



## **Simulation based product design is here to stay and is growing**

Product manufacturers around the world use computers to design and test products. Simulating real-world events in computers save cost, reduce development time and improve product performance. In addition to these benefits, simulations provide a deeper insight into product performance as they provide advanced visualization of simulation outputs such as a cross-sectional view or a unlimited output of key product measurements that is impossible to visualize in prototype based testing.

With the advancements in the computer performance and in distributed computing, large simulation models can be solved in hours. This has allowed engineers to incorporate increased amount of details in their model, choose more accurate material models, include multi-stage and multi-physics capabilities to improve the prediction capabilities of the simulation.

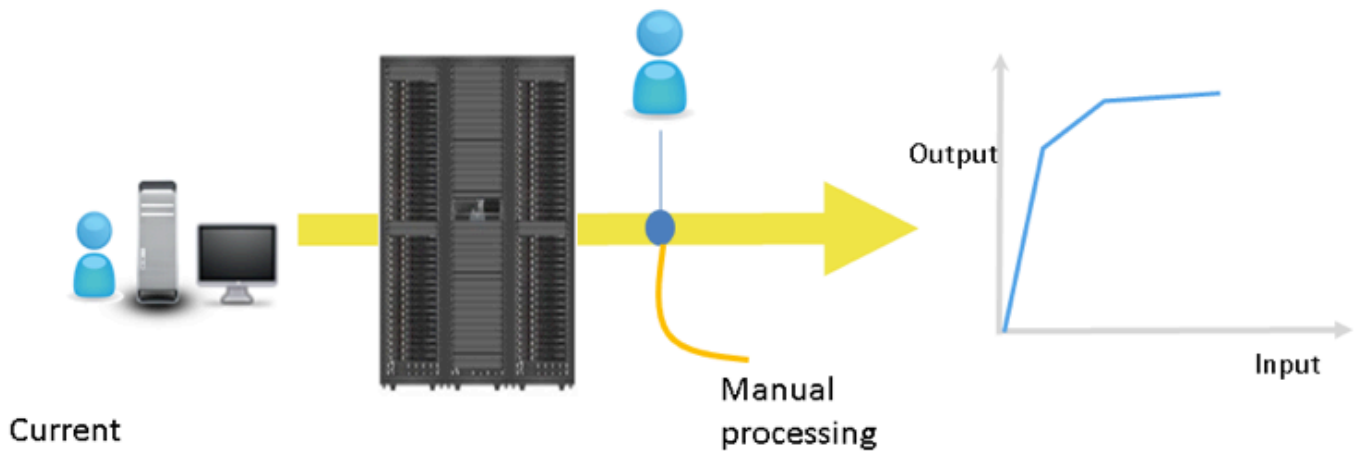
## **Simulation data visualization and analysis is manual, cumbersome, and costly**

While the capabilities of the solver has grown over the years the methods used to post-process simulations has remained stagnant. Analysts around the world used out dated systems to store and view simulation data limiting the full-extend of data visualization and analysis. File-systems are still being used to store simulation data, which provides no mining capabilities, and provide primitive ways to find the simulation of interest. Visualization of simulation data and analysis is still manual with custom and non-standard scripts that is user-dependent. Post-simulation analysis methods of today costs companies time and money and is a distraction for Analysts who otherwise could use the time and effort to engineer products.

## **d3VIEW is a radically new way to look at how post-simulation data visualization and analysis is done**

**d3VIEW** is a technology that allows you to store, manage, collaborate on, and mine **LS-DYNA**® simulation results. **d3VIEW** provides unparalleled visualization of **LS-DYNA**® results by eliminating repetitive post-simulation analysis and also provides the ability to mine and

collaborate on the results using a standard web browser. In addition, **d3VIEW** helps to manage Projects, People, and Tasks to aid virtual product development that also including tools to manage Experimental and Material databases.



With d3VIEW



## How does d3VIEW help in virtual product development?

**d3VIEW** solves several problems in the area of virtual product development that exists in almost every organization. First, viewing and analyzing large datasets is repetitive and is heavily dependent on the Analyst. **d3VIEW** solves this problem by taking a snapshot of a simulation using its SimLyzer technology (Patent Pending). The primary advantage of SimLyzer is that it eliminates repetitive post-processing by extracting over million responses with virtually no user input. Response are nothing but outputs from a simulation such as peak-displacement, maximum energy, etc. SimLyzer adds further value by “Analyzing” the extracted responses and talking to post-processors to generate relevant graphical information such as images and movies. This extraction and analysis of the extracted saves a tremendous amount

of the analyst's time and also provides a great deal of valuable data that is otherwise impossible to obtain. Studies have shown that this saves over 80% of all post-simulation analysis work. Since Simlyzer runs on the clusters, it scales to large number of parallel post-simulation analysis of results using existing hardware.

The second problem **d3VIEW** solves is related to storage space. Simulation result databases are growing exponentially and will eventually reach 1-10 Gigabytes in the near future. Simlyzer's extraction mechanism results in a data set that is less than 50 Megabytes as opposed to many Gigabytes. This is possible because the extracted data is stored in a concise yet lossless format. Thus, storage is not only easier, but it can also be readily mined and statistically analyzed since it is saved in a well-structured Relational Database.

The third problem **d3VIEW** solves is related to collaboration. Currently, collaboration on simulation results between team members in local or remote locations is primarily done through file systems (Network Attached Storage) or using emails which result in duplication of data with no control on its distribution. **d3VIEW's** powerful document management system allows storage/retrieval with access-control mechanisms and collaboration on all document types. **d3VIEW's** built-in document processor for **LS-DYNA®** keyword files allows easy previewing and editing.

