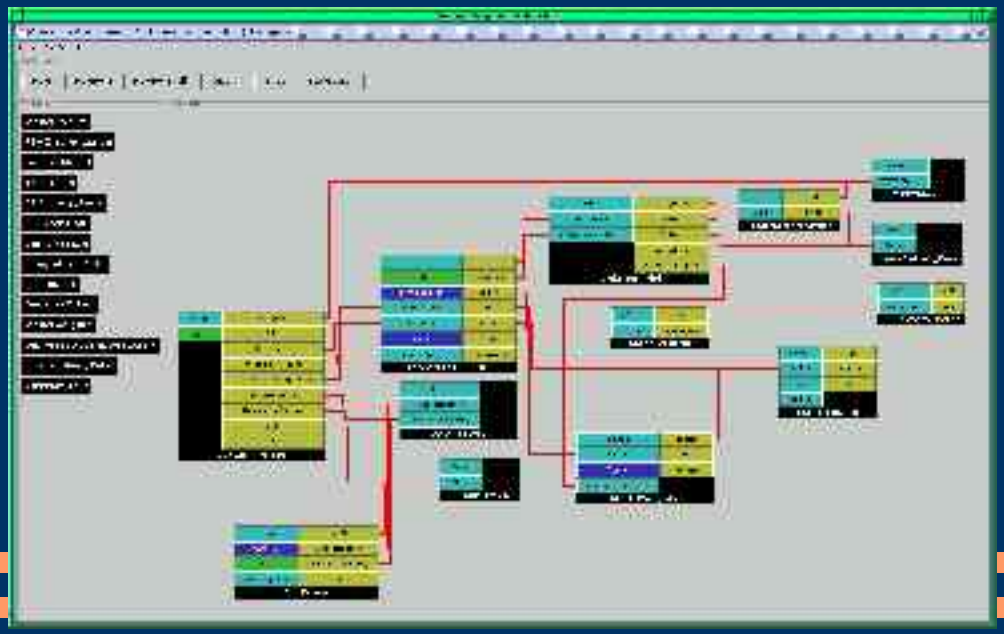
Why integrate disparate codes into single large-scale simulations?

- 'Cause that's what we get funded for ...
  - Agencies have less tolerance for many partitioned simulations ...
  - 1 viewgraf/$1E6 – need an integrated program.
- Need a way to get from many related simulations to a single integrated one.

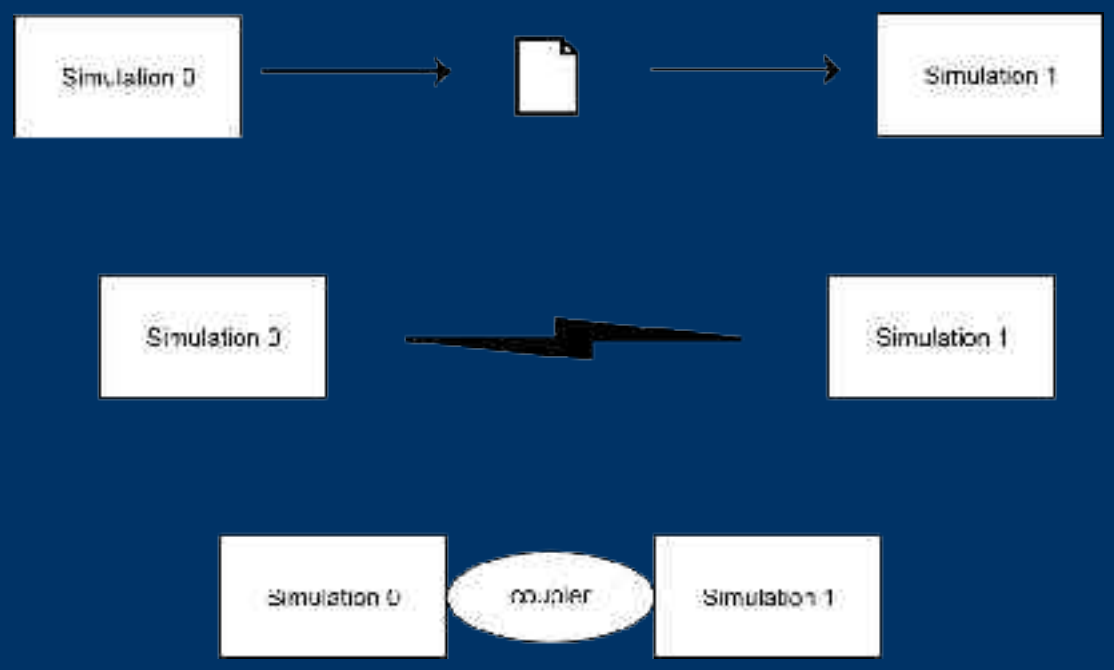


Parallel Coupling answers: "How to integrate multiple HPC applications?"

- Components ( ) *are* the answer -right?
  - provide good, high-performance coupling.
  -
- Components, sure but ...
  - like asking strangers to become a family overnight
  - there is a reason for mating ritual ...
- Restating the question more clearly: "How to evolve coupling by degrees?"

A coupling evolution success story: Community Climate Model

- Started out as disparate simulations for sub-domains of Global Climate Modeling.
  - Ocean, Land, Atmosphere, *etc.*
- Proceeded with file exchange between apps
  - *App* -> *output-file* -> *filter* -> *input-file* -> *App*
  - *i.e.* workflow
- Improved this with tighter sequential coupling
  - memory resident (*a la* Model Coupling Toolkit)
- Improved further with still-tighter parallel coupling
  - coupling between disparate partitions of a single machine
  - coupling between two parallel machines

What tools might facilitate parallel coupling

- Some existing tools ...
  - Work flow tools.
  - Model coupling toolkit
- Integrated view of disparate codes evolving to a single multi-physics simulation: