

Common Queries

This document contains a compilation of expected LSST common queries. It is based on extrapolations of some past and existing surveys (e.g. SDSS, SuperMacho) and input from the LSST Science Collaborations. It is intended to be similar to the so-called "SDSS 20 Queries". The queries are ordered based on their importance. Importance is calculated based on input from the LSST Science Collaborations.

Note that we only support a somewhat restricted subset of SQL, these restrictions are described [here](#)).

Notation:

- :value indicates input value

\$ indicates that the query has not been written or the LSST schema does not support it yet.

The queries

Analysis of a single object

- Extract light curve for a given object (time, magnitude and/or position)
- Select the full color image of a single (given) galaxy
- Find an object with a particular objectId
- Select variable objects near a known galaxy
- Give me astrometry for a given moving object

Analysis of all objects meeting certain criteria

In a region

- Cone-magnitude-color search
- Select all galaxies in given area
- Select all variable objects in given area
- Select time series data for all objects in a given area of the sky, in a given photometric band with a given variability index
- How many objects cross both Jupiter and Saturn?
- Select all unresolved objects (stellar PSF) in a given region of sky, and return their attributes
- Select all unresolved object in a specified region with cuts on attributes
- For a specified patch of sky, give me the source count density of unresolved sources (star like morphology)

Across entire sky

- Select all variable objects of a specific type
- Random sample of the data
- Find all objects similar to the colors of a quasar with redshift in a given range
- Find quasars
- Find stars with multiple measurements and with certain magnitude variations
- Select all objects with certain variability or period or amplitude
- Low-z QSO candidates using the color cuts

- Select all "new" objects
- The BRG sample. Create a volume-limited sample of luminous red galaxies with $? < z < ?$ ^{\$}
- Return moving objects whose motion uncertainty is smaller than measured motion
- Find all galaxies brighter than given magnitude
- Find all galaxies with a deVaucouleurs profile (r² falloff of intensity on disk) and the photometric colors consistent with an elliptical galaxy^{\$}
- Find extremely red galaxies
- Find high proper motion white dwarf candidates
- Select objects with proper motion
- Select objects with a measured parallax
- Find galaxies with an isophotal surface brightness (SB) larger than ? in the ? band, with an ellipticity $\geq ?$ and with position angle between ? and ? arc seconds
- Search for Cataclysmic Variables and pre-CVs with White Dwarfs and very late secondaries
- Shape cut (select fuzzy objects)^{\$}
- Galaxies with bluer centers^{\$}
- Find possible stellar occultations by a given asteroid^{\$}
- Provide a list of moving objects consistent with an asteroid^{\$}
- Select diameter-limited sample of galaxies^{\$}
- Select all variable extended objects
- (Query Moving Object Catalog see ssd.jpl.nasa.gov)^{\$}
- Select all asteroids with certain color parameters
- Select time series for every object
- Select light curves for all potentially variable objects which are currently not classified as variable objects^{\$}
- Counts of objects that are unpaired between epochs^{\$}
- Find new transients for given epoch^{\$}
- Return info about extremely red objects^{\$}
- Matching Source Catalog with the SimRefObject catalog through precomputed Match table
- Matching detected stars with the SimRefObject catalog through precomputed Match table

Analysis of objects close to other objects

Find objects near one object meeting criteria

- Find all galaxies without saturated pixels within certain distance of a given point^{\$}

Find objects near objects in a region, meeting criteria

- Find and store near-neighbor objects in a given region
- For each galaxy in the BCG data set (brightest color galaxy), in given area, count the number of galaxies within ?" of it that have a photoz within ? of that galaxy^{\$}

Find objects near objects across entire sky, meeting criteria

- Find all objects within ? arcseconds of one another that have very similar colors
- Find galaxies that are blended with a star, output the deblended galaxy magnitudes^{\$}
- Search for merging galaxy pairs, as per the prescription in Allam et al. 2004^{\$}
- Find the brightness of the closest source within ? arcmin^{\$}
- Select all variable objects within certain distance of all known galaxies
- Find stars with stellar neighbors within distance x where at least one of the stellar neighbors has the

colors of a white dwarf

- Find variable stars close to hot stars
- For each galaxy in the BRG dataset, return those which have a neighbor closer than ? arcsec with ellipticity > ? and position angle <> ?^{\$}
- Find all objects within some distance of one another that have very similar colors and light curves^{\$}

Analysis that require special grouping

- Create a count of galaxies for each of the predefined areas which satisfy a certain color cut, generate output adequate for visualization^{\$}
- Find all galaxies in dense regions^{\$}
- Provide a list of star-like objects that are ?% rare
- Select all variable objects in clusters^{\$}

Time series analysis

- Find all objects that are varying with the same pattern as a given object, possibly at different time^{\$}
- Find stars that have light curves like a simulated one^{\$}
- Find all pairs of objects that have similar time series meeting certain criteria^{\$}
- Find all objects within ? arcseconds of one another that have very similar colors and light curves^{\$}
- Find Anomalies / Surprising Patterns in a Time Series^{\$}
- Time machine: how will this object look like at time x^{\$}

Cross match with external catalogs

- Joining LSST main catalogs with other catalogs (cross match)^{\$}
- Joining LSST main catalogs with other catalogs (anti-cross match)^{\$}

Quality Assurance

- Joins with reference catalogs

Questions to Science Collaborations

See Questions about Data Analysis Queries