

# instructions

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## todo

- unzip source code packages and install.
- develop and test the code locally.
- deploy code on stampede2.

## MPICH links

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## TACC and stampede2 links

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## MPICH on Local Machine

This section includes all the material documented so far to run MPI application on a local machine.

### Installation From Source

```
cd mpich-4.0.2/  
./configure --prefix=/home/smerx/git/cse5351/hw/hw05/mpich-install/ --  
disable-fortran --disable-cxx  
make; sudo make install  
export PATH=/home/smerx/git/cse5351/hw/hw05/mpich-install:$PATH  
mpiexec --version
```

### Installation Via App Manager

Install MPICH on linux via Debian package manager.

```
sudo apt install mpich
```

## compile and run

Compile simple source code (no linking needed) and execute on local machine.

```
cd ./src
mpicc main.c -o ../out/hello_world
mpirun -np 5 ../out/hello-world
```

## On TACC

### Login

Log in to Stampede2 using SSH and use \*\*\*\* as password:

```
ssh mojra@stampede2.tacc.utexas.edu
```

### Load Module and Environment Setup

Load the MPICH2 module:

```
module help swr      # show help text for software package swr
module help          # show help text for the module system itself
module load intel/19.1.1 gcc/9.1.0 # load required compilers
module load mvapich2/2.3.7 # load MPI module
module save          # save module config for later 'restore' and use.
module restore       # load personal default module
cd $SCRATCH          # use this directory as main workspace
pwd                  # check and confirm workspace address
mkdir test && cd test
touch test.c         # c
vim test.c
```

### File Transfer

Transfer the source code file using 'rsync'.

```
localhost$ rsync      mybigfile
bjones@stampede2.tacc.utexas.edu:~/$WORK/data
localhost$ rsync -avtr mybigdir
bjones@stampede2.tacc.utexas.edu:~/$WORK/data
```

### Build Source Code

Compile and link (build) the source code.

```
mpicc test.c -o test # C source, full build
mpicc -show # Show compile line generated by call to mpicc; similarly for
other wrappers
```

or alternatively, the HEADER file and precompiled INC directory needs to be included in compile and linking commands. This method uses "mpich" library instead of using "mpicc" compiler application.

```
icc -c main.c -I${WORK}/mylib/inc -I${TACC_HDF5_INC}
# compile
icc main.o -o myexe -L${WORK}/mylib/lib -L${TACC_HDF5_LIB} -lmylib -lhdf5
# link
```

## Launch the MPI Application

Use the following flags tih

Option	Argument	Description
-p	Title	Queue name.
-J	job_name	Job name.
-N	total_nodes	Total number of nodes to use (required).
-n	total_tasks	Total number of tasks (required).
-o	output_file	Output file.
-e	error_file	Standard error file.
-t	hh:mm:ss	Wall clock time for job (required).
--mail-user=	email_address	Specify the email address to use for notifications.

Use SBATCH to assign nodes and tasks and use 'ibrun' to execute binary.

```
#SBATCH -N 4 # num cores (tasks)
#SBATCH -n 1 # num nodes
ibrun test
```

To open an interactive environment for command-line debugging use 'idev'.

```
idev -N 4 -n 1 # run on 4 nodes (-N), 1 tasks each (-n)
ibrun test -o test.out -e test.err
```

## Environment Setup for MPICH Dev and Debugging

```
ssh -X mojra@stampede2.tacc.utexas.edu # use -X for DDT GUI so X11 forwards
msgs
cd $SCRATCH && cd test
module load ddt_skx intel/19.1.1 gcc/9.1.0 mvapich2/2.3.7 # load required
compilers
mpicc -g -O0 test.c -o test # compile with debug and zero optimization
options
idev -N 1 -n 4 # run on 4 nodes (-N), 1 tasks each (-n)
ddt test

# on window 01
# ssh -X mojra@stampede2.tacc.utexas.edu # nbug
ssh mojra@stampede2.tacc.utexas.edu
cd $SCRATCH
# module load ddt_skx intel/19.1.1 gcc/9.1.0 mvapich2/2.3.7 # --- nbug
module load intel/19.1.1 gcc/9.1.0 mvapich2/2.3.7
mpicc -g q1s.c -o q1s
mpicc -g q3.c -o q3 -lm -O3

# on second 02
# ssh -X mojra@stampede2.tacc.utexas.edu # nbug
ssh mojra@stampede2.tacc.utexas.edu
cd $SCRATCH
idev -N 1 -n 4 -t 0:15:0
#ddt_skx q1s # nbug
ibrun q1s
```

## Using idev Development and DDT Debugging Apps

<https://github.com/arjunlak/Parallel-Processing-mpi-scatter-gather-Stampede/blob/master/qone>