SPIRAL2-GANIL DAQ

- **DAQ General Architecture**
- **Status of GANIL DAQ**

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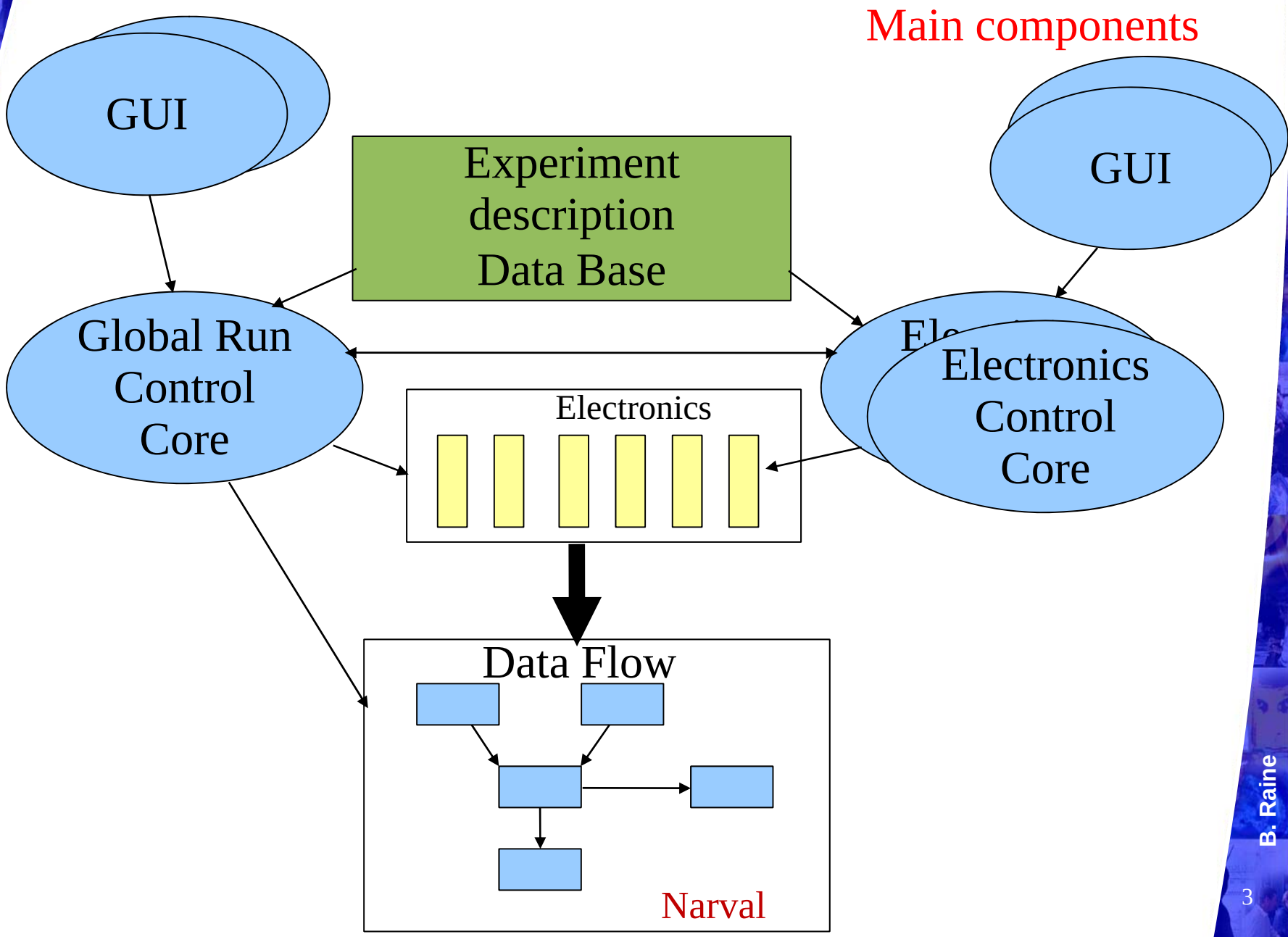
SP2-GANIL DAQ requirements

- Accept GANIL existing and future equipments
- Highly modular data acquisition system
- Small scale to large scale experiments
- User-friendly graphical interfaces
- Multi branch system (interconnection of different DAQ subsystems**)**
  - Synchronisation (timestamp, trigger interconnection)
  - Data collection with event building and filtering

    High data rate to be defined (100MBytes/sec, 1GBytes/sec?)
  - Run control of all components (including external DAQ)
  - Electronics control : setup and monitoring
  - Online data analysis

