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1.GENERAL DATA

Akis Tech Systems Pvt Ltd offers creation of the data-processing center (DPC) in the existing container of 40 feet in which already there is an existing equipment occupying 20 feet.
The offer considers the cost of the engineering equipment, computing equipment, installation and commissioning.
Akis Tech is ready to perform all complex of works on the choice of optimum architecture of creation of DPC (closed, opened, with air cooling, with water cooling), to its design, supply of equipment and accessories, to installation and commissioning and also "turnkey" delivery. After obtaining the specification and basic data the structure and the description of the offered DPC will be specified.

The general view of DPC is presented in figure 1.0

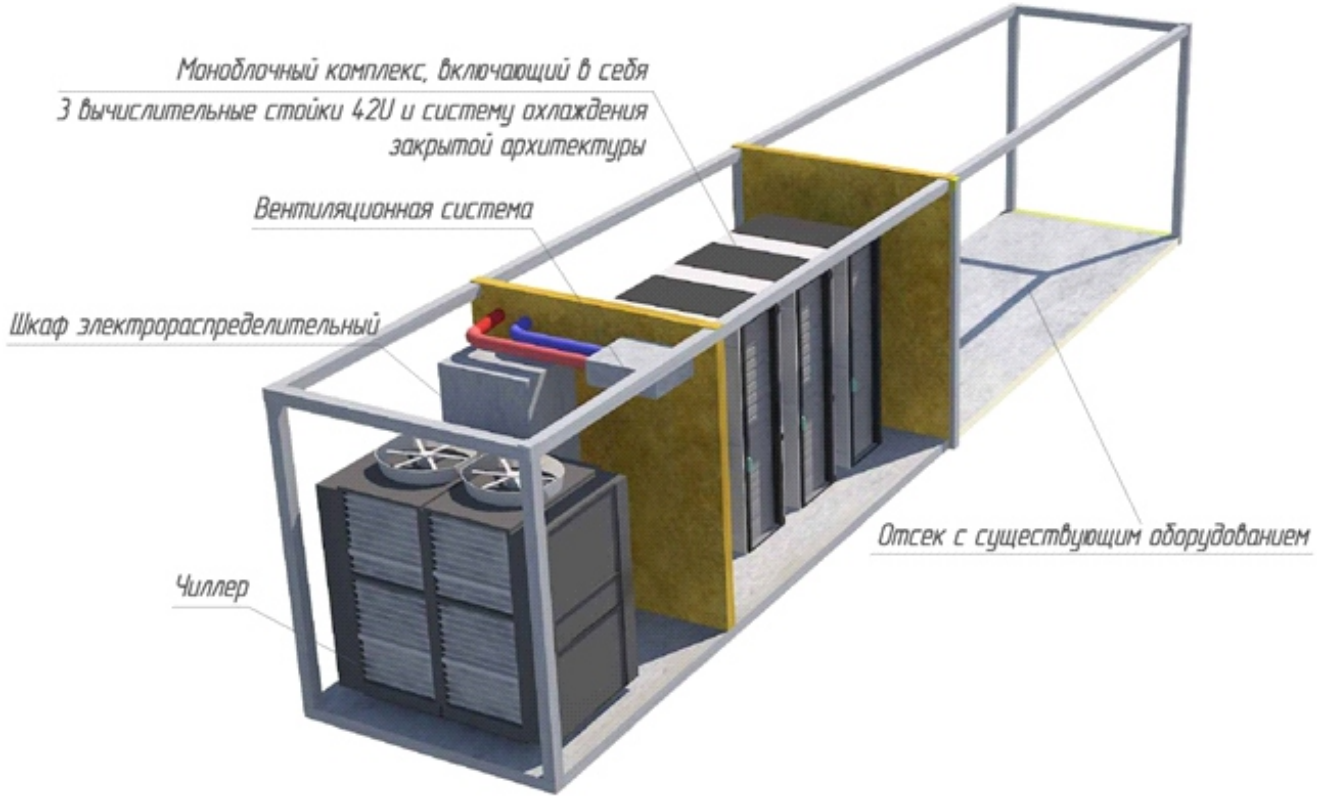

Figure 1 – General view of DPC

2. DESCRIPTION OF THE COMPUTER SYSTEM

2.1 Communication subsystem of VK

The network of management of VK is intended for transfer of office information between components of functional subsystems of VK (functions of loading of OS, exchange of information with BMC). Functions of loading of OS and exchange of information with BMC are carried out by means of 2 switchboards united in uniform network by optical communication channels of 2x10Gb/s by means of the central switchboard of network of management. For connection to network of the enterprise the switchboard of network of access with ports 10GBase-T is used. Total number of switchboards of network of management – 4.

Description	**Quantity**
Central switchboard of network of management	1

Description	**Quantity**
Switchboard of network of management (function of loading of OS) The switchboard of network of management (functions of exchange of information with BMC)	
Switchboard of network of access	1

Dimension of one switchboard – 1U. Total power consumption of all switchboards – 1.2 kW. Total height of the equipment of network of management – 4U.The VK highly productive network is intended for fast exchange of a large number of information between computing knots of the computing field VK, tool knots of a system of access of VK, servers of a control system, system of access to data, a service system and knots of storage of a system of storage of VK. The network will be realized on the equipment of HDR InfiniBand technology (in HDR100 mode). The hybrid technology in which as knots of network 40-port switchboards 40 ports HDR are used is used. Their general quantity will be 3. Dimension of one switchboard – 1U. Total power consumption – 1.5 kW. Total height of the equipment of high-performance network – 3U.In general the communication subsystem of VK has the following parameters:

- total number of switchboards – 7;
- total height of the installed equipment – 7U;
- power consumption (on the maximum power of blocks of power supply) – 2.7 kW.

