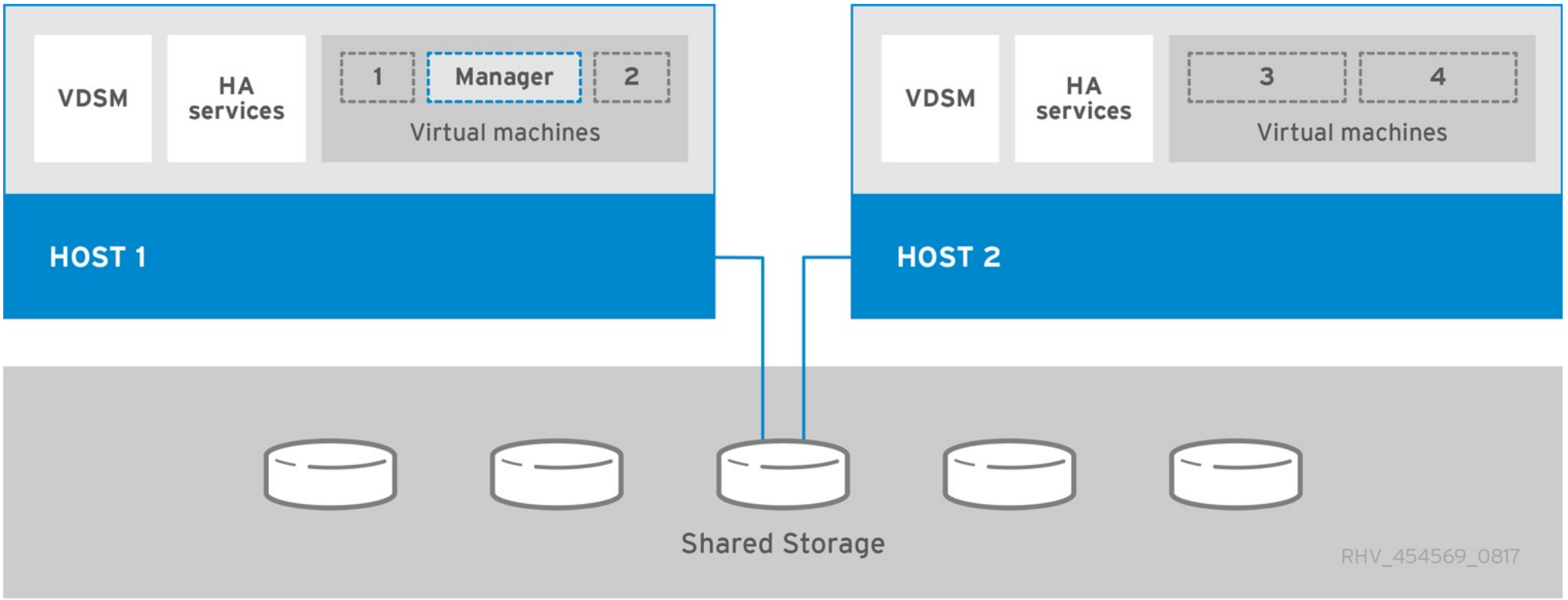


image from:
https://www.ovirt.org/documentation/installing_ovirt_as_a_self-hosted_engine_using_the_command_line/

Built On

- **KVM** - https://www.linux-kvm.org/
  Linux kernel module capable of full virtualization support for Linux on x86 hardware containing virtualization extensions (Intel VT or AMD-V)
- **QEMU** - https://www.qemu.org/
  a *generic and open source machine emulator and virtualizer*
- **libvirt** - https://libvirt.org/
  virtualization API and toolkit to manage virtualization platforms

OLVM: Inkrementalni backupi

Speaker:

Urh Srečnik

Podjetje

Abakus plus d.o.o.

