LARGE SYNOPTIC SURVEY TELESCOPE

Large Synoptic Survey Telescope (LSST)
Data Management

LSST Science Platform Test Specification

G. P. Dubois-Felsmann, L.P. Guy, J. Carlin, K.S. Krughoff, C. Slater, M. Wood-Vasey

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Abstract

This document describes the detailed test specification for the LSST Science Platform. It is a work in progress; the current version provides Test Cases covering all requirements on the LSST Science Platform, however only ≈ 10% are currently fully specified. This document will be updated as work continues on completing Test Cases.

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LSST Science Platform Test Specification

1 Introduction

This document specifies the test procedure for the LSST Science Platform. The LSST Science Platform is the component of the LSST system which is responsible for providing data access and data analysis capabilities to users. It is aimed at meeting the needs of several categories of users, including:

- Science users with LSST data rights;
- LSST Project, and later, Operations staff doing algorithm development and the associated validations;
- LSST Project staff engaged in Commissioning and related activities; and
- LSST Operations staff engaged in science validation and other data quality analyses

A full description of this product is provided in LDM-542, with requirements enumerated in LDM-554.

1.1 Objectives

This document builds on the description of LSST Data Management's approach to testing as described in LDM-503 to describe the detailed tests that will be performed on the LSST Science Platform as part of the verification of the DM system.

It identifies test cases and procedures for the tests, and the pass/fail criteria for each test.

1.2 Scope

This document describes the test procedures for the following components of the LSST system (as described in LDM-542), and their deployment over the resources and services of the LSST Data Facility:

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- The science database, especially its Qserv component;
- The API Aspect of the Science Platform, comprising:
  - Catalog query via TAP and related VO services;
  - Image metadata query via TAP and SIAv2;
  - Image retrieval and cutout generation;
  - User Workspace database creation and access; and
  - User Workspace file system access.
- The Portal Aspect of the Science Platform, comprising a set of Web-based tools for:
  - Data discovery for Project-generated and user-generated data;
  - Catalog and image query;
  - Image display;
  - Catalog data visualization;
  - Exploratory data analysis; and
  - Alert subscription control.
- The Notebook Aspect of the Science Platform, comprising:
  - A deployment of the JupyterHub and JupyterLab interactive computing environments;
  - Access to the API Aspect services from within that environment;
  - Direct access to elements of the data systems underlying those services, e.g., access to the User File Workspace as a mounted filesystem rather than through the VOSpace API;
  - A customizable, persistent user environment; and
  - The provision of pre-built deployments of releases of the LSST Stack, usable to configure the computational environment provided by JupyterLab.

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1.3 Applicable Documents

LDM-148	LSST DM System Architecture
LDM-294	LSST DM Organization & Management
LDM-503	LSST DM Test Plan
LDM-542	LSST Science Platform Design
LDM-554	LSST Science Platform Requirements
LSE-61	LSST DM Subsystem Requirements
LSE-319	LSST Science Platform Vision Document
LSE-163	LSST Data Products Definition Document

1.4 References

[1] **[LSE-61]**, Dubois-Felsmann, G., Jenness, T., 2018, *LSST Data Management Subsystem Requirements*, LSE-61, URL https://ls.st/LSE-61

[2] **[LDM-542]**, Dubois-Felsmann, G., Lim, K.T., Wu, X., et al., 2017, *LSST Science Platform Design*, LDM-542, URL https://ls.st/LDM-542

[3] **[LDM-554]**, Dubois-Felsmann, G., Ciardi, D., Mueller, F., Economou, F., 2018, *Science Platform Requirements*, LDM-554, URL https://ls.st/LDM-554

[4] **[LSE-319]**, Jurić, M., Ciardi, D., Dubois-Felsmann, G., 2017, *LSST Science Platform Vision Document*, LSE-319, URL https://ls.st/LSE-319

[5] **[LSE-163]**, Jurić, M., et al., 2017, *LSST Data Products Definition Document*, LSE-163, URL https://ls.st/LSE-163

[6] **[LDM-148]**, Lim, K.T., Bosch, J., Dubois-Felsmann, G., et al., 2018, *Data Management System Design*, LDM-148, URL https://ls.st/LDM-148

[7] **[LDM-502]**, Nidever, D., Economou, F., 2016, *The Measurement and Verification of DM Key Performance Metrics*, LDM-502, URL https://ls.st/LDM-502

[8] **[LDM-294]**, O'Mullane, W., Swinbank, J., Jurić, M., DMLT, 2018, *Data Management Organization and Management*, LDM-294, URL https://ls.st/LDM-294

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[9] **[LDM-503]**, O'Mullane, W., Swinbank, J., Jurić, M., Economou, F., 2018, *Data Management Test Plan*, LDM-503, URL https://ls.st/LDM-503

[10] **[LPM-122]**, Petravick, D., 2015, *LSST Information Classification Policy*, LPM-122, URL https://ls.st/LPM-122

2 Approach

The major activities to be performed are to:

- Verify that the LSST Science Platform components are capable of performing the functions defined in the relevant DM System Requirements, LSE-61, and in the Science Platform Requirements, LDM-554.
- Ensure that the components of the Science Platform match the documented design.
- Test all the interfaces among components of the Science Platform.
- Test all the interfaces between components of the Science Platform and other DM system components.
- Within the limits of available integration and test hardware platforms and datasets, verify that the Science Platform components meet the performance requirements set forth in the above documents, or extrapolate appropriately from the test systems available to verify that the performance requirements should be met on a fully provisioned hardware platform.
- Repeat these tests when the full hardware platform becomes available.
- Ensure that the test procedures developed are also relevant to pre-deployment testing in the Operations era.
- Ensure that the observed behavior of the Science Platform components when under test is consistent with the available documentation produced by their developers or by other authors.

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2.1 Tasks and criteria

The following are the major items under test:

- The LSST science database;
- The API Aspect of the Science Platform, encompassing Web APIs for access to LSST Data Products, both within the science database and within the Data Backbone, and enabling the creation, sharing, and management of User Generated Data Products;
- The Portal Aspect of the Science Platform, encompassing user interfaces for data discovery, retrieval, visualization, and exploratory data analysis, as well as an interface for the control of the alert subscription and "mini-broker" filtering mechanism; and
- The Notebook Aspect of the Science Platform, providing interactive computing services for LSST science users and project-internal analysts.

2.2 Features to be tested

- Availability and, where relevant, proper interpretation of Prompt Data Products through each Aspect of the Science Platform;
- Availability and, where relevant, proper interpretation of Data Release Data Products through each Aspect of the Science Platform;
- Creation of, access to, and management of User Generated Data Products through each Aspect of the Science Platform;
- Features related to authentication and authorization of users, including those related to custom access controls to User Generated Data Products;
- Features related to the manageability of the Science Platform as an operational service; and
- Integration of the components of the Science Platform with each other and with the underlying services on which they run.

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2.3 Features not to be tested

This document does not describe facilities for periodically generating or collecting key performance metrics (KPMs), except insofar as those KPMs are incidentally measured as part of executing the documented testcases. The KPMs and the system being used to track KPMs and to ensure compliance with documented requirements are described in LDM-502.

2.4 Pass/fail criteria

The results of all tests will be assessed using the criteria described in LDM-503 §4.

Note that, when executing pipelines, tasks or individual algorithms, any unexplained or unexpected errors or warnings appearing in the associated log or on screen output must be described in the documentation for the system under test. Any warning or error for which this is not the case must be filed as a software problem report and filed with the DMCCB.

2.5 Suspension criteria and resumption requirements

Refer to individual test cases where applicable.

2.6 Naming convention

With the introduction of Jira ATM plugin, the adopted naming convention is based on the corresponding Jira objects:

LVV : Is the label for the "LSST Verification and Validation" project in Jira.

LVV-XXX : Are Verification Elements, where XXX is the Verification Element identifier. Each Verification Element has at least one Test Case.

LVV-TYYY : Are Test Cases. Each Test Case is associated with a Verification Element, where YYY is the Test Case identifier.

A few deprecated test cases are still reporting in the name the old identification, that was according to the pattern LSP-XX-YY where:

LSP The product under test: the LSST Science Platform

xx Test specification number (in increments of 10)

yy Test case number (in increments of 5)

3 Test Cases Summary

Test Id	Test Name
LVV-T2	LSP-00-00: Verification of the presence of the expected WISE data
LVV-T3	LSP-00-05: Demonstration of low-volume and/or indexed queries against the WISE data via API
LVV-T4	LSP-00-10: Demonstration of table-scan queries against the WISE data via API
LVV-T5	LSP-00-15: Execution of basic catalog queries in the Portal
LVV-T6	LSP-00-20: Operation of the UI for interaction with tabular data results
LVV-T7	LSP-00-25: Image metadata, image, and image cutout queries
LVV-T8	LSP-00-30: Linkage of catalog query results with associated images
LVV-T9	LSP-00-35: Linkage of catalog query results to related catalog data
LVV-T598	Verify access to All Released or Authorized Data Products
LVV-T600	Verify LSP provides a portal aspect
LVV-T601	Verify LSP provides a notebook aspect
LVV-T602	Verify LSP provides web API
LVV-T603	Verify data access through multiple linked aspects
LVV-T604	Verify use of VO standards
LVV-T605	Verify that LSP complies with LSST data access policies
LVV-T606	Verify semantic linkages between data items
LVV-T607	Verify semantic linkages between data items and uncertainties
LVV-T608	Verify transfer of Portal data references to Notebook aspect
LVV-T609	Verify providing user file storage in LSP
LVV-T610	Verify providing user generated database in LSP
LVV-T611	Verify access controls in user workspace
LVV-T612	Verify ability to download data from LSP
LVV-T613	Verify ability to upload data to LSP
LVV-T614	Verify ability to transfer data to and from the Workspace
LVV-T615	Verify file formats provided for tabular data download

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Test Id	Test Name
LVV-T616	Verify file formats provided for image data download
LVV-T617	Verify support for peak volume of moderate-sized queries
LVV-T618	Verify support for peak volume of queries on all Objects
LVV-T619	Verify LSP handles peak volume of queries
LVV-T620	Verify LSP supports required download bandwidth
LVV-T621	Verify LSP user reference and documentation
LVV-T622	Verify LSP only available to authenticated users
LVV-T623	Verify support for new LSP users
LVV-T624	Verify implementation of common identity across LSP aspects
LVV-T625	Verify authentication via external identity providers
LVV-T626	Verify LSP identity can have multiple associated credentials
LVV-T627	Verify implementation of Acceptable Use Policy
LVV-T628	Verify LSP connections encrypted
LVV-T629	Verify privacy of users' activities
LVV-T630	Verify multiple LSP instances
LVV-T631	Verify LSP access from the public Internet (IPv4)
LVV-T632	Verify LSP access from the public Internet (IPv6)
LVV-T633	Verify indication of system availability
LVV-T634	Verify Portal is a web application
LVV-T635	Verify Portal discovery of all data products
LVV-T636	Verify Portal access to Workspace
LVV-T637	Verify Portal provides semantic linkages between data products
LVV-T638	Verify access to calibration products via Portal
LVV-T639	Verify associations between single images and coadds
LVV-T640	Verify access to external archives from Portal
LVV-T641	Verify API for Access to Portal Session State
LVV-T642	Verify Portal supports both synchronous and asynchronous queries
LVV-T643	Verify capability to run long queries in the background
LVV-T644	Verify user notification of query status
LVV-T645	Verify limitation of query results size
LVV-T646	Verify ability to browse query history
LVV-T647	Verify implementation of saving of queries
LVV-T648	Verify implementation of generic queries in API aspect
LVV-T649	Verify implementation of form-based generic query in API aspect

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Test Id	Test Name
LVV-T650	Verify implementation of ADQL-based generic query in API aspect
LVV-T651	Verify estimation of query result size
LVV-T652	Verify query by unique identifier
LVV-T653	Verify query by object or source identifier
LVV-T654	Verify query by Solar System object identifier
LVV-T655	Verify query by position on the sky
LVV-T656	Verify query by list of positions
LVV-T657	Verify implementation of astrophysical coordinate systems
LVV-T658	Verify positional query by astrophysical source name
LVV-T659	Verify positional query by Source or Object name
LVV-T660	Verify positional query based on Solar System object names
LVV-T661	Verify query by cone search
LVV-T662	Verify query by box search
LVV-T663	Verify query by time of observation
LVV-T664	Verify implementation of user-friendly tabular query
LVV-T666	Verify query by image metadata
LVV-T667	Verify queries on the alerts database
LVV-T668	Verify access to original alert state
LVV-T669	Verify query for single-epoch visit images
LVV-T670	Verify query for single-epoch raft images
LVV-T671	Verify query for single-epoch CCD images
LVV-T672	Verify metadata query for single-epoch images
LVV-T673	Verify query for coadds by image metadata
LVV-T674	Verify query for coadd image cutouts
LVV-T675	Verify query for single-epoch image cutouts
LVV-T676	Verify display of native single-visit images
LVV-T677	Verify Portal provides visualization of tabular and image data
LVV-T678	Verify visualization of ancillary information
LVV-T679	Verify visualization linking image and tabular data
LVV-T680	Verify visualization tool for uploaded tabular or image data
LVV-T681	Verify visualization of workspace data
LVV-T682	Verify availability of property sheets for table rows
LVV-T683	Verify visualization of alerts
LVV-T684	Verify display of tabular data

Draft

Test Id	Test Name
LVV-T685	Verify column selection from tables
LVV-T686	Verify capability to re-order columns in displayed tabular data
LVV-T687	Verify capability of copying data in tables
LVV-T688	Verify row selection from tables
LVV-T689	Verify capability to display tabular data in paged format
LVV-T690	Verify creation and display of X-Y scatter plots
LVV-T691	Verify creation and display of histogram plots
LVV-T692	Verify capability to change symbol shapes, sizes, and colors in XY(Z) scatter plots
LVV-T693	Verify visualization of uncertainties in plots
LVV-T694	Verify visualization of asymmetric uncertainties
LVV-T695	Verify visualization of upper and lower limits in plots
LVV-T696	Verify visualization of multiple XY plots on the same display
LVV-T697	Verify display of raft and full focal-plane single-visit images
LVV-T698	Verify display of cutout from single-visit image
LVV-T699	Verify display of native coadd images
LVV-T700	Verify display of coadd cutouts and mosaics
LVV-T701	Verify display of calibration images
LVV-T702	Verify display of user-provided images
LVV-T703	Verify display of image property sheet
LVV-T704	Verify that coordinate display tools are provided for images
LVV-T705	Verify image pixel content display
LVV-T706	Verify spatial manipulation of images
LVV-T707	Verify multi-image scaling and alignment
LVV-T708	Verify manipulation of image appearance
LVV-T709	Verify display of image mask and variance overlays
LVV-T710	Verify display of plot overlays on images
LVV-T711	Verify capability to adjust the appearance of plot overlays on images
LVV-T712	Verify display all-sky HEALPix image
LVV-T713	Verify ability to zoom in/out on a HEALPix image
LVV-T714	Verify panning in HEALPix image display
LVV-T715	Verify selection of HEALPix pixels
LVV-T716	Verify retrieval of HEALPix-associated data
LVV-T717	Verify broad applicability of coordinate display

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Test Id	Test Name
LVV-T718	Verify point coordinate display
LVV-T719	Verify distance measurement tool
LVV-T720	Verify coordinate grid overlays
LVV-T721	Verify astrophysical compass overlay
LVV-T722	Verify geometric figure overlays
LVV-T723	Verify sorting of tabular data by column
LVV-T724	Verify simple filtering of tabular data
LVV-T725	Verify calculated filtering of tabular data
LVV-T726	Verify filtering data by multiple table columns
LVV-T727	Verify calculated tabular data columns
LVV-T728	Verify statistical measurements on tabular data
LVV-T729	Verify saving of displayed tabular data
LVV-T730	Verify creation and display of false-color images
LVV-T731	Verify statistical measurements on user-selected regions of images
LVV-T732	Verify overlay of catalog sources/objects on images
LVV-T733	Verify overlay of LSST-derived orbits on images
LVV-T734	Verify overlay of user-supplied catalogs on images
LVV-T735	Verify overlay of user-supplied region files on images
LVV-T736	Verify overlay of camera artifacts on images
LVV-T737	Verify single-object time-domain image view
LVV-T738	Verify position-based time-domain image view
LVV-T739	Verify display of light curves
LVV-T740	Verify linked tables, plots, and images
LVV-T741	Verify capability to select data from a plot or image
LVV-T742	Verify saving data selection from a plot or image
LVV-T743	Verify access to user databases
LVV-T744	Verify tabular data download
LVV-T745	Verify image data download
LVV-T746	Verify selected image download
LVV-T747	Verify estimation of data download volume
LVV-T748	Verify notification of long download completion
LVV-T749	Verify API for visualization components
LVV-T750	Verify implementation of storage quotas status

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Test Id	Test Name
LVV-T751	Verify implementation of computational quotas status
LVV-T752	Verify saved Portal display preferences
LVV-T753	Verify alert subscription service
LVV-T754	Verify availability of pre-defined alert filters
LVV-T755	Verify availability of user-defined alert filters
LVV-T756	Verify monitoring of alert subscription
LVV-T757	Verify access to survey documentation
LVV-T758	Verify access to Portal documentation
LVV-T759	Verify access to Portal API documentation
LVV-T760	Verify tolerance of database changes
LVV-T761	Verify implementation of system-busy notification
LVV-T762	Verify availability of interactive Python environment
LVV-T763	Verify availability of Unix shell access
LVV-T764	Verify availability of containerized software releases
LVV-T765	Verify latency of release deployment
LVV-T766	Verify availability of data access middleware
LVV-T767	Verify availability of standard astronomy software
LVV-T768	Verify availability of user package installation
LVV-T769	Verify availability of user development environment
LVV-T770	Verify availability of persistent user home file space
LVV-T771	Verify availability of Notebook aspect documentation
LVV-T772	Verify new-user onboarding
LVV-T773	Verify availability of shared file space
LVV-T774	Verify API and Portal aspects accessible from Notebook
LVV-T775	Verify access to User File Workspace
LVV-T776	Verify access to VOSpace services from Notebook aspect
LVV-T777	Verify user database workspace access from Notebook aspect
LVV-T778	Verify access to batch system
LVV-T779	Verify implementation of quotas in Notebook aspect
LVV-T780	Verify access to all data products from Notebook aspect
LVV-T781	Verify ease of Notebook aspect deployment
LVV-T782	Verify workload for deployment in Kubernetes
LVV-T783	Verify monitoring of Notebook system health
LVV-T784	Verify visualization of images in Notebook aspect

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Test Id	Test Name
LVV-T785	Verify availability of scientific plotting tools in Notebook aspect
LVV-T786	Verify linkage of visualization tools in Notebook aspect
LVV-T787	Verify interactivity of visualizations in Notebook aspect
LVV-T788	Verify interactive scaling of visualizations in Notebook aspect
LVV-T789	Verify access to Portal queries from Notebook aspect
LVV-T790	Verify access to Portal visualization API from Notebook aspect
LVV-T791	Verify ability to launch a notebook with access to Portal query results
LVV-T792	Verify implementation of secure protocol for Notebook aspect
LVV-T793	Verify implementation of authentication and authorization service in Notebook aspect
LVV-T794	Verify secure implementation of Notebook aspect
LVV-T795	Verify access to Notebook aspect via IPv6
LVV-T796	Verify web APIs use CAOM2
LVV-T797	Verify API access to image and visit metadata
LVV-T798	Verify API access to catalog data products
LVV-T799	Verify API access to observatory metadata
LVV-T800	Verify API enforcement of information classification
LVV-T801	Verify API access to reference catalogs
LVV-T802	Verify API access to virtual data products
LVV-T803	Verify API access to FITS image data
LVV-T804	Verify API access to multiple data releases
LVV-T805	Verify API provides catalog metadata
LVV-T806	Verify availability of TAP service
LVV-T807	Verify synchronous TAP queries
LVV-T808	Verify asynchronous TAP queries
LVV-T809	Verify availability of ADQL for queries
LVV-T810	Verify SIA service for image availability
LVV-T811	Verify availability of SODA service for image data
LVV-T812	Verify API SODA cutout image support
LVV-T813	Verify query history retrieval
LVV-T814	Verify availability of cached query result retrieval
LVV-T815	Verify retrieval of query specifications
LVV-T816	Verify Butler interface to data products
LVV-T817	Verify availability of VOSpace service

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Test Id	Test Name
LVV-T818	Verify availability of WebDAV service
LVV-T819	Verify VOTable 1.3 support
LVV-T820	Verify support for VOTable TABLEDATA payload
LVV-T821	Verify support for VOTable BINARY2 payload
LVV-T822	Verify JSON support for TAP outputs
LVV-T823	Verify CSV support for TAP outputs
LVV-T824	Verify SQLite support for TAP outputs
LVV-T825	Verify support for tabular result download to Workspace
LVV-T826	Verify support for tabular upload to Workspace
LVV-T827	Verify ability to drop catalogs from Workspace
LVV-T828	Verify API uses secure protocols
LVV-T829	Verify API authentication
LVV-T830	Verify API uses project authorization infrastructure
LVV-T831	Verify secure implementation of APIs
LVV-T832	Verify containerized deployment of API services
LVV-T833	Verify support for compression of API results
LVV-T834	Verify API upgradeability
LVV-T835	Verify API logging and monitoring

Draft

4 Test Cases

4.1 LVV-T2 - LSP-00-00: Verification of the presence of the expected WISE data

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.1.1 Verification Elements

- LVV-9807 - DMS-LSP-REQ-0001-V-01: Access to All Released or Authorized Data Products_1
- LVV-9809 - DMS-LSP-REQ-0005-V-01: Linkage of Aspects_1

4.1.2 Test Items

This test will check:

- That the expected tables are present in the database and accessible via the API Aspect and the Portal Aspect;
- That the tables are present with the expected schema as documented in the IPAC- provided WISE documentation;
- That the row counts in the tables are as expected;
- That the tables cover essentially the entire sky, as expected from the characteristics of the WISE mission.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0001
- DMS-LSP-REQ-0005

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4.1.3 Predecessors

None.

4.1.4 Environment Needs

4.1.4.1 Software The test must, and can only, be carried out on the PDAC instance of the Science Platform. It relies on the availability of the IRSA deployment of the WISE and ALLWISE data to use in order to perform comparisons on content and performance.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.
The API Aspect tests will be captured in a Jupyter notebook run locally on the client computer, so the client system must have a recent production version of Jupyter installed. (The test does not depend on features of JupyterLab in any way, only the standard Notebook.)

4.1.4.2 Hardware

4.1.5 Input Specification

The test verifies, and therefore requires, the presence of the following WISE tables on the PDAC systems:

- The Source Catalog table from the AllWISE data release;
- The Multi-Epoch Photometry (MEP) table from the AllWISE data release;
- The Single-exposure Source Database from the WISE All-Sky data release (i.e., from the full-cryo 4-band phase of the original mission);
- The Single-exposure Source Database from the WISE 3-Band Cryo data release (i.e.,from the 3-band, inner-cryogen-tank-only phase of the mission);
- The Single-exposure Source Database from the NEOWISE Post-Cryo data release (i.e., from the 2-band warm phase of the mission, pre-hibernation);and

- The Single-exposure Source Database from the NEOWISE Reactivation 2015 data release (i.e., from the first year of the 2-band post-reactivation phase of the mission).

4.1.6 Output Specification

The output will consist of:

- A Jupyter notebook of the API Aspect tests performed;
- A written log of the tests performed on the GUI-based Portal Aspect; and
- A collection of the files that resulted from data download actions performed as part of the tests.

4.1.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Clone the Github lsst/LDM-540 package. Record the SHA1 for the version of the package to be used. [Additional procedures, e.g., tagging, are still to be confirmed.]
	Test Data	No data.
	Expected Result	
2	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used. Log the version of Jupyter to be used.
	Test Data	No data.
	Expected Result	
3	Description	Establish VPN connectivity to the PDAC at NCSA
	Test Data	No data.
	Expected Result	
4	Description	Execute the LDM-540/test_scripts/lsp-00-00.ipynb notebook to perform the tests listed above against the API Aspect.
	Test Data	No data.
	Expected Result	

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Step	Description, Input Data and Expected Result	
5	Description	Preserve any outputs of the script that are in the form of files outside the notebook.
	Test Data	No data.
	Expected Result	
6	Description	Manually perform, and log, the following steps against the Portal Aspect: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Navigate to the list of WISE catalogs available. Preserve screen shots as needed to document that the UI offers access to the required catalogs. 3. Perform a trivial query against each required catalog to confirm that the UI does indeed provide access. These queries should match ones in the API Aspect test notebook and will generally be small cone searches around (ra=0, dec=0). Document the query results with screen shots. It is not necessary at this time to exhaustively verify that the Portal provides access to every column of every table; spot checks should be performed and documented. (A later test will perform a full column-by-column verification, once test data more closely matching the final DPDD-driven LSST data products are available.)
	Test Data	No data.
	Expected Result	

4.2 LVV-T3 - LSP-00-05: Demonstration of low-volume and/or indexed queries against the WISE data via API

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.2.1 Verification Elements

- LVV-9808 - DMS-LSP-REQ-0004-V-01: API (Data Access) Aspect_1

Draft

4.2.2 Test Items

This test will check that the following low-volume queries can be performed against the WISE catalogs via the API Aspect.

- Small cone searches against the Object-like, ForcedSource-like, and Source-like tables; and
- Searches by exact ID matching against the Object-like, ForcedSource-like, and Source-like tables

The tests will record their performance for comparison against similar queries in the production WISE archive at IRSA, and the returned data will be compared to that for similar queries against the API services provided by IRSA.

Requirement (to remove once requirements are synchronized from magic draw)
DMS-LSP-REQ-004

4.2.3 Predecessors

LSP-00-15

4.2.4 Environment Needs

4.2.4.1 Software

4.2.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform. It relies on the availability of the IRSA deployment of the WISE and ALLWISE data to use in order to perform comparisons on content and performance.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).

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The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.
The tests will be captured in a Jupyter notebook run locally on the client computer, so the client system must have a recent production version of Jupyter installed. (The test does not depend on features of JupyterLab in any way, only the standard Notebook.)

4.2.5 Input Specification

The test requires, the presence of the following WISE tables on the PDAC systems:

- The Source Catalog table from the AllWISE data release;
- The Multi-Epoch Photometry (MEP) table from the AllWISE data release;
- The Single-exposure Source Database from the WISE All-Sky data release (i.e., from the full-cryo 4-band phase of the original mission); and
- TheSingle-exposureSourceDatabasefromtheNEOWISEReactivation2015datarelease (i.e., from the first year of the 2-band post-reactivation phase of the mission).

(The 3-band and 2-band Single-exposure Source Database tables from the pre-hibernation mission are not queried in this test case, for the sake of simplicity. These tables are smaller than the two Single-exposure Source Database tables that are included in the test case.)

4.2.6 Output Specification

The output will consist of:

- A Jupyter notebook of the API Aspect tests performed; and
- A collection of the files that resulted from data download actions performed as part of the tests.

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4.2.7 Test Procedure

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Step	Description, Input Data and Expected Result	
1	Description	Clone the Github lsst/LDM-540 package. Record the SHA1 for the version of the package to be used. [Additional procedures, e.g., tagging, are still to be confirmed.]
	Test Data	No data.
	Expected Result	
2	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used. Log the version of Jupyter to be used.
	Test Data	No data.
	Expected Result	
3	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.
	Expected Result	
4	Description	Execute the LDM-540/test_scripts/lsp-00-05.ipynb notebook to perform the tests listed above against the API Aspect.
	Test Data	No data.
	Expected Result	
5	Description	Preserve any outputs of the script that are in the form of files outside the notebook.
	Test Data	No data.
	Expected Result	

4.3 LVV-T4 - LSP-00-10: Demonstration of table-scan queries against the WISE data via API

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

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4.3.1 Verification Elements

- LVV-9824 - DMS-LSP-REQ-0028-V-01: Peak Volume for Moderate-Sized Queries_1
- LVV-9825 - DMS-LSP-REQ-0029-V-01: Peak Volume for Queries on all Objects_1

4.3.2 Test Items

This test exercises a range of table-scan-type queries against the WISE data. Queries shall be performed against the Object-like table, the Forced-Source-like table, and against at least one of the Source-like tables. A range of query result sizes should be exercised, and shall include at least:

- Queries returning a very small amount of data, fewer than 100 rows, and a small subset of columns;
- Queries matching a scaled version of the "low volume" query definition from the Data Access White Paper; and
- Queries matching a scaled version of the "high volume" query definition from the Data Access White Paper.

The scaling of the "low volume" query definition ("50 simultaneous queries against 10 million objects in the catalog, response 10 sec, result data set: 0.1 GB") is based on a assumption that the "against 10 million objects" is applied against the O(20 billion) rows anticipated in the Object table, and that it contemplates reducing the scope of any non-indexed portion of the WHERE clause of the query to that fraction of one in ~ 2000 of the rows in the table. Scaled to the ~ 750 million rows in the WISE Object-like (AllWISE "Source Catalog") table, this would be ~ 375,000 rows. Similarly scaling the result set size suggests a result set of ~ 3.7 MB.
Successful completion will be evaluated based on the system's ability to perform the query at all and to return a result with characteristics corresponding to plausible estimates or extrapolations from scaled-down queries against the IRSA WISE archive. Exact verification may not be realistic because of the lack of a system capable of performing the equivalent queries in the production WISE archive.
At a later date it may be possible to attempt equivalent queries using a non-database system and verify the exact correspondence of results, but the non-database system does not presently exist1.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0028
- DMS-LSP-REQ-0029

4.3.3 Predecessors

LSP-00-00

4.3.4 Environment Needs

4.3.4.1 Software

4.3.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform. It relies on the availability of the IRSA deployment of the WISE and ALLWISE data to use in order to perform comparisons on content and performance.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.
The tests will be captured in a Jupyter notebook run locally on the client computer, so the client system must have a recent production version of Jupyter installed. (The test does not depend on features of JupyterLab in any way, only the standard Notebook.)

4.3.5 Input Specification

This test requires the presence of the following WISE tables on the PDAC systems:

- The Source Catalog table from the AllWISE data release;

- The Multi-Epoch Photometry (MEP) table from the AllWISE data release;

The results are assumed to apply to the other tables in the PDAC WISE dataset, all of which are comparable or smaller in size.

4.3.6 Output Specification

The output will consist of:

- A Jupyter notebook of the API Aspect tests performed; and
- A collection of the files that resulted from data download actions performed as part of the tests.

4.3.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Clone the Github lsst/LDM-540 package. Record the SHA1 for the version of the package to be used. [Additional procedures, e.g., tagging, are still to be confirmed.]
	Test Data	No data.
	Expected Result	
2	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used. Log the version of Jupyter to be used.
	Test Data	No data.
	Expected Result	
3	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.
	Expected Result	
4	Description	Execute the LDM-540/test_scripts/lsp-00-10.ipynb notebook to perform the tests listed above against the API Aspect.
	Test Data	No data.
	Expected Result	

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Step	Description, Input Data and Expected Result	
5	Description	Preserve any outputs of the script that are in the form of files outside the notebook.
	Test Data	No data.
	Expected Result	

4.4 LVV-T5 - LSP-00-15: Execution of basic catalog queries in the Portal

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.4.1 Verification Elements

- LVV-9811 - DMS-LSP-REQ-0002-V-01: Portal Aspect_1
- LVV-9819 - DMS-LSP-REQ-0014-V-01: Download Data_1
- LVV-9862 - DMS-PRTL-REQ-0022-V-01: Positional Query: Astrophysical Coordinate Systems_1
- LVV-9865 - DMS-PRTL-REQ-0021-V-01: Positional Query: Multiple Positions/Objects_1
- LVV-9869 - DMS-PRTL-REQ-0026-V-01: Positional Query by Region: Cone-Search_1
- LVV-9868 - DMS-PRTL-REQ-0027-V-01: Positional Query by Region: Box-Search_1
- LVV-9859 - DMS-PRTL-REQ-0028-V-01: Query by Identifier_1
- LVV-9856 - DMS-PRTL-REQ-0016-V-01: Generic Query - Form-based_1

4.4.2 Test Items

This test will test the functional requirements to be able to perform a range of basic queries through the Portal Aspect of the LSP:

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- Cone searches on the Object-like, ForcedSource-like, and Source-like WISE tables; • Multi-target cone searches;
- Form-based searches for exact equality, e.g., for row IDs; and
- Form-based searches for sets of object attributes.

In addition, it tests the ability to download tabular query results from the Portal Aspect.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0002
- DMS-LSP-REQ-0014
- DMS-PRTL-REQ-0022
- DMS-PRTL-REQ-0021
- DMS-PRTL-REQ-0026
- DMS-PRTL-REQ-0027
- DMS-PRTL-REQ-0028
- DMS-PRTL-REQ-0016

4.4.3 Predecessors

LSP-00-05
LSP-00-10
LSP-00-20

4.4.4 Environment Needs

4.4.4.1 Software

4.4.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform. It relies on the availability of the IRSA deployment of the WISE and ALLWISE data to use in order to perform comparisons on content and performance.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.

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The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.

4.4.5 Input Specification

The test requires the presence of the following WISE tables on the PDAC systems:

- The Source Catalog table from the AllWISE data release;
- The Multi-Epoch Photometry (MEP) table from the AllWISE data release;
- The Single-exposure Source Database from the WISE All-Sky data release (i.e., from the full-cryo 4-band phase of the original mission);
- TheSingle-exposure Source Database from the NEOWISE Reactivation 2015 data release (i.e., from the first year of the 2-band post-reactivation phase of the mission).

4.4.6 Output Specification

The output will consist of:

- A written log of the tests performed on the GUI-based Portal Aspect; and
- A collection of the files that resulted from data download actions performed as part of the tests.

