

FIRST BREAK



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DUG builds supercomputer with servers submerged in coolant

DownUnder GeoSolutions has built one of the world's most powerful computing systems featuring more than 40,000 servers immersed in liquid coolant.

The system, which is expected to deliver 250 petaflops, will be housed in the Skybox Datacentre facility in Houston.

'This facility allows us to install the fastest supercomputer in the world at this time to meet the ever-increasing demand for energy,' said Dr Matthew Lamont, co-founder of DownUnder Geosolutions.

The project will deploy more than 720 enclosures using the DUG Cool liquid cooling system, which fully submerges



June Top500 list with a benchmark of 122 petaflops, and has a projected high end of 200 petaflops.

DUG says the 15-megawatt deployment represents the first phase in a project that could eventually become an exas-

fluid-immersion system, reduces power consumption by a further 20%.

DUG says its 15 megawatt deployment is the first phase of a longer-term expansion in Houston that could create an exascale system, with the power to

servers in tanks filled with dielectric fluid, an approach that reduces energy usage by about 45% compared to traditional air cooling.

DUG and Skybox expect the data centre to operate at a Power Usage Effectiveness (PUE) of 1.05, lower than even the most advanced hyperscale cloud providers.

Rob Morris, managing partner for Skybox, said of the system that is expected to operational in February 2019: 'DUG has worked for a long time refining this design. It's the largest immersion project that we're aware of in the data centre space.'

At 250 petaflops, the DUG system would exceed the current specs for the world's most powerful supercomputer, the Summit system at Oak Ridge National Laboratory in Tennessee. Summit led the

scale system. A petaflop is a quadrillion floating point operations per second, while an exaflop would be one quintillion (1,000,000,000,000,000,000) calculations per second.

The DUG cooling system fully submerges standard HPC servers into specially designed tanks filled with a dielectric fluid that is non-toxic, biodegradable, and does not conduct electricity.

Fluid is cooled and circulated around the hot server components. Heat exchangers are submerged with the computer equipment, meaning that no dielectric fluid ever leaves the tank. A water loop runs through the rooms and to each heat exchanger.

The thermal qualities of the fluid used by DUG allows the use of condensed-water chillers rather than refrigeration, saving 25 to 30% of total power usage. Removing all server fans, which are not needed in a

process 1000 petaflops of computing power.

The DUG system arrives amid a push by the US government and HPC community to develop exascale systems at three sites – Oak Ridge National Labs, Lawrence Livermore National Labs in California, and the Argonne National Laboratory in Illinois.

The DUG system in Houston will span 10,000 ft² (930 m²) of space, use up to 15 megawatts of power, and feature more than 40,000 servers.

'The exascale movement, and the computing requirements that are driving it, will present new opportunities for the commercial data centre industry,' said DUG. 'As powerful applications such as DUG's seismic tools move to cloud delivery models, they will continue to push the frontier of data centre infrastructure.'