Advanced Customisation: Scripting EPrints

EPrints Training Course

Part 2: Scripting Techniques

Roadmap

- ✓ Core API
  - ✓ manipulating your data
  - ✓ accessing data collections
  - ✓ searching your data
- ◣ Scripting techniques
  - ↔↘ essentials – putting it all together
  - ↕↘ writing export plugins
  - ⇠↘ writing screen plugins
  - ⇢↘ writing command-line tools
  - ↑↘ writing CGI scripts

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Scripting Techniques: Essentials

Putting it all together

- Two essential objects
- Session
  - connects to the repository
  - many useful methods
- Repository
  - provides access to
    - **datasets**
    - `session->get_repository->get_dataset("archive")`
    - configuration settings
- Explore using `perldoc`

Scripting for the Web

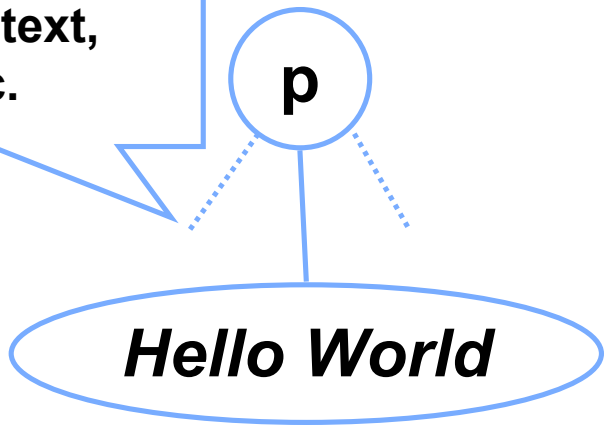
- API provides lots of methods to help you build Web pages and display (render) data
  - these methods return (X)HTML
    - but not strings!
  - XML DOM objects
    - DocumentFragment, Element, TextNode...
- Build pages from these nodes
  - `node1->appendChild(node2)`
  - why? it's easier to manipulate a tree than to manipulate a large string

XML DOM vs. Strings

```
p = make_element("p")
text = make_text(
"Hello World" )
p->appendChild(text)
```

```
p = "<p>"
p += "Hello World"
p += "</p>"
```

Can manipulate tree to add extra text, elements etc.



** Hello World **

Difficult to make changes to the string – would need to find the right position first

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Render Methods: Session

- Session provides many useful Web page building blocks
- `make_doc_fragment()`
  - create an empty XHTML document
  - fill it with things!
- `make_text(text)`
  - create an XML TextNode
- `make_element(name, attrs)`
  - create an XHTML Element

```
make_element("p", align => "right")
<p align=”right” />
```

Render Methods: Session (2)

- `render_link(uri, target)`
  - create an XHTML link

```
link = session->
   render_link("http://www.eprints.org")
text = session->make_text("EPrints")
link->appendChild(text)
```

```
<a href="http://www.eprints.org">
EPrints</a>
```

Render Methods: Session (3)

- `html_phrase(phraseid, inserts)`
  - render an XHTML phrase in the current language
  - looks up `phraseid` from the phrases files
  - inserts can be used to add extra information to the phrase
    - must be a corresponding `<epc:pin>` in the phrase
    - `<epp:phrase>Number of results: <epc:pin name="count"/></epp:phrase>`

Render Methods: Session (4)

- Many methods for building input forms, including:
  - `render_form(method, dest)`
  - `render_option_list(params)`
  - `render_hidden_field(name, value)`
  - `render_upload_field(name)`
  - `render_action_buttons(buttons)`
  - `...`

Rendering Methods: Data Objects

- `render_citation(style)`
- `render_citation_link(style)`
  - create an XHTML citation for the object
  - if style is set then use the named citation style
- `render_value(fieldname)`
  - get an XHTML fragment containing the rendered version of the value of the named field
  - in the current language

Rendering Methods: MetaFields

- `render_name(session)`
- `render_help(session)`
  - get an XHTML fragment containing the name/description of the field in the current language

Rendering Methods: Searches

- `render_description()`
  - get some XHTML describing the search parameters
- `render_search_form(help)`
  - render an input form for the search
  - if help is true then this also renders the help for each search field in current language

Getting User Input (CGI parameters)

- Session object also provides useful methods for getting user input
  - e.g. from an input form
- `have_parameters`
  - true if parameters (POST or GET) are available
- `param(name)`
  - get the value of a named parameter