4.4.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used.
	Test Data	No data.
	Expected Result	
2	Description	Establish VPN connectivity to the PDAC at NCSA.

Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	
3	Description	Manually perform, and log, the following steps against the Portal Aspect: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Perform a cone search around (ra=0,dec=0), radius 300 arcseconds, in each of the Object-like, ForcedSource-like, and a Source-like catalog. Choose a row from each search and record the primary key value for each for later use. Take screen shots of the search form and of the results of the three searches. Record the wall clock time required for the searches, if long enough to measure. 3. Perform a multi-object cone search based on the coordinates in the file LDM-540/test_scripts/lsp-00-15.coords in the Object-like table. Take screen shots of the search form and of the results of the search. Record the wall clock time required for the searches, if long enough to measure. 4. Perform a search on each of the Object-like, ForcedSource-like, and Source-like catalogs for the IDs previously saved. Confirm that each search is successful and re- turns the same information as in the original search from which the ID was taken. Perform a search on the ForcedSource-like catalog using the ID from the Object- like catalog. Confirm that a time series of measurements of that object in multiple epochs is returned. Take screen shots of the search forms and of the results of the searches. Record the wall clock time required for the searches, if long enough to measure. 5. On each of the Object-like catalog and a Source-like catalog, by performing searches over small regions of sky and exploring the results, choose a set of attributes and search parameters which should select a relatively small number of rows (< 100, 000) when applied to the entire sky. This may require some iterative experimentation at increasingly larger scales. Take screen shots of the final search forms and of the results of the searches. Record the wall clock time required for the searches, if long enough to measure.
	Test Data	No data.
	Expected Result	

4.5 LVV-T6 - LSP-00-20: Operation of the UI for interaction with tabular data results

Version	Status	Priority	Verification Type	Owner

1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.5.1 Verification Elements

- LVV-9895 - DMS-PRTL-REQ-0056-V-01: Histograms_1
- LVV-9901 - DMS-PRTL-REQ-0055-V-01: XY Scatter Plots_1
- LVV-9893 - DMS-PRTL-REQ-0054-V-01: Paging of Tabular Data_1
- LVV-9889 - DMS-PRTL-REQ-0050-V-01: Column Selection of Tabular Data_1
- LVV-9894 - DMS-PRTL-REQ-0053-V-01: Row Selection of Tabular Data_1
- LVV-9891 - DMS-PRTL-REQ-0049-V-01: Display of Tabular Data_1
- LVV-9819 - DMS-LSP-REQ-0014-V-01: Download Data_1
- LVV-9821 - DMS-LSP-REQ-0017-V-01: Tabular Data Download File Formats_1

4.5.2 Test Items

This test will test the functional requirements to be able to perform certain basic exploratory data analysis functions on tabular data results in the Portal Aspect UI:

- Sort tabular results;
- Filter tabular results based on the contents of columns; • Perform per-row selections from a table;
- Display 1D histograms of selected attributes;
- Display 2D scatter plots of selected attributes;
- Perform graphical selections of rows from plots; and
- Download tabular query results reflecting sorting and selection.

This test does not address the limits of scaling of these capabilities to large query results. That will be addressed in future test specifications. The test report should include notes on the sizes of results that were used.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0014
- DMS-LSP-REQ-0017
- DMS-PRTL-REQ-0049
- DMS-PRTL-REQ-0053
- DMS-PRTL-REQ-0050
- DMS-PRTL-REQ-0054
- DMS-PRTL-REQ-0055
- DMS-PRTL-REQ-0056

4.5.3 Predecessors

4.5.4 Environment Needs

4.5.4.1 Software

4.5.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform. It relies on the availability of the IRSA deployment of the WISE and ALLWISE data to use in order to perform comparisons on content and performance.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.

4.5.5 Input Specification

The test requires the presence of at least the Source Catalog table from the AllWISE data release.

4.5.6 Output Specification

The output will consist of:

- A written log of the tests performed on the GUI-based Portal Aspect; and
- A collection of the files that resulted from data download actions performed as part of the tests.

4.5.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used.
	Test Data	No data.
	Expected Result	
2	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.
	Expected Result	

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Step	Description, Input Data and Expected Result
3	**Description** Manually perform, and log, the following steps against the Portal Aspect, recording the time required for a step if it is not trivial: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Perform a cone search around (ra=0,dec=0), of a radius that produces a result of at least 10,000 records. (Note again that this is a functionality test, not a scaling test, however.) 3. Download the query result. Log the file type used for the download, and the file types offered. Confirm that the download includes the same number of rows reported by the UI. Confirm by sampling at the beginning and end that the sort order of the download and that shown in the UI are the same. 4. Exercise sorting of the table, including both numeric and text columns. Download the results of performing a sort of each type. Confirm by sampling that the sort order of the download matches that in the UI. 5. Verify using external tools (e.g., Unix command-line utilities) that the sort orders for text and numeric columns are appropriate. 6. Exercise filtering of a tabular result based on values of attributes. Confirm that it is possible to download the filtered result. Verify using external tools that the filter was applied as expected, by comparing the filtered download with the original one. 7. Perform selections of individual rows in the tabular result. Confirm that it is possible to download only the selected rows. 8. Construct a 1D histogram of a numeric attribute. Using the functionality of the UI, sample a few bin values. Verify using external tools that the chosen bin values match those derived from the downloaded data. 9. Construct a 2D scatter plot of selected numeric attributes. By inspecting extrema of those attributes in the table, and outlying points in the scatterplot, confirm that the plot appears to contain the expected data. (This is not meant to be an exhaustive test of completeness.) 10. Perform a (rectangular) graphical selection from a 2D plot. Record the approximate dimensions of the selection as judged from the display. Record the exact values for the region boundaries reported by the UI. Download the selected data. Verify using external tools that the expected selection was applied.
	Test Data No data.
	Expected Result

4.6 LVV-T7 - LSP-00-25: Image metadata, image, and image cutout queries

Version	Status	Priority	Verification Type	Owner

1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.6.1 Verification Elements

- LVV-9819 - DMS-LSP-REQ-0014-V-01: Download Data_1
- LVV-9820 - DMS-LSP-REQ-0018-V-01: Image Data Download File Format_1
- LVV-9881 - DMS-PRTL-REQ-0040-V-01: Query for Single Epoch Image Cutouts_1
- LVV-9880 - DMS-PRTL-REQ-0041-V-01: Query for Coadded Image Cutouts_1

4.6.2 Test Items

This test will check basic functionality related to image search and retrieval, via both the API Aspect and the Portal Aspect of the LSST Science Platform:

- Searching for images containing a specified point;
- Displaying selected images;
- Obtaining and displaying image cutouts at a specified point; and • Downloading selected images and image cutouts.

Because of limited staff resources, these tests will be based on the original PDAC dataset, the LSST Summer 2013 processing of the SDSS Stripe 82 data. The image data for the WISE and NEOWISE missions have not been loaded into PDAC.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0014
- DMS-LSP-REQ-0018
- DMS-PRTL-REQ-0041
- DMS-PRTL-REQ-0040

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4.6.3 Predecessors

4.6.4 Environment Needs

4.6.4.1 Software

4.6.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.
The API Aspect tests will be captured in a Jupyter notebook run locally on the client computer, so the client system must have a recent production version of Jupyter installed. (The test does not depend on features of JupyterLab in any way, only the standard Notebook.

4.6.5 Input Specification

The test requires the presence of the following SDSS data, from the Summer 2013 LSST processing, in the PDAC systems:

- The catalog of coadded image tiles;
- The catalog of calibrated single-epoch images, including photometric zero points; • The coadded image data; and
- The single-epoch calibrated image data.

Note that a significant fraction of the single-epoch calibrated images are known to have been lost between 2013 and the loading of the data into PDAC. The test report will note where that affects the result.

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4.6.6 Output Specification

The output will consist of:

- A Jupyter notebook of the API Aspect tests performed;
- A written log of the tests performed on the GUI-based Portal Aspect; and
- A collection of the files that resulted from data download actions performed as part of the tests.

4.6.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Clone the Github lsst/LDM-540 package. Record the SHA1 for the version of the package to be used. [Additional procedures, e.g., tagging, are still to be confirmed.]
	Test Data	No data.
	Expected Result	
2	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used. Log the version of Jupyter to be used.
	Test Data	No data.
	Expected Result	
3	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.
	Expected Result	
4	Description	Execute the LDM-540/test_scripts/lsp-00-25.ipynb notebook to perform the tests listed above against the API Aspect.
	Test Data	No data.
	Expected Result	
5	Description	Preserve any outputs of the script that are in the form of files outside the notebook.
	Test Data	No data.
	Expected Result	

Draft

Step	Description, Input Data and Expected Result	
6	Description	Manually perform, and log, the following steps against the Portal Aspect: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Perform image queries against the SDSS Stripe 82 coadded and single-epoch image data. These queries should match ones in the API Aspect test notebook. Document the query results with screen shots. 3. Download an example of each type of image. 4. Using the public SDSS archive, attempt to retrieve corresponding images and visually compare them. 5. Perform image cutout requests for 300 × 300 fields at the same targets used in the full-image queries. 6. Download the cutouts.
	Test Data	No data.
	Expected Result	

4.7 LVV-T8 - LSP-00-30: Linkage of catalog query results with associated images

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.7.1 Verification Elements

- LVV-9848 - DMS-PRTL-REQ-0004-V-01: Semantic Linkage: Portal Workflows_1
- LVV-9814 - DMS-LSP-REQ-0008-V-01: Semantic Linkage_1

4.7.2 Test Items

This test will check for the ability, in the Portal Aspect of the LSST Science Platform, to match catalog data with the image data on which the measurements were performed, specifically:

- Navigating from a catalog query result to the associated images; and
- Overlaying catalog query results on associated images.

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Because of limited staff resources, these tests will be based on the original PDAC dataset, the LSST Summer 2013 processing of the SDSS Stripe 82 data. The image data for the WISE and NEOWISE missions have not been loaded into PDAC.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0008
- DMS-PRTL-REQ-0004

4.7.3 Predecessors

LSP-00-*

4.7.4 Environment Needs

4.7.4.1 Software

4.7.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.

4.7.5 Input Specification

The test requires the presence of the following SDSS data, from the Summer 2013 LSST processing, in the PDAC systems:

- The coadded source catalog;
- The forced photometry catalog driven from the i-band coadded sources;

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- The catalog of coadded image tiles;
- The catalog of calibrated single-epoch images, including photometric zero points; • The coadded image data; and
- The single-epoch calibrated image data.

Note that a significant fraction of the single-epoch calibrated images are known to have been lost between 2013 and the loading of the data into PDAC. The test report will note where that affects the result.

4.7.6 Output Specification

The output will consist of:

- A written log of the tests performed on the GUI-based Portal Aspect.

4.7.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used.
	Test Data	No data.
	Expected Result	
2	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.
	Expected Result	
3	Description	Manually perform, and log, the following steps against the Portal Aspect: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Perform a catalog query against the i-band coadded source catalog within the Stripe 82 area. 3. Request the time series from the forced photometry catalog for a selected source. 4. Confirm that the images associated with the forced photometry measurements are available. 5. Document the query results with screen shots.

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Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	

4.8 LVV-T9 - LSP-00-35: Linkage of catalog query results to related catalog data

Version	Status	Priority	Verification Type	Owner
1	Deprecated	Normal	Test	Gregory Dubois-Felsmann

4.8.1 Verification Elements

- LVV-9814 - DMS-LSP-REQ-0008-V-01: Semantic Linkage_1

4.8.2 Test Items

This test will check for the ability, in the Portal Aspect of the LSST Science Platform, to match catalog data with related catalog data. Specifically, the test verifies the ability to navigate from a coadded source catalog entry to the associated forced photometry.

Requirements (to be removed when Reqs are synchronized from magic draw)

- DMS-LSP-REQ-0008

4.8.3 Predecessors

LSP-00-*

4.8.4 Environment Needs

4.8.4.1 Software

4.8.4.2 Hardware The test must, and can only, be carried out on the PDAC instance of the Science Platform.
The test may be performed from any client computer on the public Internet. The computer used, and the network connection involved, shall be documented in the test report.
The test requires access via the NCSA VPN from the client to the PDAC data services (which means that the performance of the VPN is a contributor to the performance observed).
The client computer must have an up-to-date mainstream Web browser, the identity of which shall be documented in the test report.

4.8.5 Input Specification

The test requires the presence of the following SDSS data, from the Summer 2013 LSST processing, in the PDAC systems:

- The coadded source catalog; and
- The forced photometry catalog driven from the i-band coadded sources.

4.8.6 Output Specification

The output will consist of:

- A written log of the tests performed on the GUI-based Portal Aspect.

4.8.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Log host and networking details of the client host to be used. Log the Web browser version to be used.
	Test Data	No data.
	Expected Result	
2	Description	Establish VPN connectivity to the PDAC at NCSA.
	Test Data	No data.

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Step	Description, Input Data and Expected Result	
	Expected Result	
3	Description	Manually perform, and log, the following steps against the Portal Aspect: 1. Navigate to the PDAC Portal. Log the URL used to do so. 2. Perform a catalog query against the i-band coadded source catalog within the Stripe 82 area. 3. Request the time series from the forced photometry catalog for a selected source. 4. Confirm that the data retrieved corresponds to the selected coadded source. 5. Document the query results with screen shots.
	Test Data	No data.
	Expected Result	

4.9 LVV-T598 - Verify access to All Released or Authorized Data Products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.9.1 Verification Elements

- LVV-9807 - DMS-LSP-REQ-0001-V-01: Access to All Released or Authorized Data Products_1

4.9.2 Test Items

Verify that the LSP can access all data products defined in the DPDD, and additional data products.

4.9.3 Predecessors

4.9.4 Environment Needs

4.9.4.1 Software

4.9.4.2 Hardware

4.9.5 Input Specification

4.9.6 Output Specification

4.9.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.10 LVV-T600 - Verify LSP provides a portal aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Michael Wood-Vasey

4.10.1 Verification Elements

- LVV-9811 - DMS-LSP-REQ-0002-V-01: Portal Aspect_1

4.10.2 Test Items

Verify that the LSP provides a web-based "Portal" to access LSST data products and user storage resources.

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The Portal is defined by further requirements.

4.10.3 Predecessors

4.10.4 Environment Needs

4.10.4.1 Software

4.10.4.2 Hardware

4.10.5 Input Specification

LSP test account
Processed dataset available in LSP

4.10.6 Output Specification

4.10.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Open LSP Portal Aspect in a browser
	Test Data	No data.
	Expected Result	LSP Portal Home Page appears
2	Description	Log in through LSP credentials
	Test Data	No data.
	Expected Result	SSO Login page presented and log-in successful. Success of login is indicated by some visual cue.
3	Description	Look for available datasets and releases.
	Test Data	No data.
	Expected Result	LSP will show available datasets and data releases.
4	Description	Look for user-stored data. Upload a sample catalog. Upload a sample image.

Draft

Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	LSP should show user products in an easy-to-find way.
5	Description	Upload a sample catalog. Upload a sample image.
	Test Data	No data.
	Expected Result	Sample catalog and image should appear in user data area.
6	Description	Visually navigate to a selected region of the sky.
	Test Data	No data.
	Expected Result	Image will be shown for regions of sky with imaging. If navigating to a region of sky not in the selected dataset, then a clear indication of no image available will be shown.
7	Description	Navigate to a specific RA, Dec.
	Test Data	No data.
	Expected Result	Image shown for given RA, Dec.
8	Description	Ask for overlay of catalog of objects at current image view.
	Test Data	No data.
	Expected Result	Boxes or circles or similar markers should apear on image.
9	Description	Mouse-over a catalog object.
	Test Data	No data.
	Expected Result	Information about that catalog object should appear
10	Description	Select a region on the image. Look at table display.
	Test Data	No data.
	Expected Result	See that table display is now restricted to images within the select area.
11	Description	Initiate a query against some other dataset.
	Test Data	No data.
	Expected Result	Expect to see a new table with results from same region of sky.
12	Description	Download image of selected region

Draft

Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	Download interface presents to user with offer to download selected file in available formats (presumably at least FITS).
13	Description	Download tables for selected region
	Test Data	No data.
	Expected Result	Download interface will present offering option to download tables in any of the supported formats.

4.11 LVV-T601 - Verify LSP provides a notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Michael Wood-Vasey

4.11.1 Verification Elements

- LVV-9810 - DMS-LSP-REQ-0003-V-01: Notebook Aspect_1

4.11.2 Test Items

Verify that the LSP provides an interactive Python computing environment, accessible via web browser, with access to LSST data products and user storage resources.

4.11.3 Predecessors

4.11.4 Environment Needs

4.11.4.1 Software

4.11.4.2 Hardware

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4.11.5 Input Specification

LSP test account
Processed dataset available in LSP

4.11.6 Output Specification

4.11.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Log in to Portal
	Test Data	No data.
	Expected Result	SSO interface to authenticate to Protal service.
2	Description	Launch/Access Notebook interface
	Test Data	No data.
	Expected Result	Notebook will present with loaded Python environment and give an input cell for entry.
3	Description	Use Python API to query for available images that cover a given RA, Dec
	Test Data	No data.
	Expected Result	List of available images will be return
4	Description	Use Python API to download an image
	Test Data	No data.
	Expected Result	Image object will be returned to user
5	Description	Inspect Image object
	Test Data	No data.
	Expected Result	Image metadata will be shown to user
6	Description	Save Image object to user storage area.
	Test Data	No data.
	Expected Result	An inspection of the user-storage area will reveal a newly created image.

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Step	Description, Input Data and Expected Result	
7	Description	Retrieve a table of objects in the region of the selected image.
	Test Data	No data.
	Expected Result	Table object available in Notebook kernel.
8	Description	Plot a color-color diagram for retrieved objects from image.
	Test Data	No data.
	Expected Result	Rendered plot in notebook about color-color diagram.
9	Description	
	Test Data	No data.
	Expected Result	

4.12 LVV-T602 - Verify LSP provides web API

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Michael Wood-Vasey

4.12.1 Verification Elements

- LVV-9808 - DMS-LSP-REQ-0004-V-01: API (Data Access) Aspect_1

4.12.2 Test Items

Verify that the LSP provides a web API for access to LSST data products and user storage resources.

4.12.3 Predecessors

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4.12.4 Environment Needs

4.12.4.1 Software

4.12.4.2 Hardware

4.12.5 Input Specification

LSP test account with empty User Storage area
Processed dataset available in LSP
Example image and tables to upload.

4.12.6 Output Specification

4.12.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Upload a table to the LSP using the web API. Likely launched from a Python session or shell.
	Test Data	No data.
	Expected Result	Inspection of user area will show file now uploaded
2	Description	Upload 5 tables to LSP using the web API.
	Test Data	No data.
	Expected Result	Inspection of user area will show 5 tables.
3	Description	Query contents of LSP User Storage area
	Test Data	No data.
	Expected Result	One image and Five tables
4	Description	Download one of the tables using the web API
	Test Data	No data.
	Expected Result	local file created that matches table

Draft

Step	Description, Input Data and Expected Result	
5	Description	Query RA, Dec region for table of objects using web API
	Test Data	No data.
	Expected Result	File or object returned with requested objects

4.13 LVV-T603 - Verify data access through multiple linked aspects

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.13.1 Verification Elements

- LVV-9809 - DMS-LSP-REQ-0005-V-01: Linkage of Aspects_1

4.13.2 Test Items

Verify that the LSP facilitates access of the same LSST or user data through multiple aspects.

4.13.3 Predecessors

4.13.4 Environment Needs

4.13.4.1 Software

4.13.4.2 Hardware

4.13.5 Input Specification

4.13.6 Output Specification

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4.13.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.14 LVV-T604 - Verify use of VO standards

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.14.1 Verification Elements

- LVV-9812 - DMS-LSP-REQ-0006-V-01: Use of VO Standards_1

4.14.2 Test Items

Verify that the LSP utilizes stable and accepted Virtual Observatory standards for public APIs.

4.14.3 Predecessors

4.14.4 Environment Needs

4.14.4.1 Software

4.14.4.2 Hardware

4.14.5 Input Specification

Draft

4.14.6 Output Specification

4.14.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.15 LVV-T605 - Verify that LSP complies with LSST data access policies

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.15.1 Verification Elements

- LVV-9806 - DMS-LSP-REQ-0007-V-01: Abide by the Data Access Policies_1

4.15.2 Test Items

Verify that the LSP complies with the public data access policy and access restrictions defined by the LSST Project.

4.15.3 Predecessors

4.15.4 Environment Needs

4.15.4.1 Software

4.15.4.2 Hardware

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4.15.5 Input Specification

4.15.6 Output Specification

4.15.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.16 LVV-T606 - Verify semantic linkages between data items

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.16.1 Verification Elements

- LVV-9814 - DMS-LSP-REQ-0008-V-01: Semantic Linkage_1

4.16.2 Test Items

Verify that the LSP provides access to linkages between data items that reflect their provenance and data dependencies.

4.16.3 Predecessors

4.16.4 Environment Needs

4.16.4.1 Software

Draft

4.16.4.2 Hardware

4.16.5 Input Specification

4.16.6 Output Specification

4.16.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.17 LVV-T607 - Verify semantic linkages between data items and uncertainties

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.17.1 Verification Elements

- LVV-9813 - DMS-LSP-REQ-0009-V-01: Semantic Linkage: Uncertainties_1

4.17.2 Test Items

Verify that the LSP provides methods to identify uncertainties associated with a given quantity.

4.17.3 Predecessors

Draft

4.17.4 Environment Needs

4.17.4.1 Software

4.17.4.2 Hardware

4.17.5 Input Specification

4.17.6 Output Specification

4.17.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.18 LVV-T608 - Verify transfer of Portal data references to Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.18.1 Verification Elements

- LVV-9815 - DMS-LSP-REQ-0010-V-01: Transfer of Portal Data References to Notebook_1

4.18.2 Test Items

Verify that data references derived from Portal exploration can be transferred and used in to retrieve the same data in the Notebook aspect.

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4.18.3 Predecessors

4.18.4 Environment Needs

4.18.4.1 Software

4.18.4.2 Hardware

4.18.5 Input Specification

4.18.6 Output Specification

4.18.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.19 LVV-T609 - Verify providing user file storage in LSP

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.19.1 Verification Elements

- LVV-9817 - DMS-LSP-REQ-0011-V-01: User File Workspace_1

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4.19.2 Test Items

Verify that the LSP provides a user file workspace for storage of user generated data files. These shall be accessible from all three aspects.

4.19.3 Predecessors

4.19.4 Environment Needs

4.19.4.1 Software

4.19.4.2 Hardware

4.19.5 Input Specification

4.19.6 Output Specification

4.19.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.20 LVV-T610 - Verify providing user generated database in LSP

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

Draft

4.20.1 Verification Elements

- LVV-9816 - DMS-LSP-REQ-0012-V-01: User Database Workspace_1

4.20.2 Test Items

Verify that the LSP allows for creation, use, and management of User Generated databases, and interaction with user databases by the same facilities as Project databases, where feasible.

4.20.3 Predecessors

4.20.4 Environment Needs

4.20.4.1 Software

4.20.4.2 Hardware

4.20.5 Input Specification

4.20.6 Output Specification

4.20.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.21 LVV-T611 - Verify access controls in user workspace

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.21.1 Verification Elements

- LVV-9818 - DMS-LSP-REQ-0013-V-01: User Workspace Access Controls_1

4.21.2 Test Items

Verify that LSP users can place access restrictions on data in the User File and Database workspaces, and that these restrictions are enforced across all aspects.

4.21.3 Predecessors

4.21.4 Environment Needs

4.21.4.1 Software

4.21.4.2 Hardware

4.21.5 Input Specification

4.21.6 Output Specification

4.21.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.22 LVV-T612 - Verify ability to download data from LSP

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.22.1 Verification Elements

- LVV-9819 - DMS-LSP-REQ-0014-V-01: Download Data_1

4.22.2 Test Items

Verify that the LSP provides a means to download data from queries, user workspaces, or other operations, to the user's system.

4.22.3 Predecessors

4.22.4 Environment Needs

4.22.4.1 Software

4.22.4.2 Hardware

4.22.5 Input Specification

4.22.6 Output Specification

4.22.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.23 LVV-T613 - Verify ability to upload data to LSP

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.23.1 Verification Elements

- LVV-9823 - DMS-LSP-REQ-0015-V-01: Upload Data_1

4.23.2 Test Items

Verify that LSP users can upload data from their system for use in the LSP aspects and storage in their user workspace.

4.23.3 Predecessors

4.23.4 Environment Needs

4.23.4.1 Software

4.23.4.2 Hardware

4.23.5 Input Specification

4.23.6 Output Specification

4.23.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.24 LVV-T614 - Verify ability to transfer data to and from the Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.24.1 Verification Elements

- LVV-9822 - DMS-LSP-REQ-0016-V-01: Transfer Data to Workspace_1

4.24.2 Test Items

Verify that users can transfer data between all features of the LSP that allow for upload and download of data.

4.24.3 Predecessors

4.24.4 Environment Needs

4.24.4.1 Software

4.24.4.2 Hardware

4.24.5 Input Specification

4.24.6 Output Specification

4.24.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.25 LVV-T615 - Verify file formats provided for tabular data download

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.25.1 Verification Elements

- LVV-9821 - DMS-LSP-REQ-0017-V-01: Tabular Data Download File Formats_1

4.25.2 Test Items

Verify that the LSP allows tabular data from search results to be downloaded in FITS, VOTable, and ASCII delimiter-separated tables (e.g., CSV).

4.25.3 Predecessors

4.25.4 Environment Needs

4.25.4.1 Software

4.25.4.2 Hardware

4.25.5 Input Specification

4.25.6 Output Specification

4.25.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.26 LVV-T616 - Verify file formats provided for image data download

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.26.1 Verification Elements

- LVV-9820 - DMS-LSP-REQ-0018-V-01: Image Data Download File Format_1

4.26.2 Test Items

Verify that LSST image data products can be downloaded via the LSP in FITS format, with appropriate metadata included.

4.26.3 Predecessors

4.26.4 Environment Needs

4.26.4.1 Software

4.26.4.2 Hardware

4.26.5 Input Specification

4.26.6 Output Specification

4.26.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.27 LVV-T617 - Verify support for peak volume of moderate-sized queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.27.1 Verification Elements

- LVV-9824 - DMS-LSP-REQ-0028-V-01: Peak Volume for Moderate-Sized Queries_1

4.27.2 Test Items

Verify that the LSP can handle a peak usage of 50 simultaneous queries without degradation, where the queries include input selection of up to 1E7 objects in the catalog, result data set of up to 0.1GB, and a response time of 10 seconds.

4.27.3 Predecessors

4.27.4 Environment Needs

4.27.4.1 Software

4.27.4.2 Hardware

4.27.5 Input Specification

4.27.6 Output Specification

4.27.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.

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Step	Description, Input Data and Expected Result
	Expected Result

4.28 LVV-T618 - Verify support for peak volume of queries on all Objects

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.28.1 Verification Elements

- LVV-9825 - DMS-LSP-REQ-0029-V-01: Peak Volume for Queries on all Objects_1

4.28.2 Test Items

Verify that the LSP can handle a peak usage of 20 simultaneous queries without degradation, where the queries include input selection of up to the entire object database, result data set of up to 6 GB, and a response time of 1 hour.

4.28.3 Predecessors

4.28.4 Environment Needs

4.28.4.1 Software

4.28.4.2 Hardware

4.28.5 Input Specification

4.28.6 Output Specification

Draft

4.28.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.29 LVV-T619 - Verify LSP handles peak volume of queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.29.1 Verification Elements

- LVV-9826 - DMS-LSP-REQ-0030-V-01: Peak Volume of In-process Queries_1

4.29.2 Test Items

Verify that the LSP can simultaneously handle peak usage of 20*6 GB = 120 GB of downloads.

4.29.3 Predecessors

4.29.4 Environment Needs

4.29.4.1 Software

4.29.4.2 Hardware

4.29.5 Input Specification

Draft

4.29.6 Output Specification

4.29.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.30 LVV-T620 - Verify LSP supports required download bandwidth

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.30.1 Verification Elements

- LVV-9827 - DMS-LSP-REQ-0031-V-01: Query Result Download Bandwidth_1

4.30.2 Test Items

Verify that the LSP supports a download rate of at least 6 Gbps for query results including tables and images.

4.30.3 Predecessors

4.30.4 Environment Needs

4.30.4.1 Software

4.30.4.2 Hardware

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4.30.5 Input Specification

4.30.6 Output Specification

4.30.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.31 LVV-T621 - Verify LSP user reference and documentation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.31.1 Verification Elements

- LVV-9828 - DMS-LSP-REQ-0019-V-01: Documentation_1

4.31.2 Test Items

Verify that the LSP provides user reference and documentation for all of its aspects.

4.31.3 Predecessors

4.31.4 Environment Needs

4.31.4.1 Software

4.31.4.2 Hardware

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4.31.5 Input Specification

4.31.6 Output Specification

4.31.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.32 LVV-T622 - Verify LSP only available to authenticated users

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.32.1 Verification Elements

- LVV-9830 - DMS-LSP-REQ-0020-V-01: Authenticated User Access_1

4.32.2 Test Items

Verify that the functions and services of all three aspects of the LSP are accessible only to authenticated users.

4.32.3 Predecessors

4.32.4 Environment Needs

4.32.4.1 Software

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4.32.4.2 Hardware

4.32.5 Input Specification

4.32.6 Output Specification

4.32.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.33 LVV-T623 - Verify support for new LSP users

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.33.1 Verification Elements

- LVV-9832 - DMS-LSP-REQ-0021-V-01: New-user Support_1

4.33.2 Test Items

Verify that guidance is provided to new users about how to become authenticated users of the LSP.

4.33.3 Predecessors

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4.33.4 Environment Needs

4.33.4.1 Software

4.33.4.2 Hardware

4.33.5 Input Specification

4.33.6 Output Specification

4.33.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.34 LVV-T624 - Verify implementation of common identity across LSP aspects

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Leanne Guy

4.34.1 Verification Elements

- LVV-9831 - DMS-LSP-REQ-0022-V-01: Common Identity_1

4.34.2 Test Items

Verify that users can authenticate and access all three aspects of the LSP using the same credentials.

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4.34.3 Predecessors

4.34.4 Environment Needs

4.34.4.1 Software

4.34.4.2 Hardware

4.34.5 Input Specification

4.34.6 Output Specification

4.34.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.35 LVV-T625 - Verify authentication via external identity providers

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Leanne Guy

4.35.1 Verification Elements

- LVV-9834 - DMS-LSP-REQ-0023-V-01: Use of External Identity Providers_1

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4.35.2 Test Items

Verify that LSP users can be authenticated using external credentials from trusted identity providers.

4.35.3 Predecessors

4.35.4 Environment Needs

4.35.4.1 Software

4.35.4.2 Hardware

4.35.5 Input Specification

4.35.6 Output Specification

4.35.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.36 LVV-T626 - Verify LSP identity can have multiple associated credentials

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.36.1 Verification Elements

- LVV-9835 - DMS-LSP-REQ-0024-V-01: Use of Multiple Sets of Credentials_1

4.36.2 Test Items

Verify that an LSP user can have multiple credentials, from different providers, associated with the same identity within the LSP.

4.36.3 Predecessors

4.36.4 Environment Needs

4.36.4.1 Software

4.36.4.2 Hardware

4.36.5 Input Specification

4.36.6 Output Specification

4.36.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.37 LVV-T627 - Verify implementation of Acceptable Use Policy

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.37.1 Verification Elements

- LVV-9829 - DMS-LSP-REQ-0025-V-01: Acceptable Use Policy_1

4.37.2 Test Items

Verify that non-Project users of the LSP are required to agree to and abide by an Acceptable Use Policy.

4.37.3 Predecessors

4.37.4 Environment Needs

4.37.4.1 Software

4.37.4.2 Hardware

4.37.5 Input Specification

4.37.6 Output Specification

4.37.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.38 LVV-T628 - Verify LSP connections encrypted

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.38.1 Verification Elements

- LVV-9836 - DMS-LSP-REQ-0026-V-01: Using secure protocols_1

4.38.2 Test Items

Verify that all external connections to the LSP are encrypted in accordance with LSST cyber-security policy.

4.38.3 Predecessors

4.38.4 Environment Needs

4.38.4.1 Software

4.38.4.2 Hardware

4.38.5 Input Specification

4.38.6 Output Specification

4.38.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.39 LVV-T629 - Verify privacy of users' activities

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.39.1 Verification Elements

- LVV-9833 - DMS-LSP-REQ-0027-V-01: Privacy of User Activities_1

4.39.2 Test Items

Verify that users' activities on the LSP are not visible to other users without the originating user's explicit permission.

4.39.3 Predecessors

4.39.4 Environment Needs

4.39.4.1 Software

4.39.4.2 Hardware

4.39.5 Input Specification

4.39.6 Output Specification

4.39.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.40 LVV-T630 - Verify multiple LSP instances

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.40.1 Verification Elements

- LVV-9839 - DMS-LSP-REQ-0032-V-01: Multiple installations_1

4.40.2 Test Items

Verify that separate instances of the LSP accessible to the public, and only within the LSST Project, are available and maintained.

4.40.3 Predecessors

4.40.4 Environment Needs

4.40.4.1 Software

4.40.4.2 Hardware

4.40.5 Input Specification

4.40.6 Output Specification

4.40.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.41 LVV-T631 - Verify LSP access from the public Internet (IPv4)

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.41.1 Verification Elements

- LVV-9837 - DMS-LSP-REQ-0033-V-01: Internet-Accessible (IPv4)_1

4.41.2 Test Items

Verify that the LSP is accessible from the public Internet using IPv4 protocols.

