CRDS Interface

# Current version: Build 7

# Changes from Build 6

* The datasets and datasetsCount queries only look at level 1b-2b files. (Build 6 looked 2a-2b files.)
* The headers query will treat datasetids for non 1b-2b files the same way it treats non-existent datasetids: i.e. it will be returned with a null. (In Build 6 the range was 2a-2b.)
* The headers query will return the level of the FileSet whose data is being returned, using the productLevel as the key. For example, "productLevel":"1b"

# Changes from Build 5

* Date, time and datetime fields are returned as the appropriate pieces. For example, meta.observation.date and meta.observation.time are combined and stored in the single field date\_obs in the database. In Build 5 if asked for meta.observation.date or meta.observation.time it would return the combined datetime field. Now it will return either the date or the time, respectively.
* Time queries now accept either second or millisecond precision (Build 5 only accepted second precision).
* Hardcoded “ASSOCIATION” has been replaced with FileSet.Detector. In Build 5 if the user asked for jw00001001001\_01101\_00001.MIRIMAGE it would return ASSOCIATION: jw00001001001\_01101\_00001.MIRIMAGE. Now it will return jw00001001001\_01101\_00001.MIRIMAGE: jw00001001001\_01101\_00001.MIRIMAGE. Note that if the user passes in a value for Association that same value will still be returned, as it was in Build 5. (For example, if the user asks for MyAssoc:jw82500001003\_02101\_00001.NRCB1 then it will return MyAssoc:jw82500001003\_02101\_00001.NRCB1)
* If the user queries by Association only (i.e. MyAssoc instead of MyAssoc:Fileset.Detector or FileSet.Detector) no data will be returned. (In theory in Build 5 it would return all FileSet.Detectors with that association, but since we didn’t have any association information in the database it didn’t do anything.)
* If a requested datasetid does not exist it will be returned with null instead of an empty parameter list.
* The datasets and datasetsCount queries only look at level 2a-2b files. (Build 5 looked at all files, but we only had 0.5-2b files in the db.)
* The headers query will treat datasetids for non 2a-2b files the same way it treats non-existent datasetids: i.e. it will be returned with a null. (Level 3 files should have a different FileSet than level 2a-2b files, but if for some reason they’re the same, the code will return data for the highest level within 2a-2b.)

# Introduction

CRDS need to query the archive database for CRDS parameters. They will use this information to reevaluate reference assignments as new reference files arrive in order to determine which filesets should be reprocessed. The Archive will provide a RESTful interface that can be used to query the database.

# Definitions

This project is based upon the functionality that currently exists for HST, but the nomenclature is different for JWST.

FileSetName: The “root” of the filename, without the detector. If a filename does not include a suffix, then the FileSetName is simply the filename without the detector and extension. If a filename does include a suffix, then the FileSetName is the filename without the detector, suffix and extension. For example:

S0000000155\_01001\_03599.ssr => S0000000155\_01001\_03599

jw00002001001\_01101\_00001\_NRCB1\_original.fits => jw00002001001\_01101\_00001

DatasetIds: A datasetId, as used by CRDS, is a combination of the Association (not yet defined in the db) and the FileSetName and detector: “Association:FileSetName.Detector”. If no Association exists then it’s based upon the FileSetName and detector only: “FileSetName.Detector:FileSetName.Detector”. For example

Association exits: Assoc1: jw00035001001\_01101\_00001.MIRIMAGE

No Association: jw00035001001\_01101\_00001.MIRIMAGE : jw00035001001\_01101\_00001.MIRIMAGE

**NOTE:** Associations are being phased out. For Build 6 if the user specifies an Association that same Association will be passed back to them. If they don’t specify an Association then FileSetName.Detector will be substituted for the Association in the returned data.

# Functionality

## DatasetIds Count by Instrument

Given an instrument return a count of datasetIds. If a date is also specified, only count datasetIds where the file’s date\_obs (date and time) is greater than the specified date. This will only return datasetIds for level 1b-2b files.

Input:

* instrument (required) examples: instrument=miri, instrument=MIRI
* minDate (optional) example: minDate=2015-06-22T15:26:31.123 (ms defaults to .000)

Output:

* {“DatasetsCount”:count} example: {"DatasetsCount":200001}

Examples:

* Count unique datasetIds for instrument MIRI:

wget "http://jwdmsdevvm4:8888/crds/datasetsCount?instrument=miri"

returns

{"DatasetsCount":200001}

* Count unique datasetIds for instrument MIRI after 2015-07-11T19:55:00:

wget " http://jwdmsdevvm4:8888/crds/datasetsCount?instrument=miri&minDate=2015-07-11T19:55:00"

returns

{"DatasetsCount":2}

## DatasetIds by Instrument

Given an instrument return a list of datasetIds. If a date is also specified, only return datasetIds where the file’s date\_obs (date and time) is greater than the specified date. An optional batchNum can also be specified, which return rows in the specified batch. If batchNum is not specified then it will return rows from the first batch. If batchNum is larger then the number of batches available then it will return no rows. This function will only return datasetIds for level 1b-2b files.

**Batching:** In order to prevent a ridiculously large number of datasetIds being returned by this function, it will only return up to maxHeaderBlockSize (see section 4.3) datasetIds. If more than that number of datasetsIds would be returned then the user will need to page through the results. The logic for doing this is as follows:

batchSize = wget maxHeaderBlockSize

numResults = wget datasetsCount

counter = 0

while (batchSize\*counter < numResults) {

wget datasets instrument=X batchNum=counter <minDate=Y>

counter ++

}

Input:

* instrument (required) examples: instrument=miri, instrument=MIRI
* minDate (optional) example: minDate=2015-06-22T15:26:31
* batchNum (optional) example: batchNum=5

Output:

* [“datasetId1”,”datasetId2”,…] example: ["jw00001001001\_01101\_00001.MIRIMAGE:jw00001001001\_01101\_00001.MIRIMAGE"," jw00035001001\_01101\_00001.MIRIMAGE:jw00035001001\_01101\_00001.MIRIMAGE"]

Examples:

* Get first batch of datasetIds for instrument MIRI:

wget "http://jwdmsdevvm4:8888/crds/datasets?instrument=miri"

returns

["jw00001001001\_01101\_00001.MIRIMAGE:jw00001001001\_01101\_00001.MIRIMAGE"," jw00035001001\_01101\_00001.MIRIMAGE"]:jw00035001001\_01101\_00001.MIRIMAGE"]

* Get first batch of datasetIds for instrument MIRI after 2015-06-22T15:26:31:

wget "http://jwdmsdevvm4:8888/crds/datasets?instrument=miri&minDate=2015-06-22T15:26:31"

returns

["jw00035001001\_01101\_00001.MIRIMAGE:jw00035001001\_01101\_00001.MIRIMAGE"]

* Get first batch of datasetIds for instrument BADINSTRUMENT:

wget "http://jwdmsdevvm4:8888/crds/datasets?instrument=BADINSTRUMENT"

returns

[]

* Get first batch of datasetIds for instrument MIRI after 2015-07-11T19:54:54 (Note: in this example maxHeaderBlockSize is 3 and there are a total of 7 datasetIds)

wget "http://jwdmsdevvm4:8888/crds/datasets? instrument=miri&minDate=2015-07-11T19:54:54&batchNum=0"

returns

["jw00001001001\_01101\_00001.MIRIMAGE:jw00001001001\_01101\_00001.MIRIMAGE"," jw00025001001\_01107\_49995.MIRIMAGE:jw00025001001\_01107\_49995.MIRIMAGE"," jw00025001001\_01107\_49996.MIRIMAGE:jw00025001001\_01107\_49996.MIRIMAGE"]

* Get second batch of datasetIds for instrument MIRI after 2015-07-11T19:54:54

wget "http://jwdmsdevvm4:8888/crds/datasets? instrument=miri&minDate=2015-07-11T19:54:54&batchNum=1"

returns

["jw00025001001\_01107\_49999.MIRIMAGE:jw00025001001\_01107\_49999.MIRIMAGE"," jw00025001001\_01107\_49998.MIRIMAGE:jw00025001001\_01107\_49998.MIRIMAGE"," jw00025001001\_01107\_49997.MIRIMAGE:jw00025001001\_01107\_49997.MIRIMAGE"]

* Get third batch of datasetIds for instrument MIRI after 2015-07-11T19:54:54

wget "http://jwdmsdevvm4:8888/crds/datasets? instrument=miri&minDate=2015-07-11T19:54:54&batchNum=2"

returns

["jw00025001001\_01107\_50000.MIRIMAGE:jw00025001001\_01107\_50000.MIRIMAGE"]

* Get fourth batch of datasetIds for instrument MIRI after 2015-07-11T19:54:54 (no data)

wget "http://jwdmsdevvm4:8888/crds/datasets? instrument=miri&minDate=2015-07-11T19:54:54&batchNum=3"

returns

[]

## Header rows limit

In order to avoid large queries, the number of datasetIds that can be returned by the Header query (see below) is limited. This value is set in a DADS config file, and can be queried as follows:

Example:

wget http://jwdmsdevvm4:8888/crds/maxHeaderBlockSize

returns

{"MaxHeaderBlockSize":4000}

## Headers by datasetIds

Given a list of datasetIds and parameters, this function will return a list of datasetIds, productLevels, parameters, and parameter values.

**NOTE:** If the number of datasetIds returned would be larger than the header rows limit (see section 3.2) then it is an error and no rows will be returned.

**NOTE:** If the user passes in a datasetId for which there is no level 1b-2b files then the returned value will be null (the same behavior as if the datasetId doesn’t exist in the database).

### Input:

* A file containing the datasetIds and parameters in the following format:

{

"CRDSHeaderQueryInput" : {

"datasetIds" : [

“<FileSetName>.<Detector>”,”<FileSetName>.<Detector?”,…

],

"parameters" : [

"<param1>",”<param2>”,…

]

}

}

There are 2 acceptable formats for datasetId:

1. Association:FileSetName.Detector will return the same Association:FileSetName.Dectector
2. FileSetName.Detector will return FileSetName.Detector:FileSetName.Detector

The parameters are in the format of the data model path, such as meta.instrument.name or meta.exposure.type

Output:

* {“datasetId1”, {“param1”:”value1”, “param2”:”value2”,…}, …} example: {" jw00035001001\_01101\_00001.MIRIMAGE:jw00035001001\_01101\_00001.MIRIMAGE":{"meta.exposure.comprssd":"","foo.bad.field":"UNDEFINED","unit.section\_name.cdelt\_1":"0.11","productLevel":"2b","META.INSTRUMENT.CCC\_STATE":"OPEN"}}
* If the requested parameter doesn’t exist then it will be returned with a value of “UNDEFINED”.
* If the requested parameter exists but the value is NULL it will be returned with a value of “”.
* If the requested datasetId doesn’t exist then it will be returned with a NULL value.
* If the requested datasetId is in a bad format then it will be ignored and will not appear in the output.

Example:

Input file testinput.json:

{

"CRDSHeaderQueryInput" : {

"datasetIds" : [

"MyAssoc:jw00002001001\_01101\_00001.NRCB1","badfileset.MIRIMAGE","jw00035001001\_01101\_00001.MIRIMAGE","jw00001001001\_01101\_00001.MIRIMAGE","OrphanAssoc","AnotherAssoc:jw00002001001\_01101\_00001.NRCB1"

],

"parameters" : [

"Meta.Exposure.Type","unit.section\_name.cdelt\_1","foo.bad.field","meta.instrument.channel","meta.instrument.detector","META.INSTRUMENT.CCC\_STATE","meta.exposure.comprssd"

]

