UBDA Platform

Example for C with IntelMPI

User Guide

Version 1.1

1 July 2019

Revision History

Version	Date	Prepared By	Summary of Changes
1.0	Jul 16, 2018		Initial release
1.1	Jul 1, 2019		Update of sample program

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1. Introduction

This document is shown a C example by using IntelMPI method running on the UBDA platform.

Note: User should first register a user account through UBDA website at: https://www.polyu.edu.hk/pfs/index.php/177729 to access the UBDA Platform

2. Perform the test

2.1 Login to ubdaplatform.polyu.edu.hk via SSH

2.2 Create the testing directory

```
$ mkdir -p $HOME/intel_mpi_c
$ cd cd $HOME/intel_mpi_c
```

2.3 Prepare the C program
(example program path: `/ubda/apps/examples/INTEL/mpi_ex1.c`)

```
$ cp -p /ubda/apps/examples/INTEL/mpi_ex1.c .
```

2.4 Load the MPI user environment. You can select ips_xe_2018_u3.

For select ips_xe_2018_u3, use the following:

```
$ module load ips_xe_2018_u3
$ module list
Currently Loaded Modulefiles:
     1)  1) ips_xe_2018_u3
$ which mpicc
/ubda/apps/intel/ips_xe_2018_u3/compilers_and_libraries_2018.3
.222/linux/mpi/intel64/bin/mpicc
```

2.5 Build the executable binary by using the selected MPI

```
$ mpicc -o mpi_ex1 mpi_ex1.c
$ file mpi_ex1
mpi_ex1: ELF 64-bit LSB executable, x86-64, version 1 (SYSV),
dynamically linked (uses shared libs), for GNU/Linux 2.6.32,
BuildID[sha1]=7fd489f2ce700532f9ab977d8ef926d3c869fe75, not
stripped
```

2.6 Prepare the job script file.

(Filename: intel_mpi_c.pbs)

```
#!/bin/sh
#PBS -N intel_mpi_c
#PBS -l nodes=2:ppn=8
#PBS -l walltime=12:00:00
#PBS -q q2s01
#PBS -V
#PBS -S /bin/bash

module load ips_xe_2018_u3

EXEC= mpi_ex1

############################################################################
NP=`cat $PBS_NODEFILE | wc -l`
NN=`cat $PBS_NODEFILE | sort | uniq | tee /tmp/nodes.$$ | wc -l`
cat $PBS_NODEFILE > /tmp/nodefile.$$
Nodes=`cat /tmp/nodes.$$ | sort -r`
Nodes=$(echo $Nodes | sed 's/ /,/g')

echo "process will start at : "
date
echo "++++++++++++++++++++++++++++++++++++++++"
cd $PBS_O_WORKDIR

export I_MPI_HYDRA_BOOTSTRAP=pbsdsh
export
I_MPI_HYDRA_BOOTSTRAP_EXEC=/ubda/apps/tsce/tsce4.1/torque6/bin/pb
sdsh

echo $NP
echo $PBS_NUM_PPN
echo $Nodes

mpirun -n $NP -ppn $PBS_NUM_PPN -hosts $Nodes $EXEC >
intel_result.out

echo "++++++++++++++++++++++++++++++++++++++++"
echo "process end at : "
date
rm -f /tmp/nodefile.$$
rm -f /tmp/nodes.$$
module unload ips_xe_2018_u3
```

Please remind to change the values for your application.

```
#PBS -N intel_mpi_c.pbs {your job name}
#PBS -l nodes=2:ppn=8 {your requested resource;nodes and
processors per node}
#PBS -q q2s01 {the job queue}
EXEC= mpi_ex1{your execute file name}
```

Example files can be found at:

/ubda/apps/examples/INTEL/

```
├──── intel_mpi_c.pbs
├──── mpi_ex1
└──── mpi_ex1.c
```

3 Job submission

3.1 Submit the script (***intel_mpi_c.pbs***) to job queue.
A job ID number will be returned.

```
$ qsub intel_mpi_c.pbs
16454.ubda-mgt01
```

3.2 Enquiry the submitted job status.

```
$ qstat -na

ubda-mgt01:
                                                                  Req'd       Req'd       Elap
Job ID                  Username    Queue    Jobname          SessID  NDS   TSK   Memory      Time    S   Time
----------------------- ----------- -------- ---------------- ------ ----- ------ --------- --------- - ---------
16454.ubda-mgt01        cw18wong    q2s01    intel_mpi_c           0     2     16       --   12:00:00 R  00:00:01
```

Job status field name	Explanation	Example
JOB ID	Unique Job id.	11282.ubda-mgt01
Job name	Name for the job allocation	intel_mpi_hellow
Queue name	Name of the job queue that the job has assigned.	q2s01
Username	Your NetID	ubdademo9
S	Job current status. Q = queued R = Job is executing C = Job was completed	Job is executing
ELAP TIME	Time for the job executed	00:00:06
Req'd Time	The maximum execution time	12:00:00 (1 day)
NDS	Total number of nodes assigned	2
TSK	Total number of cores assigned	16

4 How to check the result

4.1 Check for any error messages for your job with the JobID

```
$ more intel_mpi_c.o16454
process will start at :
Fri May  3 09:35:44 HKT 2019
++++++++++++++++++++++++++++++++++++++++
16
8
ubda-d046,ubda-d045
++++++++++++++++++++++++++++++++++++++++
process end at :
Fri May  3 09:35:47 HKT 2019
```

4.2 Check for result

```
$ wc -l intel_result.out
16 intel_result.out

$ cat intel_result.out
Hello world from processor ubda-d045, rank 10 out of 16 processors
Hello world from processor ubda-d045, rank 13 out of 16 processors
Hello world from processor ubda-d045, rank 14 out of 16 processors
Hello world from processor ubda-d045, rank 15 out of 16 processors
Hello world from processor ubda-d045, rank 8 out of 16 processors
Hello world from processor ubda-d045, rank 9 out of 16 processors
Hello world from processor ubda-d045, rank 11 out of 16 processors
Hello world from processor ubda-d045, rank 12 out of 16 processors
Hello world from processor ubda-d046, rank 0 out of 16 processors
Hello world from processor ubda-d046, rank 1 out of 16 processors
Hello world from processor ubda-d046, rank 2 out of 16 processors
Hello world from processor ubda-d046, rank 3 out of 16 processors
Hello world from processor ubda-d046, rank 4 out of 16 processors
Hello world from processor ubda-d046, rank 5 out of 16 processors
Hello world from processor ubda-d046, rank 6 out of 16 processors
Hello world from processor ubda-d046, rank 7 out of 16 processors
```

5 Useful Reference

- Command reference for qstat
  URL: http://docs.adaptivecomputing.com/torque/6-0-0/help.htm#topics/torque/commands/qstat.htm?Highlight=qstat

- Intel® MPI Library Developer Guide for Linux* OS
  URL: https://software.intel.com/en-us/mpi-developer-guide-linux-job-schedulers-support

- Intel® MPI Library Developer Reference for Linux* OS
  URL: https://software.intel.com/en-us/mpi-developer-reference-linux-hydra-environment-variables