

NASA SBIR/STTR Technologies

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



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Proposal No: 04-S1.05-9216

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

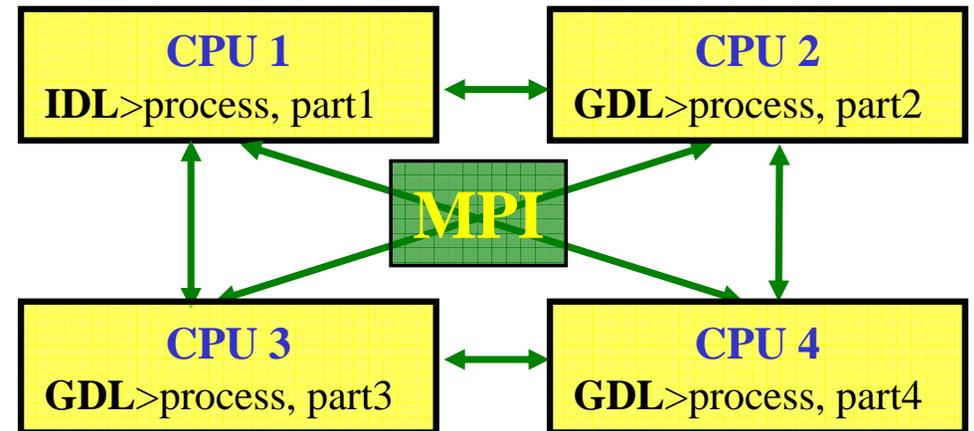
- IDL has currently no support for cluster computing

Innovation:

- Develop tools to enable IDL working in parallel
- Builds on open-source 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

- Demonstrate time savings for SEC mission data analysis by task farming
- Demonstrate the feasibility of mixed IDL/GDL parallel processing
- Demonstrate the feasibility of directive driven parallelization in IDL

Work Plan

- Task 1: Investigate parallel RHESSI data analysis using TaskDL
- Task 2: Prototype basic MPI communication routines in GDL
- Task 3: Evaluate a parallel IDL/GDL data analysis program with explicit message passing
- Task 4: Implement a prototype precompiler for directive-based parallelization
- Task 5: Write a final report

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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