

Combining biotechnology with high-performance computing to advance research on crop genetics and breeding.

How **Huazhong Agricultural University** uses a **Lenovo high-performance computing (HPC)** system to support **third-generation gene sequencing**.

Lenovo Infrastructure Solutions
for The Data-Centered

Lenovo

1

Background

Huazhong Agricultural University (HZAU) is a national key university in Wuhan, China specializing in life sciences. It also has a strong focus on agriculture, science, engineering, literature, law, economics, and management. HZAU was founded in 1952 as part of the Ministry of Education's "Project 211" program to enhance higher education standards across the country. In 2020, HZAU had 26,000 undergraduate and graduate students, and more than 2,600 faculty members.

HZAU is home to six national laboratories, including the National Key Laboratory of Crop Genetic Improvement (NKLCGI), which is a major center for teaching and research in plant genetics, crop breeding, and bioengineering. It is recognized both nationally and internationally as a leader in this space. NKLCGI has been rated an excellent national key laboratory for five consecutive years – the only agricultural research laboratory to receive this honor.

2

Challenge

Recent years have seen significant advances in gene sequencing and biotechnology, plus the proliferation of Internet of Things (IoT) devices. Scientists are capitalizing on these innovations to collect and experiment with data quickly and more cheaply, resulting in an explosion of data.

Third-generation gene sequencing has improved on previous generations and can achieve up to 99.999% accuracy. This has resulted in an exponential growth in data volumes, and demand for compute resources to analyze this data is high. NKLCGI's existing HPC cluster and storage infrastructure did not deliver the read-write performance required for third-generation sequencing. Jobs took too long to run and there were often prolonged wait times for resources.



Why Lenovo? Leading the way in HPC.

To accelerate research, HZAU decided to team up with Lenovo to ramp up its HPC capabilities.

Liu Hao, Faculty, National Key Laboratory of Crop Genetic Improvement, Huazhong Agricultural University, says: “We were very impressed by Lenovo’s HPC offering, particularly their HPC storage solutions. Our research is extremely data-intensive, so storage performance directly determines the operating efficiency of the entire HPC system. Lenovo DSS-G240 storage provides us with higher-than-expected performance, enabling us to read and write massive datasets and run batch jobs cost-effectively.”

Building the best HPC platform.

Working closely with Lenovo Professional Services, the university built a new sub-cluster of its supercomputer dedicated exclusively to NKLCGI scientists.

The new cluster is powered by 95 Lenovo ThinkSystem SN550 servers and features two Lenovo ThinkSystem SR650 servers as management and login nodes. The servers are networked with Mellanox InfiniBand FDR fabric and Lenovo Flex System EN2092 1Gb Ethernet Scalable Switches. In Linpack benchmark tests, the cluster delivers a floating-point peak performance of 295.45 TFLOPS.

HZAU also implemented a Lenovo DSS-G240 distributed storage system with a gross capacity of around 8 PB (5 PB available).



“The Lenovo engineers helped us to design a HPC system that met our needs in terms compute and storage performance, sizing, and usability. Furthermore, the IBM Spectrum LSF Suites job scheduling solution provided by Lenovo supports a large number of users and meets our management needs. The Lenovo team’s advice and support were very valuable.”

Liu Hao,
Faculty, National Key Laboratory
of Crop Genetic Improvement,
Huazhong Agricultural University

3

Results

With the new Lenovo sub-cluster, NKLGCI scientists have access to dedicated HPC resources that deliver a huge increase in compute and storage performance compared to the previous system.

Liu Hao comments: “Performance for third-generation gene sequencing workloads has improved significantly. With the Lenovo HPC system, scientists at NKLGCI can process and analyze more gene sequencing data faster—slashing time to insight and furthering vital work on plant breeding that will help to produce stronger, healthier crops.”



295.45 TFLOPS
compute performance



8 PB raw storage
capacity



Shorter time to
insight



“We were very impressed by Lenovo’s HPC offering, particularly their HPC storage solutions. Our research is extremely data-intensive, so storage performance directly determines the operating efficiency of the entire HPC system.”

Liu Hao,
Faculty, National Key Laboratory of Crop Genetic Improvement,
Huazhong Agricultural University

What will you do with High Performance Computing Solutions?

Whatever your aspirations or business goals, Lenovo can help you to leverage the power of HPC to solve today's and tomorrow's challenges.

[Explore HPC Solutions](#)

Lenovo and the Lenovo logo are trademarks or registered trademarks of Lenovo.

Intel and Intel Inside is a trademark of the Intel Corporation or its subsidiaries in the U.S. and/or other countries.
Other company, product and service names may be trademarks or service marks of others.

© Lenovo 2020. All rights reserved.