

Bringing ANSYS Multiphysics™ to the Cloud to Enable Product Development for Global Enterprises

CIMdata Commentary

Key takeaways:

- *Leading global enterprises are rapidly expanding their strategic use of virtual prototyping and simulation in product development, requiring a re-assessment of their annual engineering software and IT investments and associated ROI*
- *Public cloud solutions such as Amazon Web Services (AWS) are rapidly maturing to meet the unique business needs of global engineering R&D/product development teams including requirements for on demand high-performance computing (HPC)*
- *ANSYS® is leveraging the advances in cloud, high-performance computing and the associated IT infrastructure to provide highly flexible and secure solutions for global enterprises with geographically distributed engineering product teams*

Virtual prototyping and simulation tools have increasingly become an indispensable component of the engineering product development process. Simulation technologies such as structural analysis, thermal analysis, electromagnetics, and computational fluid dynamics let engineers quickly and cost-effectively investigate “what-if” scenarios, explore new ideas, evaluate more alternatives, and gain deeper insight into how a product will behave vs. the design requirements during use. When used starting early in the conceptual design, and then throughout the product life cycle, these tools have become powerful enablers for developing innovative products as well as establishing and enabling innovative and cost-effective design processes. Virtual prototyping and simulation have moved well beyond just being “design check” tools or an alternative to minimize physical testing and validation cycles. Leading manufacturers in many industries now utilize virtual prototyping and simulation as a strategic element of their product development process that, if effectively deployed and managed, can provide a significant competitive advantage in today’s highly competitive global markets.

As product complexity continues to grow, the computational resources required to conduct more complete and robust “systems level” virtual prototyping is increasing exponentially. Both more computing power and data storage are needed to perform comprehensive multi-physics analyses with detailed 3D models, as well as to conduct effective design optimization. Desktop PCs and workstations used by most designers and engineers often do not have the required computational power. Performing more simulations consumes time, IT resources, and can inhibit engineers from performing other critical project work in a timely manner. To address this situation, new approaches are needed and are being developed. CIMdata believes that a Cloud computing implementation can offer significant reductions in process complexity and cost-effective access to IT/HPC resources for CAE engineers. Cloud-based solutions can be deployed as a means to process multiple simulations in parallel and, potentially as important, they can be used to apply significantly more powerful computing and managed storage resources that would just not be available at a local site or company level. For example, rather than have engineers spend their valuable time simplifying 3D geometry prior to an analysis, the massive computing power available across the cloud in HPC centers can be used to perform multiple complex pre-processing tasks, run suites of complex analyses, and automatically post-process the results for reporting and collaboration.

In addition, as robust simulation tools become available via the Cloud, all types of engineers will be able to perform analyses without making a significant up-front investment in hardware and software. As such, the advent of Public Cloud as well as Private Cloud computing services with high performance networks and secure access to large-scale remote HPC centers is providing significant new IT options for engineering organizations.

Business issues such as cost, licensing, security, data transfer times, and latency need to be thoroughly assessed in the implementation of cloud-based engineering software and services. Solution providers are offering different approaches to address these issues, and consistent with the PLM industry trend, ANSYS is now offering access to a broad portfolio of Workbench-integrated multi-physics simulation capabilities via the cloud.

So what is different about the ANSYS approach for cloud computing vs. other options available today?

The ANSYS Enterprise Cloud™

The ANSYS Enterprise Cloud is designed to be a direct extension of a company's enterprise IT infrastructure and resources and leverages established Public Cloud platforms such as Amazon Web Services (AWS). Designed and implemented as a Single Tenant Cloud (STC), it is essentially a virtual data center on the cloud that addresses one of the major market concerns with cloud computing (i.e., data security and IP protection) while providing many of the proven cloud business benefits such as:

- Operational agility and flexibility
- Engineering productivity
- Global collaboration
- Reduced fixed costs for engineering IT and HPC computing
- Optimal global utilization of corporate level IT assets

ANSYS' customers enter the cloud environment through the ANSYS Cloud Gateway™, a customizable web-based interface that manages the end-to-end simulation process. The ANSYS Cloud Gateway provides a secure browser-based environment for model and results visualization, data storage and management, HPC job orchestration, and remote session management. It is also customizable to incorporate other non-ANSYS commercial software as well as in-house developed codes. Customer jobs are assigned a dedicated and partitioned area of the public cloud resources for the retention of any data sent to or generated by analysis runs on the high performance-computing (HPC) servers.

ANSYS customers will also realize industry best practices for security of their data on the ANSYS Enterprise Cloud:

- All data "in transit" is encrypted over HTTPS
- All data "at rest" is encrypted using Public Cloud encryption methods
- Complete penetration testing of each customer deployment
- Ongoing monitoring and security patch maintenance

The ANSYS Enterprise Cloud solution is also designed to minimize the issues of global network bandwidth and latency often associated with the extremely large file sizes generated by physics performance modeling and simulation applications (e.g., terabytes per file) by

leaving as much of the analysis data as possible on the cloud while also providing “lightweight” 3D data access and visualization via a web interface. In this way, the information is readily accessible to project engineering teams worldwide regardless of their geographic location and the business issues associated with moving extremely large files back and forth among multiple global locations are minimized.

One of the other major business benefits of using cloud-based resources is the flexibility to quickly scale up (and down) modeling and simulation compute capacity to meet the changing work requirements of the global engineering/R&D organization. ANSYS is mirroring this hardware elasticity with a flexible software licensing strategy.

The ANSYS business model allows customers to use their existing software licenses interchangeably on-premise or on the cloud, and is essentially agnostic about where customers source their hardware. In addition, customers will be able to augment their software assets with a new ANSYS Elastic Licensing™ solution, providing access to any amount of HPC and ANSYS application usage, when and where it’s needed. This combination allows customers to move to the cloud without a disruption in their software licensing—and adopt a pay-per-use model where and when it makes sense. The ANSYS Enterprise Cloud also includes an automated license manager deployment on the cloud and a licensing configuration service. A license reporter enables customers to generate usage reports.

The initial release of ANSYS Enterprise Cloud will be available during May of 2015. This new Cloud-based solution is initially targeted at medium- to large-scale enterprises and will be particularly attractive for companies that currently use ANSYS’ modeling and simulation solutions within geographically distributed product engineering teams.

ANSYS is actively working on additional cloud solutions as well, developing an ecosystem of solutions that will provide options for customers of all sizes. They also have their eye on emerging topics, such as Big Data Analytics for physics-based simulations, with the logical links to systems modeling and systems of systems (e.g., IoT—the Internet of Things).

CIMdata believes that intelligent use of the cloud and cloud-based computing resources such as ANSYS Enterprise Cloud will help companies in all industries to better develop innovative products in a more cost-effective and timely manner. The ANSYS offering is an excellent example of how using the Cloud can make more powerful and comprehensive simulation and analysis more readily available and easier to use for a wide range of engineers in globally distributed enterprises—throughout the product development process.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise’s ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata services, visit our website at <http://www.CIMdata.com> or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.