



Automated Testing of Formulations in the Next Generation Water Resources Modeling Framework

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Needs and Concerns

The Next Generation Water Resources Modeling Framework (NextGen) formulation teams have officially incorporated 12 models and modules into the NextGen build runtime, including those written in C, C++, Python and Fortran. With each model comes a plethora of challenges:

- Are Basic Model Interface (BMI) functions properly defined for the model domain?
- Will this model provide reasonable output given a sample input dataset?
- Are input and output variable names and units correctly assigned?
- Does the model run within NextGen framework?
- Are all state variables sound and functioning as expected?



Github Actions

What it does: Implements software standards for version control and product code updates, all over the browser!

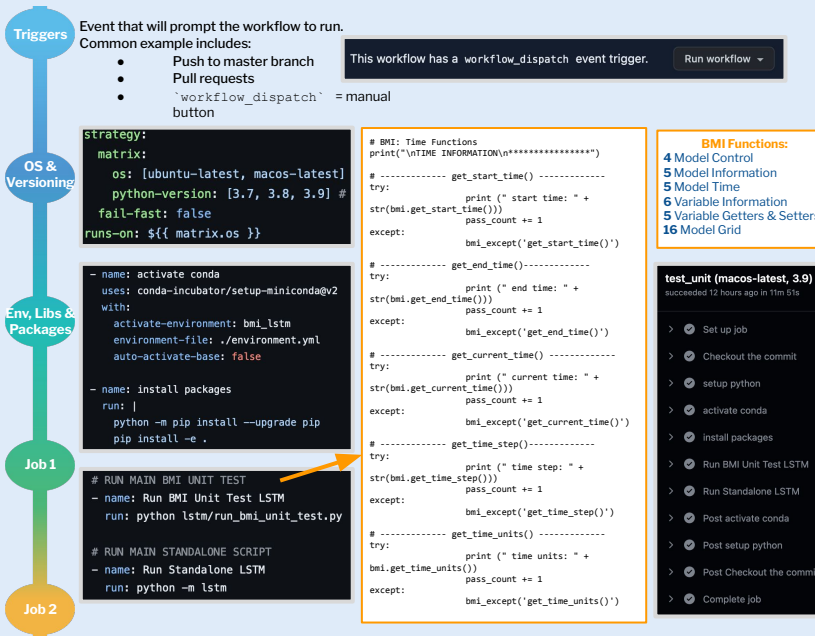
Why it helps:

- Eliminates local environment challenges
- Facilitate the proper use of model code
- Check standalone scripts
- BMI unit testing
- Framework build/runs
- Promote better community involvement &
- Overall quality of collaborative application design

How to implement:

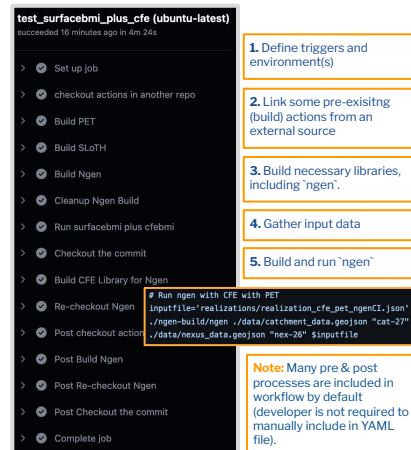
- Start with a workflow YAML file(s)
- Place in `.github/workflows` directory in a repo

How Github Actions & Workflows Aid Model & Module Development



NextGen Integration Workflow

Example: Build & Run NextGen Coupled with PET & CFE



Future Work

- Incorporate unit testing workflow for all 12 formulations
- Add mass balance checks when appropriate
- More robust error messaging
- Check for memory leaks
- Include more 'ngen' build/run workflows

REFERENCES:

Github Actions Docs: <https://docs.github.com/en/actions/using-workflows>

CFE Workflow Examples: <https://github.com/NOAA-OWP/cfeactions>

LSTM (Python) BMI Unit Testing Script: https://github.com/NOAA-OWP/lstm/blob/master/lstm/bmi_unit_test.py



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