Fugaku Commercial Software
Ansys LS-DYNA
User's Guide

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１．Preface

Purpose of this document

　This document describes how to use Ansys LS-DYNA, which is maintained by the RIKEN Center for Computational Science (R-CCS) on the supercomputer "Fugaku".

- For general information on how to use Fugaku, please refer to the manuals in the Fugaku Portal
- Please refer to the Ansys LS-DYNA manual for general Ansys LS-DYNA usage

Prerequisite

　The user shall have executed procedures such as the conclusion of a license agreement for Ansys LS-DYNA in accordance with the "Flow to Start Using" and shall have received a notice of completion for the software usage environment.

　When using commercial software installed on Fugaku, R-CCS and cooperating organizations cooperate with software vendors to manage software licenses (operation checks) and conduct investigations when inquiring about software operation. Therefore, license information and inquiries may be shared among R-CCS, cooperating organizations, and software vendors. Please understand this in advance.

２. Exectuing Ansys LS-DYNA

This section describes the procedure for domain segmentation using the pre-post environment prior to running the Ansys LS-DYNA solver on Fugaku.

２.１. Area division of input files

The following is an example of a job script for area division. Please modify it as appropriate for your work environment. Refer to the description below for the red parts. This job is submitted to the pre-post environment.

```
#!/bin/bash
#SBATCH -p ppsq
#SBATCH -N 1
#SBATCH -J odb10m
#SBATCH -t 3:00:00

NPROC=12
NTHREAD=4
module use /vol0004/apps/isv/LS-DYNA/modulefiles
module load LS-DYNA
export LSTC_LICENSE_SERVER=[IP address for license server]
mpi_root=$APPDIR_XEON/platform_mpi
export MPI_ROOT=$mpi_root
export LD_LIBRARY_PATH=$mpi_root/lib/linux_amd64:$LD_LIBRARY_PATH
export PATH=$mpi_root/bin:$PATH

CMDD="memory=800m ncpu=-1"
MPIOPTION="-prot -ibv -e ssh -cpu_bind=v,MAP_LDOM -e MPI_BIND_MAP=0,1"
WK=${PWD}
INP1=${WK}/[input filename].k
WRKD=${WK}/decomped
mkdir ${WRKD}
cd      ${WRKD}
P1=pfile-decomp
echo "general { nofull }"                           > ${P1}
echo "decomposition {   numproc ${NPROC}"          >> ${P1}
echo "                      file decomposition }"   >> ${P1}

mpirun -np 1 ${MPIOPTION} ${LD_XEON} ${CMDD} I=${INP1} outdeck=t p=${P1} ; mv d3hsp
d3hsp.outdeck-`date +%m%d%H%M` ; mv mes0000 mes.outdeck-`date +%m%d%H%M`
```

This job script assumes that the job is submitted from the directory where the input files (extension .k) are stored.

2.1.1. Settings for Area Division

- module command
    Used to set environment variables.

- module use
    Specifies where *modulefile* is stored. Do not change.

- module load *modulefile*

    Sets environment variables defined in *modulefile*.

module load LS-DYNA

    is specified, the latest version installed on Fugaku is used.

    Important: Environment variables set by the module load command may include runtime parameters. When specifying runtime parameters, be sure to specify them after the module load command.

    To use a specific version, change the *modulefile*.

Example: Using R11.2.2 version   module load LS-DYNA /R11.2.2

    Keywords for *modulefile* can be confirmed by the following command.

module use /vol0004/apps/isv/LS-DYNA/modulefiles module avail LS-DYNA

    The contents set by module can be confirmed with the following commands.

module use /vol0004/apps/isv/LS-DYNA/modulefiles module show *modulefile*

- LSTC_LICENSE_SERVER

    Set the IP address of the license server, provided by the help desk.

- MPI_ROOT
- PATH
- LD_LIBRARY_PATH

    Set PATH and LD_LIBRARY_PATH to use the MPI environment provided by Ansys LS-DYNA. Do not change this specification.

