

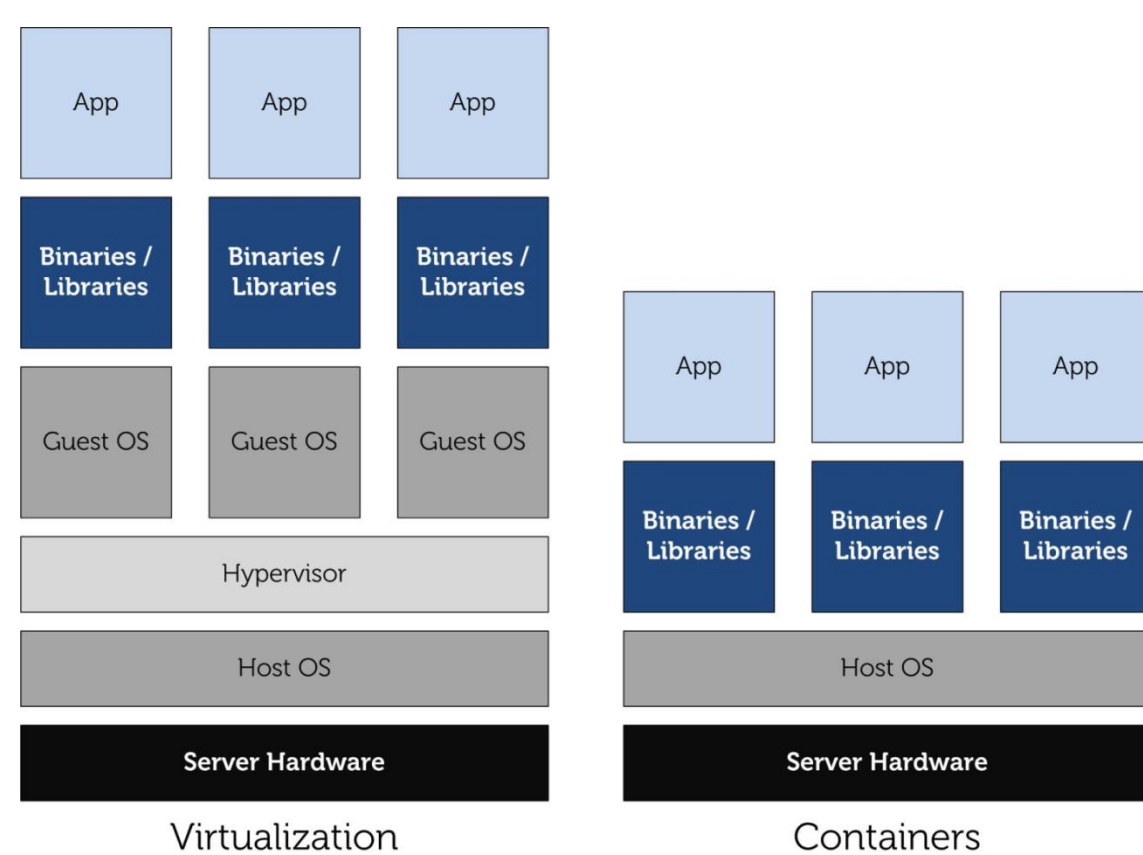


Information technologies development at KNDC

Virtualization system – topicality of the task

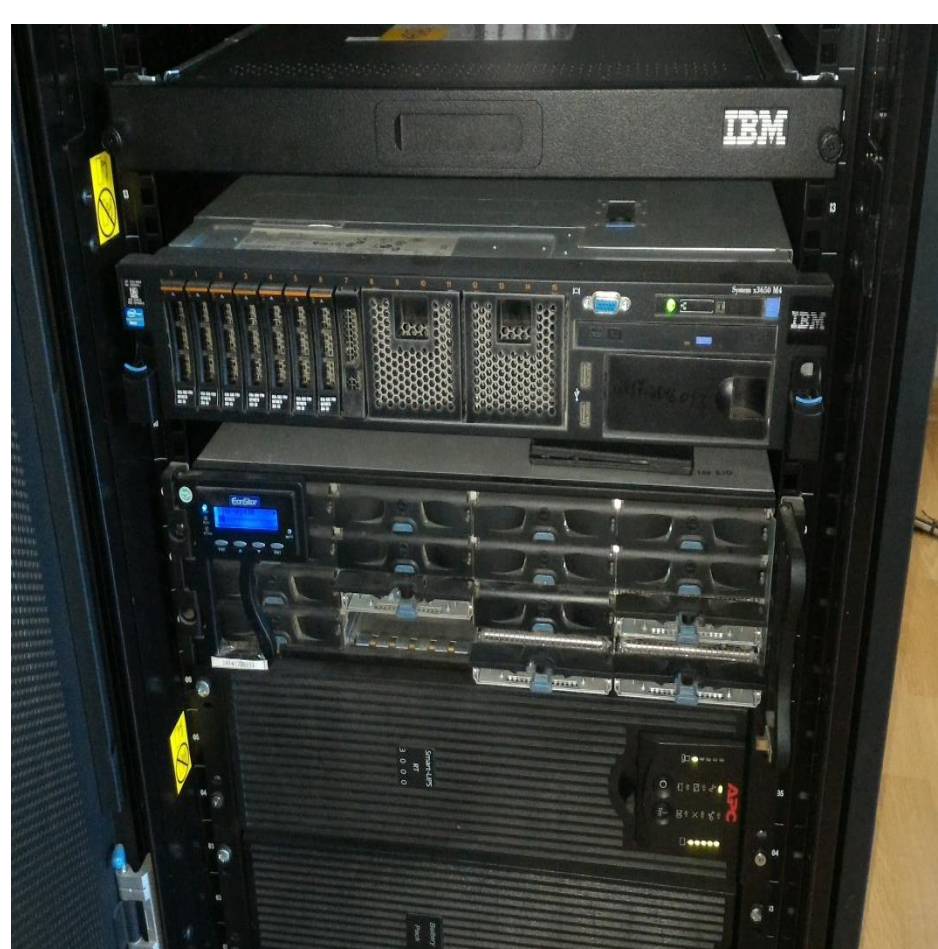
- Optimal utilization of computational resources
- Saving of physical resources
- Increase of scalability and extension of the infrastructure
- Enhanced failure tolerance
- Ability to support obsolete OS
- Virtual networks
- Snap shots

PROXMOX VE supports two types of virtualization: virtual machines (VM) and containers (LXC)



Virtualization server at KNDC (PROXMOX VE)

Virtualization server at Kazakhstan Data Centre and its specifications: The server was built on the base of IBM server (System x3650MY) provided by the CTBTO within National Data Centers support program. The server was upgraded in comparison to its standard assembly. In particular, the own SAS disk was transformed to RAID 1 consisting of 4 disks, Linux OS, and PROXMOX virtualization server. For virtual machines storage the server was added with 10 Tb EonStor disk, the same as RAID 1. The server has 32 Gb RAM that, by estimates, should be enough for 20-30 virtual machines of average load, and 8-core Intel® Xeon processor.



