Check Image Ingestion

by Bruno C. Quint

We use this notebook to check image ingestion on the Summit and at NCSA. It queries one or more exposures using Butler3 and print out the metadata.

Let's start importing Butler Gen3

In [1]:
```
import lsst.daf.butler as dafButler
```

```
WARNING: version mismatch between CFITSIO header (v4.000999999999999) and link
ed library (v4.01).


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```

Use the following cell to tell the notebook if you are running it from the Summit (True) or from NCSA (False).

In [2]:
```
summit = True
```

Now let's instanciate Butler depending on whether you are running this notebook on the Summit or not.

In [3]:
```
if summit:
    butler = dafButler.Butler("/repo/LSSTComCam/")
else:
    butler = dafButler.Butler("/repo/main/")
```

Use the following cell to query your data. You only need to update the `exposure` based on the image ID.

In [4]:
```
data_id = {'instrument': 'LSSTComCam', 'detector': 0, 'exposure': 2022060300004
```

Now you can query the data and print its metadata. The next cell should print the data's header. Make sure that it has consistent target name, observatory name, coordinates, etc.

In [5]:
```
raw = butler.get('raw', dataId=data_id, collections=["LSSTComCam/raw/all"])
print(raw.getMetadata())
```

```
lsst.obs.lsst.assembly WARNING: /data/lsstdata/base/comcam/oods/gen3butler/
raw/20220603/000004/CC_O_20220603_000004_R22_S00.fits: outAmp.getRawBBox()
 != data.getBBox(); patching. ((minimum=(0, 0), maximum=(543, 2047)) v. (mi
nimum=(0, 0), maximum=(575, 2047)))
lsst.obs.base._fitsRawFormatterBase WARNING: Cannot create a valid WCS from
metadata: CRPIX1 not found; cannot read metadata as a SkyWcs
```

```
SIMPLE = 1
// Java FITS: Tue May 24 18:20:56 UTC 2022
EXTEND = 1
// Extensions are permitted
DATE = "2022-06-03T18:18:04.603"
// Creation Date and Time of File
MJD = 59733.762553276
// Modified Julian Date that the file was written
CCD_MANU = "ITL"
// CCD Manufacturer
CCD_TYPE = "3800C"
// CCD Model Number
TESTTYPE = "OBJECT"
// BIAS, DARK, FE55, FLAT, LAMBDA, PERSISTENCE, SPOT, SFLAT_<l
IMGTYPE = "OBJECT"
// BIAS, DARK, FE55, FLAT, FLAT_<lam>, SPOT, PPUMP
EXPTIME = 15.000000000000
// Exposure Time in Seconds
FILENAME = "CC_O_20220603_000004_R22_S00.fits"
// Original name of the file
BINX = 1
// [pixels] binning along X axis
BINY = 1
// [pixels] binning along Y axis
CCDGAIN = 1.0000000000000
// Rough guess at overall system gain (e-/DNB)
CCDNOISE = 10.000000000000
// Rough guess at system noise (e- rms)
DATE-OBS = "2022-06-03T18:17:49.174"
// Date of the image trigger (readout)
MJD-OBS = 59733.762374699
// Modified Julian Date of image trigger
DATE-TRG = "2022-06-03T18:17:27.600"
// Date of the image trigger (readout), UTC f
MJD-TRG = 59733.762125000
// Modified Julian Date of image trigger
IMAGETAG = "f50c9a9ff4093c1b"
// DAQ Image id (Hex)
CCDSLOT = "S00"
// The CCD Slot
RAFTBAY = "R22"
// The RAFT Bay
FIRMWARE = "31395007"
// DAQ firmware version (Hex)
PLATFORM = "comcam"
// DAQ platform version
CONTNUM = "18edfc9b"
// REB serial # (Hex)
DAQVERS = "no_release 2021-11-18T18:42:53Z (dirty,b76790e)"
// DAQ version
DAQPART = "comcam"
// DAQ partition
DAQFOLD = "raw"
// DAQ folder the image was initially created in
OBSANNOT = ""
// DAQ image annotation
OBSID = "CC_O_20220603_000004"
// The image name or obs-id
CAMCODE = "CC"
// The "code" for AuxTel | ComCam | Main Camera
```