Scripting Techniques: Writing Export Plugins

Plugin Framework

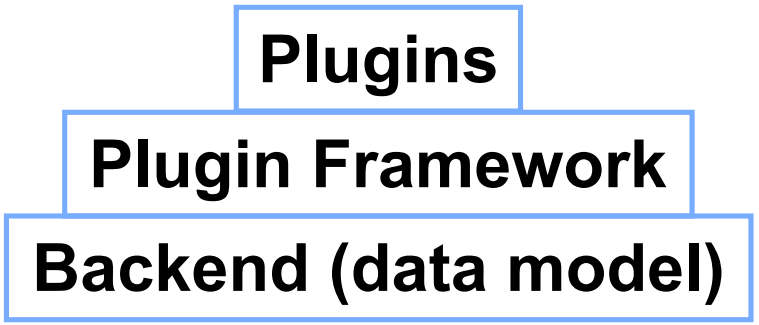
- EPrints provides a framework for plugins
  - registration of plugin capabilities
  - standard interface which plugins need to implement
- Several types of plugin interface provided
  - import and export
    - get data in and out of the repository
  - interface screens
    - add new tools and reports to UI
  - input components
    - add new ways for users to enter data

Plugin Framework (2)

- Not just a plugin framework for 3rd party extensions!
- Used extensively by EPrints itself
  - majority of (dynamic) Web pages you see are screen plugins
    - search, deposit workflow, editorial review, item control page, user profile, saved searches, adminstration tools...
  - all import/export options implemented as plugins
  - all input components in deposit workflow are plugins
    - subject browser input, file upload...

Plugin Framework (3)

- EPrints is really a generic plugin framework
  - with a set of plugins that implement the functions of a repository
- Gives plugin developers many examples to work from
  - find a plugin that does something similar to what you want to achieve and explore how it works



Writing Export Plugins

- Typically a standalone Perl module in
  - `perl_lib/EPrints/Plugin/Export/`
- Writing export plugins
  - ↔↘ register plugin
  - ↕↘ define how to convert data objects to an output/interchange format

Export Plugin: Registration

- Register
  - `name`
    - the name of the plugin
  - `visible`
    - who can use it
  - `accept`
    - what the plugin can convert
      - lists of data objects or single data objects (or both)
      - type of record (eprint, user...)
  - `suffix` and `mimetype`
    - file extension and MIME type of format plugin converts to

Registration Example: BibTeX

```
$self->{name} = "BibTeX";
$self->{accept} = [ 'list/eprint',
   'dataobj/eprint' ];
$self->{visible} = "all";
$self->{suffix} = ".bib";
$self->{mimetype} = "text/plain";
```

- Converts lists or single EPrint objects
- Available to all users
- Produces plain text file with .bib extension

Registration Example: FOAF

```
$self->{name} = "FOAF Export";
$self->{accept} = [ 'dataobj/user' ];
$self->{visible} = "all";
$self->{suffix} = ".rdf";
$self->{mimetype} = "text/xml";
```

- Converts single User objects
- Available to all users
- Produces XML file with .rdf extension

Registration Example: XML

```
$self->{name} = "EP3 XML";
$self->{accept} = [ 'list/*', 'dataobj/*' ];
$self->{visible} = "all";
$self->{suffix} = ".xml";
$self->{mimetype} = "text/xml";
```

- Converts any data object
- Available to all users
- Produces XML file with .xml extension

Export Plugin: Conversion

- For a straight conversion plugin, this usually includes:
  - ↔↘ mapping data objects to output/interchange format
  - ↕↘ serialising the output/interchange format
  - e.g. EndNote conversion section:

```
$data->{K} = $dataobj->get_value( "keywords" );
$data->{T} = $dataobj->get_value( "title" );
$data->{U} = $dataobj->get_url;
```

Export Plugin: Conversion (2)

- But export plugins aren't limited to straight conversions!
- Explore:
  - Google Maps export plugin
    - plot location data on map
    - `http://files.eprints.org/224/`
  - Timeline export plugin
    - plot date data on timeline
    - `http://files.eprints.org/225/`

Export Plugin: Template

- Register
  - subclass `EPrints::Plugin::Export`
    - inherits all the mechanics so you don't have to worry about them
    - could subclass existing plugin e.g. XML, Feed
  - define name, accept, visible etc.
    - in constructor `new()` of plugin module
- Conversion
  - define `output_dataobj` function
    - will be called by plugin subsystem for every data object that needs to be converted

Writing Import Plugins

- Typically a standalone Perl module in
  - `perl_lib/EPrints/Plugin/Import/`
- Reading input can be harder than writing output
  - need to detect and handle errors in input
  - many existing libraries available for parsing a wide variety of file formats
- Writing import plugins
  1. register
  - ↕↘ define how to convert input/interchange format into data objects
    - reverse of export

