Introduction to MAF

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WHAT’S MAF

The Multimod Application Framework 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.
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

Deployed on:

- Windows
- Linux
- Mac

(github) CMake

(C++) Qt
MAF ARCHITECTURE

Input Data

VME

Interaction

Operations

Views

Vertical application

Input Devices
MAF STRUCTURE

App

Logic

View Manager
  Views

Operation Manager
  Operations

VME Manager
  VMEs

Interaction Manager
  Devices + Interactors
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

Volume Rendering

RX-CT
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

Type of VME currently supported

root surface volume image LM-group LM FEM
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
QAT – Quality Assurance Toolkit

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