



8th Advanced
School on
SCIENTIFIC
VISUALIZATION

Introduction to MAF

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WHAT'S MAF

The **M**ultimod **A**pplication **F**ramework is:

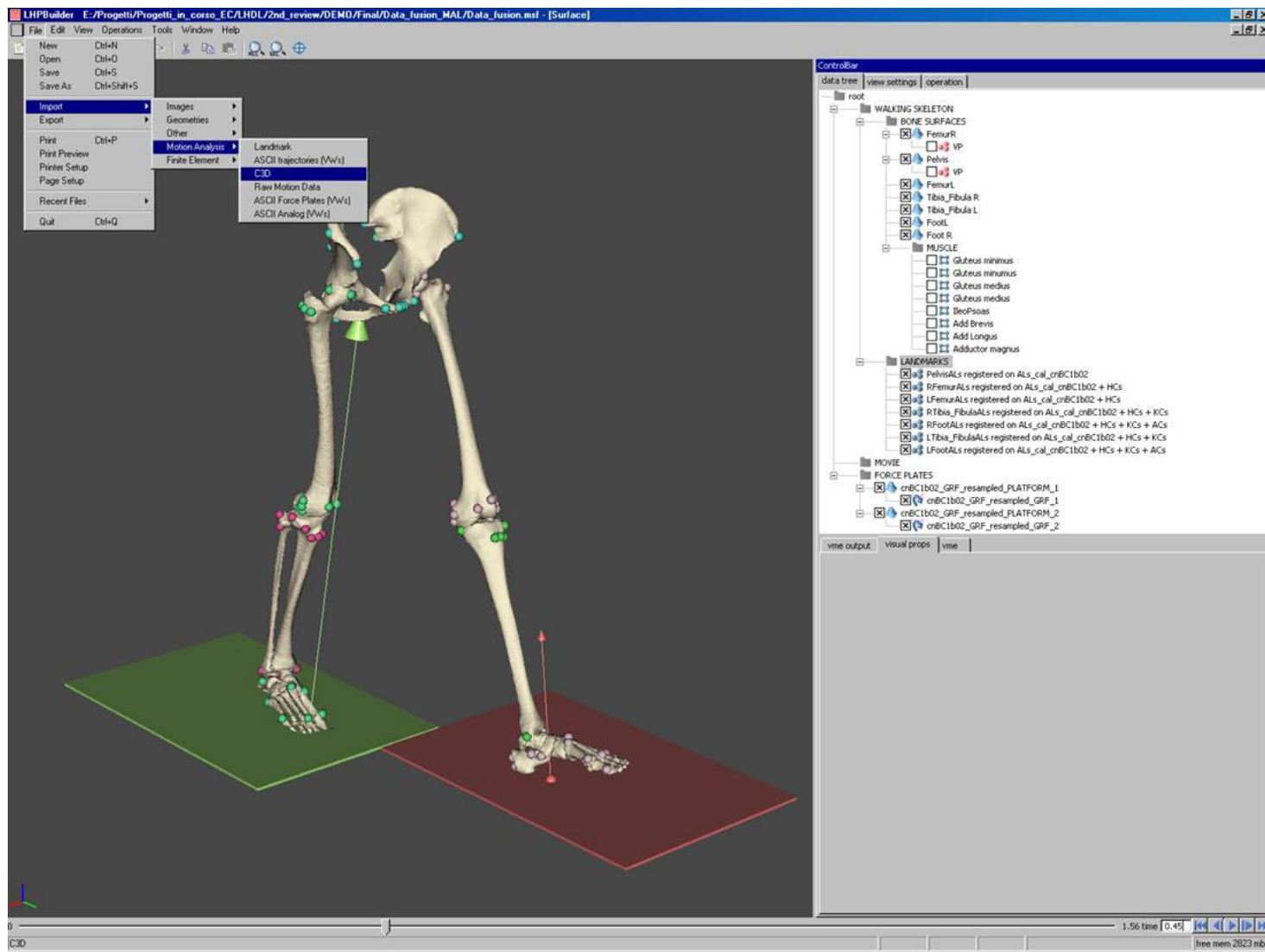
*“An open source freely available framework for rapid development of applications, based on the **Visualization Toolkit** and other specialized libraries”.*

It provides **high level components** that can be easily **combined** to develop a vertical application in different areas of scientific visualization.



MEDICAL APPLICATIONS

Registration between anatomy extracted from CT data, with movement analysis information (kinematic + force plates)

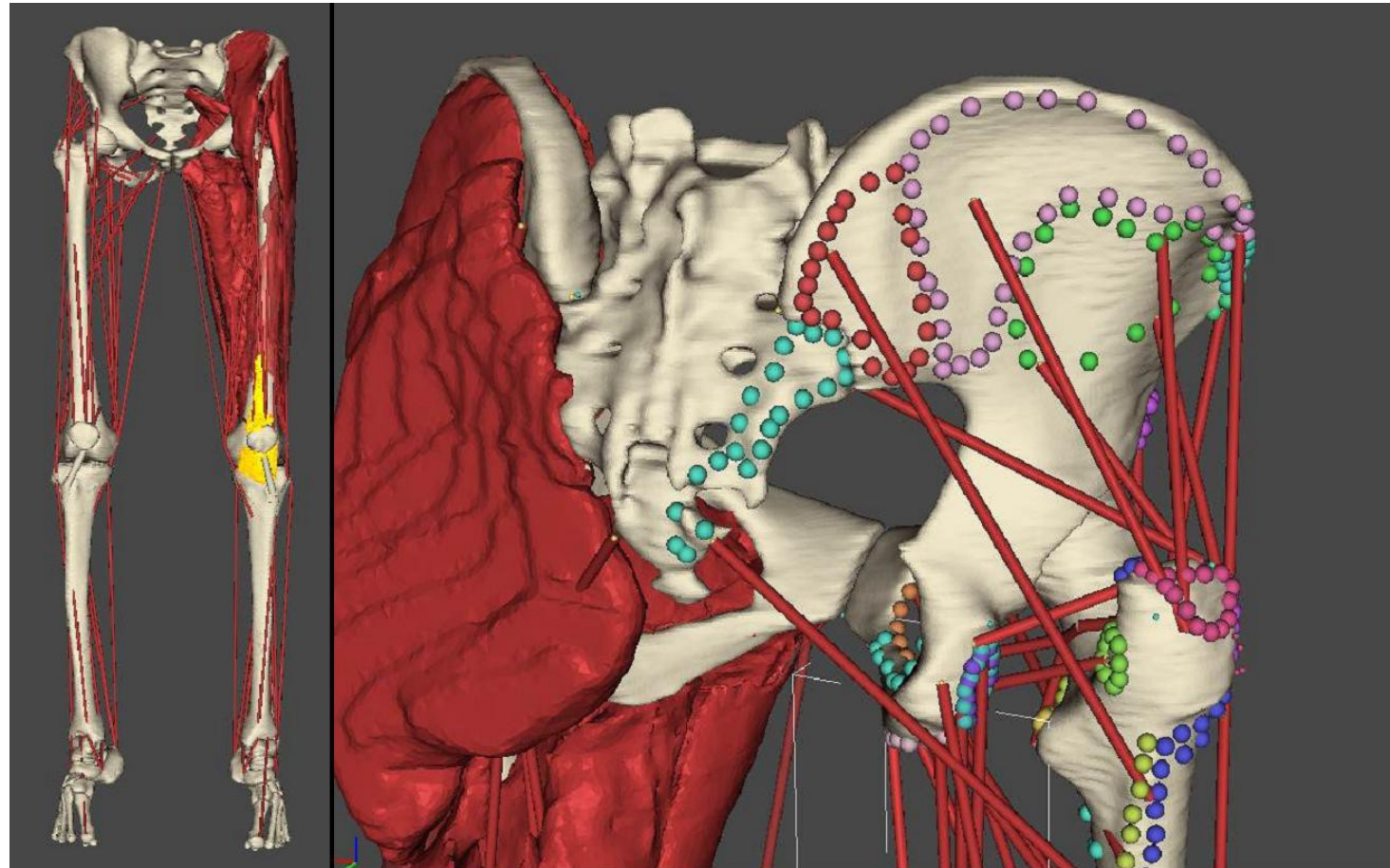




MEDICAL APPLICATIONS (2)

Registration of data coming from different sources:

- Skeleton from TC
- 3D surfaces of muscles from magnetic resonance
- Markers: insertions and muscle's origins from anatomical dissection of a cadaver





MAF3 specifications

- Framework for biomedical applications
- High modularity
- Scriptable
- Plugin system
- QA software platform



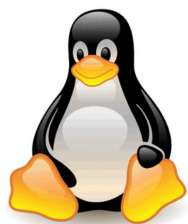
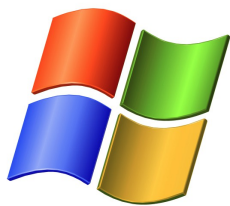
MAF3 specifications

maf3

github
SOCIAL CODE HOSTING

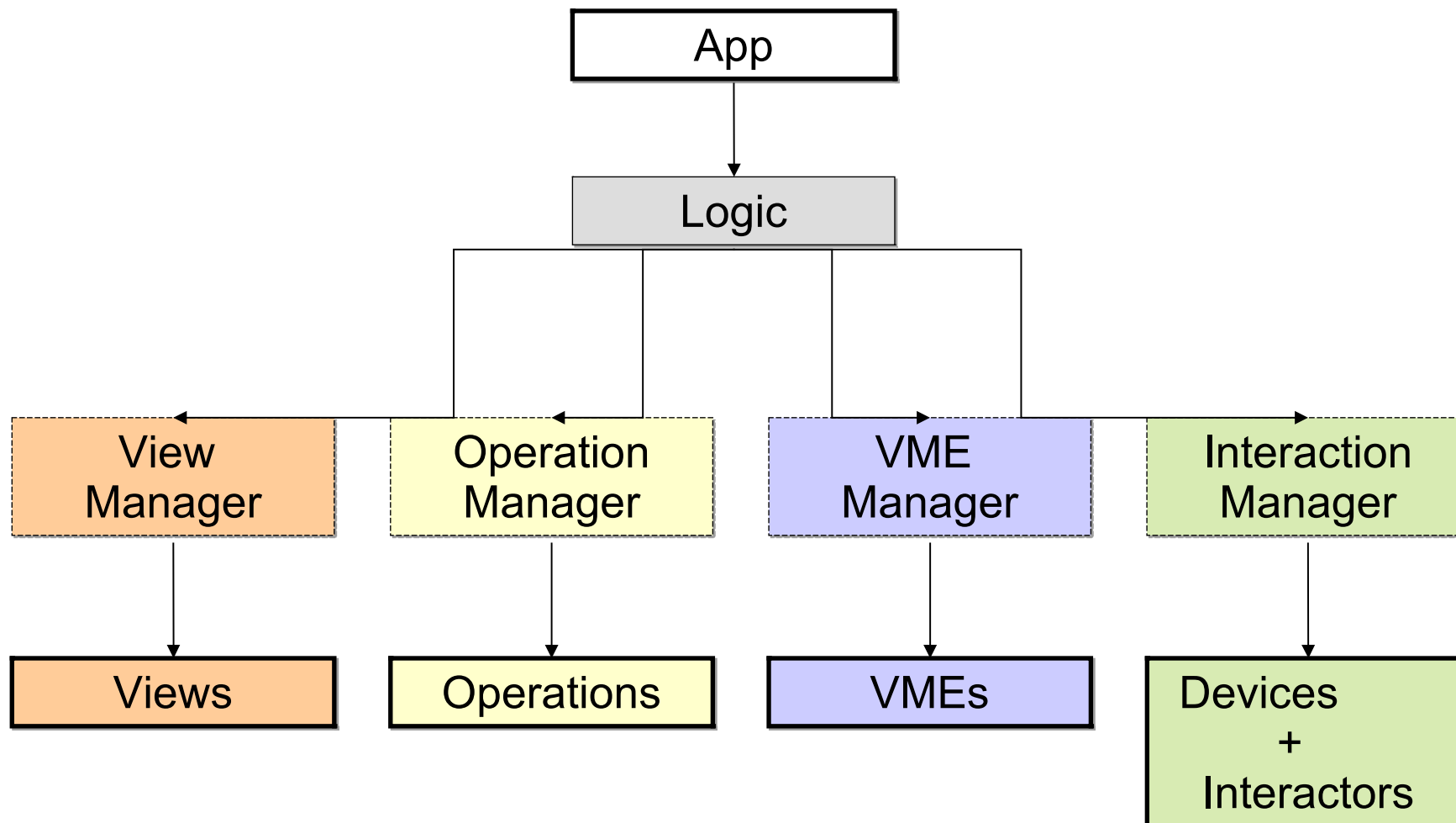


Deployed on:





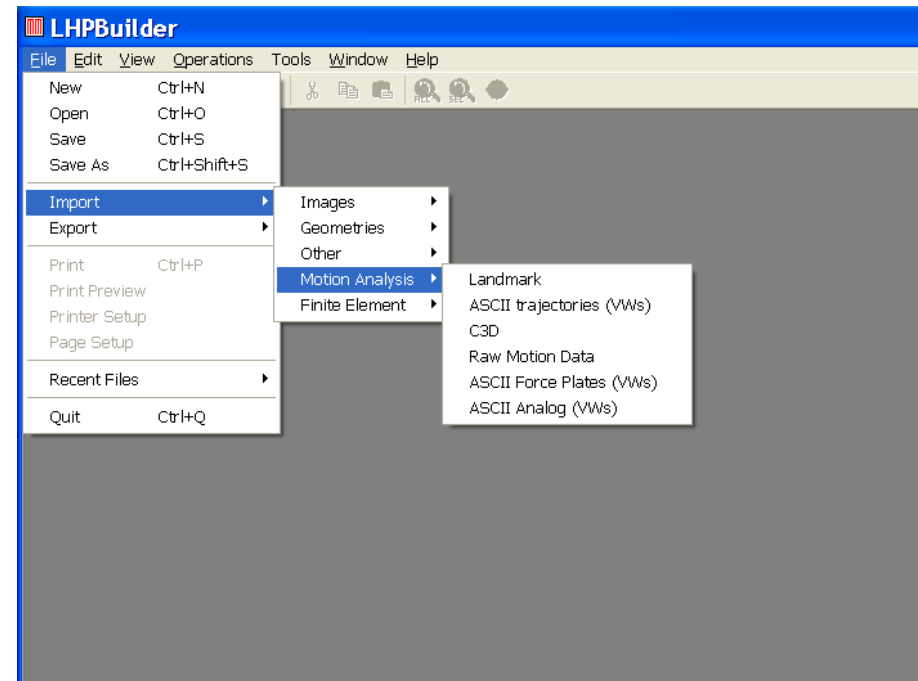
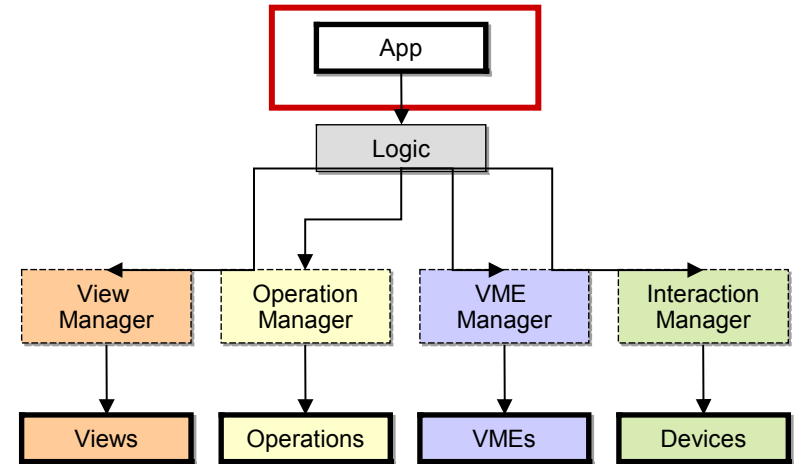
MAF STRUCTURE





THE 'APP' CLASS

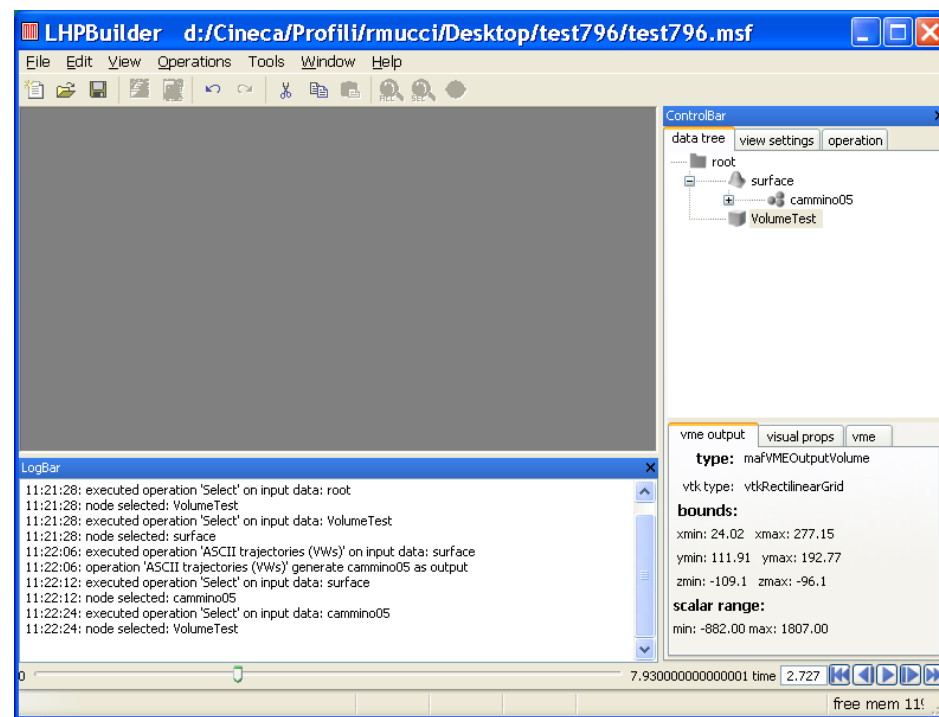
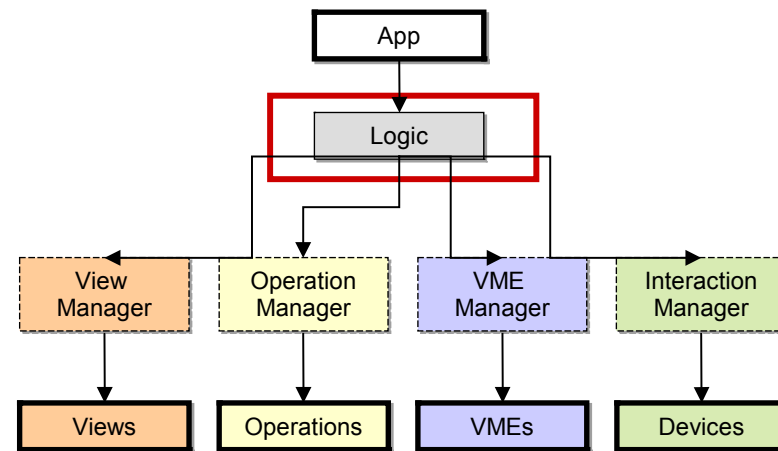
- Create the parent frame of the application
- Make an instance of the logic
- Plug the views and the operations used inside the application
- Hide/Show the interface elements for the vertical application
- Terminate the application deleting the logic





LOGIC: APPLICATION'S BEHAVIOR

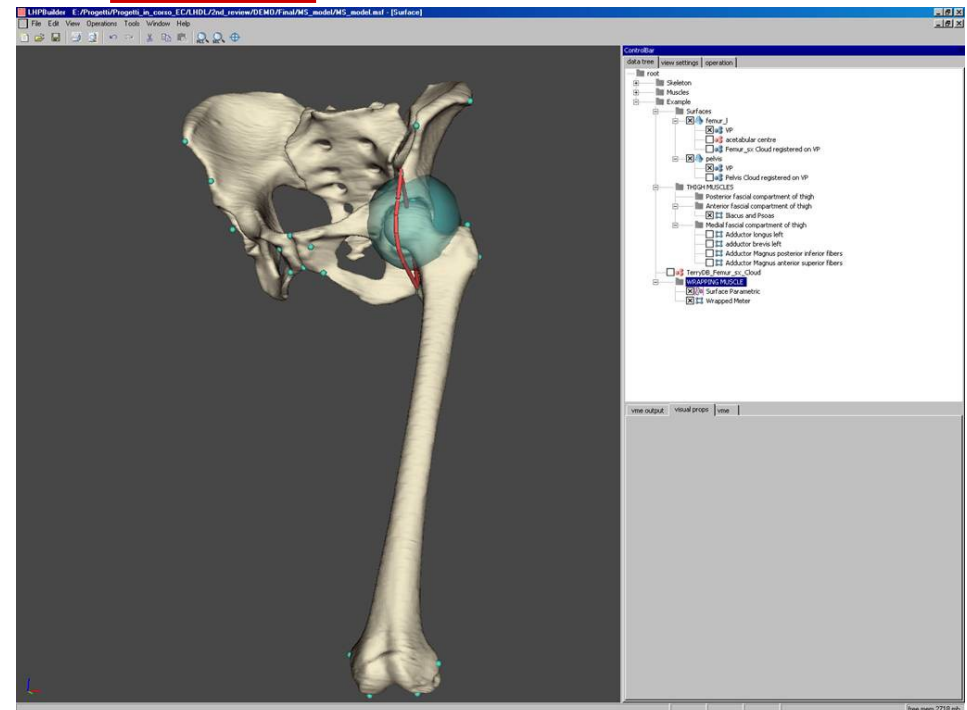
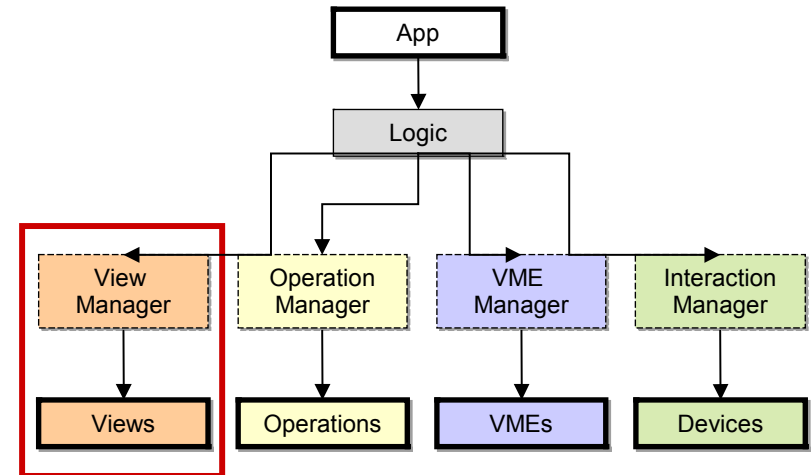
- Create and instance of each manager: *mafViewManager*, *mafOpManager*, *mafVmeManager*, *mafGUIManager*
- Listen all the events raised from the managers and from the interface elements through *mafEventBus*





mafViewManager

- Create/Delete plugged views
- Manage view selection
- Add/Remove VMEs to/from the views
- Has knowledge about the selected view and selected VME



