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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ed library (v4.01).


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ed library (v4.01).
```

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': 2022062000001
```

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 [6]:
```
raw = butler.get('raw', dataId=data_id, collections=["LSSTComCam/raw/all"])
print(raw.getMetadata())
```

```
lsst.obs.lsst.translators.comCam WARNING: CC_O_20220620_000001: replaced FI
LTER None with "unknown"
```

```
astro_metadata_translator.observationInfo WARNING: Ignoring Error calculati
ng property 'boresight_rotation_angle' using translator <class 'lsst.obs.ls
st.translators.comCam.LsstComCamTranslator'> and file /data/lsstdata/base/c
omcam/oods/gen3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fit
s: "Could not find ['ROTPA', 'ROTANGLE'] in header"
```

```
lsst.obs.lsst.translators.lsst WARNING: /data/lsstdata/base/comcam/oods/gen
3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fits(CC_O_20220620
_000001): Unable to determine airmass of a science observation, returning
 1.
```

```
astro_metadata_translator.observationInfo WARNING: Ignoring Error calculati
ng property 'tracking_radec' using translator <class 'lsst.obs.lsst.transla
tors.comCam.LsstComCamTranslator'> and file /data/lsstdata/base/comcam/ood
s/gen3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fits: '/data/
lsstdata/base/comcam/oods/gen3butler/raw/20220620/000001/CC_O_20220620_0000
01_R22_S00.fits(CC_O_20220620_000001): Unable to determine tracking RA/Dec
 of science observation'
```

```
timer.lsst.daf.butler.datastores.fileDatastore ERROR: Reading from location
file:///data/lsstdata/base/comcam/oods/gen3butler/raw/20220620/000001/CC_O_
20220620_000001_R22_S00.fits  with formatter lsst.obs.lsst.rawFormatter.Lss
tComCamRawFormatter: Took 0.0089 seconds
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_butler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.py:1336, in FileDatastore._read_artifact_into_memory(self, getInfo, ref, isComponent, cache_ref)
   1326         with time_this(
   1327             log,
   1328             msg="Reading%s from location %s %s with formatter %s",
   (...)
   1334             ),
   1335         ):
-> 1336             result = formatter.read(component=getInfo.component if isComponent else None)
   1337 except Exception as e:

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/formatters/fitsExposure.py:102, in FitsImageFormatterBase.read(self, component)
     96         raise ValueError(
     97             "Storage class inconsistency ({} vs {}) but no"
     98             " component requested".format(
     99                 self.fileDescriptor.readStorageClass.name, self.fileDescriptor.storageClass.name
    100             )
    101         )
--> 102 return self.readFull()

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_lsst/g2707824195+dcb2a29ec8/python/lsst/obs/lsst/rawFormatter.py:121, in LsstCamRawFormatter.readFull(self)
    118 rawFile = self.fileDescriptor.location.path
    119 amplifier, detector, _ = standardizeAmplifierParameters(
    120     self.checked_parameters,
--> 121     self._instrument.getCamera()[self.observationInfo.detector_num],
    122 )
    123 if amplifier is not None:
    124     # LSST raws are already per-amplifier on disk, and in a different
    125     # assembly state than all of the other images we see in
   (...)
    129     # most of the implementation (as other formatters do), but we can
    130     # call most of the same underlying code to do the work.

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/_fitsRawFormatterBase.py:390, in FitsRawFormatterBase.observationInfo(self)
    389     path = location.path if location is not None else None
--> 390     self._observationInfo = ObservationInfo(
    391         self.metadata, translator_class=self.translatorClass, filename=path
    392     )
    393 return self._observationInfo

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/observationInfo.py:228, in ObservationInfo.__init__(self, header, filename, translator_class, pedantic, search_path, required, subset)
    227 try:
--> 228     value = getattr(translator, method)()
    229 except NotImplementedError as e:
```

```
File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_
metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/tr
anslator.py:86, in cache_translation.<locals>.func_wrapper(self)
     85 if name not in self._translation_cache:
---> 86     self._translation_cache[name] = func(self)
     87 return self._translation_cache[name]

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_ls
st/g2707824195+dcb2a29ec8/python/lsst/obs/lsst/translators/lsst.py:454, in Lss
tBaseTranslator.to_location(self)
    452 try:
    453     # Try standard FITS headers
--> 454     return super().to_location()
    455 except KeyError:

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_
metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/tr
anslator.py:86, in cache_translation.<locals>.func_wrapper(self)
     85 if name not in self._translation_cache:
---> 86     self._translation_cache[name] = func(self)
     87 return self._translation_cache[name]

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_
metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/tr
anslators/fits.py:198, in FitsTranslator.to_location(self)
    197 coords = [self._header[c] for c in cards]
--> 198 value = EarthLocation.from_geocentric(*coords, unit=u.m)
    199 self._used_these_cards(*cards)

File /opt/lsst/software/stack/conda/miniconda3-py38_4.9.2/envs/lsst-scipipe-3.
0.0/lib/python3.8/site-packages/astropy/coordinates/earth.py:250, in EarthLoca
tion.from_geocentric(cls, x, y, z, unit)
    249 try:
--> 250     x = u.Quantity(x, unit, copy=False)
    251     y = u.Quantity(y, unit, copy=False)

File /opt/lsst/software/stack/conda/miniconda3-py38_4.9.2/envs/lsst-scipipe-3.
0.0/lib/python3.8/site-packages/astropy/units/quantity.py:511, in Quantity.__n
ew__(cls, value, unit, dtype, copy, order, subok, ndmin)
    508 if (value.dtype.kind in 'OSU' and
    509     not (value.dtype.kind == 'O' and
    510          isinstance(value.item(0), numbers.Number))):
--> 511     raise TypeError("The value must be a valid Python or "
    512                     "Numpy numeric type.")
    514 # by default, cast any integer, boolean, etc., to float

TypeError: The value must be a valid Python or Numpy numeric type.

The above exception was the direct cause of the following exception:

ValueError                                Traceback (most recent call last)
Input In [6], in <cell line: 1>()
----> 1 raw = butler.get('raw', dataId=data_id, collections=["LSSTComCam/raw/a
ll"])
      2 print(raw.getMetadata())

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/_butler.py:1333, in Butler.
get(self, datasetRefOrType, dataId, parameters, collections, **kwargs)
```

```
   1331 log.debug("Butler get: %s, dataId=%s, parameters=%s", datasetRefOrTyp
e, dataId, parameters)
   1332 ref = self._findDatasetRef(datasetRefOrType, dataId, collections=colle
ctions, **kwargs)
-> 1333 return self.getDirect(ref, parameters=parameters)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/_butler.py:1191, in Butler.
getDirect(self, ref, parameters)
   1171 def getDirect(self, ref: DatasetRef, *, parameters: Optional[Dict[str,
Any]] = None) -> Any:
   1172     """Retrieve a stored dataset.
   1173
   1174     Unlike `Butler.get`, this method allows datasets outside the Butle
r's
   (...)
   1189         The dataset.
   1190     """
-> 1191     return self.datastore.get(ref, parameters=parameters)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.p
y:2044, in FileDatastore.get(self, ref, parameters)
   2037 else:
   2038     # For an assembled composite this could be a derived
   2039     # component derived from a real component. The validity
   2040     # of the parameters is not clear. For now validate against
   2041     # the composite storage class
   2042     getInfo.formatter.fileDescriptor.storageClass.validateParameters(p
arameters)
-> 2044 return self. read artifact_into_memory(getInfo, ref, isComponent=isCom
ponent, cache_ref=cache_ref)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.p
y:1338, in FileDatastore._read_artifact_into_memory(self, getInfo, ref, isComp
onent, cache_ref)
   1336             result = formatter.read(component=getInfo.component if isC
omponent else None)
   1337 except Exception as e:
-> 1338     raise ValueError(
   1339         f"Failure from formatter '{formatter.name()}' for dataset {ref
.id}"
   1340         f" ({ref.datasetType.name} from {uri}): {e}"
   1341     ) from e
   1343 # File was read successfully so can move to cache
   1344 if can_be_cached:

ValueError: Failure from formatter 'lsst.obs.lsst.rawFormatter.LsstComCamRawFo
rmatter' for dataset 0277e662-fe81-5678-ba7a-6788348f26cd (raw from file:///da
ta/lsstdata/base/comcam/oods/gen3butler/raw/20220620/000001/CC_O_20220620_0000
01_R22_S00.fits): The value must be a valid Python or Numpy numeric type.