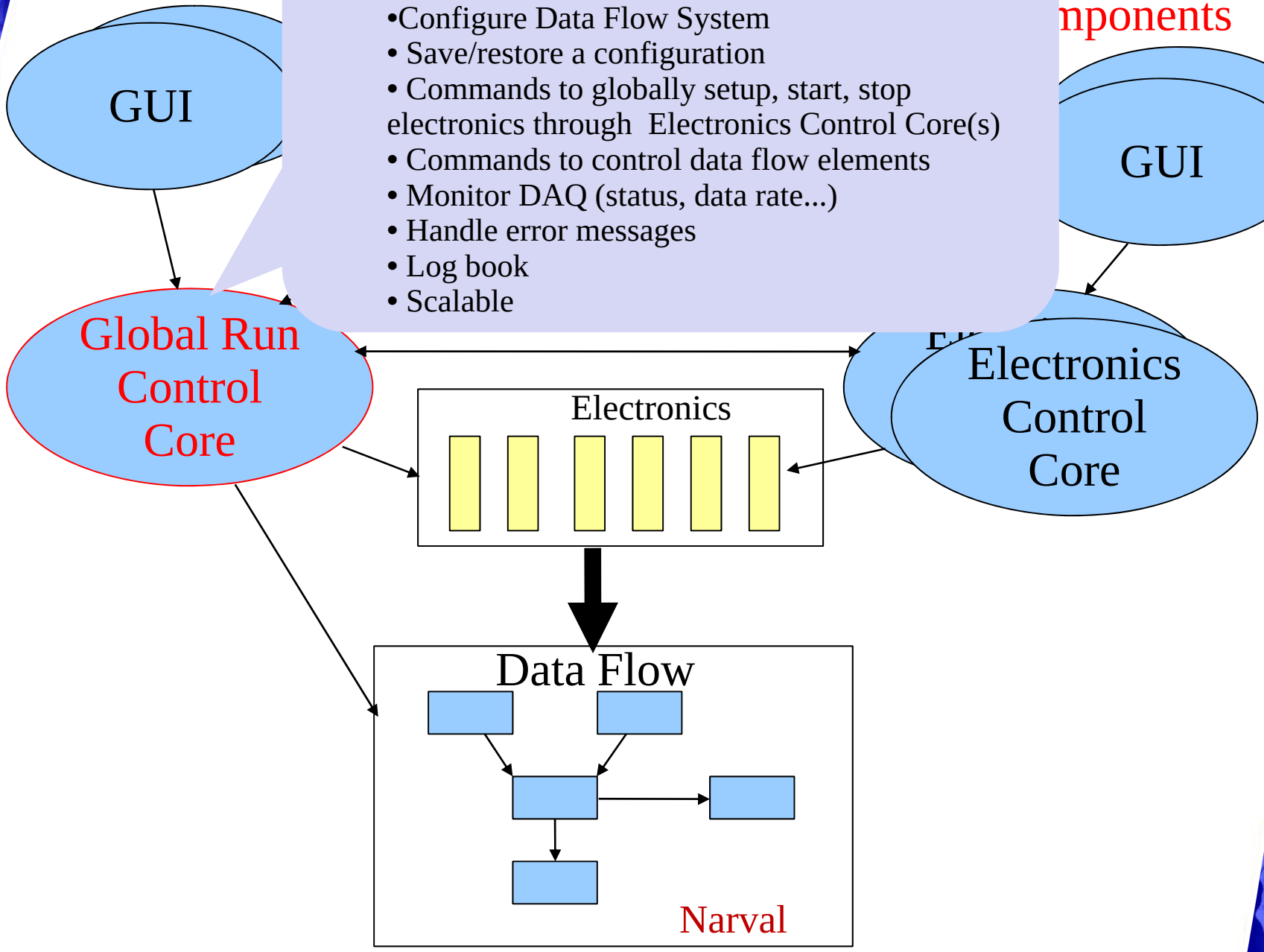
SP2-GANIL DAQ general architecture



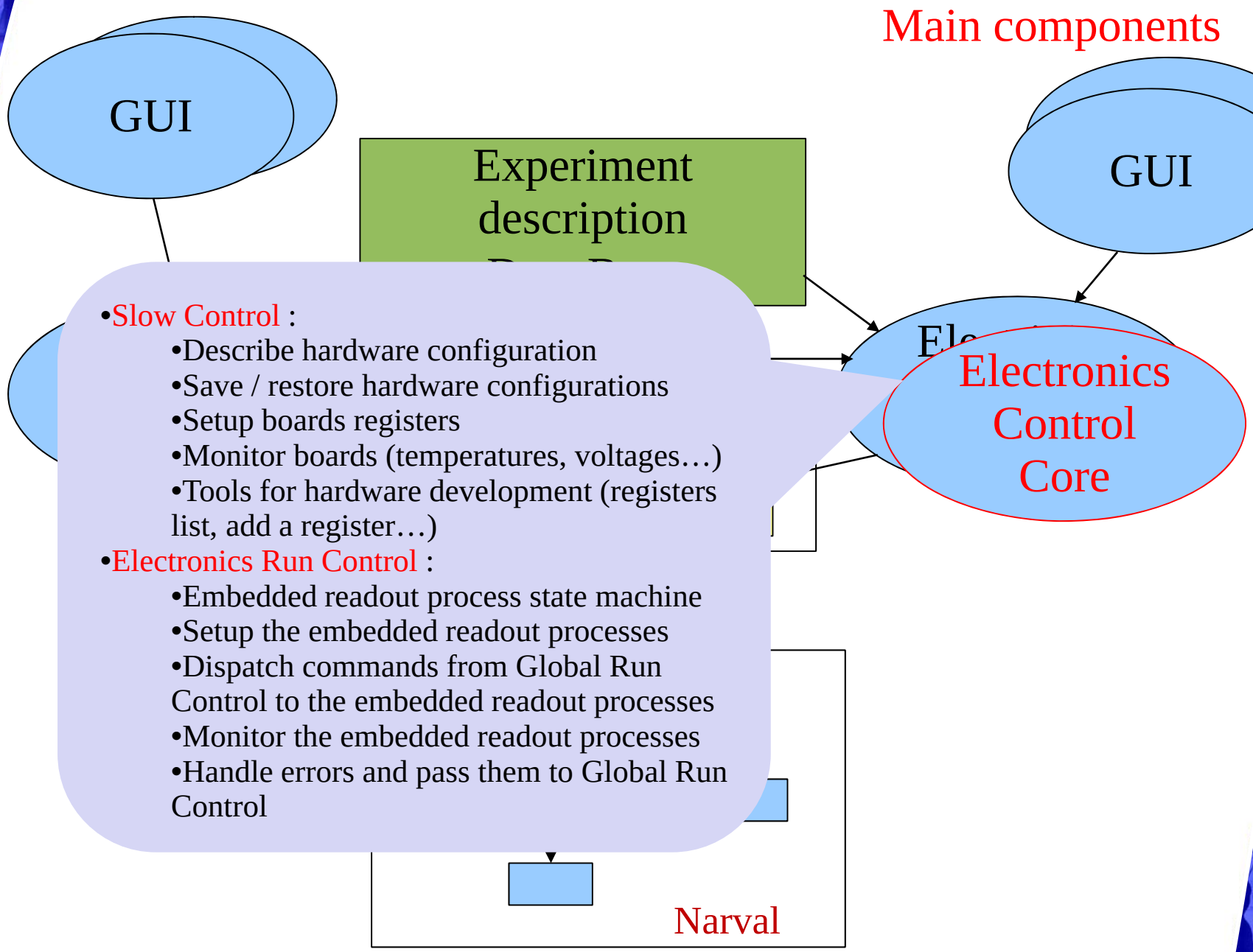
SP2 GANIL DAQ general architecture

Global control of the system during a run

- Configure Data Flow System
- Save/restore a configuration
- Commands to globally setup, start, stop electronics through Electronics Control Core(s)
- Commands to control data flow elements
- Monitor DAQ (status, data rate...)
- Handle error messages
- Log book
- Scalable