2.2. Executing Solver

The following is an example of a job script for executing Solver. Please modify it as appropriate for your work environment. Refer to the description below for the red parts. This job is submitted to the computation node.

```
#!/bin/bash -x
#PJM -L "node=6,freq=2200"
#PJM -L "rscgrp=small"
#PJM -L elapse=40:00
#PJM --mpi "proc=24"
#PJM --mpi "rank-map-bychip"
#PJM --no-stging
#PJM -j
#PJM -S
#PJM -g <groupname>
#PJM -x PJM_LLIO_GFSCACHE=/vol0004


NNODE=6
NPROC=24
NTHREAD=4
module use /vol0004/apps/isv/LS-DYNA/modulefiles
module load LS-DYNA
export LSTC_LICENSE_SERVER=[IP address for license server]
llio_transfer $LD_FX
CMD2="memory=40m memory2=40m ncpu=-${NTHREAD}"
export OMP_NUM_THREADS=${NTHREAD}
WK=${PWD}
WRKD=${WK}/decomped
cd ${WRKD}


  export P2=pfile-exec
  echo "general { nofull }"                        > ${P2}
  echo "decomposition {   numproc ${NPROC}"          >> ${P2}
  echo "                  file decomposition }"     >> ${P2}


  ${TIMEX} mpiexec -n ${NPROC} ${LD_FX} i=dyna.str p=${P2} ${CMD2} >& log-`date
+%m%d%H%M`


llio_transfer --purge ${LD_FX}
```

This job script assumes that the job is submitted from the same directory as when the area division is executed.

2.2.1. Settings for Solver

- module command
    Used to set environment variables.

- **module use**

  Specifies where *modulefile* is stored. Do not change.

- **module load** *modulefile*

  Sets environment variables defined in *modulefile*.

module load LS-DYNA

  is specified, the latest version installed on Fugaku is used.

  Important: Environment variables set by the module load command may include runtime parameters. When specifying runtime parameters, be sure to specify them after the module load command.

  To use a specific version, change the *modulefile*.

Example: Using R11.2.2 version   module load LS-DYNA/R11.2.2

  Keywords for *modulefile* can be confirmed by the following command.

module use /vol0004/apps/isv/LS-DYNA/modulefiles module avail LS-DYNA

  The contents set by module can be confirmed with the following commands.

module use /vol0004/apps/isv/LS-DYNA/modulefiles module show *modulefile*

- **LSTC_LICENSE_SERVER**

  Set the IP address of the license server, provided by the help desk.

- **llio_transfer $LD_FX**
- **llio_transfer --purge $LD_FX**

  Specifies the binary to be used with Ansys LS-DYNA. Do not change the argument.

  For more information on lllio_transfer, please refer to the User's Guide (https://www.fugaku.r-ccs.riken.jp/doc_root/ja/user_guides/use_latest/).

３. Using Ansys LS-PrePost

The following is an example of execution commands for Ansys LS-PrePost. Please

modify it as appropriate for your work environment. Refer to the description below for the red parts. Ansys LS-PrePost is used in a pre-post environment. For the procedure up to the execution of the following command, please refer to the Fugaku Visualization User Guide on the Fugaku Portal (https://www.fugaku.r-ccs.riken.jp/docs/manuals).

```
[PrePost]$   module use /vol0004/apps/isv/LS-DYNA/modulefiles
[PrePost]$   module load LS-PrePost
[PrePost]$   lsprepost
```

※ The leading "[PrePost]$" indicates command execution in a pre-post environment.

３.１. Settings for Ansys LS-PrePost

● module command

Used to set environment variables.

● module use

Specifies where *modulefile* is stored. Do not change.

● module load *modulefile*

Sets environment variables defined in *modulefile*.

```
module load LS-PrePost
```

is specified, the latest version installed on Fugaku is used.

Important: Environment variables set by the module load command may include runtime parameters. When specifying runtime parameters, be sure to specify them after the module load command.

To use a specific version, change the *modulefile*.

```
Example: Using 4.8.25 version
   module load LS-PrePost/4.8.25
```

Keywords for *modulefile* can be confirmed by the following command.

```
module use /vol0004/apps/isv/LS-DYNA/modulefiles
module avail LS-PrePost
```

The contents set by module can be confirmed with the following commands.

```
module use /vol0004/apps/isv/LS-DYNA/modulefiles
module show modulefile
```

4. Change in the environment of Ansys LS-DYNA

When environmental changes are made to Ansys LS-DYNA and Ansys LS-PrePost, the details and date of the changes will be posted on the Fugaku Portal. Please check the details of the changes and take action if necessary. The following is a list of expected changes, their impact on users, and how to deal with them.

- **Ansys LS-DYNA Version Upgrade**
  If you use the latest version specified with LS-DYNA or LS-PrePost in module load, the software version executed after the change date will be changed to the newly latest version. If you want to continue using the currently used version, add product version to the module load specification.

- **Ansys LS-DYNA specific version removal**
  If the version to be deleted is specified in module load, the software will not be available after the change date. Please change the module load setting and use another version.

5. Support

Please contact the Fugaku support (https://fugaku.zendesk.com/hc/en-us/requests/new) for Fugaku-specific content. For general information about Ansys LS-DYNA, please contact your licensee.