2.2 Computing field and system of access

Computing knots and knots of a system of access (the 20th units) are realized on the basis of 20 servers which are grouped in 1 computing block and 1 block of a system of access. Each computing knot and knot of a system of access contains two Intel processors of Xeon 6150 18 cores and 4 graphic NVidia V100 NVLink cards. The volume of random access memory of computing knot – 512 GB. Theoretical peak productivity of one computing knot – 34.31 Tflops (from them 3.11 TF on CPU and 31.2 TF on GPU).
At the same time the total peak capacity of the computer system is 686.2 TF (from them 62.2 TF on CPU and 624 TF on GPU).
System knots of computing blocks and the system of access (2 units) are realized on the basis of two servers.
In general the computing field and the system of access has the following parameters:

- total number of servers – 22;
- total height of the installed equipment – 22 U;
- power consumption (on the maximum power of blocks of electro-food)– 41.5 kW.

2.3 Control system and monitoring

The control system and monitoring (SUIM) is intended for management of start and calculations of tasks on VK (management of batch operation of tasks for calculation). Besides, the control system provides to function of the manager of the VK highly productive data transmission network and function of collection of data on a state hardware-software a component, VK services and the engineering equipment of DPC.

The control system and monitoring includes two classes of the equipment: two administrative knots of the control system (CS) and two administrative control units of the high-performance data transmission network (HPDTN).

In general the control system and monitoring has the following parameters:

- total number of servers – 4;
- total height of the installed equipment – 4U;
- power consumption (on the maximum power of blocks of power supply) – 3 kW.

2.4 System of storage

The parallel Lustre file system provides high-performance access to disk resources of storage from the user processes on VK and servers of a system of access. The parallel Lustre file system is intended for expeditious processing and limited storage time of data and is not protected by means of backup/restoration. Also provides access to disk resources of storage from the user processes on VK and servers of a system of access. The parallel Lustre file system is intended for long data storage (the user settings, application programs, basic data, calculation results, etc.).

The system of storage of VK in general has the following parameters:

- passport capacity of disk resources – 192 TB;
- useful capacity of disk resources – not less than 96 TB;
- data protection by means of RAID;
- total height of the installed equipment – 8U;
- power consumption (on the maximum power of blocks of power supply) – 3.5 kW.

2.5 System of the exact time

The system of the exact time presents the device of the exact time on the basis of receiver GPS/GLONASS with the Ethernet interface.
For hardware realization of the time server the PPS time server the Signal is used. It supports work with GPS systems and GLONASS.

In general the system of the exact time has the following parameters:

- total number of servers – 1;
- total height of the installed equipment – 1U;
- power consumption (on the maximum power of blocks of power supply) – 0.018 kW.

2.6 Main characteristics and VK DPC parameters

VK DPC has the following parameters:

- peak productivity – 686.2 TF (from them 62.2 TF on CPU and 624 TF on GPU) Tflops;
- the volume of SHD (crude) – 192 TB;
- the maximum weight of a rack – no more than 1000 kg;
- power consumption:

Component	Power consumption, kW
communication subsystem	2.7
computing field and system of access	41.5
control system and monitoring	3
system of storage	3.5
system of the exact time	0.018
In total	50.718 (40 kW taking into account consumption coefficient)

3 DESCRIPTION OF ENGINEERING SYSTEMS

The general description of the engineering systems which are a part of DPC is presented in this section.

3.1System of Uninterrupted Food (SUF)

Power supply of monoblock complexes and the IT equipment placed in computing racks is provided from the system of uninterrupted food (SUF).

The general rated capacity of the computing equipment is 40 kW (2 racks on 20 kW). SBP includes:

- the uninterruptible power supply units of the class "On-Line" of rack-mount execution installed in one of computing racks;
- necessary panel board equipment;
- the system of distribution of food in racks;

cable designs and other necessary materials. SBP is organized according to the scheme of reservation N+

3.2 Air conditioning system and cold supply

As the cooling system of the computing equipment the monoblock complexes which are turning on cooling blocks, computing racks for placement of the IT equipment, the system of automatic control and monitoring, the system of distribution of food, the system of automatic distribution of power of cooling are applied.

Air conditioning system and cold supply includes the following equipment:

- monoblock the complex including three racks and the cooling system of the closed architecture;
- the refrigerator with the hydromodule;
- ventilation system;
- necessary pipe distributing.

Air conditioning system of monoblock complexes is accepted with the scheme of reservation N+1.

Monoblock complexes have a number of advantages:

- convenience in operation;
- possibility of fast dismantling of doors;
- the uniform unified design and absolute compatibility with other additional systems;
- the maximum range of adjustment of provision 19" guides on case depth;
- compatibility 19" guides with any IT equipment;
- possibility of installation of the independent automatic fire-extinguishing system in each rack.

3.3 Automatic fire-extinguishing system (APT)

The APT system consists of the independent fire extinguishing system installed in each computing rack of a monoblock complex.

3.4 System of monitoring and scheduling

The system of monitoring and scheduling allows to exercise control of a condition of all engineering equipment and in due time to monitor any emergencies and an exit of operating parameters out of limits of the set ranges.

4. MAIN CHARACTERISTICS AND COST ASSESSMENT

The main characteristics and cost assessment of creation of DPC are presented in Table 1.

Table 1 – Main characteristics and cost assessment

№	Characteristic payment order	Value
1.	Theoretical peak productivity, TF	686.2
2.	Volume of a system of storage, TB	192
3.	Quantity of computing racks under placement of the IT equipment, piece.	2
4.	The power brought to each computing to rack under placement of the IT equipment, kW	20
5.	Quantity of computing racks under placement of the UPS, piece.System power supply, includingsystem uninterrupted food (SBP)	1
6.	with the scheme of reservation N+1	it is provided
7.	System of cold supply and conditioning with the scheme of reservation N+1	it is provided
8.	System of automatic gas fire extinguishing, automatic system control and management of access, heating, ventilation	it is provided
9.	Inspection of an object	it is provided
10.	Project works	are provided
11.	Installation and construction works	are provided
	Commissioning	are provided

MOBILE DATA PROCESSING CENTER

(3 RACKS ON 42U AND NECESSARY ENGINEERING SYSTEMS)

CONTENTS

1. GENERAL DATA

Akis Tech offers creation of the mobile data processing center (DPC) in the container module of 20 feet performed by the data storage.

