# Compile source code

- A compile script in nems fv3 code can be used to compile the code.

  o Location: your_nemsfv3gfs_branch/tests/compile.sh

    %cd your_nemsfv3gfs_branch/tests
    %./compile.sh PATHTR MACHINE_ID MAKE_OPT BUILD_NR

  o PATHTR: the full path of FV3 directory under your_nemsfv3gfs_branch
  o MACHINE_ID: machine ID,e.g: wcoss_cray, theia
  o MAKE_OPT: compile options, default ('', empty string) is for 64-bit OpenMP non-hydrostatic build using AVX2, other options are:
      'DEBUG=Y': turn on debug option
      'VERBOSE=Y': turn on VERBOSE mode to get additional details on compile
      'OPENMP=Y': use openmp
      'AVX2=Y': use AVX2 in Intel Haswell for better performance.
      'HYDRO=Y': hydrostatic mode
  o BUILD_NR: the number of build (there might be several copies of the executable). The final executable would be fv3_${BUILD_NR}.exe

  o Example:
%./compile.sh /gpfs/hps/emc/global/noscrub/Jun.Wang/nems/20170131/fv3_theia/FV3 wcoss_cray '' 1

# Making branches and check out working copy

NEMS FV3 application repository:
https://svnemc.ncep.noaa.gov/projects/nems/apps/NEMSfv3gfs/trunk

with two externals linked to nems and fv3 repositories:
https://svnemc.ncep.noaa.gov/projects/nems/trunk
https://svnemc.ncep.noaa.gov/projects/fv3/trunk

- Make NEMSfv3gfs branch:
%svn copy https://svnemc.ncep.noaa.gov/projects/nems/apps/NEMSfv3gfs/trunk
https://svnemc.ncep.noaa.gov/projects/nems/apps/NEMSfv3gfs/branches/
your_nemsfv3gfs_branch -m" create your nemsfv3gfs_branch"

- Make fv3 branch
%svn copy https://svnemc.ncep.noaa.gov/projects/fv3/trunk
https://svnemc.ncep.noaa.gov/projects/fv3/branches/your_fv3_branch -m"create your fv3
branch"

- Check out a working copy:
%svn co https://svnemc.ncep.noaa.gov/projects/nems/apps/NEMSfv3gfs/branches/
your_nemsfv3gfs_branch

# Run fv3 application test

- It is suggested to run a sanity check (also called fv3 application test/fv3 regression test) before the parallel test at high resolution.

  o Currently four regression tests are available: fv3 control, fv3 domain decomposition, fv3 threading, fv3 restart at C96 resolution

  %cd your_nemsfv3gfs_branch/tests
  % ./rt.sh –l rt.conf1

  o The general setting is at:  your_nemsfv3gfs_branch/tests/fv3_conf
    ▪ fv3_bsub.IN_wcoss_cray and fv3_qsub.IN_theia fv3_bsub.IN: fv3 job card for wcoss_cray and theia
    ▪ fv3_run.IN: input files that are copied to run directory
    ▪ nput.nml.IN: fv3 namelist file
    ▪ model_configure.IN: nems model configure file

- The executable generated from the compile.sh can be used to run FV3 parallel.
  o  Currently FV3 workflow still needs minor changes to run with NEMSfv3gfs executable

# Making changes in fv3 repository

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Acknowledgement: Dusan Jovic, Jeffrey Whitaker, Samuel Trahan, Mark Iredell

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  - Code commits

# Proposal for Code Management Procedures

**https://svnemc.ncep.noaa.gov/trac/fv3/**
**https://svnemc.ncep.noaa.gov/trac/fv3gfs/**

- NEMS FV3 and FV3GFS trac ticketing available now

1) proposal of changes, including expected code and science impacts submitted by the developer
2) review committee evaluates proposal and provides feedback
3) if okayed, branch is created and software work completed
4) run regression tests in the branch to evaluate impacts on science and computational performance
5) evidence-based review of science impacts before final code review
6) code review done by code manager and committee
7) main trunk development merged into the branch
8) re-run regression tests to ensure science and computational assessments are still valid
 9) merge request for inclusion in main trunk

Vijay Tallapragada

# Steps to make changes in fv3 repository

1. Create an fv3 ticket

2. Create branches and make a working copy

3. Make changes, compile the code and run a test

4. Run NEMSfv3gfs application test

5. Code review and commit

# Create an fv3 ticket

- An fv3 ticket needs to be created before you start the work.

    - Fv3 trac ticket at:
      **https://svnemc.ncep.noaa.gov/trac/fv3**

    - Please list proposal of changes, including expected code and science impacts

    - Code review committee will evaluates proposal and provides feedback

# Making branches and check out working copy (cont.)

- **Check out a working copy:**

%svn co https://svnemc.ncep.noaa.gov/projects/nems/apps/NEMSfv3gfs/branches/
your_nemsfv3gfs_branch

- **Change external link to fv3 branch**

%cd your_nemsfv3gfs_branch
%svn propedit svn:externals .(dot)

Change:
 FV3 –r revision_number https://svnemc.ncep.noaa.gov/projects/fv3/trunk
To:
 FV3 https://svnemc.ncep.noaa.gov/projects/fv3/branches/your_fv3_branch

%svn update
%svn ci –m"link FV3 to your_fv3_branch"

# Code review and commits

- When the tests are finished, please do the following:

  - finish documenting all the changes in your fv3 ticket

  - If trunk code is updated, please merge your branches to the latest trunks, rerun regression test and write down the impacts on science and computational performance in fv3 ticket.

  - Request code to be committed to trunk and reassign your ticket to a member of fv3 code review committee or code manager

  - The review committee and the code manager will review the code changes. If the review committee approves the code changes, code manager will commit the code changes and update regression test baseline if needed.

# More about regression test

- Current FV3 application has 4 tests, more tests will be added for nesting, climate run (atmosphere component only for now), high resolution parallel run, etc.

- NEMS regression test:

  o NEMS code manager is collecting requirements on NEMS build system. The NEMSAppBuilder and NEMSCompsetRun are not set up yet in NEMSfv3gfs for NEMS regression test. Once the NEMS build system is implemented, certain NEMS regression test for NEMSfv3gfs will be set up and this documentation may need to be updated.
  o If you are making changes inside NEMS, a NEMS ticket needs to be created and a NEMS branch will be generated and used as external NEMS link inside NEMSfv3gfs. Your code changes need to be tested with other NEMS applications to make sure that the changes will not break other applications.

- FV3GFS workflow

  o Fv3gfs workflow is under development. The workflow in fv3gfs may be implemented in the application test in the future to streamline the testing procedure.