



ESO-VLT Instrumentation

The Control Software for the FLAMES-GIRAFFE-UVES Observing Facility

P. Santin¹, P. Di Marcantonio¹, D. Popovic², and E. Pozna²

¹ INAF - Osservatorio Astronomico di Trieste, via G.B. Tiepolo 11, 34131 Trieste

² ESO, European Southern Observatory, Karl-Schwarzschild Strasse 2, D 85748 Garching bei Muenchen, Germany

Abstract. The FLAMES-GIRAFFE-UVES observing facility is installed at the Nasmyth A focus of UT2 (Kueyen) telescope unit of the VLT. It has been commissioned during 2002 and is offered starting from April 2003. This paper briefly describes the FLAMES structure and its control software, that has been fully designed and implemented at the Astronomical Observatory of Trieste.

Key words. Very Large Telescope – FLAMES – Focal plane instrumentation – Control Software

1. The FLAMES observing facility

FLAMES (Fibre Large Array Multi Element Spectrograph) is the VLT Fibre Facility, installed at the Nasmyth A focus of UT2 (Kueyen Telescope). It is a multi-object, intermediate and high resolution fibre facility, offering a large corrected field of view (25 arcmin diameter) and consisting of several components, developed by different consortia:

- Australis (AAO/ANU/UNSW)
- Paris-Meudon (OPM)
- Geneve and Lausanne (OGL)

– Bologna, Cagliari, Palermo and Trieste Astronomical Observatories (ITAL Consortium).

FLAMES is a complex instrument, and includes the following sub-systems :

- The *Fibre Positioner* hosting two plates. While one plate is observing, the other one is positioning the fibres for the subsequent observations, therefore limiting the dead time between observations;
Three types of fibre systems are installed: MEDUSA, IFU, ARGUS;
- GIRAFFE, a high and intermediate resolution optical spectrograph;
- A *link to the UVES* spectrograph (Red Arm) via eight single object fibres per plate.

Send offprint requests to: P. Santin
Correspondence to: via G.B. Tiepolo 11, 34131 Trieste



Fig. 1. GIRAFFE at the Nasmyth B focus of UT2 (Kueyen)

The ITAL Consortium was responsible for the development of the UVES-Fibre Data Reduction Software, for the upgrade of the UVES Control Software to the Fibre observing mode and for the implementation of the Observing Templates.

In the framework of a long-standing collaboration in the field of instrumentation control software, ESO committed to the Astrophysical Technologies Group of the Astronomical Observatory of Trieste the design and development of the complete package of the GIRAFFE and FLAMES Control Software

FLAMES has been commissioned during 2002, and is offered to the astronomical community starting from April 2003.

1.1. The fibre postioner

The Fibre Positioner hosts two plates, on which the fibres are attached via a magnetic button. The first step is to configure one plate (i.e. to position the fibres on the plate in the configuration position); when a plate is configured it is attached to the rotator to observe; the second plate is there-

fore available in the configuration position and may be configured while the exposure is running using the first plate. In this way the dead time between observations is limited.

Three fibre configurations are available: MEDUSA, IFU and ARGUS.

The configuration of the fibres dictates the observing mode of GIRAFFE. Eight more fibres feed UVES, and are independent from the main fibre configuration mode.

The following logical sub-systems may be identified:

- Fibre Positioning Robot
a robot with a gripper moving in $r\theta$ directions places each fibre into its final position, according to a configuration file prepared off-line by the user (a graphical tool is available);
- Plate Tumbler/Lifter
the mechanism that tumbles the structure holding the plates, attaching the configured plate to the rotator and the other one to the robot station;
- FACB (Fibre Acquisition Control Bundle)
four special bundles of fibres to be locked on four fiducial starts, for secondary guiding purposes. The four images feed a technical CCD and their combined offsets are computed to determine telescope corrections.

1.2. GIRAFFE

The spectrograph slit is fed by the fibres coming from both plates. Its set-up is fully independent and must match the plate/fibre configuration. It has one scientific CCD producing science data.

1.3. UVES

It is an autonomous instrument, already operational in slit-mode since 2000 on Nasmyth B focus. In Fibre Mode the red slit is fed by 8 fibres coming from FLAMES and

