



Fez/Fedora Support for Submission and Dissemination Services as part of the APSR RIFF Framework

Andrew Bennett, Christiaan Kortekaas, Lachlan Kuhn & Matthew Smith

Context

Whilst having objects safely and securely stored in a digital repository is a fine achievement, to make them useful they must be able to be used or “rendered”. The notion of “rendering” a document can be many things – streaming multimedia content such as an MP3 or video on demand, inclusion of images in tables or on a webpage or a visualization of a data set that has been stored inside the repository. Raftos & Yeadon (2007) ⁱ note:

“There are more kinds of storage mechanisms than long term repositories, which generally use DSpace, Fedora or EPrints. There are also file shares, CVS trees and streaming servers, to name just a few.

The process of getting an object out of its store or repository plus any associated metadata is called “dissemination”. Clearly, there is a need for a standardised object or template which any dissemination mechanism could expect to receive when requesting content from a repository.”

This project supports the APSR RIFF Framework by providing a standardised approach that any repository using Fez/Fedora may use to provide content stored therein in such a way that the APSR dissemination service can receive it and render it for the user. It does so by taking the objects themselves – the content and associated metadata and presenting them via a standard API (using XML notation) to the service.

Approach & Architectural Considerations

The approach taken in these projects was to develop services on the repository side which support the handling of marked up content and objects held in the source repository. In the context of the APSR RIFF framework, we provided these services mainly as part of the Fez/Fedora code base toolkit and implemented a number of proof-of-concept implementations of the various RIFF workflow projects. In addition to the base code for Fez/Fedora, the submission service required a number of small stand-alone modules to be written in Java in order to integrate with the ANU developed code-base.

Submission Service

For the submission service, a tool was developed by ANU developers to transform APSR METS Profile objects into “Fedora Object XML (FOXML)”. The FOXML files generated were written to map well into Fez using MODS and a Fedora specific XML datastream called “RELS_EXT” to describe the relationship between the objects. RELS-EXT is a standard and heavily used method for expressing relationships in Fedora using RDF and a triple.

The RELS-EXT datastream in each object was utilised in the OJS APSR METS objects to express the cascading hierarchical relationship between a journal, its issues, its sections, and it’s section’s articles. Each level of this hierarchy had its own FOXML object (and subsequent xml file). The “isMemberOf” predicate was used to express the journal structure, which one of the standard Fedora predicates in the Fedora RELS-EXT recommended ontology schema.

In order to correctly express the correct ordering of issues, sections and articles in the dissemination service, a “sequence” concept was implemented in Fez and expressed in the MODS metadata.

The current process for ingesting content into Fedora and Fez through the submission service is as follows:

1. The submission service extracts data from a RIFF workflow source (for example OJS) and creates a series of files for each object – in essence a series of Australian METS package files
2. The service then reads each Australian METS file and creates a corresponding FOXML file for each in a separate directory
3. The next step is to use Fedora to batch ingest all the FOXML files from that directory

4. Fez will then be able to display the unindexed Fedora objects to the admin user and allow them to select some or all to index and managed.

A submission service for OJS was the first Australian METS RIFF workflow tested and converted for Fedora use. As this is believed to be the most complex of the RIFF object submission types it will form the template for subsequent Australian METS packages.

Dissemination Service

For the dissemination service, content which is stored as objects held in a Fez/Fedora repository is mapped to marked up XML in the form of Fedora FOXML expressed as Australian METS packages (or dissemination information package – DIP) and then made available to the destination rendering service.

Similar in philosophy to the supporting services for other APSR workflow projects which generate Submission Information Packages or SIPs as described in the APSR frameworks (Raftos&Yeadon 2007, Blackall & Burton 2006)ⁱⁱ this work package fits within the APSR Dissemination Framework as a supporting service.

Though there was some development and design work carried out in the first half of the year the significant portion of coding and conceptual work for this project was carried out in a series of workshops with members of the UQ team working in conjunction with staff from ANU visiting on-site at UQ in the latter part of the year. Follow-up work and documentation was undertaken by the teams at UQ and ANU subsequent to these visits.

ANU DSpace uses Manakinⁱⁱⁱ as its dissemination engine which uses a combination of XSLT, Manakin ‘DRI’ and ‘Manifest’ xml templates. Using Manakin ANU had already created a set of dissemination styles for Open Journal System (OJS) and prototypes of styles for Open Conference System (OCS) and other RIFF APSR submission object styles as specified in the other RIFF workflow projects. In consultation with ANU, the UQ Fez team decided the most efficient outcome would be to replicate or emulate the Manakin engine in Fez to be able to directly use (or with little change) the existing and future planned Manakin styles.

The Manakin engine takes XML generated in Manakin standard ‘DRI’ and ‘Manifest’ templates and applies XSLTs and CSS to render them in dissemination. One of the most popular styles in Manakin is to use the Chameleon AJAX based CSS editor with the style. Chameleon^{iv} is an interactive theme CSS editor which came from Moodle^v. It allows a user

with administrative rights to edit the style of the dissemination directly with a live preview and save any changes directly back through the web browser. Due to its popularity, portability and ease of use it was chosen as the implementation vehicle in this Manakin emulation to Fez translation.

