

Service Genre: Generate Metadata

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The Service Genre is derived from work created as part of the D³UI: Deposit to Discovery to Delivery – A User-Focused Infrastructure for Content Management in an ADL Environment project within the Workforce ADL Co-Lab. The D³UI project was funded in part by the Joint ADL Co-Lab under contract N61339-07-2-0001 SOW 2. Any opinions, findings, conclusions or recommendations expressed herein are those of the author(s) and do not reflect the views of the U.S. Government, the University of Memphis or other project sponsors.

The template structure and format of this document are based on the Service Genre Description document from the Evolving the JADL Integrated Prototype Architecture: Alignment with the e-Framework Technical Report. This work was funded in part by the Joint ADL Co-Lab under contract N61339-06-C-0082.

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The template structure and format of this document are also based on Federated Repositories for Education (FRED) project documentation templates and guidelines, which were created as part of the FRED Project within the Australian ADL Partnership Laboratory. The FRED project is sponsored by the Australian Commonwealth Department of Education, Science and Training under the Framework for Open Learning Programme.

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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 generate metadata service genre provides an abstract service end point for generating content object metadata (e.g., LOM metadata XML documents) for learning content objects (e.g., SCOs, content packages). The metadata generation takes the source content object, plus available context information, and creates a metadata description of the content that can be used in cataloging and discovery.

Service Genre Description

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

The generate metadata service genre defines how to generate a metadata object, encoded in an XML document, containing basic cataloging and descriptive metadata for/from a content object. The metadata object SHALL conform to an identified metadata standard. This service genre is applied to a content object which SHALL conform to an identified content object standard.

This is a general description of a generate metadata service genre, independent of application end point, resource, data object, or underlying communications protocols and service models. The service genre includes the notion of generating metadata for different types of objects, in different metadata schemes and in different file formats; it is not otherwise dependent on a data model. The service genre includes a mechanism to authenticate clients. The service genre does not include authorization methods to control the return and filtering of results.

Service Genre Metadata

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

Name

- Service Genre Name: generate metadata
- LSAL ID: hdl:1870/8A4A0B0A813849DAB60AAB656CCD287D
- ADL Name: generate metadata {content object basic metadata object}
- JADL IPA ID: hdl:JADL-IPA-NA/BB1EB65A24124765BEA5E097DDB06B39 (source for derivative)

Classification

Classification Facets:

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

Technical Facets:

- State Behavior: Stateless
- Transactional Behavior: Non Transactional
- Batch Behavior: Individual
- Time Constraint Behavior: None
- Service End Point: Provider



- Authentication / Authorization: Auth'ed
- Exposure: Public

Version

- LSAL Version: 1.0.0 [hdl:1870/8A4A0B0A813849DAB60AAB656CCD287D]
- JADL IPA Version: 1.0.0 [hdl:JADL-IPA-NA/BB1EB65A24124765BEA5E097DDB06B39]

Version History			
Version	Date	Author	Description
0.50	2007-09-04	DR	Initial D ³ UI version. hdl:JADL-IPA-NA/BB1EB65A24124765BEA5E097DDB06B39
0.51	2007-09-25	DR	Editorial review, consistency.
0.70	2007-10-07	DR	Draft for review.
0.90	2007-10-13	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 generate metadata service genre is used to create a metadata instance for a content object. Manual creation of classification and cataloging metadata, e.g., IEEE Learning Object Metadata (LOM) or Dublin Core Metadata (DC), is time consuming and potentially complex. High quality metadata can aid in discovery, but good metadata is often not created. Automated metadata generation can be used to create metadata records with reasonable quality at significantly reduced cost relative to manually created metadata.

Metadata generation takes a content object in a defined representational format—a SCO, a content package, an S1000D performance support materials, Office document, media file, etc.—and generates a metadata record for the object. The metadata record conforms to a known metadata standard, e.g., LOM, DC, METS, and is encoded in a standard format, e.g., as an XML document.

The generate metadata service genre defines the minimum expected behavior of a metadata generation service and outlines common design issues involved in implementing such a service. The generate metadata service genre defines the interfaces to the metadata generation service. It does not describe the processes used internally by the service to generate the resulting metadata records.



The service genre is specialized in service expressions to generate specific formats of metadata, in specific encodings and representations, for specific types of content objects. The service expressions also specify details of transport and communication when passing data to and from the service end point. The generate metadata 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 filtering to responses according to authorization-based access control constraints.

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.

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.

