

Service Genre: Register

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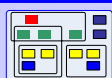
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LSAL

Information Architecture & Design, Learning Technologies, Training

Introduction

The Introduction provides a brief, standalone overview of the Service Genre. It is for a non technical reader. It may duplicate other material in the Service Genre Description.

The register service genre provides an abstract service end point for depositing metadata objects in the ADL-Registry (ADL-R) for later discovery. The register service genre takes a set of metadata objects (including information about the location of the corresponding content object), stores them in the registry and indexes the data for discovery. The register service genre returns a locator that can be used in a subsequent operation to directly retrieve the metadata object from the registry.

Service Genre Description

The Service Genre Description is the complete, formal documentation of the Service Genre.

Register is the process by which an application stores (pushes) metadata about one or more objects stored in a repository to a central federated metadata registry used to federate discovery of the objects across the entire set of repositories that participant in the federation. A register service interface for the resource provides a mechanism for the external agent (register) to contact the resource to store the metadata for the objects that are in the constituent repositories. The register service will return control information about the registration process. The registration process will return locators that can be used to access the metadata objects from the registry. The registration process MAY return an identifier which is actionable to retrieve the metadata object from the registry.

This is a general description of a register service genre, independent of application end point, resource, data object, or underlying communications protocols and service models. The service genre includes a mechanism to authenticate clients. The service genre MAY associate access authorization methods with registered metadata. These are used to filter discovery of objects from the registry.

Service Genre Metadata

The Service Genre Metadata contains basic labeling, classification and a version history for the Service Genre.

Name

- Service Genre Name: register
- LSAL ID: hdl:1870/051A0B3C187C4EDE9DCBCBA187DC8B2A
- ADL Name: ingest/deposit metadata object {repository registry}
- JADL IPA ID: hdl:JADL-IPA-NA/D2F0093B011A4F64A19ABC173B5B67D8 (source for derivative)

Classification

Classification Facets:

- Service Genre Status: Unapproved
- Domains: Repository
- Domain Coverage: Single
- Deployment Status: Developmental
- Deployment Scale: Isolated
- Maturity: Immature
- Composition: Individual
- Purpose: Exemplar, Application

Technical Facets:

- State Behavior: Stateful
- Transactional Behavior: Non Transactional



- Batch Behavior: Batch
- Time Constraint Behavior: None
- Service End Point: Consumer
- Authentication / Authorization: Auth'd
- Exposure: Public

Version

- LSAL Version: 1.0.0 [hdl:1870/051A0B3C187C4EDE9DCBCBA187DC8B2A]
- JADL IPA Version: 1.0.0 [hdl:JADL-IPA-NA/D2F0093B011A4F64A19ABC173B5B67D8]

Version History			
Version	Date	Author	Description
0.50	2007-09-04	DR	Initial D ³ UI version hdl:JADL-IPA-NA/D2F0093B011A4F64A19ABC173B5B67D8
0.51	2007-10-02	DR	Editorial review, consistency.
0.70	2007-10-07	DR	Draft for review.
0.90	2007-10-14	DR	Final editorial.
1.0.0	2007-10-21	DR	Final D ³ UI V 1.0.0.
1.0.0	2008-06-18	DR	LSAL V 1.0.0. Derivative from D ³ UI version.

Notation

The Notation element includes conventions used to describe the Service Genre.

The words MUST, MUST NOT, REQUIRED, SHALL, SHALL NOT, SHOULD, SHOULD NOT, RECOMMENDED, MAY, and OPTIONAL in this document are to be interpreted as described in [RFC 2119].

Notational conventions follow those given in the LSAL *Service Notation and Document Conventions*.

The identification and versioning scheme follows those given in the LSAL *Service Component Identification Scheme*.

The service classification scheme follows those given in the LSAL *Service Classification Scheme*.

The Service Genre Description follows those given in the LSAL *Service Genre Description Guidelines*.

Description

The Description element is an informal, standalone, non technical narrative description of the Service Genre (problem, process, business-level capabilities and workflow).

The register service genre provides the mechanism to add metadata objects to the central discovery registry in a repository federation. It is an example of a stateful, batch-oriented, request-response process. The registry is a resource containing a managed collection of metadata objects; each metadata object is associated with a content object in a repository. The metadata is used to discover objects in the repository federation and enable access to the actual objects in the repositories in the federation. The prime use of the service genre is to store metadata in the repository to enable later discovery.