4.41.3 Predecessors

4.41.4 Environment Needs

4.41.4.1 Software

4.41.4.2 Hardware

4.41.5 Input Specification

4.41.6 Output Specification

4.41.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.42 LVV-T632 - Verify LSP access from the public Internet (IPv6)

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.42.1 Verification Elements

- LVV-9838 - DMS-LSP-REQ-0034-V-01: Internet-Accessible (IPv6)_1

4.42.2 Test Items

Verify that the LSP is accessible from the public Internet using IPv6 protocols.

4.42.3 Predecessors

4.42.4 Environment Needs

4.42.4.1 Software

4.42.4.2 Hardware

4.42.5 Input Specification

4.42.6 Output Specification

4.42.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.43 LVV-T633 - Verify indication of system availability

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.43.1 Verification Elements

- LVV-9840 - DMS-LSP-REQ-0035-V-01: System-Availability Indication_1

4.43.2 Test Items

Verify that the LSP informs users when services are unavailable due to maintenance or excessive load.

4.43.3 Predecessors

4.43.4 Environment Needs

4.43.4.1 Software

4.43.4.2 Hardware

4.43.5 Input Specification

4.43.6 Output Specification

4.43.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.44 LVV-T634 - Verify Portal is a web application

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.44.1 Verification Elements

- LVV-9841 - DMS-PRTL-REQ-0001-V-01: Portal is a Web Application_1

4.44.2 Test Items

Verify that the Portal is a web application that is accessible to users via common web browsers and without downloading and installing local software.

4.44.3 Predecessors

4.44.4 Environment Needs

4.44.4.1 Software

4.44.4.2 Hardware

4.44.5 Input Specification

4.44.6 Output Specification

4.44.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.45 LVV-T635 - Verify Portal discovery of all data products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.45.1 Verification Elements

- LVV-9847 - DMS-PRTL-REQ-0002-V-01: Portal Discovery of all Data Products_1

4.45.2 Test Items

Verify that the Portal enables discovery of all data products released by the Project, including all products enumerated in the DPDD, the calibration database, and the reformatted EFD, as well as user data products to which the user has access.

4.45.3 Predecessors

4.45.4 Environment Needs

4.45.4.1 Software

4.45.4.2 Hardware

4.45.5 Input Specification

4.45.6 Output Specification

4.45.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.46 LVV-T636 - Verify Portal access to Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.46.1 Verification Elements

- LVV-9846 - DMS-PRTL-REQ-0003-V-01: Portal Access to Workspace_1

4.46.2 Test Items

Verify that users can discover and retrieve data and images within their Workspace.

4.46.3 Predecessors

4.46.4 Environment Needs

4.46.4.1 Software

4.46.4.2 Hardware

4.46.5 Input Specification

4.46.6 Output Specification

4.46.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.47 LVV-T637 - Verify Portal provides semantic linkages between data products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.47.1 Verification Elements

- LVV-9848 - DMS-PRTL-REQ-0004-V-01: Semantic Linkage: Portal Workflows_1

4.47.2 Test Items

Verify that the Portal aspect provides users the means to identify and retrieve semantically linked data. The Portal should provide straightforward UI workflows for starting from a selected data item (image or catalog entry) and identifying related data, including both direct data-dependency and provenance linkages and more scientifically oriented linkages such as the ability to navigate from an Object to its associated ForcedSources.

4.47.3 Predecessors

4.47.4 Environment Needs

4.47.4.1 Software

4.47.4.2 Hardware

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4.47.5 Input Specification

4.47.6 Output Specification

4.47.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.48 LVV-T638 - Verify access to calibration products via Portal

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.48.1 Verification Elements

- LVV-9842 - DMS-PRTL-REQ-0005-V-01: Access to Calibration Products_1

4.48.2 Test Items

Verify that calibration products are accessible from the Portal aspect, both directly and via linkages from science data products that use them. This is a sub-requirement of DMS-PRTL-REQ-0004 (associated test case: LVV-T637).

4.48.3 Predecessors

4.48.4 Environment Needs

4.48.4.1 Software

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4.48.4.2 Hardware

4.48.5 Input Specification

4.48.6 Output Specification

4.48.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.49 LVV-T639 - Verify associations between single images and coadds

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.49.1 Verification Elements

- LVV-9845 - DMS-PRTL-REQ-0006-V-01: Coadded Image to Single-Epoch Image Associations_1

4.49.2 Test Items

Verify that users can discover the associations between coadded images and the single-epoch images that contributed to the coadds. This is a sub-requirement of DMS-PRTL-REQ-0004 (associated test case: LVV-T637).

4.49.3 Predecessors

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4.49.4 Environment Needs

4.49.4.1 Software

4.49.4.2 Hardware

4.49.5 Input Specification

4.49.6 Output Specification

4.49.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.50 LVV-T640 - Verify access to external archives from Portal

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.50.1 Verification Elements

- LVV-9843 - DMS-PRTL-REQ-0007-V-01: Access to External Archives_1

4.50.2 Test Items

Verify that an interface to outside catalog and image data is available, that allows a user to determine what external astronomical data are associated with a given location on the sky and return those data for use within the Portal.

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4.50.3 Predecessors

4.50.4 Environment Needs

4.50.4.1 Software

4.50.4.2 Hardware

4.50.5 Input Specification

4.50.6 Output Specification

4.50.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.51 LVV-T641 - Verify API for Access to Portal Session State

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.51.1 Verification Elements

- LVV-9844 - DMS-PRTL-REQ-0008-V-01: API for Access to Portal Session State_1

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4.51.2 Test Items

Verify that the Portal aspect provides a network API that allows authenticated remote access by a user to aspects of their session state in the Portal. The minimal requirement is for access to the list of queries performed in that session.

4.51.3 Predecessors

4.51.4 Environment Needs

4.51.4.1 Software

4.51.4.2 Hardware

4.51.5 Input Specification

4.51.6 Output Specification

4.51.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.52 LVV-T642 - Verify Portal supports both synchronous and asynchronous queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.52.1 Verification Elements

- LVV-9854 - DMS-PRTL-REQ-0009-V-01: Support Synchronous and Asynchronous Queries_1

4.52.2 Test Items

Verify that the Portal aspect provides UI models for both synchronous and asynchronous queries. This Portal capability should include an interface to initiate, monitor, and control the execution of both sync and async queries, as well as browse their results. Long running queries may be forced to be asynchronous.

4.52.3 Predecessors

4.52.4 Environment Needs

4.52.4.1 Software

4.52.4.2 Hardware

4.52.5 Input Specification

4.52.6 Output Specification

4.52.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.53 LVV-T643 - Verify capability to run long queries in the background

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.53.1 Verification Elements

- LVV-9849 - DMS-PRTL-REQ-0010-V-01: Long Query Background_1

4.53.2 Test Items

Verify that the Portal aspect will notify the user if a query is estimated to take longer than 60 seconds, and will allow the user to put the query in background if desired.

4.53.3 Predecessors

4.53.4 Environment Needs

4.53.4.1 Software

4.53.4.2 Hardware

4.53.5 Input Specification

4.53.6 Output Specification

4.53.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.54 LVV-T644 - Verify user notification of query status

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.54.1 Verification Elements

- LVV-9853 - DMS-PRTL-REQ-0011-V-01: Query Status and Termination Notification_1

4.54.2 Test Items

Verify that the Portal notifies the user of the status of user-initiated queries, including whether the query has been terminated for any reason.

4.54.3 Predecessors

4.54.4 Environment Needs

4.54.4.1 Software

4.54.4.2 Hardware

4.54.5 Input Specification

4.54.6 Output Specification

4.54.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.55 LVV-T645 - Verify limitation of query results size

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.55.1 Verification Elements

- LVV-9851 - DMS-PRTL-REQ-0012-V-01: Query Results Size Limitation_1

4.55.2 Test Items

Verify that the Portal aspect estimates query results size, and notifies user if the query result exceeds thresholds and has been disallowed or terminated as a result.

4.55.3 Predecessors

4.55.4 Environment Needs

4.55.4.1 Software

4.55.4.2 Hardware

4.55.5 Input Specification

4.55.6 Output Specification

4.55.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.56 LVV-T646 - Verify ability to browse query history

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.56.1 Verification Elements

- LVV-9850 - DMS-PRTL-REQ-0013-V-01: Query History Inspection_1

4.56.2 Test Items

Verify that a user interface exists where users can browse the history of queries they have performed, and subsequently re-execute them if desired.

4.56.3 Predecessors

4.56.4 Environment Needs

4.56.4.1 Software

4.56.4.2 Hardware

4.56.5 Input Specification

4.56.6 Output Specification

4.56.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.57 LVV-T647 - Verify implementation of saving of queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.57.1 Verification Elements

- LVV-9852 - DMS-PRTL-REQ-0014-V-01: Query Saving - Portal_1

4.57.2 Test Items

The Portal aspect shall provide a UI for the saving of a specification artifact for a user-performed query, either for downloading or for saving to the Workspace, and a UI for re-executing a saved query found in the Workspace or uploaded remotely.

4.57.3 Predecessors

4.57.4 Environment Needs

4.57.4.1 Software

4.57.4.2 Hardware

4.57.5 Input Specification

4.57.6 Output Specification

4.57.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.58 LVV-T648 - Verify implementation of generic queries in API aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.58.1 Verification Elements

- LVV-9857 - DMS-PRTL-REQ-0015-V-01: Generic Query_1

4.58.2 Test Items

The Portal aspect shall enable the generation of queries against any tabular data exposed in the API aspect.

4.58.3 Predecessors

4.58.4 Environment Needs

4.58.4.1 Software

4.58.4.2 Hardware

4.58.5 Input Specification

4.58.6 Output Specification

4.58.7 Test Procedure

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Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.59 LVV-T649 - Verify implementation of form-based generic query in API aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.59.1 Verification Elements

- LVV-9856 - DMS-PRTL-REQ-0016-V-01: Generic Query - Form-based_1

4.59.2 Test Items

The Portal aspect shall provide a search-builder form-based interface for generic table queries. This facility may have reduced functionality for user tables for which the user has not provided full, or accurate, metadata.

4.59.3 Predecessors

4.59.4 Environment Needs

4.59.4.1 Software

4.59.4.2 Hardware

4.59.5 Input Specification

Draft

4.59.6 Output Specification

4.59.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.60 LVV-T650 - Verify implementation of ADQL-based generic query in API aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.60.1 Verification Elements

- LVV-9855 - DMS-PRTL-REQ-0017-V-01: Generic Query - ADQL-based_1

4.60.2 Test Items

The Portal aspect shall provide a means for entering a query against any table directly in ADQL. This facility shall be available for every table, including user-supplied tables.

4.60.3 Predecessors

4.60.4 Environment Needs

4.60.4.1 Software

4.60.4.2 Hardware

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4.60.5 Input Specification

4.60.6 Output Specification

4.60.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.61 LVV-T651 - Verify estimation of query result size

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.61.1 Verification Elements

- LVV-9858 - DMS-PRTL-REQ-0018-V-01: Query Result Size_1

4.61.2 Test Items

Verify that UI support exists to estimate (or determine exactly) the size of results that would be returned by a query without returning the full set of results.

4.61.3 Predecessors

4.61.4 Environment Needs

4.61.4.1 Software

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4.61.4.2 Hardware

4.61.5 Input Specification

4.61.6 Output Specification

4.61.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.62 LVV-T652 - Verify query by unique identifier

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.62.1 Verification Elements

- LVV-9859 - DMS-PRTL-REQ-0028-V-01: Query by Identifier_1

4.62.2 Test Items

Verify that queries can be performed to find data on any LSST data product with a unique ID by that ID.

4.62.3 Predecessors

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4.62.4 Environment Needs

4.62.4.1 Software

4.62.4.2 Hardware

4.62.5 Input Specification

4.62.6 Output Specification

4.62.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.63 LVV-T653 - Verify query by object or source identifier

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.63.1 Verification Elements

- LVV-9860 - DMS-PRTL-REQ-0029-V-01: Query by LSST Object and Source Identifiers: Specific Match to Identifier_1

4.63.2 Test Items

Verify that queries can be performed for a given object or source ID (e.g., (DIA)Object, (DIA)Source, ForcedSource), and return catalog, image, and metadata associated with measurements of

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the object/source.

4.63.3 Predecessors

4.63.4 Environment Needs

4.63.4.1 Software

4.63.4.2 Hardware

4.63.5 Input Specification

4.63.6 Output Specification

4.63.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.64 LVV-T654 - Verify query by Solar System object identifier

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.64.1 Verification Elements

- LVV-9861 - DMS-PRTL-REQ-0030-V-01: Query by Solar System Objects: Specific Match to Identifier_1

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4.64.2 Test Items

Verify that the UI supports queries and returns data associated with a specific Solar System Object.

4.64.3 Predecessors

4.64.4 Environment Needs

4.64.4.1 Software

4.64.4.2 Hardware

4.64.5 Input Specification

4.64.6 Output Specification

4.64.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.65 LVV-T655 - Verify query by position on the sky

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.65.1 Verification Elements

- LVV-9866 - DMS-PRTL-REQ-0020-V-01: Positional Query: Position on the Sky_1

4.65.2 Test Items

Verify that the Portal aspect supports queries based on astrophysical coordinates on the sky.

4.65.3 Predecessors

4.65.4 Environment Needs

4.65.4.1 Software

4.65.4.2 Hardware

4.65.5 Input Specification

4.65.6 Output Specification

4.65.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.66 LVV-T656 - Verify query by list of positions

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

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4.66.1 Verification Elements

- LVV-9865 - DMS-PRTL-REQ-0021-V-01: Positional Query: Multiple Positions/Objects_1

4.66.2 Test Items

Verify that the Portal supports queries based on a list of object positions. The coordinates may be specified by any of the supported means of specifying positions.

4.66.3 Predecessors

4.66.4 Environment Needs

4.66.4.1 Software

4.66.4.2 Hardware

4.66.5 Input Specification

4.66.6 Output Specification

4.66.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.67 LVV-T657 - Verify implementation of astrophysical coordinate systems

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.67.1 Verification Elements

- LVV-9862 - DMS-PRTL-REQ-0022-V-01: Positional Query: Astrophysical Coordinate Systems_1

4.67.2 Test Items

Verify that the Portal aspect supports positional queries based on equatorial, ecliptic, and Galactic astrophysical coordinate systems.

4.67.3 Predecessors

4.67.4 Environment Needs

4.67.4.1 Software

4.67.4.2 Hardware

4.67.5 Input Specification

4.67.6 Output Specification

4.67.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.68 LVV-T658 - Verify positional query by astrophysical source name

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.68.1 Verification Elements

- LVV-9863 - DMS-PRTL-REQ-0023-V-01: Positional Query: Astrophysical Source Name Lookup_1

4.68.2 Test Items

Verify that the Portal aspect supports queries based on the use of source names in commonly-used astrophysical source name lookup services (e.g., NED, Simbad, Horizons).

4.68.3 Predecessors

4.68.4 Environment Needs

4.68.4.1 Software

4.68.4.2 Hardware

4.68.5 Input Specification

4.68.6 Output Specification

4.68.7 Test Procedure

Step	Description, Input Data and Expected Result
1-1 from LVV-T849	Description: Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/. Test Data:

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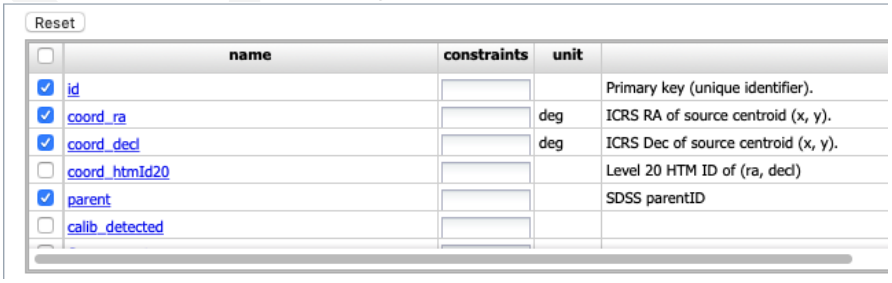
Step	Description, Input Data and Expected Result	
	Expected Result	Currently this drops the user into an active portal environment.
1-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.
2-1 from LVV-T850	Description	Currently, there is no logout mechanism on the portal. This should be updated as the system matures. Simply close the browser window.
	Test Data	
	Expected Result	Closed browser window. When navigating to the portal endpoint, expect to execute the steps in LVV-T849.
3-1 from LVV-T851	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following:  Reset name / constraints / unit id — Primary key (unique identifier). coord_ra — deg — ICRS RA of source centroid (x, y). coord_decl — deg — ICRS Dec of source centroid (x, y). coord_htmId20 — Level 20 HTM ID of (ra, decl) parent — SDSS parentID calib_detected
	Test Data	
	Expected Result	The column box should be configured to return a minimal useful set of columns.

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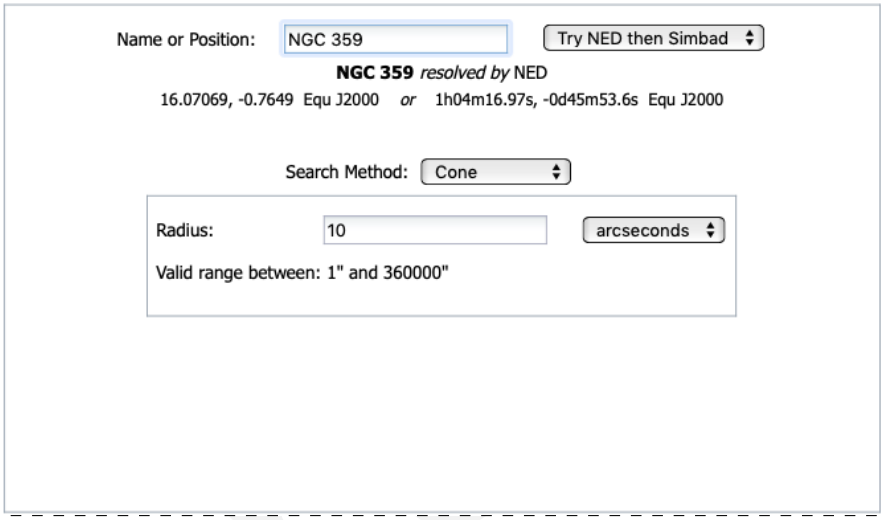
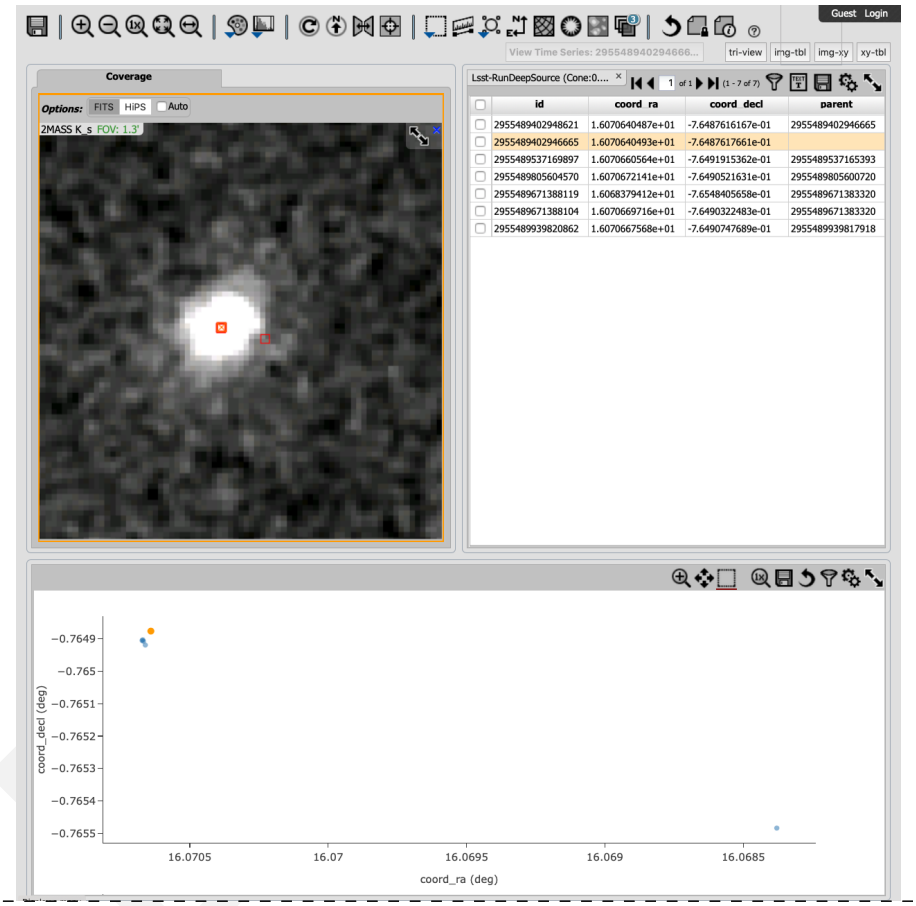
Step	Description, Input Data and Expected Result	
3-2 from LVV-T851	Description	Enter an object name for the portal to resolve. We will use NGC 359, a large elliptical galaxy in the Stripe 82 coverage. To do this, enter the name "NGC 359" in the "Name or Position" text input box. Leave the other defaults in place. 
	Test Data	
	Expected Result	There should be a message like "NGC 359 resolved by NED". The example coordinates should also changed to the coordinates of NGC 359.
3-3 from LVV-T851	Description	Submit the query to the portal query engine by clicking the "Search" button in the lower left corner of the interface.
	Test Data	

Step	Description, Input Data and Expected Result
	Expected Result: A firefly app with the summary image overlay and catalog widgets side by side. A plot of RA vs. Dec is displayed below the side by side widgets.



4.69 LVV-T659 - Verify positional query by Source or Object name

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.69.1 Verification Elements

- LVV-9864 - DMS-PRTL-REQ-0024-V-01: Positional Query: LSST Object and Source Identifiers_1

4.69.2 Test Items

Verify that positional queries can be performed for coordinates based on a given object or source ID (e.g., (DIA)Object, (DIA)Source, ForcedSource).

4.69.3 Predecessors

4.69.4 Environment Needs

4.69.4.1 Software

4.69.4.2 Hardware

4.69.5 Input Specification

4.69.6 Output Specification

4.69.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.70 LVV-T660 - Verify positional query based on Solar System object names

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.70.1 Verification Elements

- LVV-9867 - DMS-PRTL-REQ-0025-V-01: Positional Query: Solar System Object Names_1

4.70.2 Test Items

Verify that positional queries can be performed for coordinates based on a given Solar System object name.

4.70.3 Predecessors

4.70.4 Environment Needs

4.70.4.1 Software

4.70.4.2 Hardware

4.70.5 Input Specification

4.70.6 Output Specification

4.70.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.71 LVV-T661 - Verify query by cone search

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.71.1 Verification Elements

- LVV-9869 - DMS-PRTL-REQ-0026-V-01: Positional Query by Region: Cone-Search_1

4.71.2 Test Items

Verify that Portal supports position-based queries based on a cone-shaped radial search.

4.71.3 Predecessors

4.71.4 Environment Needs

4.71.4.1 Software

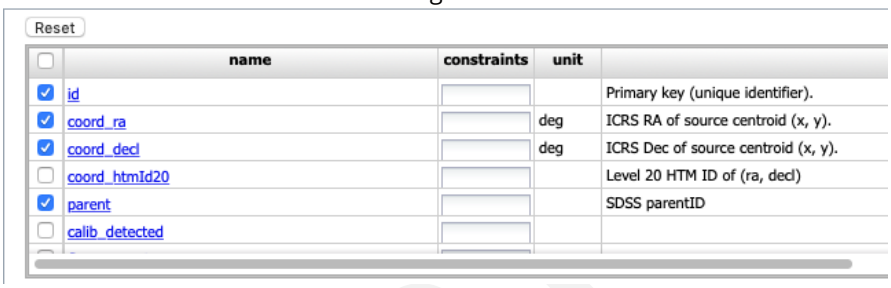
4.71.4.2 Hardware

4.71.5 Input Specification

4.71.6 Output Specification

4.71.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following: 
	Test Data	No data.
	Expected Result	The column box should be configured to return a minimal useful set of columns.
2-1 from LVV-T849	Description	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/.
	Test Data	
	Expected Result	Currently this drops the user into an active portal environment.
2-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.
3	Description	Attempt to access data using sexagesimal format by: 1) entering an arbitrary position in the Stripe 82 footprint into the "Name or Position:" input text box: 22h2m1s 0d15m0.3s 2) change the radius of the query by changing the default value in the "Radius:" box to 15.
	Test Data	No data.
	Expected Result	The cone search parameters are expected to be configured in a way as to return data from the service.
4	Description	Call the service by clicking the "Search" button in the lower left corner of the interface.
	Test Data	No data.

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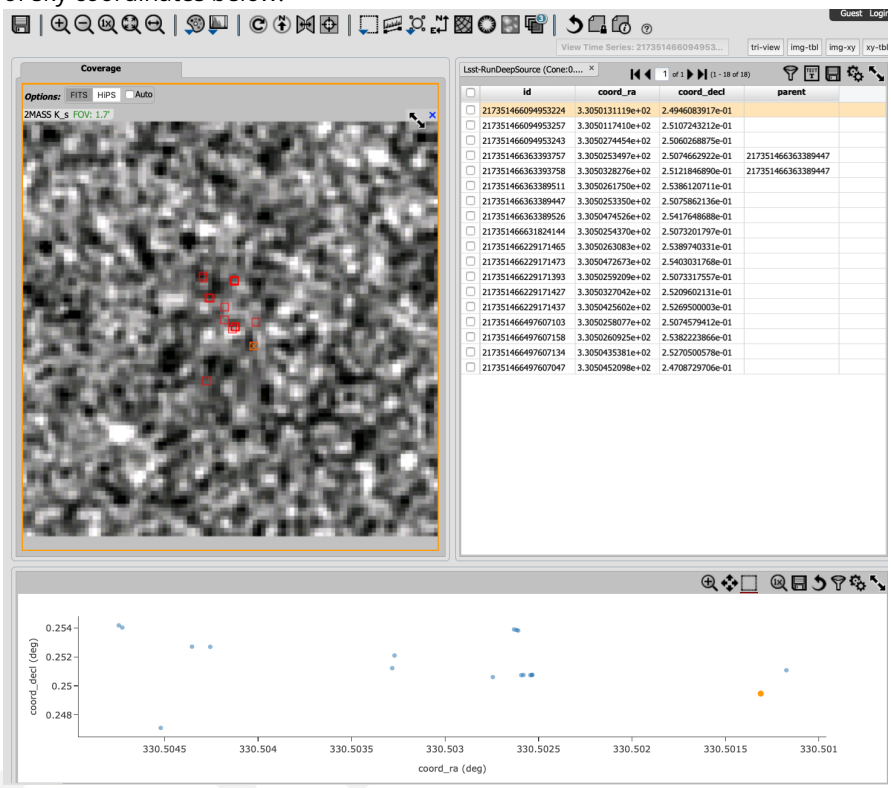
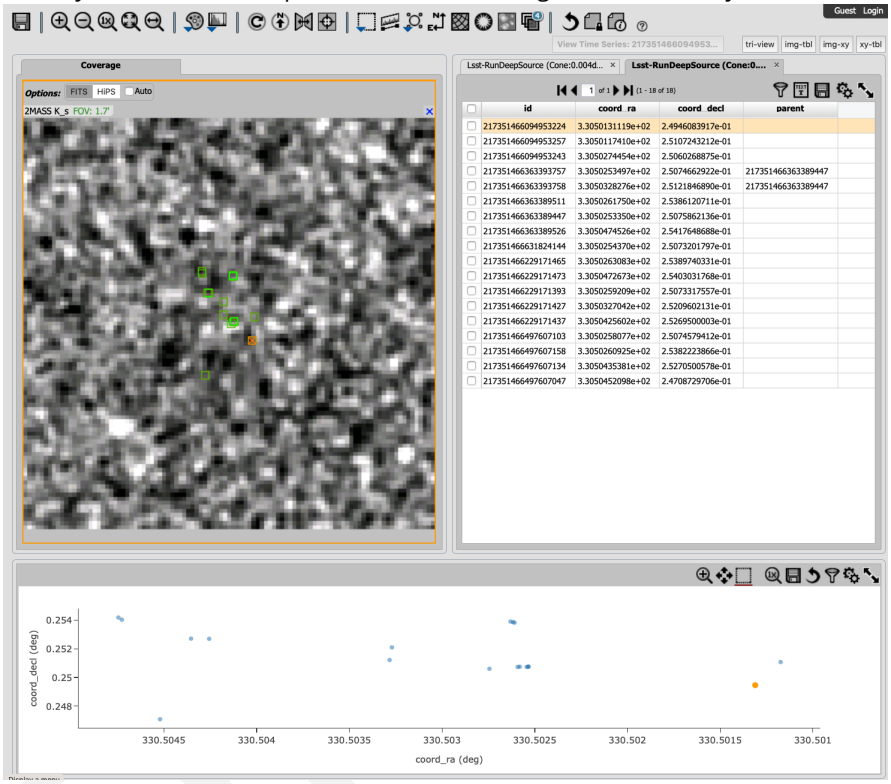
Step	Description, Input Data and Expected Result	
	Expected Result	A firefly instance with the image summary and catalog widgets side by side with the plot of sky coordinates below: 
5	Description	Return to the query interface by clicking the "LSST Data" button in the upper left of the interface.
	Test Data	No data.
	Expected Result	Expect to be returned to the query interface with the previous search criteria pre-filled in the appropriate boxes.
6	Description	Modify the query to use decimal inputs by changing "22h2m1s 0d15m0.3s" to "330.504167 0.250083".
	Test Data	No data.
	Expected Result	The parameters updated for the decimal format.
7	Description	Execute the modified query by clicking the "Search" button at the bottom left of the interface.
	Test Data	No data.

Step	Description, Input Data and Expected Result	
	Expected Result	A firefly instance as in step 4 but with two catalog tabs instead of just one: 
8	Description	Verify the two returned catalogs are the same by clicking between the two catalog tabs.
	Test Data	No data.
	Expected Result	Identical catalogs from the two queries.
9-1 from LVV-T850	Description	Currently, there is no logout mechanism on the portal. This should be updated as the system matures. Simply close the browser window.
	Test Data	
	Expected Result	Closed browser window. When navigating to the portal endpoint, expect to execute the steps in LVV-T849.

4.72 LVV-T662 - Verify query by box search

Version	Status	Priority	Verification Type	Owner

1	Draft	Normal	Test	Jeffrey Carlin

4.72.1 Verification Elements

- LVV-9868 - DMS-PRTL-REQ-0027-V-01: Positional Query by Region: Box-Search_1

4.72.2 Test Items

Verify that the Portal supports positional queries based on a coordinate system box search.

4.72.3 Predecessors

4.72.4 Environment Needs

4.72.4.1 Software

4.72.4.2 Hardware

4.72.5 Input Specification

4.72.6 Output Specification

4.72.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.73 LVV-T663 - Verify query by time of observation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.73.1 Verification Elements

- LVV-9870 - DMS-PRTL-REQ-0019-V-01: Query by Date and Time: Time Range of Observation_1

4.73.2 Test Items

Verify that the Portal supports queries based on time or ranges of date/time values in both UT and (barycentric) Julian date.

4.73.3 Predecessors

4.73.4 Environment Needs

4.73.4.1 Software

4.73.4.2 Hardware

4.73.5 Input Specification

4.73.6 Output Specification

4.73.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.74 LVV-T664 - Verify implementation of user-friendly tabular query

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.74.1 Verification Elements

- LVV-9874 - DMS-PRTL-REQ-0031-V-01: Tabular Data Query Specifications_1

4.74.2 Test Items

The Portal aspect shall provide a user interface to execute queries of the (DIA)Object and (DIA)Source tables, driven by the data dictionary associated with the tables.

4.74.3 Predecessors

4.74.4 Environment Needs

4.74.4.1 Software

4.74.4.2 Hardware

4.74.5 Input Specification

4.74.6 Output Specification

4.74.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.75 LVV-T666 - Verify query by image metadata

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Test	Jeffrey Carlin

4.75.1 Verification Elements

- LVV-9873 - DMS-PRTL-REQ-0032-V-01: Query Tabular Data based upon Image Meta-Data_1

4.75.2 Test Items

Verify that the Portal supports queries on image metadata (e.g., airmass, moon angle, etc.) from the images the catalog measurements were made from.

4.75.3 Predecessors

4.75.4 Environment Needs

4.75.4.1 Software

4.75.4.2 Hardware

4.75.5 Input Specification

4.75.6 Output Specification

4.75.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.76 LVV-T667 - Verify queries on the alerts database

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.76.1 Verification Elements

- LVV-9872 - DMS-PRTL-REQ-0033-V-01: Queries on the Alerts Database_1

4.76.2 Test Items

Verify that the Portal supports queries on parameters in the Alerts Database.

4.76.3 Predecessors

4.76.4 Environment Needs

4.76.4.1 Software

4.76.4.2 Hardware

4.76.5 Input Specification

4.76.6 Output Specification

4.76.7 Test Procedure

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Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.77 LVV-T668 - Verify access to original alert state

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.77.1 Verification Elements

- LVV-9871 - DMS-PRTL-REQ-0034-V-01: Access to Original Alert State_1

4.77.2 Test Items

Verify that alerts as they were originally raised are accessible via the Portal.

4.77.3 Predecessors

4.77.4 Environment Needs

4.77.4.1 Software

4.77.4.2 Hardware

4.77.5 Input Specification

4.77.6 Output Specification

Draft

4.77.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.78 LVV-T669 - Verify query for single-epoch visit images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.78.1 Verification Elements

- LVV-9878 - DMS-PRTL-REQ-0035-V-01: Query for Single Epoch Visit Images_1

4.78.2 Test Items

Verify that users with a list of visits (either directly, or from a visit-selection query) can query for single-epoch images corresponding to those visits.

