Basic eLearning ToolSet (BELTS)

Using BELTS with Downstream Clients

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Basic eLearning ToolSet (BELTS): Using BELTS with Downstream Clients

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Chapter 1. Introduction to BELTS

1.1. About BELTS

The Basic E-Learning Tool Set (BELTS) has been developed by The Le@rning Federation (TLF) [http://www.thelearningfederation.edu.au] to demonstrate the distribution, management and use of online curriculum content and to aid investigation of requirements for e-learning environments by Australian and New Zealand school jurisdictions.

BELTS currently provides a limited set of tools, including:

- A content repository;
- Basic activity creation, using lessons;
- Basic group management, using classes;
- Content to curriculum outcomes matching (the curriculum organiser);
- Downloading of content from The Le@rning Federation's Exchange repository of online curriculum content;
- Content replication from one BELTS to another, and
- System administration.

Note

BELTS has currently not been developed as a fully featured learning management system. BELTS is, however, an open source project that can be further developed. The Le@rning Federation encourages Australian and New Zealand education jurisdictions, and others, to consider options for collaborating and contributing to the evolution of BELTS. For more information about the project and how you can participate visit the BELTS project web site [http://belts.sourceforge.net]

1.2. About The Le@rning Federation

The Le@rning Federation [http://www.thelearningfederation.edu.au], is an initiative delivered on behalf of the Australian Education Systems Officials Committee (AESOC) by a joint venture of education.au limited [http://www.educationau.edu.au] and Curriculum Corporation [http://www.curriculum.edu.au]

In January 2001, as part of the Backing Australia's Ability: Innovation Action Plan [http://backingaus.innovation.gov.au] the Prime Minister announced funding of $34.1 million over 5 years to support the Initiative to:

- Develop a body of high-quality curriculum content, suitable to each State and Territory;
- Develop a framework which supports distributed access;
- In the long term, use the framework and content to stimulate further contribution to the pool of material.

In July 2001, all Australian States and Territories agreed to match the Commonwealth funds. Following this, New Zealand joined in the Initiative.

1.3. Who is This Guide For?

This guide is aimed at external developers who wish to include BELTS content in their own repositories or distribution systems.

1.4. Comments and Feedback

If you have any comments, corrections or feedback on this guide please feel free to contact the BELTS developers using the mailing lists at the BELTS SourceForge Site [http://belts.sourceforge.net].

Chapter 2. Accessing the Provider

2.1. Provider URL

The URL of the upstream provider is the URL of your BELTS system, with `/provide` appended as well as additional parameters depending on the required function.

2.2. Provider Authentication

Before you can request anything of the provider, you will need to authenticate yourself. The provider uses BASIC HTTP authentication for this process.

Note

A username and password must be configured and provided from the upstream BELTS before you will be able to access the system. You may need to contact your upstream provider for this information or refer to the setup instructions in the BELTS setup guide at the BELTS SourceForge site [http://belts.sourceforge.net/].

The mechanism for providing username and password fields varies depending on the language you are writing your application in. For Java, you write code similar to the following to supply your username and password to the Provider:

```
String username="my-username";
String password="my-password";

Authenticator.setDefault (new BasicAuthenticator(username, password));
```

In this listing, `BasicAuthenticator` is a Java class that provides the username and password when requested. It is written as follows:

```
import java.net.Authenticator;
import java.net.PasswordAuthentication;

public class BasicAuthenticator extends Authenticator
{
    String _username;
    String _password;

    public BasicAuthenticator(String username, String password)
    {
        _username = username;
        _password = password;
    }

    protected PasswordAuthentication getPasswordAuthentication()
    {
        return new PasswordAuthentication(_username, _password.toCharArray());
    }
}
```

Chapter 3. Listing Content

3.1. Listing Content

Content is listed by specifying the command `changed` on the URL sent to the BELTS server, with a `since` parameter specifying the cut-off date for the search, as shown in the following URL:

```
http://localhost:8080/provide/changed?since=2006-03-01
```

