

La virtualisation des services HPC au service des utilisateurs



HPC Democratisation

Simplified access to simulation applications

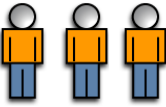
Philippe Bricard

Business Development & HPC Alliances



Typical Technical Computing issues

HPC complexity



**Engineers
Researchers**




100s of applications



Increasing volumes
of data



**Project manager
Team leader**



Complex usage
(CLI, schedulers)



Limited IT
and support staff



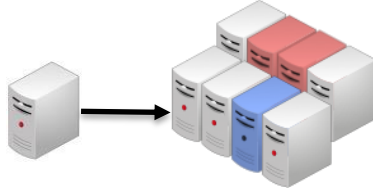
**Power Users
Application
Developers**



Increasing Multi-tenancy
Distributed users – Distributed Resources



IT Admins



Evolving HPC infrastructure

Resources



**Visualisation
Servers**



Linux &
Windows
interactive 3D
applications



**Application
licenses**



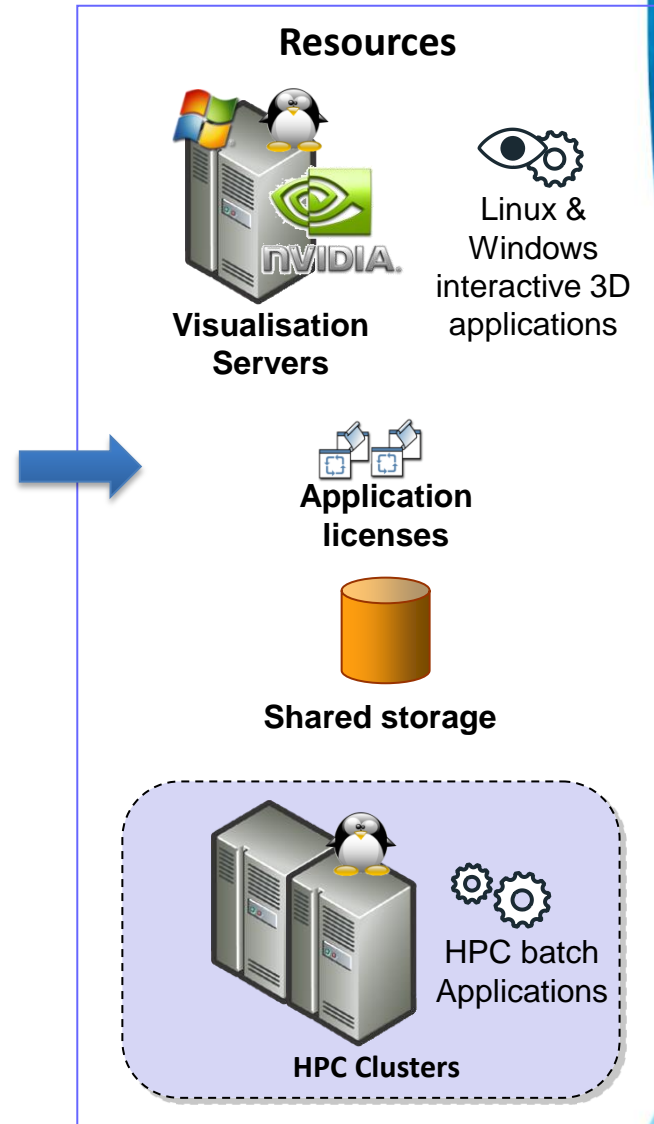
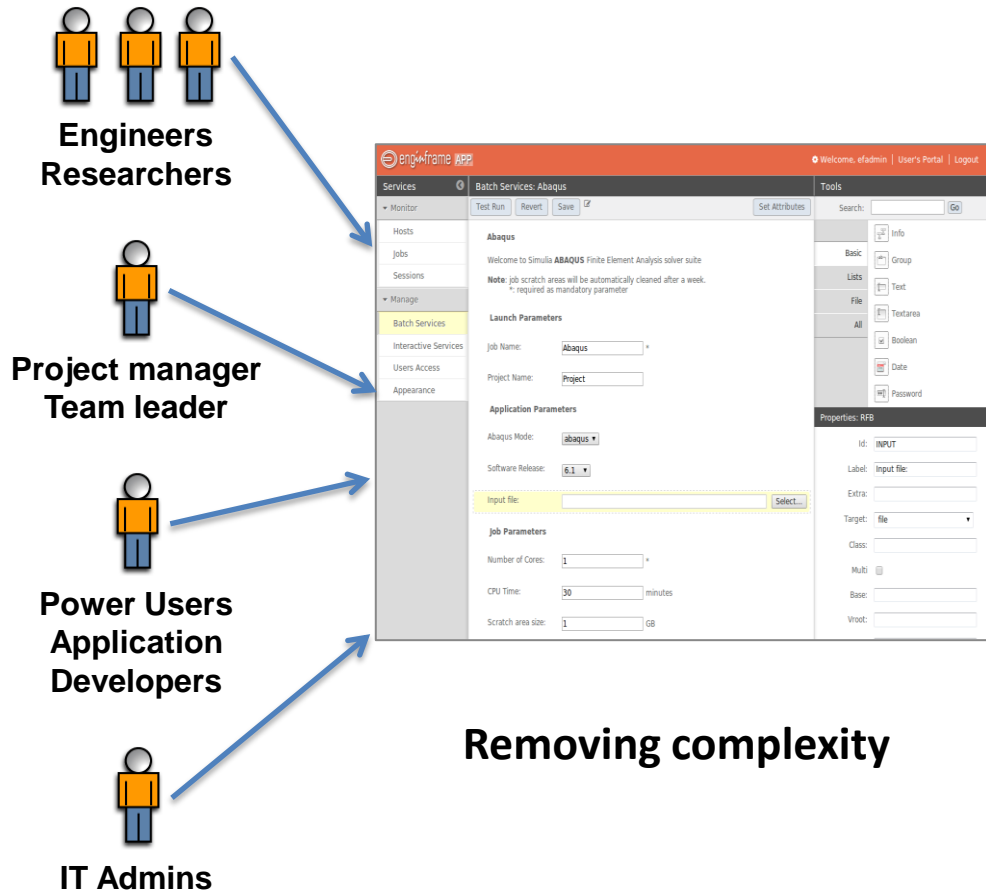
Shared storage



