

High-Performance Data Analysis Tool For Sun-Earth Connection Missions



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Identification and Significance of Innovation

How to analyze vast amounts of data produced by SEC missions?

- Use parallel processing!

IDL: data analysis tool widely used in SEC missions

- IDL has currently no support for cluster computing

Innovation:

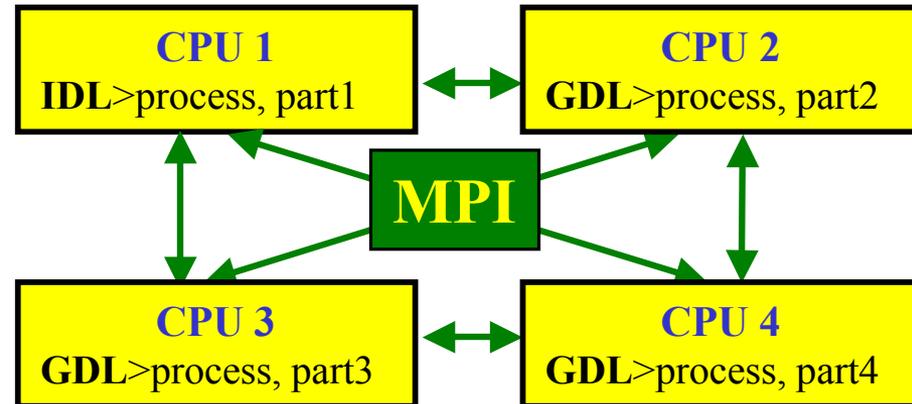
- Develop tool suite for interactive parallel computing with IDL

- Can run with GDL, no additional IDL licenses required

- Targets novice and expert parallel programmers

Significance:

- Scientists get access to high-performance analysis tool in familiar environment



Innovation enables mixed IDL/GDL parallel processing using MPI

Technical Objectives

- Advance the parallelization support tool
- **Enhance interactivity of task farming and parallel processing tool**
- Advance GDL to compute engine for interactive parallel data analysis
- **Advance toolset to market-ready quality**

Work Plan

Task 1: Enhance decomposition directives in hpDL

Task 2: Include task dependencies in TaskDL

Task 3: Enable choice of IDL execution/licensing mode

Task 4: Provide communication with workers in TaskDL

Task 5: Develop command server for mpiDL

Task 6: Enhance MPI implementation in GDL

Task 7: Apply toolset to SEC data analysis codes

Task 8: Enhance code engineering, documentation and reporting

NASA Applications

- IDL widely used throughout NASA
- Insufficient processing power in IDL is common problem
- Data analysis in various missions can benefit from parallel processing

Non-NASA Applications

- IDL widely used in academia, industry, national labs
- Data analysis in various areas can benefit from parallel processing, e.g. medical imaging, chemical engineering

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