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## **Data-Intensive Scalable Computing Laboratory (DISCL)**

### **Technical Report**

**Department of Computer Science**

**Texas Tech University**

# A Decoupled Execution Paradigm for Data-Intensive High-End Computing

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# A Decoupled Execution Paradigm for Data-Intensive High-End Computing

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## Abstract

High-end computing (HEC) applications in critical areas of science and technology tend to be more and more data intensive. I/O has become a vital performance bottleneck of modern HEC practice. Conventional HEC execution paradigms, however, are computing-centric for computation intensive applications. They are designed to utilize memory and CPU performance and have inherent limitations in addressing the critical I/O bottleneck issues of HEC. In this study, we propose a decoupled execution paradigm (DEP) to address the challenging I/O bottleneck issues. DEP is the first paradigm enabling users to identify and handle data-intensive operations separately. It is significantly better than the existing execution paradigms for data-intensive applications. The initial experimental tests have confirmed its promising potential. Its data-centric architecture could have a profound impact in future HEC systems, programming models, and algorithms design and development.

**Keywords:** decoupled execution paradigm, high-end computing, data-intensive computing, data-centric architecture.