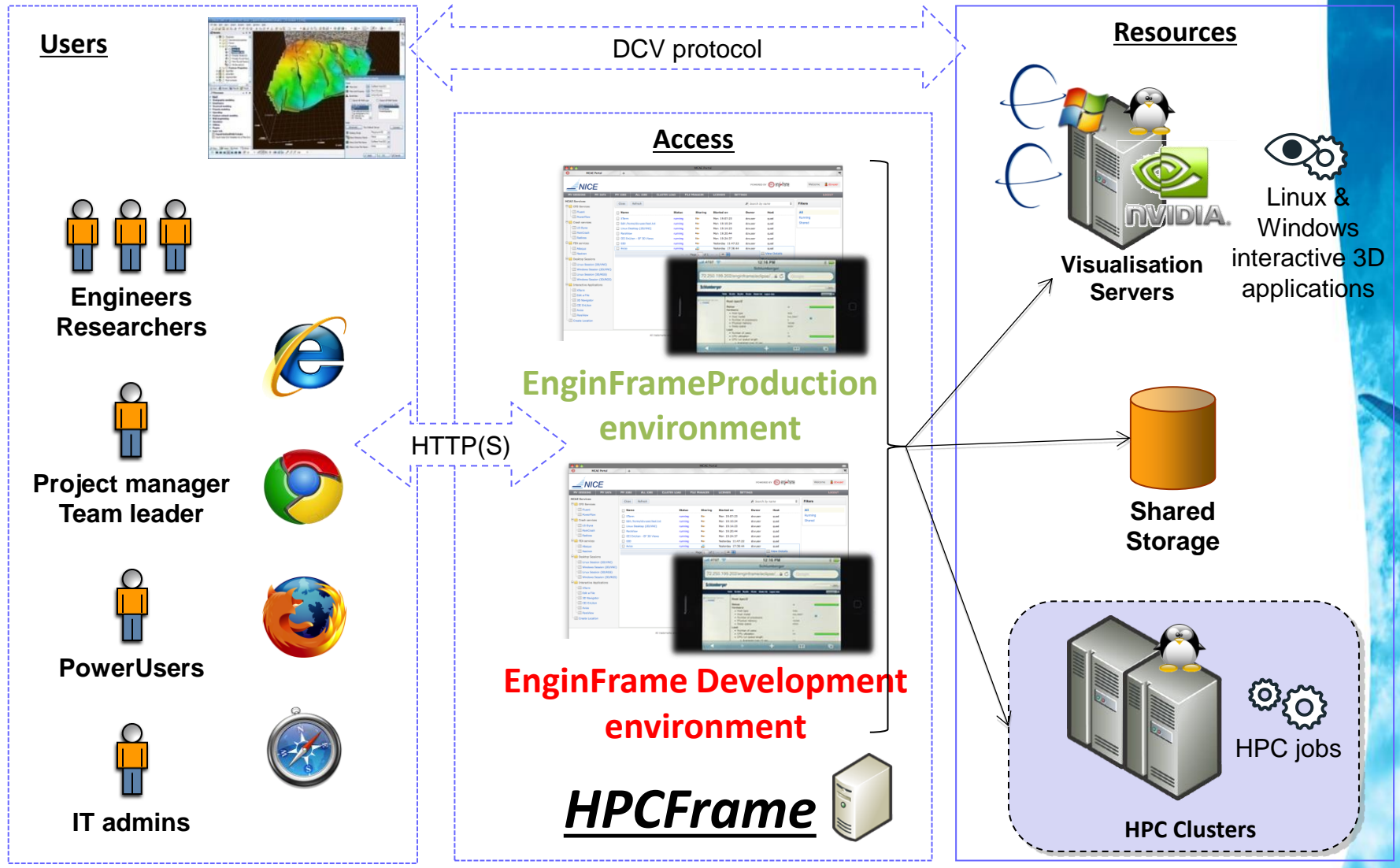
HPC batch
Applications

HPC Clusters

Addressing the Technical Computing challenge



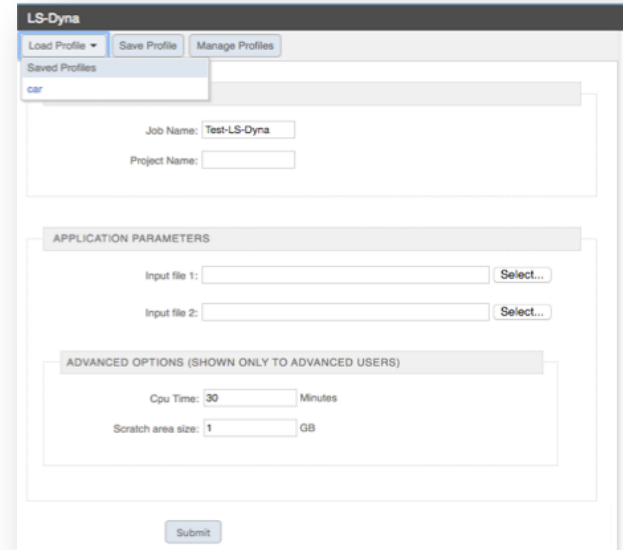
HPCFrame an EnginFrame solution



From Application to Services

```
1 #!/bin/bash
2 # ANSYS Fluent job script
3
4 run() {
5     echo "Entering JOB_WORKING_DIR: \`${JOB_WORKING_DIR}\`"
6     if [ -d "${JOB_WORKING_DIR}" ]; then
7         cd "${JOB_WORKING_DIR}"
8     else
9         echo "Unable to change directory to \`${JOB_WORKING_DIR}\`" >&2
10        exit 0
11    fi
12    echo "Running \`${*\}`"
13 }
14
15 # Fluent v150 help:
16 #Usage: Fluent [version] [-help] [options]
17 #options:
18 # -cc          classic color scheme,
19 # -cnf=x       specify the hosts file
20 # -driver [ opengl | x11 | null ],
21 #             sets the graphics driver (available drivers vary by platform),
22 #             then environment variables
```

Batch or interactive
job script



LS-Dyna

Load Profile ▾ Save Profile Manage Profiles

Saved Profiles

car

Job Name:

Project Name:

APPLICATION PARAMETERS

Input file 1:

Input file 2:

ADVANCED OPTIONS (SHOWN ONLY TO ADVANCED USERS)

Cpu Time: Minutes

Scratch area size: GB

Submission form

"HPC Service" built in "Drag & Drop" Editor

Published to Users & Groups



HPC Service catalog

Unified workspace for batch & interactive applications

Create, edit, publish, import and export applications

Manage applications availability to groups of users

The screenshot shows the 'enginframe' HPC Service catalog interface. The top navigation bar includes 'Welcome, efaadmin | User's Portal | Logout'. The main content area is titled 'Services' and contains a table of service entries. A yellow box highlights the service list, a red box highlights the availability options, and a blue box highlights the context menu.

