

Pushing storage and bandwidth requirements of SDM towards reasonable levels

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Today’s vehicle development is faced with immense complexity—think product diversity, requirement diversity, job split, or distributed labor. Software systems for simulation data management (SDM) have proven an invaluable tool for coping with this complexity. However, SDM in general is prone to consuming a lot of storage and bandwidth, if care is not taken to exploit the high redundancy in (among others) simulation input data.¹ So far, the authors of this paper are not aware of any state-of-the-art SDM system to do just that.

Intent on pushing the state of the art forward as well as storage and bandwidth requirements of SDM towards reasonable levels, the company SCALE integrated into their SDM solution a technology that easily lowers said requirements for real-world SDM datasets by factor 4 (cf. Fig. 1); for pure simulation input data even factor 14 is achieved.

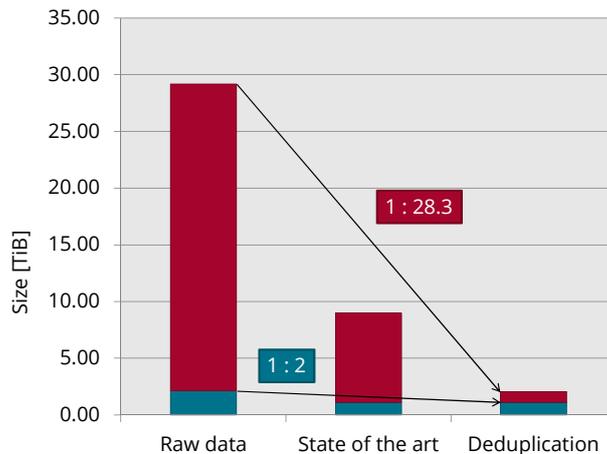


Figure 1: Storage savings on a real-world SDM dataset: 29.2 TiB raw size, 9.0 TiB after state-of-the-art compression, 2.1 TiB with the new technology—a factor 4.3 improvement over the state of the art. The bulk of the improvement is obtained because a large part of the data (top portion of each bar, mostly pure simulation input data) is particularly amenable to the new technology.

This technology is an intricate adaptation of a well-known technique for exploiting redundancy, called data deduplication, to the specific requirements of an SDM system, which are:

1. efficient storage of large data sets (in the tera- and petabyte range),
2. efficient data transfer between two stores,
3. concurrent random access (including deletion), and

¹This work’s focus is on simulation input data. For simulation output data, see for example: S. Mertler and S. P. Müller, *Reducing Storage Footprint and Bandwidth Requirements to a Minimum: Compressing Sets of Simulation Results*, LS-DYNA-Forum 2016. S. Mertler, *Neue Entwicklungen bei der Kompression von Simulationsergebnissen im Kontext von SDM-Systemen*, SCALE-Informationstag Prozessautomatisierung und Simulationsdatenmanagement, 2018.

4. no additional system requirements.

Thanks to the lowered storage and bandwidth requirements, new possibilities in vehicle development arise, such as: collaboration (almost) in real time, collaboration with more remote sites, or even just working with more elaborate simulation models. Currently, SCALE is investigating slight adaptations of the technology to reduce storage requirements of other kinds of data, such as reports.

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