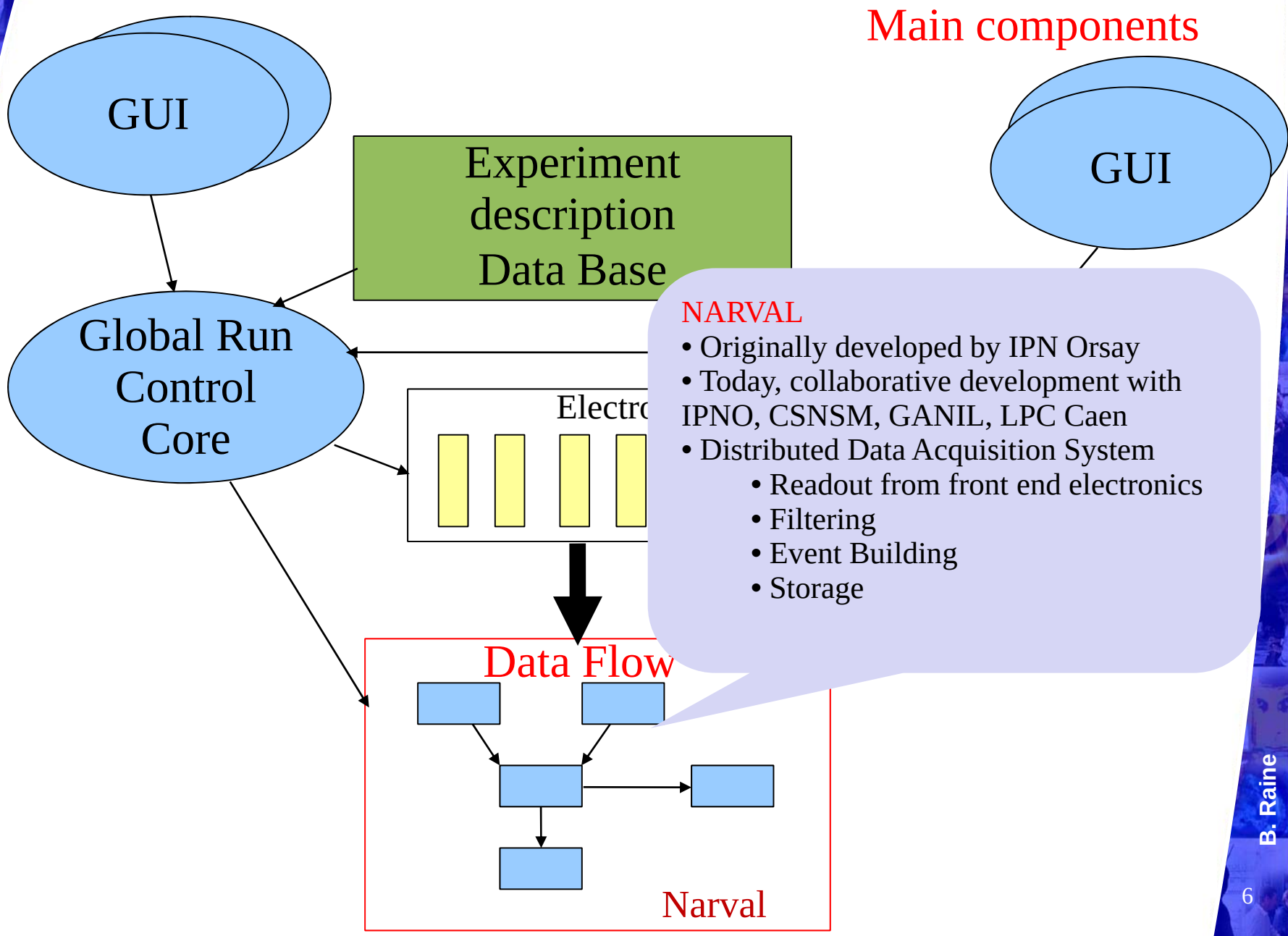


SP2-GANIL DAQ general architecture



- Slow Control :
  - Describe hardware configuration
  - Save / restore hardware configurations
  - Setup boards registers
  - Monitor boards (temperatures, voltages…)
  - Tools for hardware development (registers list, add a register…)
- Electronics Run Control :
  - Embedded readout process state machine
