Metadata Export from Semi-Structured Open Educational Resources

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Abstract

This project is investigating approaches to design and implementation of an open source toolkit to support creation of online collections of open educational resources. These collections may contain information in either structured or semi-structured formats. The toolkit, called EdRepo, provides support for curation, access to the collection and export of metadata using the Open Archives Initiative OAI-PMH protocol.

Background

Open educational resource (OER) collections are small digital libraries with specialized topics. It is desirable provide aggregated access to multiple OER collections of related content. The Ensemble project (www.computingportal.org) provides this service for computing education collections.

Creation and aggregation of OER collections is difficult because:

– Many incompatible systems makes indexing difficult.

– Lack of a standard system for OER collections increases time and difficulty of building a new collection.

– OER collection software not originally built for sharing information is difficult to integrate into larger collections.

EdRepo explores solutions to these issues.

Future Work

– Write more storage back-ends for increased flexibility.

– Expand the OAI-PMH metadata provider to include optional features targeted at large collections.

– Create an automated installer.

System Design

The toolkit is split into four separate components to allow flexibility and adaptability in building collections. The storage back-end is designed to be easily changed, depending on the needs of each individual collection.

System

Front-End
•The main user interface.
•Allows users to browse, search, and view collection content.
•May also allow creating and editing content (dependent on back-end capabilities).
•Enforces access restrictions and user privileges.

Data-Manager
•A lightweight abstraction layer to back-end data storage systems.
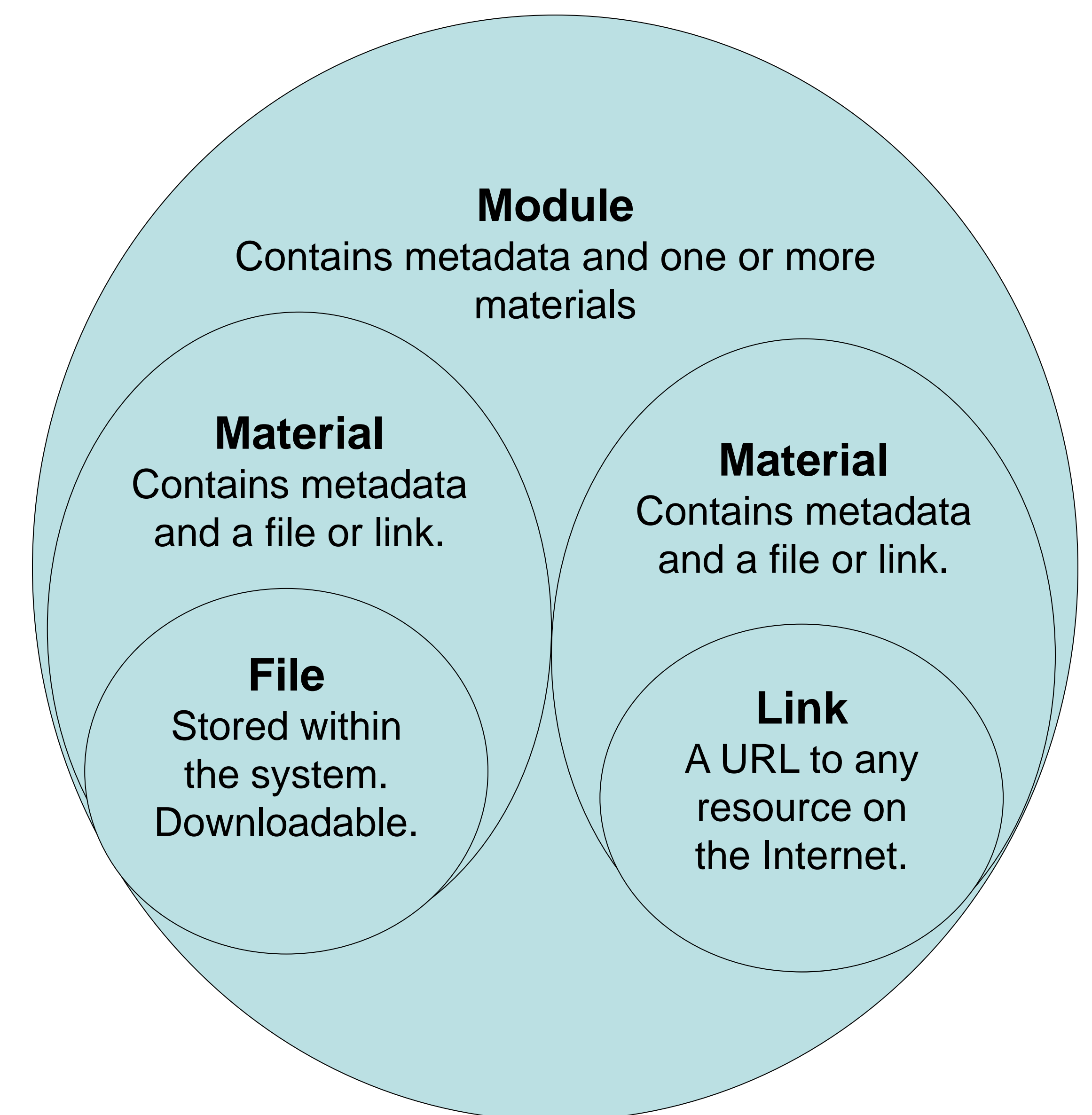•Allows easy switching between back-end storage systems.

Storage Back-End
•Handles data and metadata storage and retrieval.
•Communicates with other components via data-manager.
•Different back-ends can be used depending on the needs of the collection.
•May be simple with minimum features or more extensive in capabilities.

OAI-PMH Metadata Provider
•Exports metadata for indexing by other collections and search engines.

Collections may choose the back-end best suited for their needs without affecting other components because the back-end is abstracted by a consistent data-manager interface.

For example, a small collection might choose a lightweight, easy to use flat-file storage back-end with limited features, while a larger collection might prefer a database-based backend with more features but requiring a database server.

Regardless of the back-end used, the system retains its base feature set and metadata exporting capabilities.

Data Model

Data is organized into "modules" and "materials" to accommodate either structured or semi-structured formats. Modules are a collection of resources about a specific topic, and are made of metadata and materials. A module provides teaching resources for part of a course such as a lecture and related exercise, or a series of lectures on one topic. Users generally interact with the collection at the module level.

Module
Contains metadata and one or more materials

Material
Contains metadata and a file or link.

Material
Contains metadata and a file or link.

File
Stored within the system. Downloadable.

Link
A URL to any resource on the Internet.

Splitting resources into modules and materials provides a structure to add metadata to both clusters of materials (modules), as well as individual items (materials). Metadata elements are designed to have uniform meanings yet be general enough to accommodate the needs of many different collections.