Each metadata object in the registry is directly *retrievable* through a *locator* assigned by the registry. Each locator identifies only one metadata object in the collection.

Register is a synonym for ingest. It is a push process – a client sends data to the registry.

The service genre MAY be specialized in a service expressions to:



- deposit particular types of metadata object representations and disseminations, including their relationships
- associate authorization-based access controls with a metadata object
- assign persistent, actionable, resolvable identifiers to the objects
- specify registration validation rules
- specify communication protocols.

A repository federation registry (itself a repository) exposes a “registry” interface, defined in the service expressions that specialize this service genre. Clients MAY send requests to this interface to store the metadata objects to be managed by the registry. The client MAY deposit only one or a collection of objects. The client MAY also specify control data (e.g., access rules). The details of the packaging and encoding used to pass data from the client are defined in the service expressions that specialize this service genre.

The register service genre is authentication controlled. A client request will include necessary authentication credentials such that the service end point can permit or deny access to the service. The source of the authentication credentials is not defined by the service genre. The service end point does not apply authorization-based access control constraints during metadata registration.

Note, as with other service genres, there is no expectation that all service implementations will be interoperable. Different service expressions MAY take different approaches to defining interfaces and data models.

The register service genre is similar to the deposit service genre. Both provide the same general functionality. The register service genre constrains the process to deposit and register metadata objects, and not require any response.

Usage Scenarios

The Usage Scenarios element is an informal, non technical description of how the Service Genre is used. An illustration of process or problem workflows, expressed using services, is included. An illustration of an application using the components of the Service Genre may be included (but not a description of the design of the application). No critical or essential information required to understand the Service Genre should be included.

Register services are typically provided by an application that manages discovery, such as the discovery repository in a federation of repositories. Register services are expected to be used in conjunction with populating the registry. Objects used in discovery are passed to the registry that provides persistence and later access-controlled retrieval of the metadata object. The registry will support discovery (such as browse or search) and transformations of the metadata objects.

The basic usage scenario for the register service genre is to embed the registrar in another tool, e.g., within the *Reload* editor, as demonstrated in the (D³UI) Content Authoring service usage model. The tool deposits an object in a repository and constructs a locator for the object that is used to generate an identifier for the object. The metadata for the object, along with its locator in the repository, are then used to register the object with the ADL-R for federated discovery. Discovery is then made through the ADL-R. All of the interactions with the register service are hidden from the end user (the end user MAY not know which service end point was used) and the identifier assignment and metadata manipulation workflow is fully automated.

Applicability

The Applicability element details when the Service Genre is used or not used. It represents specific constraints and assumptions on the use of the Service Genre. It is more specific and normative than the informal Usage Scenarios. No critical or essential information required to understand the Service Genre should be included.

The service genre is applicable for adding one or more metadata objects to a discovery registry. Each metadata object has a defined data representation. The metadata includes identifier or locator information that can be used to retrieve the object from its source repository once it is discovered via the registry.



The service genre assigns stored metadata objects a label and locator used for retrieval from the registry. These labels are scoped only to the registry. There is no requirement that this label be a unique identifier that is resolvable to the item within the resource. The locator MAY be used to encode the label and resource name.

The service genre MAY also associate authorization credentials with the metadata object being added to the resource collection. These authorization credentials are used during discovery, limiting or filtering discovery results. The service genre does not define the meaning of the authorization credentials or their application during discovery.

The service genre supports the registration of a batch of metadata objects. Each metadata object in the batch may have a distinct representation.

A single encoding and packaging are specified by the service genre as applying to all metadata objects in the deposit batch. The service genre is not applicable where distinct encodings or packaging is required for different objects in the same batch as part of a single service request.

The service genre does not define the meaning of identifiers, locators or labels assigned to stored metadata objects. Service expressions that specialize this service genre MAY choose to align labels with meaningful attributes of metadata objects, but such alignment is not a requirement.

Behavior of the service genre is defined when the resource requires authentication credentials be included in the service request.

Behavior of the service genre is not defined when the resource requires its own authentication processes to permit deposit.

Behavior of the service genre is not defined if communications need to be secure.

Functionality

The Functionality element details and illustrates the behaviors provided by the Service Genre, in terms of services, workflows, messages, resources, and data objects. It is not a technical description of the Service Genre, but it must provide sufficient information to develop the Requests & Behaviors of the Service Genre and to evaluate conformance of the Service Genre to the stated behaviors. It should not include implementation-specific information.