}

}

wget --post-file=testinput.json --header="Content-type:application/json" http://jwdmsdevvm4:8888/crds/headers

returns

{"MyAssoc:jw00002001001\_01101\_00001.NRCB1":{"meta.exposure.comprssd":"F","meta.instrument.channel":"SHORT","foo.bad.field":"UNDEFINED","unit.section\_name.cdelt\_1":"0.032","META.INSTRUMENT.CCC\_STATE":"UNDEFINED","meta.instrument.detector":"NRCB1","Meta.Exposure.Type":"NRC\_IMAGEa"},"AnotherAssoc:jw00002001001\_01101\_00001.NRCB1":{"meta.exposure.comprssd":"F","meta.instrument.channel":"SHORT","foo.bad.field":"UNDEFINED","unit.section\_name.cdelt\_1":"0.032","META.INSTRUMENT.CCC\_STATE":"UNDEFINED","productLevel":"2b","meta.instrument.detector":"NRCB1","Meta.Exposure.Type":"NRC\_IMAGEa"}," jw00001001001\_01101\_00001.MIRIMAGE:jw00001001001\_01101\_00001.MIRIMAGE":{"meta.exposure.comprssd":"","meta.instrument.channel":"UNDEFINED","foo.bad.field":"UNDEFINED","unit.section\_name.cdelt\_1":"0.11","META.INSTRUMENT.CCC\_STATE":"OPEN","productLevel":"2b","meta.instrument.detector":"MIRIMAGE","Meta.Exposure.Type":"MIR\_IMAGEb"}," jw00035001001\_01101\_00001.MIRIMAGE:jw00035001001\_01101\_00001.MIRIMAGE":{"meta.exposure.comprssd":"","meta.instrument.channel":"UNDEFINED","foo.bad.field":"UNDEFINED","unit.section\_name.cdelt\_1":"0.11","META.INSTRUMENT.CCC\_STATE":"OPEN","productLevel":"2b","meta.instrument.detector":"MIRIMAGE","Meta.Exposure.Type":"MIR\_LRS-FIXEDSLITd"}," badfileset.MIRIMAGE:badfileset.MIRIMAGE":null}

### Stale data

In the JWST database, when a level 1b file is processed it replaces the keyword values of the 1a file, when 2a is processed it replaces the 1b values, and when 2b is processed it replaces the 2a values. When data is reprocessed, the highest level data is marked as stale and the cycle begins again. When a reprocessed file with the same level as the stale data is ingested, the stale data will be removed. For example, if we have processed a file through 2b then the database should look like this:

FileX, level=2b, val1, val2, val3, … isStale=False

When we start reprocessing, this row will be marked stale and we’ll insert a new row:

FileX, level=2b, val1, val2, val3, … isStale=**True** (original)

FileX, level=**1a**, val1, val2, val3, … isStale=False (reprocessed)

Further along in reprocessing the database would look like this:

FileX, level=2b, val1, val2, val3, … isStale=True (original)

FileX, level=**1b**, val1, val2, val3, … isStale=False (reprocessed)

When reprocessing is complete the database would look like this:

FileX, level=2b, val1, val2, val3, … isStale=**False** (**reprocessed**)

Usually this happens quickly and the chance for encountering stale data is small. However, if there’s a problem during reprocessing it’s possible for there to be stale data for an extended period of time.

**This method will return the highest level data available (1b – 2b), even if it’s stale.**

### Multiple rows

In the case that the database query returns more than one unique row per FileSetName.Detector, the row with the highest level (1b- 2b) will be returned.

If there is more than one unique row at the highest level (up to 2b) per FileSetName.Detector, only one row will be returned, and it is undefined which row it would be.

# Miscellaneous

* In production these queries should probably run against a replicated database in order to avoid any impact on the pipeline.
* A badly formatted input datasetid is not returned. An error is written to the log, but the datasetId is not returned to the user.
* This code is not as fast as it could be (returns parameters for 5000 ids in about 30 seconds when debugging is turned off). The Hibernate code could probably be tweaked to make it run faster.