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Designing the NextGen Framework to Support Community Engagement

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The Philosophy of the NextGen Framework

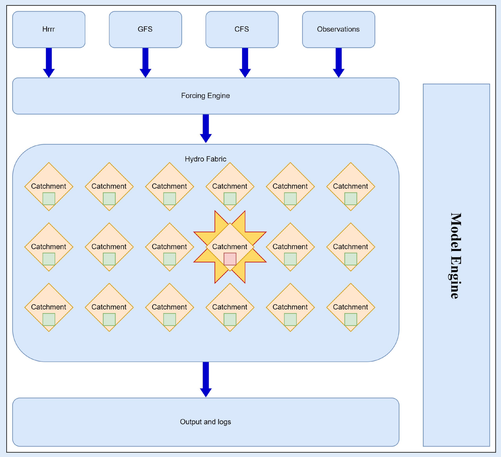
The System that creates the National Water Model should be:

- Useful for research and experimentation at many scales
- Usable for operational forecasting.
- Provide an operational National Water Model.
- Provide a platform for independent research.
- Usable on a laptop
- Capable of efficiently using all aviable compute resources

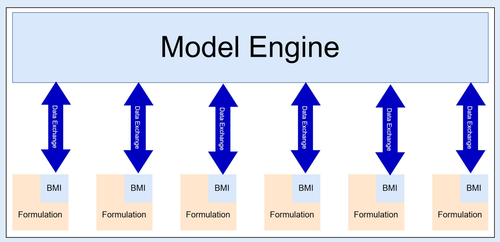
Managing Complexity in the NextGen Framework

- A continental scale model is complex, and operational continental scale model is even more complex.
- How can this complexity be reduced to allow easy of research.
- Separation of code based on functions. Testing a new physics scheme can be done with little or no changes to the rest of the model
- Physics code act on inputs and creates output with out needing to know the source or destination of the

NextGen Framework Allows easy modeling within OWP operational domains



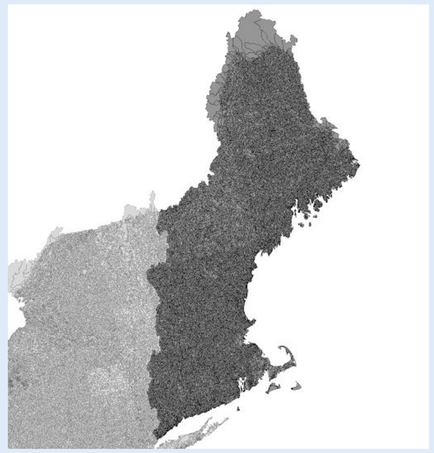
The NextGen Framework allows people to easily change the physics being used in one part of a simulation without changing the rest of the simulation



The use of BMI allows all models to be treated identically by the NextGen Framework. This makes new physics easy to add to me model

Formulations are like puzzle pieces. They may be complete models or they can be combined to create a complete model.

The Conus Hydrofabric for the NextGen Framework. Displaying divide boundaries. The resulting Image is too dense for individual catchments to be viewable at this scale.



The NextGen Hydro fabric for the VPU 01 region. Even at this scale catchments are not clearly visible.

NHDPlus dataset with divide boundaries. This is the level of detail that the NWM is built on.

The NextGen Framework relies on several interrelated technologies

BMI:

- Simple Framework that allows interaction between programs
- Allows the framework to send and receive data from computational models
- Simple interface "Easier to implement“
- Compatible with binary closed source models

Hydrofabric:

- Data structure that combines the surface and routing information from domains modeled with the NextGen Framework
- Hydrofabric files used for operations are available.
- Tools are available to subset Hydrofabric to a particular region

Formulations:

- Pure Physics code that creates outputs from inputs
- Each catchment has one ore more attached formulations
- Catchments may use different formulations. Allowing regionalized physics.
- Formulations maybe combined with no limit on the number used in a catchment.

Conclusions

The Next Gen Framework, provides to tools, data, and capabilities, to enable easy testing of new physics schemes anywhere within the operational forecast region.

Hydrofabric QR Code

Model Engine QR Code

ACKNOWLEDGEMENTS:

The creation of the NextGen System is results of the work of many people, both in OWP and contractors

REFERENCES:

References go here

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