A SOA Based Design of JUNO DAQ
Online Software

On behalf of the JUNO collaboration

JUNO:
The Jiangmen Underground Neutrino Observatory

Online Software: A *distributed* system including configuring, monitoring, controlling, multi-processes management, information sharing...

SOA:
*Service Oriented Architecture*
messages exchange

Technical tools:

Features:
1. Provides service for Dataflow or DCS
2. loosely-coupled and modular
3. Multi DAQs could run concurrently
4. High availability
A SOA Based Design of JUNO DAQ: Online Software

Jin Li1,2, Minhao Gu1, Fei Li1, Kejun Zhu1,2
On behalf of the JUNO collaboration

1State Key Laboratory of Particle Detection and Electronics, Institute of High Energy Physics, CAS, Beijing, 100049, China
2University of Chinese Academy of Sciences, Beijing 100049, China, Email: jl@ihep.ac.cn, zkj@ihep.ac.cn

Introduction

JUNO:
- Determine the muon-nuino mass hierarchy, precisely measure oscillation parameters
- Test the longitudinal oscillation detector with the best energy resolution in the world
- Control detector with 18000 37 PMTs and 20000 27 PMTs, Water Cherenkov with 2400 30 PMTs

Since the numerous PMTs and large-scaled front-end electronic readout channels, DAQ will be large-scaled with thousands of software processes distributed over several hundreds of computing nodes.

Online Software: A distributed system which is designed to control and monitor the whole DAQ system, plays a important global role during the whole data taking period, including configuring, monitoring, controlling, multi-processes management, information sharing...

Online Software design:
- SOA: Service oriented architecture—locally-coupled, modular, reusable
- Message exchange—ZeroMQ
- PARTITION: DAQs run concurrently
- HA: High availability—Zookeeper
- Other functional modules: Configuration, Run Controller, Information sharing

Online Software architecture design:

The total DAQ architecture:
- Green: framework services, SOA based framework of the online software—Run Control, Information service...
- Orange: user parts, Data flow system
- Blue: underlying layer: ZeroMQ, Zookeeper, Redis

ZeroMQ as a communication layer:
- ZeroMQ as a communication layer:
  - ZeroMQ: Message exchange among services
  - ZeroMQ as a communication layer:

Configuration:
- User interface: Web browser with 2D pane
- Config-Services provides services about parallel/serial, at, gate, and relationship between levels that defined in XML file
- HA: High availability—Zookeeper

Summary:
- The architecture design of JUNO DAQ Online software has been achieved.
- The core functions have been accomplished and the whole system runs well with dummy data.
- The JUNO site is under construction, however, So the design is in laboratory and the further development and optimization is ongoing.