The offer considers the cost of the engineering equipment, computing equipment, installation and commissioning.

Akis Tech is ready to perform all complex of works on the choice of optimum architecture of creation of DPC (closed, opened, with air cooling, with water cooling), to its design, supply of equipment and component parts, to installation and commissioning and also "turnkey" delivery. After obtaining the specification and basic data the structure and the description of the offered DPC will be specified.

2. DESCRIPTION OF STORAGE SYSTEM (SHD)

SHD has the following parameters:

- the interface for external connection to data storage servers - 40/100 Gbit / with Ethernet or ERD/HDR Infiniband;
- the number of servers of storage - 6;
- quantity of disk storage systems of data - 6;
- passport capacity of all disk resources - 4608 TB;
- data protection by means of RAID;
- total height of the installed equipment - 108U;
- power consumption (on the maximum power of electrical power units) - 31.2 kW.

3. DESCRIPTION OF ENGINEERING SYSTEMS

The general description of the engineering systems which are a part of mobile DPC is presented in this section. System of Uninterrupted Power (SUP)

Power supply of monoblock complexes and the IT equipment placed in computing racks is provided from the system of uninterrupted power (SUP).
The total rated capacity of the computing equipment installed in three racks is 31.2 kW.
SBP includes:

- uninterruptible power supply units of the class "On-Line" rack
  the executions set in one of computing racks;
- necessary panel board equipment;
- the system of power distribution in racks;
  cable constructions and other necessary materials. SBP is organized according to the scheme of reservation N+1.

3.2 Conditioning system and cold supply

As the cooling system of the computing equipment the monoblock complexes which are turning on cooling blocks, computing racks for placement of the IT equipment, an automatic control system and monitoring, the system of power distribution, cooling power automatic distribution system are applied.
The conditioning system and cold supply includes the following equipment:

- monoblock the complex including four racks and a system coolings of the closed architecture;

- the refrigerator with the hydromodule;
- ventilation system;
- necessary pipe distributing.
  The conditioning system of monoblock complexes is accepted with the scheme of reservation N+1.

Monoblock complexes have a number of advantages:

- convenience in operation;
- possibility of fast dismantling of doors;
- the uniform unified design and absolute compatibility with other additional systems;
- the maximum adjustment range of provision 19" guides on cabinet depth;
- compatibility 19" guides with any IT equipment;
- possibility of installation of autonomous system of automatic fire fighting in each rack.

3.3 **Automatic fire-extinguishing system (APT)**

The APT system consists of autonomous system of fire extinguishing, ustanavliva-a hole in each computing rack of a monoblock complex.

3.4 Monitoring system and schedulings

The monitoring system and schedulings allows to exercise control of a status of all engineering equipment and to timely monitor any faults and an output of operating parameters out of limits of the set ranges.

4. MAIN CHARACTERISTICS AND COST ASSESSMENT

The main characteristics and cost assessment of creation of DPC are presented in Table 1.

Table 1 - Main characteristics and cost assessment

NO	Characteristic payment order	Value
1.	Volume of storage system, TB	4608
2.	Quantity of computing racks on placement	3 IT equipments, piece.
3.	Total power of computing racks, kW	31.2
4.	Quantity of computing racks on placement	1 UPSes, piece.
5.	The electrical generating system, including a system is provideduninterrupted power (SBP) with the scheme reservations of N+1	
6.	System of cold supply and conditioningit is provided with the scheme of reservation N+1	it is provided
7.	System of automatic gas fire extinguishing, automatic system of control and access controls, heating, ventilation	it is provided
8.	Inspection of an object	it is provided
9.	Project works	are provided
10.	Installation and construction works	are provided
11.	Commissioning	are provided