

ZTF File Systems

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Some facts

Incoming raw image files will be generically named:

ztf_<YYYYMMDDdddd>_<fieldId>_<filter>_c<ccdId>_<type>.fits.fz

where:

fieldId = 000001 .. 001906

filter = two character string for filter ID

ccdId = 01 .. 16

type = o (science survey)

= b (bias image)

= f (flat-screen image)

e.g:

ztf_2017010103923_000123_sr_c12_o.fits.fz

Each CCD-based file above will be split into four readout-channel images from which products will ensue. The ZTF Camera has 16 CCDs, therefore resulting in 64 readout-channel images. We will label each readout-channel image using the following identifier range:

rcid = 00, 01, 02, ..., 63.

Operations file system

Figure 1 shows a schematic of the primary components of the file system under pipeline operations. Below is a summary of the subdirectories. Further below are example filenames that would reside under each subdirectory.

- **<rcid>/** = 01/, 02/, 03/, ... 63/: readout-channel based image and catalog products to facilitate pipeline communication and temporary storage prior to archiving. These are broken down into various types: epochal products (**realtime/**); reference-image products (**refimg/**); source-matching for lightcurve generation (**srcmtch/**); calibration products made from cal image data acquired at start of night (**calprod/**).
- **static/**: external catalogs and fallback image calibrations, broken down into catalogs for astrometric calibration and verification (**astrom/**); photometric calibration (**photom/**); fallback image calibrations (**calimg/**).
- **mopsprod/**: products from moving object pipeline system.
- **sw/**: pipeline software: binaries, scripts, libraries and dependencies reside under here.
- **cdf/**: pipeline configuration data files containing parameters for all software

File Server and Volume Partitioning

For the 64 readout-channel IDs (**rcid** = 00, 01, 02, ... 63), we can assign each to a unique volume. These volumes can then be apportioned to N different file servers. Alternatively, depending on the load, the file servers may also be configured to serve files from a mixture or any of the specific directories: **realtime/**, **refimg/**, **srcmtch/**, **calprod/**, **static/**. Symbolic links can be used to map components of this tree to specific storage volumes (TBD).

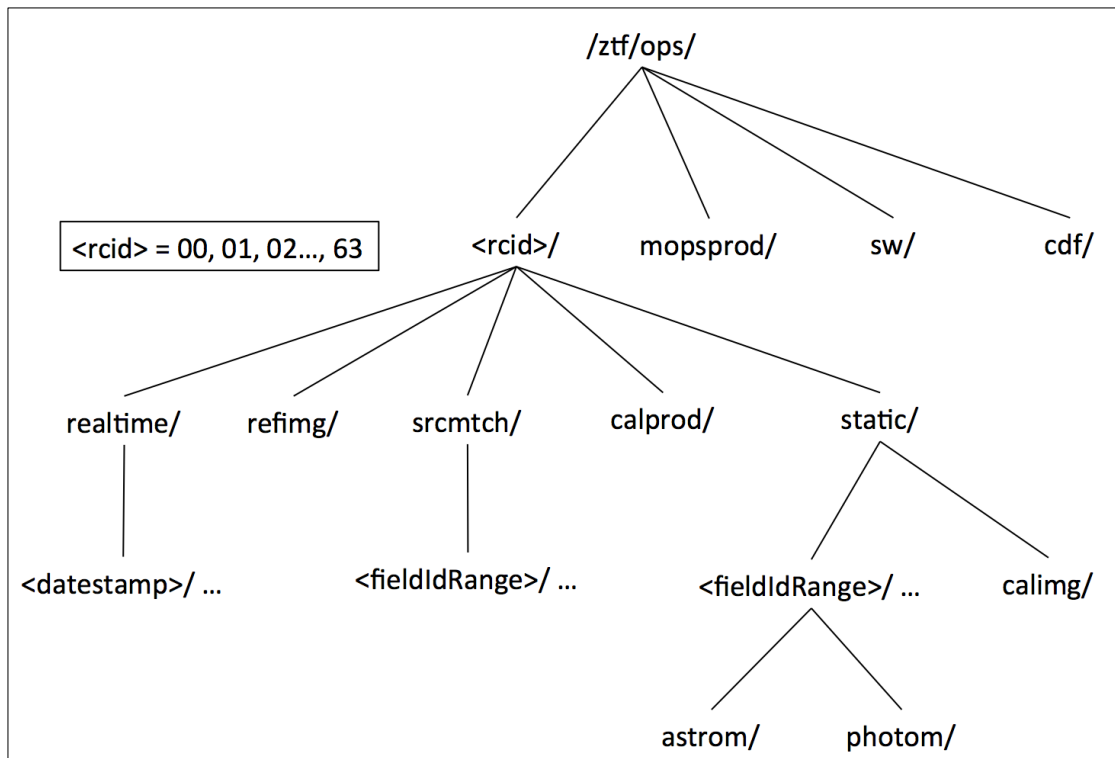


Figure 1: Directory structure for pipeline operations.

