Supported by: Astrofisica con Specchi a Tecnologia Replicante Italiana

ICALEPCS2017 Barcelona · Spain, October 8-13 Palau de Congressos de Catalunya www.icalepcs2017.org

Procedures of software integration test and release for ASTRI SST-2M prototype proposed for the Cherenkov Telescope Array

V. Conforti[1], A. Bulgarelli[1], V. Fioretti[1] , F. Gianotti[1], G. Malaguti[1],M. Trifoglio[1], M. Bartolini[2], A. Orlati[2], O. Catalano[3], P. Sangiorgi[3], L.A. Antonelli[4], S. Gallozzi[4], F. Lucarelli[4], M. Mastropietro[4], V. Testa[4], F. Russo[5], P. Bruno[6], A. Costa[6], A. Grillo[6], F. Vitello[6] R. Canestrari[7], J. Schwarz[7], S. Scuderi[7], S. Vercellone[7], E. Antolini[8], G. Tosti[8], for the CTA ASTRI Project

[1]*INAF-IASF Bologna, Istituto di Astrofisica Spaziale e Fisica Cosmica, Bologna, Italy*
[2]*INAF-IRA Bologna, Istituto di Radio Astronomia, Bologna, Italy*
[3]*INAF-IASF Palermo, Istituto di Astrofisica Spaziale e Fisica Cosmica, Palermo, Italy*
[4]*INAF-OA Roma, Osservatorio Astronomico, Monteporzio Catone (Roma), Italy*
[5]*INAF-OA Pino Torinese, Osservatorio Astronomico, Torino, Italy*
[6]*INAF-OA Catania, Osservatorio Astronomico, Catania, Italy*
[7]*INAF-OA Brera, Osservatorio Astronomico, Milano, Italy*
[8]*Università degli Studi di Perugia, Perugia, Italy*

ABSTRACT

The Cherenkov Telescope Array (CTA) project is an international initiative to build a next generation ground-based observatory for very high energy gamma-rays. Three classes of telescopes with different mirror size will be located in the northern and southern hemispheres. One of the first sets of CTA small size class of telescopes will be composed of nine ASTRI telescopes. The ASTRI mini-array will be based on the end-to-end ASTRI SST-2M prototype already installed on Mt. Etna (Italy). The Mini-Array Software System (MASS) supports the end to end ASTRI SST-2M prototype and mini-array operations. The ASTRI software integration team defined the procedures to perform effectively the integration tests and release activities. The developer has to properly use the repository tree and branches according to the development status. We require that the software includes also specific sections for automated tests and that the software is well tested (in simulated and real system) before any release. Here we present the method adopted to release the first MASS version to support the ASTRI SST-2M prototype test and operation activities.

ASTRI Mini-Array Software System

The capabilities of the ASTRI software are depicted in Fig 1. The *Archive & Data Analysis* runs off-site; it provides functionalities for the proposal management, data analysis, archive and retrieve. The *Observatory Control System* is responsible to run the observations, providing the user/engineering GUI. It controls the telescopes and uses the on-site repo through the *TMCDB* (database that supports the configuration and monitoring), the data capturer and the DAQ. The telescope system has in charge the full management of the telescope (camera, mirrors, mount, pointing). The OPC-UA layer interfaces the hardware devices (including also the power, networking, interlocks and safety systems) with the software built within ACS (Alma Common Software). In addition the telescope exploits the Weather station, the auxiliaries (for the calibration) and the ICT monitor and control.

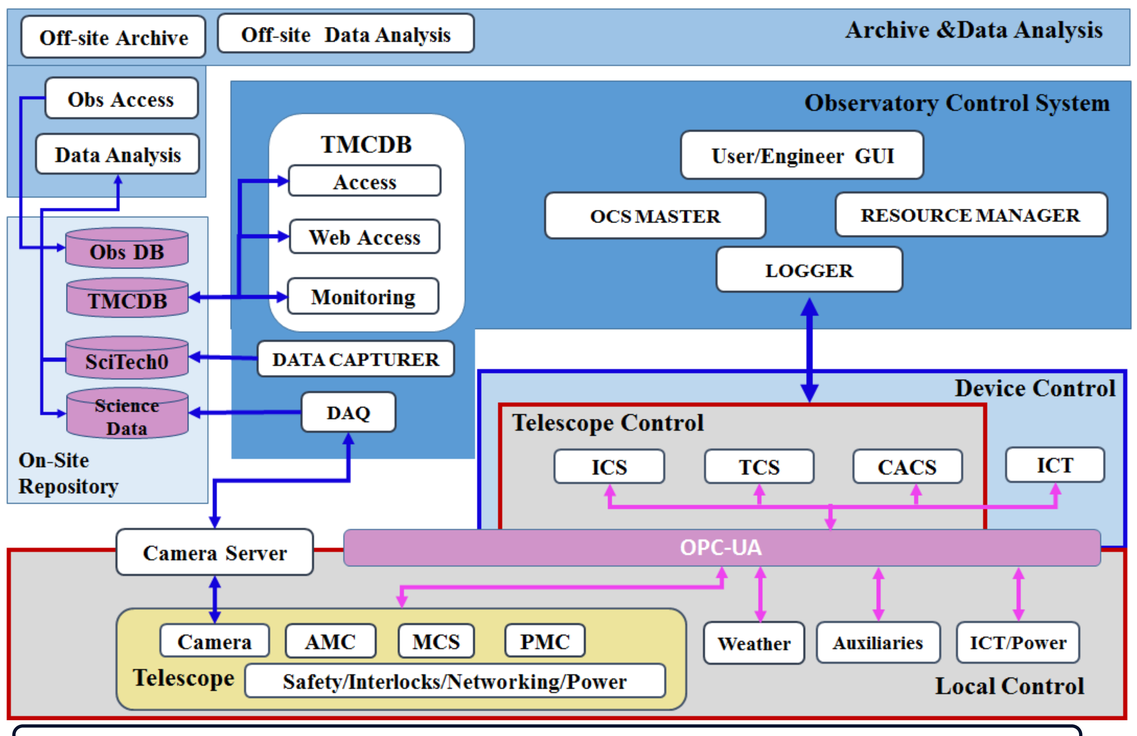

Fig. 1: ASTRI MASS Software Architecture

Software Integration during the coding

We provide to the developers the following supporting services: a virtual machine properly configured, the testing tools and guidelines, a code generator software and the simulators of the hardware devices. We provide a Git repository for the version control. It is configured to implement the Integration-Manager workflow (see Fig 2). The developer verifies the component version on the private area. The integration manager executes the test cloning the software from the public area (development branch). The blessed repository (master branch) contains the releases.

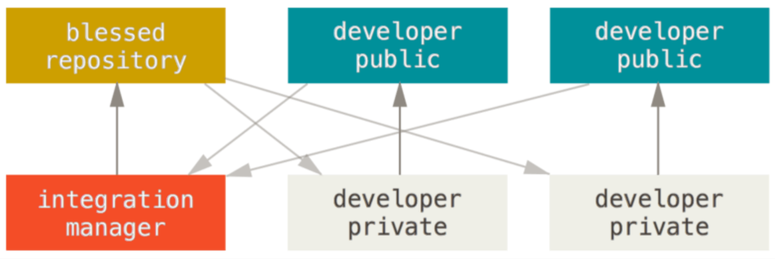

Fig. 2: Integration-Manager Workflow

The Integration tests

We execute the integration tests before any software release. In the first step we verify the installation and interaction among software components on the ASTRI test bed (a virtual environment which reproduces the same configuration on site).
The Fig. 3 depicts the ASTRI deployment model of the Telescope System. The nodes with stereotype «SL 6.7» are server machines equipped with Scientific Linux at the version 6.7. On these machines run the ACS container services in order to exploit the facilities of ACS and then to run the software in distributed mode.

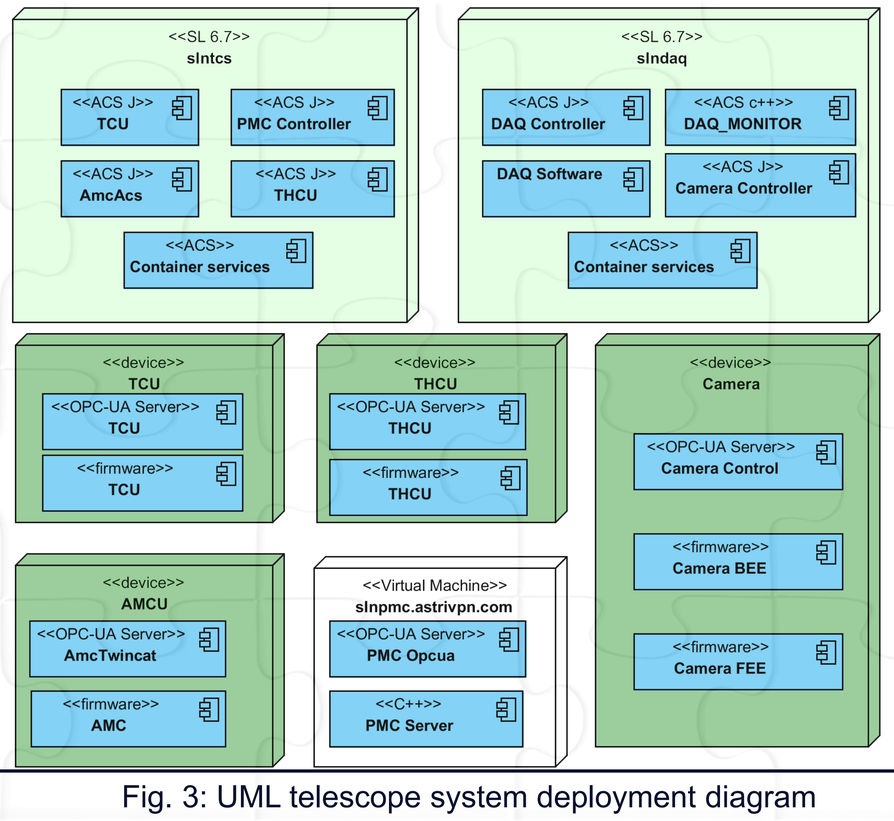

Fig. 3: UML telescope system deployment diagram

The nodes with stereotype «device» denote the hardware where both the firmware and the OPC-UA server are installed to interface the ACS components. We have also the installer properly configured to download the software, to connect the hardware devices, and to deploy the software properly. Once the test succeeds on the test bed, the next step is to perform the integration test on-site to verify the setup procedures, the interfaces among the software components, and the connections between the software and the hardware. This integration test is part of the ASTRI project AIV (Assembly Integration and Verification) plan.

ASTRI release and Conclusions

Once the test is successful, we tag and push the release into the master branch on the repository. The release document provides details about the configuration and capabilities. The users can report and track the bug fixing or require new features through a web application. We used these procedure in the current year with some benefit: execution of tests more quickly and the restore of a stable release in case of failure. We plan to improve these procedures and to exploit the lessons learned for the ASTRI mini-array and the CTA observatory.

ACKNOWLEDGEMENTS: This work is supported by the Italian Ministry of Education, University, and Research (MIUR) with funds specifically assigned to the Italian National Institute of Astrophysics (INAF) for the Cherenkov Telescope Array (CTA), and by the Italian Ministry of Economic Development (MISE) within the "Astronomia Industriale“ program. We acknowledge support from the Brazilian Funding Agency FAPESP (Grant 2013/10559-5) and from the South African Department of Science and Technology through Funding Agreement 0227/2014 for the South African Gamma-Ray Astronomy Programme. We gratefully acknowledge financial support from the agencies and organizations listed here: http://www.cta-observatory.org/consortium_acknowledgments. This work was conducted in the context of the CTA ASTRI Project.