Remote desktop configuration for work with high performance graphical applications

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15.04.2019
Moscow
HybriLIT education and testing polygon

10 nodes 20x Xeon E5-2695v2,v3 total 252 cores
21x Nvidia K20X, K40, K80
Total 2,5 Tb RAM
Performance: 140 Tf (SP), 50 Tf (DP)

GOVORUN supercomputer

21 nodes 21x Xeon Phi 7290 total 1512 cores
39 nodes 78x Xeon Gold 6154 total 1404 cores
5 nodes 10x Xeon E5-2698 v4 total 200 cores
40x NVIDIA V100
Total 10 Tb RAM
Performance: 1140 Tf (SP), 550 Tf (DP)

Home & data

450 Tb ZFS
300 Tb EOS
120 Tb Lustre
### User requirements

<table>
<thead>
<tr>
<th>Light</th>
<th>Medium</th>
<th>High</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Light" /></td>
<td><img src="image2.png" alt="Medium" /></td>
<td><img src="image3.png" alt="High" /></td>
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</tbody>
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#### Batch or offline

- `$ ssh`
- `$ sbatch`
- 10 cores
- 2 hours
- `$ cat output`

**Example:**

```
$ ssh
$ sbatch
10 cores
2 hours
$ cat output
```

#### Batch or online

- `$ ssh`
- `$ sbatch`
- 400 cores
- 10 gres
- 7 day
- `$ cat output`

**Example:**

```
$ ssh
$ sbatch
400 cores
10 gres
7 day
$ cat output
```

#### Online

- `$ ssh`
- `$ module add Comsol`
- `$ comsol`
- **Display results**
- **512 Gb RAM**
- **2 Gb GDDR**

**Example:**

```
$ ssh
$ module add Comsol
$ comsol
Display results
512 Gb RAM
2 Gb GDDR
```

### User ratio

- **50%**
- **45%**
- **5%**
Access modes

**Hardware specs**

12X
- 4 core
- 20 Gb RAM
- ZFS
- EOS
- CVMFS

Login nodes for software development and running applications by batch mode for SSH. MATE desktop environment provide access to high performance graphical applications. Support NVIDIA Tesla M60 to provide access to online computation mode for development software by COMSOL, Mathematica, MatLab, Maple packages.

4X
- 4 core
- 20 Gb RAM
- 2 Gb GDDR
- 40 Gb SSD
- CVMFS

Graphical user interfaces for work with offline computations. Support NVIDIA Tesla M60 to provide access to online computation mode for development software by COMSOL, Mathematica, MatLab, Maple packages.

**Home and data**

**Software**

HybriLIT platform

**Access modes**

- SSH & X2Go
- Citrix Receiver
Virtual Desktop Infrastructure (VDI) is virtualization technology that hosts a desktop operating system on a centralized server in a data center. Provides persistent Windows or Linux virtual desktops that can be fully customized to meet the needs of users.

**HybriLIT**

Education and testing polygon is based on heterogeneous structure of computation nodes and allows developing parallel applications for carrying out computation using various computing architectures such as multicore CPUs and GPUs.

CPU and GPU calculations, Using high performance software, Education and trainings.

**GOVORUN**

Is a two-component system that includes CPU-component based on the newest Intel architectures (Intel Xeon Phi and Intel Skylake processors), and GPU-component based on NVIDIA DGX-1 Volta.

High performance computation for physical experiments.

**ACCESS MODES**

Batch
X2Go
Citrix Receiver
Citrix structure

Windows Server 2016 AD
active directory

Active directory
DHCP
DNS

System VMs
Citrix Studio
Citrix StoreFront
LM Citrix
LM Nvidia

Windows Server 2016 DC
Delivery controller

Hypervisor with **2x CPUs 32 cores, 4x NVIDIA Tesla M60, 512 Gb RAM** and XenServer 7.6 operation system
Change mode from calculate to graphical + NVIDIA GRID drivers install

Using Citrix Center for manage VMs: creation virtual machine and change hardware settings for master image prepare

**Master image**

- 4 Cores, 20 Gb RAM, 2 GDDR, 40 Gb SSD
- 4 Cores, 20 Gb RAM, 2 GDDR, 40 Gb SSD
- 4 Cores, 20 Gb RAM, 2 GDDR, 40 Gb SSD
- 4 Cores, 20 Gb RAM, 2 GDDR, 40 Gb SSD

Citrix environment settings: XenTools, Samda, Nvidia GRID, Citrix VDA

HybriLIT environment settings
Scientific Linux 7.6, CVMFS with Comsol, Maple, Matlab, Mathematica

Citrix Studio settings: add host, create machine catalog, create delivery group

Connect to Virtual Desktop by browser and Citrix Receiver for running provided packages
• Citrix application
• LDAP users
• Change AD
Thank you for your attention!