Locality-driven High-level I/O Aggregation for Processing Scientific Datasets

By Jialin Liu
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Date: October 15th, 2013 (Tuesday)
Time: 3:40pm-4:40pm
Venue: ECE 108 (Pulsed Power Conference Room)

Note: Please note that the venue is changed due to unavailability of bullen room for only this seminar and we will continue to have the next seminar series in bullen room.

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Abstract:
Scientific I/O libraries, like PnetCDF, ADIOS, and HDF5, have been commonly used to facilitate the array-based scientific dataset processing. The underlying physical data layout in formation, however, is usually hidden from the upper layer's logical access. Such mismatching can lead to poor I/O. In this research, we have observed performance degradation in the case of concurrent sub-array accesses, where overlaps among calls that access sub-arrays led to high contention on storage servers due to the logical-physical mismatching. We propose a locality-driven high-level I/O aggregation approach to addressing these issues in this work. By designing a logical-physical mapping scheme, we try to utilize the scientific dataset's structured formats and the file systems' data distribution to resolve the mismatching issue. Therefore the I/O can be carried out in a locality-driven fashion. The proposed approach is effective and complements existing I/O strategies, such as the independent I/O or collective I/O strategy. We have also carried out experimental tests and the results

Speaker Bio:
Jialin Liu is a 3rd year PhD student in the Data-Intensive Scalable Computing Laboratory. He received his bachelor degree in 2011. His research focuses on the scientific data management, parallel I/O, computer architecture and system software support for big data analysis.