Reference UPC-IO Implementation
Status and Report
Reference UPC-IO Status

◆ The first release is available online since May, 2005
◆ Internal CVS
  – Keep tracking of all the versions
  – Change logs
  ◆ Beta 1 – Nov, 2004
    » Initial version. Concept verified and basic functionality implemented.
  ◆ Beta 2 – Jan, 2005
    » Mapped each UPC-IO function to the most optimized MPI-IO optimization levels.
  ◆ Beta 3 – March, 2005
    » Further optimized the read/write functions and clear naming space
  ◆ Release (Beta 4) – May, 2005
    » Major bug fixed. Passed the test suites and internal cases.
The Reference Implementation

- Based on MPI-IO
- Implements full UPC-IO library functions
- Needs Berkeley UPC compiler (supports MPI)
- Spec v1.2 compliance
- Virtually portable to any platform that provides MPI-IO support
MPI-IO Optimization Levels

- MPI-IO provides 2 axis of optimizations
- Higher level usually delivers better performance
UPC-IO Optimizations

Mapping UPC-IO functions onto MPI-IO optimization levels

September 24, 2005
The Formal UPC-IO testing – Black box

- Testing strategy, strictly following the latest UPC spec v1.2, feature-by-feature
- Testing suites, guided by the strategy

Internal testing cases – White box

- Trying to cover erroneous paths
- Corner cases, e.g. misaligned shared array

Comprehensive test case from Berkeley group (Dan)

- Help to identify the problem from users’ point of view
Benchmarking

◆ Synthetic Benchmark
  – Read/Write from/to local buffer
    ◆ with and without fsync function calls
  – Read/Write from/to shared buffer
    ◆ both private and common file points
    ◆ infinite and finite blocksize
  – Stress testing number of opened files

◆ Real application: BTIO
  – Based on NPB BT application
Future Plans

- A portable high performance mid-layer
  - Similar to ADIO (Abstract-Device Interface for I/O) for the MPI-IO, which directly talk to the File system to enable the high performance
  - Reference implementation to support PVFS

- More I/O benchmark
  - e.g. SSCA#3 with File IO