The register service genre supports only a single function to add objects to a resource. The function is part of a stateful workflow.

A request SHALL specify:

- The set of metadata objects to deposit and register (objects) [REQUIRED].
- Authentication credentials [REQUIRED].

A request MAY specify:

- The representation of the metadata objects (i.e., what representation are used in the deposit set) [OPTIONAL].
 - Representations SHOULD refer to existing standards and SHOULD include version numbers or version information.
- The packaging and encoding of the objects (i.e., what packaging and encoding are in the deposit set) [OPTIONAL].
 - Packaging and encoding SHOULD refer to existing standards and SHOULD include version numbers or version information.
- The logical relationship between the metadata object and an existing metadata object within the registry (e.g., version of, alternative dissemination of) [OPTIONAL].

Deposit and register requests for multiple objects are treated as a batch; representation and encoding settings SHALL be applied uniformly to all objects in the batch. Representation and relationship settings SHALL be specified individually for each object in the deposit set.



The workflow is a two-step process. The first register request returns a transaction code. A subsequent request using the transaction code returns the status of processing of the original request (complete, incomplete) or final results.

No other functionality is defined. The functionality that is defined MAY be extended. Major new or additional functionality SHOULD NOT be included; extended capabilities SHOULD be included in other service genres.

Requests & Behaviors

The Requests & Behaviors element details all of the behaviors exposed by the Service Genre. It lists functionality that can be used by applications or Service Implementations. The information must be sufficient to specialize the Service Genre to one or more Service Expressions.

The format and definitions for requests and responses SHALL be defined by the service expressions that specialize the service genre. Requests and behaviors SHALL meet the following conditions:

- One *Register Request* SHALL be defined:
 - The request SHALL be capable of adding a single metadata object to the registry given the metadata object itself.
 - The request MAY be capable of adding a set of metadata objects to the registry given the metadata object set.
 - The request SHALL be capable of depositing and registering any of the types of metadata objects managed by the resource.
 - The request MAY permit the client to specify one or more acceptable representations for the metadata objects.
 - The relationship SHALL be specified individually for each metadata object in the deposit set.
 - The request MAY permit the client to specify the data encoding or packaging for the metadata objects.
 - The same packaging and encoding SHALL apply to all objects in the deposit set.
 - The request MAY include the specification of the relationship between a metadata object and an existing metadata object in the registry.
 - The relationship SHALL be specified individually for each metadata object in the deposit set.
 - The request SHALL include authentication credentials used to control access to the service end point.
- The first response in the workflow SHALL include a transaction code used in subsequent requests.
- Subsequent requests using the transaction code will be used to retrieve the results of the service operation.
- A response to a status request SHALL return an indicator that the operation is either complete or not complete.
- When the operation is complete, the response SHALL include a locator that can be used to retrieve each metadata object added to the registry. The locator SHALL be necessary and sufficient to retrieve the metadata object from the registry, i.e., a client attempting to retrieve the metadata object must know the registry to be accessed; the registry need not be encoded in the locator.
- The response MAY include a unique, persistent, resolvable identifier assigned to each metadata object added to the registry. The identifier SHALL be sufficient to use a resolution service to identify the registry and the label within the resource to retrieve the metadata object from the registry, i.e., a client may be able to retrieve the object through the support of a resolution service without knowing the registry in advance.
- When the operation is complete, responses SHALL include error indicators or other needed control information:
 - Error indicators SHALL be available for the request as a whole (e.g., the encoding is unknown).
 - Separate error indicators SHALL be used to describe the results for each metadata object.



Use & Interactions

The Use & Interactions element details how the Requests & Behaviors are combined to provide the stated functionality of the Service Genre. This is a precise technical description of how the Service Genre provides its capabilities.

The model for a client to interact with a service implementation SHALL be defined by the service expressions that specialize the service genre.

Structure

The Structure element provides a conceptual model of how the Service Genre manipulates data and state to provide results in response to requests. An illustration of the structure should be included. The structure information is used to specialize the Service Genre to one or more Service Expressions, but is not needed to understand how to use or interact with the Service Genre.

