Recent Developments in LoCo - Instant Collaboration in Simulation Data Management

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Abstract

While computer simulation has become a standard business practice for many companies, the number of simulations performed, the size and complexity of the models, the computational costs, and the predictive capabilities of the models keep increasing. As a consequence, the effective management of simulation data and related process information has become paramount.

In the past 10 years SCALE has developed a comprehensive simulation and test data framework (SCALE.sdm) in close collaboration with the German automotive industry. Several Apps cover the entire CAE design process. This presentation focuses on recent developments in LoCo, SCALE's system for simulation data management. LoCo applies several new approaches to simulation data management, such as strict offline capabilities, automatic synchronization of relevant data, comprehensive version management of all involved objects, and novel approaches for the assembly of models.

Version control - the management of changes to data - is an important aspect of simulation data management. The version control functions of a simulation data management system are usually either based on the lock-modify-unlock or the copy-modify-merge approach. LoCo is based on the latter approach, as it is the natural choice for an environment in which individual engineers must be able to observe the effects of their own changes in isolation from the work of others.

Vehicle crash simulation is a prime example of a field where large teams of engineers simultaneously work on complex models and perform large numbers of computationally expensive simulations runs. During a vehicle development process there are several phases where a finite element model is set up based on CAD data. During such a phase a team of simulation engineers creates finite element models of the various components of the vehicle and must make sure that these sub-models can be joined together correctly to assemble a full car model. This setting is unusual in the sense that there is no need for the individual engineers to observe the effects of their own changes in isolation. As a consequence the copy-modify-merge approach feels cumbersome and unnecessarily complicated, whereas the lock-modify-unlock approach seems much more appropriate. Ideally, the model setup team should be able to switch to the lock-modify-unlock approach temporarily and return to the copy-edit-merge approach once model setup is complete. In the end of 2016 a new feature designated "LiveMode" was introduced in LoCo to accommodate this approach.

The new LiveMode feature was implemented in such a way that the user can seamlessly switch between normal mode (copy-modify-merge) and LiveMode (lock-modify-unlock). In LiveMode a component opened by a user is automatically locked for all other users and automatically released once the component is closed. As data upload and download is handled by a synchronization mechanism in the background, there is no need for the user to actively "check out" or "check in" components.

The LiveMode was first introduced at selected costumers in January 2017. First experiences show that, besides the model setup use case described above, a second use case has developed. The LiveMode is also used as an "instant collaboration tool". Typically two users, who would like to collaborate on a specific task, switch to LiveMode, work on the same set of data simultaneously and then return to normal mode.