

# Scalability of the Next Generation National Water Model Framework

SESSION NUMBER

OWP OFFICE OF  
WATER  
PREDICTION

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Add Other Information if Needed

## Goals

- Determine how well the NGen Framework adapts to change domain sizes and availability of computational resources
- Determine the computational cost of different potential formulations
- Determine if we have sufficient scaling for an operational model

## Methods

### Processes Data Acquisition

Linux time command  
Multiple MPI process configurations tested  
Each configuration tested multiple times  
Separate runs for timing each formulation

### Formulation Data Acquisition

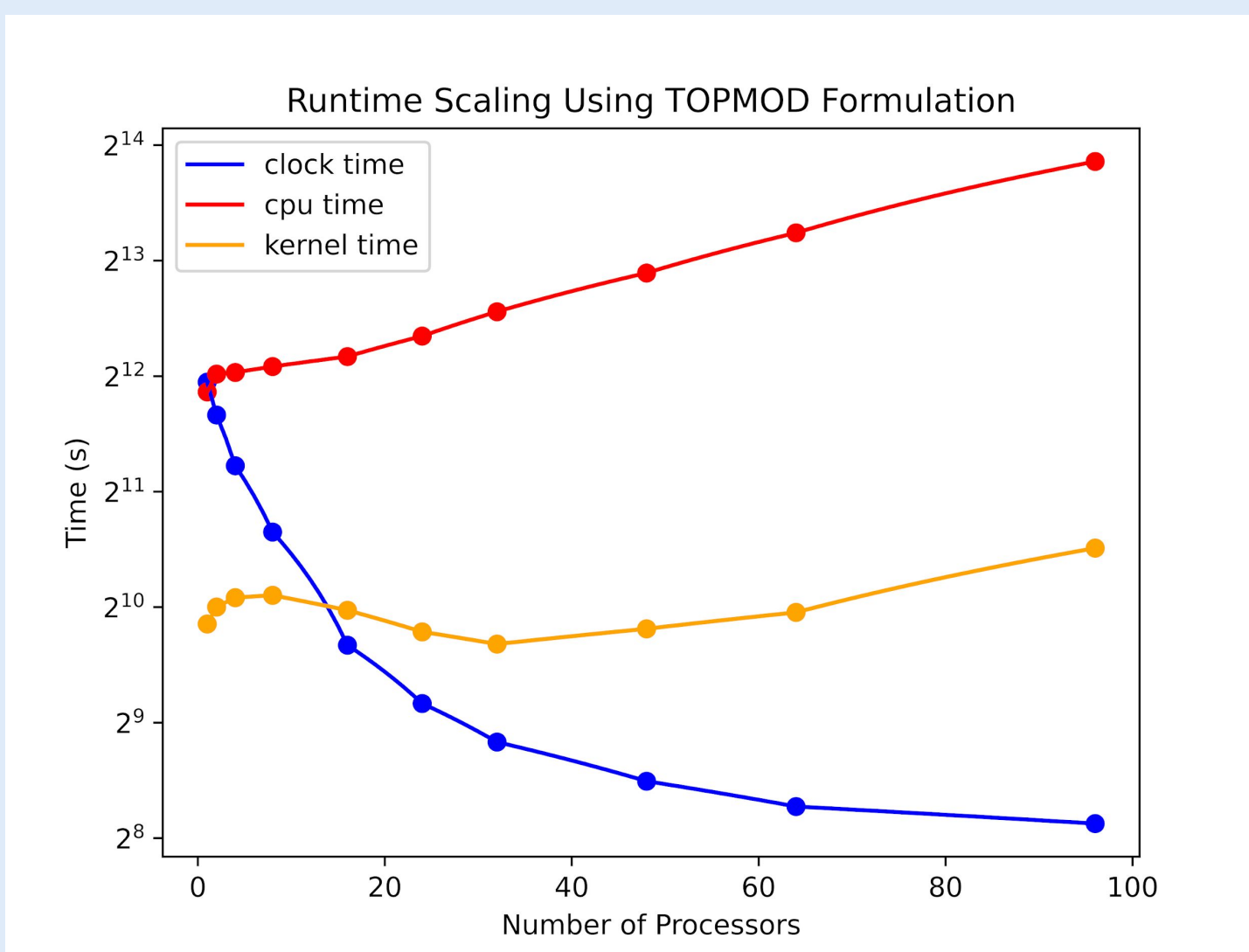
