

Overview of the TriBITS Lifecycle Model: A Lean/Agile Software Lifecycle Model for Research-based Computational Science and Engineering Software

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Abstract

Software lifecycles are becoming an increasingly important issue for computational science & engineering (CSE) software. The process by which a piece of CSE software begins life as a set of research requirements and then matures into a trusted high-quality capability is both commonplace and extremely challenging. Although an implicit lifecycle is obviously being used in any effort, the challenges of this process—respecting the competing needs of research vs. production—cannot be overstated.

Here we describe a proposal for a well-defined software lifecycle process based on modern Lean/Agile software engineering principles. What we propose is appropriate for many CSE software projects that are initially heavily focused on research but also are expected to eventually produce usable high-quality capabilities. The model is related to TriBITS, a build, integration and testing system, which serves as a strong foundation for this lifecycle model, and aspects of this lifecycle model are ingrained in the TriBITS system. Indeed this lifecycle process, if followed, will enable large-scale sustainable integration of many complex CSE software efforts across several institutions.