The basic usage scenario for the generate metadata service genre is to embed the metadata generator in another tool, e.g., within the *Reload* editor, as demonstrated in the (D³UI) Content Authoring service usage model. The tool invokes the metadata generator, specifying the content object and desired metadata results. The generator returns the generated metadata to the tool for further processing. All of the interactions with the metadata generation service are hidden from the end user (the end user may not know which service end point was used) and the metadata generation workflow is fully automated. Alternatively, a simple GUI tool could be created as a wrapper to use the metadata generator as part of a manual content management workflow process.

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.

As defined, the generate metadata service genre is applicable for generating metadata in any supported metadata format, in any supported metadata encoding, for any supported content object format.

Any subsequent processing of the generated metadata is out of scope for this service genre.

The service genre is defined for generation of a single metadata record and encoding, for a single content object. Batch behavior is not defined.

The service genre is defined to require authentication to use the service end point. Authentication credentials are included in the service request.

Behavior of the service genre is not defined when the service end point requires its own authentication processes to permit retrieval.

The service genre does not define how to obtain the content object for which the metadata is to be generated.

Behavior of the service genre is not defined when the content object requires authorization or access controls.

Behavior of the service genre is not defined when the metadata generation service end point filters results that are returned based on authorization policies or rules that need to be communicated through the service control interface.

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 generate metadata service genre supports two functions:

Metadata Generation Inspection Function: The inspect request is used to determine the capabilities of the metadata generator. This information enables a client to successfully communicate with the service end point of the metadata generator. Data gathered MAY include:

- Descriptions (machine processible) of the types of content objects for which metadata may be generated.
- Descriptions (machine processible) of the metadata formats that may be generated.
- Descriptions (machine processible) of the metadata encodings that may be returned for the generated metadata.
- Descriptions (machine processible) of the supported communications and transport protocols.

Metadata Generation Function: The generation function is used to generate a metadata record.

A request SHALL specify:

- The content object for which metadata is to be generated [REQUIRED].
- Authentication credentials to use the service end point [REQUIRED].

A request MAY specify:

- The desired output format including:
 - Requested metadata format [OPTIONAL]. Representations SHOULD refer to existing standards and SHOULD include version numbers or version information.
 - Requested metadata encoding [OPTIONAL]. Representations SHOULD refer to existing standards and SHOULD include version numbers or version information.
 - Context (for the content object, used in generating the metadata) [OPTIONAL].

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 *Metadata Generation Function* SHALL be defined:
 - The function SHALL be capable of generating all supported metadata formats and all supported encodings for the defined content object type.
 - The request SHALL include authentication credentials used to control access to the service end point.
 - The request SHOULD include control information to specify the requested metadata format and encoding.
 - The request SHOULD include context information used by the metadata generator to generate the metadata record.
 - A normal (non error) response SHALL include the generated metadata.
 - The response SHOULD include summary information.
- One *Metadata Generation Inspection Function* SHOULD be defined:
 - The request SHOULD include authentication data.



- The response SHOULD include information about all supported content object types, metadata formats and encodings.
- Responses shall include error indicators or other needed control information.

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.

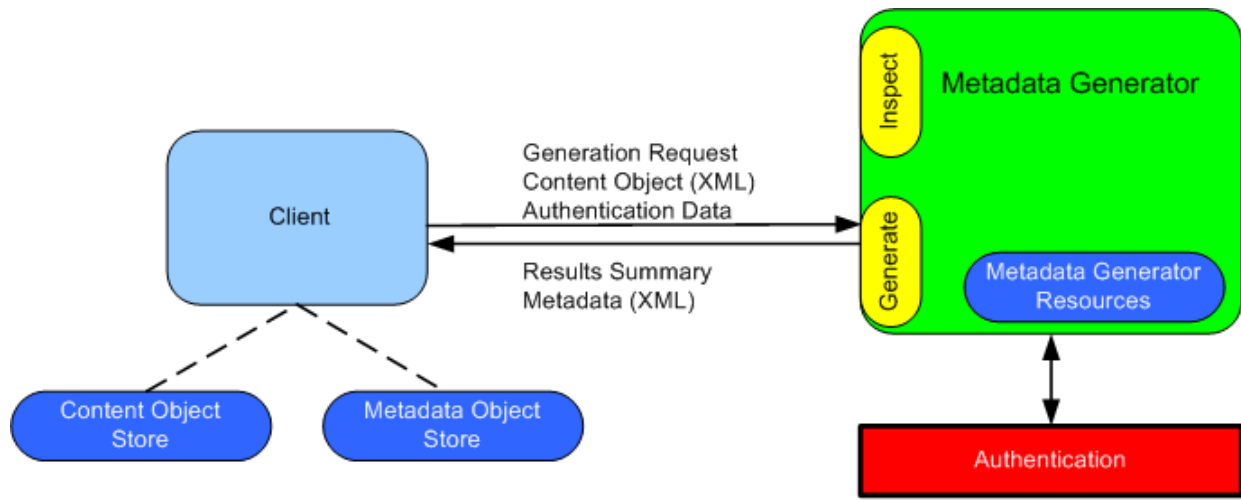
The model for a client to interact with a service implementation SHALL be defined by the service expressions that specialize the service genre.