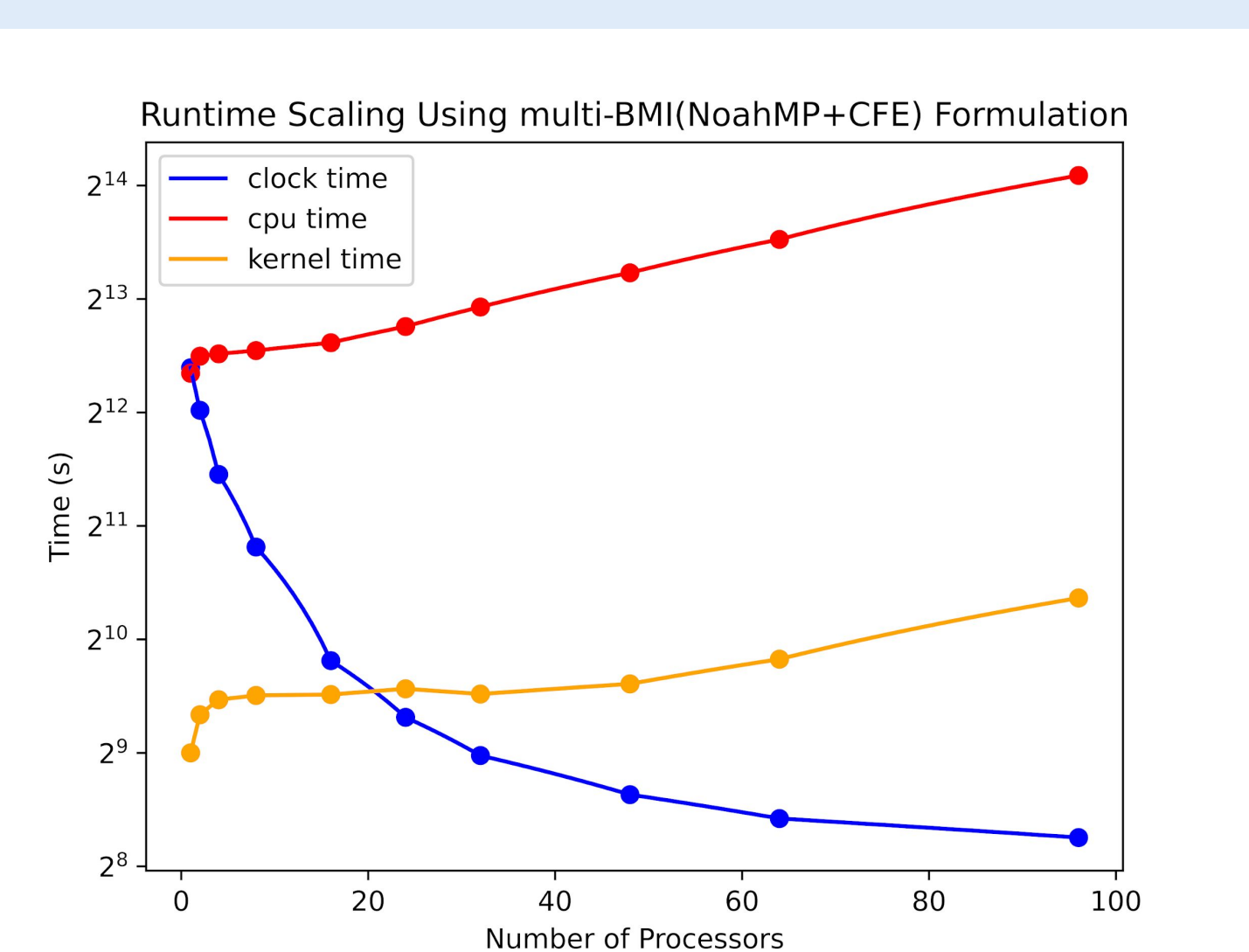
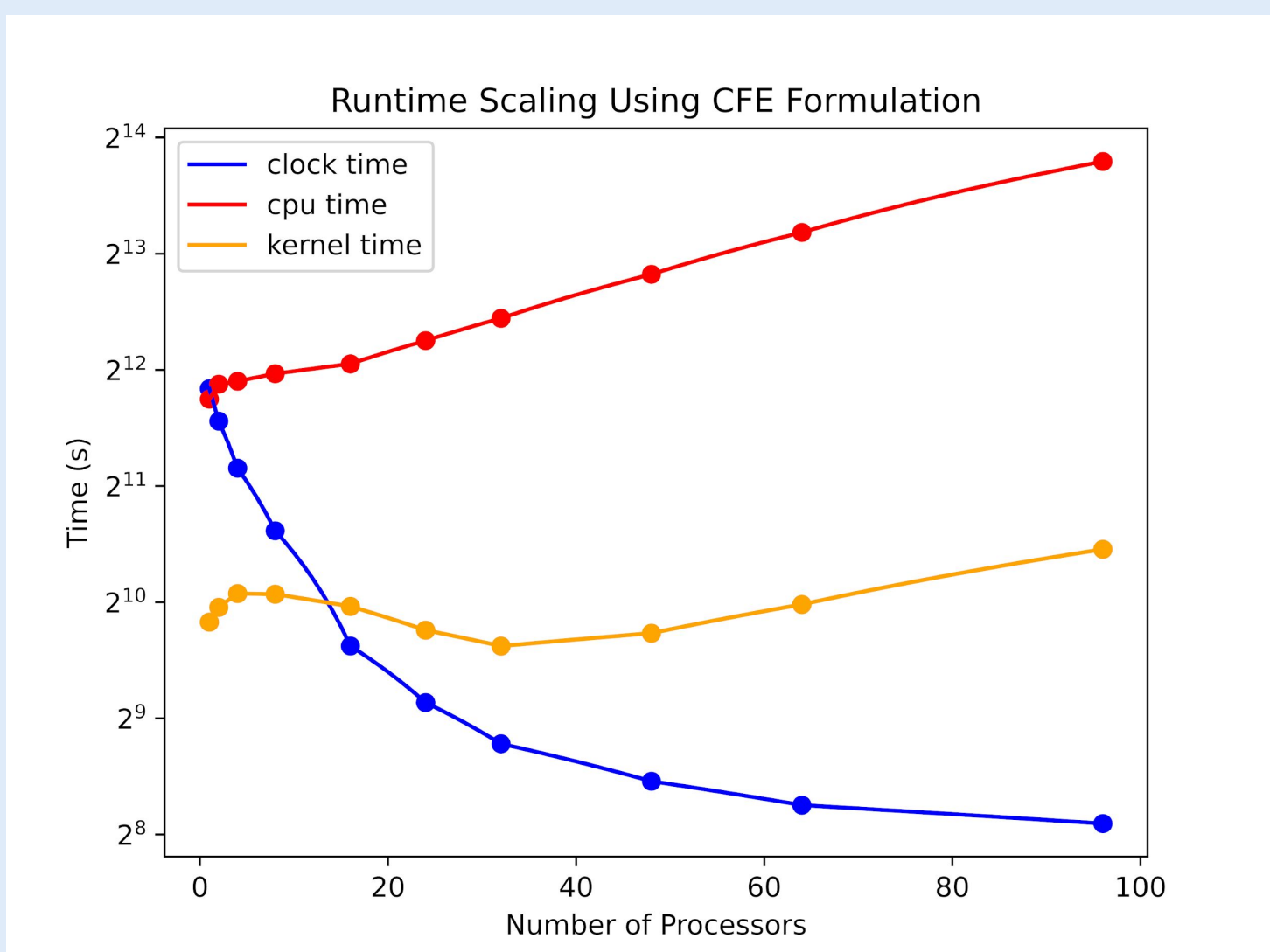
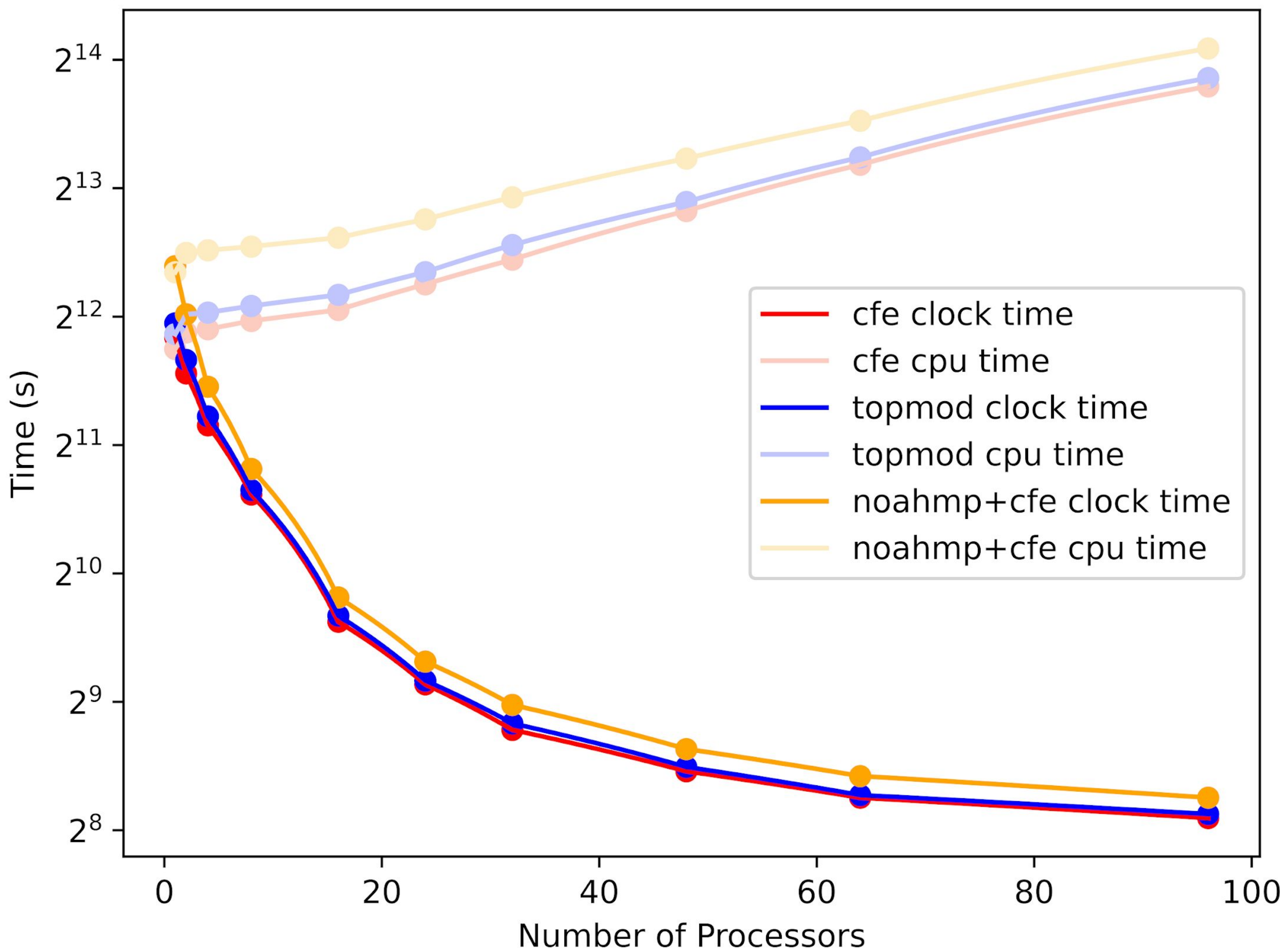
Internal profiling code  
Terminal I/O suppressed while profiling  
Process timing and formulation profiling done separately