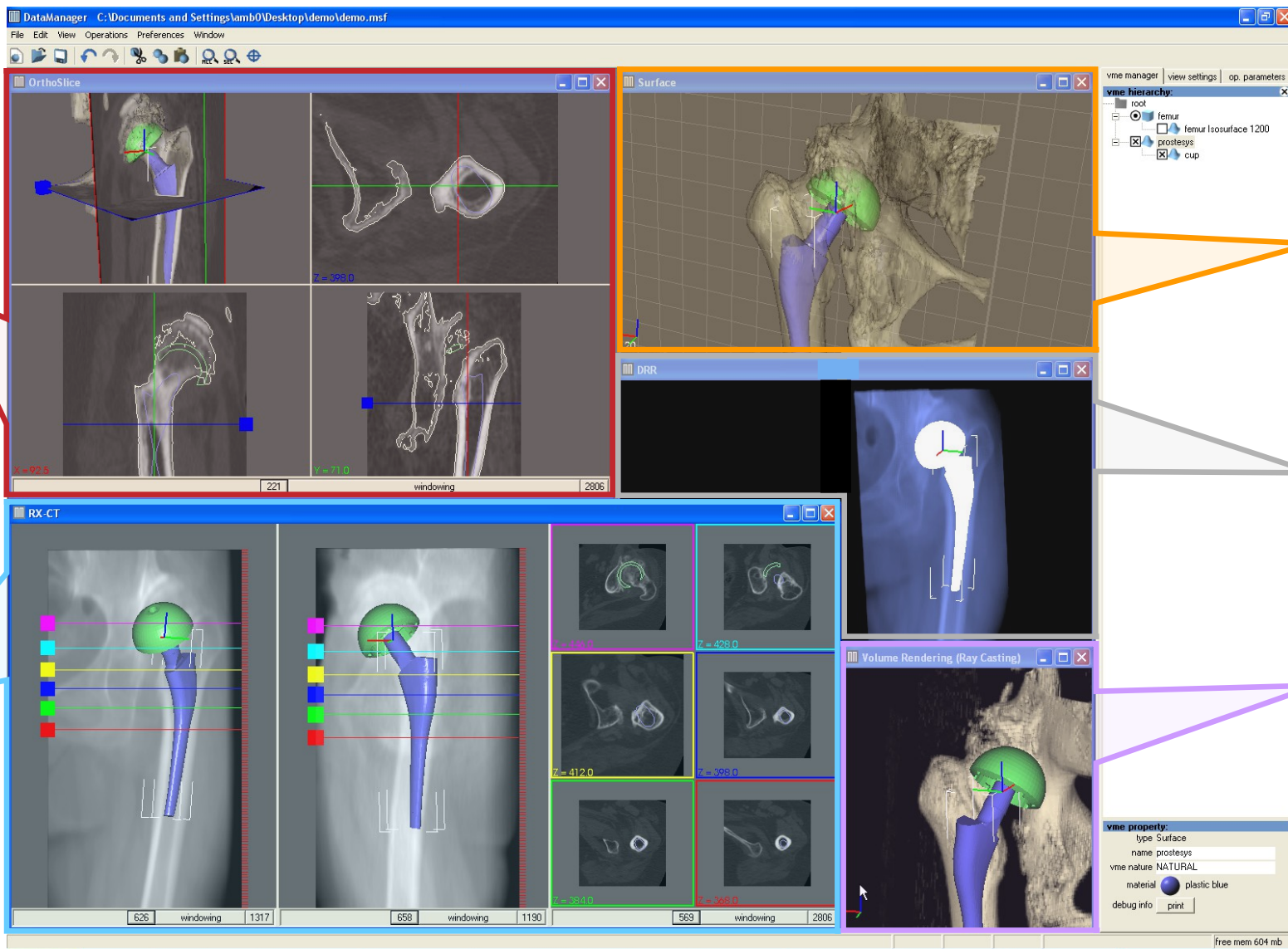


MAF VIEW

- All VMEs are visible inside each view
- View ask to VME for its own visual pipe, and use it to render the VME



VISUAL REPRESENTATION IN MAF



OrthoSlice

Surface

DRR

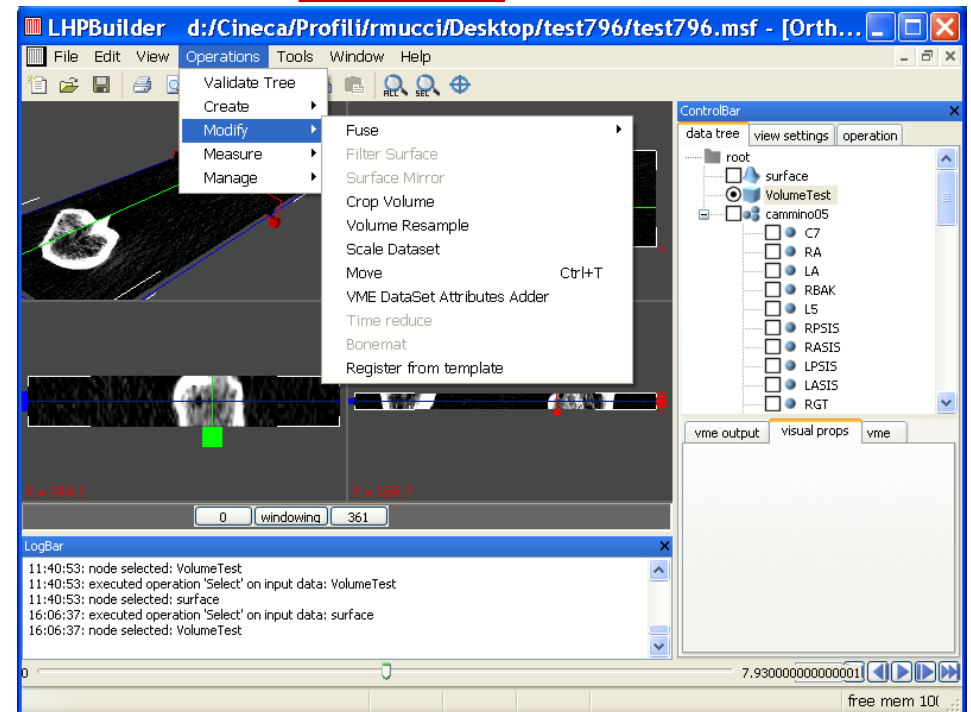
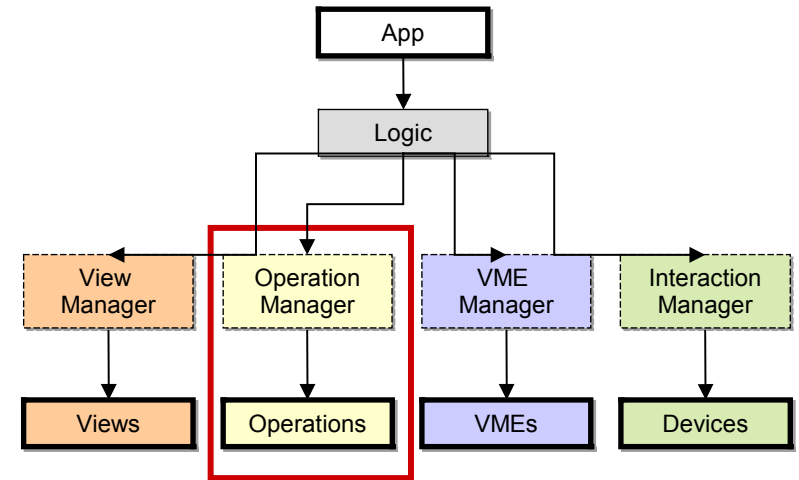
RX-CT

Volume Rendering



mafOpManager

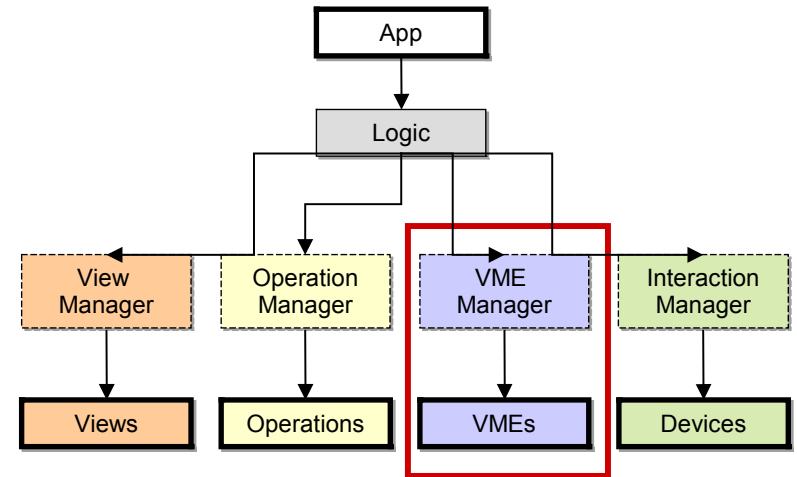
- Manage the operation execution
- Manage the undo stack
- Enable/Disable menu items and toolbar buttons according to the VME selected and to the operation execution



