Quick Install Instruction for FronTier

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1 C and Fortran Compiler

1.1 Check Compilers

First, we need to check c, c++, fortran compliers with the following commands:

```
 gcc -v
 g++ -v
 gfortran -v
```

1.2 Install Compilers

Install the compliers with the following commands if needed:

```
 apt-get install gcc
 apt-get install g++
 apt-get install gfortran
```

2 Set up Blas and Lapack

If Blas and Lapack were not installed, set up them with these commands:

```
 apt-get install libblas-dev
 apt-get install liblapack-dev
```

3 Set up MPI

First download load mpich at


Second, install mpich according README file in mpich directory.

Third, add the bin subdirectory of the installation directory to your path in your startup script (.bashrc for bash, .cshrc for csh, etc.). For example: if the mpich is installed at /usr/local/pkg/mpich, the lines

```
PATH=/usr/local/pkg/mpich/bin:$PATH; export PATH;
```
4 Set up PETSc

For solving linear systems in incompressible fluid parallelly, we need to install PETSc which is a fast parallel sparse linear system solver. We can get PETSc on the following webpage.

http://www.mcs.anl.gov/petsc/petsc-as/index.html

Install PETSc by the following commands:

```
tar -xvf petsc-3********
cd petsc-3.****
export PETSC_DIR=$PWD
./configure --with-blas-lapack-dir=/usr --with-mpi-dir=/usr/local/pkg/mpich
-prefix=/usr/local/pkg/petsc
make PETSC_DIR=/usr/local/src/petsc-3.1-p8 PETSC_ARCH=linux-gnu-c-debug all
make PETSC_DIR=/usr/local/src/petsc-3.1-p8 PETSC_ARCH=linux-gnu-c-debug install
make PETSC_DIR=/usr/local/pkg/petsc test
```

For some old version of petsc, we also need libX11 to be in the /usr/lib, otherwise the linking would fail.

5 Set up HDF4, Gd

5.1 Set up Zlib, Jpeg, Szip, Gd

If you are root user, you can install these labs in the following way:

```
sudo apt-get install libpng-dev
sudo apt-get install libjpeg-dev
sudo apt-get install libgd2-xpm-dev
```

Otherwise, go to the website http://www.hdfgroup.org/release4/obtain.html download these libs at External Libraries Used By HDF4 part.

Install these libs following the instruction in them.

5.2 Set up HDF4

Go to HDF4 directory, then run the following commands:

```
./configure --with-zlib=/path to zlib --with-jpeg=/path to jpeg --with-szip=/path to szip --prefix=/path to install hdf F77=gfortran
```

For example:

```
./configure --with-zlib=/usr/local/pkg/zlib --with-jpeg=/usr/local/pkg/jpeg --with-szip=/usr/local/pkg/szip --prefix=/usr/local/pkg/hdf F77=gfortran
```
6 Set up FronTier with build.sh

build.sh is a high level build script for FronTier. The parameter '-h' will give you a brief help file for using the build.sh. we need to add to part into build.sh for our own computer.

6.1 First part

In “// Choose proper compilers based on machine” part we add an elif clause like:

```sh
elif [[ "${HOST}" == "newdelta" ]]; then
  echo "Computer is recognized as Delta."
  config_delta
```

6.2 Second part

We add a function named cong_delta into build.sh like this.

```sh
###
function cong_delta {
  export CXX="mpicxx ${OPTS} ${COPTS_GCC}"
  export F77="mpif77 ${OPTS}"  
  export CC="mpicc ${OPTS} ${COPTS_GCC}"
  export PETSC_DIR=/usr/local/pkg/petsc
  export PETSC_INCLUDE="-I${PETSC_DIR}/include"
  export PETSC_LIB="-L${PETSC_DIR}/lib -lpetsc -llapack -lblas -ldl -lm
  -L/usr/X11R6/lib -lx11"
  if [[ -n "$WITHHDF" ]]; then
    CONF="$CONF with-hdf=/usr/local/pkg/hdf"
  fi
  if [[ -n "$WITHGD" ]]; then
    CONF="$CONF with-gd=/usr"
  fi
  export CONF="-with-mpich=/usr/local/pkg/mpich -with-petsc=${PETSC_DIR}
  -with-devel $CONF -with-gd=/usr"
  PMAKE="-j2"
}
###
```

6.3 run build.sh

`./build.sh -d -n with-hdf
make`