SALOME USERS’ DAY

News and perspectives

13/10/2020

The SALOME Team (EDF/CEA/OCC)
Introduction
Welcome to SALOME Users’ Day 2020

Ask your questions here

Please make sure to mute your microphone

Ask to be given the opportunity to speak
THE SALOME PLATFORM OFFERS GENERIC FUNCTIONS FOR NUMERICAL SIMULATIONS...

geometry ➔ meshing ➔ computation scheme ➔ visualisation
THE SALOME PLATFORM OFFERS GENERIC FUNCTIONS FOR NUMERICAL SIMULATIONS...

Insert your favourite solver here
THE DISCIPLINARY PLATFORMS
SALOME_* AND MORE
THE SALOME PLATFORM
POSSIBLE USAGES

- Building a model from scratch
- Import/export of CAD and mesh models
- Personalised functionalities for specific physics needs
- Personalised specific platforms when integrating a physics solver
- Specific tools built on SALOME basis for specific engineering applications
- GUI and scripting usage
THE SALOME PLATFORM PROJECT
FACTS AND FIGURES

- Started back in 2000: EDF-CEA partnership
- Open source (LGPL), available here: www.salome-platform.org

- More than 61,000 downloads in 2019
- Several hundred of users (R&D and engineering)
- 30 people EDF-CEA development team (10 people core)

- About 60 prerequisites from the open source community
- 1.8 million lines: 70% C++, 20% Python, 10% others (compilation & configuration)
- More than 3000 verification tests (from unitary to user real cases, with a focus on CAD and meshing models)
THE SALOME FUNCTIONALITIES
OPEN THE TOOLBOX

- Shaper CAD
- SMESH Meshing
- HOMARD Mesh refinement
- EFICAS Data setting model
- YACS Computation orchestration
- JobManager Cluster computation launcher
- MED Mesh and field processing
- PARA ViS Scientific visualisation
- Melissa In-situ statistical treatment
- SolverLab PDE solver

TECHNICAL BASIS
Process and data management

KERNEL
Solver integration

MED

GUI

YACS

GEN
News
SHAPER
THE NEW CAO MODELER

- Interactive, variational, parametric
  - Bottom-up approach
  - Constraints solver
  - Dynamic update of shapes
  - Dynamic content of groups
  - Multi-dimensional geometry
  - Conformal meshing
  - Python scripting still possible

- Roadmap for GEOM
  - To be suppressed from GUI in SALOME 10
  - Underlying engine functional with no end date

SHAPER AVAILABLE IN SALOME 9.3
SHAPER
A FEW EXAMPLES

SHAPER AVAILABLE IN SALOME 9.3
SHAPER
NEW FUNCTIONALITIES

- Automatic constraints
- Ellipse and arc of ellipse
- Change sketch plane
- Selection by filter
- Group on the whole result
- Group subtraction
- Defeaturing
- ...

SALOME 9.4, 9.5 & 9.6
The main object and the groups are available in the ShaperResults zone, without any operation.
SMESH
THE MESHING MODULE

- Multi-element 1D, 2D and 3D
- NetGen open source algorithms
- MeshGems commercial algorithms (DISTENE French company)
- Mesh refinement with the HOMARD module
- Crack insertion tool
SMESH
IMPROVED MESHER PVC GEMS ERGONOMICS

- New MeshGems GUI
  - All options now available

- Automatic meshing improvements
SMESH
NEW FUNCTIONALITIES

- “Viscous layers” now deals with periodicity
- “Body fitting” take into account shared faces
- “Polyhedron per Solid” to mesh your shape as it is
- Anti-aliasing, using a new VTK feature
SCIENTIFIC VISUALISATION
THE PARAVIS MODULE

- Based on ParaView open source product (by Kitware American company)
- Fields visualisation
- Parametrical analysis
- HPC visualisation
- Virtual reality
- Pedagogical visualisation
PARAVIS
THE SCIENTIFIC VISUALISATION

○ Ease access to pedagogical visualisation by adding easily a realistic context around datasets coming from simulation
  ▪ See Kitware’s blog!

○ Static mesh plugin is now part of Kitware’s plugins
  ▪ Share with the ParaView community the performance gains of rendering multi time steps datasets on a static mesh
  ▪ See Kitware’s blog and GitLab!
PARAVIS
THE SCIENTIFIC VISUALISATION

- Custom filters for several physics
  - Wide range of physics: mechanics, hydraulics, electromagnetism…
  - Custom user interface
  - Sequence of multi-filters
  - Well-suited for repeated custom post-processing for safety studies
  - Make ParaView easier for occasional users
PARAVIS
THE SCIENTIFIC VISUALISATION

- Custom filters for several physics (2/2)

rate of flow across polyline (MEDCoupling powered)

constraints representation on dam (1)

constraints representation on dam (2)

sediment deposit inside closed polyline (MEDCoupling powered)
YACS
COMPUTATION ORCHESTRATION

- Chain or couple several operations and solvers

The **OpenTURNS** example is in continuous evolution.
VERIFICATION

LARGE EFFORT ON SHAPER QUALIFICATION SINCE SALOME 9.3
375 BUGS HAVE BEEN CORRECTED! 1225 UNIT TESTS DEVELOPED!

- **MCO SALOME qualification** done by Open Cascade
  - 827 unitary tests
  - 1835 automatic tests
  - 323 automatic tests

- **EDF qualification**
  - 417 automatic tests daily done (make tests)
  - 468 automatic tests daily done (SALOME Python tests)
  - 45 user automatic tests done at each beta phase

- **CEA qualification**
  - 457 automatic tests daily done (SALOME Python tests)
  - 205 automatic graphic tests done with the SQUISH tool
  - 224 manual graphic tests done at each beta phase

Recall: your bugs in the trackers always lead to a test!
VERIFICATION
AUTOMATIC GUI TESTING WITH SQUISH

- **205 TESTS**
  - Executed everyday on CentOS 7 and Windows with Jenkins
  - GUI bugs are found as soon as they appear
  - Every modules are covered
- **Coming soon**
  - SHAPER GUI is more stable: we will be able to develop more tests!
  - Extension to other Linux platforms
SALOME DISTRIBUTION
AVAILABLE OS

- **Published by CEA**:
  - CentOS 6, 7 & 8
  - Fedora 28, 30 & 32
  - Ubuntu 16 & 18
  - Debian 8, 9 & 10
  - Windows 10
  - Universal (int 32 & int 64)
  - Nightly qualified version available

- **Published by EDF**:
  - Calibre 9
  - Scibian 9 (qualified)
  - Scibian 10
  - SciMotors
  - Nightly verified version available
**SALOME DOWNLOADS**

**2020 TRAFFIC ON SALOME-PLATFORM.ORG**

- 109556 visits
- 61113 downloads

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![Map of Nb downloads](image)
Perspectives
PRE/POST CAPABILITIES

- **Shaper**
  - New functionalities and better ergonomics
  - An improved CAO to mesh link

- **SMESH**
  - Ergonomic meshing capabilities
    - User-friendly GUI and intuitive viewer
    - Dedicated physics meshing
  - Merge mesh refinement capabilities to meshing module
  - MG-TetraHPC user friendly on cluster

- **Visualisation**
  - Custom filters on demand
YACS

- New algorithm for computations distribution which manages the workload of resources
- Create a YACS scheme out of a Python script

```python
import yacsdecorator
@yacsdecorator.leaf
def f1(x,y):
    r = x + y
    return r
@yacsdecorator.leaf
def f2(a):
    r = a + 2
    return r
@yacsdecorator.leaf
def f3(x, y):
    s = x + y
    p = x * y
    return s, p
@yacsdecorator.bloc
def myschema():
    x = f1(x=3, y=4)
    a, b = f3(x, 2)
    f2(a)
    r = f1(a, b)
    return r
```
FIELDS

RENOVATION AND EXTENSION

- **Renovation**
  - Portage to SALOME 9.6
  - Development of tests and correction of bugs

- **Extensions planned for SALOME 9.7 et 9.8**
  - Simplified 3D views with more parameters for the user
  - 2D views for the core physics
  - Mutualized views coming from disciplinary platforms
AND MORE

- New web site
- New forum
- Built-in documentation
- More trainings
SALOME TO COME
NEW VERSIONS CALENDAR

- SALOME 9.6
  - By the end of this year

- SALOME 9.7
  - May/June 2021

- SALOME 9.8
  - December 2021

- SALOME 10
  - After 2021
  - Containing renewed architecture… and ergonomics
    - All modules on stand-alone usage
    - Customizable Graphical User Interfaces using services from several modules
    - Provide services outside SALOME
FOLLOW US ON…

- [www.salome-platform.org](http://www.salome-platform.org)
- [salome.der.edf.fr](http://salome.der.edf.fr) (interne EDF)
- [salome.intra.cea.fr](http://salome.intra.cea.fr) (interne CEA)
- YouTube
  - “Learn Salome” https://www.youtube.com/channel/UCm7CSP3v1VF6brzmTIV9c3Q
  - “SALOME Tutoriels” https://www.youtube.com/channel/UCokrSqnpg3sLXkagZwUmuXg
  - “SALOME CAD/CAE platform” https://www.youtube.com/playlist?list=PLgvBxFyGVRbZZz4wVvP36xXQL-S81RZsc

TRAITEMENT DE L’INFORMATION SCIENTIFIQUE

- Plateforme SALOMÉ – Module 1 : Prise en main ……………………81
- Plateforme SALOMÉ – Module 2 : Maillage avec SMESH …………82
- Plateforme SALOMÉ – Module 3 : Modélisation géométrique avec SHAPER …………………………………………83
- Plateforme SALOMÉ – Module 4 : Utilisation du modèle de visualisation ParaVIS ……………………………………………84
- Plateforme SALOMÉ – Module 5 : Utilisation de l’assimilation de données avec ADAO …………………………………………85
- Plateforme SALOMÉ – Module 6 : Initialisation au scripting dans le module de visualisation ParaVIS et Manipulation de maillages et de champs avec le module MEDCOUPLING ………………………………86
Merci