  - Setup the embedded readout processes
  - Dispatch commands from Global Run Control to the embedded readout processes
  - Monitor the embedded readout processes
  - Handle errors and pass them to Global Run Control

SP2-GANIL DAQ general architecture

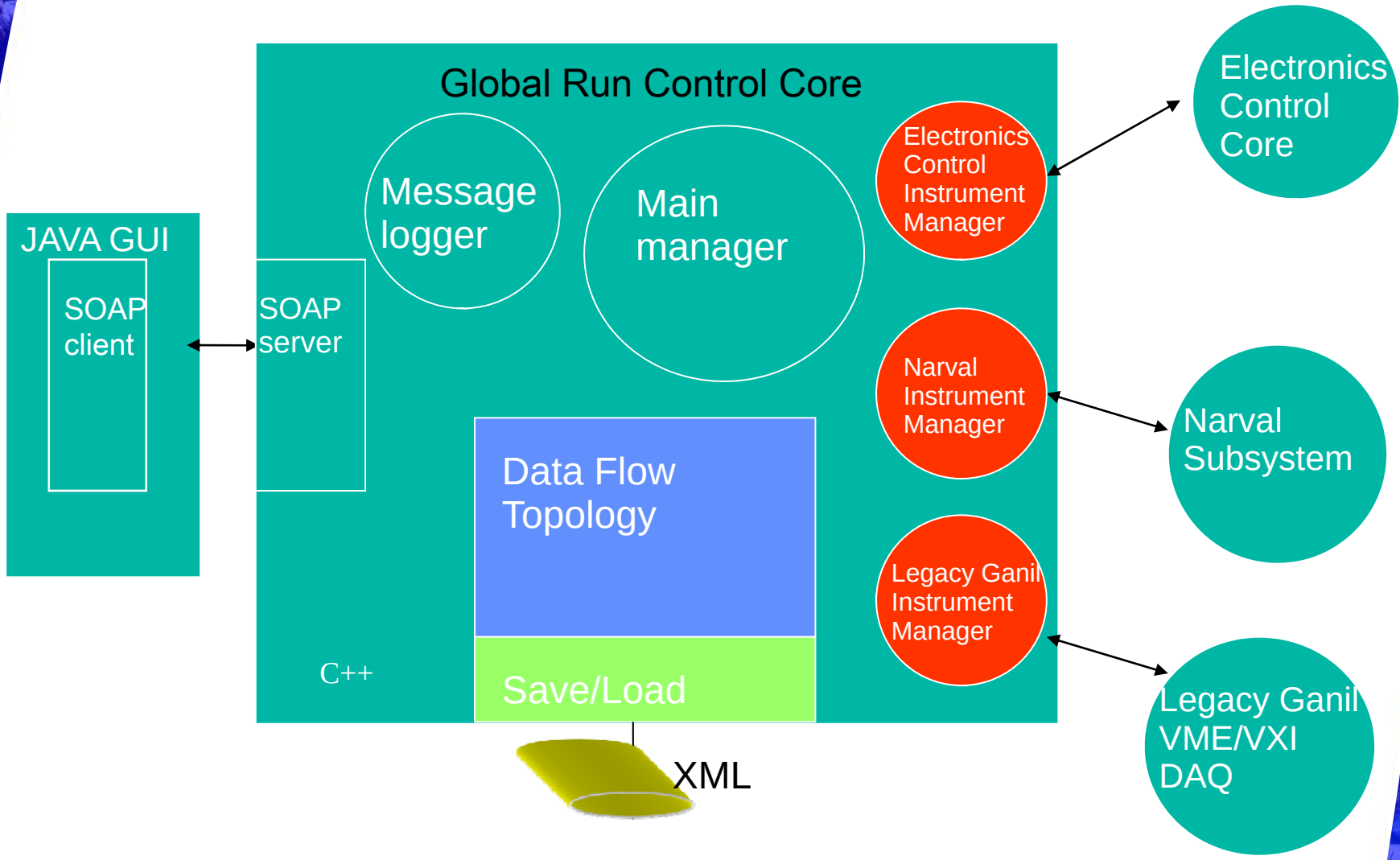


GANIL DAQ Development

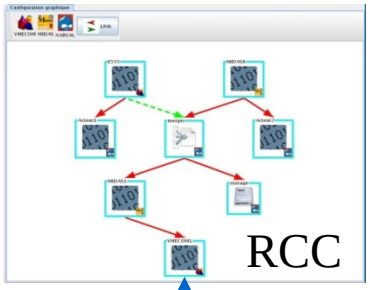
Some principles :