4.78.3 Predecessors

4.78.4 Environment Needs

4.78.4.1 Software

4.78.4.2 Hardware

4.78.5 Input Specification

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4.78.6 Output Specification

4.78.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.79 LVV-T670 - Verify query for single-epoch raft images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.79.1 Verification Elements

- LVV-9877 - DMS-PRTL-REQ-0036-V-01: Query for Single Epoch Raft Images_1

4.79.2 Test Items

Verify that users of the single-epoch query service (LVV-9878) can limit the returned visit images to only a specified raft.

4.79.3 Predecessors

4.79.4 Environment Needs

4.79.4.1 Software

4.79.4.2 Hardware

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4.79.5 Input Specification

4.79.6 Output Specification

4.79.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.80 LVV-T671 - Verify query for single-epoch CCD images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.80.1 Verification Elements

- LVV-9876 - DMS-PRTL-REQ-0037-V-01: Query for Single Epoch CCD Image_1

4.80.2 Test Items

Verify that users of the single-epoch query service (LVV-9878) can limit the returned visit images to only a specified CCD.

4.80.3 Predecessors

4.80.4 Environment Needs

4.80.4.1 Software

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4.80.4.2 Hardware

4.80.5 Input Specification

4.80.6 Output Specification

4.80.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.81 LVV-T672 - Verify metadata query for single-epoch images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.81.1 Verification Elements

- LVV-9879 - DMS-PRTL-REQ-0038-V-01: Single-Epoch Image Query Specifications_1

4.81.2 Test Items

Verify that the Portal provides an option to query for visits and single-epoch images of a certain type based on image metadata or parameters from the reformatted EFD.

4.81.3 Predecessors

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4.81.4 Environment Needs

4.81.4.1 Software

4.81.4.2 Hardware

4.81.5 Input Specification

4.81.6 Output Specification

4.81.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.82 LVV-T673 - Verify query for coadds by image metadata

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.82.1 Verification Elements

- LVV-9875 - DMS-PRTL-REQ-0039-V-01: Coadded Image Query Specifications_1

4.82.2 Test Items

Verify that the Portal aspect supports queries based on image metadata describing the provenance of the contributing images, that return the corresponding coadd image(s).

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4.82.3 Predecessors

4.82.4 Environment Needs

4.82.4.1 Software

4.82.4.2 Hardware

4.82.5 Input Specification

4.82.6 Output Specification

4.82.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.83 LVV-T674 - Verify query for coadd image cutouts

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.83.1 Verification Elements

- LVV-9880 - DMS-PRTL-REQ-0041-V-01: Query for Coadded Image Cutouts_1

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4.83.2 Test Items

Verify that Portal users can query based on image metadata for coadds, then obtain a list of sub-images (cutouts) with a specified center position and size.

4.83.3 Predecessors

4.83.4 Environment Needs

4.83.4.1 Software

4.83.4.2 Hardware

4.83.5 Input Specification

4.83.6 Output Specification

4.83.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.84 LVV-T675 - Verify query for single-epoch image cutouts

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.84.1 Verification Elements

- LVV-9881 - DMS-PRTL-REQ-0040-V-01: Query for Single Epoch Image Cutouts_1

4.84.2 Test Items

Verify that Portal users can query based on image metadata for single-epoch images, then obtain a list of sub-images (cutouts) with a specified center position and size.

4.84.3 Predecessors

4.84.4 Environment Needs

4.84.4.1 Software

4.84.4.2 Hardware

4.84.5 Input Specification

4.84.6 Output Specification

4.84.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.85 LVV-T676 - Verify display of native single-visit images

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.85.1 Verification Elements

- LVV-9905 - DMS-PRTL-REQ-0062-V-01: Display Native Single-Visit Image Data Products_1

4.85.2 Test Items

Verify that the Portal aspect provides a means to display the native single-visit image data products, including raw images, Processed Visit Images (PVIs), and difference images, as well as the standard single-exposure calibration images used as inputs for flats, bias frames, etc.

4.85.3 Predecessors

4.85.4 Environment Needs

4.85.4.1 Software

4.85.4.2 Hardware

4.85.5 Input Specification

4.85.6 Output Specification

4.85.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.86 LVV-T677 - Verify Portal provides visualization of tabular and image data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.86.1 Verification Elements

- LVV-9884 - DMS-PRTL-REQ-0042-V-01: Visualization of Tabular and Image Data_1

4.86.2 Test Items

Verify that the Portal aspect provides the capability to visualize all tabular and image data defined in the DPDD, as well as user data products.

4.86.3 Predecessors

4.86.4 Environment Needs

4.86.4.1 Software

4.86.4.2 Hardware

4.86.5 Input Specification

4.86.6 Output Specification

4.86.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Examine tabular view to verify that the selected quantities are displayed.
	Test Data	No data.
	Expected Result	An interactive view

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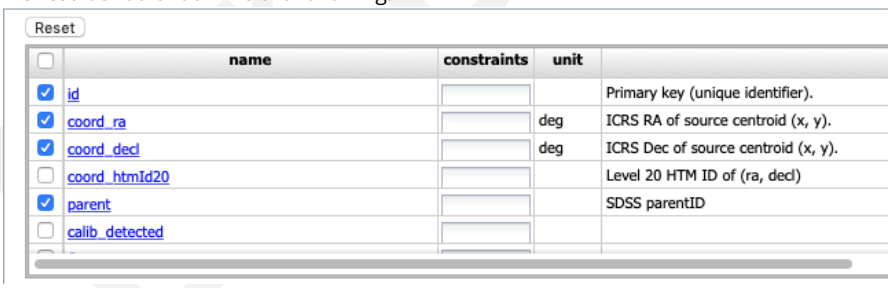
Step	Description, Input Data and Expected Result	
2-1 from LVV-T849	Description	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/.
	Test Data	
	Expected Result	Currently this drops the user into an active portal environment.
2-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.
3-1 from LVV-T851	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following: 
	Test Data	
	Expected Result	The column box should be configured to return a minimal useful set of columns.

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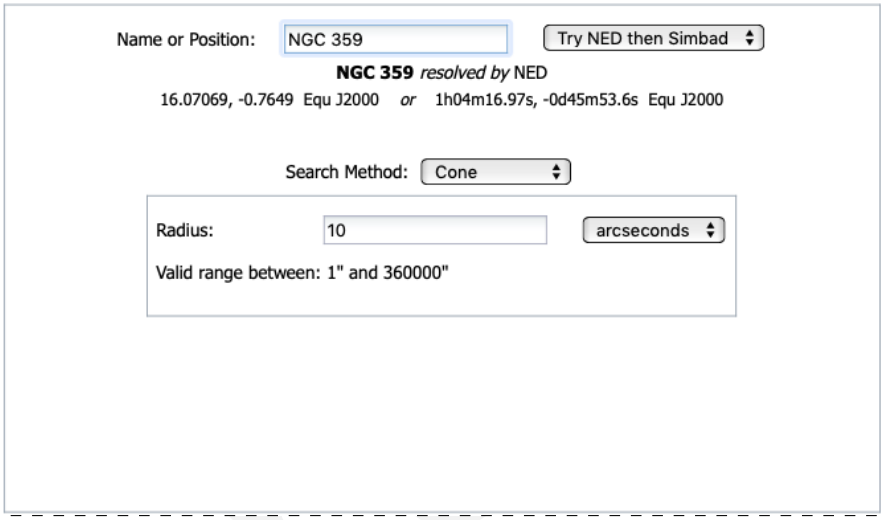
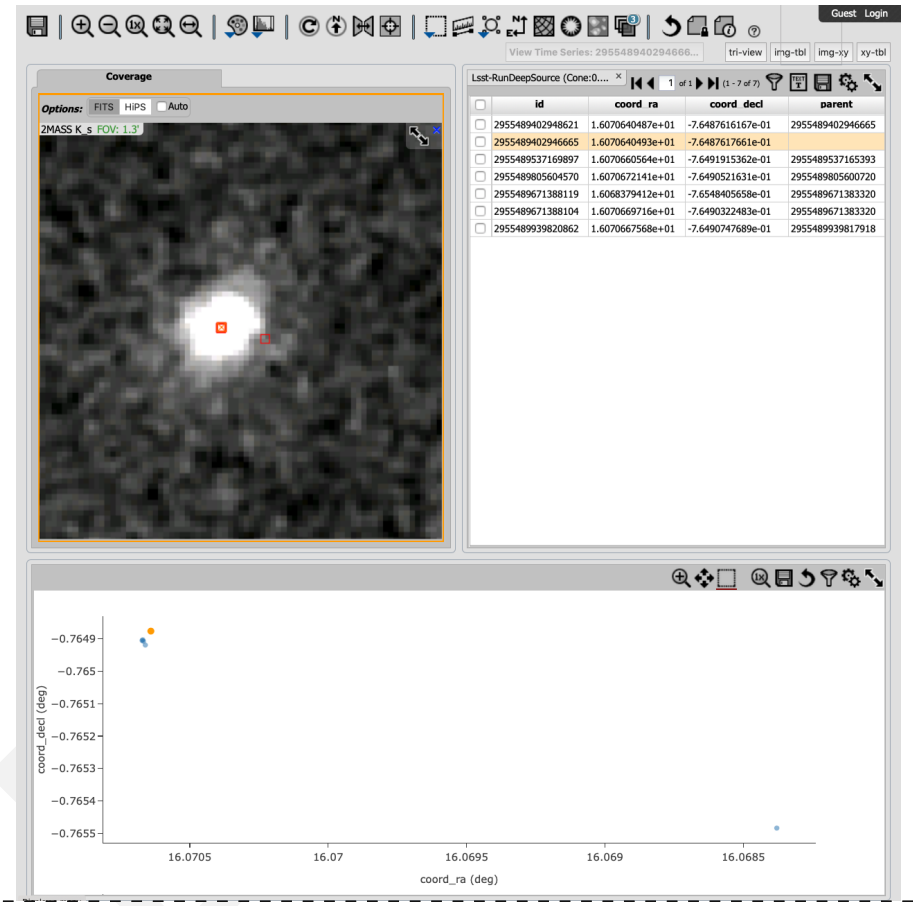
Step	Description, Input Data and Expected Result	
3-2 from LVV-T851	Description	Enter an object name for the portal to resolve. We will use NGC 359, a large elliptical galaxy in the Stripe 82 coverage. To do this, enter the name "NGC 359" in the "Name or Position" text input box. Leave the other defaults in place. 
	Test Data	
	Expected Result	There should be a message like "NGC 359 resolved by NED". The example coordinates should also changed to the coordinates of NGC 359.
3-3 from LVV-T851	Description	Submit the query to the portal query engine by clicking the "Search" button in the lower left corner of the interface.
	Test Data	

Step	Description, Input Data and Expected Result
Expected Result	A firefly app with the summary image overlay and catalog widgets side by side. A plot of RA vs. Dec is displayed below the side by side widgets.



4.87 LVV-T678 - Verify visualization of ancillary information

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.87.1 Verification Elements

- LVV-9883 - DMS-PRTL-REQ-0043-V-01: Visualization of Ancillary Information_1

4.87.2 Test Items

Verify that the Portal provides the ability to visualize certain ancillary information produced by the LSST pipeline, including, but not limited to, image regions, image bit-planes, survey footprints, focal-plane footprints and PSF representations.

4.87.3 Predecessors

4.87.4 Environment Needs

4.87.4.1 Software

4.87.4.2 Hardware

4.87.5 Input Specification

4.87.6 Output Specification

4.87.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.88 LVV-T679 - Verify visualization linking image and tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.88.1 Verification Elements

- LVV-9882 - DMS-PRTL-REQ-0044-V-01: Linking Visualization of Image Data to Tabular Data_1

4.88.2 Test Items

Verify that the Portal aspect provides a capability for users to navigate between visualization and tabular data for a given tabular entry.

4.88.3 Predecessors

4.88.4 Environment Needs

4.88.4.1 Software

4.88.4.2 Hardware

4.88.5 Input Specification

4.88.6 Output Specification

4.88.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.89 LVV-T680 - Verify visualization tool for uploaded tabular or image data

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.89.1 Verification Elements

- LVV-9885 - DMS-PRTL-REQ-0045-V-01: Visualization of Uploaded Tabular and Image Data_1

4.89.2 Test Items

Verify that the Portal provides a means of visualizing uploaded tables or images.

4.89.3 Predecessors

4.89.4 Environment Needs

4.89.4.1 Software

4.89.4.2 Hardware

4.89.5 Input Specification

4.89.6 Output Specification

4.89.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.90 LVV-T681 - Verify visualization of workspace data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.90.1 Verification Elements

- LVV-9886 - DMS-PRTL-REQ-0046-V-01: Visualization of Workspace Data_1

4.90.2 Test Items

Verify that data selected in a workspace browser can be conveniently visualized.

4.90.3 Predecessors

4.90.4 Environment Needs

4.90.4.1 Software

4.90.4.2 Hardware

4.90.5 Input Specification

4.90.6 Output Specification

4.90.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.91 LVV-T682 - Verify availability of property sheets for table rows

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.91.1 Verification Elements

- LVV-9888 - DMS-PRTL-REQ-0047-V-01: Table Row Property Sheet_1

4.91.2 Test Items

Verify that the Portal permits inspection of a row in tabular data query results, summarizing metadata such as units, semantic information, and relationships between columns.

4.91.3 Predecessors

4.91.4 Environment Needs

4.91.4.1 Software

4.91.4.2 Hardware

4.91.5 Input Specification

4.91.6 Output Specification

4.91.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.92 LVV-T683 - Verify visualization of alerts

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.92.1 Verification Elements

- LVV-9887 - DMS-PRTL-REQ-0048-V-01: Alert Visualization_1

4.92.2 Test Items

Verify that the Portal aspect provides for the users a "property sheet" for the contents of an alert packet including, but not necessarily limited to, the alert postage stamp image, the postage stamp time series, the photometric time series, the source and object information (e.g., position, brightness).

4.92.3 Predecessors

4.92.4 Environment Needs

4.92.4.1 Software

4.92.4.2 Hardware

4.92.5 Input Specification

4.92.6 Output Specification

4.92.7 Test Procedure

Step	Description, Input Data and Expected Result
	Description
1	

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Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	

4.93 LVV-T684 - Verify display of tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.93.1 Verification Elements

- LVV-9891 - DMS-PRTL-REQ-0049-V-01: Display of Tabular Data_1

4.93.2 Test Items

Verify that the Portal provides an interactive environment that displays table data by columns and rows.

4.93.3 Predecessors

4.93.4 Environment Needs

4.93.4.1 Software

4.93.4.2 Hardware

4.93.5 Input Specification

4.93.6 Output Specification

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4.93.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.94 LVV-T685 - Verify column selection from tables

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.94.1 Verification Elements

- LVV-9889 - DMS-PRTL-REQ-0050-V-01: Column Selection of Tabular Data_1

4.94.2 Test Items

Verify that the Portal provides the capability to select specific columns from tabular data, for display and download.

4.94.3 Predecessors

4.94.4 Environment Needs

4.94.4.1 Software

4.94.4.2 Hardware

4.94.5 Input Specification

Draft

4.94.6 Output Specification

4.94.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.95 LVV-T686 - Verify capability to re-order columns in displayed tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.95.1 Verification Elements

- LVV-9892 - DMS-PRTL-REQ-0051-V-01: Display Order of Columns of Tabular Data_1

4.95.2 Test Items

Verify that the Portal provides capability to change the order in which columns of tabular data are displayed.

4.95.3 Predecessors

4.95.4 Environment Needs

4.95.4.1 Software

4.95.4.2 Hardware

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4.95.5 Input Specification

4.95.6 Output Specification

4.95.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.96 LVV-T687 - Verify capability of copying data in tables

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.96.1 Verification Elements

- LVV-9890 - DMS-PRTL-REQ-0052-V-01: Copying of Tabular Data_1

4.96.2 Test Items

Verify that data can be interactively selected and copied from displayed tables in the Portal aspect.

4.96.3 Predecessors

4.96.4 Environment Needs

4.96.4.1 Software

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4.96.4.2 Hardware

4.96.5 Input Specification

4.96.6 Output Specification

4.96.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.97 LVV-T688 - Verify row selection from tables

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.97.1 Verification Elements

- LVV-9894 - DMS-PRTL-REQ-0053-V-01: Row Selection of Tabular Data_1

4.97.2 Test Items

Verify that the Portal provides the capability to select specific rows from tabular data, for display and download.

4.97.3 Predecessors

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4.97.4 Environment Needs

4.97.4.1 Software

4.97.4.2 Hardware

4.97.5 Input Specification

4.97.6 Output Specification

4.97.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.98 LVV-T689 - Verify capability to display tabular data in paged format

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.98.1 Verification Elements

- LVV-9893 - DMS-PRTL-REQ-0054-V-01: Paging of Tabular Data_1

4.98.2 Test Items

Verify that the Portal aspect provides the capability to display tabular data in a paged format, in the case that database queries return results too large to display on a single page.

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4.98.3 Predecessors

4.98.4 Environment Needs

4.98.4.1 Software

4.98.4.2 Hardware

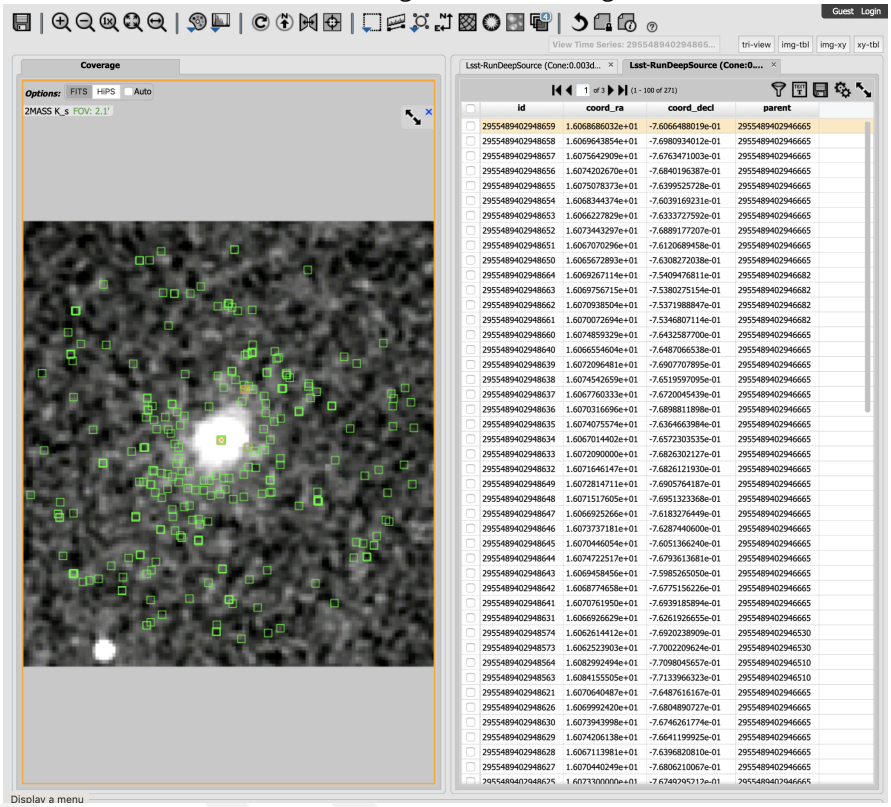
4.98.5 Input Specification

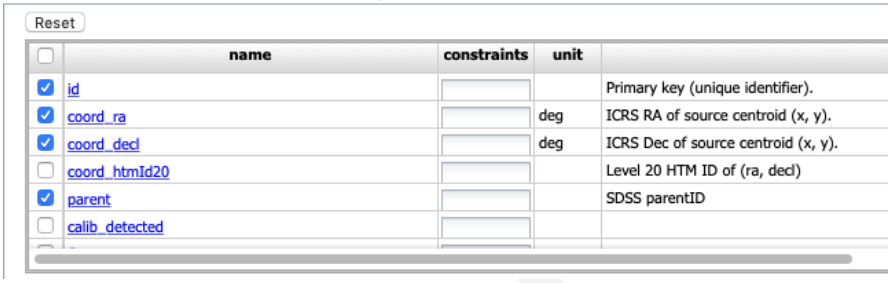
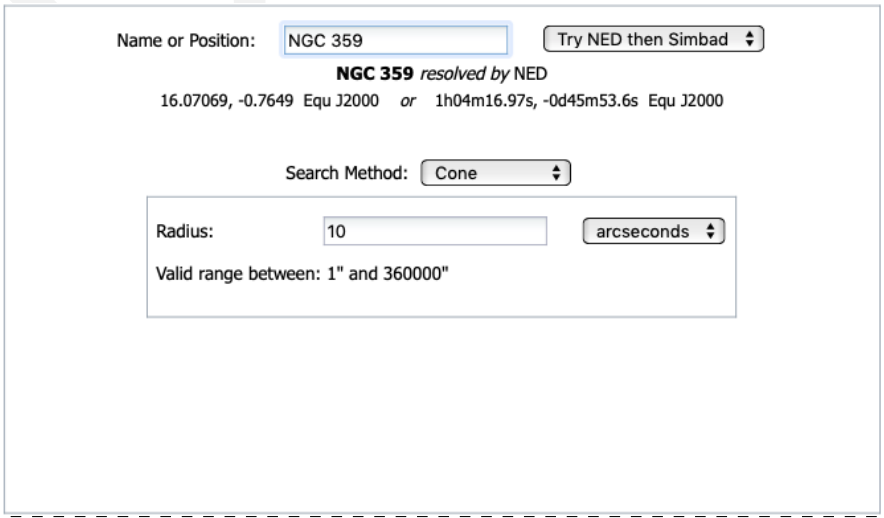
4.98.6 Output Specification

4.98.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Extend the size of the returned table by: 1) returning to the query interface by clicking the "LSST Data" button in the upper left of the interface 2) update the query by increasing the query radius from 10 to 60 arcseconds 3) execute the modified query by clicking the "Search" button in the lower left of the query interface
	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result	
	Expected Result	An additional table tab of the catalog visualization widget: 
2-1 from LVV-T849	Description	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/.
	Test Data	
	Expected Result	Currently this drops the user into an active portal environment.
2-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.

Step	Description, Input Data and Expected Result	
3-1 from LVV-T851	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following: 
	Test Data	
	Expected Result	The column box should be configured to return a minimal useful set of columns.
3-2 from LVV-T851	Description	Enter an object name for the portal to resolve. We will use NGC 359, a large elliptical galaxy in the Stripe 82 coverage. To do this, enter the name "NGC 359" in the "Name or Position" text input box. Leave the other defaults in place. 
	Test Data	
	Expected Result	There should be a message like "NGC 359 resolved by NED". The example coordinates should also changed to the coordinates of NGC 359.

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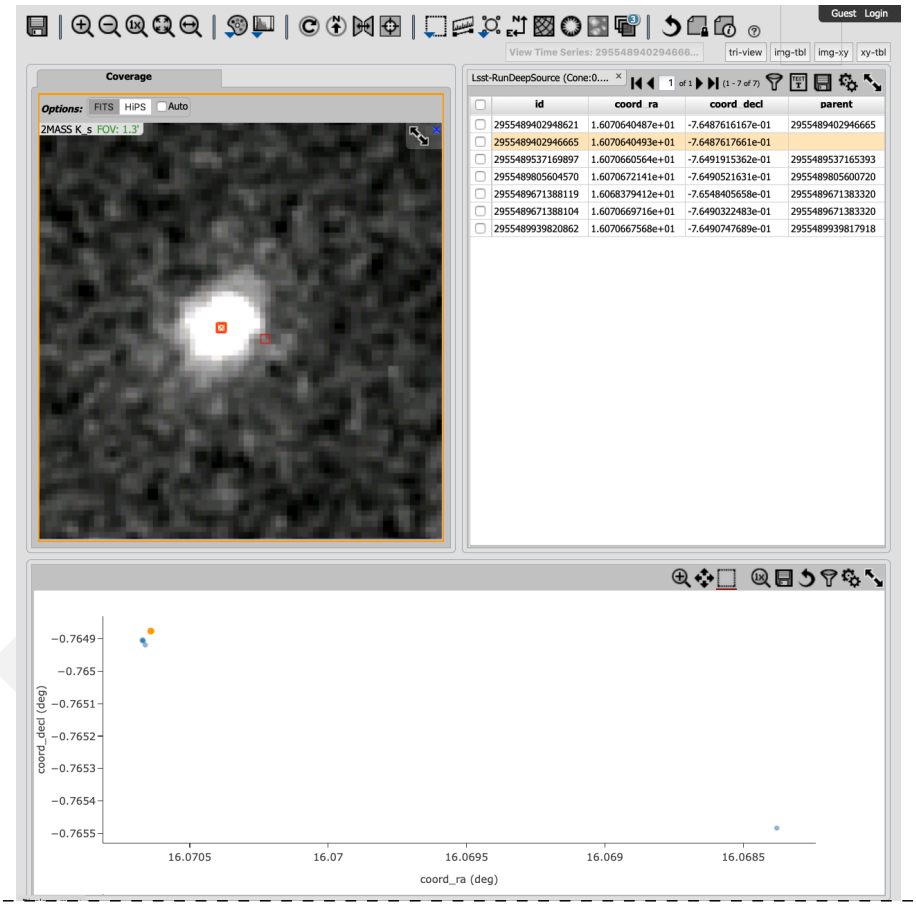
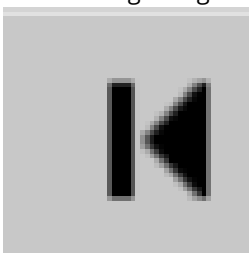
Step	Description, Input Data and Expected Result
3-3 from LVV-T851	**Description** Submit the query to the portal query engine by clicking the "Search" button in the lower left corner of the interface. **Test Data** **Expected Result** A firefly app with the summary image overlay and catalog widgets side by side. A plot of RA vs. Dec is displayed below the side by side widgets. 
4	**Description** Verify the ability to page through the catalog by using the navigation icons at the upper left of the catalog visualization widget. Page forward to the end of the catalog. Use the "back to beginning" button. 

Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	Expect to be able to page through the catalog and to navigate to the first or last page from any intervening page.
5-1 from LVV-T850	Description	Currently, there is no logout mechanism on the portal. This should be updated as the system matures. Simply close the browser window.
	Test Data	
	Expected Result	Closed browser window. When navigating to the portal endpoint, expect to execute the steps in LVV-T849.

4.99 LVV-T690 - Verify creation and display of X-Y scatter plots

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.99.1 Verification Elements

- LVV-9901 - DMS-PRTL-REQ-0055-V-01: XY Scatter Plots_1

4.99.2 Test Items

Verify that the Portal provides the capability to create and display 2-dimensional X-Y scatter plots from tabular data.

4.99.3 Predecessors

4.99.4 Environment Needs

4.99.4.1 Software

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4.99.4.2 Hardware

4.99.5 Input Specification

4.99.6 Output Specification

4.99.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.100 LVV-T691 - Verify creation and display of histogram plots

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.100.1 Verification Elements

- LVV-9895 - DMS-PRTL-REQ-0056-V-01: Histograms_1

4.100.2 Test Items

Verify that the Portal provides the capability to create and display 1-dimensional and 2-dimensional histogram plots from tabular data.

4.100.3 Predecessors

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4.100.4 Environment Needs

4.100.4.1 Software

4.100.4.2 Hardware

4.100.5 Input Specification

4.100.6 Output Specification

4.100.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.101 LVV-T692 - Verify capability to change symbol shapes, sizes, and colors in XY(Z) scatter plots

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.101.1 Verification Elements

- LVV-9900 - DMS-PRTL-REQ-0057-V-01: Symbol Size, Shape, and Color Coding in XY(Z) Scatter Plots_1

Draft

4.101.2 Test Items

Verify that users can change the shape, size, and color of symbols in XY(Z) scatter plots to indicate information from additional dimensions of tabular data.

4.101.3 Predecessors

4.101.4 Environment Needs

4.101.4.1 Software

4.101.4.2 Hardware

4.101.5 Input Specification

4.101.6 Output Specification

4.101.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.102 LVV-T693 - Verify visualization of uncertainties in plots

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.102.1 Verification Elements

- LVV-9898 - DMS-PRTL-REQ-0058-V-01: Plot Quantitative Uncertainties_1

4.102.2 Test Items

Verify the capability to represent uncertainties in plots of tabular data.

4.102.3 Predecessors

4.102.4 Environment Needs

4.102.4.1 Software

4.102.4.2 Hardware

4.102.5 Input Specification

4.102.6 Output Specification

4.102.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.103 LVV-T694 - Verify visualization of asymmetric uncertainties

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

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4.103.1 Verification Elements

- LVV-9897 - DMS-PRTL-REQ-0059-V-01: Plot Asymmetric Quantitative Uncertainties_1

4.103.2 Test Items

Verify that the Portal aspect can display uncertainties that are asymmetric (i.e., differ in the positive and negative directions).

4.103.3 Predecessors

4.103.4 Environment Needs

4.103.4.1 Software

4.103.4.2 Hardware

4.103.5 Input Specification

4.103.6 Output Specification

4.103.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.104 LVV-T695 - Verify visualization of upper and lower limits in plots

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.104.1 Verification Elements

- LVV-9899 - DMS-PRTL-REQ-0060-V-01: Plot Upper and Lower Quantitative Limits_1

4.104.2 Test Items

Verify that the Portal is capable of displaying quantities that represent upper or lower limits (provided, for example, for non-detections).

4.104.3 Predecessors

4.104.4 Environment Needs

4.104.4.1 Software

4.104.4.2 Hardware

4.104.5 Input Specification

4.104.6 Output Specification

4.104.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.105 LVV-T696 - Verify visualization of multiple XY plots on the same display

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.105.1 Verification Elements

- LVV-9896 - DMS-PRTL-REQ-0061-V-01: Multiple XY-Plots on the Same Display_1

4.105.2 Test Items

Verify that the Portal provides the capability to display multiple XY plots on a single display canvas.

4.105.3 Predecessors

4.105.4 Environment Needs

4.105.4.1 Software

4.105.4.2 Hardware

4.105.5 Input Specification

4.105.6 Output Specification

4.105.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.106 LVV-T697 - Verify display of raft and full focal-plane single-visit images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.106.1 Verification Elements

- LVV-9906 - DMS-PRTL-REQ-0063-V-01: Display Raft- and Focal-Plane-Level Single-Visit Image Data_1

4.106.2 Test Items

Verify that the Portal aspect has the ability to generate a single-visit image display of a raft and full focal-plane image.

4.106.3 Predecessors

4.106.4 Environment Needs

4.106.4.1 Software

4.106.4.2 Hardware

4.106.5 Input Specification

4.106.6 Output Specification

4.106.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.107 LVV-T698 - Verify display of cutout from single-visit image

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.107.1 Verification Elements

- LVV-9907 - DMS-PRTL-REQ-0064-V-01: Display Single Visit Image Cut-Out_1

4.107.2 Test Items

Verify that the Portal is capable of displaying a cutout from a single-visit image.

4.107.3 Predecessors

4.107.4 Environment Needs

4.107.4.1 Software

4.107.4.2 Hardware

4.107.5 Input Specification

4.107.6 Output Specification

4.107.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.108 LVV-T699 - Verify display of native coadd images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.108.1 Verification Elements

- LVV-9904 - DMS-PRTL-REQ-0065-V-01: Display Native Coadded Image Data Products_1

4.108.2 Test Items

Verify that the Portal can display native coadd image products (i.e., patch-level images).

4.108.3 Predecessors

4.108.4 Environment Needs

4.108.4.1 Software

4.108.4.2 Hardware

4.108.5 Input Specification

4.108.6 Output Specification

Draft

4.108.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.109 LVV-T700 - Verify display of coadd cutouts and mosaics

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.109.1 Verification Elements

- LVV-9903 - DMS-PRTL-REQ-0066-V-01: Display Coadded Image Cutouts / Mosaics_1

4.109.2 Test Items

Verify that the Portal aspect has the capability to display cutout or mosaic images created from coadds.

4.109.3 Predecessors

4.109.4 Environment Needs

4.109.4.1 Software

4.109.4.2 Hardware

4.109.5 Input Specification

Draft

4.109.6 Output Specification

4.109.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.110 LVV-T701 - Verify display of calibration images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.110.1 Verification Elements

- LVV-9902 - DMS-PRTL-REQ-0067-V-01: Display Calibration Image Data Products_1

4.110.2 Test Items

Verify that the Portal is capable of displaying calibration image data products, including synthetic flats, bias frames, etc.

4.110.3 Predecessors

4.110.4 Environment Needs

4.110.4.1 Software

4.110.4.2 Hardware

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4.110.5 Input Specification

4.110.6 Output Specification

4.110.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.111 LVV-T702 - Verify display of user-provided images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.111.1 Verification Elements

- LVV-9908 - DMS-PRTL-REQ-0068-V-01: Display User-provided Images_1

4.111.2 Test Items

Verify that the Portal has the capability of displaying user-provided images in widely-used astronomical data formats, and properly interprets commonly-used WCS specifications from the image headers. This includes FITS format, and may be extended to others.

4.111.3 Predecessors

4.111.4 Environment Needs

4.111.4.1 Software

Draft

4.111.4.2 Hardware

4.111.5 Input Specification

4.111.6 Output Specification

4.111.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.112 LVV-T703 - Verify display of image property sheet

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.112.1 Verification Elements

- LVV-9909 - DMS-PRTL-REQ-0069-V-01: Image Property Sheet_1

4.112.2 Test Items

Verify that the Portal has the ability to display a property sheet for an image data product or user-provided image, displaying image format and other header data.

4.112.3 Predecessors

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4.112.4 Environment Needs

4.112.4.1 Software

4.112.4.2 Hardware

4.112.5 Input Specification

4.112.6 Output Specification

4.112.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.113 LVV-T704 - Verify that coordinate display tools are provided for images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.113.1 Verification Elements

- LVV-9914 - DMS-PRTL-REQ-0070-V-01: Provide Coordinate Display Tools for Images_1

4.113.2 Test Items

Verify that the Portal provides all the capabilities in the Coordinate Display Tools section in LDM-554 for image displays. Specific capabilities will depend on the availability of WCS information for an image.