## **Is d3VIEW a post-processor for LS-DYNA®? How is it different from other post-processors?**

**d3VIEW** is an advanced post-simulation analysis tool and it does not aim to replace existing client-side post-processors. Instead **d3VIEW** actually works with other post-processors, such as **LS-PrePost**, to accomplish many post-processing tasks.

## **How does d3VIEW understand LS-DYNA® simulation results?**

**d3VIEW** understand **LS-DYNA®** simulation results through its SimLyzer technology which is designed to recognize and understand virtually all data output by **LS-DYNA®**.

## **What file types does d3VIEW's document management system support?**

**D3VIEW** supports several files and is continuously being extended to support more. Its built-in document processing handles

BMP	✓	AVI	✓	DOC	✓
JPG	✓	MP3	✓	PDF	✓
GIF	✓	MOV	✓	PPT	✓
D3PLOT	✓	MPG	✓	TXT	✓
D3HSP	✓	M4V	✓	WPD	✓
PNG	✓	BINOUT	✓	RTF	✓

## How can simulation results be imported into d3VIEW?

There are four ways by which analysts can import simulation result into **d3VIEW**. All of the methods require less than 50Mb of storage space and can be configured to use “post-processing” templates to customize the extraction



The **first** method is by manual upload. The analysts uses a simple web based form to choose the result files (such as D3PLOT, D3HSP, BINOUT, etc ..) neither individually or using a single compressed file (.tar, tar.gz, .bz2, .zip) from a previously run simulation. In a intranet environment, this method can be very fast but is time-consuming from the Analysts point of view since it is a manual process.



The **second** method is by running a “Crawler” that operates in a directory specified by the user. The “Crawler” recursively looks for **LS-DYNA®** results, automatically processes them, and imports them into **d3VIEW** database.



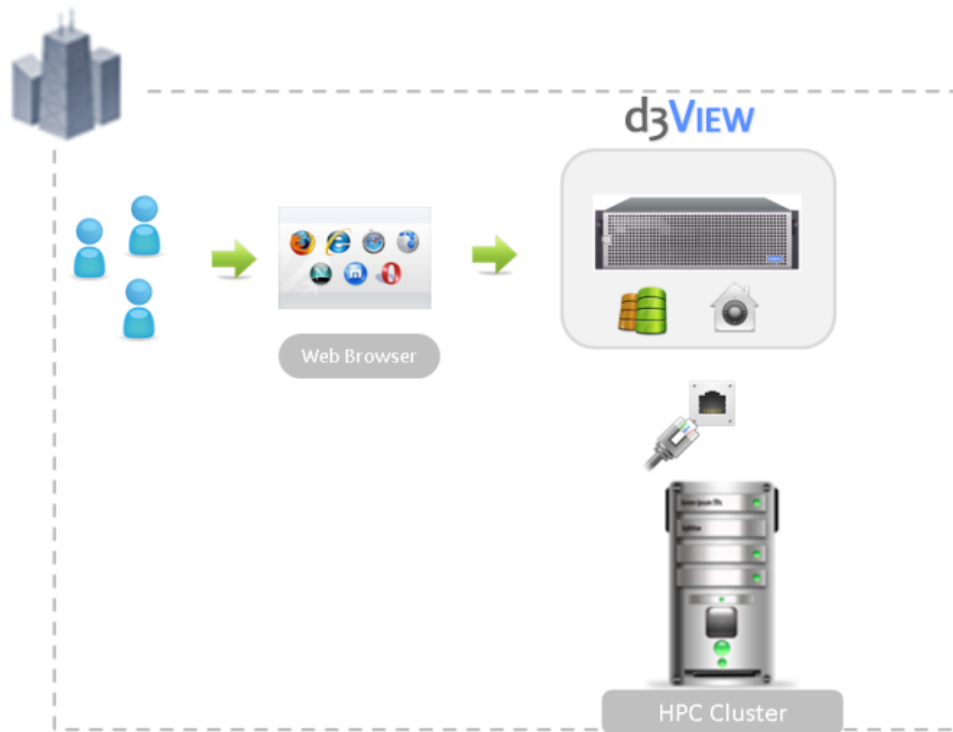
The **third** method which requires by far the least amount of time and effort is by injecting a single line in the job submission and staging scripts that activates the SimLyzer technology in the directory containing the final analysis results.



The **fourth** method utilizes **d3VIEW's** ability to schedule simulations to a High Performance Cluster (HPC) using any scheduling software. When the job is submitted, **d3VIEW** remembers the working directory and processes the results once they return.

## How can d3VIEW be integrated in a corporate environment?

**d3VIEW** is a web-based application and runs on any operating system that supports a web server, such as Apache (an open source web server). It stores persistent data using a relational database, such as MYSQL, in conjunction with a file system based Vault. Any modern computer with at least 2 GB of RAM and a 100 GB of disk space is sufficient to install and configure **d3VIEW**.



## What other solvers are supported ?

D3VIEW currently works for LS-DYNA, Nastran and its family of solvers, and OpenFOAM. With minimal configuration, d3VIEW can work for almost all solvers.

## Where can I get more information ?

You can visit <http://www.d3view.com> for more information, email [info@d3view.com](mailto:info@d3view.com) or contact your local LS-DYNA distributor for more details.