- Linux used on most nodes (even in FPGAs with CPU)
- Client/server architecture for Core of applications (eg Global Run Control, Electronics Control)
- Configurations saved in XML files
- Communications : Web services (SOAP messages)
- Errors : Log4j, Log4cxx, Log4ada
- User-friendly graphical interfaces

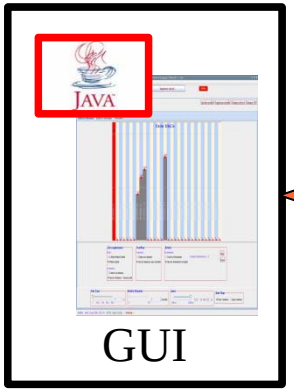
GANIL Global Run Control System



GANIL Electronics Control System



SOAP



RMI 1

ECC

1 SOAP *

Embedded Linux

Load

Create

Restore

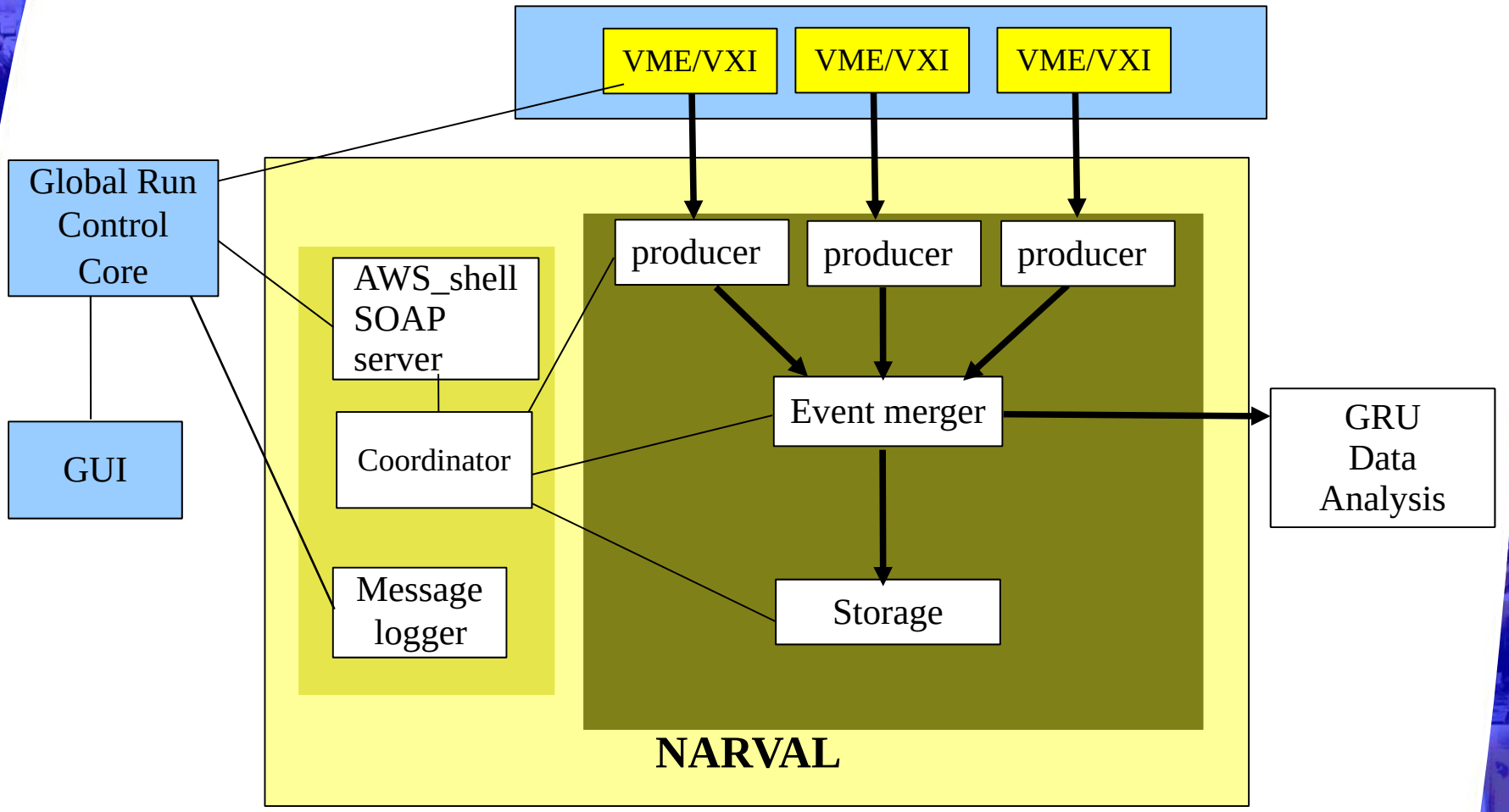
Backup

known hardware library

XML

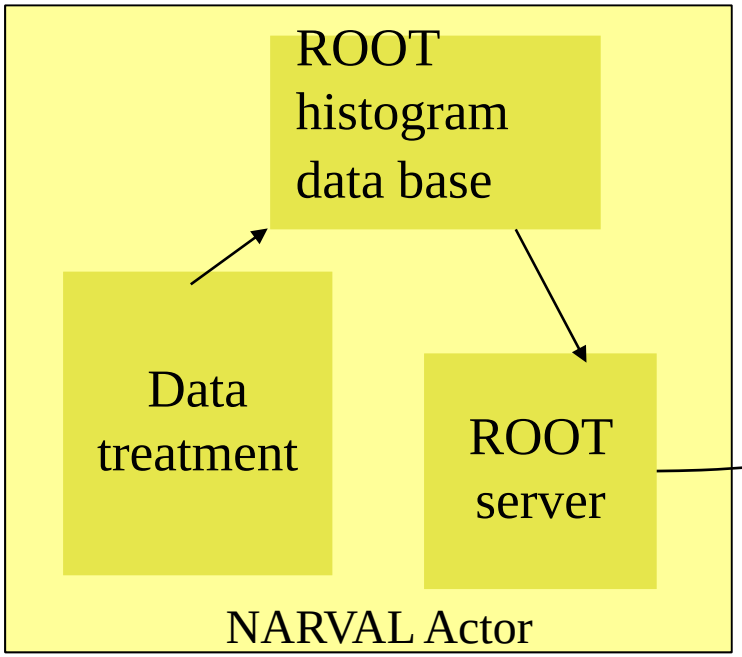
Experiment setup

NARVAL in GANIL DAQ

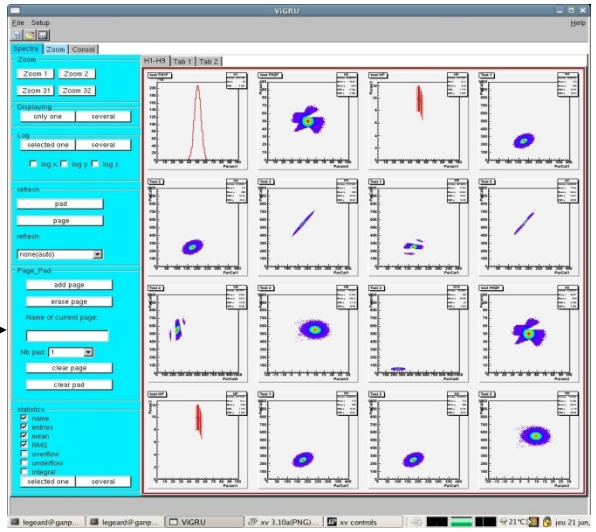


ROOT in NARVAL Actor

GANIL ROOT Utilities



TCP/IP



ViGRU

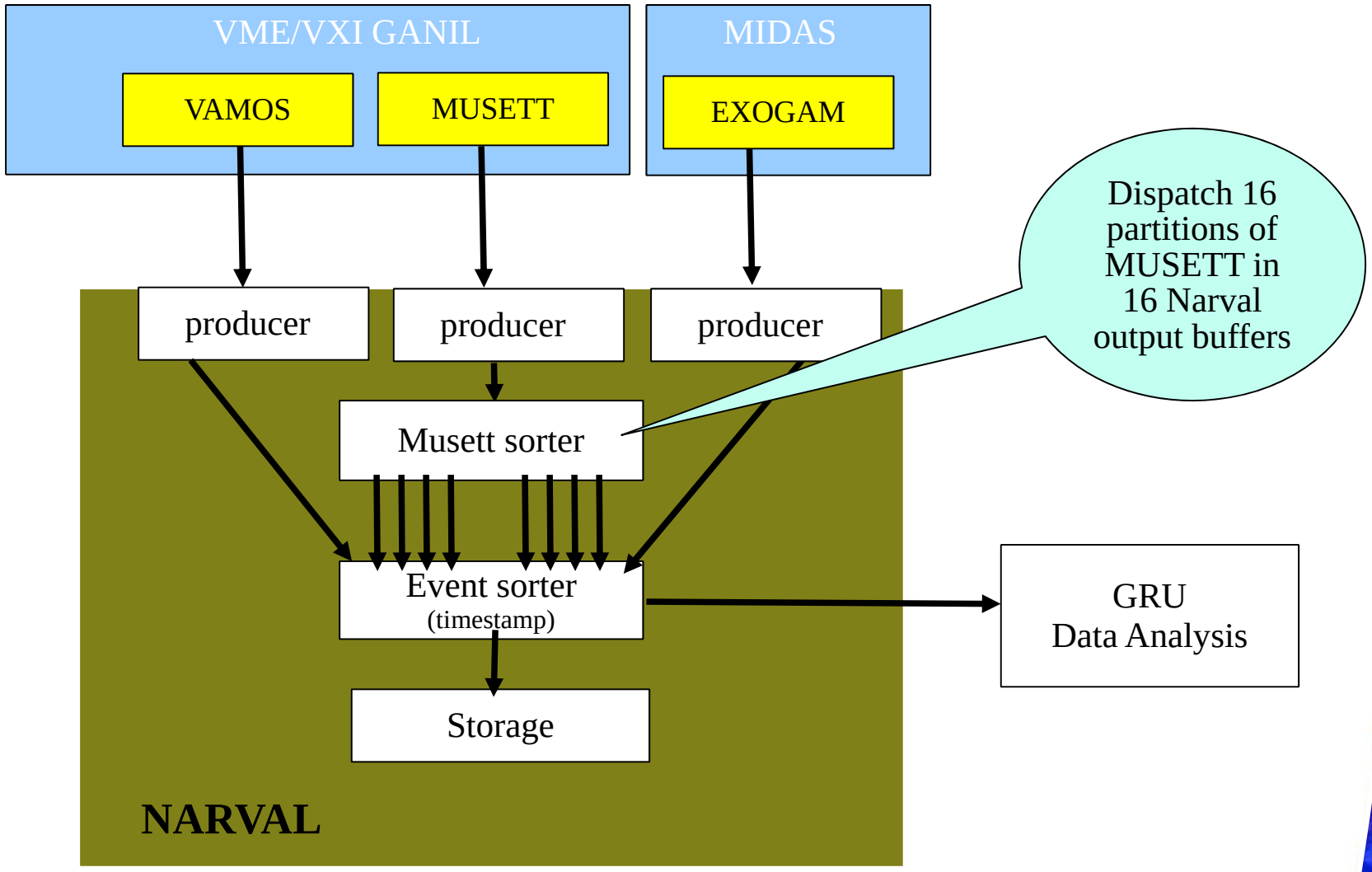
ROOT Spectra display

- ADA binding for basic commands to create, destroy, increment histograms
- ROOT library directly accessible for C++ programmers