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4.113.3 Predecessors

4.113.4 Environment Needs

4.113.4.1 Software

4.113.4.2 Hardware

4.113.5 Input Specification

4.113.6 Output Specification

4.113.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.114 LVV-T705 - Verify image pixel content display

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.114.1 Verification Elements

- LVV-9911 - DMS-PRTL-REQ-0071-V-01: Image Pixel Content Display_1

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4.114.2 Test Items

Verify that the Portal provides the capability to inspect the pixel contents of an image at the cursor position.

4.114.3 Predecessors

4.114.4 Environment Needs

4.114.4.1 Software

4.114.4.2 Hardware

4.114.5 Input Specification

4.114.6 Output Specification

4.114.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.115 LVV-T706 - Verify spatial manipulation of images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.115.1 Verification Elements

- LVV-9912 - DMS-PRTL-REQ-0072-V-01: Image Spatial Manipulation_1

4.115.2 Test Items

Verify that the Portal allows users to spatially manipulate displayed images, including resizing, rescaling, reprojecting, zooming, and cropping.

4.115.3 Predecessors

4.115.4 Environment Needs

4.115.4.1 Software

4.115.4.2 Hardware

4.115.5 Input Specification

4.115.6 Output Specification

4.115.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.116 LVV-T707 - Verify multi-image scaling and alignment

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.116.1 Verification Elements

- LVV-9913 - DMS-PRTL-REQ-0073-V-01: Multi-Image Scaling and Aligning_1

4.116.2 Test Items

Verify that the Portal has the capability to display multiple images on a common astrophysical coordinate scale, aligned on the screen in a common orientation.

4.116.3 Predecessors

4.116.4 Environment Needs

4.116.4.1 Software

4.116.4.2 Hardware

4.116.5 Input Specification

4.116.6 Output Specification

4.116.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.117 LVV-T708 - Verify manipulation of image appearance

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.117.1 Verification Elements

- LVV-9910 - DMS-PRTL-REQ-0074-V-01: Image Appearance Manipulation_1

4.117.2 Test Items

Verify that the Portal enables users to manipulate the appearance of displayed images, including changing the stretch, color table, or displayed data range.

4.117.3 Predecessors

4.117.4 Environment Needs

4.117.4.1 Software

4.117.4.2 Hardware

4.117.5 Input Specification

4.117.6 Output Specification

4.117.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.118 LVV-T709 - Verify display of image mask and variance overlays

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.118.1 Verification Elements

- LVV-9915 - DMS-PRTL-REQ-0075-V-01: Image Mask and Variance Overlays_1

4.118.2 Test Items

Verify that the Portal enables overlaying pixel-based data on top of already displayed images, including image masks (bit planes) and variance data.

4.118.3 Predecessors

4.118.4 Environment Needs

4.118.4.1 Software

4.118.4.2 Hardware

4.118.5 Input Specification

4.118.6 Output Specification

4.118.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.119 LVV-T710 - Verify display of plot overlays on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.119.1 Verification Elements

- LVV-9917 - DMS-PRTL-REQ-0076-V-01: Image Plot Overlays_1

4.119.2 Test Items

Verify that the Portal has the capability to overlay tabular data on an image, based on input image or astrophysical coordinates, as supported by availability of coordinate system information.

4.119.3 Predecessors

4.119.4 Environment Needs

4.119.4.1 Software

4.119.4.2 Hardware

4.119.5 Input Specification

4.119.6 Output Specification

4.119.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.120 LVV-T711 - Verify capability to adjust the appearance of plot overlays on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.120.1 Verification Elements

- LVV-9916 - DMS-PRTL-REQ-0077-V-01: Image Overlays: Adjustment of Colors and Positions_1

4.120.2 Test Items

Verify that the Portal enables users to adjust the annotations, colors, transparency, and positions of plot overlays displayed on top of images.

4.120.3 Predecessors

4.120.4 Environment Needs

4.120.4.1 Software

4.120.4.2 Hardware

4.120.5 Input Specification

4.120.6 Output Specification

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4.120.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.121 LVV-T712 - Verify display all-sky HEALPix image

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.121.1 Verification Elements

- LVV-9918 - DMS-PRTL-REQ-0078-V-01: Display All-Sky HEALPix Image_1

4.121.2 Test Items

Verify that the Portal aspect is able to display an all-sky image in the HEALPix format.

4.121.3 Predecessors

4.121.4 Environment Needs

4.121.4.1 Software

4.121.4.2 Hardware

4.121.5 Input Specification

Draft

4.121.6 Output Specification

4.121.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.122 LVV-T713 - Verify ability to zoom in/out on a HEALPix image

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.122.1 Verification Elements

- LVV-9922 - DMS-PRTL-REQ-0079-V-01: Zoom In and Out on a HEALPix Image_1

4.122.2 Test Items

Verify that the Portal enables users to zoom in and out on a displayed HEALPix image, adapting the displayed spatial scale and traversing different levels of the image hierarchy.

4.122.3 Predecessors

4.122.4 Environment Needs

4.122.4.1 Software

4.122.4.2 Hardware

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4.122.5 Input Specification

4.122.6 Output Specification

4.122.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.123 LVV-T714 - Verify panning in HEALPix image display

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.123.1 Verification Elements

- LVV-9920 - DMS-PRTL-REQ-0080-V-01: Pan Around on a HEALPix Image_1

4.123.2 Test Items

Verify that the Portal enables panning (i.e., moving around within) a displayed HEALPix image, provided that the entire image is not already displayed.

4.123.3 Predecessors

4.123.4 Environment Needs

4.123.4.1 Software

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4.123.4.2 Hardware

4.123.5 Input Specification

4.123.6 Output Specification

4.123.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.124 LVV-T715 - Verify selection of HEALPix pixels

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.124.1 Verification Elements

- LVV-9919 - DMS-PRTL-REQ-0081-V-01: HEALPix Pixel Selection_1

4.124.2 Test Items

Verify that Portal users can select individual HEALPix pixels or groups of pixels and obtain references from them for use in other LSP aspects.

4.124.3 Predecessors

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4.124.4 Environment Needs

4.124.4.1 Software

4.124.4.2 Hardware

4.124.5 Input Specification

4.124.6 Output Specification

4.124.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.125 LVV-T716 - Verify retrieval of HEALPix-associated data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.125.1 Verification Elements

- LVV-9921 - DMS-PRTL-REQ-0082-V-01: Retrieve HEALPix-Associated Data_1

4.125.2 Test Items

Verify that the Portal enables users to retrieve metadata and data associated with selected HEALPixels and display that data in tabular or image form as appropriate.

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4.125.3 Predecessors

4.125.4 Environment Needs

4.125.4.1 Software

4.125.4.2 Hardware

4.125.5 Input Specification

4.125.6 Output Specification

4.125.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.126 LVV-T717 - Verify broad applicability of coordinate display

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.126.1 Verification Elements

- LVV-9924 - DMS-PRTL-REQ-0083-V-01: Coordinate Display Applicability_1

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4.126.2 Test Items

Verify that the Portal aspect provides the coordinate display and measurement tools for all applicable two-dimensional data displays where the two coordinates have a spatial interpretation.

4.126.3 Predecessors

4.126.4 Environment Needs

4.126.4.1 Software

4.126.4.2 Hardware

4.126.5 Input Specification

4.126.6 Output Specification

4.126.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.127 LVV-T718 - Verify point coordinate display

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

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4.127.1 Verification Elements

- LVV-9928 - DMS-PRTL-REQ-0084-V-01: Point Coordinate Display_1

4.127.2 Test Items

Verify that the Portal aspect displays the coordinates corresponding to the position of the mouse cursor. When coordinate conversion information is available, all available coordinates should be displayed.

4.127.3 Predecessors

4.127.4 Environment Needs

4.127.4.1 Software

4.127.4.2 Hardware

4.127.5 Input Specification

4.127.6 Output Specification

4.127.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.128 LVV-T719 - Verify distance measurement tool

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.128.1 Verification Elements

- LVV-9926 - DMS-PRTL-REQ-0085-V-01: Distance Measurement Tool_1

4.128.2 Test Items

Verify that the Portal provides a tool to measure the distance between two points in an image or a 2-dimensional plot. Distances should be calculated in both image/plot coordinates (electronic or spatial X and Y) and in astrophysical coordinates (if applicable). Calculations shall be performed in spherical geometry where appropriate.

4.128.3 Predecessors

4.128.4 Environment Needs

4.128.4.1 Software

4.128.4.2 Hardware

4.128.5 Input Specification

4.128.6 Output Specification

4.128.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.129 LVV-T720 - Verify coordinate grid overlays

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.129.1 Verification Elements

- LVV-9925 - DMS-PRTL-REQ-0086-V-01: Coordinate Grid Overlays_1

4.129.2 Test Items

Verify that the Portal provides the capability to overlay one or more coordinate grids atop images or 2-dimensional plots with known coordinate systems. (For example, it should be possible to overlay equatorial, Galactic, and ecliptic coordinate grids simultaneously.)

4.129.3 Predecessors

4.129.4 Environment Needs

4.129.4.1 Software

4.129.4.2 Hardware

4.129.5 Input Specification

4.129.6 Output Specification

Draft

4.129.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.130 LVV-T721 - Verify astrophysical compass overlay

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.130.1 Verification Elements

- LVV-9923 - DMS-PRTL-REQ-0087-V-01: Astrophysical Compass Overlay_1

4.130.2 Test Items

Verify that the Portal provides the capability to overlay a North-East compass atop images or 2-dimensional plots with known astrophysical coordinate systems.

4.130.3 Predecessors

4.130.4 Environment Needs

4.130.4.1 Software

4.130.4.2 Hardware

4.130.5 Input Specification

Draft

4.130.6 Output Specification

4.130.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.131 LVV-T722 - Verify geometric figure overlays

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.131.1 Verification Elements

- LVV-9927 - DMS-PRTL-REQ-0088-V-01: Geometric Figure Overlays_1

4.131.2 Test Items

Verify that the Portal aspect enables the drawing, display, and selection of a closed 2-dimensional polygon on any 2-dimensional image.

4.131.3 Predecessors

4.131.4 Environment Needs

4.131.4.1 Software

4.131.4.2 Hardware

Draft

4.131.5 Input Specification

4.131.6 Output Specification

4.131.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.132 LVV-T723 - Verify sorting of tabular data by column

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.132.1 Verification Elements

- LVV-9934 - DMS-PRTL-REQ-0089-V-01: Sorting of Tabular Data by Column_1

4.132.2 Test Items

Verify that the Portal aspect enables users to sort tabular data by a single column within the table and redisplay the sorted data.

4.132.3 Predecessors

4.132.4 Environment Needs

4.132.4.1 Software

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4.132.4.2 Hardware

4.132.5 Input Specification

4.132.6 Output Specification

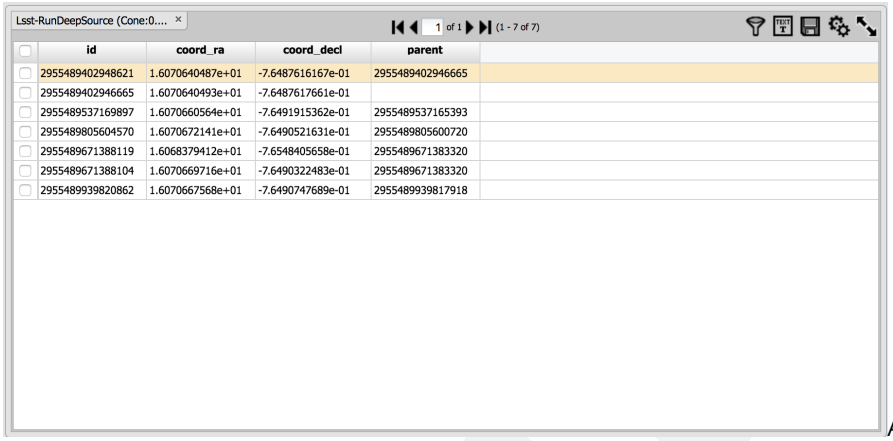
4.132.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Click on the column header that reads "coord_ra". This should re-sort the table so that objects are sorted in ascending order by RA. Click on the "coord_ra" header again, and the sorting should change to descending order by RA.
	Test Data	No data.

Draft

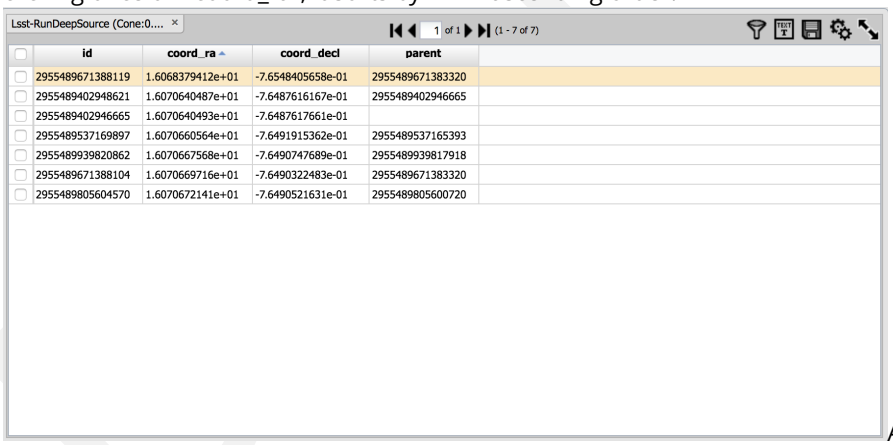
Step	Description, Input Data and Expected Result
	Expected Result

Default view (when you first search):



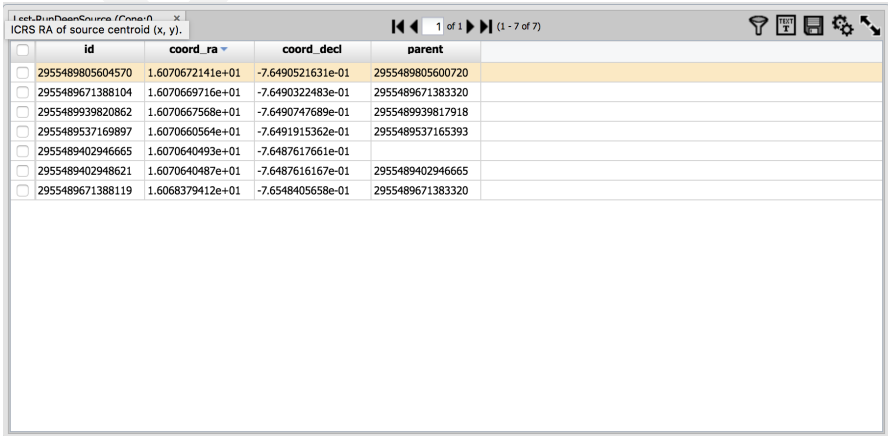
id	coord_ra	coord_decl	parent
2955489402948621	1.6070640487e+01	-7.6487616167e-01	2955489402946665
2955489402946665	1.6070640493e+01	-7.6487617661e-01	
2955489537169897	1.6070660564e+01	-7.6491915362e-01	2955489537165393
2955489805604570	1.6070672141e+01	-7.6490521631e-01	2955489805600720
2955489671388119	1.6068379412e+01	-7.6548405658e-01	2955489671383320
2955489671388104	1.6070669716e+01	-7.6490322483e-01	2955489671383320
2955489939820862	1.6070667568e+01	-7.6490747689e-01	2955489939817918

After clicking once on "coord_ra", it sorts by RA in ascending order:



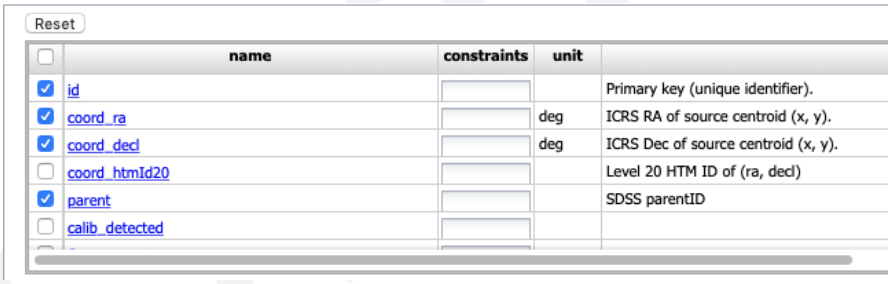
id	coord_ra	coord_decl	parent
2955489671388119	1.6068379412e+01	-7.6548405658e-01	2955489671383320
2955489402948621	1.6070640487e+01	-7.6487616167e-01	2955489402946665
2955489402946665	1.6070640493e+01	-7.6487617661e-01	
2955489537169897	1.6070660564e+01	-7.6491915362e-01	2955489537165393
2955489939820862	1.6070667568e+01	-7.6490747689e-01	2955489939817918
2955489671388104	1.6070669716e+01	-7.6490322483e-01	2955489671383320
2955489805604570	1.6070672141e+01	-7.6490521631e-01	2955489805600720

After clicking again on "coord_ra", it sorts by RA in descending order:



id	coord_ra	coord_decl	parent
2955489805604570	1.6070672141e+01	-7.6490521631e-01	2955489805600720
2955489671388104	1.6070669716e+01	-7.6490322483e-01	2955489671383320
2955489939820862	1.6070667568e+01	-7.6490747689e-01	2955489939817918
2955489537169897	1.6070660564e+01	-7.6491915362e-01	2955489537165393
2955489402946665	1.6070640493e+01	-7.6487617661e-01	
2955489402948621	1.6070640487e+01	-7.6487616167e-01	2955489402946665
2955489671388119	1.6068379412e+01	-7.6548405658e-01	2955489671383320

2-1 from LVV-T849	Description	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/.
	Test Data	

Step	Description, Input Data and Expected Result	
	Expected Result	Currently this drops the user into an active portal environment.
2-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.
3-1 from LVV-T851	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following: 
	Test Data	
	Expected Result	The column box should be configured to return a minimal useful set of columns.

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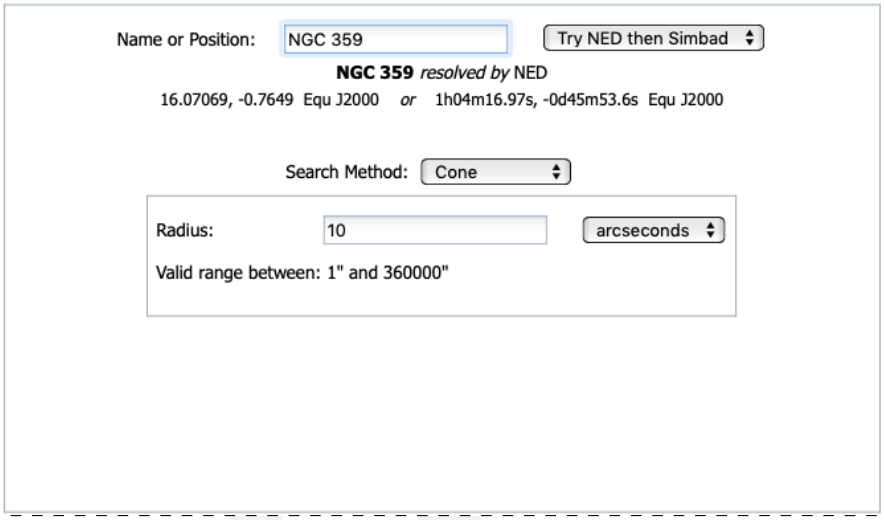
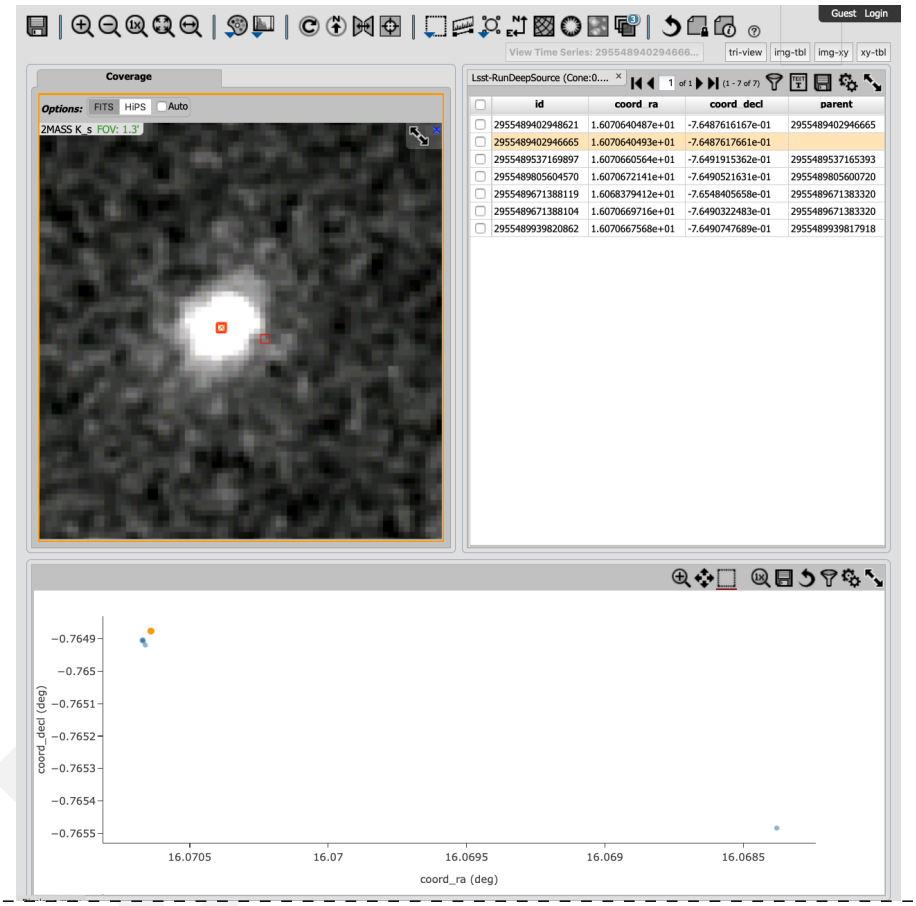
Step	Description, Input Data and Expected Result	
3-2 from LVV-T851	Description	Enter an object name for the portal to resolve. We will use NGC 359, a large elliptical galaxy in the Stripe 82 coverage. To do this, enter the name "NGC 359" in the "Name or Position" text input box. Leave the other defaults in place. 
	Test Data	
	Expected Result	There should be a message like "NGC 359 resolved by NED". The example coordinates should also changed to the coordinates of NGC 359.
3-3 from LVV-T851	Description	Submit the query to the portal query engine by clicking the "Search" button in the lower left corner of the interface.
	Test Data	

Step	Description, Input Data and Expected Result	
	Expected Result	A firefly app with the summary image overlay and catalog widgets side by side. A plot of RA vs. Dec is displayed below the side by side widgets. 
4-1 from LVV-T850	Description	Currently, there is no logout mechanism on the portal. This should be updated as the system matures. Simply close the browser window.
	Test Data	
	Expected Result	Closed browser window. When navigating to the portal endpoint, expect to execute the steps in LVV-T849.
5	Description	Try sorting by another column (e.g., "Id") by clicking on that column header, and confirm that the table updates.
	Test Data	No data.
	Expected Result	Table now sorted by the column that was clicked.

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Step	Description, Input Data and Expected Result

4.133 LVV-T724 - Verify simple filtering of tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.133.1 Verification Elements

- LVV-9933 - DMS-PRTL-REQ-0090-V-01: Simple Filtering of Tabular Data_1

4.133.2 Test Items

Verify that the Portal aspect provides the capability to filter tabular data by a single column, including but not limited to less than (<), less than or equal (<=), greater than (>), greater than or equal (=>), equal (=), not equal (!=) and not null (!=null).

4.133.3 Predecessors

4.133.4 Environment Needs

4.133.4.1 Software

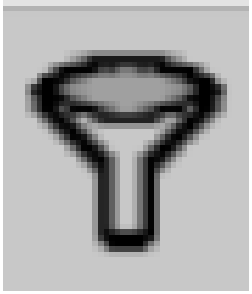
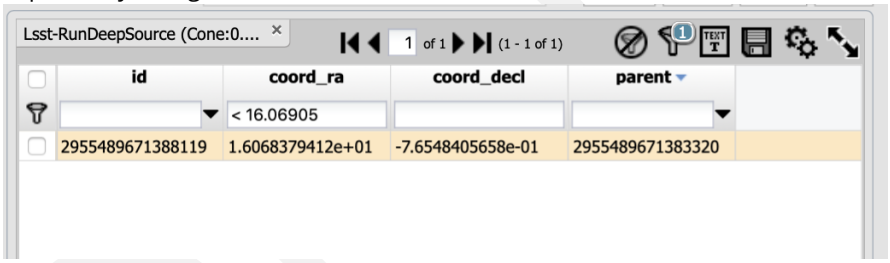
4.133.4.2 Hardware

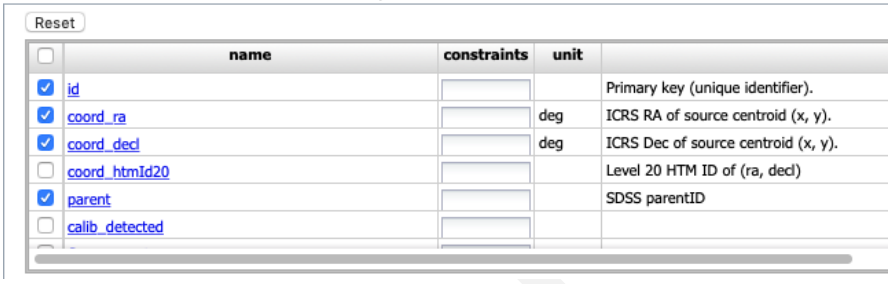
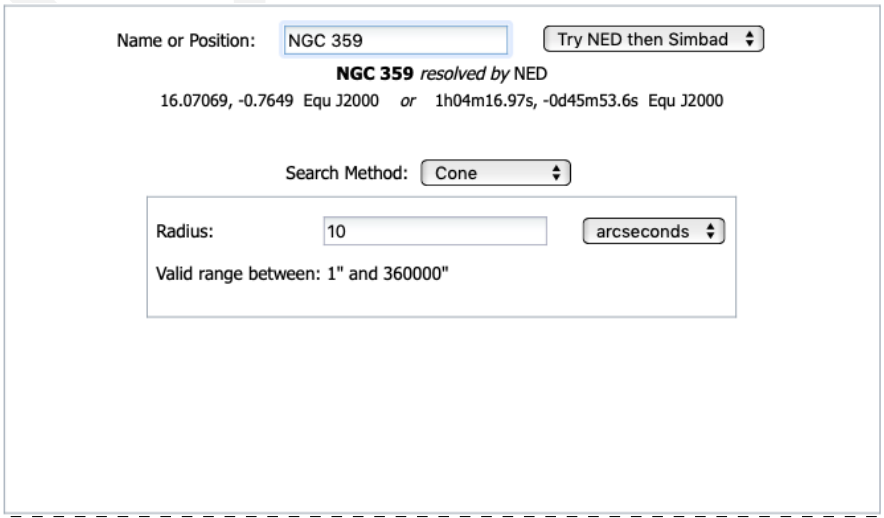
4.133.5 Input Specification

4.133.6 Output Specification

4.133.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	Verify the table can be filtered by: 1. choosing the "filter" icon:  2. entering a filter criterion in the filter box: e.g. coadd_ra is less than 16.06905. 3. pressing return to execute the filtering
	Test Data	No data.
	Expected Result	Expect only a single row to be selected: 
2-1 from LVV-T849	Description	Navigate to the portal endpoint. The stable version should be used for this test and is currently located at: https://lsst-lsp-stable.ncsa.illinois.edu/portal/suit/.
	Test Data	
	Expected Result	Currently this drops the user into an active portal environment.
2-2 from LVV-T849	Description	Though the current stable system does not authenticate currently, this step and the previous one should be updated as the system evolves.
	Test Data	
	Expected Result	No-op.

Step	Description, Input Data and Expected Result	
3-1 from LVV-T851	Description	The default catalog (SDSS Stripe 82, 2013 LSST Processing) is fine for this. Choose columns to return by: 1) unchecking the top box in the column selection box 2) checking columns for id, coord_ra, coord_dec, and parent. The result should look like the following: 
	Test Data	
	Expected Result	The column box should be configured to return a minimal useful set of columns.
3-2 from LVV-T851	Description	Enter an object name for the portal to resolve. We will use NGC 359, a large elliptical galaxy in the Stripe 82 coverage. To do this, enter the name "NGC 359" in the "Name or Position" text input box. Leave the other defaults in place. 
	Test Data	
	Expected Result	There should be a message like "NGC 359 resolved by NED". The example coordinates should also changed to the coordinates of NGC 359.

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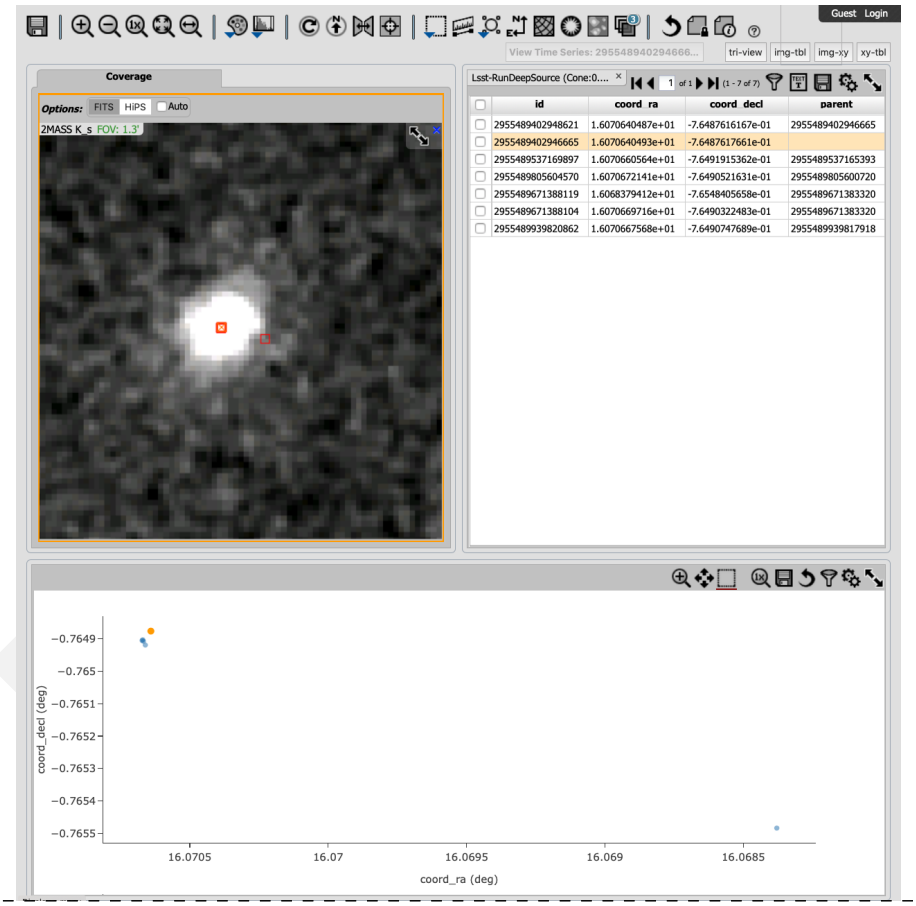
Step	Description, Input Data and Expected Result	
3-3 from LVV-T851	Description	Submit the query to the portal query engine by clicking the "Search" button in the lower left corner of the interface.
	Test Data	
	Expected Result	A firefly app with the summary image overlay and catalog widgets side by side. A plot of RA vs. Dec is displayed below the side by side widgets. 
4-1 from LVV-T850	Description	Currently, there is no logout mechanism on the portal. This should be updated as the system matures. Simply close the browser window.
	Test Data	
	Expected Result	Closed browser window. When navigating to the portal endpoint, expect to execute the steps in LVV-T849.

4.134 LVV-T725 - Verify calculated filtering of tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.134.1 Verification Elements

- LVV-9929 - DMS-PRTL-REQ-0091-V-01: Calculated Filtering of Tabular Data_1

4.134.2 Test Items

Verify that the Portal aspect provides the capability to filter a table by single column where the filter has simple arithmetic calculations applied to the column values, including but not limited to sqrt, log, log10, exponentials and trigonometric functions.

4.134.3 Predecessors

4.134.4 Environment Needs

4.134.4.1 Software

4.134.4.2 Hardware

4.134.5 Input Specification

4.134.6 Output Specification

4.134.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.135 LVV-T726 - Verify filtering data by multiple table columns

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.135.1 Verification Elements

- LVV-9931 - DMS-PRTL-REQ-0092-V-01: Filtering of Tabular Data by Multiple Columns_1

4.135.2 Test Items

Verify that the Portal aspect provides the capability to filter tabular data by multiple columns within the table and redisplay the filtered table.

4.135.3 Predecessors

4.135.4 Environment Needs

4.135.4.1 Software

4.135.4.2 Hardware

4.135.5 Input Specification

4.135.6 Output Specification

4.135.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.136 LVV-T727 - Verify calculated tabular data columns

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.136.1 Verification Elements

- LVV-9930 - DMS-PRTL-REQ-0093-V-01: Calculated Quantities on Tabular Data_1

4.136.2 Test Items

Verify that the Portal enables the arithmetic calculation and display of new tabular data columns based on existing columns in a table.

