The current software, like hardware, has been inherited from the NA49 experiment. The core of the present framework, DSPACK, was developed in the early 1990s. Significant effort was invested to reuse the existing code and to develop missing parts. Difficulties in maintaining and developing distinctly imposed data structures and analyses were frequent. The reconstruction and simulation chain was divided into so-called "chains", which are stand-alone programs that read and write data following the shell-script model. Chains are managed by an overcomplicated shell script which is using command-line arguments as well as environmental variables. This approach causes considerable amount of error during production runs.

### Problem

- Hybrid programming technique is used for simulation and reconstruction clients which are written mostly in Fortran and C. Furthermore, the GFORTRAN code is particularly difficult due to the non-standard features, specific to the Portland Group's commercial compiler.

### Solution

Documentation is quiet and mostly out of date. Consequently, analysis of source code is needed in order to rebuild the most relevant part of the documentation.

Model of data is highly rigid. Some of the inherited detectors, which are not used in NA61 anymore, have to stay supported. Furthermore, introduction of new detectors was not foreseen during designing of the data structures and therefore, some of the old data structures were used in order to accommodate new detectors leading to large incompatibilities in the code.

In the new framework CPPUnit is used to provide the necessary conversions between old and new data structures. Once the framework passes validation, modules will be replaced one by one, giving opportunity to implement new algorithms.

### Legacy code: lessons from NA61/SHINE offline software upgrade adventure

The new Projectile Spectator Detector is complementing the setup for central measurement in ion collisions. The physics program of NA61 is the systematic measurement of hadron production properties in hadron-nucleus collisions as reference for neutrino (T2K) and cosmic-ray (Pierre Auger Observatory) experiments. Furthermore, the search for the critical point of strongly interacting matter in nuclear-nucleus collisions via different hadron production observables, such as fluctuation measures.

In order to expedite migration, module wrappers for clients are enabled to run old reconstruction chain in the new framework. Additionally, DSPACK Interface is created to provide the necessary conversions between old and new data structures. Once the framework passes validation, modules will be replaced one by one, giving opportunity to implement new algorithms.

### Simplified calling sequence of shell script

```
if(tmp .ge. tmp1) then
  tmp = 50.7**3
  write (*,*) 'Bigger or equal that 130323.85: YES!!!'
else
  write (*,*) 'Bigger or equal that 130323.85: NO!!!'
endif
```

### DSPACK Interface

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