The service genre assumes the following logical data model for stored metadata objects:

- Objects are within collections in managed resources. The physical manifestation of storage of the metadata objects is hidden behind the service interface.
- Each metadata object has a locator that encodes the registry that contains the metadata object and the label of the metadata object within the registry.
- Labels or *access keys* are attributes of a metadata object (possibly a composite set of attributes that MAY be treated as a single surrogate), which discriminate a metadata object from all the other distinct metadata objects held in the resource:
 - Each metadata object has a label.
 - A label uniquely identifies a metadata object in the context of a registry.
- Each metadata object MAY have one or more digital *representations* or *disseminations*:
 - Different representations MAY be stored as static objects or they MAY be generated from the same underlying object on the fly in response to a request. Different representations of a metadata object MAY be considered as distinct objects by other systems (e.g., they MAY have their own labels). No further assumptions on relations between metadata objects or representations of metadata objects are made.
 - The stored representation MAY not be the same as the deposit encoding.
- Representations of different types of metadata for the same content object are different metadata objects. The model for the relationships between metadata objects specified in the deposit set is not specified. The service genre does not assume a fully elaborated model such as FRBR.
- Each submitted metadata object MAY have an *encoding*:
 - A metadata object MAY need to be encoded or packaged according to some protocol or standard. Examples include ZIP, TAR, IMS CP for packaging, and BINHEX, URL-Encode, UTF-8 for encoding.
 - The stored encoding MAY not be the same as the deposit encoding.
- A register request for a metadata object is a request for a metadata object or objects to be transmitted from the requestor to the registry. The object representation and encoding are included in the request from the client.
 - The metadata objects SHALL be packaged and encoded according to the request, which MAY be specified by the requestor or a default encoding SHALL be assumed if not specified.
 - The representation MAY be specified in the request or a default representation SHALL be assumed if not specified.

Additional encodings MAY be required to support transport-level message exchange.

Basic workflow steps in the registration process (without error handling) are:

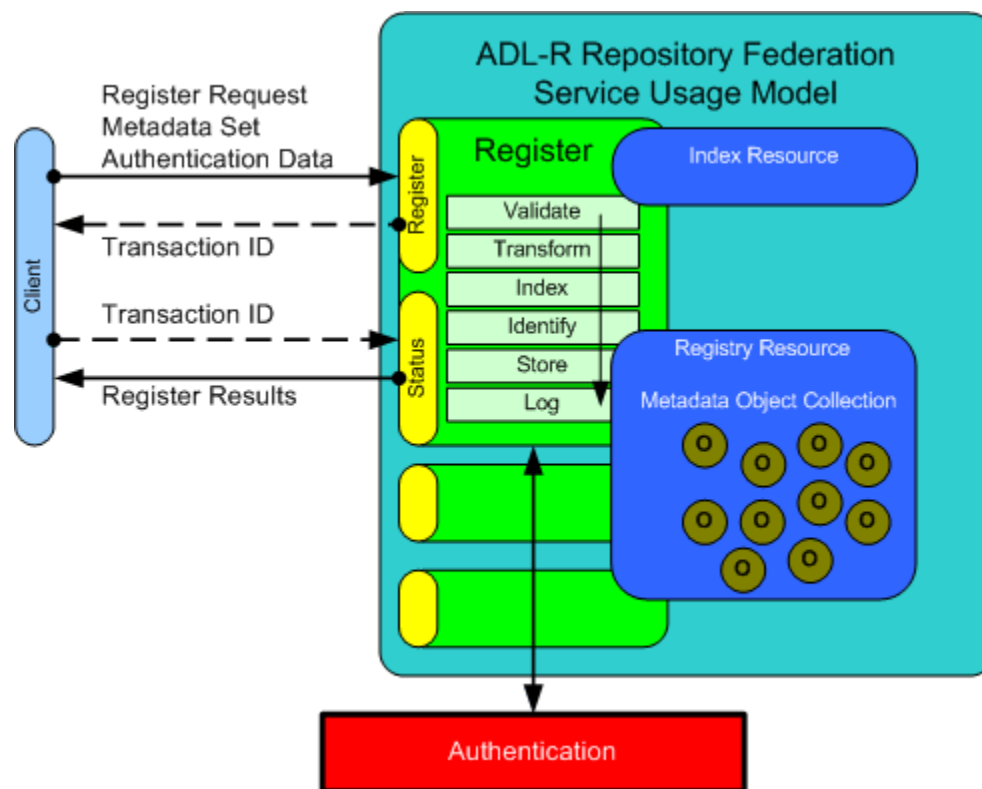
- Provide descriptive information about the content object to be added to the metadata registry, i.e., the metadata object (the request). The metadata object SHOULD conform to a designated standard. The request may be for a single item or a batch of items.
- Authenticate and authorize (via access controls and business rules) the request.



