

Carnegie Mellon joins Open Cirrus test bed for advancing cloud computing research

February 16 2010

Carnegie Mellon University's School of Computer Science is the latest research institution to host a site as part of Open Cirrus, a global, open-source test bed for the advancement of cloud computing research and education.

A computing cluster housed in Carnegie Mellon's Data Center Observatory will provide additional resources for Carnegie Mellon faculty and other researchers worldwide. Open Cirrus was launched in 2008 by HP, Intel and Yahoo! to promote open collaboration among industry, academia and governments on data-intensive, Internet-scale computing. The test bed now includes cloud computing infrastructure at 10 "centers of excellence" worldwide.

Organizations increasingly take advantage of cloud computing, which allows them to use shared services and data processing and storage resources that are managed by other organizations. But until recently, university faculty and students did not have direct access to cloud [computing resources](#) necessary for research and education on this emerging computing paradigm. That limited universities in their ability to prepare students who will increasingly work in cloud environments. It also inhibited academic research on new applications for the cloud and on how to improve the software and hardware that enables cloud computing.

"Having a facility like this and being able to participate in Open Cirrus will provide us with unprecedented opportunities for research and

education on Internet-scale computing," said Randal E. Bryant, dean of the School of Computer Science. "We see applications well beyond those being pursued by industry today, including astronomy, neuroscience, and knowledge extraction and representation, and we will be able to delve more deeply into the design of the system itself."

Carnegie Mellon [computer scientists](#) have been leaders as cloud computing has emerged as a focus of academic research. Carnegie Mellon was the first university to make use of M45, a 4,000-processor, Hadoop-based computing cluster that Yahoo! made available to academic researchers beginning in late 2007. Since then, M45 research by Carnegie Mellon has resulted in infrastructure innovations, such as new approaches to diagnosing performance problems and a technique for shrinking the storage requirements for data files by 33 percent. Carnegie Mellon researchers also have used the M45 cluster to pioneer new applications that require Internet-scale resources, such as natural language processing, automated extraction of knowledge from the Web and developing a deeper understanding of when the "wisdom of crowds" is effective and when it is not for services such as Wikipedia.

Carnegie Mellon researchers have benefited from access to the existing Open Cirrus site operated by Intel Labs Pittsburgh on the Carnegie Mellon campus. Together with M45 and the university's new computing cluster, Carnegie Mellon researchers now are running experiments on three cloud-computing clusters.

Greg Ganger, professor of electrical and computer engineering and director of Carnegie Mellon's Parallel Data Lab, said the new computing cluster, which has 159 servers and 1,165 processing cores, was made possible by Intel's generous donation of CPUs and money. The cluster has 2.4 trillion bytes, or terabytes, of memory and almost 900 terabytes of storage. A contribution by APC of power management and cooling systems also was crucial for building and operating the cluster.

Like other sites in Open Cirrus, the computing cluster will be made available to researchers worldwide later this year.

Ganger said much of the research at the Carnegie Mellon site likely will focus on the university's strengths — how to make the cloud computing infrastructure faster, more reliable and more energy efficient and how to use the cloud in innovative ways for new applications. "This site embodies our commitment to the collaborative, open-source research environment that Open Cirrus promotes and to aggressively pursuing [cloud computing](#) research on this campus," he said.

In addition to Carnegie Mellon, the Open Cirrus test bed includes centers of excellence at HP Labs, Intel Research and Yahoo! as well as the Infocomm Development Authority of Singapore, the University of Illinois at Urbana-Champaign, the Steinbuch Centre for Computing of the Karlsruhe Institute of Technology in Germany, the Russian Academy of Sciences, the Electronics and Telecommunications Research Institute in South Korea and MIMOS, a Malaysian research and development organization.

Provided by Carnegie Mellon University

Citation: Carnegie Mellon joins Open Cirrus test bed for advancing cloud computing research (2010, February 16) retrieved 26 April 2024 from <https://phys.org/news/2010-02-carnegie-mellon-cirrus-bed-advancing.html>

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