Petek, 3. junij

12:35 - 13:20

Težavnost: Basic

Dvorana: James Cook

Področje: Database

OLVM Licensing

- Free to use/install
- ***Optional*** commercial support by Oracle

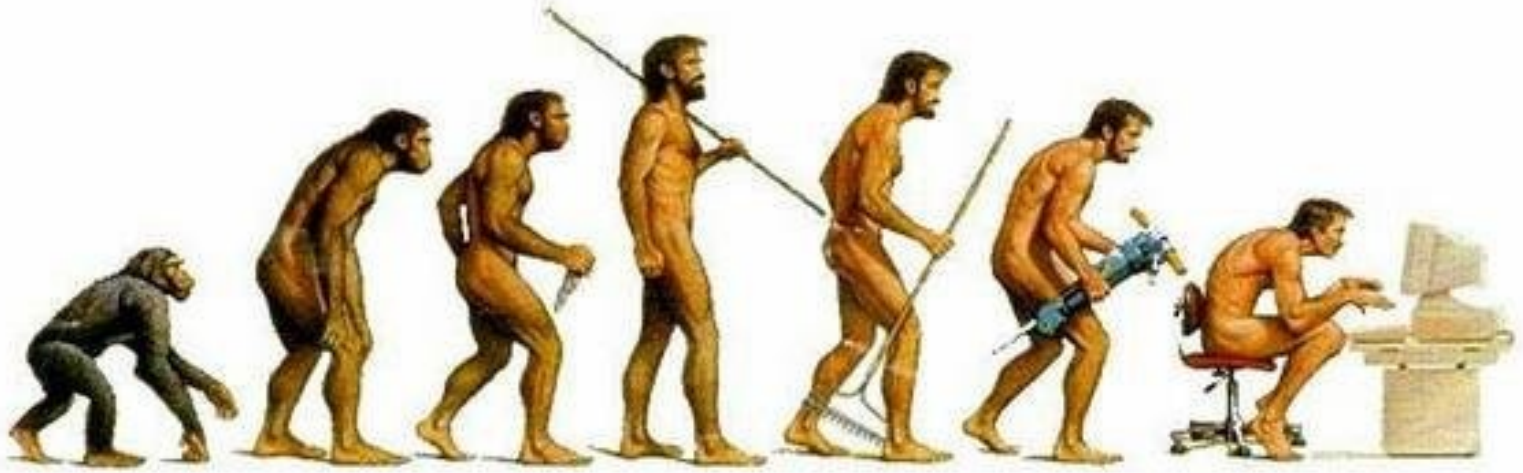
- Approved hard partitioning technologies by Oracle:
  - OLVM
  - OVM (end of life, »Extended Support« still available)
  - Oracle Solaris Zones
  - Source: https://www.oracle.com/assets/partitioning-070609.pdf

Other Virtulizations?

- Oracle Database licences requires you to license all the ***physical*** CPUs in all the nodes in the vm cluster.
- It ***may*** be impossible to use OLVM hard partitioning for Standard Edition Databases anyway
  - Because each chip in multi-chip processor is considered as a socket

Oracle License Management Services (LMS) is the established authority on Oracle licensing policy. Licensing information in this presentation is for educational purposes only and may even be incorrect.

VE Evolution



Abakus
As na disku.

30 Years ANNIVERSARY OF SERVICE

Modern Infrastructure for Oracle (and beyond)

mag. Sergej Rožman

sergej.rozman@abakus.si

Make IT JUN 2022

BANKA SLOVENIJE

Gorenjska Banka
Vse, kar šteje.

NOVA BANKA

PH Primorska hranilnica

skbbanka
otp group

KVM – Kernel-based Virtual Machine

- since 2006 by Qumranet, acquired by Red Hat in 2008
- clouds based on KVM: Openstack, IBM Cloud, Rackspace, Google, ...
- virtualizations based on KVM: Red Hat Enterprise Virtualization, Oracle Virtualization, Proxmox VE, oVirt, ...

KVM – Kernel-based Virtual Machine

Run a VM

```
# qemu-system-x86_64 -enable-kvm -hda /tmp/test.raw
VNC server running on 127.0.0.1:5900
```

- initial parameters of VM are specified in a command line
- default graphical console is at VNC localhost:5900 (or specified in command line)
- VM management goes through UNIX socket (JSON format) or QEMU/Monitor (Ctrl-Alt-2)

Manage a VM – example: eject CD/DVD

```
# find and connect to right socket

{ "execute": "eject", "arguments": { "device": "ide1-cd0" } }
{"return": {}}
```

libvirt

- since 2005 by Red Hat

  https://libvirt.org/

- is a toolkit to manage virtualization platforms

- XML configuration

Manage a VM – example: eject CD/DVD

```
# virsh change-media VMname hdc --eject
succeeded to complete action eject on media
```

