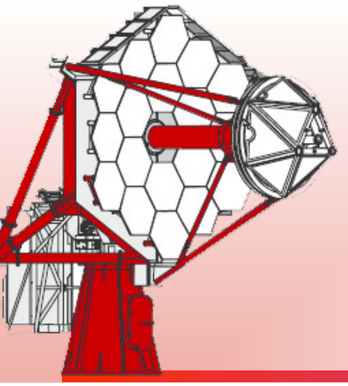

LOUD Architecture

Logging UnifieD (LOUD) for ASTRI Mini Array

Federico Incardona *(INAF - Osservatorio astronomico di Catania),*
Alessandro Costa, Kevin Munari, Pietro Bruno, Andrea Bulgarelli, Stefano Germani, Alessandro Grillo, Joseph Schwarz, Eva Sciacca, Gino Tosti, Fabio Vitello and Giuseppe Tudisco for the ASTRI project.
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Federico.incardona@inaf.it

ASTRI FOR CTA

The ASTRI (Astrofisica con Specchi a Tecnologia Replicante Italiana) Mini-Array (MA) project is an international collaboration led by the Italian National Institute for Astrophysics (INAF), and it is installed at the site of the Teide Observatory in Tenerife (Spain). ASTRI MA is composed of nine Cherenkov telescopes operating in the energy range 1-100 TeV, and aims to study very high-energy gamma ray astrophysics and optical intensity interferometry of bright stars.

SCADA FOR ASTRI

The Supervision Control and Data Acquisition (SCADA) system is responsible for monitoring and controlling all the operations carried out at the ASTRI MA.

LOUD FOR SCADA

The Logging UnifieD (LOUD) subsystem is one of the main components of SCADA. It provides the service responsible for collecting, filtering, exposing and storing log events collected by all the array elements (telescopes, LIDAR, devices, etc.)

LOUD System Architecture

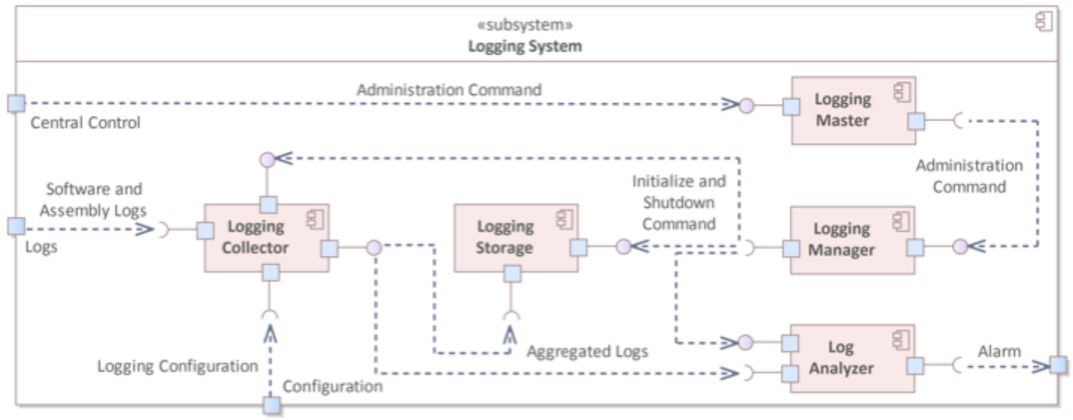

Fig. 1: Logical view of LOUD. Log sources are Alma Common Software (ACS) components, OPC UA servers and low-level software.

LOUD (Fig. 1) is responsible for acquiring logging files from all the elements of the ASTRI MA. The Logging Collector gets logging information from relevant software components and assemblies, which comes from ALMA Common Software (ACS) components, OPC UA servers and low-level software. The Logging Collector is composed of a set of Log Shippers and of an instance of Log Aggregator (Fig. 2).
The Log Shippers are low-footprint and resource-efficient daemons that harvest a set of log files. Each Log Shipper is designed to run on a single host and gathers the set of log files produced on that machine. A Log Shipper extracts and acquires log events offering a buffer functionality and implementing back-pressure strategies towards the down stream components. Log shippers filter only those events of the required level, and send them to the Log Aggregator.
The Log Aggregator processes log events from Log Shippers, and sends them to Logging Storage and Logging Analyzer through a queue mechanism.
The Logging Analyzer is responsible to analyse logging data information to trigger further alarms as well as warnings for the technical crew. The Logging Storage stores logging events quantities according to desired log entry level.
The Logging Manager component interacts via the Logging Master with the Central Control (CC), which is the SCADA component that manages and administrates all the subsystems. It receives start-up and shut-down commands, and passes them to the LOUD systems. It provides also the LOUD status information to the CC.
The Logging Master implements and exposes to the CC a standard state machine that implements the system life cycle in a standardized way, in order to keep track of the health and the activation condition of LOUD, and to simplify the integration with other subsystems.

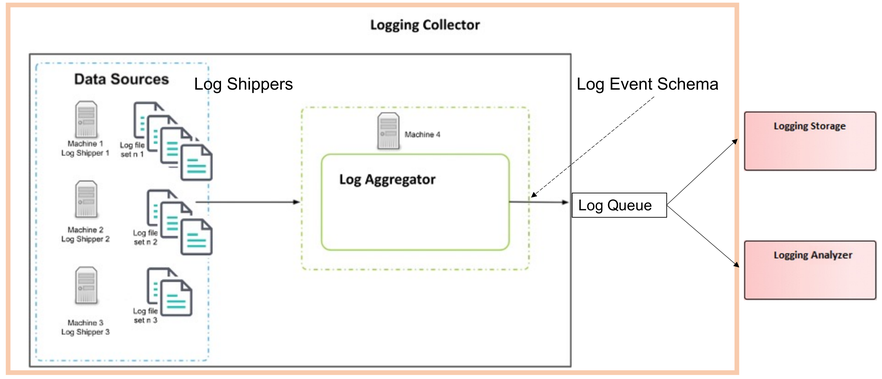

Fig. 2: Architecture of the Logging Collector.

LOUD is designed and built exploiting the current most advanced technologies in the field of the Internet of Things (IoT), and it is based on open-source software. It is written in Java programming language and is integrated with ACS. The system architecture has been designed to scale up with the number of devices to be monitored and with the number of software components to be taken into account in the distributed logging system.