How to correlate directly off Mark5 modules

This page describes how to set DiFX up to allow "native" Mark5 correlations. This page does not cover the use of fuseMK5. In the "nativemk5" approach described here, an mpifxcorr datastream process runs on each Mark5 unit, meaning that mpifxcorr must be compliled in a manner that can be run on the Mark5 units.

1. Linux requirements

Compatibility of the Conduant streamstor drivers severely limits the choice of Linux kernels. The supported kernel versions depend on the exact version of the driver (the SDK version number) that is used. SDK version 8.2 or later are suggested as earlier versions have known stability issues related to the way the streamstor cards are accessed by DiFX. As of this writing (Nov 18, 2010) only 32-bit kernels are supported. See mixing architectures to see how to configure a cluster to support a mixture of 32 bit and 64 bit members of a cluster running mpifxcorr. Note that mixing different streamstor SDK versions across the cluster is possible, but for each a separately compiled version of the mpifxcorr binary will be required due to differences in library requirements. Differences between major SDK releases (e.g., SDK8 and SDK9) usually also have API-level changes. Currently mpifxcorr can be compiled against either SDK8 or SDK9 series.

2. Installation of Conduant's streamstor Software Development Kit (SDK)

Mark5 units as distributed by Conduant or Haystack Observatory typically have a fully installed software development kit. It may be desirable to reinstall the OS and/or upgrade the SDK. Please follow the guidelines for SDK installation provided by Conduant.

3. Installing a package-config file for streamstor

For `mpifxcorr` and `mk5daemon` to find the libraries and include files for the streamstor SDK, it is most convenient to place a package-config (.pc) file in a location identified by environment variable PKG_CONFIG_PATH. Note that the streamstor libraries must be in the LD_LIBRARY_PATH or in a system library directory for run-time linking. Two examples follow:

Example streamstor.pc for SKD8.2

```
prefix=/usr
exec_prefix=${prefix}
libdir=${exec_prefix}/lib
includedir=${prefix}/include


Name: streamstor
Description: Conduant streamstor driver and library
Requires:
Version: 8.2
Libs: -L${libdir} -lwdapi921 -lssapi -lrt
```

```
Cflags: -I${includedir}
```

Example streamstor.pc for SDK9.0

```
prefix=/usr
exec_prefix=${prefix}
libdir=${exec_prefix}/lib
includedir=${prefix}/include

Name: streamstor
Description: Conduant streamstor driver and library
Requires:
Version: 9.0
Libs: -L${libdir} -lwdapi1011 -lssapi -lrt
Cflags: -I${includedir}
```

4. Compilation of ''mpifxcorr''

Compilation of `mpifxcorr` should proceed as usual. The configuration process should find the streamstor.pc file and properly configure the compilation for native mark5. You should see `nativemk5.cpp` being correlated as a result.

5. Dealing with Mark5 Module directories

Mark5 modules do not contain a conventional filesystem and due to the potential of failure in decoding modules and the fact that decoding the scans can be time consuming, the reading of module directories to `.dir` files is handled outside the correlation process. These `.dir` files are stored in the directory pointed to by the $MARK5_DIR_PATH$ environment variable. The program `mk5dir`, found in the `mk5daemon` package, performs the decoding of the modules. This can be run manually on each Mark5 module at the command line:

```
mk5dir A
```

The `.dir` file contains a hash code at the top. If the hash code matches that of the installed module (implying that no new scans have been added and that all existing scans are unchanged) then the directory file is not updated.

6. Running a correlator job

Within the `.input` file for a correlator job, nativemk5 is turned on by setting

```
DATA SOURCE:            MODULE
```

And by setting the filename to the Volume Serial Number (VSN) of the module to correlate. Note that only one module VSN can be provided per antenna when using nativemk5.

```
D/STREAM 0 FILES:    1
FILE 0/0:            NRAO+293
```

The module to be installed (NRAO+293 in the above example) can be installed in either bank of the Mark5 unit.

7. mk5daemon and extra functionality

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