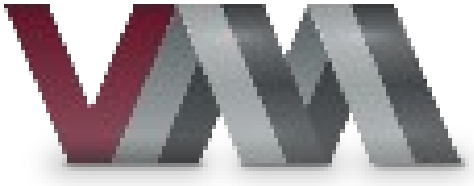
GUI Management

- 44 management utilities

  according to https://www.linux-kvm.org/page/Management_Tools

- Oracle Linux Virtualization Manager is not one of them, oVirt is

Red Hat Virtual Machine Manager



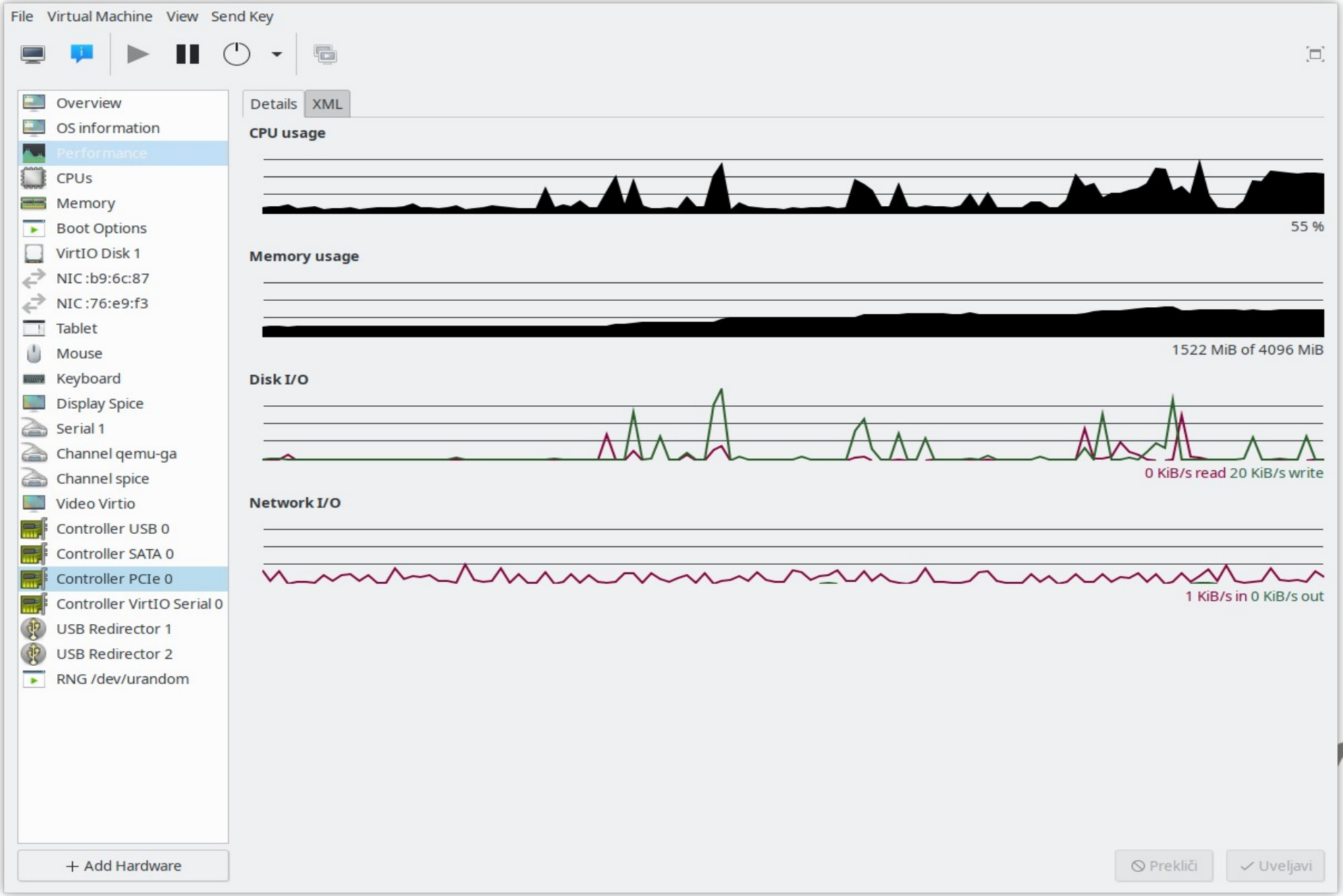
- since 2008 by Red Hat

  https://virt-manager.org/

- Red Hat Virtual Machine Manager, also known as virt-manager, is a **desktop** virtual machine manager/monitor

- just tool, not an environment

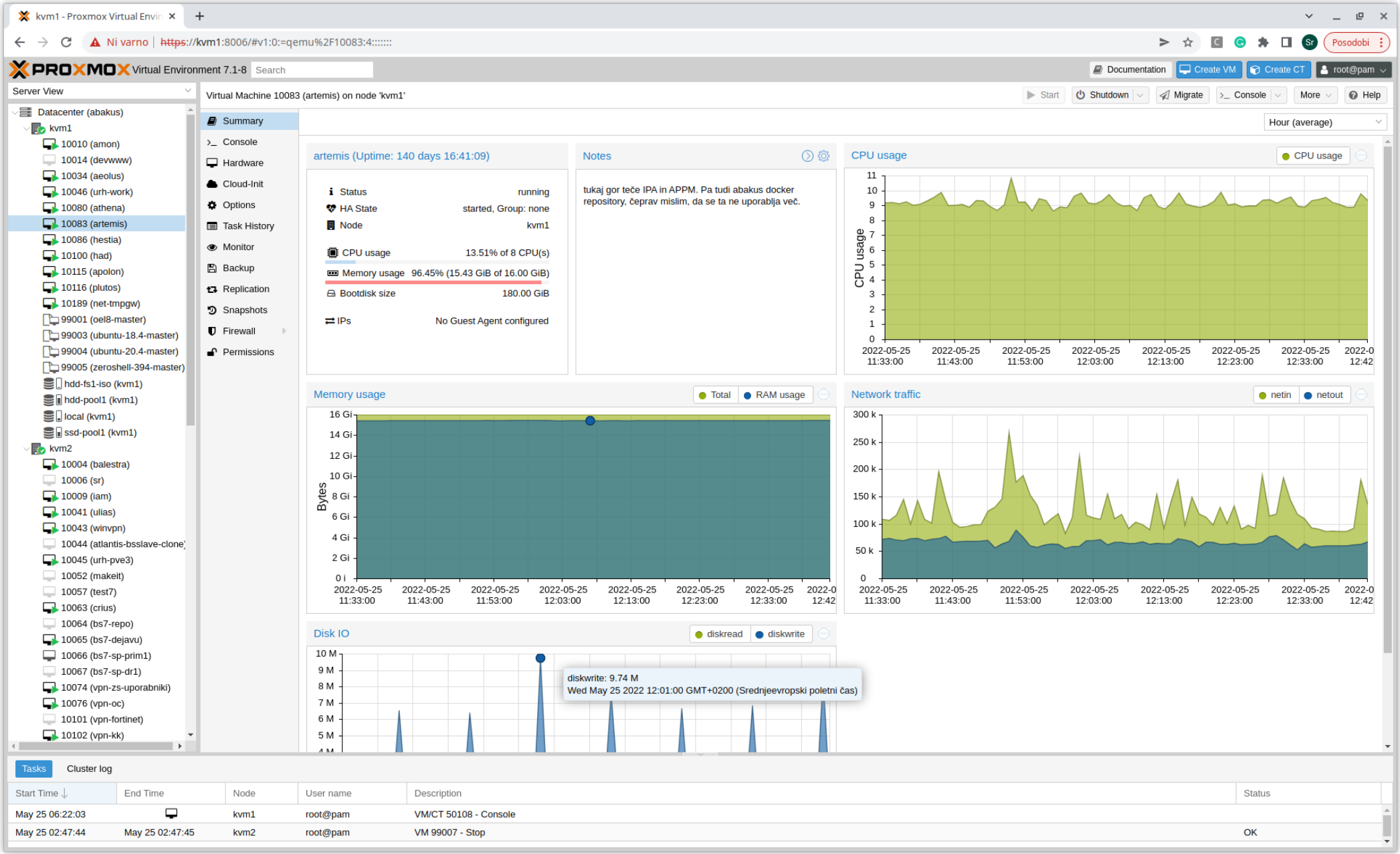
virt-manager



Proxmox VE

- since 2008 by Proxmox Server Solutions GmbH, Austria
  https://www.proxmox.com/en/proxmox-ve
- web-based graphical interface management
- simple and intuitive use
- robust, not easy to break
- **well integrated with all modern hardware and storage systems**
- can be all-in-one solution

Proxmox VE


kvm1 - Proxmox Virtual Envir
Ni varno | https://kvm1:8006/#v1:0:=qemu%2F10083:4:::::::
Posodobi
PROXMOX Virtual Environment 7.1-8
Search
Documentation
Create VM
Create CT
root@pam
Server View
Virtual Machine 10083 (artemis) on node 'kvm1'
Start
Shutdown
Migrate
Console
More
Help
Datacenter (abakus)
kvm1
10010 (amon)
10014 (devwww)
10034 (aeolus)
10046 (urh-work)
10080 (athena)
10083 (artemis)
10086 (hestia)
10100 (had)
10115 (apolon)
10116 (plutos)
10189 (net-tmpgw)
99001 (oel8-master)
99003 (ubuntu-18.4-master)
99004 (ubuntu-20.4-master)
99005 (zeroshell-394-master)
hdd-fs1-iso (kvm1)
hdd-pool1 (kvm1)
local (kvm1)
ssd-pool1 (kvm1)
kvm2
10004 (balestra)
10006 (sr)
10009 (iam)
10041 (ulias)
10043 (winvpn)
10044 (atlantis-bsslave-clone)
10045 (urh-pve3)
10052 (makeit)
10057 (test7)
10063 (crius)
10064 (bs7-repo)
10065 (bs7-dejavu)
10066 (bs7-sp-prim1)
10067 (bs7-sp-dr1)
10074 (vpn-zs-uporabniki)
10076 (vpn-oc)
10101 (vpn-fortinet)
10102 (vpn-kk)
Summary
Console
Hardware
Cloud-Init
Options
Task History
Monitor
Backup
Replication
Snapshots
Firewall
Permissions
Hour (average)
artemis (Uptime: 140 days 16:41:09)
Status running
HA State started, Group: none
Node kvm1
CPU usage 13.51% of 8 CPU(s)
Memory usage 96.45% (15.43 GiB of 16.00 GiB)
Bootdisk size 180.00 GiB
IPs No Guest Agent configured
Notes
tukaj gor teče IPA in APPM. Pa tudi abakus docker repository, čeprav mislim, da se ta ne uporablja več.
CPU usage
CPU usage
Memory usage
Total
RAM usage
Bytes
Network traffic
netin
netout
Disk IO
diskread
diskwrite
diskwrite: 9.74 M
Wed May 25 2022 12:01:00 GMT+0200 (Srednjeevropski poletni čas)
Tasks
Cluster log
Start Time
End Time
Node
User name
Description
Status
May 25 06:22:03
kvm1
root@pam
VM/CT 50108 - Console
May 25 02:47:44
May 25 02:47:45
kvm2
root@pam
VM 99007 - Stop
OK

Modern Infrastructure

Boris will now tell us about the experience with the Oracle database in virtual and non-virtual environments.

Thank you

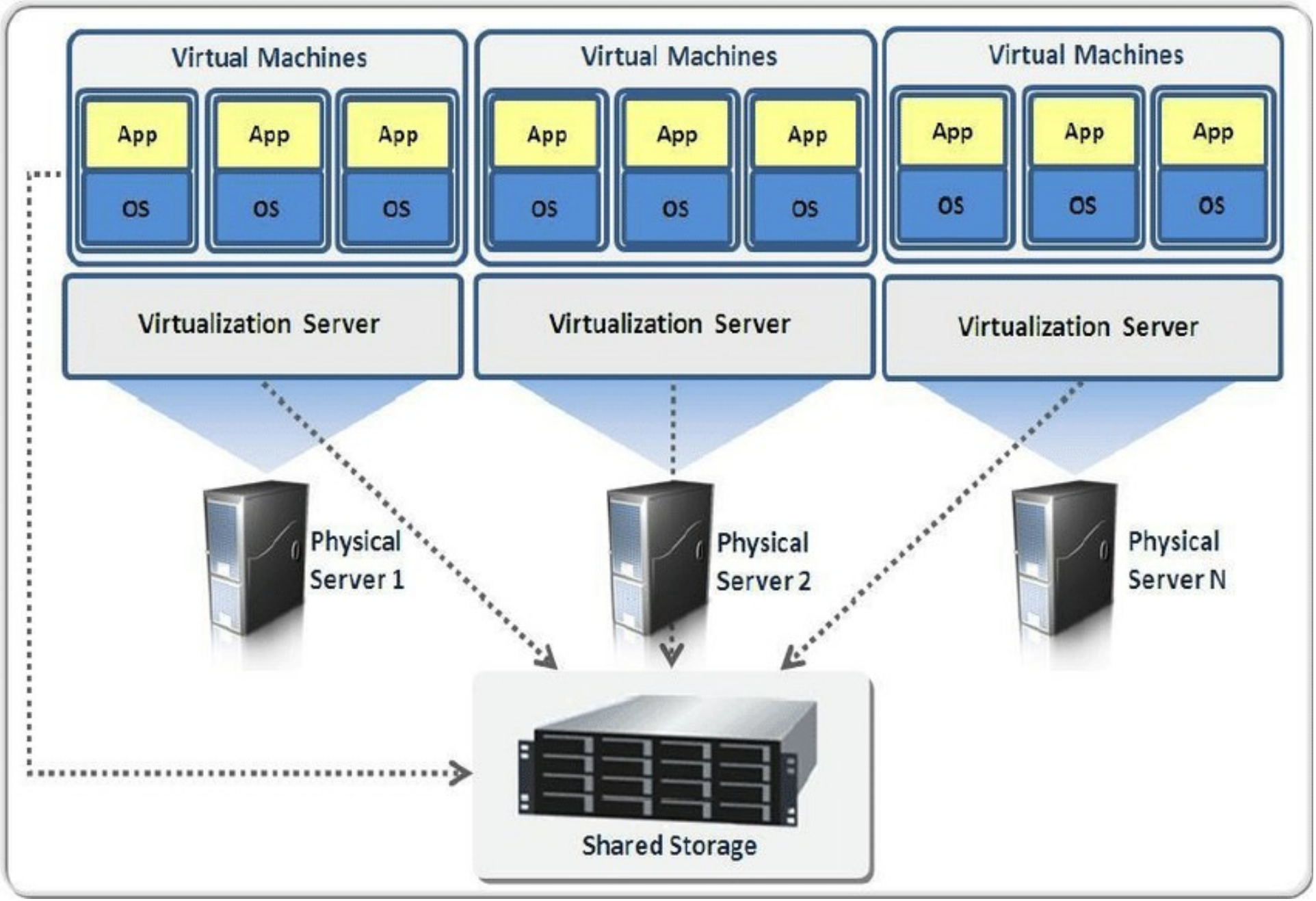
GENERALI Zavarovalnica

MILENIJUM® OSIGURANJE

NLB Vita Življenjska zavarovalnica

PRVA Prva osebna zavarovalnica, d. d.

triglav


Virtual Machines
App
App
App
OS
OS
OS
Virtual Machines
App
App
App
OS
OS
OS
Virtual Machines
App
App
App
OS
OS
OS
Virtualization Server
Virtualization Server
Virtualization Server
Physical Server 1
Physical Server 2
Physical Server N
Shared Storage

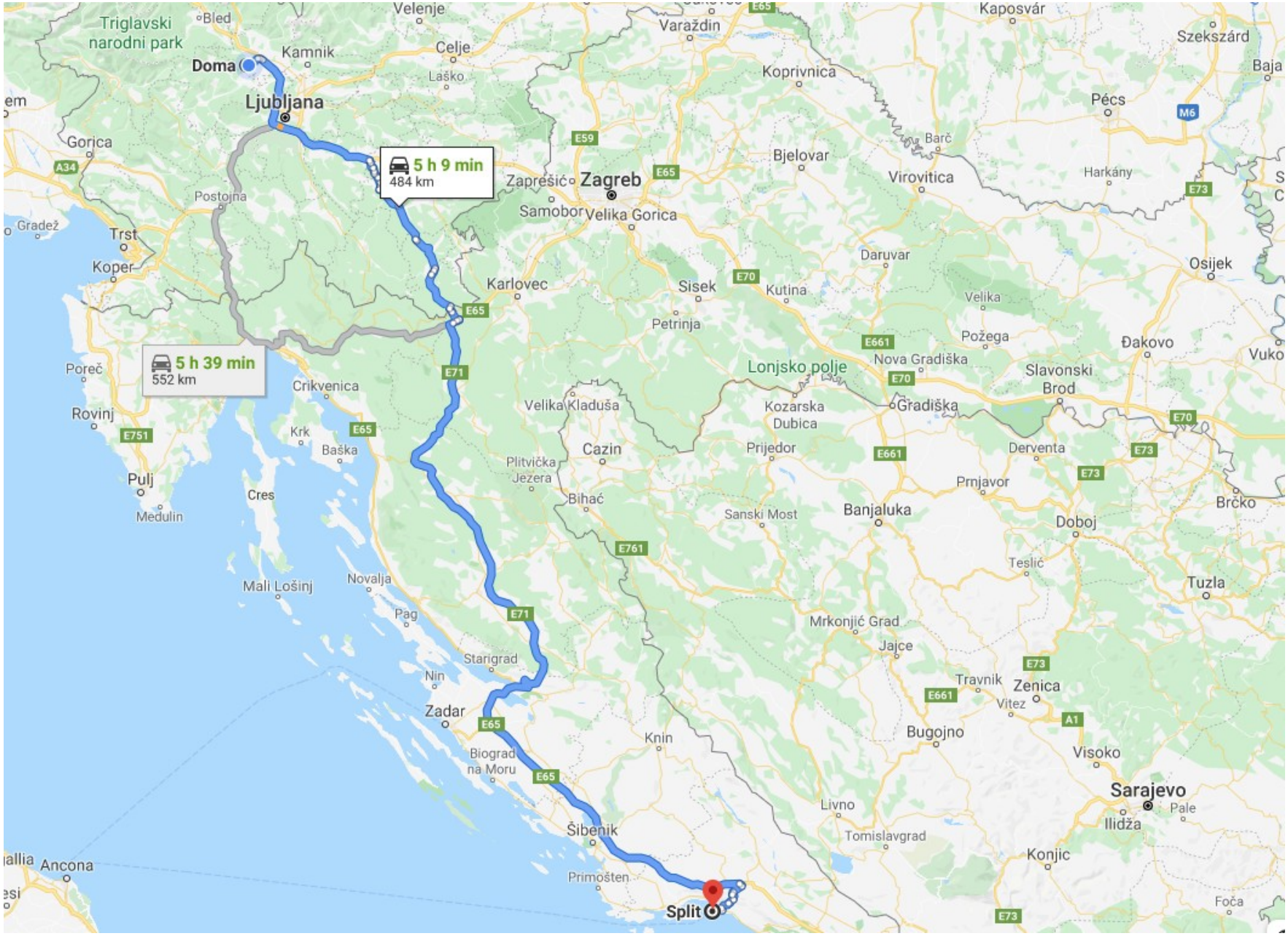
Make IT

2022

How is database performance doing today?

Distance and time

- I drove my car to Split for 4 hours.
- How fast did it take?


Doma
Ljubljana
5 h 9 min
484 km
5 h 39 min
552 km
Zagreb
Split
Triglavski narodni park
Bled
Kamnik
Celje
Velenje
Varaždin
Koprivnica
Kaposvár
Szekszárd
Baja
Pécs
Gorica
Postojna
Trst
Koper
Gradež
Zaprešić
Samobor
Velika Gorica
Bjelovar
Virovitica
Barč
Harkány
Daruvar
Osijek
Karlovec
Sisek
Petrinja
Kutina
Velika
Požega
Đakovo
Vuko
Nova Gradiška
Lonjsko polje
Slavonski Brod
Gradiška
Kozarska Dubica
Prijedor
Derventa
Brčko
Poreč
Crikvenica
Rovinj
Krk
Baška
Pulj
Medulin
Cres
Velika Kladuša
Cazin
Plitvička Jezera
Bihać
Sanski Most
Banjaluka
Prnjavor
Doboj
Teslić
Tuzla
Mali Lošinj
Novalja
Pag
Starigrad
Nin
Zadar
Knin
Mrkonjić Grad
Jajce
Travnik
Zenica
Vitez
Bugojno
Visoko
Sarajevo
Pale
Ilidža
Livno
Tomislavgrad
Konjic
Foča
Šibenik
Primošten
Biograd na Moru
Ancona
E59
E65
E70
E71
E73
E661
E751
E761
M6
A1
A34

Distance and time

- I drove my car to Split for 4 hours.
- How fast did it take?
- Google maps: 484 km
- Put this together:
  - 484 km / 4 h = 121 km/h

Test case

- I drove my car to Split and it takes 6 hours.
- 484 / 6 = 80,67 km/h
- 80,67 < 121:
  - it takes »too long«;
  - something went wrong;
  - don’t know what,
  - … but it indicates I need something to do

Test case

- I drove my car to Split and it takes 6 hours.
- 484 / 6 = 80,67 km/h
- 80,67 < 121:
  - it takes »too long«;
  - something went wrong;
  - don’t know what,
  - … but it indicates I need something to do:
    - new car?
    - new road?
    - new route?

Indicator km/h

- The indicator does not tell what is wrong or what to do.
- It tells us about relationship between distance and time.
- We may want to investigate further.

Work and Time

1 worker 12 wheelbarrows in 60 min

Work and Time

- 1 worker (workload).
- 12 wheelbarrows (work_done).
  - unit of work: wheelbarrow.
- 60 min (time).
- Work_time = workload * time = 1 * 60 = 60 min.
- Response Time = work_time / work_done = 60 min / 12 = **5 min / wheelbarrow.**

Work and Time

2 workers 24 wheelbarrows in 60 min

Work and Time

- 2 workers (workload).
- 24 wheelbarrows (work_done).
- 60 minutes (time).
- Work_time = workload * time = 2 * 60 = 120 min.
- Response Time = work_time / work_done = 120 min / 2 = **5 min / wheelbarrow.**

Response Time

- rate of work_done and work_time is linear.
- as work_done increases so does the work_time.
- Response Time is constant.

Response Time

- rate of work_done and work_time is linear.
- as work_done increases so does the work_time.
- Response Time is constant.
- until ...

Response Time

- rate of work_done and work_time is linear.
- as work_done increases so does the work_time.
- Response Time is constant.
- until ...
- the system get's too busy.