```
CONTRLLR = "O"
// The controller (e.g. O for OCS, C for CCS)
DAYOBS = "20220603"
// The observation day as defined in the image name
SEQNUM = 4
// The sequence number from the image name
HEADVER = 2
// Version number of header
INSTRUME = "ComCam"
// Instrument
TELESCOP = "Simonyi Survey Telescope"
// Telescope
TSTAND = "EOCCv2_SUM"
// Test Stand
SEQFILE = "FP_ITL_2s_ir2_v26.seq"
// Sequencer file name
SEQNAME = "FP_ITL_2s_ir2_v26.seq"
// Sequencer file name
SEQCKSUM = "980618532"
// Checksum of Sequencer
LSST_NUM = "ITL-3800C-229"
// LSST Assigned CCD Number
CCD_SERN = "23166"
// Manufacturers? CCD Serial Number
REBNAME = "LCA-13574-061"
// LSST Assigned Name REB name
RAFTNAME = "LCA-11021_RTM-031"
// LSST Assigned Raft name
DARKTIME = 15.581600000000
// Dark Time in Seconds (see TSEIA-91)
DATE-BEG = "2022-06-03T18:17:49.174"
// Time at the start of integration
MJD-BEG = 59733.762374699
// Modified Julian Date derived from DATE-BEG
DATE-END = "2022-06-03T18:18:04.604"
// End date of the observation
MJD-END = 59733.762553287
// Date derived from DATE-END
FPVERS = "1.1.3"
// The focal-plane version number
IHVERS = "1.0.29"
// The image-handling version number
OBS-LONG = -70.749417000000
// [deg] Observatory east longitude
OBS-LAT = -30.244639000000
// [deg] Observatory latitude
OBS-ELEV = 2663.0000000000
// [m] Observatory elevation
OBSGEO-X = 1818938.9400000
// [m] X-axis Geocentric coordinate
OBSGEO-Y = -5208470.9500000
// [m] Y-axis Geocentric coordinate
OBSGEO-Z = -3195172.0800000
// [m] Z-axis Geocentric coordinate
RA = 126.75611028235
// RA commanded from pointing component
DEC = -39.045675747759
// DEC commanded from pointing component
RASTART = 126.75618483373
// RA of telescope from AZSTART and ELSTART
```

```
DECSTART = -39.045675615423
// DEC of telescope from AZSTART and ELSTART
RAEND = 126.75708521640
// RA of telescope from AZEND and ELEND
DECEND = -39.045673802381
// DEC of telescope from AZEND and ELEND
ROTPA = 8.4879831658374e-314
// Rotation angle relative to the sky (deg)
ROTCOORD = "sky"
// Telescope Rotation Coordinates
HASTART = -2.0814744114977
// [HH:MM:SS] Telescope hour angle at start
ELSTART = 62.999309850483
// [deg] Telescope zenith distance at start
AZSTART = 117.67571089179
// [deg] Telescope azimuth angle at start
AMSTART = 1.1220672437825
// Airmass at start
HAEND = 0.0000000000000
// [HH:MM:SS] Telescope hour angle at end
ELEND = 63.056610761889
// [deg] Telescope zenith distance at end
AZEND = 117.69705047217
// [deg] Telescope azimuth angle at end
AMEND = 0.0000000000000
// Airmass at end
TRACKSYS = "RADEC"
// Tracking system RADEC, AZEL, PLANET, EPHEM
RADESYS = "ICRS"
// Equatorial coordinate system FK5 or ICRS
FOCUSZ = 199.59793827003
// Focus Z position
OBJECT = "slew_icrs"
// Name of the observed object
GROUPID = "2022-06-03T18:17:48.942"
BUNIT = "adu"
// Brightness units for pixel array
TIMESYS = "TAI"
// The time scale used
CURINDEX = 1
// Index number for exposure within the sequence
MAXINDEX = 1
// Number of requested images in sequence
PROGRAM = <Unknown>
// Name of the program
REASON = <Unknown>
// Reason for observation
FILTBAND = "r"
// Name of the filter band
FILTER = "r_03"
// Name of the physical filter
FILTPOS = 4119.0000000000
// Filter measured position of slide
FILTSLOT = 2
// Filter home slot
SHUTTIME = 15.000000000000
// Shutter exposure time
SIMULATE MTMOUNT = 0
// MTMount Simulation Mode (False=0)
SIMULATE MTM1M3 = <Unknown>
```

```
// MTM1M3 Simulation Mode (False=0)
SIMULATE MTM2 = 0
// MTM2 Simulation Mode (False=0)
SIMULATE CAMHEXAPOD = 0
// CAMHexapod Simulation Mode (False=0)
SIMULATE M2HEXAPOD = 1
// M2Hexapod Simulation Mode (False=0)
SIMULATE MTROTATOR = 0
// MTRotator Simulation Mode (False=0)
SIMULATE MTDOME = 1
// MTDome Simulation Mode (False=0)
SIMULATE MTDOMETRAJECTORY = 0
// MTDomeTrajectory Simulation Mode (False=
XTENSION = "IMAGE"
// marks beginning of new HDU
BITPIX = 32
// bits per data value
NAXIS = 2
// number of axis
NAXIS1 = 576
// size of the n'th axis
NAXIS2 = 2048
// size of the n'th axis
PCOUNT = 0
// Required value
GCOUNT = 1
// Required value
CHECKSUM = "JaiAMWf6JafAJUf5"
// checksum for the current HDU
CHANNEL = 1
EXTNAME = "Segment10"
CCDSUM = "1 1"
DATASEC = "[4:512,1:2000]"
DETSEC = "[509:1,1:2000]"
DETSIZE = "[1:4072,1:4000]"
DTV1 = 513
// detector transformation vector
DTV2 = 0
// detector transformation vector
DTM1_1 = -1.0000000000000
// detector transformation matrix
DTM2_2 = 1.0000000000000
// detector transformation matrix
DTM1_2 = 0.0000000000000
// detector transformation matrix
DTM2_1 = 0.0000000000000
// detector transformation matrix
WCSNAMEA = "AMPLIFIER"
// Name of coordinate system
CTYPE1A = "Seg_X"
// In the camera coordinate system
CTYPE2A = "Seg_Y"
// In the camera coordinate system
PC1_1A = 0.0000000000000
PC1_2A = -1.0000000000000
PC2_1A = -1.0000000000000
PC2_2A = 0.0000000000000
CDELT1A = 1.0000000000000
CDELT2A = 1.0000000000000
CRPIX1A = 0.0000000000000
```

