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The National Ignition Facility (NIF), currently under construction at the Lawrence Livermore National Laboratory, is a stadium-sized facility containing a 192-beam, 1.8 Megajoule, 500-Terawatt, ultra-violet laser system together with a 10-meter diameter target chamber with room for nearly 100 experimental diagnostics. When completed, NIF will be the world's largest and most energetic laser experimental system, providing an international center to study inertial confinement fusion and physics of matter at extreme densities and pressures. The NIF is operated by the Integrated Computer Control System (ICCS), which is a layered architecture of over 700 lower-level front-end processors attached to nearly 60,000 control points and coordinated by higher-level supervisory subsystems in the main control room. A shot automation framework has been developed and deployed during the past year to orchestrate and automate shots performed at the NIF using the ICCS. The Shot Automation framework is designed to automate 4-8 hour shot sequences, that includes deriving shot goals from an experiment definition, set up of the laser and diagnostics, automatic alignment of laser beams, and a countdown to charge and fire the lasers. These sequences consist of set of preparatory verification shots, leading to amplified system shots followed by post-shot analysis and archiving. The framework provides for a flexible, model-based work-flow execution, driven by scripted automation called macro steps. The shot director software is the orchestrating component of a very flexible automation layer which allows us to define, coordinate and reuse simpler automation sequences. This software provides a restricted set of shot life cycle state transitions to 26 collaboration supervisors that automate 8-laser beams (bundle) and a common set of shared resources. Each collaboration supervisor commands approximately 10 subsystem shot supervisors that perform automated control and status verification. Collaboration supervisors translate shot life cycle state commands from shot director into sequences of "macro steps" to be distributed to each of its shot supervisors, maintains order of macro steps for each subsystem, and supports collaboration between macro steps. They also manage failure, restarts, and rejoining into the shot shot cycle (if necessary) and manage auto/manual macro step execution and collaborations between other collaboration supervisors. Each macro step has database-driven verification phases and a scripted perform phase. This provides for a highly flexible framework for performing a variety of NIF shot types. Database tables define the order of work and dependencies (workflow) of macro steps to be performed for a shot. A graphical model editor facilitates the definition and viewing of an execution model. A change manager tool enables "de-participation" of individual devices, of entire laser segments (beams, quads, or bundles of beams) or individual diagnostics. This software has been deployed to the NIF facility and is currently being used to support NIF main laser commissioning shots and build-out of the NIF laser. This will be used to automate future target and experimental shot campaigns.

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