« Openplast : An Applied Grid for SMEs »

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Pôle Européen Plasturgie
Recherche & Développement

Enabling Grids for E-science in Europe

OPENPLAST
PLATE-FORME DE SIMULATION SUR GRILLE DE CALCUL POUR LA PLASTURGIE

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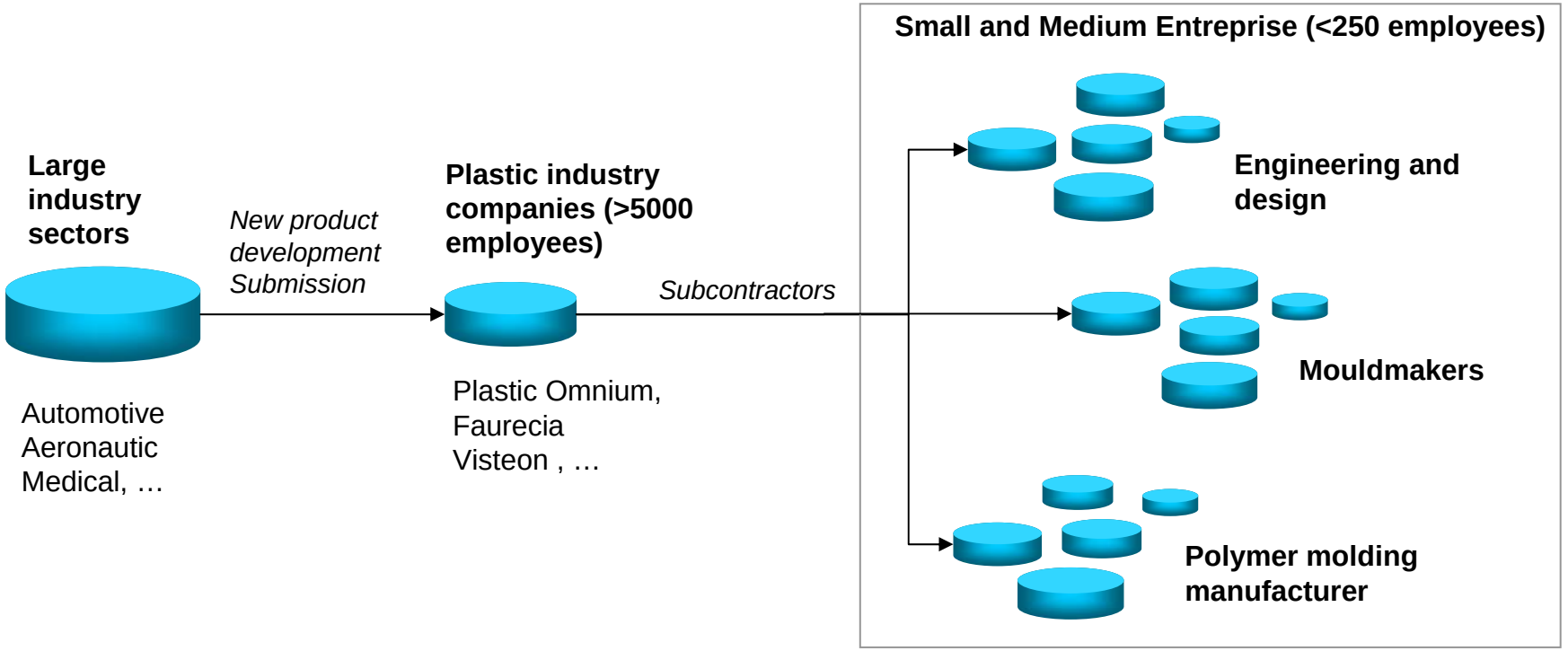
1. General Informations about Openplast project

- Openplast is a French granted R&D program on grid in direction to plastic processing industry
- Openplast began in 2003 and will finish at the end of this year.
- Openplast goal was to develop and to deploy a grid platform for plastic industry, in direction of SMEs
- The Openplast partnership includes 3 industrial partners and 3 academic partners.

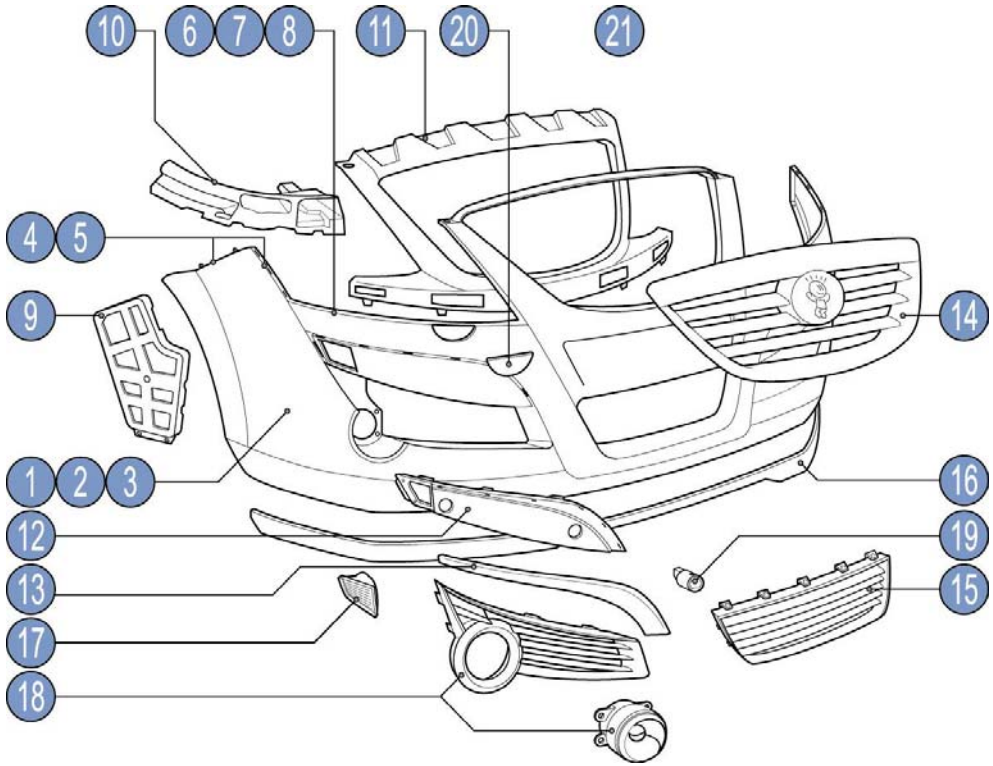
2. The context of Plastic Product Development (1/2)

- The subject of this talk is related to computational needs of SMEs for plastic product development. The protagonists of plastic product development cycle are :



2. The context of Plastic Product Development (2/2)

- Plastic product are very complex system : multipart and multifunction system

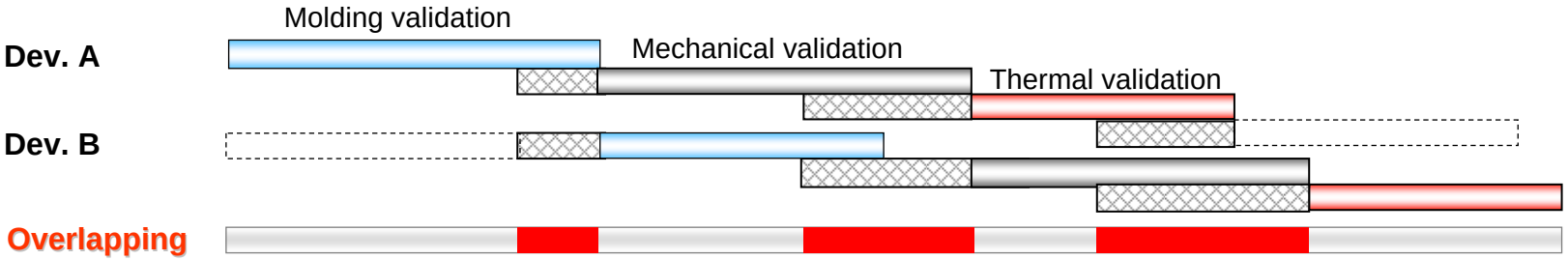


Car front bumper
Time-to-market is about 4 years

Courtesy of Plastic Omnium Auto Exterior

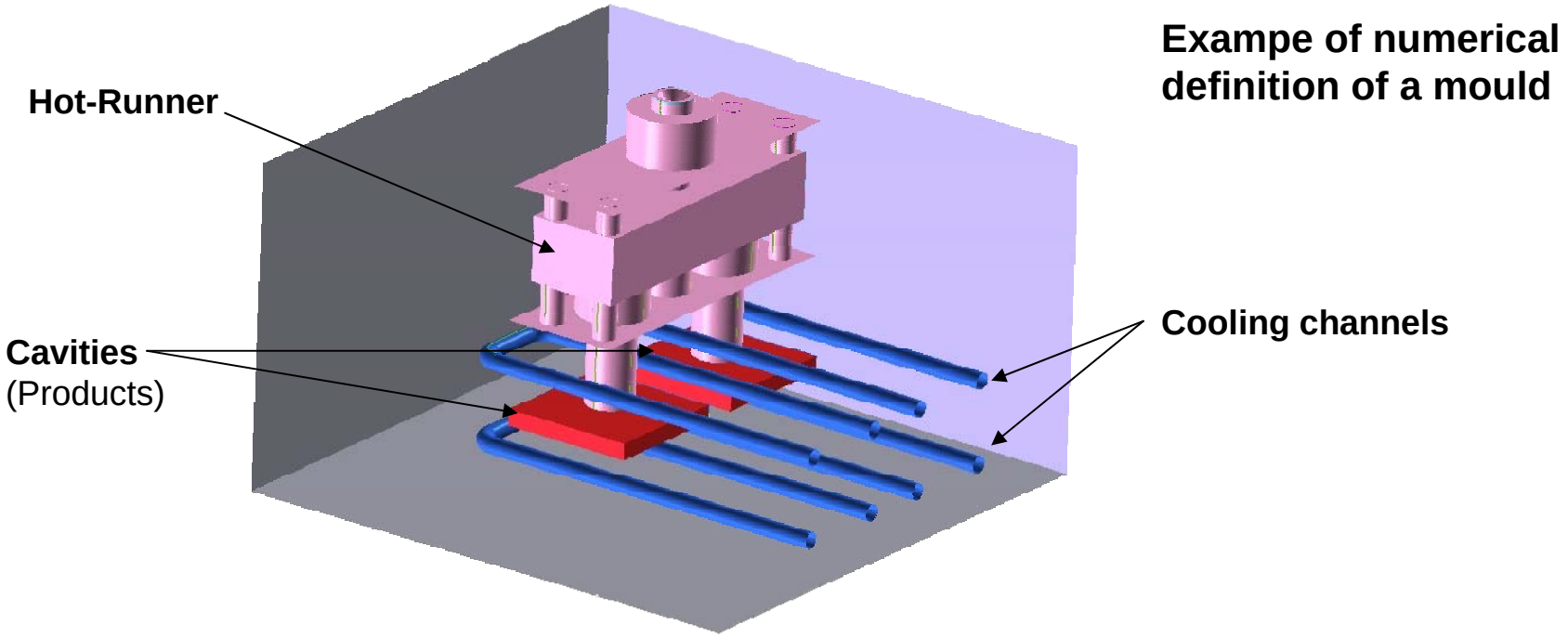
2. Plastic processing industry and SMEs needs (1/4)

- SMEs require computational resources flexibility. SMEs have a limited number of software licences to achieve computational tasks. They are not able to smooth peaks of activity due to new business or conflicts between resources. In this case, they must subcontract business (problem of confidentiality and QoS).
- Problems of delay induce substantial financial penalties.



2. Plastic processing industry and SMEs needs (2/4)

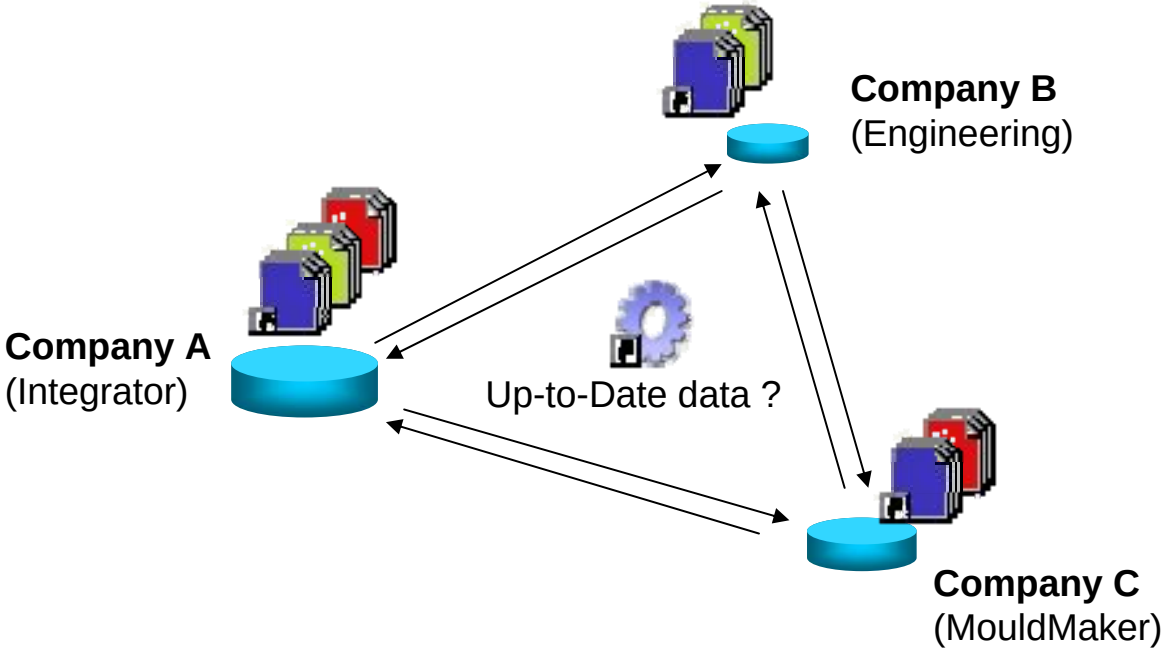
- SMEs needs also to access to additional computational resources to optimise the design of a mould. In general, they need to extend temporally their computational capacities to assume innovative product developments.



Exampe of numerical definition of a mould

2. Plastic processing industry and SMEs needs (3/4)

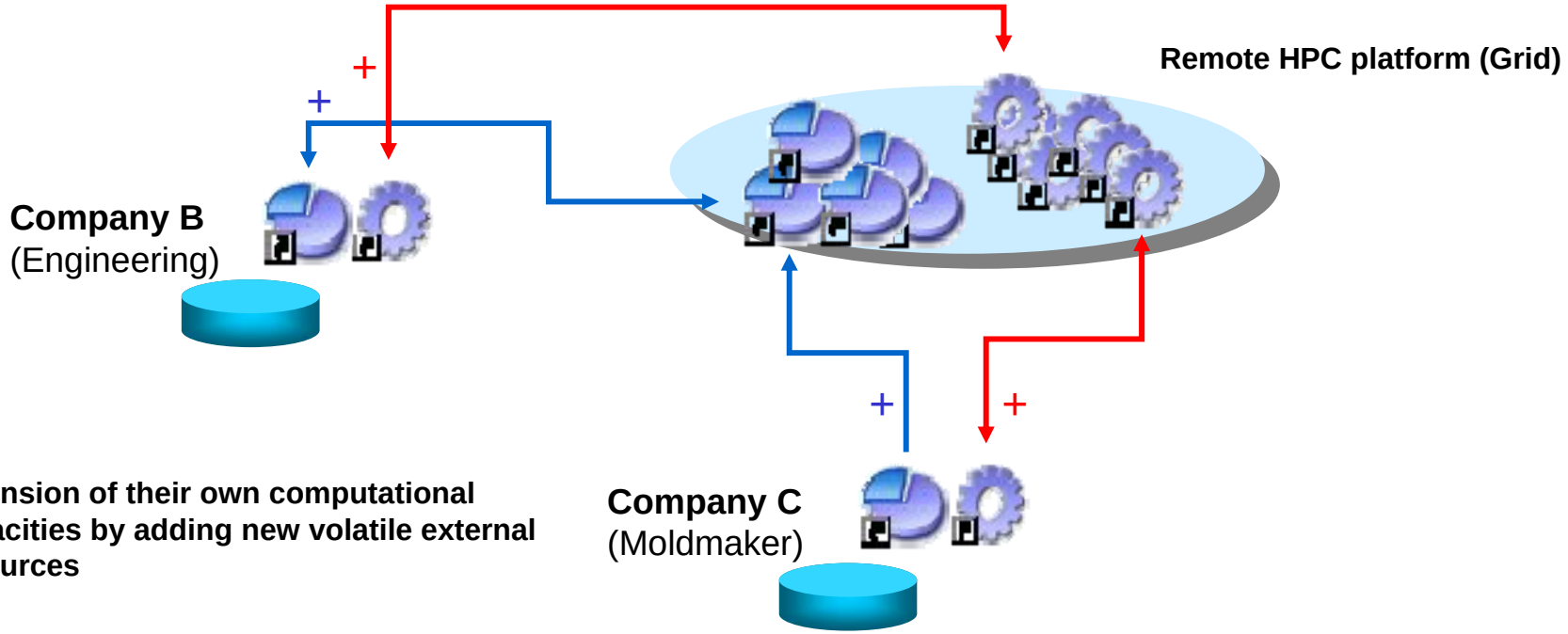
- Plastic product development activities produce large data set. SMEs have difficulties to manage it. Problems of data integrity often occur, data management and data exchange between subcontractors are not yet efficient…



• Size of data set is about 100Go/Study
• For a car Bumper we estimate size of data closed to 1 To.

2. Plastic processing industry and SMEs needs (4/4)

- In definitive, summary of SMEs needs show us that they need to have access to additional and complementary computational resources such as : additional application licences, collaborative workspace, …



Extension of their own computational capacities by adding new volatile external resources

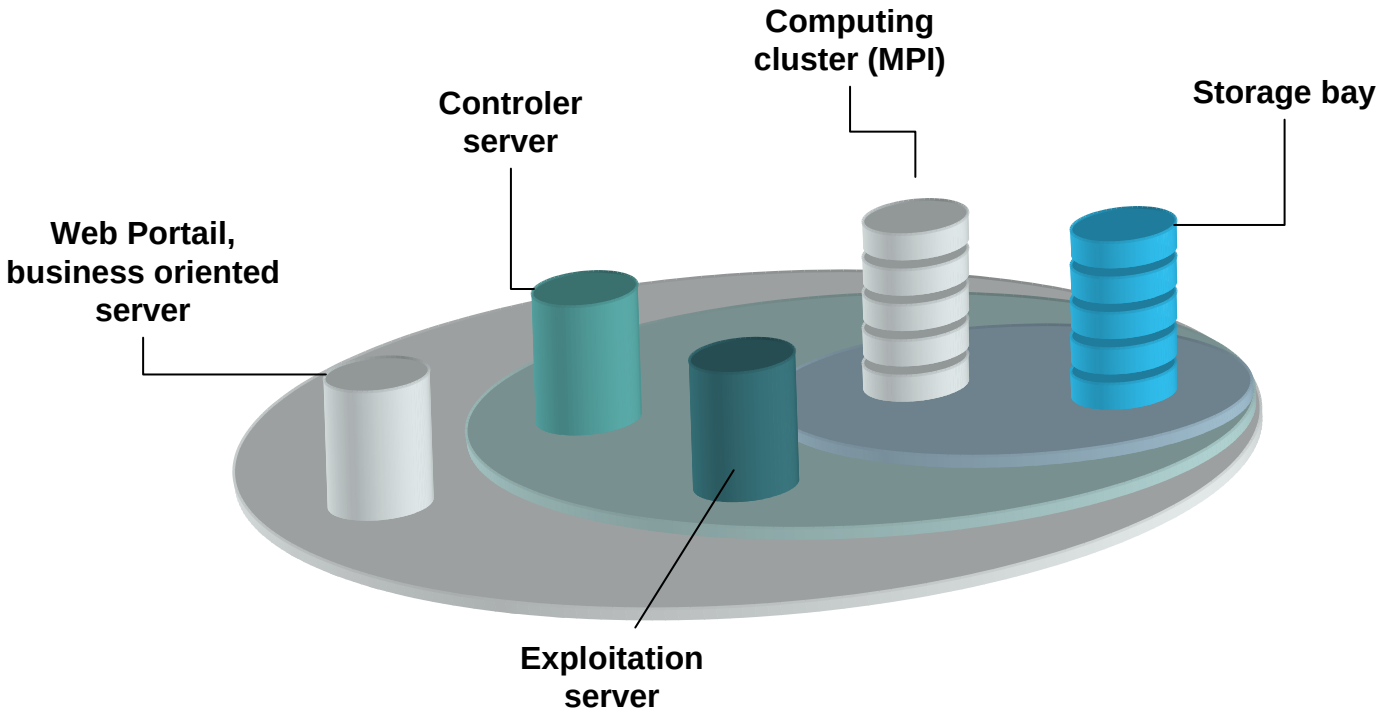
3. The Openplast grid (1/11)

- What « Applied grid for SMEs » means ?

  - ✓ It's a grid which hosts a representative panel of applications dedicated to an industrial sector.
  - ✓ It's a grid which is supported by representative actor of the targeted industrial sector (PEP).
  - ✓ It's a grid for which the partnerships with software editors are essentials to enhance the panel of hosted applications
  - ✓ It's a grid where representative industrials must participate to enhance the set of business services (Polymer suppliers, Injection molding machine producers, …)
  - ✓ …

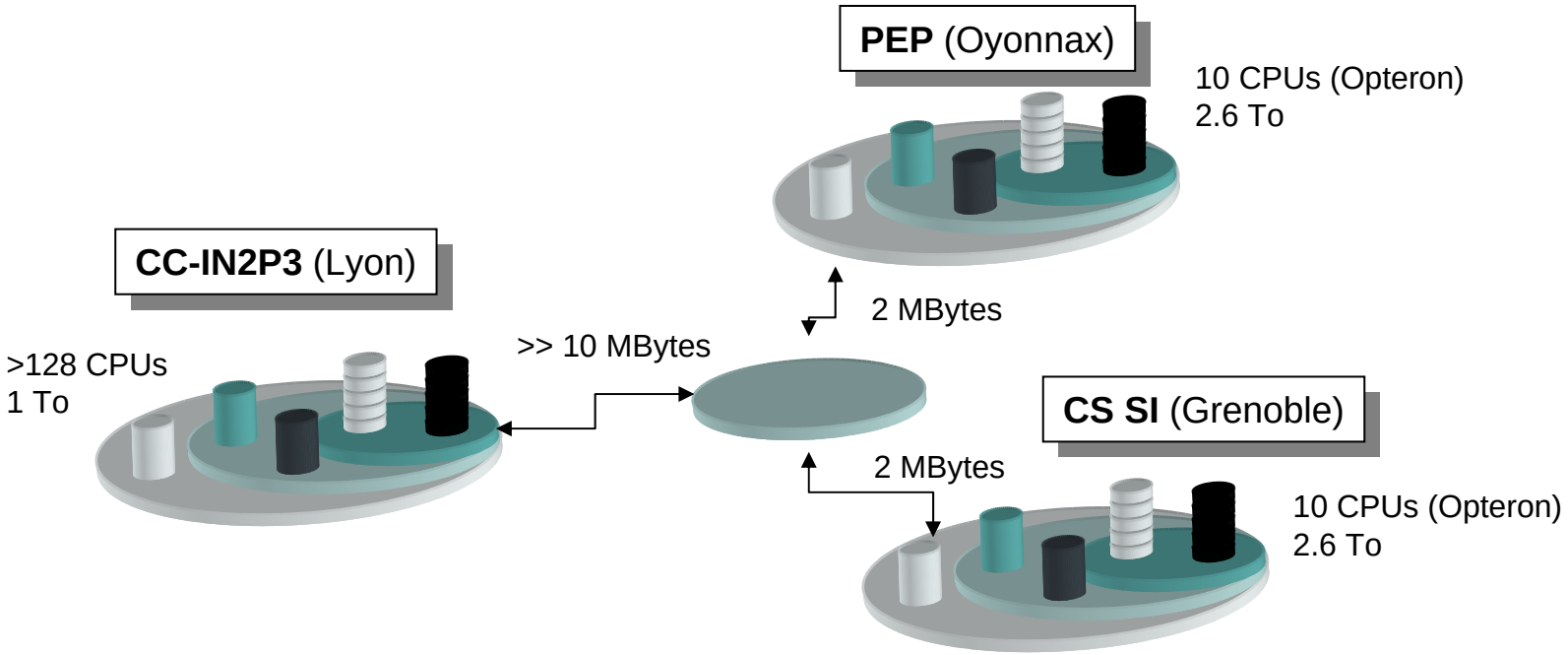
3. The Openplast grid (2/11)

- A typical Openplast node



3. The Openplast grid (3/11)

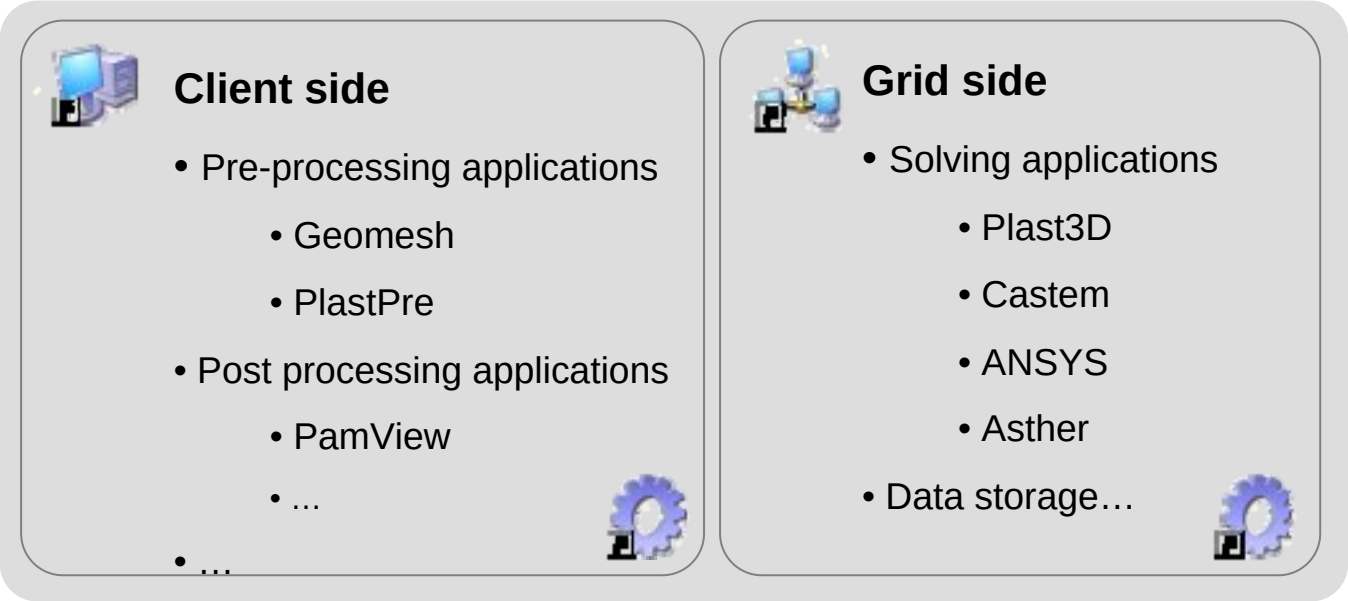
- Openplast grid infrastructure



Openplast Grid services have been developed by CS SI
Workflow Engine have been developed by CC-IN2P3

3. The Openplast grid (4/11)

- Openplast Grid Application Model



Remarks : Client side applications require in general Graphical Resources (GPU), Grid side applications are in general applications which require HPC resources (Cluster), XML Data Exchange between applications have been considered.

3. The Openplast grid (5/11)

- Openplast grid usage and basic job submission principles

❶ **Definition of a study** on end-user client Desktop with client applications

❷ **Connection to Openplast** Web Portal with certificat authentification

❸ **Uploading** file study to end-user workspace

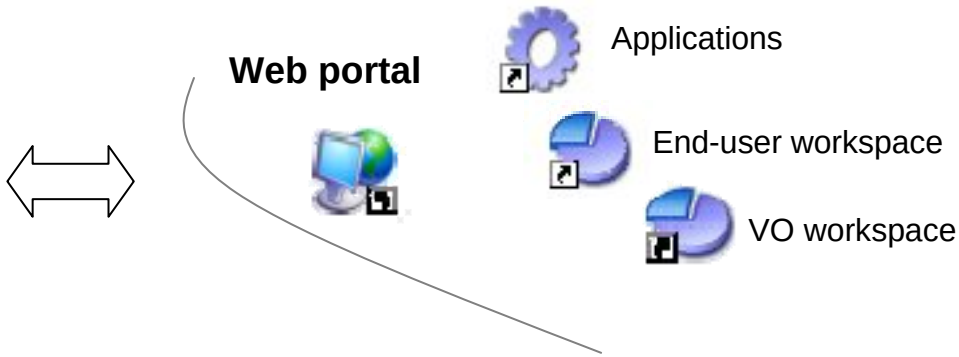
❹ **Job submission**

❺ **Monitoring** and e-mail notification

❻ **Download results** from end-user workspace

❼ **Analysis** of results with client post-processing applications

OpenPlast Grid End-User Vision



3. The Openplast grid – web portal (6/11)

3. The Openplast grid – Subscription (7/11)

Abonnement :

Période de validité de l'abonnement	Abonnement de calcul (en temps CPU)	Abonnement de stockage (en Go)	Abonnement à la grille (en nombre de connexion)
Du 01-01-2006 - 00:00:00 au 01-01-2007 - 00:00:00	96:43:35 restant	2000 Go dû(s)	218 jetons restant

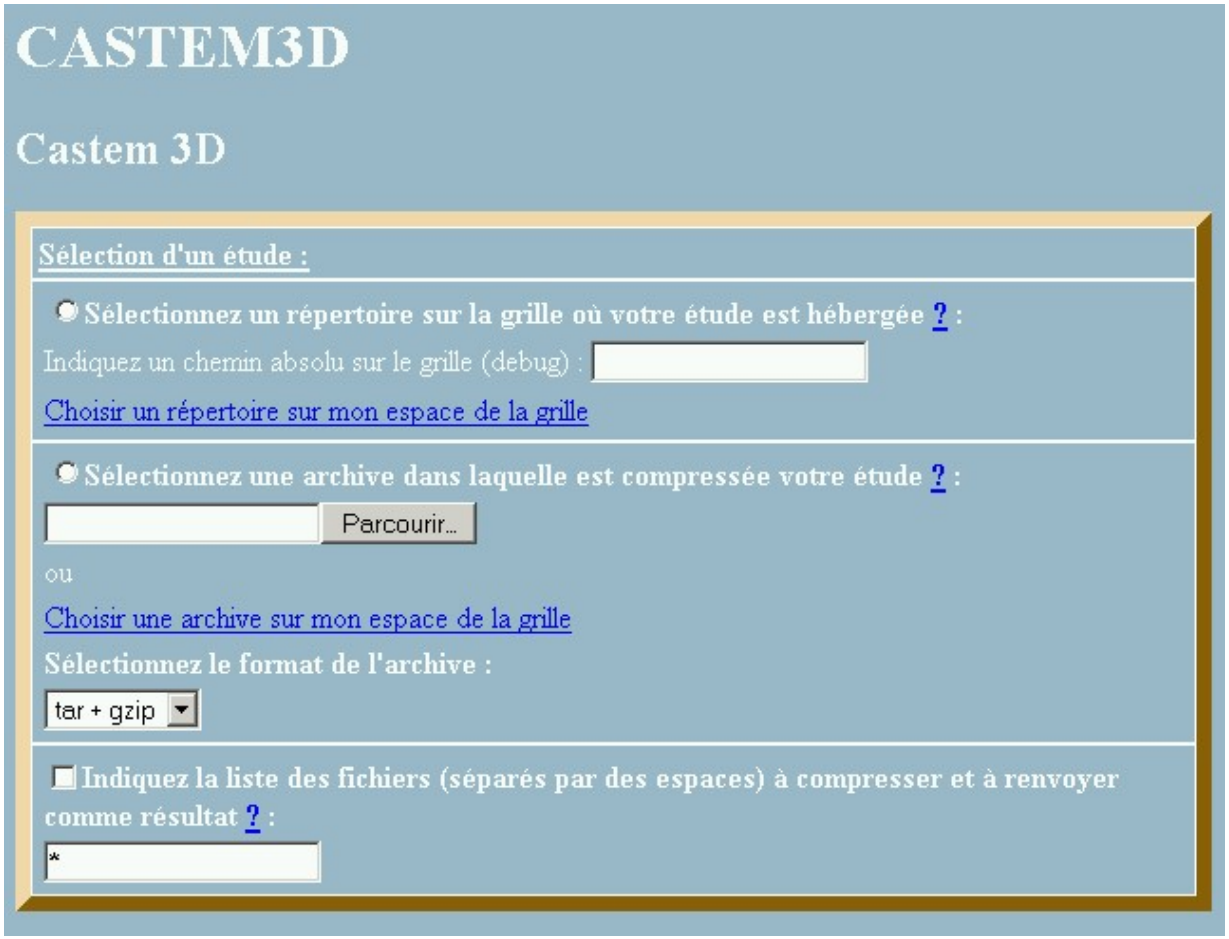
3. The Openplast grid – application (8/11)

Choix	Nom	Description	Administrateur	Abonnement	Licence	Déploiement	Tutorial
○	CASTEM3D	Castem 3D	Nicolas DEMESY	Visualiser	Visualiser	Visualiser	Visualiser
○	FLUENT	Fluent 2D/3D	Nicolas DEMESY	Visualiser	Visualiser	Visualiser	Visualiser
○	HELLO	Hello World	Nicolas DEMESY	Visualiser	Visualiser	Visualiser	Visualiser
○	OPENPLAST		Nicolas DEMESY	Visualiser	Visualiser	Visualiser	Visualiser

Valider

Nom du site	Statut	Temps d'attente	Temps d'exécution total
◉ la grille (service d'allocation)	ACTIF	0:00:29	0:00:22
○ CCIN2P3-Globus-2.4	ACTIF	0	0
○ CCIN2P3-Globus-4	ACTIF	0	0
○ CS-Grenoble-Cluster-AMD-2.4	ACTIF	0:00:03	0:00:27
○ CS-Grenoble-Cluster-AMD-4.0	ACTIF	0:00:54	0:00:17
○ CS-Grenoble-Mini-Cluster-Globus-2.4	ACTIF	0	0
○ CS-Grenoble-Mini-Cluster-Globus-4	ACTIF	0	0
○ PEP-Globus-4	ACTIF	0	0

3. The Openplast grid – job submission (9/11)



3. The Openplast grid – workflow informations (10/11)

Workflow graph-1-31032006-692

Statut : terminé

Niveau de sécurité : authentification
Date de création : 2006/03/31-12:00:02
Date de soumission : 2006/03/31-12:00:25
Date d'activation : 2006/03/31-12:00:25
Temps d'attente : 0 seconde(s)
Date de fin : 2006/03/31-12:03:27
Temps d'exécution total : 182 seconde(s)

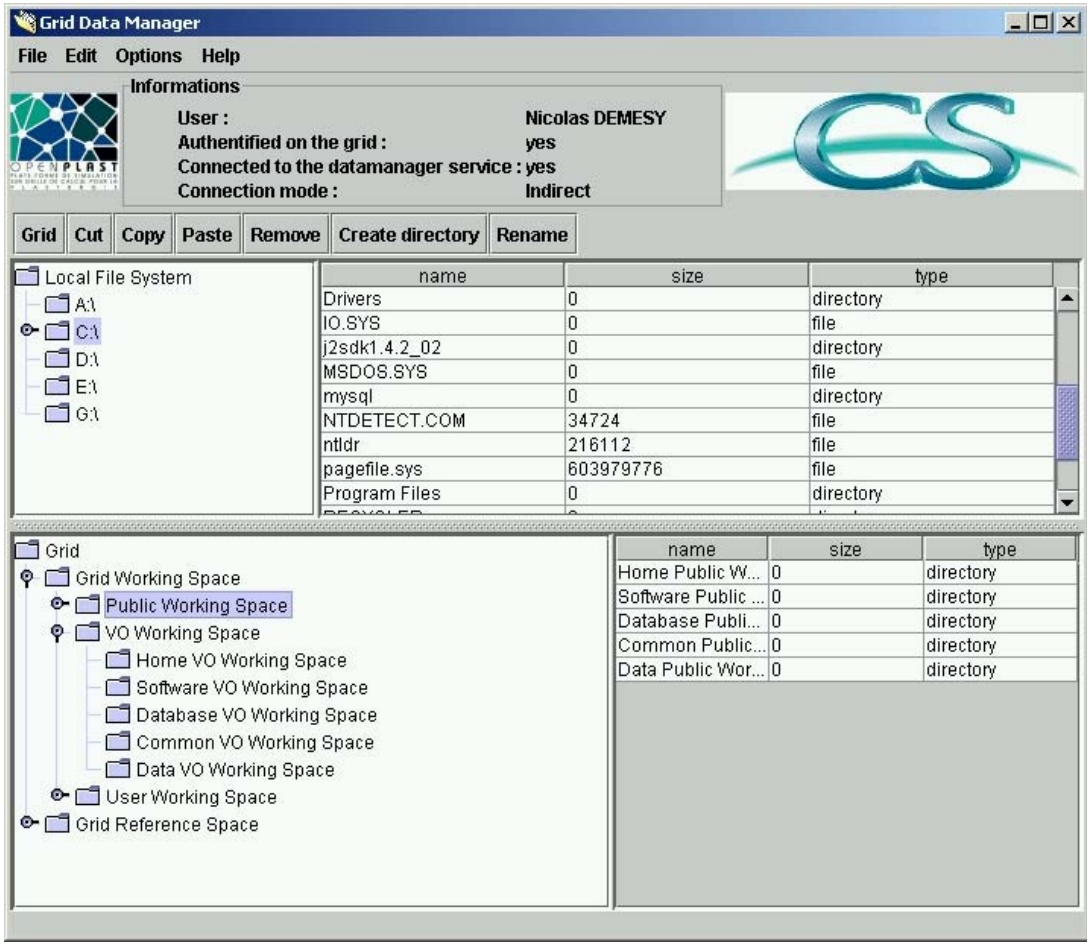
+ Job job-1-1-31032006-692

Statut : terminé

Description : CASTEM3D - Etude ?
Niveau de sécurité : authentification
Type : Multi-thread
Gestionnaire de batch : pbs
Nombre de processus utilisé(s) : 8
Date de soumission : 2006/03/31-12:00:25
Date d'activation : 2006/03/31-12:03:02
Temps d'attente : 146 seconde(s)
Date de fin : 2006/03/31-12:03:26
Temps total d'exécution : 20 seconde(s)
Site utilisé : CS-Grenoble-Cluster-AMD-4.0
Application utilisée : CASTEM3D
Temps de pre-transfert des fichiers utilisés : 11 seconde(s)
Temps de post-transfert des fichiers générés : 4 seconde(s)

Actions : Supprimer le workflow - Visualiser le schéma - Visualiser les données et les résultats associés

3. The Openplast grid – grid data manager (11/11)



4. Future works and perspectives

1. Reservation of computational resources (CPUs and working space)
2. "Computing on demand business models" and related licensing mode must be defined between Software editors, Grid provider, and end-users. It 's essential to motivate software editors to deploy their applications on grids.
3. Make experiments with SMEs to validate exploitation model.
4. Make experiments to acquire economical data to fit computing on demand business models.
5. Necessity to develop "Quote application" to deliver estimate (development of a grid service to estimate computational resource costs).
6. Abstraction and confidentiality of data between subcontractors
7. Make Openplast grid interoperable with other grids (Openplast-EGEE interoperability).

Thank you for your attention