

REQUEST FOR INFORMATION

*(Does not count toward the 15-page project narrative limit.)
(Will not be considered during the review and selection process.)*

In the coming years, the LCFs will be acquiring pre-exascale systems; see the system descriptions provided at the call for proposals web site (<http://hpc.science.doe.gov>). The INCITE program has a stewardship role to ensure that the community is preparing to effectively and efficiently utilize these systems. Responses to this RFI will be used by the LCFs to identify training opportunities in the coming year(s) and to help the INCITE program management shape future calls for proposals. Authors should provide the following information:

DEVELOPMENT PLAN FOR NEXT-GENERATION SYSTEMS

Proposal authors should describe their software development plans, articulating their strategy for running effectively on the forthcoming HPC systems at the ALCF and OLCF. We recognize that researchers will not have access to, or experience with, these new hardware architectures, however, authors should give thought to the LCF future systems and indicate whether they have committed resources to prepare to maximize node-level parallelism and data locality. Areas to consider for discussion include the following.

- Experiments or developments to make use of hardware multi-threading on a core and multiple cores per node
- Experiments or developments to expose vector or streaming parallelism through, e.g. OpenMP, CUDA, Pthreads, compiler directives such as OpenACC, etc.
- General design to improve data locality and memory hierarchy usage

Projects that currently have no specific development plans may indicate this, and provide feedback on potential training topics that would be useful.

Insert paragraph(s).

SOFTWARE SUSTAINABILITY PLAN

As software takes on an increasingly important role in scientific research, the INCITE program recognizes the need to promote improved sustainability of the software efforts and products. The development and use of scientific software play a central role in scientific research. Improved sustainability has the potential to increase the pace of scientific discovery and promote more efficient and effective use of computing resources. Areas to consider for discussion include the following:

- i. *For software developed by the PIs of the project:* Describe the overall software development process used, emphasizing elements that are most important for sustainability. Details should include descriptions of (i) how software requirements are determined and transformed into implemented code, tested and deployed (the software lifecycle), (ii) how integration of new and revised capabilities into existing software preserve existing capabilities (regression testing), (iii) how users learn about utilizing the code in their scientific efforts (documentation and training). We are also interested in the tools that software developers employ, including (i) source management tools and processes (how source code will be developed and managed), (ii) issue tracking tools and processes (how feature requests and software faults or “bugs” will be recorded and managed), (iii) regression testing tools and processes (how regression tests will be invoked) and (iv) software distribution tools and processes (how will users and collaborators access software products).

- ii. *For software used by the project:* Use of third-party software typically reduces the cost (time and effort) compared to developing the same capability independently. At the same time, it also increases risk. Describe how the third-party software is tested for correct behavior, initially and when upgrading to a new version (verification and validation); and describe how loss of functionality via faults and missing feature are handled by the third-party software and how complete loss of the capability will be addresses (risk mitigation).

Projects that currently have no specific sustainability plans may indicate this, and provide feedback on potential training topics that would be useful.

Insert paragraph(s).