сервер	IBM System x3650 M4 (7915K0G / 7915 K00) Express
процессор	1 (up to 2) Intel® Xeon® E5-2650 v2 (Ivy Bridge) 2.60-3.40GHz, 8 Core, Hyper-Threading, 8 DQTS QPI, 20MB L3 cache
чипсет	Intel® C602 (Datsburg) PCI
плата	16GB (2 DIMM x 8GB) DDR-III PC3-14900 ECC Registered Single Rank (up to 24 DIMMs PC3-14900, upgradeable to 768GB max.)
RAID-контроллер	IBM ServerAID MS110w 8-internal channel SAS 6G RAID (SAS 6G, 5.25" hot-swap) 10B Flash Backed Write Cache (upgradeable to 8GB) (50)
дисковая подсистема	up to 16TB (16 x 1TB) hot-swap SATA/SAS SFF 2.5" HDD/SSD System (8 upgradeable to 16 HDD bays)
жесткие диски	0 (up to 16) x 2.5" hot-swap SFF SATA/SAS HDD
сетевой адаптер	4 channel iGbE 10/100/1000 GbE Gigabit LAN Network Interface Controller with iGbE, SR-IOV, optional DVD Multi Burner
оптический привод	750W Hot Plug (upgradeable to 1+1 Redundant 750W or 900W Power Supply System)
блоки питания	Module 11 Standard (upgradeable to Advanced)
корпус	IBM Integrated Management Module 11 Standard (upgradeable to Advanced)
управление	

Creation of servers virtualization system;



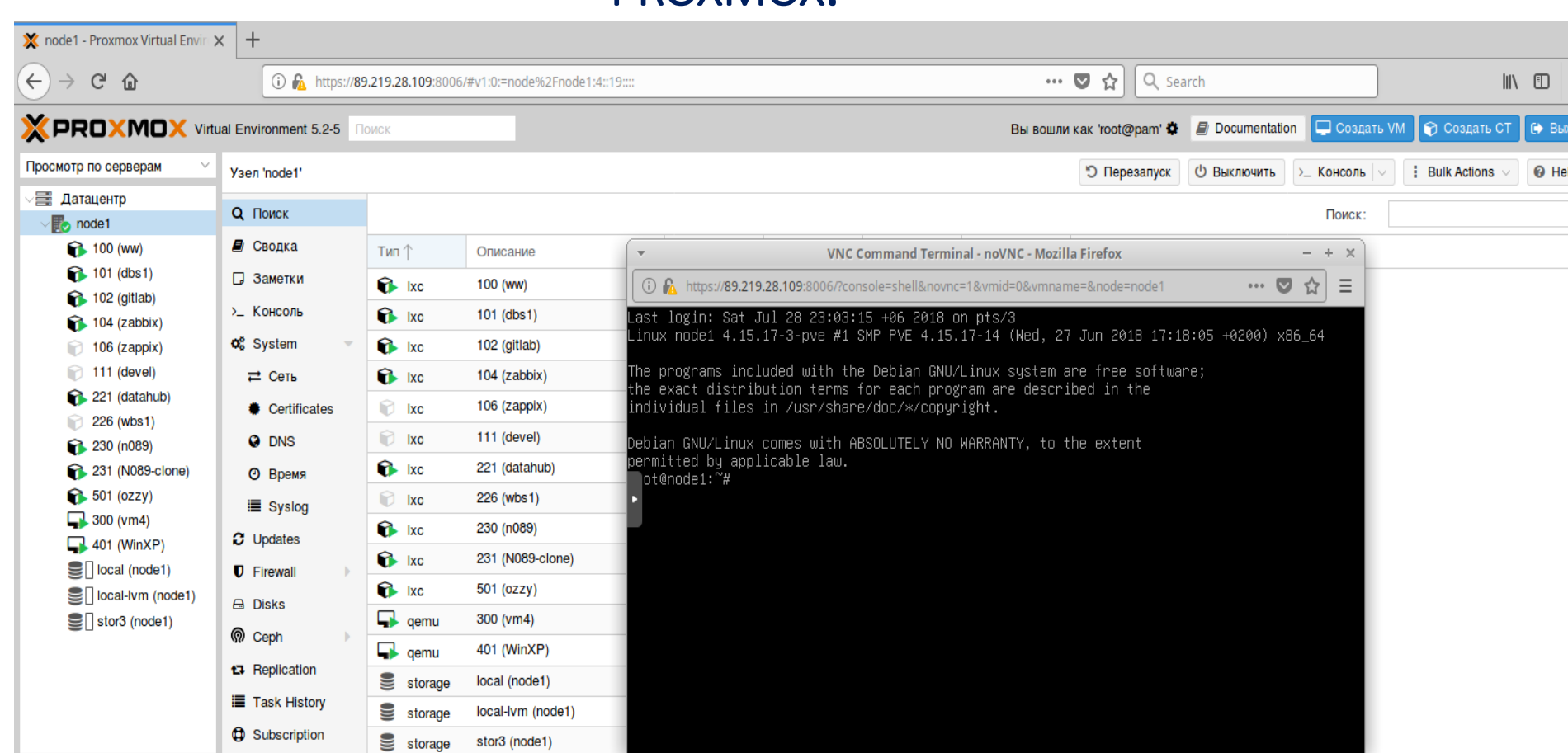
Virtualization system of servers used at KNDC – PROXMOX VE