Name	Status	Author	Last modification	Published Folder	Availability
<input type="checkbox"/> ANSYS Mechanical	Published	efadmin	Yesterday 13:37:24 by efaadmin	services	FEA, groupUniv
<input type="checkbox"/> MSC Nastran	Published	efadmin	Today 10:27:22 by efaadmin	FEA	FEA, groupUniv
<input type="checkbox"/> Abaqus	Published	efadmin	Today 10:26:55 by efaadmin	FEA	all-users
<input type="checkbox"/> ANSYS Fluent	Published	efadmin	Today 10:25:47 by efaadmin	CFD	all-users
<input type="checkbox"/> LS-Dyna	Published	efadmin	Today 10:57:38 by efaadmin	FEA	all-users
<input type="checkbox"/> Job Submission	Not publ...	NICE	Feb 04, 2015 by NICE		
<input type="checkbox"/> ANSYS CFX	Published	efadmin	Today 10:15:13 by efaadmin	CFD	all-users
<input type="checkbox"/> ANSYS Workbench GUI	Not publ...	NICE	Today 16:15:49 by efaadmin		
<input type="checkbox"/> Windows Desktop	Not publ...	NICE	Oct 28, 2014 by NICE		

The context menu (blue box) includes the following actions: Edit, Test Run, Publish, Duplicate, Export, and Delete.

