CentOS7 vs ALMA9 GlueX Software

In particular halld_recon (hd_dump)

Compilers

CentOS7: ifarm1901, ifarm1801, ifarm1802

- ifarm1901: gcc (GCC) 4.8.5 20150623 (Red Hat 4.8.5-44)
- ifarm1802: gcc (GCC) 4.8.5 20150623 (Red Hat 4.8.5-44)

ALMA9: ifarm9, harpo(local desktop)

- ifarm9: gcc (GCC) 11.4.1 20230605 (Red Hat 11.4.1-2)
- Harpo: gcc (GCC) 11.4.1 20230605 (Red Hat 11.4.1-2)

In order to compare “apples” with “apples” it is important to make sure that the same compiler options are used, in particular the **OPTIMIZATION** switch!

Compiler options

It turns out in the global installation (on /group, nightly builds, production) the file **Makefile_halld_recon** has **DEBUG=0** and **OPTIMIZATION=3**

While in the local halld_recon directory the file **SConstruct** has **DEBUG=1** and **OPTIMIZATION=2**

Incidentally this difference does NOT matter on CentOS7 (gcc 4.8.5)

BUT it DOES on ALMA9 (gcc 11.4.1)!

Comparison of output of hd_dump

hd_dump -A -p foo.evio (run 121060_029 one block event 42692040-[79])

On CentOS7:

- all versions of hd_dump with OPTIMIZATION = 0, 2, and 3 result in the same output

On ALMA9:

- OPTIMIZATION = 0 or 2 lead to the same result
- OPTIMIZATION = 3 leads to significant differences in the output of hd_dump DFDCSegment, DTrackCandidate, DTrackWireBased and DTrackTimeBased

On *ALMA9 vs CentOS7:*

- OPTIMIZATION = 0, and 2 lead to differences in DTrackWireBased and DTrackTimeBased
- OPTIMIZATION = 3 lead to differences in DFDCSegment, DTrackCandidate, DTrackWireBased and DTrackTimeBased

Level of differences between CentOS7 and ALMA9

With OPTIMIZATION= 0 or 2:

differences are seen in DTrackWireBased and DTrackTimeBased. They are minor, mostly only in the value of the Chi2 and sometimes also in the 3rd or 4th digit after decimal point in the value of the angles (theta/phi), momentum or energy

With OPTIMIZATION= 3 :

differences are seen more often in DFDCSegment, DTrackCandidate, DTrackWireBased and DTrackTimeBased. However, at the level of 1% only very few instances show differences and some more at the level of 0.1%.

Conclusion

- Generally there is a need to make sure the same OPTIMIZATION is used throughout the GlueX software package regardless of deployment method.
- Differences between CentOS7 and ALMA9 with the SAME OPTIMIZATION level need to be investigated with a full reconstruction and analysis chain for some select channel on a limited but controlled data set.
- Need to understand the implications of different optimization levels and a decision has to be taken as to which OPTIMISATION level to use.