Status and roadmap of the AlFa Framework

Mohammad Al-Turany

GSI-IT/CERN-PH-AIP

Just to remind you what is "AlFa"

- Will rely on a data-flow based model (Message Queues).
- It will contain
    - Transport layer (based on: ZeroMQ, NanoMSG)
    - Configuration, building and testing tools (infrastructure)
    - Management and monitoring tools
- Provide unified access to configuration parameters and databases.
- It will include support for a heterogeneous and distributed computing system.
- Incorporate common data processing components

And What is **NOT** in Alfa

- Monte-Carlo simulation (Transport)
  - AlFa will use the output of the Monte-Carlo simulation for developing the re-construction

- GRID
  - AlFa Should be seen as an application which could run in any distributed system Grid or what ever will be there in 2018

Where we are now?

- We can choose between two transport layers and we could add new options if needed

    - ZeroMQ

    - Nanomsg

ZeroMQ vs. nanomsg

Alexey Rybalchenko

https://github.com/nanomsg/nanomsg/issues/206

local throughput (Mb/s)

message size	1B	1KB	100KB	1MB
ZeroMQ 3.2.4	46	6694	22703	19096
nanomsg master branch 2013-12-10	7	5791	19304	DNF

remote latency (µs)

message size	1B	1KB	100KB	1MB
ZeroMQ 3.2.4	186	256	1152	9860
nanomsg master branch 2013-12-10	162	219	1170	DNF

results confirmed by nanomsg developer:

```
"Dez 10 10:26:46 <sustrik> [...] the performance wasn't tuned up yet"
```

Protocol buffers

Alexey Rybalchenko

- Google Protocol Buffers support is now implemented
  – Example in Tutorial 3 in FairRoot.

- To use protobuf, run cmake as follows:
  – cmake -DUSE_PROTOBUF=1

Boost serialization

Nicolas Winckler

- Code portability - depend only on ANSI C++ facilities.

- Code economy - exploit features of C++ such as RTTI, templates, and multiple inheritance, etc. where appropriate to make code shorter and simpler to use.

- Independent versioning for each class definition. That is, when a class definition changed, older files can still be imported to the new version of the class.

- Deep pointer save and restore. That is, save and restore of pointers saves and restores the data pointed to.

- ....

http://www.boost.org/doc/libs/1_55_0/libs/serialization/doc/index.html

This is used already by the CBM Online group in Frankfurt and to we need it to communicate with them!

Nicolas Winckler
Alexey Rybalchenko

Protobuf, Boost or Manual serialization?

- Boost:
  - we are generic in the tasks but intrusive in the data class (digi, hit, timestamp)

- Manual and Protobuf
  - we are generic in the class but intrusive in the tasks (need to fill/access payloads from class with set/get x, y, z etc).

Manual method is still the fastest, protobuf is 20% slower and boost is 30% slower.

preliminary

Dynamic Deployment System

- Deploy executables

- Use (utilize) any RMS (Slurm, Grid Engine, ...),

- Secure execution of nodes (watchdog),

- Support different topologies and user process dependencies,

- Support a central log engine

- ....

See talk by Anar today

Anar Manafov
Andrey Lebedev

Templated Digi-loader and File-sink are under development

- This is the interface between the simulation data driven framework.

- Data is read from ROOT files, converted to raw data format (if necessary) and then send as messages over the network.

- (de)serialise of digis and/or hits

- It can use manual serialization of messages, boost serialization and/or protobuf

Nicolas Winckler

New Proto-Type for ALICE

- Use the existing geometry of the ITS and TPC detectors

- Port the stepping managers to FairRoot

- Make a simple simulation of ALICE detector that can be used with the generic digi-loader as a first step for developing algorithms in AlFa later.

Charalampos Kouzinopoulos

FAIR: Next steps

- Testing the full reconstruction chain with the First Level Event Selector cluster (FLES) of the CBM experiment

- Integrate the GPU triplet finder (CUDA code) of PANDA experiment into the Framework

ALICE: Next steps

- Continue developing the simulation proto type (see talk by Charis today)

- Implement (port) the TPC and ITS digitization to the proto type and adapt them to the pile up simulation in FairRoot

- Use the generic loaders (data samplers) on the time frames generated by the proto type

ALICE offline week