

ANSYS Fluent 17.1 Installation Best Practices



BEST PRACTICES

1. Introduction

The following best practices document is provided as courtesy of the HPC Advisory Council.

2. Application Description:

ANSYS Fluent is a Computational Fluid Dynamics is a computational technology that enables the study of the dynamics of things that flow. Computational Fluid Dynamics (CFD) brings together a number of different disciplines. CFD enables better understanding of qualitative and quantitative physical phenomena in the flow which is used to improve engineering design. ANSYS Fluent is a leading CFD application from ANSYS. It is widely used in almost every industry sector and manufactured product. The following instructions document the steps for running with the MPI library called Mellanox HPC-X

3. Version Information:

ANSYS Fluent 17.1. For more information about ANSYS Fluent, please visit:

<https://www.esi-group.com/software-solutions/virtual-performance/virtual-performance-solution>

4. Prerequisites:

The instructions from this best practice have been tested on the following configuration:

4.1 Hardware:

- Dell PowerEdge R730 32-node (1024-core) "Thor" cluster.
- Dual-Socket 14-Core Intel E5-2697Av4 @ 2.60 GHz CPUs
- Mellanox ConnectX-4 EDR InfiniBand adapters
- Mellanox Switch-IB 2 VPI InfiniBand switch

4.2 OS and Software:

- RHEL 7.2, MLNX_OFED_LINUX-3.3-1.0.4.0 InfiniBand SW stack
- MPI: [Mellanox HPC-X v1.6.392](#)
- Application: ANSYS Fluent

5. Modifications

5.1 HPC-X libraries redirections

The HPC-X version used is newer than the Open MPI ver-

sion that Fluent uses. To work around this, we will need to redirect the library used.

```
module use /opt/hpcx-v1.6.392-gcc-MLNX_OFED_LINUX-3.3-1.0.0.0-redhat7.2-x86_64
module load hpcx
mkdir ${HOME}/lib
ln -s $OMPI_HOME/lib/libmpi.so ${HOME}/lib/libmpi.so.1
ln -s $OMPI_HOME/lib/libopen-pal.so ${HOME}/lib/libopen-pal.so.4
ln -s $OMPI_HOME/lib/libopen-rte.so ${HOME}/lib/libopen-rte.so.4
export LD_LIBRARY_PATH=${HOME}/lib:${LD_LIBRARY_PATH}
```

5.1 Modification to fluentbench.pl

We will copy the Fluent benchmark script (fluentbench.pl) to include single quotes between \$PARA_MPI_FLAGS for correctly taking the options that we will provide in command line.

```
$ vim ~/bench/fluent/bin/fluentbench.pl
354     if ($PARA_MPIRUN_FLAGS ne "")
355         #{ $solver_options="$solver_options -mpiopt=$PARA_MPIRUN_FLAGS"; }
356         { $solver_options="$solver_options -mpiopt='$PARA_MPIRUN_FLAGS'"; }
```

6. Running ANSYS Fluent using HPC-X

This is an example of running ANSYS Fluent using HPC-X. The specification of the flags are described below:

- mpi: Specifies the Fluent executable for Open MPI / HPC-X to be used
- mpiopt: The would include all the options for HPC-X. In the list of options specified, we specified mlx5_0:1 as the InfiniBand interface to be used.
- norm: Do not remove case and data files at end of benchmark
- pib: Specifies to use InfiniBand for the network protocol
- t: Number of tasks
- cnf: Host file defining the list of hosts

```
export FLUENT_ARCH=lnamd64
export ANSYSLMD_LICENSE_FILE=1055@192.168.12.50
ulimit -s 1024000

# Adjust the MPI library location for Fluent to use HPC-X instead
export OPENMPI_ROOT=$OMPI_HOME
export PARA_MPIRUN_FLAGS="--report-bindings -bind-to core -mca coll_fca_enable 1 -mca coll_fca_np 0 -mca coll_hcoll_enable 0 -mca btl_openib_if_include mlx5_0:1 -x MXM_RDMA_PORTS=mlx5_0:1 -bind-to core -x MXM_TLS=ud,shm,self"
$HOME/bench/fluent/bin/fluentbench.pl -path=/opt/ansys_inc/v171/fluent/ -ssh -noloadchk -norm rotor_3m -t1024 -mpi=openmpi -pib -cnf=$HOME/hostfile -mpiopt="$PARA_MPIRUN_FLAGS"
```



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