

On Demand Licensing with LS-DYNA

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1 Abstract

The LS-DYNA simulation software is used on different High-Performance-Computing platforms since many years. Most of the users have access to in-house Cluster systems running LS-DYNA in the MPP-version on up to several 100s of Cores and an appropriate number of licenses to use their hardware effectively [1]. In recent years there was increasing demand inside the LS-DYNA user base for a flexible and efficient offering of software licenses both for on-premise hardware and for Cloud-based HPC-platforms. Since 2016 DYNAmore and LSTC offer a flexible and cost-efficient pay-per use licensing scheme. This licensing scheme is being implemented and can be accessed through LSTC and DYNAmore, who are responsible for the development and distribution of the LS-DYNA simulation software.

In this paper the different licensing schemes are being presented and practical experiences with the new LS-DYNA pay per use licensing concept are compared to other licensing possibilities. In addition the usage of LS-DYNA on Cloud-based infrastructure is shown. Advantages and disadvantages are discussed for different configurations and scenarios involving both SMEs and large organizations from automotive and other industries.

2 Classical Licensing Concept

2.1 Integrated versus modular licensing

There are different licensing models offered by different CAE software vendors. One popular licensing model is a modular concept, which limits the usage of the CAE software to a certain application field or industry. Different modules are adequately priced and different packages containing a module combination can be licensed. LS-DYNA never had such a limitation. All applications and industry-specific developments are available through the LS-DYNA license. This allows all users to use explicit and implicit time integration schemes, use all solvers in all application scenarios ranging from crash analysis, deep drawing to fluid dynamics or acoustics. As one of the goals in the LS-DYNA application is to be one code allowing multi-disciplinary applications, this is one of the central development and licensing ideas. A lot of customers estimate the fact, that they can just use new features and applications without paying any additional license fee.

2.2 Network Licensing versus Node-locked Licensing

A node-locked license limits the user to start the CAE-Code only on one dedicated node. One node is typically a workstation or a cluster node containing typically two main processors with Multi-Core architecture. This licensing concept was too much restricted and today LS-DYNA is always offered with a flexible network license allowing all nodes within the IP-network to run LS-DYNA jobs.

2.3 Job versus Core Licensing

An additional licensing concept for LS-DYNA is being offered since 2017. There is a possibility implemented in the network license server to increase the number of cores used per job run by adding additional core licenses. This allows users with a relatively low total number of cores (less than 35 licenses) to add additional LS-DYNA performance to the existing compute server infrastructure in a very simple and cost-efficient manner. The additional core licenses can be used in SMP and MPP fashion.

3 New Licensing Concepts

3.1 Usage of LS-DYNA on Cloud Infrastructure

Since last year the demand for Cloud Infrastructure to account for peak loads in CAE departments has been continuously increasing. Therefore an initiative for a flexible licensing concept in LS-DYNA has been started by LSTC and DYNAmore in 2015 [2]. There are different possibilities to license LS-DYNA on cloud infrastructure:

1. Short term lease
2. Pay per use license
3. BYOL – “Bring your own license”

The short term lease allows customers to use the classical licensing concepts for a short time period with a minimum of one month on additional hardware, which is being rented from a Cloud Infrastructure provider of his choice.

The pay per use license allows the user to pay per core hour, which is a common practice in the Cloud Infrastructure market place. The precondition for this licensing concept is, that the user already has a classical lease or paid-up license of LS-DYNA which is under current maintenance.

The BYOL concept allows the user to use the license server installed on his premise also on the Cloud Infrastructure.

3.2 Usage of Hybrid Cloud Concepts

In most cases customers do not use Cloud Infrastructure as their only compute resource, but in a mixed scenario, which means that a certain number of nodes is installed on their own premise and a supplementary part is being provided by the Cloud Infrastructure provider. In such a case also mixed licensing concepts can be implemented, which means, that additional licenses can be added based on short term or pay per use basis. The pay per use-license could in such a case even been used for on-premise hardware.

4 Cost efficiency

The total costs to operate the compute resource plus LS-DYNA licensing in different configurations is very much dependent on the size of the CAE department and the number of jobs which need to be analyzed in a certain time period. Different examples show that the licensing flexibility is a key argument for a cost-efficient CAE infrastructure both in-house and provided by an external Cloud-provider.

5 Summary

Different licensing concepts are being shown and their advantages and disadvantages are being discussed. For a couple of examples it is shown, that the size and structure of the job loads is responsible for a good choice between the different licensing concepts. There is no standard rule available, which in all situations can be applied.

6 Literature

- [1] Göhner, U.: "1000 Core Challenge", 13th LS-DYNA Forum, 2014.
- [2] Göhner, U.: "Experiences with LS-DYNA on Cloud-like Infrastructure", 10th European LS-DYNA conference, 2015.