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The Design and Progress of Data Management and Data Service for HEPS

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China's High Energy Photon Source (HEPS), the first national high-energy synchrotron radiation light source and soon one of the world's brightest fourth-generation synchrotron radiation facilities, is being under intense construction in Beijing's Huairou District, and will be completed in 2025. The 14 beamlines for the phase I of HEPS will produces more than 300PB/year raw data. Efficiently storing, analyzing, and sharing this huge amount of data presents a significant challenge for HEPS.

To make sure that the huge amount of data collected at HEPS is accurate, available and accessible, we developed an effective data management system that is aimed at automating the organization, transfer, storage, distribution and sharing of the data produced from HEPS experiments. First, the general situation of HEPS and the construction progress of the whole project are introduced. Second, the architecture and data flow of the HEPS DMS are described. Third, key techniques and new function modules implemented in this system are introduced. For example, the process of automatic data tracking when using a hierarchical storage policy is illustrated, and how the DMS deals with the metadata collection when an emergency occurs such as beamline network interruption. Finally, the progress and the effect of the data management and data service system deployed at testbed beamlines of BSRF are given.

The integration and the verification of the whole system at 3W1 beamline of BSRF (Beijing Synchrotron Radiation Facility) were finished and achieved great success. It strongly proved the rationality of the design scheme and the feasibility of the technologies. After the optimization and upgrade of the functionality, the data management system were deployed at 4W1B, which is a running beamline at BSRF, can provide data service for beamline users.

Primary author: HU, Hao (Institute of High Energy of Physics)

Co-authors: ZHUANG, Bo (Institute of High Energy of Physics); FAZHI, Qi (IHEP); LUO, qi (中科院高能物理所计算中心); HFWANG, 王浩帆 (IHEP)

Presenter: HU, Hao (Institute of High Energy of Physics)

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