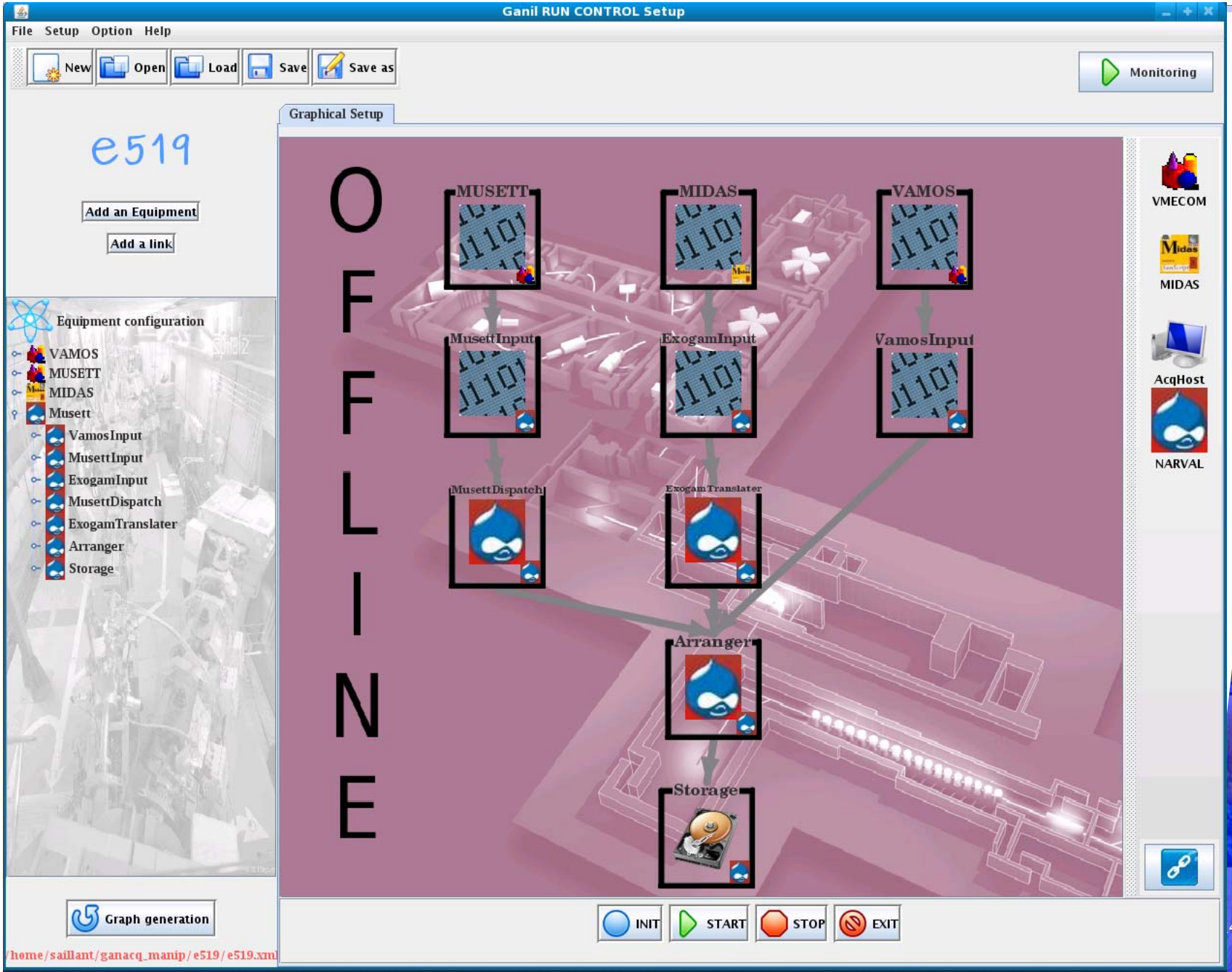
Status of GANIL DAQ with Narval and GRCC

- **Experiments with Narval and a first version of the Global Run Control**
  - **Tests of MUSETT (march 2010)**
    - **Event builder based on timestamp and several stages of sorting**
  - **MUST2@Riken (May-June 2010)**
    - **Coupling of the MUST2 DAQ (based on standard GANIL DAQ) with the RIBF DAQ**
  - **Currently available for standard GANIL experiments**
    - **MAYA**
    - **EXOGAM+VAMOS**
      - **Event builder based on event number**