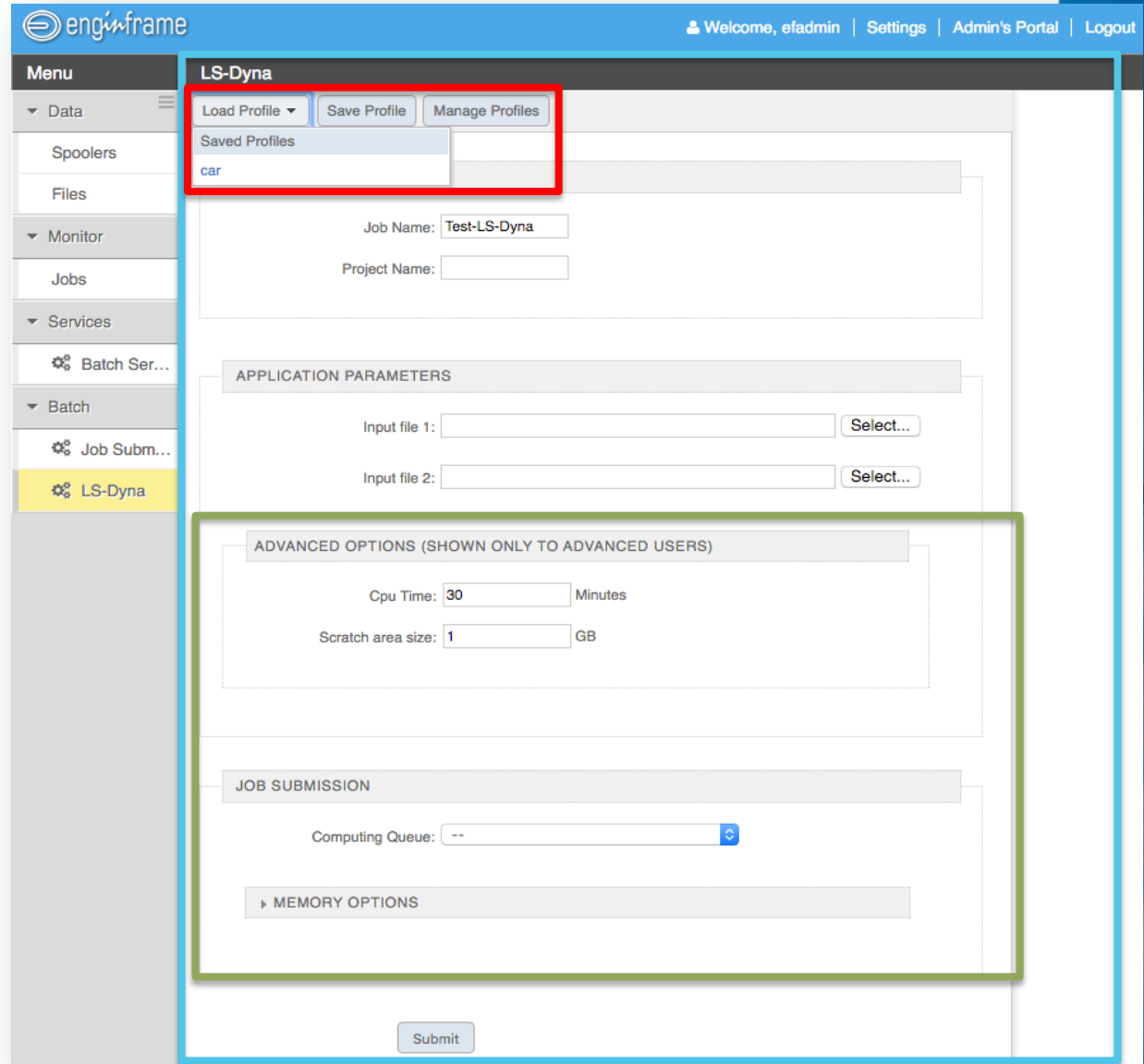
Service submission

Access user friendly, application-oriented job submission forms

Complexity of underlying scheduler is hidden

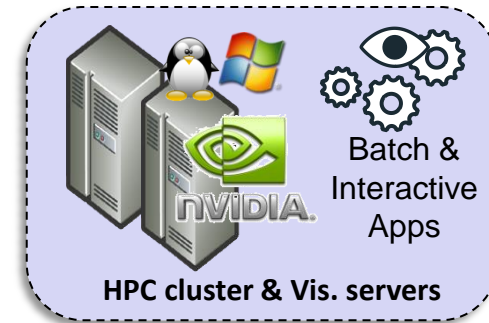
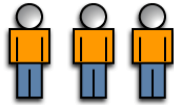
Show different options depending on user's skills (ACL managed)

Quickly access frequently used parameters



The screenshot shows the 'enginframe' web interface for 'LS-Dyna' job submission. The top navigation bar includes 'Welcome, efadmin', 'Settings', 'Admin's Portal', and 'Logout'. The left menu has 'Data', 'Monitor', 'Services', and 'Batch' sections, with 'LS-Dyna' highlighted. The main content area has a 'Load Profile' dropdown (highlighted in red) with 'car' selected, and 'Save Profile' and 'Manage Profiles' buttons. Below are 'Job Name' (Test-LS-Dyna) and 'Project Name' fields. The 'APPLICATION PARAMETERS' section includes 'Input file 1' and 'Input file 2' with 'Select...' buttons. The 'ADVANCED OPTIONS (SHOWN ONLY TO ADVANCED USERS)' section (highlighted in green) includes 'Cpu Time: 30 Minutes' and 'Scratch area size: 1 GB'. The 'JOB SUBMISSION' section has a 'Computing Queue' dropdown. At the bottom is a 'Submit' button.