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 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: Metadata Generator 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 design assumes that the process of generating metadata may be sufficiently different from generating other types of documents or objects (e.g., generating an assessment). Thus different service genres are defined for each different document type.

A process to generate a metadata record is not defined; the service genre only defines interfaces and observable behaviors, not internal models, algorithms or structure.

Metadata generation algorithms MAY be defined in the service expressions that specialize the service genre (resulting in many different service expressions) or they MAY be deferred to the resulting service implementation design. In the later case, the single service expression MAY act as a router to per-object service implementations.

The service genre supports only individual requests, not batch processing. The service genre may be extended to support batch requests or a separate service genre may be defined. Batch processing may take significant time; appropriate messaging is required to address delays and time outs, e.g., request-response may not be an appropriate messaging model. The overall requests and behaviors would remain the same.

The service genre assumes that the content object will be passed in the request for metadata generation. A locator for the content object could be passed instead, but such an approach would require an additional service to obtain the content object from the locator. This obtain service would also require authentication and possibly authorization data be passed. Such an approach would complicate the overall service design and workflow. Such an approach could be modeled in an alternative service genre or as an extension to the functionality of this service genre.

The service genre uses request-response messaging. This assumes that metadata generation will be sufficiently fast to support this type of interaction. An alternative, if generating the metadata requires significant time, would be to use a call-back messaging model. Additional interactions would be required, but the overall requests and behaviors would remain the same.

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:

- A service implementation MAY use internal resources to aid in metadata generation. The provisioning of these resources is not defined but MUST be considered in the implementation design.
- The service expression MAY include the specification of the communications protocol as part of its definition or it MAY layer the functions on top of another communications protocol.

Consistency:

- A service implementation MAY NOT return the same metadata record for the same request on subsequent invocations, i.e., it MAY use historic or other data to decide which metadata to return.



Performance:

- A service implementation SHALL be capable of handling simultaneous requests from different clients.
- A service expression should consider the time required to process a content object and generate a metadata record in the design of the messaging model and behavior interfaces. The resulting service implementation SHOULD consider the implication of long response times.

Communications and Messaging:

- The service genre assumes a request-response messaging model. The functionality does not require request-response messaging, and a call back or polling messaging model may be used as an alternative.
- The service expressions that specialize the service genre SHALL specify the messaging model.

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 or that may be embedded within the content object, context or metadata.

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 content object format standards.
- Service expressions SHALL specify applicable metadata format standards.
- Service expressions SHALL specify applicable metadata encoding standards.
- Service expressions SHALL specify applicable communications, encoding and transport protocol standards.
- Service expressions SHALL specify applicable context object format 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 used in the D³UI development-to-deposit prototype using *Reload* to generate ADL-R metadata for content packages.

Potential: The service genre could be used in any content management or content creation process to create metadata. A typical implementation would use a specialized service expression, selecting specific formats for generated metadata for specific types of content objects.

Potential: The service genre could be used in a service usage model for a repository federation. Metadata would be automatically generated as part of a repository or registry deposit workflow, or to augment metadata from other sources. A typical implementation would use a specialized service expression, selecting specific formats for generated metadata for specific types of content objects.



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.

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) authoring: V1.0.0.

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

Metadata generation (genre) is part of the (D³UI) content authoring service usage model (genre based) and is used within an authoring and content deposit workflow to generate ADL-R profiled LOM/SCORM metadata for ADL Content objects (SCOs, Content packages, S1000D performance support materials). The content object is deposited in a repository and the generated metadata is deposited in the ADL-R for content discovery, i.e., the content object is registered with the ADL-R.

(FRED) repository federation: V1.0.0.

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

Metadata generation (genre) is a part of the repository federation service usage model (genre based) and is used to create metadata to be added to the content in 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.

