# **GOVORUN** supercomputer engineering infrastructure

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A complex engineering infrastructure has been developed to support the GOVORUN supercomputer, which is an expansion of the HybriLIT heterogeneous cluster. The infrastructure combines an integration of two solutions on cooling systems: the air cooling system for the GPUcomponent and the water cooling system for the CPU-component based on the solution of the RSC Group.



The NVIDIA solution is based on air cooling, that is why the rack with DGX-1 servers is located at the other end of the hall relative to the RSC racks with water cooling. The components' cooling inside the server is ensured by four massive paired ventilators with a rotation speed over 8000 RPM.



Power consumption of one server under load can reach 3200 W, i.e. the whole rack including 5 servers requires about 16 kW. To provide the necessary power supply, two three-phase power distributors APC AP8886 with the ability of connection up to 32 A per phase are installed in the server cabinet. Riello Master HP 160 kVA is used as an uninterruptible power supply. Four power supplies for 1600 W with N+1 redundancy are installed in the server. The

steady distribution of load on power supplies is provided by a special controller.

A dry cooling tower is installed. Its task is to provide cooling of the coolant involved in the process. It is achieved due to the following: the fluid supplied to the heat exchanger lowers its temperature under the influence of the airflow taken by the ventilation unit from the environment.

Ethylene glycol from the cooling tower enters the collector and then the heat exchanger, which absorbs thermal energy from the water circulating through the supercomputer computing nodes





The water cooled to a temperature of 45 degrees enters the supercomputer After passing through the entire circuit in the supercomputer, the water heated to 50 degrees returns to the heat exchanger, where it is cooled transferring thermal energy to the hydraulic circuit of the dry cooling tower.

The cooling system has a smooth performance tuning, which allows one to increase or decrease the power of the cooling system in accordance with actual load. It ensures a significant reduction of power consumption during partial load.



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An input circuit breaker for 400 A is used for the switchboard power. The entire rack "RSC Tornado" consumes up to 100 kW under full load.

The supercomputer is powered by UPS APC Galaxy 7000 to provide the

autonomous work in case of power loss.



electronics that measure the temperature of the coolant and regulate the ventilator rotation speed are used in the switchboard on the cooling tower.



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