Update on an OpenSHMEM Verification/Validation Test Suite

Howard Pritchard
David Noel

OpenSHMEM BOF, SC'17

LA-UR-17-31038

UNCLASSIFIED

Motivation

- There are already several vendor/organization OpenSHMEM test suites at https://github.com/openshmem-org, isn't this good enough?
- Great there are all these tests but there are problems
- This problem was discussed at a recent OpenSHMEM Implementers F2F in Maryland

Motivation (2)

- Test suites have different test harnesses, some of the home-brewed variety (complicates use in CI testing)
- Vendor test suites often test vendor implementation specific extensions
- Bugs in vendor test suites that have only been used (mainly) with their implementation
- Worst is when the standard isn't specific enough to standardize error-checking tests (*shmem_memalign*)

Results of cross test suite/cross Implementation Study

Testing OpenSHMEM

	tests-cray	tests-mellanox	tests-uh
SOS	Not all passed	Not all passed	All but one
Cray SHMEM	All passed	Not all passed	All but one
OpenMPI	All but one	All passed	All passed
SGI-MPT	Not all passed	KILLED	Not all passed

UNCLASSIFIED

Summary of observations

Observations

- vendors are using different interpretations of arguments e.g. shmem_align
- differing names for constants e.g. _SHMEM_ALLTOALL_SYNC_SIZE
- use of deprecated OpenSHMEM features in the tests cases e.g. #include <mpp/shmemx.h>
- use of non-standardized extensions in some test cases e.g. shmem_broadcast
- Mellanox had incorrect usage of collective functions
- tests-uh global_exit.x often failed

Testing against SandiaSHMEM:
- tests-cray: problems with 5 test cases
- tests-mellanox: problems with broadcast, barrier, and all reduce test cases
- tests-uh: test_shmem_global_exit.x fails

Testing against CraySHMEM:
- tests-cray: all tests passed
- tests-mellanox: alltoalls fails, barrier, and broadcast hang, along with reduce
- tests-uh: test_shmem_global_exit.x fails

Testing against OpenMPI:
- tests-cray: everything passed except for shmalloc_loop
- tests-mellanox: all tests passed
- tests-uh: all tests passed

Testing against SGI:
- tests-cray: problems with 6 test cases
- tests-mellanox: complete failure after basic:fence test case
- tests-uh: problems have to deal with memory allocation

Goals of a new V/V Test Suite

- A framework that is easy to use in Continuous Integration Testing and by end users checking out an OpenSHMEM implementation
- Don't reinvent a test framework harness
- Want first version of the test suite to work with as many OpenSHMEM implementations as possible
- Try to pull in as many (all?) of the tests from existing test suites

Status

- Inspired by SOS automake parallel test harness approach:
  - ./configure
  - make check -j *TEST_RUNNER="srun -n32"*
- Incorporate existing test suites into the framework: Cray, UH, SOS, later Mellanox
  - use autoconf means to weed out vender specific tests
  - move deadlock detection into app (UH error case tests)
  - modify apps to return values expected by test harness
- As soon as licensing is sorted out, will move the repo to https://github.com/openshmem-org
- Fixes to vendor test suites will be back ported to original repos using GitHub PRs

UNCLASSIFIED

Directory structure

```
|-autom4te.cache
|-config
|-cray
|---sma1
|---sma2
|-uh
|---error_tests
|-----Fortran
|-------atomic
|-------transfer
|---feature_tests
|-----C
|-----Fortran
|-------accessibility
|-------alloc
|-------atomic
|-------broadcast
|-------collect
|-------reductions
|-------transfer
|---performance_tests
|-----micro_benchmarks
```

UNCLASSIFIED

Acknowledgements