Work and Time

4 workers
(waiting)
24 wheelbarrows
in 60 min

Work and Time

- 4 workers (workload).
- 24 wheelbarrows (work_done).
- 60 minutes (time).
- Work_time = workload * time = 4 * 60 = 240 min.
- Response Time = work_time / work_done = 240 min / 24 = **10 min / wheelbarrow.**

Unit of Work: LIO (logical IO)

- LIO processing is the number-one bottleneck for many busieness processes.
- LIO consumes two of system's most expensive resources: CPU and latches.

https://method-r.com/wp-content/uploads/2017/07/Why-You-Should-Focus-on-LIOs-Instead-of-PIOs.pdf
https://blog.pythian.com/do-you-know-if-your-database-slow/
https://blog.orapub.com/20181204/do-direct-path-reads-count-as-logical-reads.html

Work and Time

	Workers	Oracle Server
workload	4 workers	active sessions
unit of work	wheelbarrow	LIO*
work done	24 wheelbarrows	LIOs
wall time	60 min	
work time	workload * time	DB time
response time	work time / work done	

Oracle Server Calculation

- workload = DB time / wall time.
- response time = DB time / LIO (**ms/LIO**).
- throughput: LIO / wall time (LIO/ms).
- Respone time is hardware dependent.

Oracle Server Calculation

- workload = DB time / wall time.
- response time = DB time / LIO (**ms/LIO**).
- throughput: LIO / wall time (LIO/ms).
- Respone time is hardware dependent.
- Calculate response time baseline when database performs »acceptable«.
  - Carve it in stone.

How is database performance doing today?

Good, normal or bad?

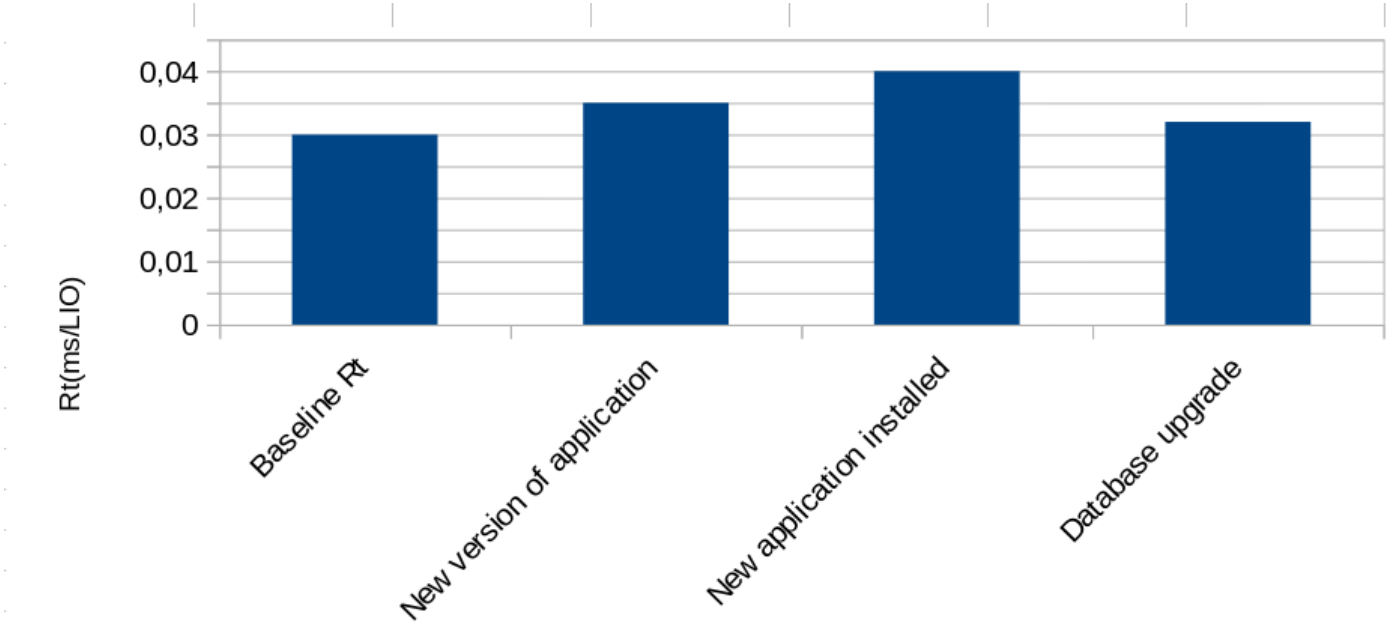
How is database performance doing today?

Good, normal or bad?

$$\frac{\text{current response time}}{\text{baseline response time}}$$

Useful cases

- Virtual environment.
- Evolving application.
- New application installed.
- Database upgrade.
- ...



Make IT

2022

- 9:50 Boris Oblak
  One indicator to rule them all
  (James Cook)
- 12:35 Urh Srečnik
  OLVM: Inkrementalni backupi (dirty bitmaps)
  (James Cook)

http://www.abakus.si/