

# DCFUG Training - 1 Introduction and Feature Tour

These training archives may be out of date, but have been retained and kept available for the community's benefit in reviewing previous sessions.

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## Learning Outcomes

- Understand the purpose of a repository
- Learn what Fedora can do for you
- Understand the key capabilities of the software

## Course Outline

### Introduction to Fedora 4

#### What is a Repository?

- Secure software that stores, preserves, and provides access to digital materials
- Supports complex semantic relationships between objects both within and outside the repository
- Supports millions of objects, both large and small
- Capable of interoperating with other applications and services

#### Fedora 4 Guiding Principles

- Improved performance, enhanced vertical and horizontal scalability
- More flexible storage options
- Features to accommodate research data management
- Better capabilities for participating in the world of linked open data
- An improved platform for developers—one that is easier to work with and which will attract a larger core of developers.

#### Exposing and Connecting Content with Fedora 4

- Flexible, extensible object modelling
- Atomic objects with semantic connections using standard ontologies

- RDF-based metadata using Linked Data
- RESTful API with native RDF response format

## New Vocabulary

| Fedora 3                | Fedora 4  |
|-------------------------|-----------|
| Objects and datastreams | Resources |
| Object                  | Container |
| Datastream              | Binary    |

## Core Components

### Durable Storage

One of the core components of Fedora 4 is its long-term storage and preservation capability. A number of features support this capability; they have been grouped here under the notion of Durable Storage.

#### Fixity

- Over time, digital objects can become corrupt and unusable by suffering from bit rot and other digital preservation dangers
- Fixity checks help preserve digital objects by verifying their integrity using techniques such as checksumming
- On content ingest, Fedora can verify a user-provided checksum against the calculated value
- A checksum can be recalculated and compared at any time via a REST-API request

### Backup and Restore

- A full backup, including all binaries as well as a compact serialization of all containers, can be performed at any time
- A full restore from a repository backup can be performed at any time

### Export and Import

- A specific Fedora resource, its children resources, and associated binaries can be exported
  - The serialization of the Fedora resource is more portable than the compact form found in the backup/restore feature
  - Exported resources are serialized in a standard JCR/XML format
- An exported resource or hierarchy of resources can be imported at any time

### Versioning

- Versions can be created across the entire repository or on particular API calls.
- A previous version can be restored via the REST-API.

## Data Modelling

### Resources

- Both containers and binaries are represented as resources.
- Container nodes can have both containers and binaries as children.
- The tree structure allows for inheritance of things like security policies.

### Properties

- Resources have a number of properties, which are expressed as RDF triples.
  - The resource itself is the implicit subject of each triple.
- Properties can be RDF literals (e.g. dc:title) or they can express relationships both internal and external to the repository.
- Any number of RDF namespaces can be defined and used.

### Content Models

- Content can be modelled using RDF properties
- Properties can have either literals or URIs as their objects
- Resources can have any number of properties using any number of namespaces

### Linked Data

- Fedora 4 is compliant with the [LDP 1.0](#) spec.
- Metadata can be represented as RDF triples that point to resources outside the repository.
- Many possibilities for exposing, importing, sharing resources with other web applications.

## User Interface

### Administrative Console

Tour of the HTML administrative interface.

## External Components

### Camel

#### Indexing

- Indexing repository content for external applications can be accomplished by using the Camel component.
- The Camel component receives JMS messages on repository updates and relays these messages to one or more external applications.
- Repository content can be optionally assigned the `rdf:type` property "Indexable" in order to be filtered from non-indexable content (any predicate will do)

#### Triplestore

- An external triplestore can be used to index the RDF triples of content managed by Fedora.
- Any triplestore that supports SPARQL-update can be used; Fuseki and Sesame have been tested.

#### External Search

- An external search application can be used to perform more complex search queries on repository content.
- Any search application that supports JSON-based updates can be used; Solr has been tested.

### Authorization

- Authentication (not to be confused with authorization) is assumed to take place in a layer above the application.
- The authorization framework provides a plug-in point within the repository that calls out to an optional authorization enforcement module.
- Currently, two authorization implementations exist.

#### Role-based Authorization

- Basic authorization compares the user's role(s) with an Access Control List (ACL) defined on a Fedora resource.
- ACLs can be inherited; if a given resource does not have an associated ACL, Fedora will examine parent resources until it finds one.

#### XACML Authorization

- XACML policies can provide much more complex and granular authorization.
- A default policy must be defined for the repository, and each resource can override the default with another policy.
- A XACML policy referenced by a resource will also apply to all the resource's children, unless they define their own XACML policies that override the parent policy.

### Audit Service

- Maintains a history of events for each repository resource
- Both internal repository events and events from exterior sources can be recorded
- Uses the existing event system, Camel component, and external triplestore

### OAI Provider

- Implements Open Archives Protocol Version 2.0 using Fedora 4 as the backend.
- Exposes an endpoint which accepts OAI conforming HTTP requests.
- Supports `oai_dc` out of the box, but users are able to add their own metadata format definitions to `oai.xml`.

## Performance

### Transactions

- Multiple actions can be bundled together into a single repository event (transaction).
- Transactions offer performance benefits by cutting down on the number of times data is written to the repository filesystem (which tends to be the slowest action).

### Clustering

- Two or more Fedora instances can be configured to work together in a cluster.
- Fedora 4 currently supports clustering for high-availability use cases.

- A load balancer can be setup in front of two or more Fedora instances to evenly distribute read requests across each instance.
- If one Fedora instance in the cluster goes down, read requests can be directed to the other instance.
- Ingests are replicated across all instances in the cluster.