```

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 [7]:
```
metadata = butler.get('raw.visitInfo', dataId=data_id, collections=["LSSTComCam
print(metadata)
```

```
lsst.obs.lsst.translators.comCam WARNING: CC_O_20220620_000001: replaced FI
LTER None with "unknown"
```

```
astro_metadata_translator.observationInfo WARNING: Ignoring Error calculati
ng property 'boresight_rotation_angle' using translator <class 'lsst.obs.ls
st.translators.comCam.LsstComCamTranslator'> and file /data/lsstdata/base/c
omcam/oods/gen3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fit
s: "Could not find ['ROTPA', 'ROTANGLE'] in header"
```

```
lsst.obs.lsst.translators.lsst WARNING: /data/lsstdata/base/comcam/oods/gen
3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fits(CC_O_20220620
_000001): Unable to determine airmass of a science observation, returning
 1.
```

```
astro_metadata_translator.observationInfo WARNING: Ignoring Error calculati
ng property 'tracking_radec' using translator <class 'lsst.obs.lsst.transla
tors.comCam.LsstComCamTranslator'> and file /data/lsstdata/base/comcam/ood
s/gen3butler/raw/20220620/000001/CC_O_20220620_000001_R22_S00.fits: '/data/
lsstdata/base/comcam/oods/gen3butler/raw/20220620/000001/CC_O_20220620_0000
01_R22_S00.fits(CC_O_20220620_000001): Unable to determine tracking RA/Dec
 of science observation'
```

```
timer.lsst.daf.butler.datastores.fileDatastore ERROR: Reading component vis
itInfo from location file:///data/lsstdata/base/comcam/oods/gen3butler/raw/
20220620/000001/CC_O_20220620_000001_R22_S00.fits  with formatter lsst.obs.
lsst.rawFormatter.LsstComCamRawFormatter: Took 0.0076 seconds
```

```
---------------------------------------------------------------------------
TypeError                                 Traceback (most recent call last)
File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_butler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.py:1336, in FileDatastore._read_artifact_into_memory(self, getInfo, ref, isComponent, cache_ref)
   1326         with time_this(
   1327             log,
   1328             msg="Reading%s from location %s %s with formatter %s",
   (...)
   1334             ),
   1335         ):
-> 1336             result = formatter.read(component=getInfo.component if isComponent else None)
   1337 except Exception as e:

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/formatters/fitsExposure.py:94, in FitsImageFormatterBase.read(self, component)
     93 if component is not None:
---> 94     return self.readComponent(component)
     95 else:

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/_fitsRawFormatterBase.py:330, in FitsRawFormatterBase.readComponent(self, component)
    329 elif component == "visitInfo":
--> 330     return self.makeVisitInfo()
    331 elif component == "detector":

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/_fitsRawFormatterBase.py:182, in FitsRawFormatterBase.makeVisitInfo(self)
    175 """Construct a VisitInfo from metadata.
    176
    177 Returns
   (...)
    180     Structured metadata about the observation.
    181 """
--> 182 return MakeRawVisitInfoViaObsInfo.observationInfo2visitInfo(self.observationInfo)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_base/gc18b5ea8f9+573ef9d3a0/python/lsst/obs/base/_fitsRawFormatterBase.py:390, in FitsRawFormatterBase.observationInfo(self)
    389     path = location.path if location is not None else None
--> 390     self._observationInfo = ObservationInfo(
    391         self.metadata, translator_class=self.translatorClass, filename=path
    392     )
    393 return self._observationInfo

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/observationInfo.py:228, in ObservationInfo.__init__(self, header, filename, translator_class, pedantic, search_path, required, subset)
    227 try:
--> 228     value = getattr(translator, method)()
    229 except NotImplementedError as e:
```

```
File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/translator.py:86, in cache_translation.<locals>.func_wrapper(self)
     85 if name not in self._translation_cache:
---> 86     self._translation_cache[name] = func(self)
     87 return self._translation_cache[name]

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/obs_lsst/g2707824195+dcb2a29ec8/python/lsst/obs/lsst/translators/lsst.py:454, in LsstBaseTranslator.to_location(self)
    452 try:
    453     # Try standard FITS headers
--> 454     return super().to_location()
    455 except KeyError:

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/translator.py:86, in cache_translation.<locals>.func_wrapper(self)
     85 if name not in self._translation_cache:
---> 86     self._translation_cache[name] = func(self)
     87 return self._translation_cache[name]

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/astro_metadata_translator/g2425970722+65efa646f1/python/astro_metadata_translator/translators/fits.py:198, in FitsTranslator.to_location(self)
    197 coords = [self._header[c] for c in cards]
--> 198 value = EarthLocation.from_geocentric(*coords, unit=u.m)
    199 self._used_these_cards(*cards)

File /opt/lsst/software/stack/conda/miniconda3-py38_4.9.2/envs/lsst-scipipe-3.0.0/lib/python3.8/site-packages/astropy/coordinates/earth.py:250, in EarthLocation.from_geocentric(cls, x, y, z, unit)
    249 try:
--> 250     x = u.Quantity(x, unit, copy=False)
    251     y = u.Quantity(y, unit, copy=False)

File /opt/lsst/software/stack/conda/miniconda3-py38_4.9.2/envs/lsst-scipipe-3.0.0/lib/python3.8/site-packages/astropy/units/quantity.py:511, in Quantity.__new__(cls, value, unit, dtype, copy, order, subok, ndmin)
    508 if (value.dtype.kind in 'OSU' and
    509     not (value.dtype.kind == 'O' and
    510          isinstance(value.item(0), numbers.Number))):
--> 511     raise TypeError("The value must be a valid Python or "
    512                     "Numpy numeric type.")
    514 # by default, cast any integer, boolean, etc., to float

TypeError: The value must be a valid Python or Numpy numeric type.

The above exception was the direct cause of the following exception:

ValueError                                Traceback (most recent call last)
Input In [7], in <cell line: 1>()
----> 1 metadata = butler.get('raw.visitInfo', dataId=data_id, collections=["LSSTComCam/raw/all"])
      2 print(metadata)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_butler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/_butler.py:1333, in Butler.get(self, datasetRefOrType, dataId, parameters, collections, **kwargs)
   1331 log.debug("Butler get: %s, dataId=%s, parameters=%s", datasetRefOrTyp
```

```
e, dataId, parameters)
   1332 ref = self._findDatasetRef(datasetRefOrType, dataId, collections=colle
ctions, **kwargs)
-> 1333 return self.getDirect(ref, parameters=parameters)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/_butler.py:1191, in Butler.
getDirect(self, ref, parameters)
   1171 def getDirect(self, ref: DatasetRef, *, parameters: Optional[Dict[str,
Any]] = None) -> Any:
   1172     """Retrieve a stored dataset.
   1173
   1174     Unlike `Butler.get`, this method allows datasets outside the Butle
r's
   (...)
   1189         The dataset.
   1190     """
-> 1191     return self.datastore.get(ref, parameters=parameters)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.p
y:2044, in FileDatastore.get(self, ref, parameters)
   2037 else:
   2038     # For an assembled composite this could be a derived
   2039     # component derived from a real component. The validity
   2040     # of the parameters is not clear. For now validate against
   2041     # the composite storage class
   2042     getInfo.formatter.fileDescriptor.storageClass.validateParameters(p
arameters)
-> 2044 return self._read_artifact_into_memory(getInfo, ref, isComponent=isCom
ponent, cache_ref=cache_ref)

File /opt/lsst/software/stack/stack/miniconda3-py38_4.9.2-3.0.0/Linux64/daf_bu
tler/gcdca06ccf6+6087c1f380/python/lsst/daf/butler/datastores/fileDatastore.p
y:1338, in FileDatastore._read_artifact_into_memory(self, getInfo, ref, isComp
onent, cache_ref)
   1336             result = formatter.read(component=getInfo.component if isC
omponent else None)
   1337 except Exception as e:
-> 1338     raise ValueError(
   1339         f"Failure from formatter '{formatter.name()}' for dataset {ref
.id}"
   1340         f" ({ref.datasetType.name} from {uri}): {e}"
   1341     ) from e
   1343 # File was read successfully so can move to cache
   1344 if can_be_cached:

ValueError: Failure from formatter 'lsst.obs.lsst.rawFormatter.LsstComCamRawFo
rmatter' for dataset 0277e662-fe81-5678-ba7a-6788348f26cd (raw.visitInfo from
 file:///data/lsstdata/base/comcam/oods/gen3butler/raw/20220620/000001/CC_O_20
220620_000001_R22_S00.fits): The value must be a valid Python or Numpy numeric
type.
```

In [ ]: