**Blue Waters Petascale Semester Curriculum v1.0**

**Unit 11: Domain Science: Astrophysical Fluid Dynamics**

**Sample Assessment**

*Developed by* *Marc Gagné and Roman Voronov for the Shodor Education Foundation, Inc.*



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### Formative Assessments

During each lesson, students complete a set of activities. To assess student progress, we recommend that students submit an activity report after each lesson. Each activity report will consist of an activity summary, critical thinking questions and activity results in one or more parts, a reflection/discussion section, and references. The activity report is a formative assessment, so the instructor should provide students with questions/guidelines and a rubric prior to the activity report due date, and should provide feedback and assessment using the rubric before the next lesson begins.

### Summative Assessment

This set of lessons provides a sample summative assessment: a student project. An alternative type of student assessment might include an exam or quiz consisting of multiple-choice or free-response questions.

#### Sample Summative Assessment: Student Project

* *Research component:* students will use internet resources to find a fluid dynamics problem they wish to explore with PLUTO.
* *Coding component*: students will identify an appropriate test problem to modify. Students will then edit the definitions.h, init.c and pluto.ini files to initialize the problem.
* *Testing component*: Students will test code at lower mesh resolution on development queue, and modify code as needed. Students will generate makefile (python script), compile with MI, schedule, run, and debug C code.
* *Simulation component:* Students will select appropriate simulation time and mesh resolution, then allocate cluster resources based on prior performance and scaling results. Students will schedule job on cluster, and analyze performance.
* *Visualization component:* students will visualize and animate simulation results in VisIt.
* *Analysis component:* Students will qualitatively and quantitatively analyse their results, and compare them to published results.
* *Discussion component:* students will critically analyze their code, their methodology and their results. Students will reflect upon what they learned and possible next steps.
* *Reference section:* students will properly cite appropriate references.