### Testing Domain

HUC 01  
~20,000 catchments

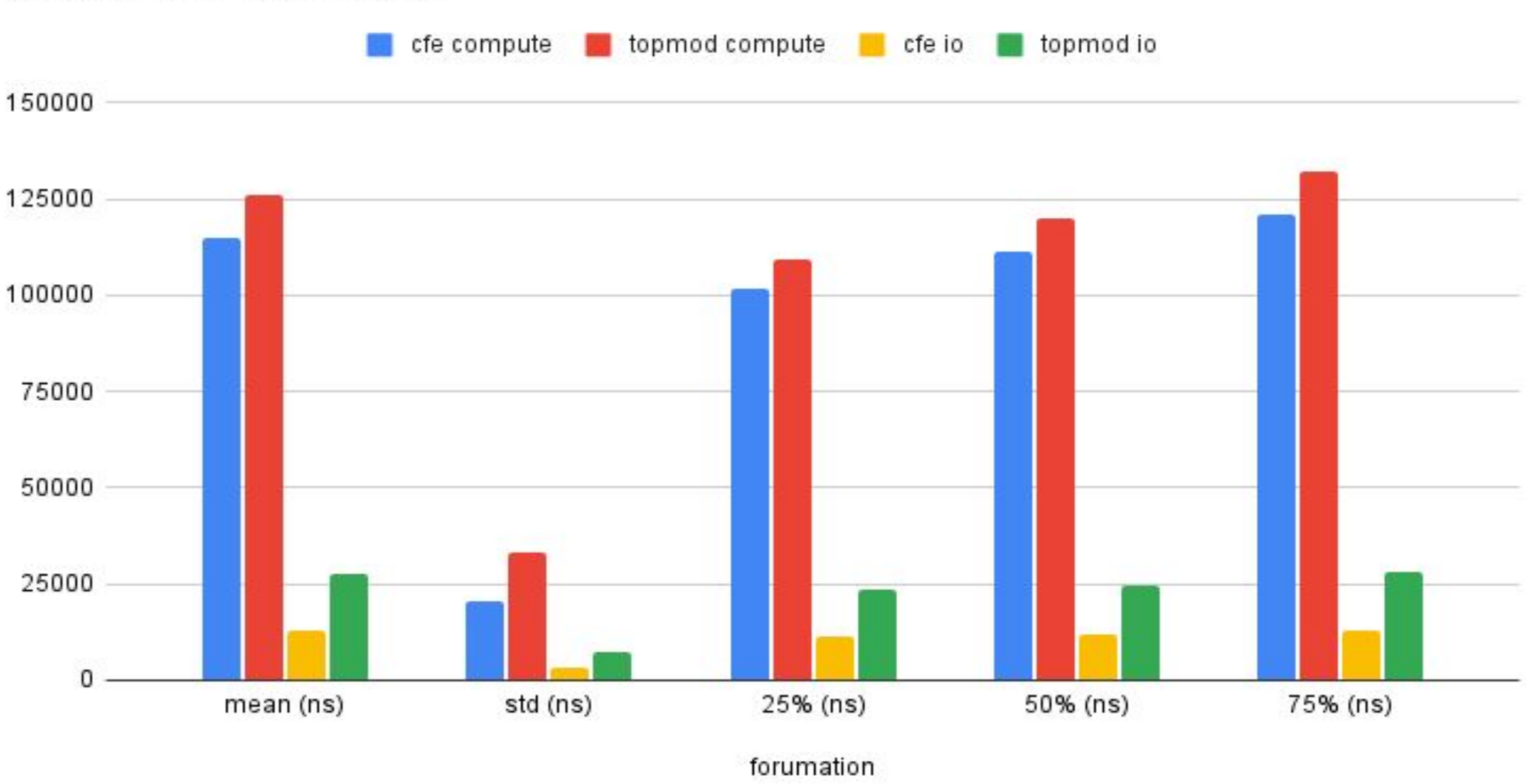
## The framework shows good scaling with increasing numbers of processors

Comparison of clock and cpu time for CFE, topmod, and NoahMP+CFE



## Results & Discussion

Formulation Times in ns



- The framework exhibits good scaling with increasing number of processors
- Increases in CPU time are due to replicated startup costs
- CFE, TOPMOD, and NoahMP+CFE had very similar performance curves
- There is substantial variation in formulation run times

## Future Work

Testing of addition for formulations  
Testing of combined formulations  
Timing of multi-formulation runs  
Timing of routing

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Acknowledgements go here

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