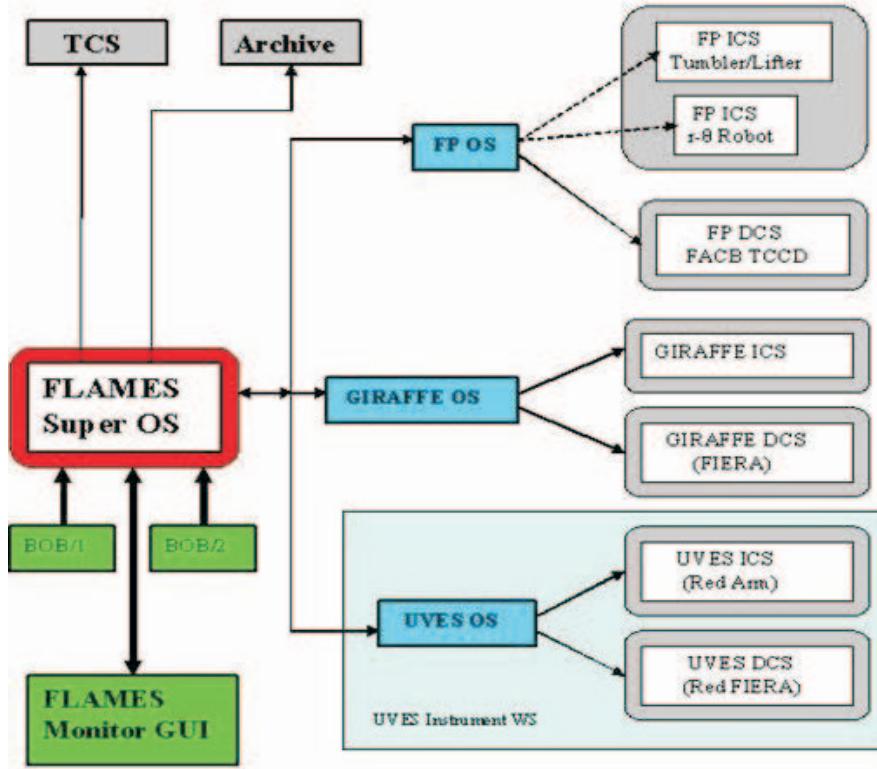


Fig. 3. The FLAMES Control Software Architecture

only the Red Arm is used. The Uves Fibre Mode is available with any plate/fibre configuration

FLAMES as a whole is controlled by FLAMES Super OS, with the following tasks:

2. The Control Software

Each instrument, to operate also in a stand-alone mode, is based on the standard ESO INS architecture, (Observation Software + Instrument Control Software + Detector Control Software). In this way they can be tested individually for most of their functionality.

- it coordinates all the operations of FP, GIRAFFE and UVES;
- it guarantees the parallelism of the operations;
- it is the only interface to the Telescope and to the Archive;
- it is the only interface to the User (i.e. to the Monitor GUI and to BOB).



Fig. 2. UVES at the Nasmyth B focus of UT2 (Kueyen)

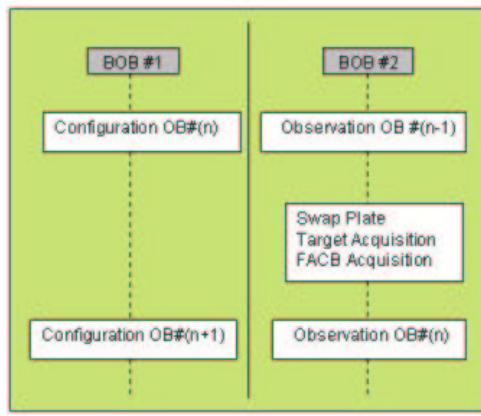


Fig. 4. Twin BOB operations

2.1. Exposure parallelism between GIRAFFE and UVES

UVES is an instrument working on a different Nasmyth platform, on a different Instrument Workstation and therefore in a different VLT Software Environment. This fact represents a novelty in the VLT Instrumentation scenario and it has been necessary to devise new solutions to allow the control of UVES from an external environment, coordinating its operations and its data production. To avoid the transfer of huge amount of data between the two environments, the final FITS data file is still handled by the UVES software, with contributions for the final FLAMES data file header coming from FLAMES SOS. A new mechanism for header data exchange between software environments has been contributed to the VLT Common Software and particular attention has been paid to the synchronization of the operations in the two environments.

2.2. Configuration parallelism

While GIRAFFE and/or UVES in fact are observing, the other plate is attached at the robot. FLAMES SOS must insure that the exposure and the configuration can proceed at the same time. In this way at the end of an Observation Block the new

plate is ready to be observed with, and the only dead time is that needed for the plate swap (approximately 5 min)

2.3. Operations

To boost parallelism of operations and to minimize the dead time, FLAMES is controlled by the User with two parallel BOBs. The templates have been designed to run the same OB twice, on the two BOBs.

- First run
 - Plate configuration
- Second run
 - Plate swap
 - Target acquisition
 - FACB acquisition
 - Observation

During the observation the next OB can be started and the two tasks may run in parallel (the Configuration may take up to 20 min).

References

- Santin, P., Di Marcantonio, P., 2002, VLT Software - FLAMES Software User and Maintenance Manual, VLT-MAN-ESO-13740-2896
 Pasquini, L., et al., The Messenger, 110, 2002