

Germans unwrap Europe's fastest supercomputer

Research center unveils IBM Blue Gene system offering peak performance of 45.8 teraflops

By James Niccolai, IDG News Service
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The German Research Center Jülich unveiled Europe's most powerful supercomputer this week, an **IBM** ([Profile](#), [Products](#), [Articles](#)) Blue Gene system that will be used by European scientists to do environmental and particle physics research.

Called JUBL, or Jülich Blue Gene/L, the system offers a peak performance of 45.8 teraflops, equivalent to 45.8 trillion operations per second. That makes it Europe's most powerful supercomputer based on the latest [top 500 list](#), published in November, said Dr. Norbert Attig of Jülich's Central Institute for Applied Mathematics.

It supplants another **IBM** ([Profile](#), [Products](#), [Articles](#)) system, the MareNostrum blade cluster at the Barcelona Supercomputer Center.

JUBL will serve as a "virtual laboratory" where scientists do environmental research work, such as simulating the diffusion of harmful materials in the atmosphere. It will also be used for the material and life sciences.

One of three supercomputing centers in Germany, Jülich is already home to a supercomputer called JUMP (Jülich Multi Processor), based on IBM's p690 servers. That system has a peak performance of 8.9 teraflops per second.

The [Blue Gene architecture](#) offers several advantages over the p690, according to Attig. Each processor in JUBL is less powerful, but there are many more of them and they are packed more tightly together, giving a better "gigaflop to floor space ratio," he said.

JUBL has 2,048 processors in each of its eight racks, for a total of 16,384. The older JUMP machine has 32 processors in each of 41 racks, for a total of 1,312 processors.

"The performance of each processor is lower, but the architecture gives you more flexibility because you have less heat to transfer out of the machine," Attig said.

The Blue Gene system also occupies less floor space -- about 100 square meters, compared to 300 to 400 square meters for the p690 system, he said.

Jülich made an agreement with IBM not to discuss the price of the system. "However, I can tell you that Iowa State University bought a similar system with one rack for \$1.3 million. We have not paid any more" for each rack, Attig said.

Researchers have so far used only about 20 percent of JUBL's performance capacity, according to Attig. One of the challenges has been porting applications from JUMP to take advantage of the Blue Gene system's highly-parallel architecture.

"On the new system you can only see the big performance gain if you have high-scaling applications, so applications which really run on thousands of processors," he said. "We had the first rack delivered last year, in June or July. We did the first porting and saw it was much more successful than we'd expected. We thought only a few applications would scale up, but then we saw a lot of applications could take advantage. So we asked IBM for more of them, and finally we have seven more racks," he said.

The new machine still lacks some basic management tools.

"A lot of software is missing or at a stage where it can't be used conveniently." Attig said. "For example, we have no scheduling system right now, so we use a handwritten reservation system and that restricts the number of users dramatically."

JUBL is currently serving only about 10 projects and 30 users, while JUMP is hosting 150 projects and 600 users, he said. JUBL was switched on about a month ago, he added, and the number of users will increase over time.

Jülich and IBM plan to show off the supercomputer at the Cebit trade show this week in Hanover, Germany, with some online demonstrations.

Such systems are needed to keep pace with growing demand for compute time from scientists and academics, which will increase by a factor of a thousand in the next five years, predicted Joachim Treusch, chairman of the board at Jülich.

The world's [most powerful supercomputer](#) is another IBM machine, the Blue Gene/L System at the U.S. Department of Energy's Lawrence Livermore National Laboratories in California. It was measured with a Linpack benchmark performance of 280.6 teraflops.

The Linpack benchmark is "a more realistic measure" of the Blue Gene system's capabilities, Attig said. JUBL has a Linpack benchmark of 36.5 teraflops, he said.