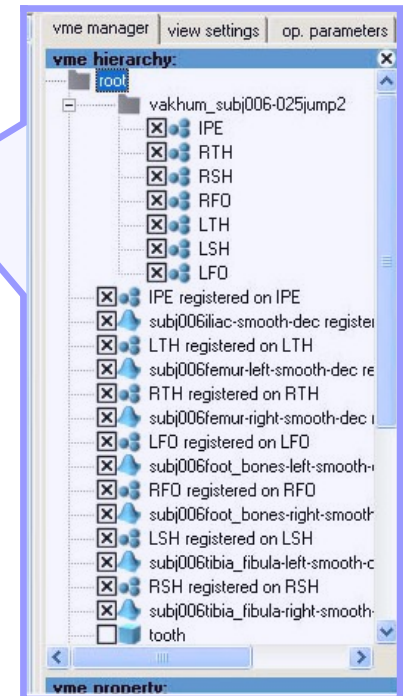


mafVMEManager

- Add/Remove a VME to/from the tree
- Manage the file save, open, new
- Manage the file history
- Set the time to the VME tree



Data Tree



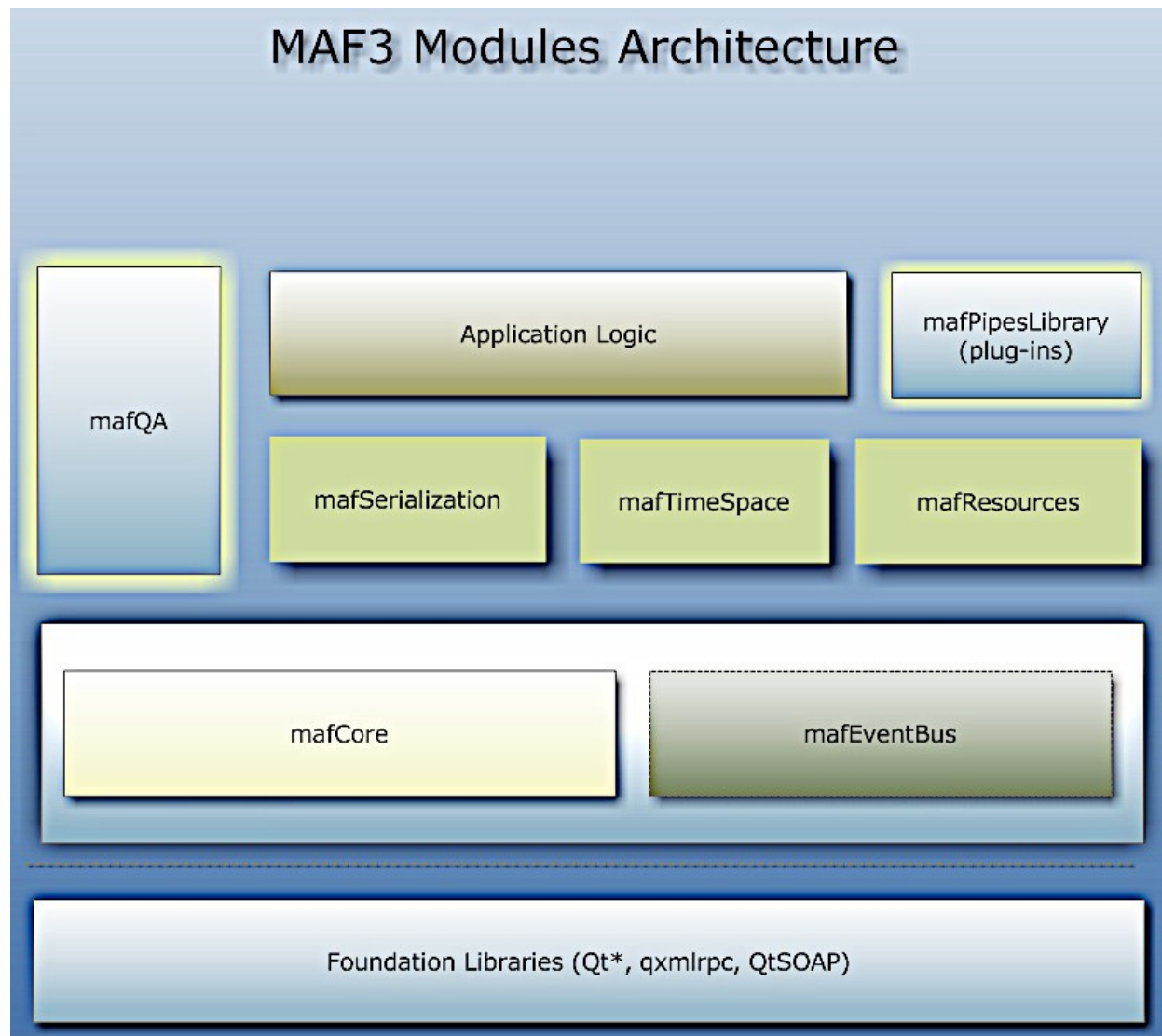
Type of VME currently supported





MAF3 Architecture

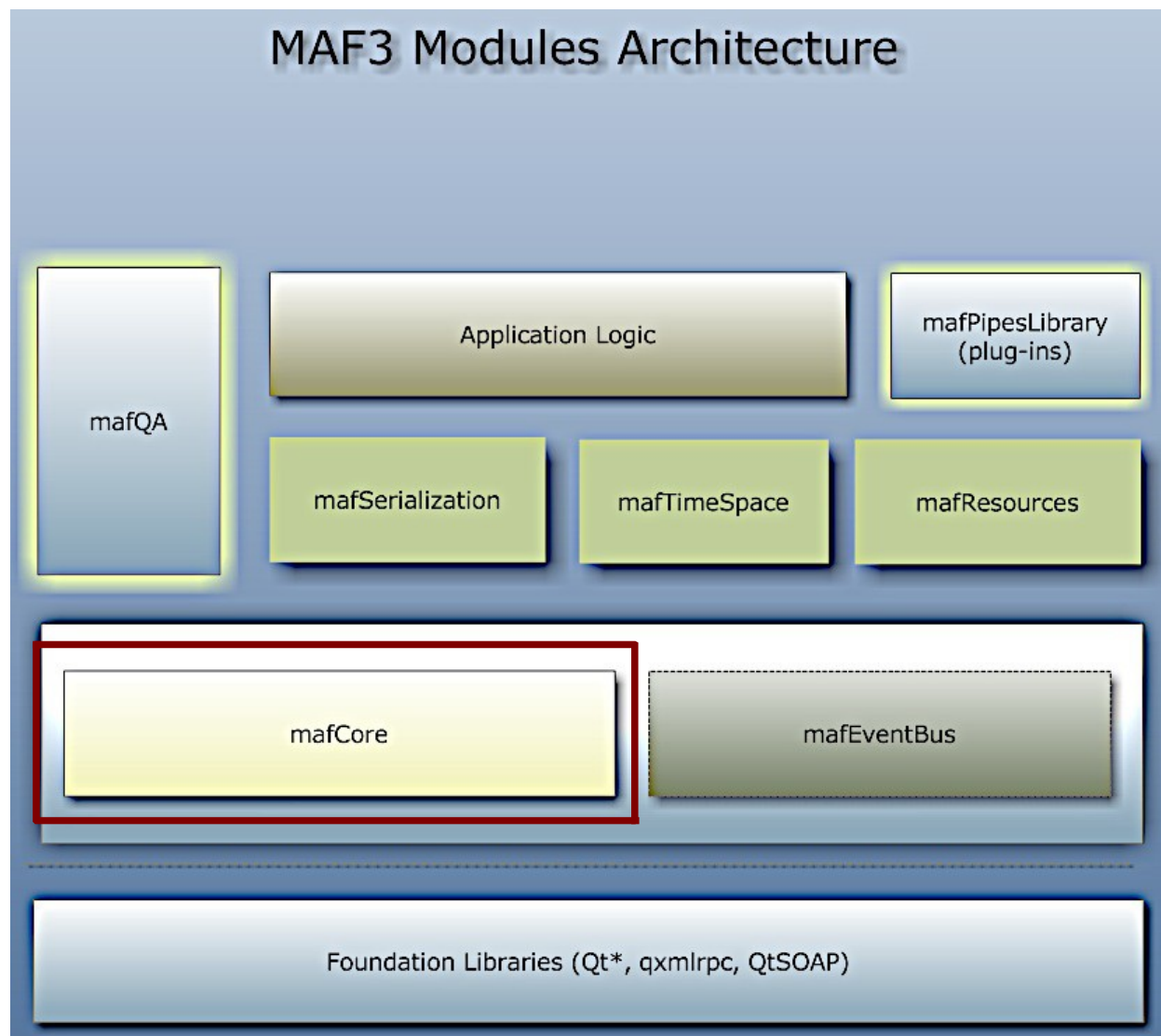
- www.openmaf.org
- Ready for end-user application
- Provides a flexible plugin-system