Outcomes

The Fez submission service is a workflow which allows the submission of packaged objects to the Fez+Fedora based repository (expressed as Australian METS Packages mapped to FOXML) and indexing them to ensure the content is managed within the repository.

The Fez dissemination service is a full working Manakin emulation that accepts APSR Submission services objects and disseminates them in the same method as would a DSpace installation.

The UQ team were able to successfully demonstrate the same functionality in submitting and disseminating content from the exemplar workflows using the FEZ/Fedora repository and as that available to a Dspace site running the submission and dissemination services developed at ANU.

Objectives

1. To enable submission of objects from OJS into a Fez+Fedora based repository via Australian METS profile objects and the RFF submission service.
2. To disseminate Australian METS Profile objects (specifically Journal objects from OJS to begin with) coming from Fez+Fedora to the user exactly as it would be from DSpace.
3. To make it as simple as possible to integrate existing and future submission packages and Manakin dissemination styles straight into Fez with little or no changes;
4. To contribute code back to ANU and Manakin and to provide feedback on how to make the process support cross-digital-repository software compatibility.

Further requirements that were met:

- Discovered and recommended ways that future and existing Manakin styles could be written in a way to make it much easier for non-Dspace repository software to use.
- Cleaned up many of the aspects of the existing OJS templates to make them more easily maintainable e.g. centralised many repeated values in a variables.
- Packaged and documented the service^{vi} in a format (through the Fez Wiki) suitable for release in the public domain (conditional on the identification of a IP license suitable for the higher education sector); and
- The software is released under the GPL license. Third party software is also included covering various licenses (details included in distribution) and is open source.
- Demonstrated a full journal including its issues, sections and articles displaying the same way in a Fez website and a DSpace website.
- Exposed this work including the code and the above demonstration to the Fedora mailing lists and the Manakin development team.
- During the RUBRIC workshop at USQ the Muradora^{vii} team were able to replicate the Fez Manakin emulation code for the Muradora repository code from the Fez Wiki documentation. This extends the APSR dissemination service across DSpace, Fez and Muradora. From seeing the benefits of the APSR Dissemination service in Muradora, they are also working on replicating the APSR Submission service in their software. This uptake and spread of the APSR Submission and Dissemination services will increase its sustainability.

Other Learning

One of the unintended but significant benefits of the way that this service was developed was a demonstration of the power and flexibility of small team development workshops which aim to deliver software in a more “agile” fashion. As a result of this focus and its associated benefits, the team was able to significantly reduce the overall risk associated with development of the code and also complete the tasks in a very short timeframe. The workshop approach maximised the availability of staff to collaborate through a process of continuous planning and feedback, and ensured that cohesion and the project deliverables were at the forefront of the teams mind throughout the development process. As a result of this iterative planning and feedback loop, the team was able to

continuously align the software with desired framework needs, easily adapting to changes in the underlying repository systems and technology platforms chosen. Rather than the more traditional “waterfall” software development project methodology, by following an agile process, at the conclusion of this project the team delivered a service that much better addresses the business and customer needs.

Conclusion

As more Manakin delivered APSR METS Profile dissemination styles are created the Fez+Fedora repository engine will be able to easily install and use them. The UQ Fez team will keep an eye on the OCS and other dissemination styles coming out of the RIFF workflow projects as they are completed and ensure that they work with the Fez version of the dissemination engine.

As demonstrated by the port to Muradora, the design and architectural philosophy of this service is such that it will be compatible with newer versions and clients running Fedora which further enhances its usefulness in a sustainable digital repository service.

As these new styles become available and are successfully demonstrated they will be exposed to the Fez, Fedora, DSpace and Manakin communities to increase the awareness of this outcome of APSR.

- ⁱ [Submission Service Report](http://www.apsr.edu.au/submission_service/submission_service_report.pdf), Peter Raftos & Scott Yeadon - ANU, November 2007
(http://www.apsr.edu.au/submission_service/submission_service_report.pdf)
- ⁱⁱ Framework Proposals Papers available from APSR – online version not currently available
- ⁱⁱⁱ MANAKIN Project - <http://di.tamu.edu/projects/xmlui/manakin/>
- ^{iv} [Chameleon Theme](http://docs.moodle.org/en/Chameleon) - <http://docs.moodle.org/en/Chameleon>
- ^v [MOODLE Project](http://moodle.org/) - <http://moodle.org/>
- ^{vi} [Manakin Emulation](http://dev-epo.library.uq.edu.au/wiki/index.php/Manakin_Themes) Documentation - http://dev-epo.library.uq.edu.au/wiki/index.php/Manakin_Themes
- ^{vii} [MURADORA](http://drama.ramp.org.au/cgi-bin/trac.cgi) Project, which is part of RAMP - <http://drama.ramp.org.au/cgi-bin/trac.cgi>