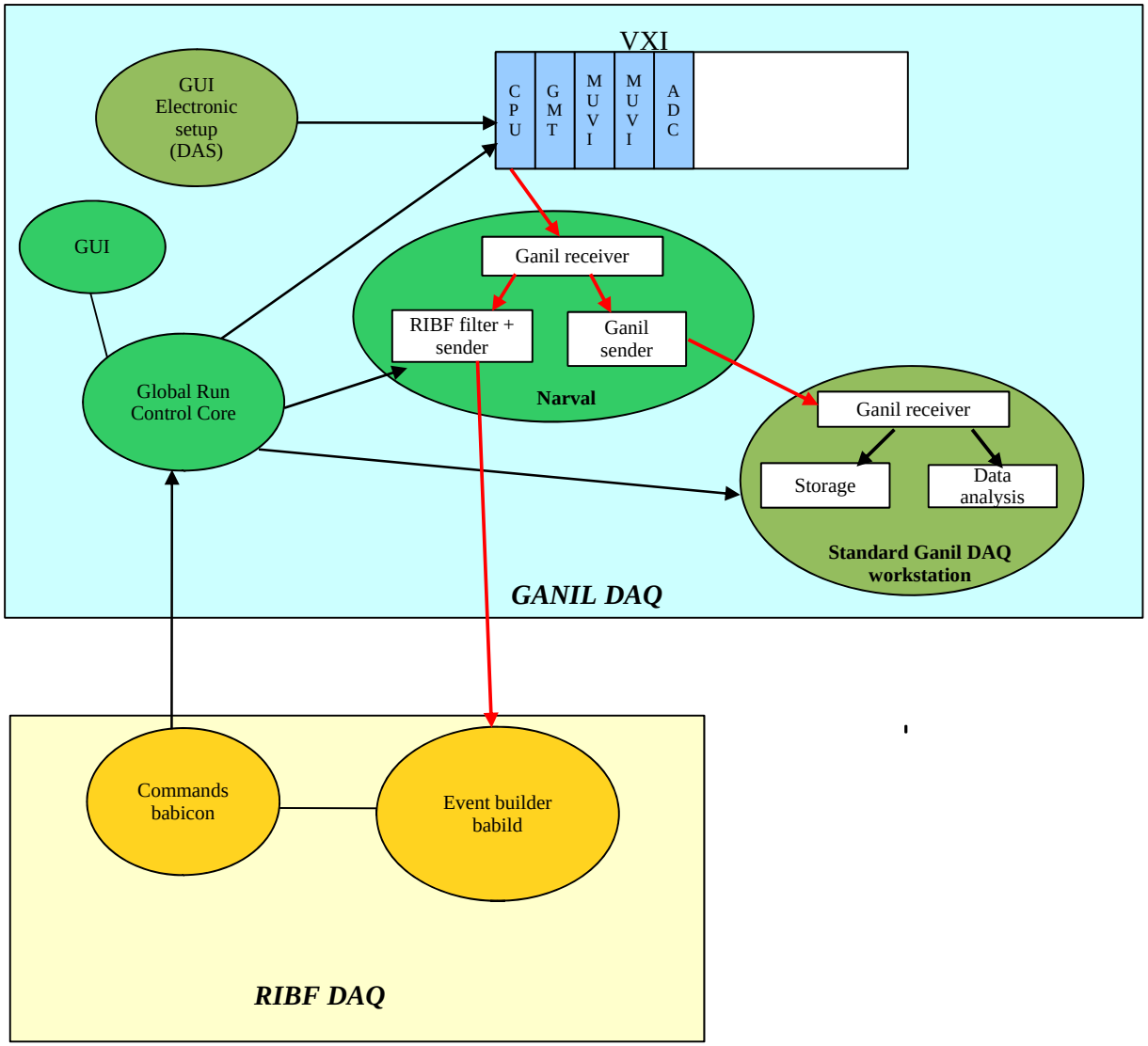
MUSETT + VAMOS + EXOGAM



MUSETT + VAMOS + EXOGAM



GANIL + RIKEN DAQ



Status of GANIL developments

- **Global Run Control**
  - First version available
- **Electronics Control**
  - Development in progress, first version under test
- **Embedded Linux in Virtex4/Virtex5**
  - Linux from Xilinx, using ELDK development kit
  - Register server, first version available
  - Data readout to be done
- **Data Analysis**
  - Ganil Root Utilities available with current GANIL data format
- **SP2 Data Format**
  - Implementation in 2011 for Exogam2 and GET projects

SP2 DAQ ICC Working Group

First conclusions

- General architecture proposed by GANIL agreed
  - Global run control provided by GANIL
  - Narval Data flow provided by GANIL
    - specific actors to be developped in collaboration between Ganil and detector builders
    - interface with other DAQ systems is possible
  - Electronics control system and configuration backup provided by detector builders

- Difficult to have the same tools in all the projects for the setup of electronics and backup of the configuration
  - Define interfaces between all parts of the system

SP2 DAQ ICC Working Group

- **First recommendations**
  - **A common minimun state machine to be implemented in RCC, ECC, embedded electronics**
    - First proposition done, implemented in GANIL RCC
  - **Define a minimum set of commands between global run control and electronics control, using WEB services (SOAP protocol)**
    - List approved, first implemention in progress
  - **Have a standard data format for GANIL/SPIRAL2 runs.**
    - Proposition based on the MultiFrame data format proposed by IRFU for the GET project approved, some adjustements to be discussed
  - **Define an error reporting mechanism**
    - to be done
  - **Associate the backup configuration with each run**
    - To be done
  - **Provide a C++ library to access parameters of the configuration**
    - To be done