- Validate the overall request.
- For each metadata object in the batch request:
 - Validate the individual request and submitted metadata object information.
 - Transform the descriptive information (schema transform plus external to internal representation).
 - Add to the descriptive information (e.g., timestamps) to complete the metadata object according to federation requirements.
 - Assign an identifier to the metadata object.
 - Add the metadata object to the repository federation. Update the catalog of metadata objects in the repository federation.
 - Store the metadata object.
 - Index the metadata object and catalog.
 - If the metadata object is a new *work* (in the FRBR sense), update relationship information of the metadata for the content object.
 - Log the activity.
 - Return status results.
 - Return metadata object identifier.
- Log the activity.
- Return status results.

The structure of the service genre SHALL be defined by the service expressions that specialize the service genre.

The overall flow of interactions with the service is illustrated in the diagram.



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Figure 1: Register Service Genre [© Copyright 2007, Learning Systems Architecture Lab, All Rights Reserved.]



Design Decisions & Tradeoffs

The Design Decisions & Tradeoffs element documents overall choices, tradeoffs and their implications on the design of the Service Genre. It does not address the issues related to the internal details of a Service Implementation used to implement the Service Expression based on the Service Genre. No critical or essential information required to understand the Service Genre should be included.

The process of assigning labels and locators to metadata objects and their meanings is not defined; the service genre only defines interfaces and observable behaviors, not internal models and structure.

The service genre supports batch processing, with all elements of the batch treated as a set. Since it uses request-response messaging, requests for single objects may be made. If necessary a simplified, separate service genre that deposits only a single object at a time may be defined. Alternatively, as defined, a service expression may specialize the service genre to deposit and register only a single object.

The service genre uses a stateful workflow. The time to register metadata objects may be long, especially if batches are large, so a complete response as a single message pair may not be feasible. With known limits on batch size and performance bounds on the registration process, a non workflow could be defined in a service expression that specializes the service genre.

Authentication is an essential part of this service genre.

The service genre could include an *Inspection* request. The *Inspection* request returns to clients the range of permissible values for service request parameters (metadata representations and encodings in particular). This service genre does not include such a request.

Implementation Guide & Dependencies

The Implementation Guide & Dependencies element describes issues of concern in specializing the Service Genre to one or more Service Expressions and their corresponding Service Implementations. Resolution of issues discussed is deferred to the actual Service Implementation design. No critical or essential information required to understand the Service Genre should be included.

The following design decisions apply to the service expressions that specialize the service genre.

Structure and Design:

- The choice of type of label assigned to the stored metadata object is made while developing the service expression. Extrinsic attributes of the metadata object (e.g., semantically opaque identifiers) are a better choice as labels than intrinsic attributes (e.g., timestamp).
- Certain classes of extrinsic labels, such as file locations, are fragile, being dependent on object state, and MAY not have long-term persistence. Such labels SHOULD NOT be used as retrieval labels in contexts requiring long-term persistent of retrieval keys.
- The label only needs to be unique within the scope of the registry. It need not be globally unique.
- The label need not be externally actionable: it MAY be defined as a retrieval key through an ad hoc, one-off arrangement between requestor and provider, with no expectation that the label will be stored and managed externally or be actionable by any other external service.
- Identifiers SHALL be unique, persistent, and resolvable.
- All design decisions related to the meaning of labels and their association with metadata objects are deferred to the design of the service expression.
- All design decisions related to the representation and structuring of related metadata objects are deferred to the design of the service expression.
- While the service implementation accesses a specific registry resource, the registry itself MAY be a separately managed resource. A service expression MAY specify that the registry is a single physical storage system or it MAY specify that the registry is a distributed collection. The registry MAY be managed by a separate collection of storage manager services. All design decisions related to realization of the registry are deferred to the design of the service expression.



- Transport level encodings (e.g., UTF8 over HTTP) of results SHALL be defined by the service expressions that specialize the service genre.

Consistency:

- The service implementation SHALL ensure that all labeled (identified) metadata objects are stored and can be retrieved by label or locator at a later time.

Performance:

- A service implementation SHALL be capable of handling simultaneous requests from different clients.
- A service implementation SHOULD implement an indexing scheme or equivalent method to permit efficient access and discovery.
- Load balancing and distributed storage SHOULD be implemented for large registries.

Security and Privacy Considerations:

- Service implementations MAY be subject to denial-of-service attacks.
- Care should be taken to maintain privacy of any personal data or other records that MAY disclose usage patterns.