The result of this command will be an XML document of MIME-type `application/xml`, similar to the following:

```
<?xml version="1.0" encoding="UTF-8"?>
<content:contents xmlns:content="http://www.thelearningfederation.edu.au/ns
    <content:page-size>2846</content:page-size>
    <content:start-page>0</content:start-page>
    <content:num-results>2846</content:num-results>
    <content:total-results>2846</content:total-results>
    <content:content exist:id="1" exist:source="exchange:L2055:1.0">
        ...
    </content:content
    <content:removed-content>
        ...
    </content:removed-content>
</content:contents>
```

The following table describes the elements returned in the above output

Element Name	Contents
content:page-size	The number of content items returned with each page of results. For content listings through the provider interface, there is only one page returned so this has the same value as the `<content:total-results>` element.
content:start-page	The first page (0-indexed) of results returned. For content listings through the provider interface, there is only one page returned so this is always zero.
content:num-results	The number of content items returned with this page of results. For content listings through the provider interface, there is only one page returned so this has the same value as the `<content:total-results>` element.
content:total-results	The total number of content items in the search results.
content:content	The full details of an individual content item. There is one of these for each published item in the search results.
content:removed-content	The basic details of a content item that is no longer published in the repository.

Table 3.1. Content List Elements

3.2. Content Details

The individual content items are described in the `content:content` element using a range of descriptive fields. For example, the following listing is the output for one content item:

```
<content:content xmlns:cmap="http://lex.thelearningfederation.edu.au/cmap/2003/06/" xml
  <content:source>exchange</content:source>
  <content:id>L2055</content:id>
  <content:version>1.0</content:version>
  <content:local>true</content:local>
  <content:published>true</content:published>
  <content:last-modified>1145848547718</content:last-modified>
  <content:size>85132</content:size>
  <content:searchable>
      ...
  </content:searchable>
  <content:metadata>
    <imsmd:lom>
        ...
    </imsmd:lom>
  </content:metadata>
  <content:outcomes>
    <cmap:curriculum-description>
        ...
    </cmap:curriculum-description>
  </content:outcomes>
</content:content>
```

The following table describes the elements returned in the above output

Element Name	**Contents**
content:source	The source repository for this object. This is an identifier specified by the upstram BELTS server and serves to distinguish content that comes from different external repositories.
content:id	The identifier of the content. This is the identifier used by the external repository for this content item.
content:version	The version of this object.
content:local	Whether this object is stored locally on the BELTS server. For downstream clients, the value of this field will alway be `true`.
content:published	Whether this object is published on the BELTS server. For downstream clients, the value of this field will alway be `true`.
content:last-modified	The timestamp when this object was last modified. This is a long value indicating the number of milliseconds since January 1, 1970.
content:size	The size (in bytes) of the downloadable content file for this object.
content:searchable	The searchable data for this object. This information is used internally by BELTS but may be used by the downstream client for their own purposes.
content:metadata	The IMS and TLF metadata associated with this learning object. The content of this element is taken directly from the learning object. For further information on the content of this element, please refer to the Metadata Application Profile specification in the TLF Documents section at http://www.thelearningfederation.edu.au.
content:outcomes	This element describes how the content item assists in

Element Name	Contents
	reaching the outcomes described by the Curriculum Organiser for the BELTS site. The Curriculum Organiser is described in more detail in the BELTS documentation at the BELTS SourceForge site [http://belts.sourceforge.net/].

Table 3.2. Content Elements

3.2.1. Searchable Content Details

The `content:searchable` element contains a number of fields that are used by BELTS during content searches. These fields are taken from the various metadata elements and provide a summary of the information known about the object in a format suitable for searching. The following is an example of the elements contained within the `content:searchable` element:

```
<content:searchable>
  <content:title>Arrays: word problems with products from 30 to 50</content:title>
  <content:tlf>learning-object</content:tlf>
  <content:description>Read a number problem and think about how to solve it. For exa
  <content:keyword>Calculations</content:keyword>
  <content:aggregation-level>2</content:aggregation-level>
  <content:type>educational</content:type>
  <content:topic>Arrays</content:topic>
  <content:topic>Division</content:topic>
  <content:topic>Factors</content:topic>
  <content:topic>Multiples</content:topic>
  <content:topic>Multiplication</content:topic>
  <content:topic>Remainders</content:topic>
  <content:learning-area>Mathematics</content:learning-area>
  <content:strand>Mathematics\Number</content:strand>
  <content:contentconcept>Mathematics\Arithmetic</content:contentconcept>
  <content:contentconcept>Mathematics\Division</content:contentconcept>
  <content:contentconcept>Mathematics\Factors</content:contentconcept>
  <content:contentconcept>Mathematics\Guess-Check-Improve</content:contentconcept>
  <content:contentconcept>Mathematics\Multiples</content:contentconcept>
  <content:contentconcept>Mathematics\Multiplication</content:contentconcept>
  <content:year-level>4</content:year-level>
  <content:year-level>5</content:year-level>
  <content:keylearningobjective>Students apply knowledge of factors of numbers to sol
  <content:keylearningobjective>Students apply the commutative property of multiplica
  <content:educationalvalue>Students develop and consolidate knowledge of basic numbe
  <content:educationalvalue>Students interpret word problems to construct equations.<
  <content:educationalvalue>Provides opportunities to consider the relationship betwe
  <content:educationalvalue>Automated array construction provides a visual model to s
  <content:outcome>6</content:outcome>
  <content:outcome>7</content:outcome>
  <content:outcome>8</content:outcome>
  <content:quicksearch>arrays: word problems with products from 30 to 50
      read a number problem and think about how to solve it. for example, when 38 is
      calculations
      students develop and consolidate knowledge of basic number facts that underlie
      students interpret word problems to construct equations.
      provides opportunities to consider the relationship between multiplication and
      automated array construction provides a visual model to support understanding o
      arrays
      division
      factors
      multiples
      multiplication
      remainders
      students apply knowledge of factors of numbers to solve problems with products
      students apply the commutative property of multiplication.</content:quicksearch>
```

```
  </content:searchable>
```

The following table describes the elements returned in the above output

Element Name	Contents
content:title	The title of this content item
content:tlf	The TLF designation of this content item, either `learning object` or `resource`
content:description	The description of this content item
content:keyword	The set of keywords used to describe this content item
content:aggregaton-level	The number of content items that are aggregated to make up this content item
content:type	The type of this content item
content:topic	The set of topics covered by this content item
content:learning-area	The set of learning areas covered by this content item
content:strand	The set of strands covered by this content item
content:contentconcept	The concept/context entries associated with this content item
content:year-level	The set of year levels covered by this content item
content:keylearningobjective	The set of key learning objectives covered by this content item
content:educationalvalue	The set of education values covered by this content item
content:outcome	The set of outcomes that this content item could be useful for
content:quicksearch	The text searched through when a quick search is performed on this content item

Table 3.3. Searchable Elements

3.3. Removed Content Details

Content items that exist on the upstream BELTS server and are not published, or have been removed from the upstream BELTS server are described in the `content:removed-content` element using the basic set of fields required to identify the object. This allows the downstream client to remove those objects. The following listing is the output for one removed content item:

```
<content:removed-content>
    <content:source>exchange</content:source>
    <content:id>L1458</content:id>
    <content:version>1.0</content:version>
</content:removed-content>
```

The following table describes the elements returned in the above output

Element Name	Contents
content:source	The source repository for this object. This is an identifier specified by the upstram BELTS server and serves to distinguish content that comes from different external repositories.

Element Name	Contents
content:id	The identifier of the content. This is the identifier used by the external repository for this content item.
content:version	The version of this object.

Table 3.4. Content Elements

Chapter 4. Downloading Content

4.1. Downloading Content

Content is downloaded by specifying the command `fetch` on the URL sent to the BELTS server, with details of the item's source, id and version, followed by the filename for the file to be downloaded.

The result of this command will be a ZIP file containing the learning object from the BELTS upstream server. The format of the URL for downloading is as follows:

```
http://localhost:8080/provide/fetch/{source}/{id}/{version}/{filename}
```

The following table describes the fields required in the URL.

Field Name	Content
{source}	The source repository for the learning object, taken from the `<content:source>` element.
{id}	The id of the learning object, taken from the `<content:id>` element.
{version}	The version of the learning object, taken from the `<content:version>` element.
{filename}	The filename for the downloaded file.

Table 4.1. File Download URL Fields

The following is a URL that could be used to download the content from the previous example:

```
http://localhost:8080/provide/fetch/exchange/L2055/1.0/content.zip
```

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