Demystifying 3DEXPERIENCE on the Cloud

This is the fourth article in my Demystifying series and will try to explain the approach and functionality of the **3D**EXPERIENCE platform when it is run on the cloud. For more background, on the **3D**EXPERIENCE platform, please see Demystifying **3D**EXPERIENCE. In that previous article, I explained that the idea of **3D**EXPERIENCE was to transform the user experience adding social networking, single sign-on, dashboarding, and other features to the foundation of the 3DSpace (ex. ENOVIA V6) platform. In this article, I will attempt to demystify the concepts underlying **3D**EXPERIENCE on the cloud and present some strengths and opportunities for the Dassault Systèmes SaaS portfolio. Strap on your seatbelts though, this journey will require a bit of technical explanation for it to make sense.

Quick Cloud Dictionary

Some terms I will use indiscriminately in this article bear some brief definitions to render the article intelligible to non-cloud savants.

- IaaS - Infrastructure as a Service - this means that the hardware, storage and networking required to run the platform are all virtualized so that cloud resources can be optimized across 100s or 1000s of physical machines. This allows for massive optimizations of physical resources (less idle cycles, disks closer to capacity, and network bandwidth fully optimized) and also allows for allocation of more resources when a particular virtual environment is under load (say, for an eCommerce site during Black Friday). Amazon AWS is a good example of an IaaS where one can purchase virtual storage, virtual hardware, and virtual networking. Typically, cloud providers use an IaaS to optimize their datacenters. The virtual resources are accessible to applications in the same manner as local resources. Transparency and elasticity are the keys here.
- PaaS - Platform as a Service - this is a layer on top of the IaaS which presents virtual machines and services to the administration to use to build or deploy applications. With AWS, you can purchase a virtual machine, manage it yourself and deploy your own apps. This would be a PaaS-type use case on the cloud. Until recently, most PLM vendors offered cloud resources where customers could install their own instances and manage them, so these were sold in a PaaS manner. PaaS almost always requires the pre-existence of an IaaS foundation for deploying the platforms. Note importantly that with a PaaS, once has access to the entire system and the command line.
- SaaS - Software as a Service - this is the most advanced form of cloud computing where everything is sold and accessed as a service. These services are intended to be self-contained and in complete ignorance of the location of the server or the data. When you use Facebook or PayPal or nearly any other consumer service on the cloud, you are typically using it in SaaS mode. In order for SaaS to work, both IaaS and PaaS are required. In the case of **3D**EXPERIENCE on the cloud, there are several IaaS providers (Amazon AWS and Outscale at this writing, but lots of talk around Microsoft Azurecontinues and DS announced recently an alliance with Huawei Cloudin China as well) and one PaaS provider: Outscale. With SaaS, there is no access to the command line and in most cases, customization is not permitted. If

you cannot perform the modification or change from a web-based user interface, it simply cannot be done.

n! - Initial Experiments in Cloud Computing

The R2014x release was not actually the first Dassault Systèmes (DS) venture into cloud computing. Back in 2011, there was a brief attempt to put SolidWorks file management (n!Fuze) and basic CATIA/DELMIA/SIMULIA data management on the cloud (n!Volve) via Amazon Web Services. Unfortunately, the scope of the applications was too limited and the partnership with cloud vendors rather sporatic, and neither of these initiatives met expectations (see Oleg's article here). However, Dassault Systèmes did learn several things from this: they realized that they needed their own cloud platform, they needed to continue to simplify the complex customization issues (see my article on Demystifying **3D**EXPERIENCE Customization), and they needed to put the ENOVIA portfolio on the cloud to make this viable. They also realized that the user interface needed a consequential amount of rework to make it far simpler for users particularly when accessed from the cloud. For the first issue, they partnered with Outscale (which they recently acquired a majority share in) for a dedicated cloud IaaS in France and several other regions on which they build their own PaaS to manage the services. For the other three, well, that is where **3D**EXPERIENCE comes in.

The Anatomy of 3DEXPERIENCE

Several components of the **3D**EXPERIENCE platform were actually born on the cloud and ported back on-premises. After having deployed the cloud-based enterprise social engineering platform DSSWYM for employees and partiers, having acquired the NetVibes dashboarding and networking platform (also exclusively cloud-based), and having created a cloud-based passport mechanism for authentication of the previous n! cloud solutions, DS decided to integrate all of these into the **3D**EXPERIENCE platform, the target being equivalent functionality and user interface regardless of whether run on the cloud or on-premises. In order to fix some of the lingering issues of the portfolio, DS also simultaneously embarked on an ambitious but ultimately successful undertaking to transform and unify the user interface of all the platform-branded product lines: CATIA, DELMIA, ENOVIA, and SIMULIA. The rich clients (those requiring a graphics adapter to manipulate full 3D models) of CATIA, DELMIA and SIMULIA got a unified color scheme and a new Action Bar across the bottom of the screen where all the tools and so forth would be located. The web-based clients of 3DSwym, 3DDashboarding, and the ENOVIA apps were wrapped in an HTML5/CSS3 framework giving a unified look and feel. That being said, the environments were not completely blended together: when you select 3DSwym or an ENOVIA app from the 3DCompass, you get a new tab or new windows in which the pieces of the application can be placed. For ENOVIA, this means that the user interface is still using Java Server Pages, just with an HTML5/CSS3 wrapper. Stated another way, 3DDashboard, 3DSwym and ENOVIA are separate environments. The innovation being the introduction of widgets on 3DDashboard that can draw on data from ENOVIA or 3DSwym: it is

not required to open ENOVIA to get to data accessible through ENOVIA. User dashboards could be built to incorporate data from disparate sources and thus be tailored to different user profiles.

3DEXPERIENCE R2014x

With the release of **3D**EXPERIENCE R2014x, DS successfully released the platform both on-cloud and on-premises with an identical user interface and the new dashboarding capabilities. There were naturally a few hiccups: 3DSwym architecture was actually not a trivial move from the cloud and required a release or two for the on-premises version to mature. Another critical difference was the portfolio of available products: at launch, only a fraction of the entire combined CATIA+DELMIA+ENOVIA+SIMULIA portfolios were available on the cloud. The reason for this is alluded to in my customization article and in my definition of SaaS earlier in this article. Since the platform in a SaaS manner does not allow for any access to the command line or non-web-based tools and since many of the ENOVIA-based tools in particular required these tools for setup, they were not made available on the cloud. In summary, the on-premises portfolio now included 3DPassport and 3DDashboard and the new user interface and more or less the equivalent functionality of the previous V6R2013x release, just with a new naming convention. On-cloud, the platform also included 3DSwym but had a smaller portfolio, "optimized for the cloud."

Another difference between the two environments bears mentioning here: another key difference is that, unlike the on-premises deployments that typically exist for years at a time, once the on-cloud platform moves from one release to the next, the tenants of the cloud are migrated forward to the new release and no longer have access to the previous environment. This required a strict adherence to the principles of One Click to allow for the seamless migration forward. It also allows for a far greater support of mobility on the cloud since the cloud release is at the most 11 or 12 months old and thus closer in time of the release of browsers and mobile-based operating systems. This explains why there are differences in client support between the cloud and on-premises platforms and also why I will skip forward to 17x now because, on the cloud, 14x, 15x, and 16x no longer exist.

Evolution to R2017x

Since the release of R2014x, DS has released 3 additional version of **3D**EXPERIENCE basically adding functionality each time. The on-premises environment now benefited from 3DSwym and more "configuration" was added to the on-cloud environment as well as new functionality as the portfolio continually approached the same breadth of the on-premises environment. The previously-mentioned issues of customization on the cloud were mitigated by three factors: the imposition of the One-Click environment for all deployments, the advent of Unified Typing allowing for web-based addition of attributes, and the introduction of a 3DSpace Content Configuration widget that allowed for modification of lifecycle and attributes. The platform still incorporates essentially the same brands, but now the on-premises and the on-cloud portfolios are nearly aligned.

Strengths

The real strength of the DS cloud portfolio is the seamless integration of each of the applications into a single environment and its pure SaaS nature. None of DS current competitors have as large a breadth of cloud-based solutions with the same level of integration. IT is entirely feasible for a company to design their parts with CATIA, run simulations in SIMULIA and perform manufacturing planning without ever leaving the cloud. The vertical integration of licensing and in turn to the industry portfolios makes the value proposition unique and powerful. While a private cloud possibility exists, the only difference besides price is the dedicated compute, networking and storage resources available to a private cloud tenant versus a public cloud tenant. Customers can choose to run on the cloud, on private cloud or on premises running in each case nearly identical software in feature and function.

Weaknesses

There is no such thing as perfect software and so to be objective, I need to mention some of the shortcomings and thus opportunities for the platform going forward. In my view, one of the biggest weaknesses of the cloud is the lack of integration of product structure and bill-of-materials. This is due primarily to the differences in data models between the old VPM V6 and MatrixOne products from which V6 and later **3D**EXPERIENCE were derived. This means that customers have to choose to work on product structure in CATIA or BOM in ENOVIA, but cannot do both. This situation was somewhat helped in the R2018x release this year which allows a Collaboration with EBOM command within CATIA which pushes the Product Structure information over to the BOM including an automatic sync of attributes to the BOM when the product passes the Frozen/Released lifecycle state. Ultimately, DS is working towards a unified BOM which will permit the bi-directional synchronization, but that is still a little ways out.

Due to a similar constraint, the only managed CAD systems are CATIA **3D**EXPERIENCE and imported CATIA V5 data. This is also problematic for customers, because there are no adapters for SolidWorks, NX, Creo, or other commonly used CAD products, not yet anyway. Similarly, there are no adapters for integrating to ERP systems such as SAP or CRM systems such as SalesForce.com. There is an XPDM proprietary framework for synchronizing with SAP, but details about this are scant. Lastly, there are still a great number of things which still require customization via older command-line tools such as matrix, business and MQL which cannot be done on the cloud.

Another potential issue for cloud customers is that once the customer's data center is chosen by DS, the customer data remains there for the duration of the SaaS contract. There is no replication between data centers of the user's databases, the only exception being that each data center has a shadow data center relatively close by with an off-line, disaster recovery copy of the primary data center's applications and data. There was some very limited file replication added in R2017x, but nowhere near as sophisticated and complete as what exists on premises. This means that for organizations that have large populations of users in on geographically separated sites, neither the on cloud or the on premises environments will resolve the performance issues related to the distance between the users and the application servers.

Outlook to R2018x and Beyond

Dassault Systèmes has previewed some new features of the upcoming R2018x release on the cloud including more configuration for ENOVIA, and, in theory, there will be the first POWER'BY adapters coming for SolidWorks, NX, Creo, and Revit. Beyond R2018x, expect that parts of 3DEXCITE, BIOVIA and GEOVIA finally get elements on the cloud as the on-cloud vs on-premises functionality gap to close even faster.

Caveat emptor: Michael Finocchiaro worked for DS from 2010 to 2017 and worked on the releases of R2014x, R2015x and R2016x. In October 2017, he created Finocchiaro Consulting to help customers get the most out of their **3D**EXPERIENCE deployment.