```
CRPIX2A = 0.0000000000000
CRVAL1A = 2001.0000000000
CRVAL2A = 513.00000000000
WCSNAMEC = "CCD"
// Name of coordinate system
CTYPE1C = "CCD_X"
// In the camera coordinate system
CTYPE2C = "CCD_Y"
// In the camera coordinate system
PC1_1C = 0.0000000000000
PC1_2C = -1.0000000000000
PC2_1C = -1.0000000000000
PC2_2C = 0.0000000000000
CDELT1C = 1.0000000000000
CDELT2C = 1.0000000000000
CRPIX1C = 0.0000000000000
CRPIX2C = 0.0000000000000
CRVAL1C = 4001.0000000000
CRVAL2C = 513.00000000000
WCSNAMER = "RAFT"
// Name of coordinate system
CTYPE1R = "RAFT_X"
// In the camera coordinate system
CTYPE2R = "RAFT_Y"
// In the camera coordinate system
PC1_1R = 0.0000000000000
PC1_2R = -1.0000000000000
PC2_1R = -1.0000000000000
PC2_2R = 0.0000000000000
CDELT1R = 1.0000000000000
CDELT2R = 1.0000000000000
CRPIX1R = 0.0000000000000
CRPIX2R = 0.0000000000000
CRVAL1R = 4126.0000000000
CRVAL2R = 602.00000000000
WCSNAMEF = "FOCAL_PLANE"
// Name of coordinate system
CTYPE1F = "FP_X"
// In the camera coordinate system
CTYPE2F = "FP_Y"
// In the camera coordinate system
PC1_1F = 0.0000000000000
PC1_2F = -1.0000000000000
PC2_1F = -1.0000000000000
PC2_2F = 0.0000000000000
CDELT1F = 1.0000000000000
CDELT2F = 1.0000000000000
CRPIX1F = 0.0000000000000
CRPIX2F = 0.0000000000000
CRVAL1F = 29526.000000000
CRVAL2F = 26002.000000000
WCSNAMEE = "FP_SERPAR"
// Name of coordinate system
CTYPE1E = "FP_S"
// In the camera coordinate system
CTYPE2E = "FP_P"
// In the camera coordinate system
PC1_1E = -1.0000000000000
PC1_2E = 0.0000000000000
PC2_1E = 0.0000000000000
```

```
PC2_2E = -1.0000000000000
CDELT1E = 1.0000000000000
CDELT2E = 1.0000000000000
CRPIX1E = 0.0000000000000
CRPIX2E = 0.0000000000000
CRVAL1E = 26002.000000000
CRVAL2E = 29526.000000000
WCSNAMEB = "CCD_SERPAR"
// Name of coordinate system
CTYPE1B = "CCD_S"
// In the serial-parallel coordinate system
CTYPE2B = "CCD_P"
// In the serial-parallel coordinate system
PC1_1B = -1.0000000000000
PC1_2B = 0.0000000000000
PC2_1B = 0.0000000000000
PC2_2B = -1.0000000000000
CDELT1B = 1.0000000000000
CDELT2B = 1.0000000000000
CRPIX1B = 0.0000000000000
CRPIX2B = 0.0000000000000
CRVAL1B = 513.00000000000
CRVAL2B = 4001.0000000000
WCSNAMEQ = "RAFT_SERPAR"
// Name of coordinate system
CTYPE1Q = "RAFT_S"
// In the serial-parallel coordinate system
CTYPE2Q = "RAFT_P"
// In the serial-parallel coordinate system
PC1_1Q = -1.0000000000000
PC1_2Q = 0.0000000000000
PC2_1Q = 0.0000000000000
PC2_2Q = -1.0000000000000
CDELT1Q = 1.0000000000000
CDELT2Q = 1.0000000000000
CRPIX1Q = 0.0000000000000
CRPIX2Q = 0.0000000000000
CRVAL1Q = 602.00000000000
CRVAL2Q = 4126.0000000000
BSCALE = 1.0000000000000
BZERO = 0.0000000000000
INHERIT = 1
// Extension inherits values from primary header
DATASUM = "937803659"
// checksum of the data records
HIERARCH ASTRO METADATA FIX MODIFIED = 0
HIERARCH ASTRO METADATA FIX DATE = "2022-06-03T18:17:57.743135"
```

This is an alternative way to query for metadata. Right now, you might see a couple of NaN's. This is a known issue and there is work on it (DM-32298).

In [ ]:
```
metadata = butler.get('raw.visitInfo', dataId=data_id, collections=["LSSTComCam
print(metadata)
```