Proxmox Virtual Environment (Proxmox VE) — open-source virtualization system based on [Debian GNU/Linux](#)

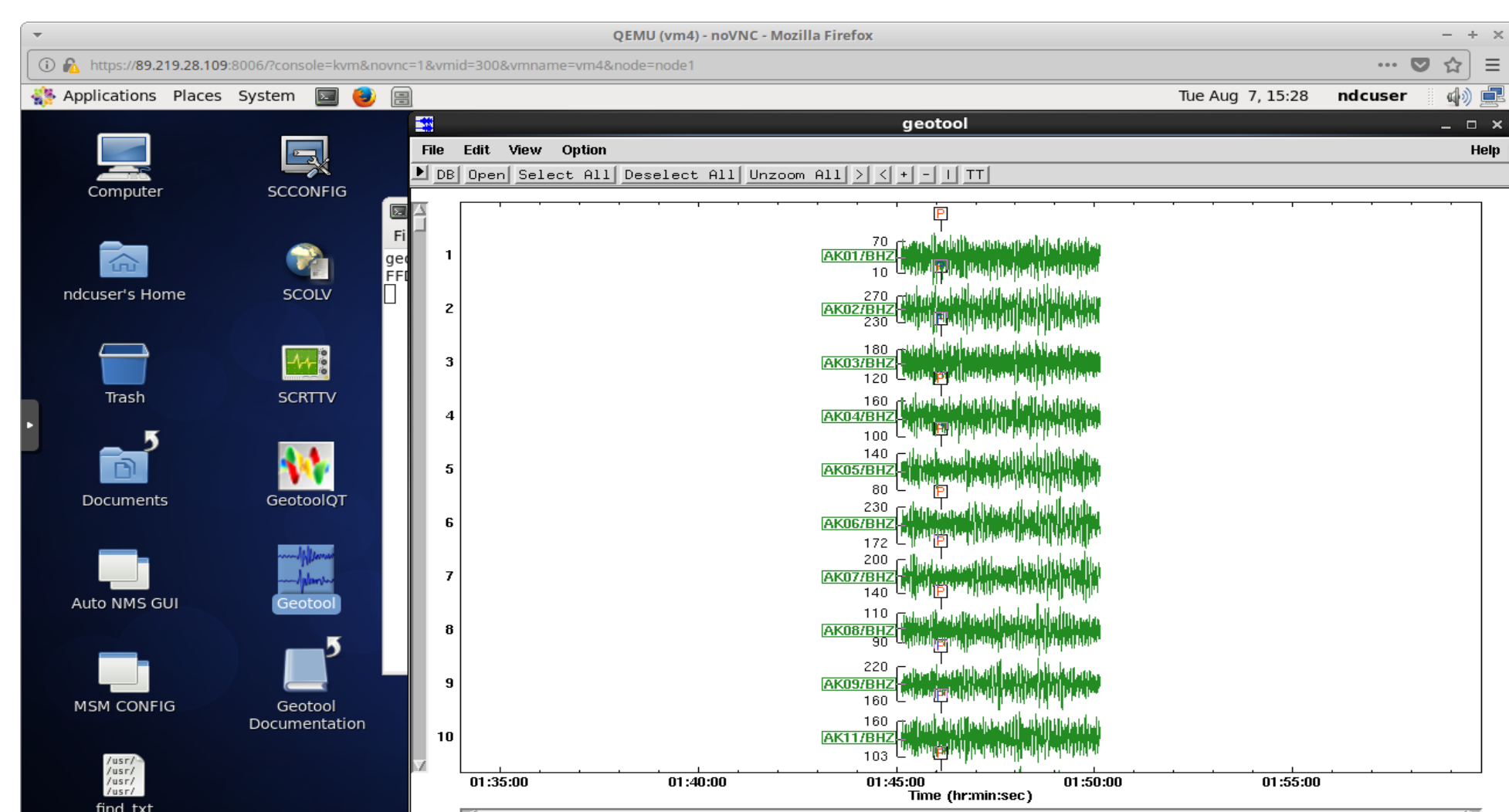
Main advantages of Proxmox VE:

- Easy management via web-interface.
- Monitoring of load in real time.
- Statistics and informative graphs of virtualization server load and every virtual machine separately – by RAM, CPU, HDD, network in terms of the past hour/day/week/month/year.
- Joining of servers into a cluster with ability of live migration of virtual machines (without stopping of a guest system).
- Quick extraction of guest systems out of the templates.
- Saving of a virtual machine image state (snap shot), forming of a state tree and ability to rollback to any of points.
- Automated backup of virtual machines.
- Download of ready templates from the developers site (such as general distribution packages, and adjusted for a specified task, for instance, running of MediaWiki, Drupal or WordPress).

WEB-interface of administrator panel. In addition, the interface access can be set via access and safety policy supported by PROXMOX.



Virtual servers can be installed from installation images. The Figure below shows the installed virtual machine NDC-in-a-Box (CTBTO) supplied to the National Data Centers with already pre-installed and ready for use utilities. The Figure shows virtual machine opened in the web-browser without installation of any additional software. The screenshot shows the opened Geotool program.

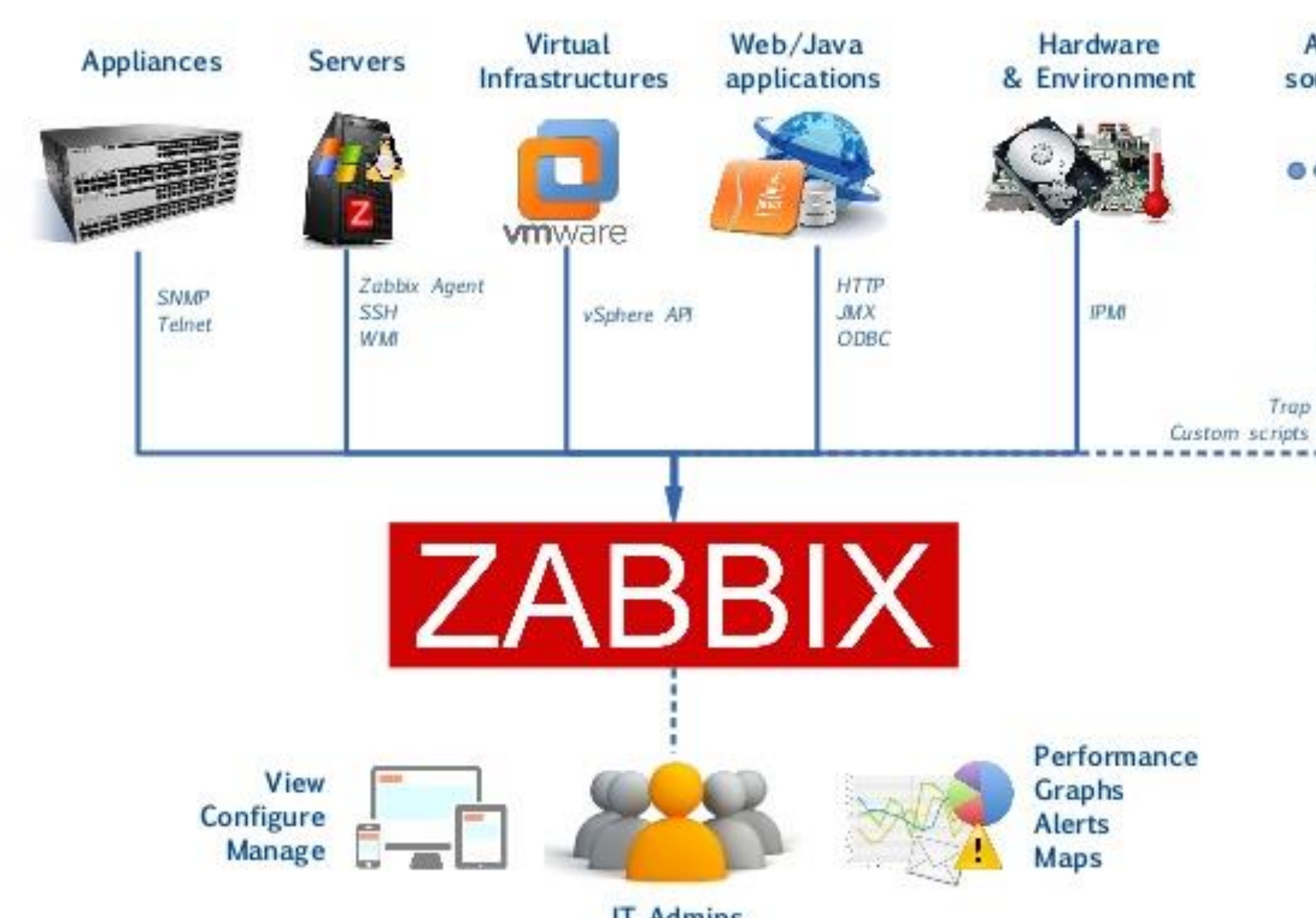


Creation of IT-infrastructure monitoring system;



The main capabilities of ZABBIX on information acquiring from such information systems as:

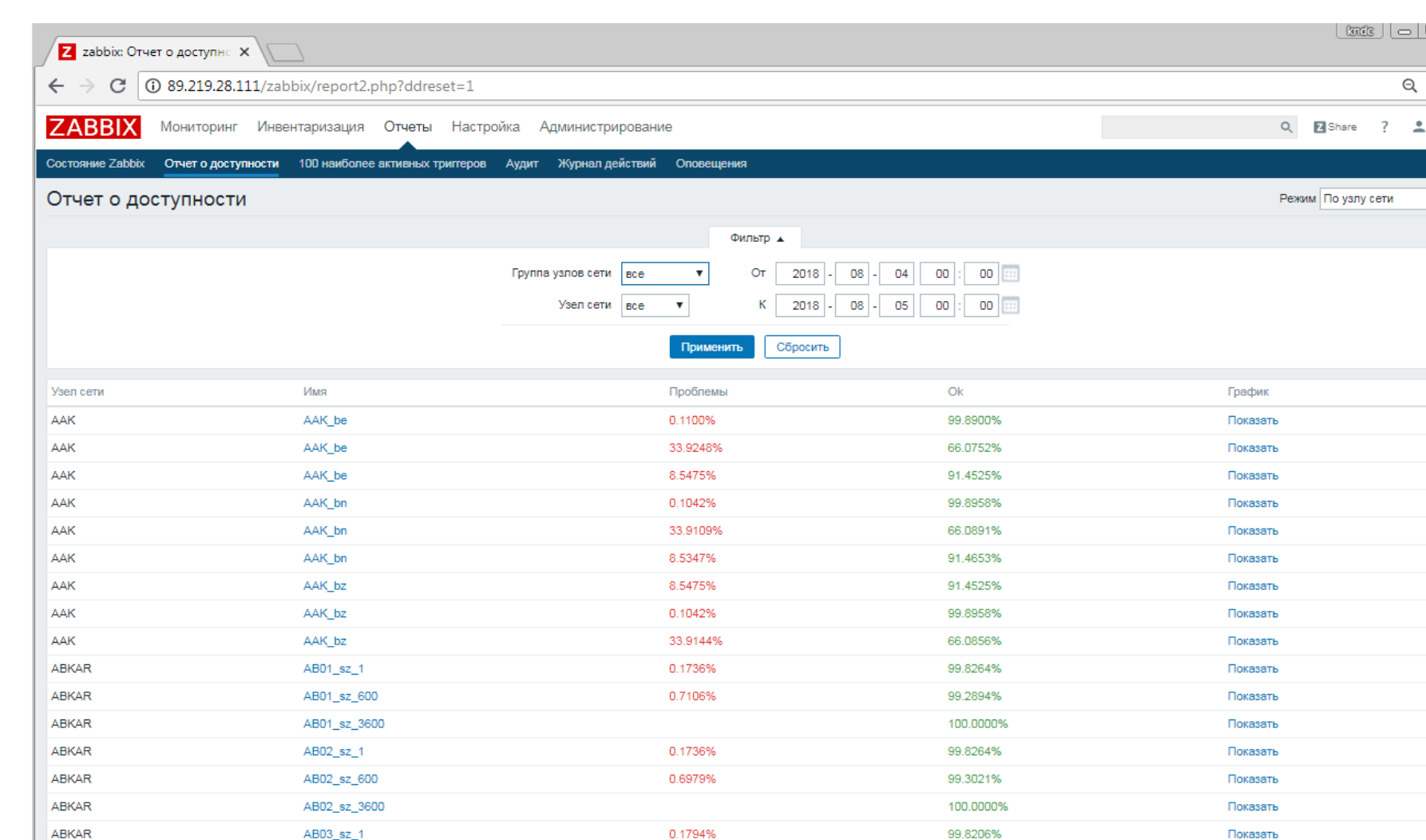
- Any user programs, scripts, services;
- Different types of servers, such as mail servers, web-servers, DB servers;
- Log files, stream data, virtual machines, etc.
- Elements of network communication (hubs, routers, switches) and peripheral equipment (printers, scanners, phones);
- Operation systems;
- Hardware elements: hard disks, memory, processors;
- UPS elements.



Utilization of ZABBIX at KNDC

- Display and control of data arrival processes;
- Monitoring of software and systems operation via log files;
- Control for KNDC WEB-resources operation;
- Monitoring for databases and servers;
- Control for emergency power systems;
- Alerts on emergency and critical situations, and on failure of software and hardware.

ZABBIX receives information from agents, interprets it and shows volumes of arriving information, number of problems, failures during data receive process.

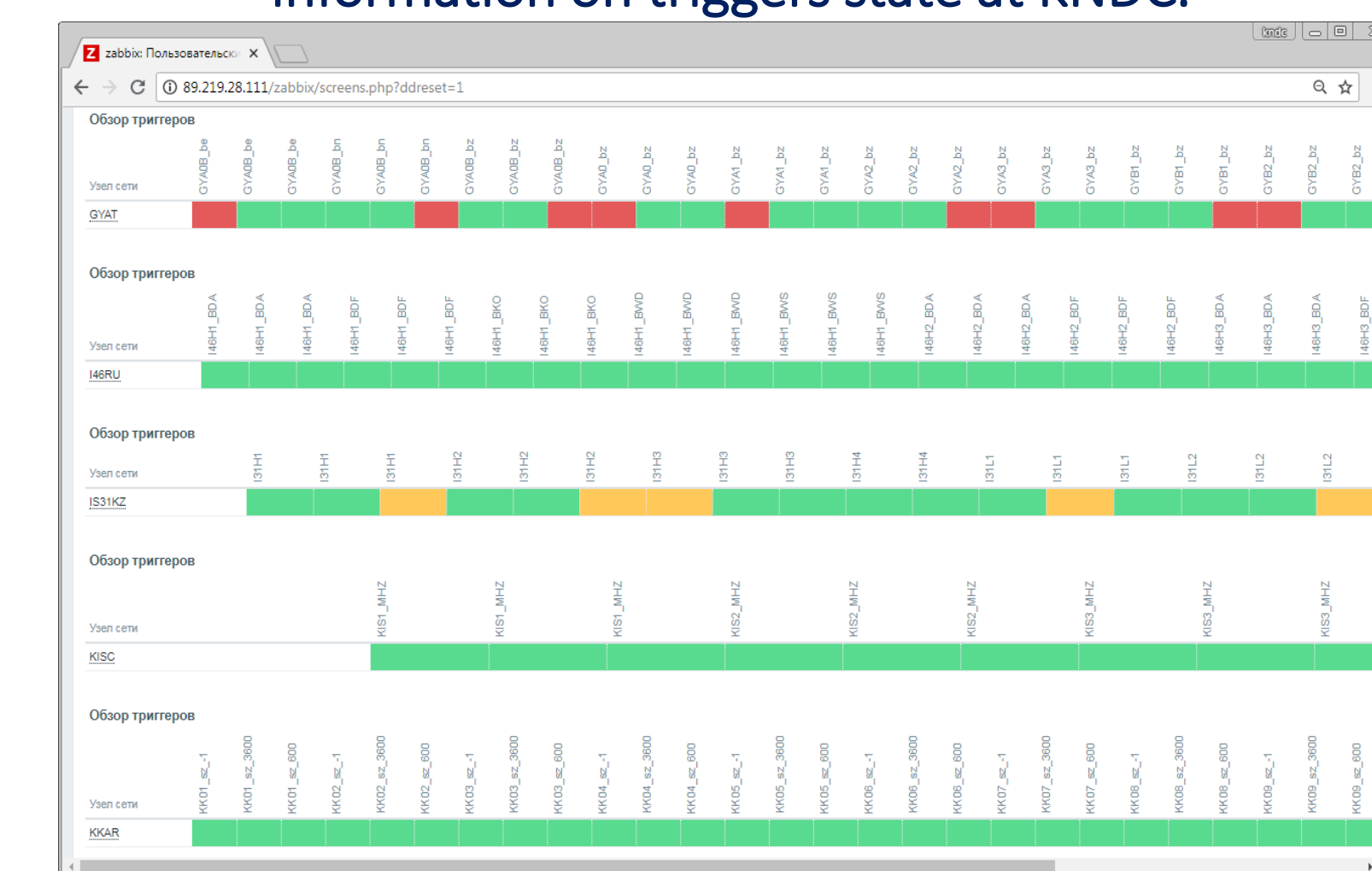


- IT-infrastructure monitoring system is an observation system allowing for repeated analysis of facilities and systems state, tracing of dynamics of changes and processes occurring with them.
- The key task of IT monitoring systems is receiving, saving and analysis of information on state of controlled elements of IT structure of the company. The system allows for quick reaction in the case of IT services operation failure, and for effective prevention of failures appearance.

Selection of IT-infrastructure monitoring system

- **Nagios** – open-source program for monitoring of computer systems and networks: observation, control of state of computational nodes and services, informing of an administrator if any of services stops its operation
- **Munin** – is easy network instrument for resources monitoring. It allows acquiring data from several servers simultaneously and show everything in light beautiful graphs.
- **Zabbix** – free system for monitoring and tracing of states of different computer network services, servers, and network equipment.

ZABBIX, using its triggers ,responses to threshold values of delay at data arrival from seismic stations and displays the information on triggers state at KNDC.



ZABBIX shows information on the state of its controlled nodes, and on the base of triggers state informs the current status.