MAF3 modules

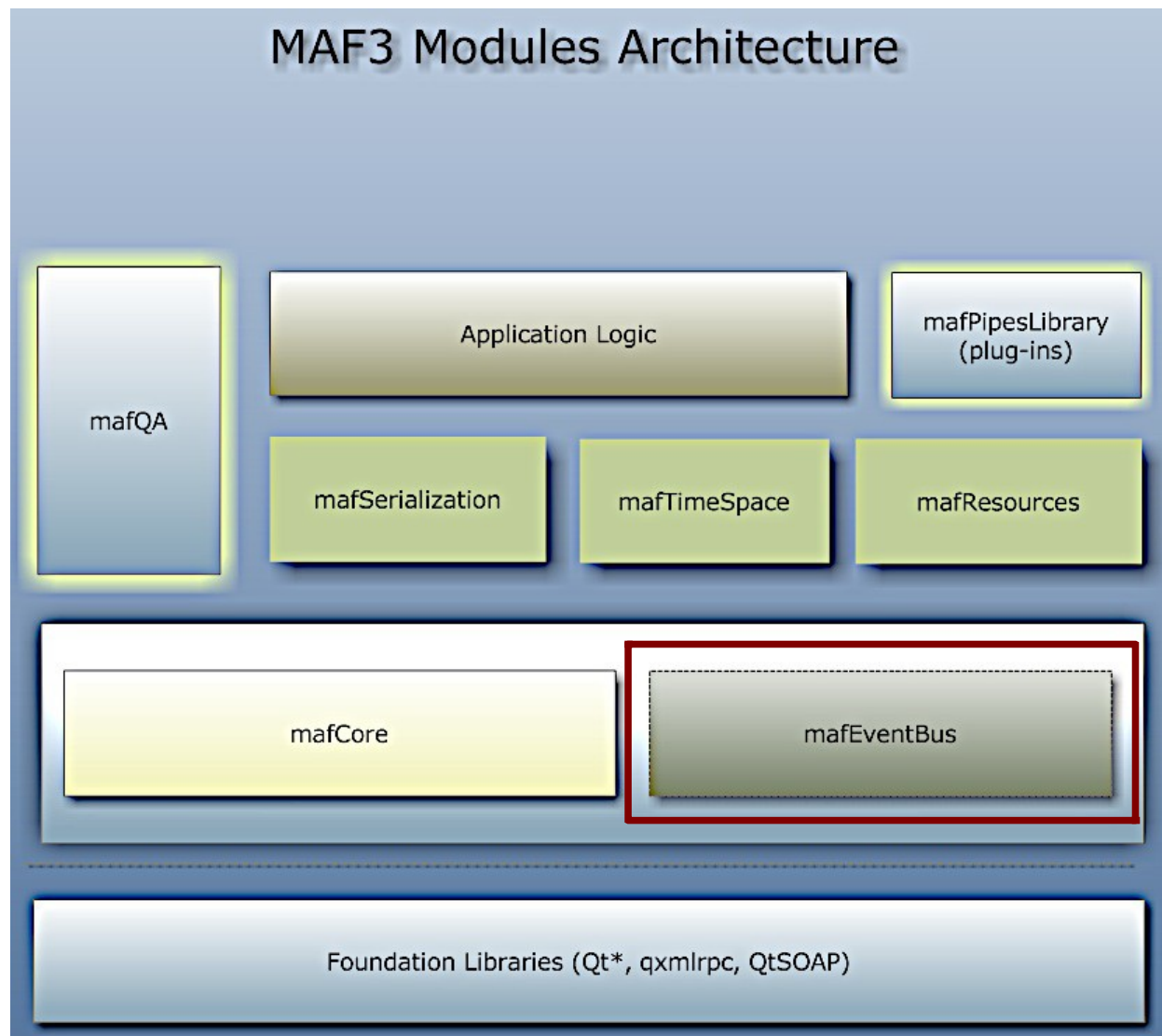
- **mafCore**
- Interfaces
- Factories
- Threads
- Logger





MAF3 modules in Hypermodel

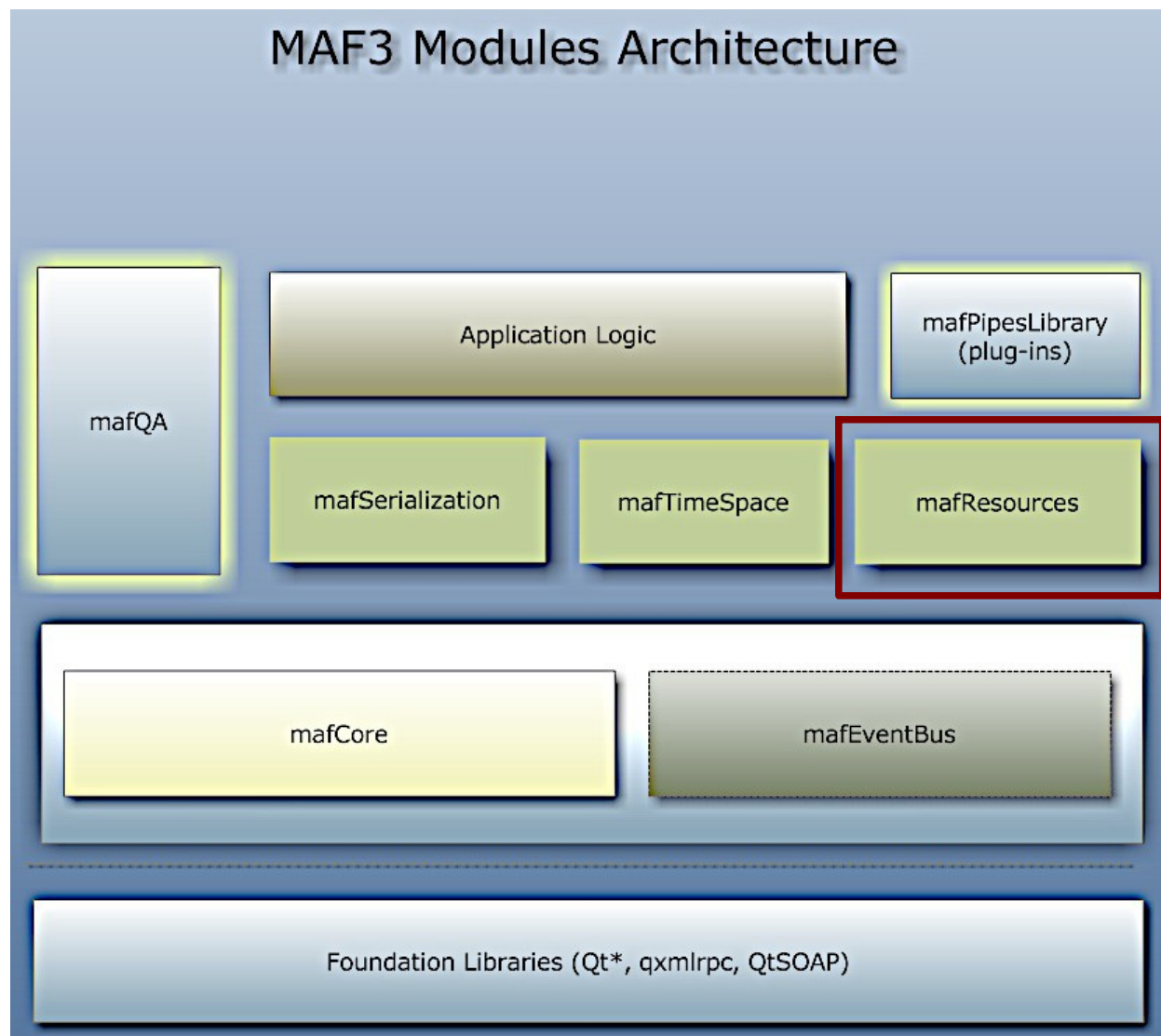
- **mafEventBus**
 - Dispatchers
 - Connectors





MAF3 modules

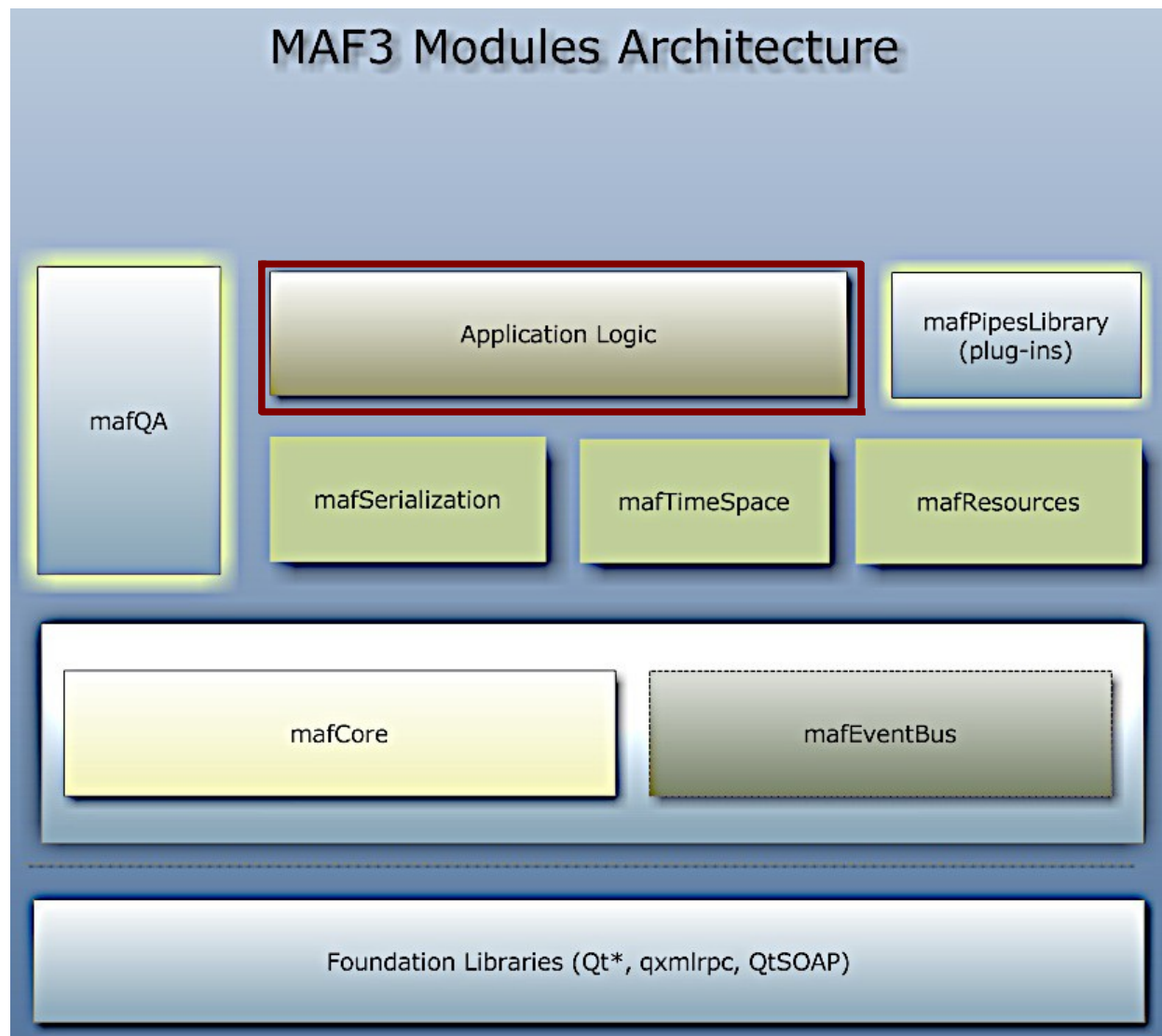
- **mafResources**
- mafOperation
- Plugin interface
- Managers





MAF3 modules

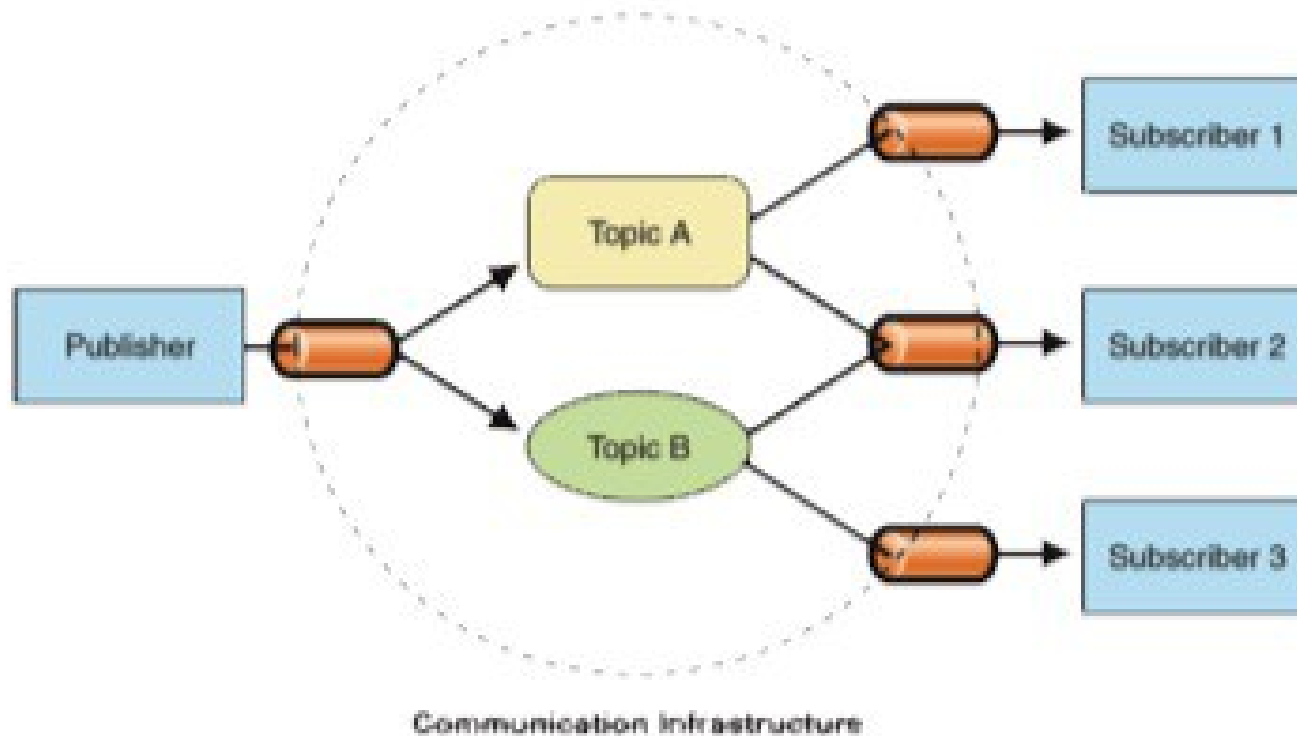
- **Logic**
- Application Logic





Communication Model

- **Publish – Subscribe** between MAF modules
- **Point-To-Point** inside a module





MAF3 EventBus

- Communication between modules
- Independency between modules
- Flexibility
- Manages Local/Remote communications
- Provides a generic interface in passing arguments

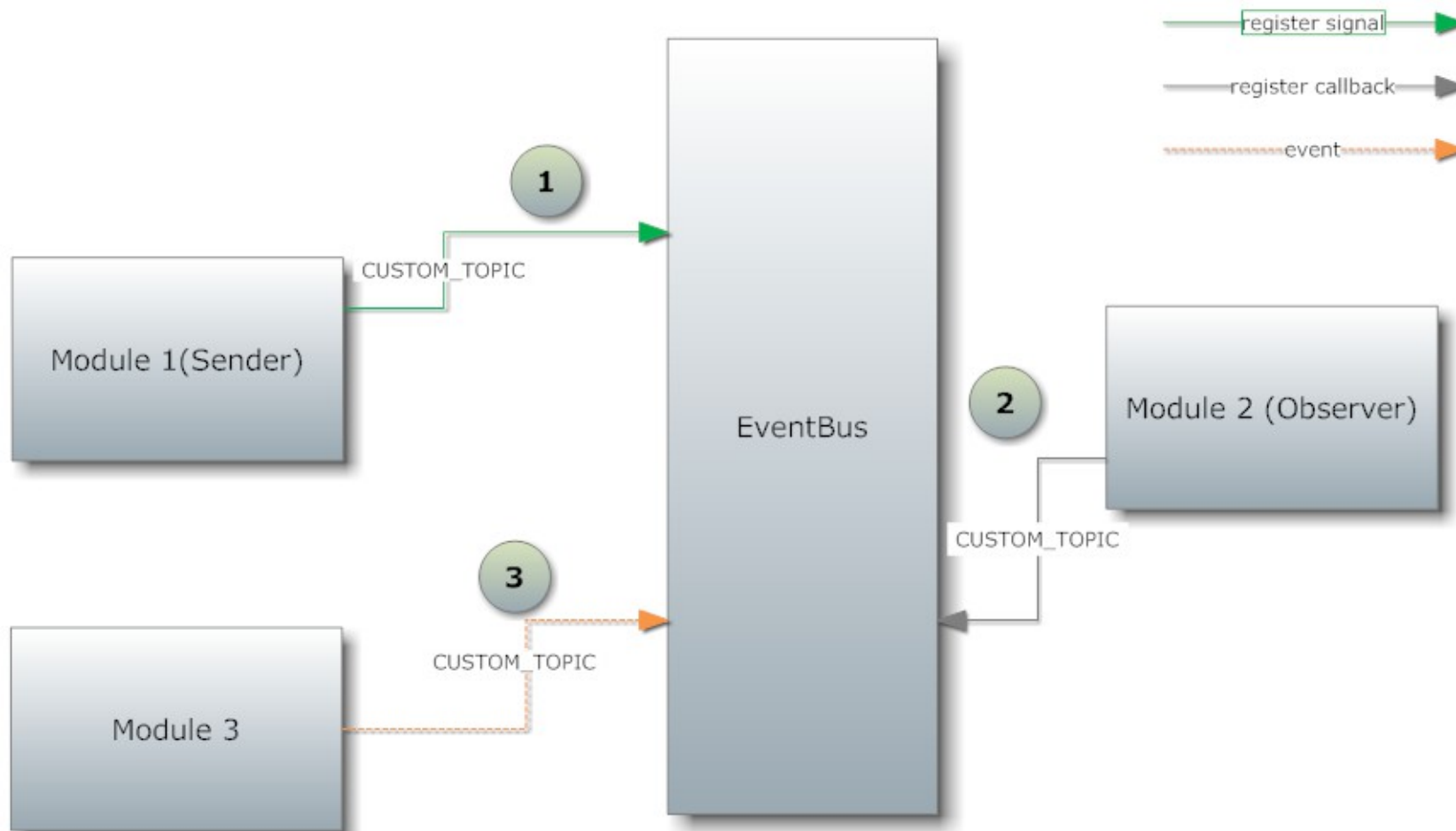


Local communication

- Based on **Qt** Signal/Slot mechanism
- Allows connection at run time, without class dependencies
- Topic Taxonomy
- Topic Filtering



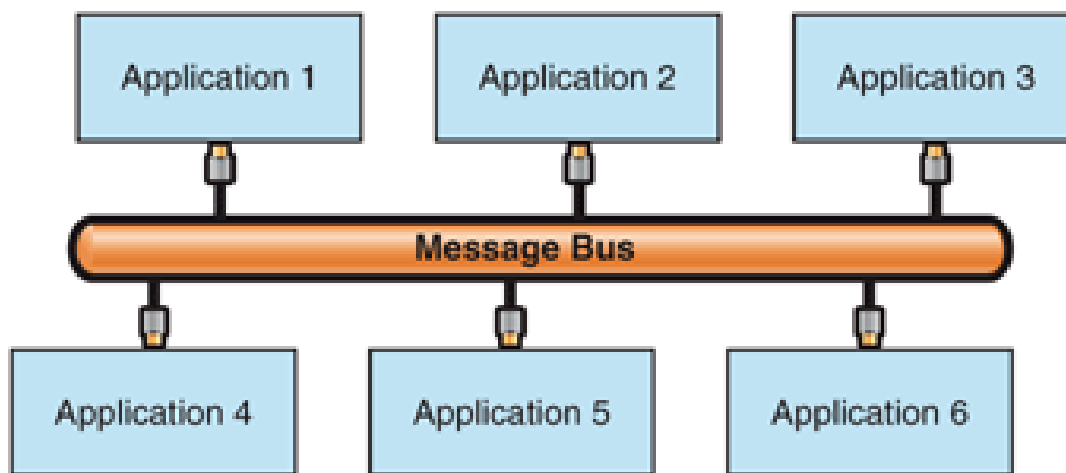
Local communication





Remote Communication

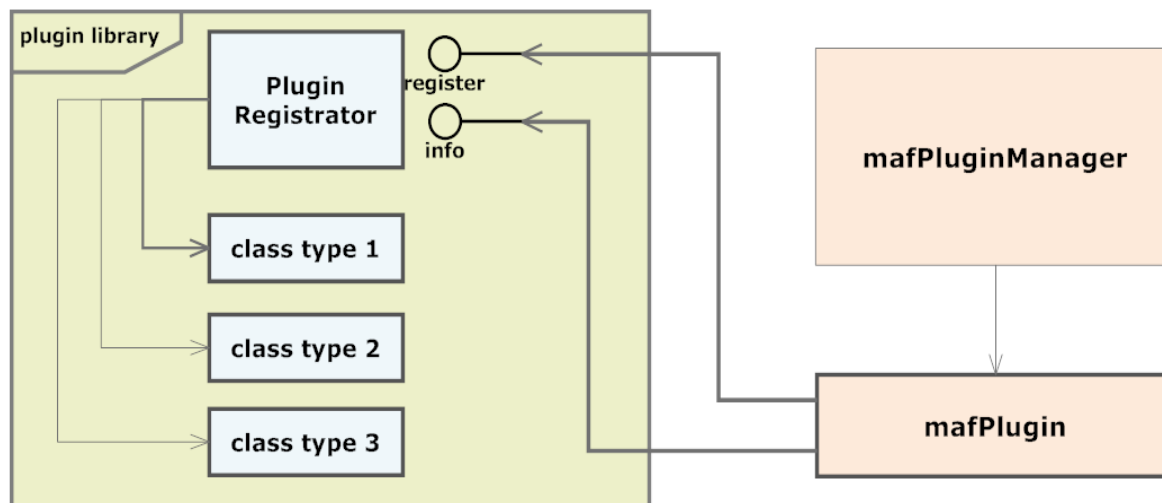
- Delegates to a Remote **Dispatcher**
- Dispatcher instantiates **Connector** for a specific protocol (XMLRPC, SOAP, REST ...)
- Same interface of Local Communication





MAF3 Plugin System

- Implementation from a common interface
- Decoupling from GUI components
- Objects instantiated only when necessary





Plug-ins developed in MAF3

- **PhysiomeSpace plug-in:**
 - Upload
 - Download
 - Execute commands on PS
- **SOAP plug-in**
- **VTK plug-in:** filter, data management and visualization



Quality Assurance

- Refers to the systematic measurement following specified requirements, that confers error-prevention in a product
- Well-Tested code is better code!



QAT – Quality Assurance Toolkit



github
SOCIAL CODE HOSTING

 python

 **CMake**



QAT – Quality Assurance Toolkit

- Based on Rules
- Rules are extensible
- Able to generate visual report
- Connect with external applications



MAF2

maf3