4.136.3 Predecessors

4.136.4 Environment Needs

4.136.4.1 Software

4.136.4.2 Hardware

4.136.5 Input Specification

4.136.6 Output Specification

Draft

4.136.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.137 LVV-T728 - Verify statistical measurements on tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.137.1 Verification Elements

- LVV-9935 - DMS-PRTL-REQ-0094-V-01: Statistical Measurements on Tabular Data_1

4.137.2 Test Items

Verify that the Portal aspect enables the capability to perform a set of statistical measurements (e.g., mean, median, RMS, skew, kurtosis) on tabular data selected by the user.

4.137.3 Predecessors

4.137.4 Environment Needs

4.137.4.1 Software

4.137.4.2 Hardware

4.137.5 Input Specification

Draft

4.137.6 Output Specification

4.137.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.138 LVV-T729 - Verify saving of displayed tabular data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.138.1 Verification Elements

- LVV-9932 - DMS-PRTL-REQ-0095-V-01: Saving Displayed Tabular Data_1

4.138.2 Test Items

Verify that the Portal aspect provides the capability to save and or download tabular data as it is displayed in the interface maintaining the content, filtering, and sorting.

4.138.3 Predecessors

4.138.4 Environment Needs

4.138.4.1 Software

4.138.4.2 Hardware

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4.138.5 Input Specification

4.138.6 Output Specification

4.138.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.139 LVV-T730 - Verify creation and display of false-color images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.139.1 Verification Elements

- LVV-9936 - DMS-PRTL-REQ-0096-V-01: False-color Images Creation and Display_1

4.139.2 Test Items

Verify that the Portal aspect has the capability to create and display false-color images composed from any user-selectable set of filters from multiple filter views of the same region.

4.139.3 Predecessors

4.139.4 Environment Needs

4.139.4.1 Software

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4.139.4.2 Hardware

4.139.5 Input Specification

4.139.6 Output Specification

4.139.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.140 LVV-T731 - Verify statistical measurements on user-selected regions of images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.140.1 Verification Elements

- LVV-9937 - DMS-PRTL-REQ-0097-V-01: Statistical Measurements on Image Data_1

4.140.2 Test Items

Verify that the Portal aspect enables the capability to perform a set of statistical measurements (e.g., mean, median, RMS, skew, kurtosis) on user-selected regions in images.

4.140.3 Predecessors

Draft

4.140.4 Environment Needs

4.140.4.1 Software

4.140.4.2 Hardware

4.140.5 Input Specification

4.140.6 Output Specification

4.140.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.141 LVV-T732 - Verify overlay of catalog sources/objects on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.141.1 Verification Elements

- LVV-9942 - DMS-PRTL-REQ-0098-V-01: Overlay Catalog of Sources and Objects on Images_1

4.141.2 Test Items

Verify that the Portal aspect enables the overlay of positions of catalog sources and objects on a displayed image based upon astrophysically-based or observatory-based coordinates.

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4.141.3 Predecessors

4.141.4 Environment Needs

4.141.4.1 Software

4.141.4.2 Hardware

4.141.5 Input Specification

4.141.6 Output Specification

4.141.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.142 LVV-T733 - Verify overlay of LSST-derived orbits on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.142.1 Verification Elements

- LVV-9943 - DMS-PRTL-REQ-0099-V-01: Overlay LSST-Derived Orbits_1

Draft

4.142.2 Test Items

Verify that the Portal aspect has the capability to overlay predicted positions from the orbits of solar system objects in the LSST catalog on to images.

4.142.3 Predecessors

4.142.4 Environment Needs

4.142.4.1 Software

4.142.4.2 Hardware

4.142.5 Input Specification

4.142.6 Output Specification

4.142.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.143 LVV-T734 - Verify overlay of user-supplied catalogs on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.143.1 Verification Elements

- LVV-9944 - DMS-PRTL-REQ-0100-V-01: Overlay User-provided Catalogs on Images_1

4.143.2 Test Items

Verify that the Portal enables users to overlay the positions of objects in user-supplied catalogs on top of images.

4.143.3 Predecessors

4.143.4 Environment Needs

4.143.4.1 Software

4.143.4.2 Hardware

4.143.5 Input Specification

4.143.6 Output Specification

4.143.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.144 LVV-T735 - Verify overlay of user-supplied region files on images

Version	Status	Priority	Verification Type	Owner

Draft

1	Draft	Normal	Inspection	Jeffrey Carlin

4.144.1 Verification Elements

- LVV-9945 - DMS-PRTL-REQ-0101-V-01: Overlay User-provided Region Files on Images_1

4.144.2 Test Items

Verify that Portal users can upload a region file and overlay the region on a displayed image.

4.144.3 Predecessors

4.144.4 Environment Needs

4.144.4.1 Software

4.144.4.2 Hardware

4.144.5 Input Specification

4.144.6 Output Specification

4.144.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.145 LVV-T736 - Verify overlay of camera artifacts on images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.145.1 Verification Elements

- LVV-9940 - DMS-PRTL-REQ-0102-V-01: Display of Camera Artifacts as Overlays_1

4.145.2 Test Items

Verify that the Portal aspect has the capability to display as image overlays camera artifacts including but not limited to image crosstalk matrices, ghost image identifications, saturation, and column bleeding.

4.145.3 Predecessors

4.145.4 Environment Needs

4.145.4.1 Software

4.145.4.2 Hardware

4.145.5 Input Specification

4.145.6 Output Specification

4.145.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.146 LVV-T737 - Verify single-object time-domain image view

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.146.1 Verification Elements

- LVV-9948 - DMS-PRTL-REQ-0103-V-01: Single-Object Time-Domain Image View_1

4.146.2 Test Items

Verify that the Portal provides the capability to view an image time series that maintains the same physical scale, photometric scale, and image size display of a cutout area centered on an LSST object. If the object moves, then the images should stay centered on the object.

4.146.3 Predecessors

4.146.4 Environment Needs

4.146.4.1 Software

4.146.4.2 Hardware

4.146.5 Input Specification

4.146.6 Output Specification

4.146.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.147 LVV-T738 - Verify position-based time-domain image view

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.147.1 Verification Elements

- LVV-9946 - DMS-PRTL-REQ-0104-V-01: Position-based Time-Domain Image View_1

4.147.2 Test Items

Verify that the Portal provides the capability to view an image time series that maintains the same physical scale, photometric scale, and image size display of a specified region on the sky. If the object moves, then the images should stay centered on the sky and the object will appear to move.

4.147.3 Predecessors

4.147.4 Environment Needs

4.147.4.1 Software

4.147.4.2 Hardware

4.147.5 Input Specification

4.147.6 Output Specification

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4.147.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.148 LVV-T739 - Verify display of light curves

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.148.1 Verification Elements

- LVV-9938 - DMS-PRTL-REQ-0105-V-01: Brightness Light Curves_1

4.148.2 Test Items

Verify that the Portal can display graphically the brightness/flux/magnitude of an LSST Object, Source, or ForcedSource as a function of time.

4.148.3 Predecessors

4.148.4 Environment Needs

4.148.4.1 Software

4.148.4.2 Hardware

4.148.5 Input Specification

Draft

4.148.6 Output Specification

4.148.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.149 LVV-T740 - Verify linked tables, plots, and images

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.149.1 Verification Elements

- LVV-9941 - DMS-PRTL-REQ-0106-V-01: Linked Tables, Plots, and Images_1

4.149.2 Test Items

Verify that the Portal aspect has the capability to have tabular data, plots, and images with overlays connected via brushing and linking, so that updates to the data in any one visualization tool (e.g., plot, image, table) creates an update in other visualization tools.

4.149.3 Predecessors

4.149.4 Environment Needs

4.149.4.1 Software

4.149.4.2 Hardware

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4.149.5 Input Specification

4.149.6 Output Specification

4.149.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.150 LVV-T741 - Verify capability to select data from a plot or image

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.150.1 Verification Elements

- LVV-9939 - DMS-PRTL-REQ-0107-V-01: Data Selection from a Plot or Image_1

4.150.2 Test Items

Verify that the Portal aspect enables the selection of data contained inside or outside a closed 2-dimensional polygon on an xy-plot, 2-dimension data structure (e.g., density plot), and a 2-dimensional image.

4.150.3 Predecessors

4.150.4 Environment Needs

4.150.4.1 Software

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4.150.4.2 Hardware

4.150.5 Input Specification

4.150.6 Output Specification

4.150.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.151 LVV-T742 - Verify saving data selection from a plot or image

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.151.1 Verification Elements

- LVV-9947 - DMS-PRTL-REQ-0108-V-01: Saving Data Selection from a Plot or Image_1

4.151.2 Test Items

Verify that the Portal aspect enables the saving of data selected via a polygon selection across the linked images, tables, and plots.

4.151.3 Predecessors

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4.151.4 Environment Needs

4.151.4.1 Software

4.151.4.2 Hardware

4.151.5 Input Specification

4.151.6 Output Specification

4.151.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.152 LVV-T743 - Verify access to user databases

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.152.1 Verification Elements

- LVV-9949 - DMS-PRTL-REQ-0109-V-01: Access to User Databases_1

4.152.2 Test Items

Verify that the Portal aspect provides read/write access to user databases (Level 3 tabular data products) and has implemented any access restrictions placed on such data.

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4.152.3 Predecessors

4.152.4 Environment Needs

4.152.4.1 Software

4.152.4.2 Hardware

4.152.5 Input Specification

4.152.6 Output Specification

4.152.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.153 LVV-T744 - Verify tabular data download

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.153.1 Verification Elements

- LVV-9954 - DMS-PRTL-REQ-0110-V-01: Tabular Data Download_1

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4.153.2 Test Items

Verify that the Portal aspect includes a mechanism for a user to download to a remote site, Workspace, or to an existing or new user database the tabular results from a database query, including for catalog or image metadata.

4.153.3 Predecessors

4.153.4 Environment Needs

4.153.4.1 Software

4.153.4.2 Hardware

4.153.5 Input Specification

4.153.6 Output Specification

4.153.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.154 LVV-T745 - Verify image data download

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.154.1 Verification Elements

- LVV-9951 - DMS-PRTL-REQ-0111-V-01: Image Data Download_1

4.154.2 Test Items

Verify that the Portal aspect includes mechanisms for a user to download image data to a remote site or to the Workspace, from both screens displaying images and screens displaying lists of image metadata.

4.154.3 Predecessors

4.154.4 Environment Needs

4.154.4.1 Software

4.154.4.2 Hardware

4.154.5 Input Specification

4.154.6 Output Specification

4.154.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.155 LVV-T746 - Verify selected image download

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.155.1 Verification Elements

- LVV-9953 - DMS-PRTL-REQ-0112-V-01: Selected Image Download_1

4.155.2 Test Items

Verify that the Portal aspect supports user selection for download of a subset of the images in an image metadata table or image cutout table.

4.155.3 Predecessors

4.155.4 Environment Needs

4.155.4.1 Software

4.155.4.2 Hardware

4.155.5 Input Specification

4.155.6 Output Specification

4.155.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.156 LVV-T747 - Verify estimation of data download volume

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.156.1 Verification Elements

- LVV-9950 - DMS-PRTL-REQ-0113-V-01: Download Volume Estimation_1

4.156.2 Test Items

Verify that the Portal provides an estimate of the volume of a data download before the user confirms the download option.

4.156.3 Predecessors

4.156.4 Environment Needs

4.156.4.1 Software

4.156.4.2 Hardware

4.156.5 Input Specification

4.156.6 Output Specification

4.156.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.157 LVV-T748 - Verify notification of long download completion

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.157.1 Verification Elements

- LVV-9952 - DMS-PRTL-REQ-0114-V-01: Long Download Completion Notification_1

4.157.2 Test Items

Verify that the Portal aspect notifies the user with an estimate of how long a download is expected to take. The user can continue to monitor the download; verify that an option has been provided to notify the user when the download has completed.

4.157.3 Predecessors

4.157.4 Environment Needs

4.157.4.1 Software

4.157.4.2 Hardware

4.157.5 Input Specification

4.157.6 Output Specification

4.157.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

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Step	Description, Input Data and Expected Result
	Expected Result

4.158 LVV-T749 - Verify API for visualization components

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.158.1 Verification Elements

- LVV-9955 - DMS-PRTL-REQ-0115-V-01: APIs for Visualization Components_1

4.158.2 Test Items

Verify that the Portal aspect provides a documented application program interface that allows users and services at any location to access and manipulate the Portal's visualization services. This is intended to enable API control of the visualization components and tool-level visualization services to be called and controlled through an API. There will be a Web API as well as a Python wrapper for it.

4.158.3 Predecessors

4.158.4 Environment Needs

4.158.4.1 Software

4.158.4.2 Hardware

4.158.5 Input Specification

Draft

4.158.6 Output Specification

4.158.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.159 LVV-T750 - Verify implementation of storage quotas status

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.159.1 Verification Elements

- LVV-9958 - DMS-PRTL-REQ-0116-V-01: Storage Quotas User Interface_1

4.159.2 Test Items

Verify that the Portal aspect provides a summary of the current status of users' storage allocations.

4.159.3 Predecessors

4.159.4 Environment Needs

4.159.4.1 Software

4.159.4.2 Hardware

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4.159.5 Input Specification

4.159.6 Output Specification

4.159.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.160 LVV-T751 - Verify implementation of computational quotas status

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.160.1 Verification Elements

- LVV-9956 - DMS-PRTL-REQ-0117-V-01: Computational Quotas User Interface_1

4.160.2 Test Items

Verify that the Portal aspect provides a summary of the current status of users' allocations of computational resources.

4.160.3 Predecessors

4.160.4 Environment Needs

4.160.4.1 Software

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4.160.4.2 Hardware

4.160.5 Input Specification

4.160.6 Output Specification

4.160.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.161 LVV-T752 - Verify saved Portal display preferences

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.161.1 Verification Elements

- LVV-9957 - DMS-PRTL-REQ-0118-V-01: Portal Display Preferences_1

4.161.2 Test Items

Verify that the Portal aspect enables a user to establish and save viewing preferences, including, but not limited to, which tabular data columns to view, how tables should be sorted by default, which calculated quantities appear within a table, what image stretch and color tables, what types of plots are generated, how data are overlaid on images.

4.161.3 Predecessors

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4.161.4 Environment Needs

4.161.4.1 Software

4.161.4.2 Hardware

4.161.5 Input Specification

4.161.6 Output Specification

4.161.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.162 LVV-T753 - Verify alert subscription service

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.162.1 Verification Elements

- LVV-9960 - DMS-PRTL-REQ-0119-V-01: Alert Subscription Service_1

4.162.2 Test Items

Verify that the Portal aspect provides an interface to the alert subscription service that allows authenticated users with LSST data rights to subscribe to a stream of alert events.

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4.162.3 Predecessors

4.162.4 Environment Needs

4.162.4.1 Software

4.162.4.2 Hardware

4.162.5 Input Specification

4.162.6 Output Specification

4.162.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.163 LVV-T754 - Verify availability of pre-defined alert filters

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.163.1 Verification Elements

- LVV-9961 - DMS-PRTL-REQ-0120-V-01: Pre-defined Alert Filters_1

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4.163.2 Test Items

Verify that the Portal provides an interface to permit alert subscriptions to be configured with Project-provided alert filters.

4.163.3 Predecessors

4.163.4 Environment Needs

4.163.4.1 Software

4.163.4.2 Hardware

4.163.5 Input Specification

4.163.6 Output Specification

4.163.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.164 LVV-T755 - Verify availability of user-defined alert filters

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.164.1 Verification Elements

- LVV-9962 - DMS-PRTL-REQ-0121-V-01: User-defined Alert Filters_1

4.164.2 Test Items

Verify that the Portal provides an interface to permit alert subscriptions to be configured with user-provided alert filters.

4.164.3 Predecessors

4.164.4 Environment Needs

4.164.4.1 Software

4.164.4.2 Hardware

4.164.5 Input Specification

4.164.6 Output Specification

4.164.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.165 LVV-T756 - Verify monitoring of alert subscription

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.165.1 Verification Elements

- LVV-9959 - DMS-PRTL-REQ-0127-V-01: Alert Subscription Monitoring_1

4.165.2 Test Items

Verify that the Portal provides feedback about the status and performance of a user's filters in the alert subscription service.

4.165.3 Predecessors

4.165.4 Environment Needs

4.165.4.1 Software

4.165.4.2 Hardware

4.165.5 Input Specification

4.165.6 Output Specification

4.165.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.166 LVV-T757 - Verify access to survey documentation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.166.1 Verification Elements

- LVV-9963 - DMS-PRTL-REQ-0122-V-01: Access to Observatory Documentation_1

4.166.2 Test Items

Verify that the Portal provides access to Project-provided documentation on the design, construction, and operation of the LSST.

4.166.3 Predecessors

4.166.4 Environment Needs

4.166.4.1 Software

4.166.4.2 Hardware

4.166.5 Input Specification

4.166.6 Output Specification

4.166.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.167 LVV-T758 - Verify access to Portal documentation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.167.1 Verification Elements

- LVV-9965 - DMS-PRTL-REQ-0123-V-01: Portal User Documentation_1

4.167.2 Test Items

Verify that the Portal provides access to documentation on the use of the Portal (i.e., a user guide, or similar).

4.167.3 Predecessors

4.167.4 Environment Needs

4.167.4.1 Software

4.167.4.2 Hardware

4.167.5 Input Specification

4.167.6 Output Specification

4.167.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.168 LVV-T759 - Verify access to Portal API documentation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.168.1 Verification Elements

- LVV-9964 - DMS-PRTL-REQ-0124-V-01: Portal API Documentation_1

4.168.2 Test Items

Verify that the Portal provides access to reference manual-style documentation of its public network and programmatic APIs.

4.168.3 Predecessors

4.168.4 Environment Needs

4.168.4.1 Software

4.168.4.2 Hardware

4.168.5 Input Specification

4.168.6 Output Specification

4.168.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.169 LVV-T760 - Verify tolerance of database changes

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.169.1 Verification Elements

- LVV-9967 - DMS-PRTL-REQ-0125-V-01: Tolerance of Production Database Changes_1

4.169.2 Test Items

Verify that the Portal aspect facilitates accommodation of database expansion and changes and metadata extension and changes associated with the evolution of the Level 1 data, Level 2 data releases, and other planned data sources.

4.169.3 Predecessors

4.169.4 Environment Needs

4.169.4.1 Software

4.169.4.2 Hardware

4.169.5 Input Specification

4.169.6 Output Specification

4.169.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.170 LVV-T761 - Verify implementation of system-busy notification

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.170.1 Verification Elements

- LVV-9966 - DMS-PRTL-REQ-0126-V-01: System-Busy Indication_1

4.170.2 Test Items

Verify that the Portal provides a means to inform users when the elements of the system are unavailable due to maintenance or excessive load.

4.170.3 Predecessors

4.170.4 Environment Needs

4.170.4.1 Software

4.170.4.2 Hardware

4.170.5 Input Specification

4.170.6 Output Specification

4.170.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.171 LVV-T762 - Verify availability of interactive Python environment

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Simon Krughoff

4.171.1 Verification Elements

- LVV-9971 - DMS-NB-REQ-0005-V-01: Interactive Python Environment_1

4.171.2 Test Items

Verify that the Notebook aspect provides an interactive Python environment through both a notebook interface and via a Python interactive interpreter.

4.171.3 Predecessors

4.171.4 Environment Needs

4.171.4.1 Software

4.171.4.2 Hardware

4.171.5 Input Specification

4.171.6 Output Specification

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4.171.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Click in the empty cell to get a cursor. Enter the example code. Execute the example code by pressing shift+enter on the keyboard.
	Test Data	No data.

	Example Code	`import lsst.afw.image as afw_image`
		`im = afw_image.ImageF(10, 10)`
		`isinstance(im, afw_image.ImageF)`

	Expected Result	The expected result of this code is the value True without error or warning.
2-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
2-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
3-1 from LVV-T838	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher"
	Test Data	
	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
3-2 from LVV-T838	Description	Select the option under "Notebook" labeled "LSST" by clicking on the icon.
	Test Data	
	Expected Result	An empty notebook with a single empty cell. The kernel show up as "LSST" in the top right of the notebook.
4	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.

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Step	Description, Input Data and Expected Result

4.172 LVV-T763 - Verify availability of Unix shell access

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Simon Krughoff

4.172.1 Verification Elements

- LVV-9976 - DMS-NB-REQ-0006-V-01: Unix Shell Access_1

4.172.2 Test Items

Verify that the Notebook aspect provides command-line access to a Unix shell with the same environment as the interactive Python environment.

4.172.3 Predecessors

4.172.4 Environment Needs

4.172.4.1 Software

4.172.4.2 Hardware

4.172.5 Input Specification

4.172.6 Output Specification

4.172.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
1-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
2	Description	Verify that the STDOUT and STDERR output streams are attached to an interactive terminal using the example test code.
	Test Data	No data.

	Example Code	`case "$-" in`
		`*i*) echo This shell is interactive ;;`
		`*) echo This shell is not interactive ;;`
		`esac`

	Expected Result	The shell should print "This shell is interactive" to the terminal window.
3	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.
4-1 from LVV-T839	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher".
	Test Data	
	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
4-2 from LVV-T839	Description	Select the option under "Other" labeled "Terminal" by clicking on the icon.
	Test Data	
	Expected Result	A terminal window appears with command line access to the user's file system.

Draft

4.173 LVV-T764 - Verify availability of containerized software releases

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Simon Krughoff

4.173.1 Verification Elements

- LVV-9974 - DMS-NB-REQ-0007-V-01: Pre-installed Containerized Software Releases_1

4.173.2 Test Items

Verify that users of the Notebook aspect are able to choose from a curated list of pre-built containers (including version of LSST stack) for their notebooks (and any other provided interactive environment) to execute in.

4.173.3 Predecessors

4.173.4 Environment Needs

4.173.4.1 Software

4.173.4.2 Hardware

4.173.5 Input Specification

4.173.6 Output Specification

4.173.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.

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Step	Description, Input Data and Expected Result	
	Expected Result	Notification of successful logout, OK to close browser window.
2-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
2-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
3	Description	Click in the empty cell to get a cursor. Enter the example code. Execute the example code by pressing shift+enter on the keyboard, and confirm that the version listed on the screen is the one you requested.
	Test Data	No data.
	Example Code	`!eups list -s | grep lsst_distrib`
	Expected Result	The expected result of this code is something similar to the following: `lsst_distrib 17.0+10 current w_2019_11 setup`
4	Description	After logging out, log back into the Notebook Aspect, and try a container with a different stack version.
	Test Data	No data.
	Expected Result	
5-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.

Draft

Step		Description, Input Data and Expected Result
5-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
6	Description	Click in the empty cell to get a cursor. Enter the example code. Execute the example code by pressing shift+enter on the keyboard.
	Test Data	No data.

	Example Code	`import lsst.afw.image as afw_image`
		`im = afw_image.ImageF(10, 10)`
		`isinstance(im, afw_image.ImageF)`

	Expected Result	The expected result of this code is the value True without error or warning.
7	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.
8	Description	Enter the example code. Execute the example code by pressing shift+enter on the keyboard.
	Test Data	No data.

	Example Code	`import lsst.afw.image as afw_image`
		`im = afw_image.ImageF(10, 10)`
		`isinstance(im, afw_image.ImageF)`

	Expected Result	The expected result of this code is the value True without error or warning.
9	Description	Click in the empty cell to get a cursor. Enter the example code. Execute the example code by pressing shift+enter on the keyboard, and confirm that the version listed on the screen is the one you requested.
	Test Data	No data.
	Example Code	`!eups list -s | grep lsst_distrib`

Draft

Step	Description, Input Data and Expected Result	
	Expected Result	The expected result of this code is something similar to the following: `lsst_distrib 17.0+10 current w_2019_11 setup`
10-1	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher"
from	Test Data	
LVV-T838	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
10-2	Description	Select the option under "Notebook" labeled "LSST" by clicking on the icon.
from	Test Data	
LVV-T838	Expected Result	An empty notebook with a single empty cell. The kernel show up as "LSST" in the top right of the notebook.
11-1	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher"
from	Test Data	
LVV-T838	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
11-2	Description	Select the option under "Notebook" labeled "LSST" by clicking on the icon.
from	Test Data	
LVV-T838	Expected Result	An empty notebook with a single empty cell. The kernel show up as "LSST" in the top right of the notebook.

4.174 LVV-T765 - Verify latency of release deployment

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Demonstration	Jeffrey Carlin

4.174.1 Verification Elements

- LVV-9975 - DMS-NB-REQ-0008-V-01: Release Deployment Latency_1

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4.174.2 Test Items

Verify that it is possible to add a new environment (with a new version of the LSST stack) to the curated list of available execution environments in less than four hours.

4.174.3 Predecessors

4.174.4 Environment Needs

4.174.4.1 Software

4.174.4.2 Hardware

4.174.5 Input Specification

4.174.6 Output Specification

4.174.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.175 LVV-T766 - Verify availability of data access middleware

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.175.1 Verification Elements

- LVV-9969 - DMS-NB-REQ-0009-V-01: Data Access Middleware Availability_1

4.175.2 Test Items

Verify that users of the Notebook Aspect are able to make use of the LSST Python I/O middleware layer to perform data discovery, data access and any other supported functions (e.g., provenance information). Notably, the Data Butler is available in the Notebook Python environment, with full access to all authorized data products available on that instance of the Science Platform.

4.175.3 Predecessors

4.175.4 Environment Needs

4.175.4.1 Software

4.175.4.2 Hardware

4.175.5 Input Specification

4.175.6 Output Specification

4.175.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.176 LVV-T767 - Verify availability of standard astronomy software

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.176.1 Verification Elements

- LVV-9968 - DMS-NB-REQ-0010-V-01: Common Astronomy Package Availability_1

4.176.2 Test Items

Verify that the Notebook Aspect provides select standard astronomy packages in the interactive environments. These may include, for example, Astropy and S-Extractor.

4.176.3 Predecessors

4.176.4 Environment Needs

4.176.4.1 Software

4.176.4.2 Hardware

4.176.5 Input Specification

4.176.6 Output Specification

4.176.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.177 LVV-T768 - Verify availability of user package installation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Simon Krughoff

4.177.1 Verification Elements

- LVV-9978 - DMS-NB-REQ-0011-V-01: User Package Installation_1

4.177.2 Test Items

Verify that the Notebook Aspect has a process that allows users to add new packages to their environment It is intended that operations like "pip install" will be usable.

4.177.3 Predecessors

4.177.4 Environment Needs

4.177.4.1 Software

4.177.4.2 Hardware

4.177.5 Input Specification

4.177.6 Output Specification

4.177.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Open a new terminal window by navigating the top menu bar "File" -> "New" -> "Terminal".
	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result	
	Expected Result	A shell prompt (bash by default) with cursor focus.
2-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
2-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
3	Description	Verify the pip based module is not already installed by: 1) entering the example code in the empty cell 2) running the cell by pressing shift+enter on the keyboard.
	Test Data	No data.
	Example Code	`import pip_install_test`
	Expected Result	The expected result is a ModuleNotFoundError exception with a second empty cell under the first.
4	Description	Verify the local file module is not already installed by: 1) entering the example code in the second empty cell 2) running the cell by pressing shift+enter on the keyboard.
	Test Data	No data.
	Example Code	`import local_file_test`
	Expected Result	The expected result is a ModuleNotFoundError exception with a third empty cell under the first two.
5	Description	Install the pip test package by entering the example code at the shell prompt.
	Test Data	No data.
	Example Code	`pip install --user pip-install-test`

Draft

Step	Description, Input Data and Expected Result	
	Expected Result	A message in the terminal indicating success installing the package.
6	Description	Install a local python package on the PYTHONPATH in the notebook by executing the example code at the shell prompt.
	Test Data	No data.

	Example Code	`TMPDIR=‘mktemp -d‘`
		`echo ’print(”Hello: this is a test of the user import system”)’ > ${TMPDIR}/local_file_test.py`
		`if [ -e ${HOME}/notebooks/.user_setups ]; then`
		`mv ${HOME}/notebooks/.user_setups ${TMPDIR}`
		`fi`
		`echo ’export PYTHONPATH=’${TMPDIR}’:${PYTHONPATH}’ > $HOME/notebooks/.user_setups`

	Expected Result	The example code should complete without error or warning.
7	Description	Select the notebook created in Step 2 by clicking on the appropriate tab.
	Test Data	No data.
	Expected Result	
8	Description	Clear all errors by navigating the top menu bar "Kernel" -> "Restart Kernel and Clear All Outputs..."
	Test Data	No data.
	Expected Result	Three cells with code from Step 3 in the first cell, code from Step 4 in the second cell, and an empty third cell.
9	Description	Check the pip install by: 1) selecting the first cell in the notebook 2) executing the cell by pressing shift+enter on the keyboard.
	Test Data	No data.
	Expected Result	The cell should execute without error or warning. A message may be displayed indicating the success of import.
10	Description	Check the local file install by: 1) selecting the second cell in the notebook 2) executing teh cell by pressing shift+enter on the keyboard
	Test Data	No data.
	Expected Result	The cell should execute without error or warning. A message saying "Hello: this is a test of the user import system" will be displayed.

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Step	Description, Input Data and Expected Result	
11	Description	Navigate back to the terminal window by selecting the appropriate tab. Clean up the test installs by executing the example code in the terminal window.
	Test Data	No data.

	Example Code	`rm -r ${TMPDIR}`
		`rm ${HOME}/notebooks/.user_setups`
		`if [ -e ${TMPDIR}/.user_setups ]; then`
		`  mv ${TMPDIR}/.user_setups ${HOME}/notebooks/`
		`fi`
		`pip uninstall -y pip-install-test`

	Expected Result	The example code should execute without error or warning.
12	Description	Delete the notebook by: 1) right clicking the notebook in the file browser 2) selecting delete from the dropdown.
	Test Data	No data.
	Expected Result	The notebook should disappear from the file browser.
13	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.
14-1 from LVV-T838	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher"
	Test Data	
	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
14-2 from LVV-T838	Description	Select the option under "Notebook" labeled "LSST" by clicking on the icon.
	Test Data	
	Expected Result	An empty notebook with a single empty cell. The kernel show up as "LSST" in the top right of the notebook.

4.178 LVV-T769 - Verify availability of user development environment

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.178.1 Verification Elements

- LVV-9977 - DMS-NB-REQ-0012-V-01: User Development Environment_1

4.178.2 Test Items

Verify that the Notebook Aspect environment permits a user to edit and build their own version of any LSST science pipeline package in their container. This implies the availability of both a C++ and a Python development environment.

4.178.3 Predecessors

4.178.4 Environment Needs

4.178.4.1 Software

4.178.4.2 Hardware

4.178.5 Input Specification

4.178.6 Output Specification

4.178.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.179 LVV-T770 - Verify availability of persistent user home file space

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Simon Krughoff

4.179.1 Verification Elements

- LVV-9973 - DMS-NB-REQ-0013-V-01: Persistent User Home File Space_1

4.179.2 Test Items

Verify that the Notebook Aspect provides a persistent home space such that per user configuration survives shutdown and restart of the environment. This space appears as a home directory from Python and in the Unix shell environment. This includes things like .bashrc, .pythonrc, and user installed python libs.

4.179.3 Predecessors

4.179.4 Environment Needs

4.179.4.1 Software

4.179.4.2 Hardware

4.179.5 Input Specification

4.179.6 Output Specification

4.179.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
1-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
2	Description	Create a dummy ASCII text file in your home directory by typing the following at the command line. The second line confirms that the file was created with some text.
	Test Data	No data.
	Example Code	`$ echo '1 2 3 4 5' > tmp.txt` `$ cat tmp.txt`
	Expected Result	The file ('tmp.txt' in this example) is present in the home directory, and its contents print to the screen ('1 2 3 4 5' in this example).
3	Description	Check to see that a .bashrc file exists by typing "ls .bashrc" at the command line. If it does not exist, create one by typing "touch .bashrc". Then make a change to the .bashrc file by opening it with your favorite text editor, and adding the example code below. Save the .bashrc file. Confirm that the new line is in your .bashrc file by typing "cat .bashrc".
	Test Data	No data.
	Example Code	`echo "This is a test. This is only a test."`
	Expected Result	User's .bashrc file exists, and contains a line with the example code.
4	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.

Draft

Step	Description, Input Data and Expected Result	
5-1 from LVV-T837	Description	Authenticate to the notebook aspect of the LSST Science Platform (NB-LSP). This is currently at https://lsst-lsp-stable.ncsa.illinois.edu/nb.
	Test Data	
	Expected Result	Redirection to the spawner page of the NB-LSP allowing selection of the containerized stack version and machine flavor.
5-2 from LVV-T837	Description	Spawn a container by: 1) choosing an appropriate stack version: e.g. the latest weekly. 2) choosing an appropriate machine flavor: e.g. medium 3) click "Spawn"
	Test Data	
	Expected Result	Redirection to the JupyterLab environment served from the chosen container containing the correct stack version.
6	Description	After logging back in, check whether your changes have been retained. Open a terminal, and confirm that the message entered into your .bashrc file prints to the screen. Confirm that the temporary file you created is still present (e.g., by typing "cat tmp.txt" and observing that the contents print to the screen).
	Test Data	No data.
	Expected Result	The message entered into the .bashrc file prints to the screen upon opening a terminal, and the dummy text placed in the .txt file displays when the "cat" command is executed.
7	Description	Remove the file created above (using "rm test.txt" from the command line), and delete the added line from .bashrc.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.
8	Description	From the "File" menu, select "Save All, Exit, and Log Out" to exit the Notebook Aspect.
	Test Data	No data.
	Expected Result	Notification of successful logout, OK to close browser window.
9-1 from LVV-T839	Description	Open a new launcher by navigating in the top menu bar "File" -> "New Launcher".
	Test Data	
	Expected Result	A launcher window with several sections, potentially with several kernel versions for each.
9-2 from LVV-T839	Description	Select the option under "Other" labeled "Terminal" by clicking on the icon.

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Step	Description, Input Data and Expected Result
	Test Data
	Expected Result: A terminal window appears with command line access to the user's file system.

4.180 LVV-T771 - Verify availability of Notebook aspect documentation

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.180.1 Verification Elements

- LVV-9970 - DMS-NB-REQ-0014-V-01: Documentation_1

4.180.2 Test Items

Verify that the Notebook Aspect provides documentation of each of the constituent features as well as tutorial notebooks demonstrating the use of the Aspect.

4.180.3 Predecessors

4.180.4 Environment Needs

4.180.4.1 Software

4.180.4.2 Hardware

4.180.5 Input Specification

4.180.6 Output Specification

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4.180.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.181 LVV-T772 - Verify new-user onboarding

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.181.1 Verification Elements

- LVV-9972 - DMS-NB-REQ-0015-V-01: New-User Onboarding_1

4.181.2 Test Items

Verify that the Notebook Aspect provides clear documentation on how to obtain credentials for accessing the Notebook Aspect.

4.181.3 Predecessors

4.181.4 Environment Needs

4.181.4.1 Software

4.181.4.2 Hardware

4.181.5 Input Specification

Draft

4.181.6 Output Specification

4.181.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.182 LVV-T773 - Verify availability of shared file space

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.182.1 Verification Elements

- LVV-9983 - DMS-NB-REQ-0016-V-01: Shared File Space_1

4.182.2 Test Items

Verify that the Notebook Aspect provides access to a shared read/write filesystem visible to all users of an instance of the Science Platform.

4.182.3 Predecessors

4.182.4 Environment Needs

4.182.4.1 Software

4.182.4.2 Hardware

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4.182.5 Input Specification

4.182.6 Output Specification

4.182.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.183 LVV-T774 - Verify API and Portal aspects accessible from Notebook

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.183.1 Verification Elements

- LVV-9980 - DMS-NB-REQ-0017-V-01: Access to the API and Portal Aspects_1

4.183.2 Test Items

Verify that the Notebook Aspect is able to utilise the data access services provided by other Aspects. In particular, a Notebook user can use standard VO services to access LSST Data Releases.

4.183.3 Predecessors

4.183.4 Environment Needs

4.183.4.1 Software

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4.183.4.2 Hardware

4.183.5 Input Specification

4.183.6 Output Specification

4.183.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.184 LVV-T775 - Verify access to User File Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.184.1 Verification Elements

- LVV-9985 - DMS-NB-REQ-0018-V-01: User File Workspace Access_1

4.184.2 Test Items

Verify that users of the Notebook Aspect are able to access the User File Workspace available as a POSIX filesystem from within the Python kernels and shell-prompt sessions it supports.

4.184.3 Predecessors

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4.184.4 Environment Needs

4.184.4.1 Software

4.184.4.2 Hardware

4.184.5 Input Specification

4.184.6 Output Specification

4.184.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.185 LVV-T776 - Verify access to VOSpace services from Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.185.1 Verification Elements

- LVV-9986 - DMS-NB-REQ-0019-V-01: VOSpace Access_1

4.185.2 Test Items

Verify that users of the Notebook Aspect are able to interact with VOSpace services available through project or external services. Users will be able to directly use VOSpace APIs within a Notebook.

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4.185.3 Predecessors

4.185.4 Environment Needs

4.185.4.1 Software

4.185.4.2 Hardware

4.185.5 Input Specification

4.185.6 Output Specification

4.185.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.186 LVV-T777 - Verify user database workspace access from Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.186.1 Verification Elements

- LVV-9984 - DMS-NB-REQ-0020-V-01: User Database Workspace Access_1

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4.186.2 Test Items

Verify that users are able to interact with their User Database through the Notebook Aspect to insert, delete, and control access to their tables. This will be possible via TAP, at least, and possibly through lower-level access.

4.186.3 Predecessors

4.186.4 Environment Needs

4.186.4.1 Software

4.186.4.2 Hardware

4.186.5 Input Specification

4.186.6 Output Specification

4.186.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.187 LVV-T778 - Verify access to batch system

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

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4.187.1 Verification Elements

- LVV-9981 - DMS-NB-REQ-0021-V-01: Batch System Access_1

4.187.2 Test Items

Verify that the Notebook aspect provides access to a batch processing system via shell access.

4.187.3 Predecessors

4.187.4 Environment Needs

4.187.4.1 Software

4.187.4.2 Hardware

4.187.5 Input Specification

4.187.6 Output Specification

4.187.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.188 LVV-T779 - Verify implementation of quotas in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

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4.188.1 Verification Elements

- LVV-9982 - DMS-NB-REQ-0022-V-01: Compute and Storage Quotas_1

4.188.2 Test Items

Verify that the Notebook Aspect has a quota system for compute and storage authorized access via an authentication system.

4.188.3 Predecessors

4.188.4 Environment Needs

4.188.4.1 Software

4.188.4.2 Hardware

4.188.5 Input Specification

4.188.6 Output Specification

4.188.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.189 LVV-T780 - Verify access to all data products from Notebook aspect

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.189.1 Verification Elements

- LVV-9979 - DMS-NB-REQ-0023-V-01: Access to All Data Products_1

4.189.2 Test Items

Verify that an authorized user of the Notebook Aspect is able to access the reformatted Engineering and Facilities Database (EFD) and and all other LSST released data products.

4.189.3 Predecessors

4.189.4 Environment Needs

4.189.4.1 Software

4.189.4.2 Hardware

4.189.5 Input Specification

4.189.6 Output Specification

4.189.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.190 LVV-T781 - Verify ease of Notebook aspect deployment

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.190.1 Verification Elements

- LVV-9988 - DMS-NB-REQ-0024-V-01: Ease of Deployment_1

4.190.2 Test Items

Verify that the Notebook Aspect is deployable to multiple instances and contexts, both private and public.

4.190.3 Predecessors

4.190.4 Environment Needs

4.190.4.1 Software

4.190.4.2 Hardware

4.190.5 Input Specification

4.190.6 Output Specification

4.190.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.191 LVV-T782 - Verify workload for deployment in Kubernetes

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Demonstration	Jeffrey Carlin

4.191.1 Verification Elements

- LVV-9987 - DMS-NB-REQ-0025-V-01: Deployment Workload in Kubernetes_1

4.191.2 Test Items

Given a Kubernetes cluster with a configuration meeting a documented standard set of specifications, verify that it takes an engineer with admin rights no more than 2 days to deploy the Notebook Aspect in that context. The specification is expected to constrain factors such as software versions for Kubernetes and related packages, available storage, a shared file system, and an authentication system.

4.191.3 Predecessors

4.191.4 Environment Needs

4.191.4.1 Software

4.191.4.2 Hardware

4.191.5 Input Specification

4.191.6 Output Specification

4.191.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.192 LVV-T783 - Verify monitoring of Notebook system health

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.192.1 Verification Elements

- LVV-9989 - DMS-NB-REQ-0026-V-01: System Health Monitoring_1

4.192.2 Test Items

Verify that the Notebook Aspect provides a service health microservice and a dynamic web page hostable on separate resources that provides a view of the health status.

4.192.3 Predecessors

4.192.4 Environment Needs

4.192.4.1 Software

4.192.4.2 Hardware

4.192.5 Input Specification

4.192.6 Output Specification

Draft

4.192.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.193 LVV-T784 - Verify visualization of images in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.193.1 Verification Elements

- LVV-9990 - DMS-NB-REQ-0032-V-01: Image Visualization_1

4.193.2 Test Items

Verify that the Notebook aspect provides tools for visualization of images produced by the LSST stack tools.

4.193.3 Predecessors

4.193.4 Environment Needs

4.193.4.1 Software

4.193.4.2 Hardware

4.193.5 Input Specification

Draft

4.193.6 Output Specification

4.193.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.194 LVV-T785 - Verify availability of scientific plotting tools in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.194.1 Verification Elements

- LVV-9991 - DMS-NB-REQ-0033-V-01: Scientific Plotting_1

4.194.2 Test Items

Verify that the Notebook Aspect provides common plotting methods including scatter plots, raster images, histograms, 2D histograms, contours, line traces, polygons, compositions of these (contours on scatter plots), density images.

4.194.3 Predecessors

4.194.4 Environment Needs

4.194.4.1 Software

Draft

4.194.4.2 Hardware

4.194.5 Input Specification

4.194.6 Output Specification

4.194.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.195 LVV-T786 - Verify linkage of visualization tools in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.195.1 Verification Elements

- LVV-9993 - DMS-NB-REQ-0034-V-01: Visualization Linkage_1

4.195.2 Test Items

Verify that the Notebook Aspect provides "drill down" functionality in plots, including brushing and linking between plots, interactive discovery of metadata about particular points, drill down to imaging from measurements.

4.195.3 Predecessors

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4.195.4 Environment Needs

4.195.4.1 Software

4.195.4.2 Hardware

4.195.5 Input Specification

4.195.6 Output Specification

4.195.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.196 LVV-T787 - Verify interactivity of visualizations in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.196.1 Verification Elements

- LVV-9992 - DMS-NB-REQ-0035-V-01: Visualization Interactivity_1

4.196.2 Test Items

Verify that the Notebook Aspect provides interactive plots for certain visualizations, including linked axes on multiple plots, zoom, pan, and data point selection.

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4.196.3 Predecessors

4.196.4 Environment Needs

4.196.4.1 Software

4.196.4.2 Hardware

4.196.5 Input Specification

4.196.6 Output Specification

4.196.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.197 LVV-T788 - Verify interactive scaling of visualizations in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.197.1 Verification Elements

- LVV-9994 - DMS-NB-REQ-0036-V-01: Visualization Scaling_1

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4.197.2 Test Items

Verify that the Notebook Aspect provides interactive plots that scale to include at least 1E6 datapoints. This may be done through an adaptive refinement scheme like datashader.

4.197.3 Predecessors

4.197.4 Environment Needs

4.197.4.1 Software

4.197.4.2 Hardware

4.197.5 Input Specification

4.197.6 Output Specification

4.197.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.198 LVV-T789 - Verify access to Portal queries from Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.198.1 Verification Elements

- LVV-9996 - DMS-NB-REQ-0029-V-01: Access to Portal-Initiated Queries_1

4.198.2 Test Items

Verify that a user of the Notebook Aspect can access search queries they performed in the Portal Aspect.

4.198.3 Predecessors

4.198.4 Environment Needs

4.198.4.1 Software

4.198.4.2 Hardware

4.198.5 Input Specification

4.198.6 Output Specification

4.198.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.199 LVV-T790 - Verify access to Portal visualization API from Notebook aspect

Version	Status	Priority	Verification Type	Owner

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1	Draft	Normal	Inspection	Jeffrey Carlin

4.199.1 Verification Elements

- LVV-9995 - DMS-NB-REQ-0030-V-01: Access to Portal Visualization API_1

4.199.2 Test Items

Verify that the Notebook Aspect provides a mechanism for "pushing" specific types of data to the Portal API. For instance, this allows a user to plot a catalog of coordinates over an image display using the Portal's Firefly components. This is supported by DMS-PRTL-REQ-0115 on the Portal side.

4.199.3 Predecessors

4.199.4 Environment Needs

4.199.4.1 Software

4.199.4.2 Hardware

4.199.5 Input Specification

4.199.6 Output Specification

4.199.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.200 LVV-T791 - Verify ability to launch a notebook with access to Portal query results

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.200.1 Verification Elements

- LVV-9997 - DMS-NB-REQ-0031-V-01: Notebook-Launching Interface_1

4.200.2 Test Items

Verify that the Notebook Aspect provides a means to trigger the opening of a notebook with access to the results of a query performed in the Portal. This is intended to permit a Portal user to perform a query and then quickly obtain a Notebook session with that data available for further analysis.

4.200.3 Predecessors

4.200.4 Environment Needs

4.200.4.1 Software

4.200.4.2 Hardware

4.200.5 Input Specification

4.200.6 Output Specification

4.200.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.201 LVV-T792 - Verify implementation of secure protocol for Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.201.1 Verification Elements

- LVV-10000 - DMS-NB-REQ-0001-V-01: Secure Protocol_1

4.201.2 Test Items

Verify that the Notebook Aspect is accessible through an HTTPS endpoint.

4.201.3 Predecessors

4.201.4 Environment Needs

4.201.4.1 Software

4.201.4.2 Hardware

4.201.5 Input Specification

4.201.6 Output Specification

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4.201.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.202 LVV-T793 - Verify implementation of authentication and authorization service in Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.202.1 Verification Elements

- LVV-9998 - DMS-NB-REQ-0002-V-01: Authentication and Authorization_1

4.202.2 Test Items

Verify that the Notebook Aspect provides a means to authenticate users for the purpose of establishing authorized use and only permit access to authenticated users using the LSST Data Facility authentication and authorization service.

4.202.3 Predecessors

4.202.4 Environment Needs

4.202.4.1 Software

4.202.4.2 Hardware

Draft

4.202.5 Input Specification

4.202.6 Output Specification

4.202.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.203 LVV-T794 - Verify secure implementation of Notebook aspect

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.203.1 Verification Elements

- LVV-9999 - DMS-NB-REQ-0003-V-01: Secure Implementation_1

4.203.2 Test Items

Verify that the Notebook aspect does not allow users to circumvent authorizing controls.

4.203.3 Predecessors

4.203.4 Environment Needs

4.203.4.1 Software

4.203.4.2 Hardware

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4.203.5 Input Specification

4.203.6 Output Specification

4.203.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.204 LVV-T795 - Verify access to Notebook aspect via IPv6

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.204.1 Verification Elements

- LVV-10001 - DMS-NB-REQ-0004-V-01: IPV6 Access_1

4.204.2 Test Items

Verify that the Notebook Aspect supports access using IPv6 protocols.

4.204.3 Predecessors

4.204.4 Environment Needs

4.204.4.1 Software

4.204.4.2 Hardware

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.204.5 Input Specification

4.204.6 Output Specification

4.204.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.205 LVV-T796 - Verify web APIs use CAOM2

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.205.1 Verification Elements

- LVV-10011 - DMS-API-REQ-0021-V-01: Use of CAOM2_1

4.205.2 Test Items

Verify that the API Aspect Web APIs present image and visit metadata organized in accordance with the CAOM2 data model.

4.205.3 Predecessors

4.205.4 Environment Needs

4.205.4.1 Software

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.205.4.2 Hardware

4.205.5 Input Specification

4.205.6 Output Specification

4.205.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.206 LVV-T797 - Verify API access to image and visit metadata

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.206.1 Verification Elements

- LVV-10003 - DMS-API-REQ-0022-V-01: Access to Image and Visit Metadata_1

4.206.2 Test Items

Verify that the API Aspect provides for retrieval of image and visit metadata via TAP ADQL queries.

4.206.3 Predecessors

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.206.4 Environment Needs

4.206.4.1 Software

4.206.4.2 Hardware

4.206.5 Input Specification

4.206.6 Output Specification

4.206.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.207 LVV-T798 - Verify API access to catalog data products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Colin Slater

4.207.1 Verification Elements

- LVV-10002 - DMS-API-REQ-0023-V-01: Access to Catalog Data Products_1

4.207.2 Test Items

Verify that the API Aspect provides for retrieval of all Prompt and Data Release catalog data via TAP ADQL queries.

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4.207.3 Predecessors

4.207.4 Environment Needs

4.207.4.1 Software

4.207.4.2 Hardware

4.207.5 Input Specification

DRP and Prompt Processing data products must be loaded into the LSP databases.

4.207.6 Output Specification

4.207.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Create a Jupyer Notebook session in the LSP.
	Test Data	No data.
	Expected Result	
2	Description	Instantiate a connection to the TAP service with the pyVO library.
	Test Data	No data.

	Example Code	`import pyvo`
		
		`service = pyvo.dal.TAPService('https://lsst-lsp-stable.ncsa.illinois.edu/api/tap')`
		
		`service.describe()`

	Expected Result	A description of the TAP service should be printed, with no errors.

Draft

Step	Description, Input Data and Expected Result	
3	Description	List the available tables.
	Test Data	No data.
	Example Code	`service.tables.describe()`
	Expected Result	A list of available tables should be printed, including both DRP and Prompt Processing data products.
4	Description	Execute an example query on one of the DRP tables, such as the Object table (inserting the correct table name from Step 3):
	Test Data	No data.
	Example Code	`results = service.search("SELECT * from DRP_schema.example_DRP_table LIMIT 5")` `results.to_table().show_in_notebook()`
	Expected Result	Rows from the DRP data products should be displayed properly.
5	Description	Repeat Step 4 but with an example Prompt Products table (such as DIAObject) from Step 3.
	Test Data	No data.
	Expected Result	Rows from the Prompt Products table should be displayed properly.

4.208 LVV-T799 - Verify API access to observatory metadata

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.208.1 Verification Elements

- LVV-10005 - DMS-API-REQ-0024-V-01: Access to Observatory Metadata_1

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4.208.2 Test Items

Verify that the API Aspect provides for retrieval of observatory metadata (including the Transformed EFD) via TAP ADQL queries.

4.208.3 Predecessors

4.208.4 Environment Needs

4.208.4.1 Software

4.208.4.2 Hardware

4.208.5 Input Specification

4.208.6 Output Specification

4.208.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.209 LVV-T800 - Verify API enforcement of information classification

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.209.1 Verification Elements

- LVV-10009 - DMS-API-REQ-0025-V-01: Enforcement of Information Classification_1

4.209.2 Test Items

Verify that the API Aspect does NOT allow access to Sensitive or Highly Sensitive (per LPM-122) observatory metadata.

4.209.3 Predecessors

4.209.4 Environment Needs

4.209.4.1 Software

4.209.4.2 Hardware

4.209.5 Input Specification

4.209.6 Output Specification

4.209.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.210 LVV-T801 - Verify API access to reference catalogs

Version	Status	Priority	Verification Type	Owner

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

1	Draft	Normal	Inspection	Jeffrey Carlin

4.210.1 Verification Elements

- LVV-10006 - DMS-API-REQ-0026-V-01: Access to Reference Catalogs_1

4.210.2 Test Items

Verify that the API Aspect provides for retrieval of all reference catalog data via TAP ADQL queries. For the purposes of this requirement a "reference catalog" is an externally sourced catalog used during data production activities.

4.210.3 Predecessors

4.210.4 Environment Needs

4.210.4.1 Software

4.210.4.2 Hardware

4.210.5 Input Specification

4.210.6 Output Specification

4.210.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.211 LVV-T802 - Verify API access to virtual data products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.211.1 Verification Elements

- LVV-10007 - DMS-API-REQ-0027-V-01: Access to Virtual Data Products_1

4.211.2 Test Items

Verify that the API Aspect provides services to initiate regeneration of, and facilitate retrieval of, virtual data products on demand.

4.211.3 Predecessors

4.211.4 Environment Needs

4.211.4.1 Software

4.211.4.2 Hardware

4.211.5 Input Specification

4.211.6 Output Specification

4.211.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.212 LVV-T803 - Verify API access to FITS image data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.212.1 Verification Elements

- LVV-10004 - DMS-API-REQ-0028-V-01: Access to Image Data in FITS Format_1

4.212.2 Test Items

Verify that the API Aspect delivers image data in FITS format.

4.212.3 Predecessors

4.212.4 Environment Needs

4.212.4.1 Software

4.212.4.2 Hardware

4.212.5 Input Specification

4.212.6 Output Specification

4.212.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.213 LVV-T804 - Verify API access to multiple data releases

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.213.1 Verification Elements

- LVV-10010 - DMS-API-REQ-0029-V-01: Multiple Data Releases_1

4.213.2 Test Items

Verify that the API Aspect Web APIs provide unambiguous access to data products and metadata from more than one Data Release simultaneously.

4.213.3 Predecessors

4.213.4 Environment Needs

4.213.4.1 Software

4.213.4.2 Hardware

4.213.5 Input Specification

4.213.6 Output Specification

4.213.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.214 LVV-T805 - Verify API provides catalog metadata

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.214.1 Verification Elements

- LVV-10008 - DMS-API-REQ-0030-V-01: Catalog Metadata Service_1

4.214.2 Test Items

Verify that the API Aspect provides complete metadata for all tables within each data release, including a per-column description, IVOA UCD when appropriate, units when appropriate, and any relationship with other columns.

4.214.3 Predecessors

4.214.4 Environment Needs

4.214.4.1 Software

4.214.4.2 Hardware

4.214.5 Input Specification

4.214.6 Output Specification

4.214.7 Test Procedure

Step	Description, Input Data and Expected Result	
	Description	
1	Test Data	No data.

Draft

Step	Description, Input Data and Expected Result
	Expected Result

4.215 LVV-T806 - Verify availability of TAP service

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.215.1 Verification Elements

- LVV-10015 - DMS-API-REQ-0006-V-01: TAP Service for Tabular Queries_1

4.215.2 Test Items

Verify that the API Aspect Web APIs include an endpoint conforming to IVOA TAP 1.1 for the purpose of accessing tabularly structured data.

4.215.3 Predecessors

4.215.4 Environment Needs

4.215.4.1 Software

4.215.4.2 Hardware

4.215.5 Input Specification

4.215.6 Output Specification

4.215.7 Test Procedure

Draft

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.216 LVV-T807 - Verify synchronous TAP queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.216.1 Verification Elements

- LVV-10014 - DMS-API-REQ-0007-V-01: Synchronous TAP Support_1

4.216.2 Test Items

Verify that the API Aspect TAP endpoint supports synchronous queries as described by the IVOA TAP 1.1 specification.

4.216.3 Predecessors

4.216.4 Environment Needs

4.216.4.1 Software

4.216.4.2 Hardware

4.216.5 Input Specification

4.216.6 Output Specification

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4.216.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.217 LVV-T808 - Verify asynchronous TAP queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.217.1 Verification Elements

- LVV-10013 - DMS-API-REQ-0008-V-01: Asynchronous TAP Support_1

4.217.2 Test Items

Verify that the API Aspect TAP endpoint supports asynchronous queries as described by the IVOA TAP 1.1 specification.

4.217.3 Predecessors

4.217.4 Environment Needs

4.217.4.1 Software

4.217.4.2 Hardware

4.217.5 Input Specification

Draft

4.217.6 Output Specification

4.217.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.218 LVV-T809 - Verify availability of ADQL for queries

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Colin Slater

4.218.1 Verification Elements

- LVV-10012 - DMS-API-REQ-0009-V-01: ADQL Support_1

4.218.2 Test Items

Verify that the API Aspect TAP endpoint supports IVOA ADQL 2.1 as a query language.

4.218.3 Predecessors

4.218.4 Environment Needs

4.218.4.1 Software

4.218.4.2 Hardware

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4.218.5 Input Specification

An example table must be loaded into an LSP database.

4.218.6 Output Specification

4.218.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Create a Jupyer Notebook session in the LSP.
	Test Data	No data.
	Expected Result	
2	Description	Instantiate a connection to the TAP service with the pyVO library by running: import pyvo service = pyvo.dal.TAPService('http://lsst-lsp-stable.ncsa.illinois.edu/api/tap') service.describe()
	Test Data	No data.
	Expected Result	A description of the TAP service should be printed, with no errors.
3	Description	Execute: service.tables.describe()
	Test Data	No data.
	Expected Result	A list of available tables should be printed.
4	Description	Execute an example query on one of the available tables (inserting the correct table name from Step 3): results = service.search("SELECT * from schema.example_table LIMIT 5") results.to_table().show_in_notebook()

Draft

Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	Rows from the test table should be correctly displayed.

5	Description	Execute an example cone search to verify the correct parsing of ADQL. The example table must have ra and decl columns, and the target center of 1.0 and -1.0 in the example query should be replaced with coordinates inside the data footprint. Execute:
		
		`results = service.search("SELECT ra, decl FROM schema.example_table WHERE CONTAINS(POINT('ICRS'`
		`results.to_table().show_in_notebook()`

	Test Data	No data.
	Expected Result	Rows should be returned from the example table, and all of them should be within 0.5 degrees of the specified center coordinate.

4.219 LVV-T810 - Verify SIA service for image availability

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.219.1 Verification Elements

- LVV-10016 - DMS-API-REQ-0016-V-01: SIA Service for Image Availability_1

4.219.2 Test Items

Verify that the API Aspect Web APIs include an endpoint conforming to IVOA SIA V2 for the purpose of locating available images.

4.219.3 Predecessors

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.219.4 Environment Needs

4.219.4.1 Software

4.219.4.2 Hardware

4.219.5 Input Specification

4.219.6 Output Specification

4.219.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.220 LVV-T811 - Verify availability of SODA service for image data

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.220.1 Verification Elements

- LVV-10018 - DMS-API-REQ-0017-V-01: SODA Service for Image Data_1

4.220.2 Test Items

Verify that the API Aspect Web APIs include an endpoint conforming to IVOA SODA 1.0 for the purpose of retrieving image data.

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4.220.3 Predecessors

4.220.4 Environment Needs

4.220.4.1 Software

4.220.4.2 Hardware

4.220.5 Input Specification

4.220.6 Output Specification

4.220.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.221 LVV-T812 - Verify API SODA cutout image support

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Colin Slater

4.221.1 Verification Elements

- LVV-10017 - DMS-API-REQ-0018-V-01: Cutout Service_1

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4.221.2 Test Items

Verify that the API Aspect SODA endpoint supports performing cutouts on all released image data types.

4.221.3 Predecessors

4.221.4 Environment Needs

4.221.4.1 Software

4.221.4.2 Hardware

4.221.5 Input Specification

4.221.6 Output Specification

4.221.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.222 LVV-T813 - Verify query history retrieval

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.222.1 Verification Elements

- LVV-10020 - DMS-API-REQ-0038-V-01: Query History Retrieval_1

4.222.2 Test Items

Verify that the API aspect provides interfaces for retrieving the history of queries for a user.

4.222.3 Predecessors

4.222.4 Environment Needs

4.222.4.1 Software

4.222.4.2 Hardware

4.222.5 Input Specification

4.222.6 Output Specification

4.222.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.223 LVV-T814 - Verify availability of cached query result retrieval

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.223.1 Verification Elements

- LVV-10019 - DMS-API-REQ-0039-V-01: Cached Query Result Retrieval_1

4.223.2 Test Items

Verify that the API Aspect provides for the caching of results of queries for a limited time, and their retrieval based on information from the query history or on query identifiers previously returned from asynchronous query services.

4.223.3 Predecessors

4.223.4 Environment Needs

4.223.4.1 Software

4.223.4.2 Hardware

4.223.5 Input Specification

4.223.6 Output Specification

4.223.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.224 LVV-T815 - Verify retrieval of query specifications

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.224.1 Verification Elements

- LVV-10021 - DMS-API-REQ-0040-V-01: Query Specification Retrieval_1

4.224.2 Test Items

Verify that the API Aspect provides interfaces that return an artifact containing a complete specification for a query, and that permit that artifact to be used at a later time to re-execute the same query.

4.224.3 Predecessors

4.224.4 Environment Needs

4.224.4.1 Software

4.224.4.2 Hardware

4.224.5 Input Specification

4.224.6 Output Specification

4.224.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.225 LVV-T816 - Verify Butler interface to data products

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.225.1 Verification Elements

- LVV-10022 - DMS-API-REQ-0034-V-01: Butler Interface to Data Products_1

4.225.2 Test Items

Verify that the API Aspect provides a connection between the Data Butler (Generation 3) instances within notebooks hosted in a LDF instance and backend file system, database, and object data stores within that same LDF instance, for the purpose of allowing notebook aspect users to access data release data products and user generated data products as Python objects.

4.225.3 Predecessors

4.225.4 Environment Needs

4.225.4.1 Software

4.225.4.2 Hardware

4.225.5 Input Specification

4.225.6 Output Specification

4.225.7 Test Procedure

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.226 LVV-T817 - Verify availability of VOSpace service

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.226.1 Verification Elements

- LVV-10023 - DMS-API-REQ-0019-V-01: VOSpace Service_1

4.226.2 Test Items

Verify that the API Aspect Web APIs include an endpoint conforming to IVOA VOSpace 2.0 for the purpose of persistence and retrieval of user-generated file-oriented data products in the User Workspace defined in DMS-LSP-REQ-0011.

4.226.3 Predecessors

4.226.4 Environment Needs

4.226.4.1 Software

4.226.4.2 Hardware

4.226.5 Input Specification

Draft

4.226.6 Output Specification

4.226.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.227 LVV-T818 - Verify availability of WebDAV service

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.227.1 Verification Elements

- LVV-10024 - DMS-API-REQ-0020-V-01: WebDAV Service_1

4.227.2 Test Items

Verify that the API Aspect Web APIs include an endpoint conforming to WebDAV for the purpose of persistence and retrieval of user-generated file-oriented data products in the User Workspace defined in DMS-LSP-REQ-0011.

4.227.3 Predecessors

4.227.4 Environment Needs

4.227.4.1 Software

4.227.4.2 Hardware

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.227.5 Input Specification

4.227.6 Output Specification

4.227.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.228 LVV-T819 - Verify VOTable 1.3 support

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Colin Slater

4.228.1 Verification Elements

- LVV-10029 - DMS-API-REQ-0010-V-01: VOTable Output for TAP_1

4.228.2 Test Items

Verify that the API Aspect TAP endpoint supports IVOA VOTable 1.3 as an available output format.

4.228.3 Predecessors

4.228.4 Environment Needs

4.228.4.1 Software

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.228.4.2 Hardware

4.228.5 Input Specification

4.228.6 Output Specification

4.228.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	Open a Terminal window on the Science Platform.
	Test Data	No data.
	Expected Result	
2	Description	Retrieve the TAP capabilities description by executing: curl https://lsst-lsp-stable.ncsa.illinois.edu/api/tap/capabilities
	Test Data	No data.
	Expected Result	
3	Description	Inspect the capabilities file. Under the TAP capability, one of the outputFormat elements should correspond to VOTable.
	Test Data	No data.
	Expected Result	The expected XML looks like: <outputFormat ivo-id="ivo://ivoa.net/std/TAPRegExt#output-votable-td"> <mime>application/x-votable+xml</mime> <alias>votable</alias> </outputFormat>
4	Description	Create a Notebook instance in the Science Platform.
	Test Data	No data.
	Expected Result	

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

Step	Description, Input Data and Expected Result	
5	Description	Make a request to the TAP service and print the raw output returned by executing: import pyvo service = pyvo.dal.TAPService('https://lsst-lsp-stable.ncsa.illinois.edu/api/tap') query = service.create_query("SELECT * FROM TAP_SCHEMA.tables",) output = q.execute_raw() print(output)
	Test Data	No data.
	Expected Result	The result should be a VOTable file; which is indicated by these initial elements in the XML: <?xml version="1.0" encoding="UTF-8"?> <VOTABLE xmlns="http://www.ivoa.net/xml/VOTable/v1.3" xmlns:xsi="http://www.w3.org/2001/XMLScl

4.229 LVV-T820 - Verify support for VOTable TABLEDATA payload

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.229.1 Verification Elements

- LVV-10030 - DMS-API-REQ-0011-V-01: VOTable TABLEDATA Payload_1

4.229.2 Test Items

Verify that API Aspect services that support returning results in VOTable format support the return of a VOTable data payload in the XML-based TABLEDATA serialization.

4.229.3 Predecessors

DRAFT NOT YET APPROVED – The contents of this document are subject to configuration control by the LSST DM Change Control Board. – DRAFT NOT YET APPROVED

4.229.4 Environment Needs

4.229.4.1 Software

4.229.4.2 Hardware

4.229.5 Input Specification

4.229.6 Output Specification

4.229.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.230 LVV-T821 - Verify support for VOTable BINARY2 payload

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.230.1 Verification Elements

- LVV-10028 - DMS-API-REQ-0012-V-01: VOTable BINARY2 Payload_1

4.230.2 Test Items

Verify that the API Aspect services that support returning results in VOTable format support the return of a VOTable data payload in the BINARY2 serialization.

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4.230.3 Predecessors

4.230.4 Environment Needs

4.230.4.1 Software

4.230.4.2 Hardware

4.230.5 Input Specification

4.230.6 Output Specification

4.230.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.231 LVV-T822 - Verify JSON support for TAP outputs

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.231.1 Verification Elements

- LVV-10026 - DMS-API-REQ-0013-V-01: JSON Output for TAP_1

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4.231.2 Test Items

Verify that the API Aspect TAP endpoint supports JSON as an alternative available output format.

4.231.3 Predecessors

4.231.4 Environment Needs

4.231.4.1 Software

4.231.4.2 Hardware

4.231.5 Input Specification

4.231.6 Output Specification

4.231.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.232 LVV-T823 - Verify CSV support for TAP outputs

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

Draft

4.232.1 Verification Elements

- LVV-10025 - DMS-API-REQ-0014-V-01: CSV Output for TAP_1

4.232.2 Test Items

Verify that the API Aspect TAP endpoint supports CSV as an alternative available output format. This output format is not required to meet requirements otherwise in force on the return of table and column metadata.

4.232.3 Predecessors

4.232.4 Environment Needs

4.232.4.1 Software

4.232.4.2 Hardware

4.232.5 Input Specification

4.232.6 Output Specification

4.232.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.233 LVV-T824 - Verify SQLite support for TAP outputs

Draft

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.233.1 Verification Elements

- LVV-10027 - DMS-API-REQ-0015-V-01: SQLite Output for TAP_1

4.233.2 Test Items

Verify that the API Aspect TAP endpoint supports SQLite as an alternative available output format.

4.233.3 Predecessors

4.233.4 Environment Needs

4.233.4.1 Software

4.233.4.2 Hardware

4.233.5 Input Specification

4.233.6 Output Specification

4.233.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

Draft

4.234 LVV-T825 - Verify support for tabular result download to Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.234.1 Verification Elements

- LVV-10032 - DMS-API-REQ-0031-V-01: Tabular Result Download to Workspace_1

4.234.2 Test Items

Verify that the API Aspect provides a capability for users to save their query results as VOTables in their allocated VOSpace, subject to limitations of a resource quota system.

4.234.3 Predecessors

4.234.4 Environment Needs

4.234.4.1 Software

4.234.4.2 Hardware

4.234.5 Input Specification

4.234.6 Output Specification

4.234.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

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4.235 LVV-T826 - Verify support for tabular upload to Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.235.1 Verification Elements

- LVV-10033 - DMS-API-REQ-0032-V-01: Tabular Upload to Workspace_1

4.235.2 Test Items

Verify that the API Aspect provides a capability for users to upload catalog data products (formatted as VOTables) residing within their allocated VOSpace, such that the catalog products after upload may be joined in queries against data release catalog products, subject to limitations of a resource quota system.

4.235.3 Predecessors

4.235.4 Environment Needs

4.235.4.1 Software

4.235.4.2 Hardware

4.235.5 Input Specification

4.235.6 Output Specification

4.235.7 Test Procedure

Step	Description, Input Data and Expected Result
	Description
1	

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Step	Description, Input Data and Expected Result	
	Test Data	No data.
	Expected Result	

4.236 LVV-T827 - Verify ability to drop catalogs from Workspace

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.236.1 Verification Elements

- LVV-10031 - DMS-API-REQ-0033-V-01: Deletion from Workspace_1

4.236.2 Test Items

Verify that the API Aspect provides a capability for users to drop previously uploaded user catalog data products.

4.236.3 Predecessors

4.236.4 Environment Needs

4.236.4.1 Software

4.236.4.2 Hardware

4.236.5 Input Specification

4.236.6 Output Specification

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4.236.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.237 LVV-T828 - Verify API uses secure protocols

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.237.1 Verification Elements

- LVV-10037 - DMS-API-REQ-0001-V-01: Secure Protocols_1

4.237.2 Test Items

Verify that the API Aspect Web APIs are accessible through HTTPS endpoints.

4.237.3 Predecessors

4.237.4 Environment Needs

4.237.4.1 Software

4.237.4.2 Hardware

4.237.5 Input Specification

Draft

4.237.6 Output Specification

4.237.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.238 LVV-T829 - Verify API authentication

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.238.1 Verification Elements

- LVV-10034 - DMS-API-REQ-0003-V-01: Authentication_1

4.238.2 Test Items

Verify that the API Aspect Web APIs accept authenticated requests for the purpose of establishing user identity.

4.238.3 Predecessors

4.238.4 Environment Needs

4.238.4.1 Software

4.238.4.2 Hardware

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4.238.5 Input Specification

4.238.6 Output Specification

4.238.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.239 LVV-T830 - Verify API uses project authorization infrastructure

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.239.1 Verification Elements

- LVV-10035 - DMS-API-REQ-0004-V-01: Authorization_1

4.239.2 Test Items

Verify that the API Aspect Web APIs interact with project authorization infrastructure for the purpose of establishing authorized use.

4.239.3 Predecessors

4.239.4 Environment Needs

4.239.4.1 Software

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4.239.4.2 Hardware

4.239.5 Input Specification

4.239.6 Output Specification

4.239.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.240 LVV-T831 - Verify secure implementation of APIs

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.240.1 Verification Elements

- LVV-10036 - DMS-API-REQ-0005-V-01: Secure Implementation_1

4.240.2 Test Items

Verify that the API Aspect Web APIs prevent users from circumventing authorization controls.

4.240.3 Predecessors

4.240.4 Environment Needs

4.240.4.1 Software

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4.240.4.2 Hardware

4.240.5 Input Specification

4.240.6 Output Specification

4.240.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.241 LVV-T832 - Verify containerized deployment of API services

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.241.1 Verification Elements

- LVV-10038 - DMS-API-REQ-0035-V-01: Containerized Deployment_1

4.241.2 Test Items

Verify that the API Aspect services are delivered as containerized applications.

4.241.3 Predecessors

4.241.4 Environment Needs

4.241.4.1 Software

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4.241.4.2 Hardware

4.241.5 Input Specification

4.241.6 Output Specification

4.241.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.242 LVV-T833 - Verify support for compression of API results

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.242.1 Verification Elements

- LVV-10040 - DMS-API-REQ-0002-V-01: Result Compression_1

4.242.2 Test Items

Verify that the API Aspect Web APIs support gzip HTTP content-encoding for the purpose of returning compressed data.

4.242.3 Predecessors

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4.242.4 Environment Needs

4.242.4.1 Software

4.242.4.2 Hardware

4.242.5 Input Specification

4.242.6 Output Specification

4.242.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.243 LVV-T834 - Verify API upgradeability

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.243.1 Verification Elements

- LVV-10041 - DMS-API-REQ-0036-V-01: Upgradability_1

4.243.2 Test Items

Verify that the API Aspect service software are upgradable in place with minimal user down-time.

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4.243.3 Predecessors

4.243.4 Environment Needs

4.243.4.1 Software

4.243.4.2 Hardware

4.243.5 Input Specification

4.243.6 Output Specification

4.243.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

4.244 LVV-T835 - Verify API logging and monitoring

Version	Status	Priority	Verification Type	Owner
1	Draft	Normal	Inspection	Jeffrey Carlin

4.244.1 Verification Elements

- LVV-10039 - DMS-API-REQ-0037-V-01: Logging and Monitoring_1

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4.244.2 Test Items

Verify that the API Aspect services provide logging and monitoring capabilities for the purpose of supporting service operators.

4.244.3 Predecessors

4.244.4 Environment Needs

4.244.4.1 Software

4.244.4.2 Hardware

4.244.5 Input Specification

4.244.6 Output Specification

4.244.7 Test Procedure

Step	Description, Input Data and Expected Result	
1	Description	
	Test Data	No data.
	Expected Result	

A Traceability

Verification Elements	Test Cases
LVV-9807 - DMS-LSP-REQ-0001-V-01: Access to All Released or Authorized Data Products_1	LVV-T2 LVV-T598
LVV-9809 - DMS-LSP-REQ-0005-V-01: Linkage of Aspects_1	LVV-T2 LVV-T603
LVV-9808 - DMS-LSP-REQ-0004-V-01: API (Data Access) Aspect_1	LVV-T3 LVV-T602
LVV-9824 - DMS-LSP-REQ-0028-V-01: Peak Volume for Moderate-Sized Queries_1	LVV-T4 LVV-T617
LVV-9825 - DMS-LSP-REQ-0029-V-01: Peak Volume for Queries on all Objects_1	LVV-T4 LVV-T618
LVV-9811 - DMS-LSP-REQ-0002-V-01: Portal Aspect_1	LVV-T5 LVV-T600

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Verification Elements	Test Cases
LVV-9819 - DMS-LSP-REQ-0014-V-01: Download Data_1	LVV-T5 LVV-T6 LVV-T7 LVV-T612
LVV-9862 - DMS-PRTL-REQ-0022-V-01: Positional Query: Astrophysical Coordinate Systems_1	LVV-T5 LVV-T657
LVV-9865 - DMS-PRTL-REQ-0021-V-01: Positional Query: Multiple Positions/Objects_1	LVV-T5 LVV-T656
LVV-9869 - DMS-PRTL-REQ-0026-V-01: Positional Query by Region: Cone-Search_1	LVV-T5 LVV-T661
LVV-9868 - DMS-PRTL-REQ-0027-V-01: Positional Query by Region: Box-Search_1	LVV-T5 LVV-T662
LVV-9859 - DMS-PRTL-REQ-0028-V-01: Query by Identifier_1	LVV-T5 LVV-T652
LVV-9856 - DMS-PRTL-REQ-0016-V-01: Generic Query - Form-based_1	LVV-T5 LVV-T649
LVV-9895 - DMS-PRTL-REQ-0056-V-01: Histograms_1	LVV-T6 LVV-T691
LVV-9901 - DMS-PRTL-REQ-0055-V-01: XY Scatter Plots_1	LVV-T6 LVV-T690
LVV-9893 - DMS-PRTL-REQ-0054-V-01: Paging of Tabular Data_1	LVV-T6 LVV-T689
LVV-9889 - DMS-PRTL-REQ-0050-V-01: Column Selection of Tabular Data_1	LVV-T6 LVV-T685
LVV-9894 - DMS-PRTL-REQ-0053-V-01: Row Selection of Tabular Data_1	LVV-T6 LVV-T688
LVV-9891 - DMS-PRTL-REQ-0049-V-01: Display of Tabular Data_1	LVV-T6 LVV-T684
LVV-9821 - DMS-LSP-REQ-0017-V-01: Tabular Data Download File Formats_1	LVV-T6 LVV-T615
LVV-9820 - DMS-LSP-REQ-0018-V-01: Image Data Download File Format_1	LVV-T7 LVV-T616
LVV-9881 - DMS-PRTL-REQ-0040-V-01: Query for Single Epoch Image Cutouts_1	LVV-T7 LVV-T675
LVV-9880 - DMS-PRTL-REQ-0041-V-01: Query for Coadded Image Cutouts_1	LVV-T7 LVV-T674
LVV-9848 - DMS-PRTL-REQ-0004-V-01: Semantic Linkage: Portal Workflows_1	LVV-T8 LVV-T637
LVV-9814 - DMS-LSP-REQ-0008-V-01: Semantic Linkage_1	LVV-T8 LVV-T9 LVV-T606
LVV-9810 - DMS-LSP-REQ-0003-V-01: Notebook Aspect_1	LVV-T601
LVV-9812 - DMS-LSP-REQ-0006-V-01: Use of VO Standards_1	LVV-T604
LVV-9806 - DMS-LSP-REQ-0007-V-01: Abide by the Data Access Policies_1	LVV-T605
LVV-9813 - DMS-LSP-REQ-0009-V-01: Semantic Linkage: Uncertainties_1	LVV-T607
LVV-9815 - DMS-LSP-REQ-0010-V-01: Transfer of Portal Data References to Notebook_1	LVV-T608
LVV-9817 - DMS-LSP-REQ-0011-V-01: User File Workspace_1	LVV-T609
LVV-9816 - DMS-LSP-REQ-0012-V-01: User Database Workspace_1	LVV-T610
LVV-9818 - DMS-LSP-REQ-0013-V-01: User Workspace Access Controls_1	LVV-T611
LVV-9823 - DMS-LSP-REQ-0015-V-01: Upload Data_1	LVV-T613
LVV-9822 - DMS-LSP-REQ-0016-V-01: Transfer Data to Workspace_1	LVV-T614
LVV-9826 - DMS-LSP-REQ-0030-V-01: Peak Volume of In-process Queries_1	LVV-T619
LVV-9827 - DMS-LSP-REQ-0031-V-01: Query Result Download Bandwidth_1	LVV-T620
LVV-9828 - DMS-LSP-REQ-0019-V-01: Documentation_1	LVV-T621
LVV-9830 - DMS-LSP-REQ-0020-V-01: Authenticated User Access_1	LVV-T622
LVV-9832 - DMS-LSP-REQ-0021-V-01: New-user Support_1	LVV-T623
LVV-9831 - DMS-LSP-REQ-0022-V-01: Common Identity_1	LVV-T624
LVV-9834 - DMS-LSP-REQ-0023-V-01: Use of External Identity Providers_1	LVV-T625
LVV-9835 - DMS-LSP-REQ-0024-V-01: Use of Multiple Sets of Credentials_1	LVV-T626
LVV-9829 - DMS-LSP-REQ-0025-V-01: Acceptable Use Policy_1	LVV-T627
LVV-9836 - DMS-LSP-REQ-0026-V-01: Using secure protocols_1	LVV-T628
LVV-9833 - DMS-LSP-REQ-0027-V-01: Privacy of User Activities_1	LVV-T629
LVV-9839 - DMS-LSP-REQ-0032-V-01: Multiple installations_1	LVV-T630
LVV-9837 - DMS-LSP-REQ-0033-V-01: Internet-Accessible (IPv4)_1	LVV-T631
LVV-9838 - DMS-LSP-REQ-0034-V-01: Internet-Accessible (IPv6)_1	LVV-T632
LVV-9840 - DMS-LSP-REQ-0035-V-01: System-Availability Indication_1	LVV-T633
LVV-9841 - DMS-PRTL-REQ-0001-V-01: Portal is a Web Application_1	LVV-T634
LVV-9847 - DMS-PRTL-REQ-0002-V-01: Portal Discovery of all Data Products_1	LVV-T635
LVV-9846 - DMS-PRTL-REQ-0003-V-01: Portal Access to Workspace_1	LVV-T636
LVV-9842 - DMS-PRTL-REQ-0005-V-01: Access to Calibration Products_1	LVV-T638

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Verification Elements	Test Cases
LVV-9845 - DMS-PRTL-REQ-0006-V-01: Coadded Image to Single-Epoch Image Associations_1	LVV-T639
LVV-9843 - DMS-PRTL-REQ-0007-V-01: Access to External Archives_1	LVV-T640
LVV-9844 - DMS-PRTL-REQ-0008-V-01: API for Access to Portal Session State_1	LVV-T641
LVV-9854 - DMS-PRTL-REQ-0009-V-01: Support Synchronous and Asynchronous Queries_1	LVV-T642
LVV-9849 - DMS-PRTL-REQ-0010-V-01: Long Query Backgrounding_1	LVV-T643
LVV-9853 - DMS-PRTL-REQ-0011-V-01: Query Status and Termination Notification_1	LVV-T644
LVV-9851 - DMS-PRTL-REQ-0012-V-01: Query Results Size Limitation_1	LVV-T645
LVV-9850 - DMS-PRTL-REQ-0013-V-01: Query History Inspection_1	LVV-T646
LVV-9852 - DMS-PRTL-REQ-0014-V-01: Query Saving - Portal_1	LVV-T647
LVV-9857 - DMS-PRTL-REQ-0015-V-01: Generic Query_1	LVV-T648
LVV-9855 - DMS-PRTL-REQ-0017-V-01: Generic Query - ADQL-based_1	LVV-T650
LVV-9858 - DMS-PRTL-REQ-0018-V-01: Query Result Size_1	LVV-T651
LVV-9860 - DMS-PRTL-REQ-0029-V-01: Query by LSST Object and Source Identifiers: Specific Match to Identifier_1	LVV-T653
LVV-9861 - DMS-PRTL-REQ-0030-V-01: Query by Solar System Objects: Specific Match to Identifier_1	LVV-T654
LVV-9866 - DMS-PRTL-REQ-0020-V-01: Positional Query: Position on the Sky_1	LVV-T655
LVV-9863 - DMS-PRTL-REQ-0023-V-01: Positional Query: Astrophysical Source Name Lookup_1	LVV-T658
LVV-9864 - DMS-PRTL-REQ-0024-V-01: Positional Query: LSST Object and Source Identifiers_1	LVV-T659
LVV-9867 - DMS-PRTL-REQ-0025-V-01: Positional Query: Solar System Object Names_1	LVV-T660
LVV-9870 - DMS-PRTL-REQ-0019-V-01: Query by Date and Time: Time Range of Observation_1	LVV-T663
LVV-9874 - DMS-PRTL-REQ-0031-V-01: Tabular Data Query Specifications_1	LVV-T664
LVV-9873 - DMS-PRTL-REQ-0032-V-01: Query Tabular Data based upon Image MetaData_1	LVV-T666
LVV-9872 - DMS-PRTL-REQ-0033-V-01: Queries on the Alerts Database_1	LVV-T667
LVV-9871 - DMS-PRTL-REQ-0034-V-01: Access to Original Alert State_1	LVV-T668
LVV-9878 - DMS-PRTL-REQ-0035-V-01: Query for Single Epoch Visit Images_1	LVV-T669
LVV-9877 - DMS-PRTL-REQ-0036-V-01: Query for Single Epoch Raft Images_1	LVV-T670
LVV-9876 - DMS-PRTL-REQ-0037-V-01: Query for Single Epoch CCD Image_1	LVV-T671
LVV-9879 - DMS-PRTL-REQ-0038-V-01: Single-Epoch Image Query Specifications_1	LVV-T672
LVV-9875 - DMS-PRTL-REQ-0039-V-01: Coadded Image Query Specifications_1	LVV-T673
LVV-9905 - DMS-PRTL-REQ-0062-V-01: Display Native Single-Visit Image Data Products_1	LVV-T676
LVV-9884 - DMS-PRTL-REQ-0042-V-01: Visualization of Tabular and Image Data_1	LVV-T677
LVV-9883 - DMS-PRTL-REQ-0043-V-01: Visualization of Ancillary Information_1	LVV-T678
LVV-9882 - DMS-PRTL-REQ-0044-V-01: Linking Visualization of Image Data to Tabular Data_1	LVV-T679
LVV-9885 - DMS-PRTL-REQ-0045-V-01: Visualization of Uploaded Tabular and Image Data_1	LVV-T680
LVV-9886 - DMS-PRTL-REQ-0046-V-01: Visualization of Workspace Data_1	LVV-T681
LVV-9888 - DMS-PRTL-REQ-0047-V-01: Table Row Property Sheet_1	LVV-T682
LVV-9887 - DMS-PRTL-REQ-0048-V-01: Alert Visualization_1	LVV-T683
LVV-9892 - DMS-PRTL-REQ-0051-V-01: Display Order of Columns of Tabular Data_1	LVV-T686
LVV-9890 - DMS-PRTL-REQ-0052-V-01: Copying of Tabular Data_1	LVV-T687
LVV-9900 - DMS-PRTL-REQ-0057-V-01: Symbol Size, Shape, and Color Coding in XY(Z) Scatter Plots_1	LVV-T692
LVV-9898 - DMS-PRTL-REQ-0058-V-01: Plot Quantitative Uncertainties_1	LVV-T693
LVV-9897 - DMS-PRTL-REQ-0059-V-01: Plot Asymmetric Quantitative Uncertainties_1	LVV-T694
LVV-9899 - DMS-PRTL-REQ-0060-V-01: Plot Upper and Lower Quantitative Limits_1	LVV-T695
LVV-9896 - DMS-PRTL-REQ-0061-V-01: Multiple XY-Plots on the Same Display_1	LVV-T696
LVV-9906 - DMS-PRTL-REQ-0063-V-01: Display Raft- and Focal-Plane-Level Single-Visit Image Data_1	LVV-T697
LVV-9907 - DMS-PRTL-REQ-0064-V-01: Display Single Visit Image Cut-Out_1	LVV-T698
LVV-9904 - DMS-PRTL-REQ-0065-V-01: Display Native Coadded Image Data Products_1	LVV-T699
LVV-9903 - DMS-PRTL-REQ-0066-V-01: Display Coadded Image Cutouts / Mosaics_1	LVV-T700
LVV-9902 - DMS-PRTL-REQ-0067-V-01: Display Calibration Image Data Products_1	LVV-T701
LVV-9908 - DMS-PRTL-REQ-0068-V-01: Display User-provided Images_1	LVV-T702

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Verification Elements	Test Cases
LVV-9909 - DMS-PRTL-REQ-0069-V-01: Image Property Sheet_1	LVV-T703
LVV-9914 - DMS-PRTL-REQ-0070-V-01: Provide Coordinate Display Tools for Images_1	LVV-T704
LVV-9911 - DMS-PRTL-REQ-0071-V-01: Image Pixel Content Display_1	LVV-T705
LVV-9912 - DMS-PRTL-REQ-0072-V-01: Image Spatial Manipulation_1	LVV-T706
LVV-9913 - DMS-PRTL-REQ-0073-V-01: Multi-Image Scaling and Aligning_1	LVV-T707
LVV-9910 - DMS-PRTL-REQ-0074-V-01: Image Appearance Manipulation_1	LVV-T708
LVV-9915 - DMS-PRTL-REQ-0075-V-01: Image Mask and Variance Overlays_1	LVV-T709
LVV-9917 - DMS-PRTL-REQ-0076-V-01: Image Plot Overlays_1	LVV-T710
LVV-9916 - DMS-PRTL-REQ-0077-V-01: Image Overlays: Adjustment of Colors and Positions_1	LVV-T711
LVV-9918 - DMS-PRTL-REQ-0078-V-01: Display All-Sky HEALPix Image_1	LVV-T712
LVV-9922 - DMS-PRTL-REQ-0079-V-01: Zoom In and Out on a HEALPix Image_1	LVV-T713
LVV-9920 - DMS-PRTL-REQ-0080-V-01: Pan Around on a HEALPix Image_1	LVV-T714
LVV-9919 - DMS-PRTL-REQ-0081-V-01: HEALPix Pixel Selection_1	LVV-T715
LVV-9921 - DMS-PRTL-REQ-0082-V-01: Retrieve HEALPix-Associated Data_1	LVV-T716
LVV-9924 - DMS-PRTL-REQ-0083-V-01: Coordinate Display Applicability_1	LVV-T717
LVV-9928 - DMS-PRTL-REQ-0084-V-01: Point Coordinate Display_1	LVV-T718
LVV-9926 - DMS-PRTL-REQ-0085-V-01: Distance Measurement Tool_1	LVV-T719
LVV-9925 - DMS-PRTL-REQ-0086-V-01: Coordinate Grid Overlays_1	LVV-T720
LVV-9923 - DMS-PRTL-REQ-0087-V-01: Astrophysical Compass Overlay_1	LVV-T721
LVV-9927 - DMS-PRTL-REQ-0088-V-01: Geometric Figure Overlays_1	LVV-T722
LVV-9934 - DMS-PRTL-REQ-0089-V-01: Sorting of Tabular Data by Column_1	LVV-T723
LVV-9933 - DMS-PRTL-REQ-0090-V-01: Simple Filtering of Tabular Data_1	LVV-T724
LVV-9929 - DMS-PRTL-REQ-0091-V-01: Calculated Filtering of Tabular Data_1	LVV-T725
LVV-9931 - DMS-PRTL-REQ-0092-V-01: Filtering of Tabular Data by Multiple Columns_1	LVV-T726
LVV-9930 - DMS-PRTL-REQ-0093-V-01: Calculated Quantities on Tabular Data_1	LVV-T727
LVV-9935 - DMS-PRTL-REQ-0094-V-01: Statistical Measurements on Tabular Data_1	LVV-T728
LVV-9932 - DMS-PRTL-REQ-0095-V-01: Saving Displayed Tabular Data_1	LVV-T729
LVV-9936 - DMS-PRTL-REQ-0096-V-01: False-color Images Creation and Display_1	LVV-T730
LVV-9937 - DMS-PRTL-REQ-0097-V-01: Statistical Measurements on Image Data_1	LVV-T731
LVV-9942 - DMS-PRTL-REQ-0098-V-01: Overlay Catalog of Sources and Objects on Images_1	LVV-T732
LVV-9943 - DMS-PRTL-REQ-0099-V-01: Overlay LSST-Derived Orbits_1	LVV-T733
LVV-9944 - DMS-PRTL-REQ-0100-V-01: Overlay User-provided Catalogs on Images_1	LVV-T734
LVV-9945 - DMS-PRTL-REQ-0101-V-01: Overlay User-provided Region Files on Images_1	LVV-T735
LVV-9940 - DMS-PRTL-REQ-0102-V-01: Display of Camera Artifacts as Overlays_1	LVV-T736
LVV-9948 - DMS-PRTL-REQ-0103-V-01: Single-Object Time-Domain Image View_1	LVV-T737
LVV-9946 - DMS-PRTL-REQ-0104-V-01: Position-based Time-Domain Image View_1	LVV-T738
LVV-9938 - DMS-PRTL-REQ-0105-V-01: Brightness Light Curves_1	LVV-T739
LVV-9941 - DMS-PRTL-REQ-0106-V-01: Linked Tables, Plots, and Images_1	LVV-T740
LVV-9939 - DMS-PRTL-REQ-0107-V-01: Data Selection from a Plot or Image_1	LVV-T741
LVV-9947 - DMS-PRTL-REQ-0108-V-01: Saving Data Selection from a Plot or Image_1	LVV-T742
LVV-9949 - DMS-PRTL-REQ-0109-V-01: Access to User Databases_1	LVV-T743
LVV-9954 - DMS-PRTL-REQ-0110-V-01: Tabular Data Download_1	LVV-T744
LVV-9951 - DMS-PRTL-REQ-0111-V-01: Image Data Download_1	LVV-T745
LVV-9953 - DMS-PRTL-REQ-0112-V-01: Selected Image Download_1	LVV-T746
LVV-9950 - DMS-PRTL-REQ-0113-V-01: Download Volume Estimation_1	LVV-T747
LVV-9952 - DMS-PRTL-REQ-0114-V-01: Long Download Completion Notification_1	LVV-T748
LVV-9955 - DMS-PRTL-REQ-0115-V-01: APIs for Visualization Components_1	LVV-T749
LVV-9958 - DMS-PRTL-REQ-0116-V-01: Storage Quotas User Interface_1	LVV-T750
LVV-9956 - DMS-PRTL-REQ-0117-V-01: Computational Quotas User Interface_1	LVV-T751
LVV-9957 - DMS-PRTL-REQ-0118-V-01: Portal Display Preferences_1	LVV-T752

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Verification Elements	Test Cases
LVV-9960 - DMS-PRTL-REQ-0119-V-01: Alert Subscription Service_1	LVV-T753
LVV-9961 - DMS-PRTL-REQ-0120-V-01: Pre-defined Alert Filters_1	LVV-T754
LVV-9962 - DMS-PRTL-REQ-0121-V-01: User-defined Alert Filters_1	LVV-T755
LVV-9959 - DMS-PRTL-REQ-0127-V-01: Alert Subscription Monitoring_1	LVV-T756
LVV-9963 - DMS-PRTL-REQ-0122-V-01: Access to Observatory Documentation_1	LVV-T757
LVV-9965 - DMS-PRTL-REQ-0123-V-01: Portal User Documentation_1	LVV-T758
LVV-9964 - DMS-PRTL-REQ-0124-V-01: Portal API Documentation_1	LVV-T759
LVV-9967 - DMS-PRTL-REQ-0125-V-01: Tolerance of Production Database Changes_1	LVV-T760
LVV-9966 - DMS-PRTL-REQ-0126-V-01: System-Busy Indication_1	LVV-T761
LVV-9971 - DMS-NB-REQ-0005-V-01: Interactive Python Environment_1	LVV-T762
LVV-9976 - DMS-NB-REQ-0006-V-01: Unix Shell Access_1	LVV-T763
LVV-9974 - DMS-NB-REQ-0007-V-01: Pre-installed Containerized Software Releases_1	LVV-T764
LVV-9975 - DMS-NB-REQ-0008-V-01: Release Deployment Latency_1	LVV-T765
LVV-9969 - DMS-NB-REQ-0009-V-01: Data Access Middleware Availability_1	LVV-T766
LVV-9968 - DMS-NB-REQ-0010-V-01: Common Astronomy Package Availability_1	LVV-T767
LVV-9978 - DMS-NB-REQ-0011-V-01: User Package Installation_1	LVV-T768
LVV-9977 - DMS-NB-REQ-0012-V-01: User Development Environment_1	LVV-T769
LVV-9973 - DMS-NB-REQ-0013-V-01: Persistent User Home File Space_1	LVV-T770
LVV-9970 - DMS-NB-REQ-0014-V-01: Documentation_1	LVV-T771
LVV-9972 - DMS-NB-REQ-0015-V-01: New-User Onboarding_1	LVV-T772
LVV-9983 - DMS-NB-REQ-0016-V-01: Shared File Space_1	LVV-T773
LVV-9980 - DMS-NB-REQ-0017-V-01: Access to the API and Portal Aspects_1	LVV-T774
LVV-9985 - DMS-NB-REQ-0018-V-01: User File Workspace Access_1	LVV-T775
LVV-9986 - DMS-NB-REQ-0019-V-01: VOSpace Access_1	LVV-T776
LVV-9984 - DMS-NB-REQ-0020-V-01: User Database Workspace Access_1	LVV-T777
LVV-9981 - DMS-NB-REQ-0021-V-01: Batch System Access_1	LVV-T778
LVV-9982 - DMS-NB-REQ-0022-V-01: Compute and Storage Quotas_1	LVV-T779
LVV-9979 - DMS-NB-REQ-0023-V-01: Access to All Data Products_1	LVV-T780
LVV-9988 - DMS-NB-REQ-0024-V-01: Ease of Deployment_1	LVV-T781
LVV-9987 - DMS-NB-REQ-0025-V-01: Deployment Workload in Kubernetes_1	LVV-T782
LVV-9989 - DMS-NB-REQ-0026-V-01: System Health Monitoring_1	LVV-T783
LVV-9990 - DMS-NB-REQ-0032-V-01: Image Visualization_1	LVV-T784
LVV-9991 - DMS-NB-REQ-0033-V-01: Scientific Plotting_1	LVV-T785
LVV-9993 - DMS-NB-REQ-0034-V-01: Visualization Linkage_1	LVV-T786
LVV-9992 - DMS-NB-REQ-0035-V-01: Visualization Interactivity_1	LVV-T787
LVV-9994 - DMS-NB-REQ-0036-V-01: Visualization Scaling_1	LVV-T788
LVV-9996 - DMS-NB-REQ-0029-V-01: Access to Portal-Initiated Queries_1	LVV-T789
LVV-9995 - DMS-NB-REQ-0030-V-01: Access to Portal Visualization API_1	LVV-T790
LVV-9997 - DMS-NB-REQ-0031-V-01: Notebook-Launching Interface_1	LVV-T791
LVV-10000 - DMS-NB-REQ-0001-V-01: Secure Protocol_1	LVV-T792
LVV-9998 - DMS-NB-REQ-0002-V-01: Authentication and Authorization_1	LVV-T793
LVV-9999 - DMS-NB-REQ-0003-V-01: Secure Implementation_1	LVV-T794
LVV-10001 - DMS-NB-REQ-0004-V-01: IPV6 Access_1	LVV-T795
LVV-10011 - DMS-API-REQ-0021-V-01: Use of CAOM2_1	LVV-T796
LVV-10003 - DMS-API-REQ-0022-V-01: Access to Image and Visit Metadata_1	LVV-T797
LVV-10002 - DMS-API-REQ-0023-V-01: Access to Catalog Data Products_1	LVV-T798
LVV-10005 - DMS-API-REQ-0024-V-01: Access to Observatory Metadata_1	LVV-T799
LVV-10009 - DMS-API-REQ-0025-V-01: Enforcement of Information Classification_1	LVV-T800
LVV-10006 - DMS-API-REQ-0026-V-01: Access to Reference Catalogs_1	LVV-T801
LVV-10007 - DMS-API-REQ-0027-V-01: Access to Virtual Data Products_1	LVV-T802

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Verification Elements	Test Cases
LVV-10004 - DMS-API-REQ-0028-V-01: Access to Image Data in FITS Format_1	LVV-T803
LVV-10010 - DMS-API-REQ-0029-V-01: Multiple Data Releases_1	LVV-T804
LVV-10008 - DMS-API-REQ-0030-V-01: Catalog Metadata Service_1	LVV-T805
LVV-10015 - DMS-API-REQ-0006-V-01: TAP Service for Tabular Queries_1	LVV-T806
LVV-10014 - DMS-API-REQ-0007-V-01: Synchronous TAP Support_1	LVV-T807
LVV-10013 - DMS-API-REQ-0008-V-01: Asynchronous TAP Support_1	LVV-T808
LVV-10012 - DMS-API-REQ-0009-V-01: ADQL Support_1	LVV-T809
LVV-10016 - DMS-API-REQ-0016-V-01: SIA Service for Image Availability_1	LVV-T810
LVV-10018 - DMS-API-REQ-0017-V-01: SODA Service for Image Data_1	LVV-T811
LVV-10017 - DMS-API-REQ-0018-V-01: Cutout Service_1	LVV-T812
LVV-10020 - DMS-API-REQ-0038-V-01: Query History Retrieval_1	LVV-T813
LVV-10019 - DMS-API-REQ-0039-V-01: Cached Query Result Retrieval_1	LVV-T814
LVV-10021 - DMS-API-REQ-0040-V-01: Query Specification Retrieval_1	LVV-T815
LVV-10022 - DMS-API-REQ-0034-V-01: Butler Interface to Data Products_1	LVV-T816
LVV-10023 - DMS-API-REQ-0019-V-01: VOSpace Service_1	LVV-T817
LVV-10024 - DMS-API-REQ-0020-V-01: WebDAV Service_1	LVV-T818
LVV-10029 - DMS-API-REQ-0010-V-01: VOTable Output for TAP_1	LVV-T819
LVV-10030 - DMS-API-REQ-0011-V-01: VOTable TABLEDATA Payload_1	LVV-T820
LVV-10028 - DMS-API-REQ-0012-V-01: VOTable BINARY2 Payload_1	LVV-T821
LVV-10026 - DMS-API-REQ-0013-V-01: JSON Output for TAP_1	LVV-T822
LVV-10025 - DMS-API-REQ-0014-V-01: CSV Output for TAP_1	LVV-T823
LVV-10027 - DMS-API-REQ-0015-V-01: SQLite Output for TAP_1	LVV-T824
LVV-10032 - DMS-API-REQ-0031-V-01: Tabular Result Download to Workspace_1	LVV-T825
LVV-10033 - DMS-API-REQ-0032-V-01: Tabular Upload to Workspace_1	LVV-T826
LVV-10031 - DMS-API-REQ-0033-V-01: Deletion from Workspace_1	LVV-T827
LVV-10037 - DMS-API-REQ-0001-V-01: Secure Protocols_1	LVV-T828
LVV-10034 - DMS-API-REQ-0003-V-01: Authentication_1	LVV-T829
LVV-10035 - DMS-API-REQ-0004-V-01: Authorization_1	LVV-T830
LVV-10036 - DMS-API-REQ-0005-V-01: Secure Implementation_1	LVV-T831
LVV-10038 - DMS-API-REQ-0035-V-01: Containerized Deployment_1	LVV-T832
LVV-10040 - DMS-API-REQ-0002-V-01: Result Compression_1	LVV-T833
LVV-10041 - DMS-API-REQ-0036-V-01: Upgradability_1	LVV-T834
LVV-10039 - DMS-API-REQ-0037-V-01: Logging and Monitoring_1	LVV-T835

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