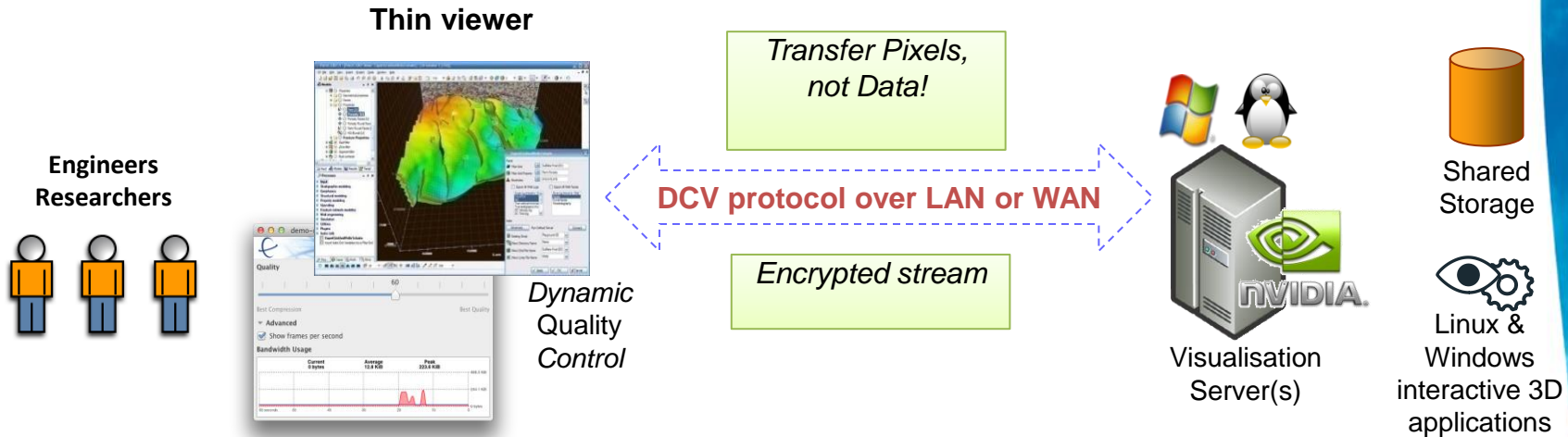
Technical Computing Portal



- **Web based workspace for simulation users**
 - Engineers, Researchers, Scientists, Designers...
- **Easy integration of HPC and Visualisation applications**
 - Reuse existing scripts
 - Web based editor to design submission forms
 - Clear separation between development & production
- **Advanced Data management functions**
 - Remote file browsing
 - Simulation results organization & pre-visualisation
- **User roles and management**
 - PowerUser role
 - Graphical user interface to manage user/groups application access
- **Off-the-shelf connexion with HPC Clusters**
 - Connects to one or multiple clusters
 - Through a single or different job schedulers
 - Support for LSF, PBS, Moab, GridEngine, Slurm, Openlava...
- **Highly secured environment**
 - Encrypted communications
 - Authentication through PAM – Support for TFA
 - Integration with existing directories (LDAP, AD...)
- **Packaged solution deployment & management**
 - Automated integration to HPC environment
 - Optional Remote Visualisation & High Availability support
 - Comprehensive management and support tools



Remote visualisation with DCV



- **Thin viewer**, with low-end requirements
- **OpenGL** and **DirectX** applications
- **Collaboration**
- **Bandwidth and latency adaptable** on a per-client basis

- **Windows** and **Linux** servers support
- **Windows, Linux, OSX, iOS*, Android*** clients support
- Share GPUs among multiple Users
- Leverage high-end NVIDIA GPU
 - GRID API 2.0
 - H264 Encoder Chip

* Download RealVNC from the Apple/Android appstore

Combining Self-service HPC + Visualization



MCAE Services

- CFD Services
- Crash services
 - LS-Dyna
 - PamCrash
 - Radioss
- FEA services
 - Abaqus
 - Nastran
- Desktop Sessions
- Interactive Applications
- Create Location

LS-Dyna

Welcome to LS-Dyna
Simulation data will be kept on scratch areas for a week

Job Name: **Dummy crash**

Project: **Test**

CPU time: **90** min

Scratch size: **20** GB

Memory options

Computing queue: **priority (Active, 0 jobs, 0 running)**

Input file 1: **sdyna/input/airbag.k** **Select...**

Input file 2: **Select...**

Input file 3: **Select...**

Restart: **No**

Mail address:

EnLiten Pro by CEI, Inc. (car)

Time = 0.23 seconds

plastic

0.014

0.010

0.007

0.003

0.000

Maximum plastic vs. Time

Time	Maximum plastic
0.0	0.0
0.1	0.6
0.2	0.8
0.3	0.8

Dummy crash

Post processing with CEI EnLiten Delete Refresh

Data

Upload Download Create Folder Delete Compress

Location:

Name	Size	Date Modified
adptmp	0 bytes	Today 01:05
airbag.k	411 KB	Today 01:05
car.els	5.93 MB	Today 01:05
d3dump01.0000	7 KB	Today 01:05
d3dump01.0001	10 KB	Today 01:05
d3hsp	0 bytes	Today 01:05
d3plot	7 KB	Today 01:05
d3plot01	7 KB	Today 01:05
glistat	6 KB	Today 01:05

Jobs

Delete Rename... Compress... Open with EnLiten

Value proposition

For Data Center Managers

- Increase quality of HPC services
- Shorten response time to clients' requests
- Democratize HPC

For Users

- Access service anywhere at anytime
- Harness the full power of HPC
- Get quick access to new simulation services

For IT Admins

- Provide secure access to the datacenter
- Reduce support requirements
- Easy integration with the existing HPC infrastructure





Technical Computing in the Cloud Era
www.nice-software.com

Applications Mobile

HPC Secure Access

Efficient Cloud

Remote Visualization

3D Flexible

Cross Platform Big Data

Analytics