Overview of SWIM CS Issues

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Computer Science Research in SWIM

- Two reasons for CS in SWIM
  1. To help accomplish the physics goals of the project
  2. To do cool computer science research
- Mostly, we try to find ways to do both at the same time
- We've done a lot of cool stuff recently, embodied in the IPS
- We'd like to see it being used to do cool physics!
  - Test & validate what we've done, look for gaps
  - Push the envelope
- Here are some CS-related things to think about as we plan for new physics

Things to Think About

Presentations/discussion later today…

- Visualization
  - Elvis-style monitoring
  - Analysis and discovery
  - Publication
- Using concurrent multitasking (MCMD) capability
  - Just use it!™
  - Data exchange in multitasking simulations
  - More convenient ways of expressing multitasking workflows
- Data management
  - Data provenance
  - Capture and archival
  - Sharing and discovery

More Things to Think About

- Testing
  - Standalone physics codes
  - IPS
  - IPS components
  - Integrated simulations
- Debugging
  - Verification of component outputs to Plasma State
  - What features/capabilities would be helpful?
- Software Provenance
  - Which codes are we running and where do they come from?
- Physbin
  - Staying up to date
  - Notification of changes
  - Versioning

Even More Things to think About

- Performance and instrumentation
  - Integrate with build & execution process?
  - What use useful to have “all the time” from IPS?
- Integration with Dakota and/or other optimization tools?
- Use of IPS beyond SWIM
  - Framework is pretty general
  - From the CS standpoint, we’d like to see the envelope pushed beyond SWIM