STC#4 Report

Date: 2-4/10/2017
Location: Inria LILLE
Please find also enclosed the slides of the STC#4 presentation
(including workgroup presentations)

Participants

- Hugo Talbot (SOFA Consortium)
- Guillaume Paran (SOFA Consortium)
- Christian Duriez
- Damien Marchal
- Jeremie Dequidt
- Eulalie Coevoet
- Bruno Carrez
- Olivier Goury
- Erwan Douaille
- Antonin Bernardin
- Thomas Morzadec
- Maxime Thieffry
- Stephane Cotin
- Frédéric Roy
- Rémi Bessard
- François Jourdes
- Erik Pernod
- Noura Hamze
- Markus Walzhöni
- Johan Moreau (Hangout)
- Jorg Peters / Ruilang (Hangout)
- Fabian Aichele (Hangout)
Agenda of STC#4

Day 1 - Monday 2nd October (afternoon)
Point de la communauté et consortium
Présentation des travaux en cours
Free evening (bar)

14:00 - Opening STC#4
● Introduction + agenda
● New vision of workgroups

14:15 - SOFA report (part 1)
● Consortium activity: memberships, communication, tech. work
● SOFA activity: release, features, workflow
● Discussions

15:15 - SOFA report (part 2)
● Report STC#3 workgroups
  ○ multithreading
  ○ sparse matrices
  ○ NG
  ○ validation
● Present next days: how future project(s) will be chosen + coding sprint

16:30 - SOFA Roadmap and coding sprint focus
● Poll for upcoming tasks
● Ranking from everyone
● Defining task for coding sprint

16:30 - SOFA demos
● Present your achievements: scientific results and demos

Day 2 & 3 - Tuesday 3rd October & Wednesday 4th

09:00 - Coding sprint : Room 1 + Room 2

17:30 - End of STC#4
STC#4 Report

You will find all information regarding the report on SOFA, its activity and the consortium activity within the STC#4 slides.

Below is a short summary of the discussions about the SOFA workgroups:

- **SOFA NG (Guillaume Paran)**
  Many discussions took place about SOFA Next Gen aiming at refactorize the current (non-core) modules and components by moving them into plugins. In this idea, a work of pluginization has been started during the coding sprint. After further discussions, it has been discussed that a massive pluginization was too intrusive and would have many unmanageable consequences.

  The roadmap of this workgroup is now available on the associated GitHub issue: [https://github.com/sofa-framework/sofa/issues/543](https://github.com/sofa-framework/sofa/issues/543)

- **Multithreading (on behalf of Maxime Mogé)**
  Work is in progress. The parallelization focuses on the Visitor level. This allows to accelerate every simulations in SOFA without affecting the API. However, this can’t focus on most complicated cases, where a strong acceleration is needed (e.g. collision detection ..).

  Some news will soon be given on the associated GitHub issue: [https://github.com/sofa-framework/sofa/issues/24](https://github.com/sofa-framework/sofa/issues/24)

- **Sparse matrices (Christian Duriez)**
  This work is still in progress and will soon be available as a plugin in SOFA. The chosen approach aims at using the existing mapping API to allow non-uniform matrix description, replace the existing mask implementation. This is done using the applyJT functions of mapping and the existing MatrixDeriv type. The update made by Christian during the STC was that the methods brings the following advantages:
    - Very low footprint on SOFA (use of existing mechanisms)
    - Sparse form without masks
    - Compatible with all solvers that use addKtoMatrix
  However, it presents drawbacks, namely
    - Complexity of accessing the multimatrices
    - Possible improvements in sparse matrix multiplication
    - No detection when jacobians are accumulated several times
  This work arose the lack of one unique sparse matrix representation.
• **Validation (on behalf of Igor Peterlik)**
  The project of application for an EUROSTAR project has failed (retraction from InSimo). The idea of working on this topic is still very hot. If you are willing to get involved in the project and its writing, please do not hesitate to contact the consortium staff.

  Partners could be:
  ○ Renumics
  ○ TIMC
  ○ Inria
  ○ InSimo

Finally, our researchers wanted to share some of their work:

• **Topologies with CGoGN library (on behalf of David Cazier)**
  The new CGoGN topology is now available in a branch of SOFA and show good first result in term of performance. However, important benchmarks remains: with case of topological changes where the dynamic topology is really more powerful using combinatorial maps. Finally, the most important drawback is the fact that all ForceField must be modified to support the CGoGN topology.
  Difficult to discuss the topic without the interested person present.

• **IBMethod (on behalf of Christoph Paulus)**
  A new method should soon be available based on the Immersed Boundary Method to simulate geometrically-complicated mechanical objects immersed into a grid. Good result in term of accuracy and performance are shown. This work will soon made available as a plugin.

**SOFA Demos**

• **SOFA + Unity**
  Erik Pernod made a demonstration of his work coupling SOFA and Unity3d for prototyping simulations. Find all [Erik's achievements](https://www.youtube.com/watch?v=dQw4w9WgXcQ) on YouTube.

• **PSL**
  Damien Marchal presented us his work using Python and PSL to interactively design a simulation and write the scene. Impressive ! Soon available !

• **Visit of the Defrost Lab**
SOFA Roadmap & coding sprint

Consortium staff main task
Further to the discussions regarding our previous workgroups, it has been decided for the Consortium staff to focus only on the SOFA NG project.

Listing and ranking tasks for the coding sprint
1. SOFA NG: pluginizing and deprecating
2. Merge codes: FixedConstraint, GearSpringFF, StaticSolver
3. Write tests
4. drawTools
5. Merge InSimo branches
6. Clean warnings
7. Write doc
8. Coding style checker

Coding sprint
At the end, only the deprecations have been merged into master. None of the pluginizations done during the sprint has been merged.

https://github.com/sofa-framework/sofa/issues/413
https://github.com/sofa-framework/sofa/pull/453
https://github.com/sofa-framework/sofa/pull/457