Longevity of products and subdirectory contents

realtime/: one night; to be archived next day. Maximum is three days.

calprod/: one night; to be archived next day. Maximum is three days.

refimg/: five days max; to allow for quick-look QA prior to archival. **Note:** will all be made during first few months of the survey.

srcmtch/: must persist for duration of survey; files will grow incrementally every two-weeks.

static/: must persist for duration of survey; **astrom/** & **photom/** regenerated if fieldIds change. The default fallback calibration files under **calimg/** will be periodically updated.

1. Filename examples under <rcid>/

Examples of paths/files down to each low-level directory under <rcid>/ are as follows:

```
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2.fits [raw split image]
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_sciimg.fits
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_mskimg.fits
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_sexcat.fits
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_psfcat.fits
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_diffimg.fits (no money!)
/ztf/ops/52/realtime/datestamp/ztf_20170101.03819_000432_yz_c12_q2_log.txt
```

...

```
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_refimg.fits
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_refcov.fits
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_refunc.fits
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_refsex.fits
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_refpsf.fits
/ztf/ops/52/refimg/ztf_000432_yz_c12_q2_reflog.fits
```

...

```
/ztf/ops/52/srcmtch/000350-000550/ztf_000432_yz_c12_q2_srcmtch.hdf
/ztf/ops/52/srcmtch/000350-000550/ztf_000432_yz_c12_q2_srcmtchlog.txt
```

...

```
/ztf/ops/52/calprod/ztf_20170101_yz_c12_q2_bias.fits
/ztf/ops/52/calprod/ztf_20170101_yz_c12_q2_flat.fits
```

...

```
/ztf/ops/52/static/<fieldIdRange>/astrom/gaia_filtcat_<fieldId>_c12_q2.tbl
/ztf/ops/52/static/<fieldIdRange>/astrom/tmass_filtcat_<fieldId>_c12_q2.tbl
/ztf/ops/52/static/<fieldIdRange>/photom/panstarrs_filtcat_<fieldId>_c12_q2.tbl
/ztf/ops/52/static/calimg/ztf_20170101_yz_c12_q2_fallbackbias.fits
/ztf/ops/52/static/calimg/ztf_20170101_yz_c12_q2_fallbackflat.fits
/ztf/ops/52/static/calimg/ztf_20170101_yz_c12_q2_lownuflat.fits
/ztf/ops/52/static/calimg/ztf_20170101_yz_c12_q2_pmask.fits
```

2. Filename examples under mopsprod/

There may be several separate MOPS runs per night. Each file product will be tagged with a “<mopsrunId>”, as follows:

```
/ztf/ops/mopsprod/ztf_20170101_yz_c12_r<mopsrunId>_tracklets.tbl  
/ztf/ops/mopsprod/ztf_20170101_yz_c12_r<mopsrunId>_meta.tbl  
/ztf/ops/mopsprod/ztf_20170101_yz_c12_r<mopsrunId>_log.tbl
```

3. Pipeline software and configuration (CDF) files

The following will mimic the build-output directory structure.

```
/ztf/ops/sw/  
/ztf/ops/cdf/
```

4. Static calibration data for pipelines

- static image masks
- fallback hi-nu flats
- to-be delivered low-nu responsivity maps
- fallback superbias frames
- external catalogs partitioned appropriately in sub-dirs for quick search
 - astrometric calibration support (e.g, Gaia, UCAC,... for SCAMP)
 - astrometric verification support (e.g., 2mass, other?)
 - photometric calibration (e.g., Pan STARRS)

```
/ztf/ops/<rcid>/static/
```

Example filenames are given in Section 1.

5. Work areas

```
/ztf/work/ztfpo/  
/ztf/work/ztfbr/  
/ztf/work/ztfri/  
/ztf/work/ztffm/  
/ztf/work/ztfds/  
/ztf/work/ztfsg/  
/ztf/work/ztfcb/  
...
```

6. User home directories

```
/home/<user>/
```

7. Inbox for ingestion of raw data

Staging area for ingestion.

/ztf/ingest/

8. IRSA inbox

Staging area for delivering DB load-files to archive:

/ztf/irsainbox/

9. Depot area

Staging area for realtime products for retrieval by external scanners.

/ztf/depot/

10. Raw image data archive

Partition using YYYYMMDD?

/ztf/archive/raw/

11. Cal data products archive

Partition using YYYYMMDD?

/ztf/archive/cal/

12. Science data products archive

- epochal images and catalogs
- reference images and catalogs
- difference images [no money for these yet]

Partition using YYYYMMDD?

/ztf/archive/proc/

13. Local scratch on nodes

Where pertinent, we may want to mimic a similar directory as shown in Figure 1.