Applicable Standards

The Applicable Standards element lists domain-specific standards applicable to the Service Genre as a whole. Standards are described in terms of name, version and citation link. Conformance requirements and extensions should be noted. Standards used to implement applications are excluded. No critical or essential information required to understand the Service Genre should be included.

None. No standards are directly applicable to the service genre as a whole.

The service expressions that specialize the service genre SHALL be defined in terms of standards:

- Service expressions SHALL specify applicable registration/publication standards for the metadata objects (e.g., ATOM publishing format).
- Service expressions SHALL specify applicable digital representation standards for the metadata objects.
- Service expressions SHALL specify applicable data encoding and packaging format standards for the metadata objects.
- Service expressions SHALL specify applicable communications, encoding and transport protocol standards.
- Service expressions SHALL specify applicable standards-based authentication models.

Known Uses

The Known Uses element documents actual uses of the Service Genre in applications and systems, including how used, extensions, limits.

Actual: The service genre is specialized in the D³UI development-to-deposit prototype using *Reload* to store metadata in the ADL-R.

Potential: The service genre could be used in any content management or content creation process to store metadata in a registry for discovery.

Potential: The service genre could be used in a service usage model for a repository federation. The service genre supports push metadata ingest into the metadata registry of the repository federation for discovery.



Service Genre Dependencies

The Service Genre Dependencies lists other Service Genres that this Service Genre is dependent upon. Dependent Service Genres are identified by name and version.

authenticate: Vx.xx.

[\[link to service genre\]](#)

The service genre requires authentication for use. The authenticate service genre is part of the identity service usage model [\[link to service usage model\]](#). The identity service usage model is an integrated set of service genres that provides the operational user identity infrastructure that includes the creation of user rights and roles, user authentication and user authorization.

authorize: Vx.xx.

[\[link to service genre\]](#)

The service genre uses authorization to filter results. The authorize service genre is part of the identity service usage model [\[link to service usage model\]](#). The identity service usage model is an integrated set of service genres that provides the operational user identity infrastructure that includes the creation of user rights and roles, user authentication and user authorization.

repository storage manager: Vx.xx.

[\[link to service usage model\]](#)

The repository storage manager service usage model is an integrated set of service genres that provides access operators (CRUD, versioning, audit, ACID transactions) for a stored data collection, e.g., the metadata registry, collection registry, repository registry, archival repository, escrow repository.

Related Service Usage Models

The Related Service Usage Models element documents and illustrates how the Service Genre is used in Service Usage Models. Related Service Usage Models are identified by name and version. No critical or essential information required to understand the Service Genre should be included.

(D³UI) content authoring: V1.0.0.

[\[D³UI content-authoring-sum-v100 / hdl:1870/3FD212C661F1464AA79DBB22D3DE00FF\]](#)

Register (genre) is part of the (D³UI) content authoring service usage model (genre based) and is used within an authoring and content deposit workflow to store metadata objects in the ADL-R.

(FRED) repository federation: V1.0.0.

[\[link to service usage model\]](#)

Register (genre) is a part of the repository federation service usage model (genre based) and is used to add metadata from the repositories and collections that participate in the federation to build the registry data used for discovery. The repository federation service usage model provides an integrated set of service genres used to populate and use the metadata registry that supports a repository federation. Functionality includes content management (creation and management of metadata objects within a repository federation), content discovery (discovery of content objects from a repository federation) and content delivery (retrieval of and access to content objects discovered through a repository federation).

(ADL-R) repository federation: V1.0.0.

[\[ADL-R repository-federation-sum-v100 / hdl:1870/E2FE4AD428A1468FA284E270245F72D7\]](#)

The (ADL-R) repository federation service usage model is a derivative subset of the (FRED) repository federation service usage model. For the purposes of this service genre they are interchangeable.



Related Service Patterns

The Related Service Patterns element documents and illustrates how the Service Genre is used in Service Patterns. Related Service Patterns are identified by name and version.

None.

References

The References element includes references and bibliographic citations to works needed to understand the Service Genre.

None.

Glossary & Terminology

The Glossary & Terminology element defines domain-specific terms used in documenting the Service Genre.

Terms in the LSAL *Service Glossary* are applicable to this Service Genre.

Working Notes / Things To Do

The Working Notes element documents open issues in the development of the Service Genre and is for internal project use only. It should be deleted before the Service Genre is submitted for publication.

None.