Scripting Techniques: Writing Screen Plugins

Plugins: Writing Screen Plugins

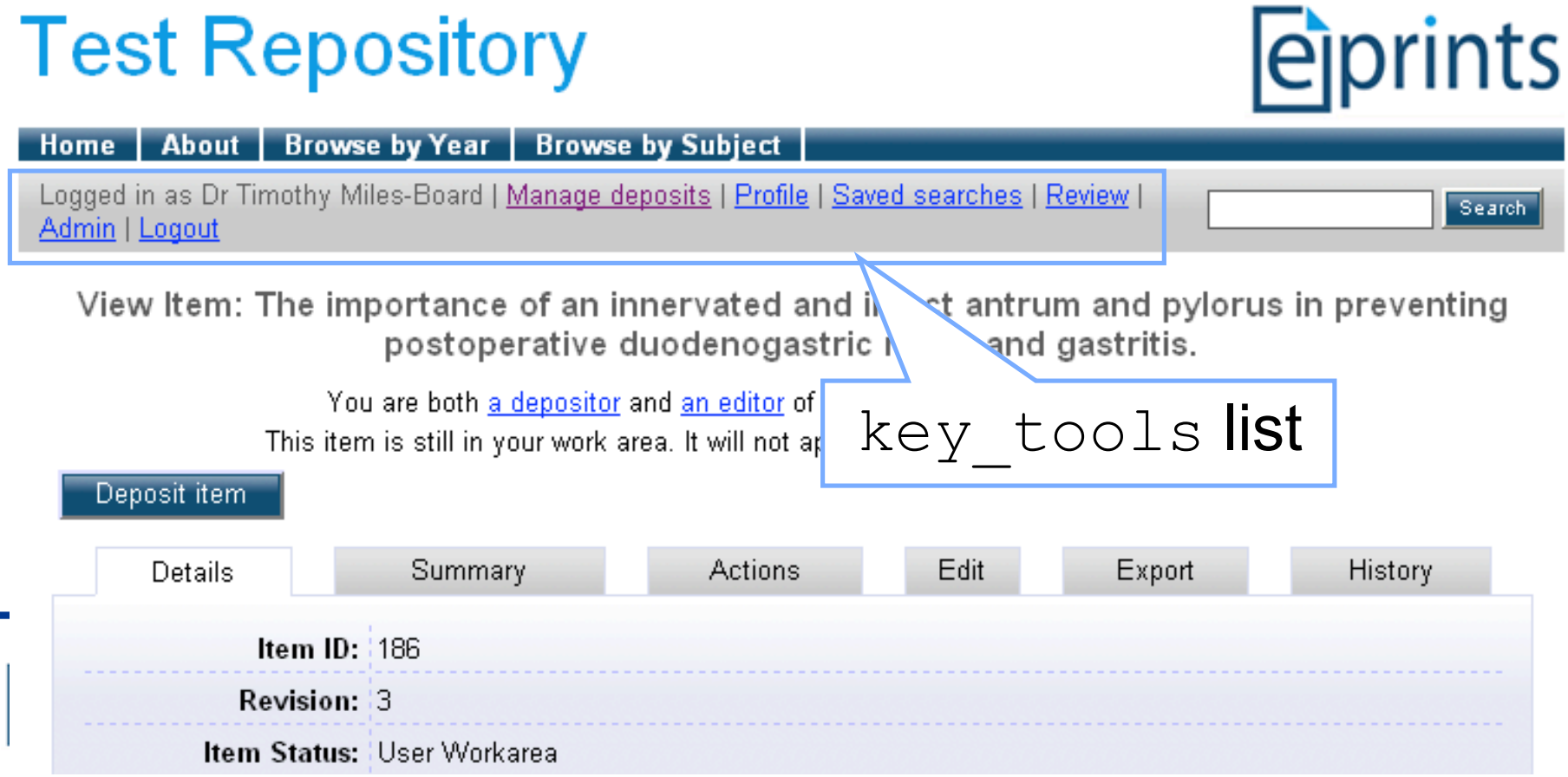
- One or more Perl modules in
  - `perl_lib/EPrints/Plugin/Screen/`
  - may be bundled with phrases, config files, stylesheets etc.
- Writing screen plugins
  - ↔↘ register
    - where it appears in UI
    - who can use it
  - ↕↘ define functionality

Screen Plugin: Registration

- Register
  - `actions`
    - the actions the plugin can carry out (if any)
  - `appears`
    - where abouts in the interface the plugin and/or actions will appear
      - named list
      - position in list
    - will be displayed as link, button or tab

Registration Example: Manage Deposits

```
$self->{appears} = [
  { place => "key_tools", position => 100, }
];
```



Registration Example: EPrint Details

```
$self->{appears} = [
  { place => "eprint_view_tabs", position => 100, },
];
```

Test Repository

eprints

Home | About | Browse by Year | Browse by Sub

Logged in as Dr Timothy Miles-Board | Manage deposits |
Admin | Logout

View Item: The importance of an innerva
postoperative duode

You are both a depositor and an editor of this it epositor screen.
This item is still in your work area. It will not appear in the y until you deposit it.

Deposit item

Details | Summary | Actions | Edit | Export | History

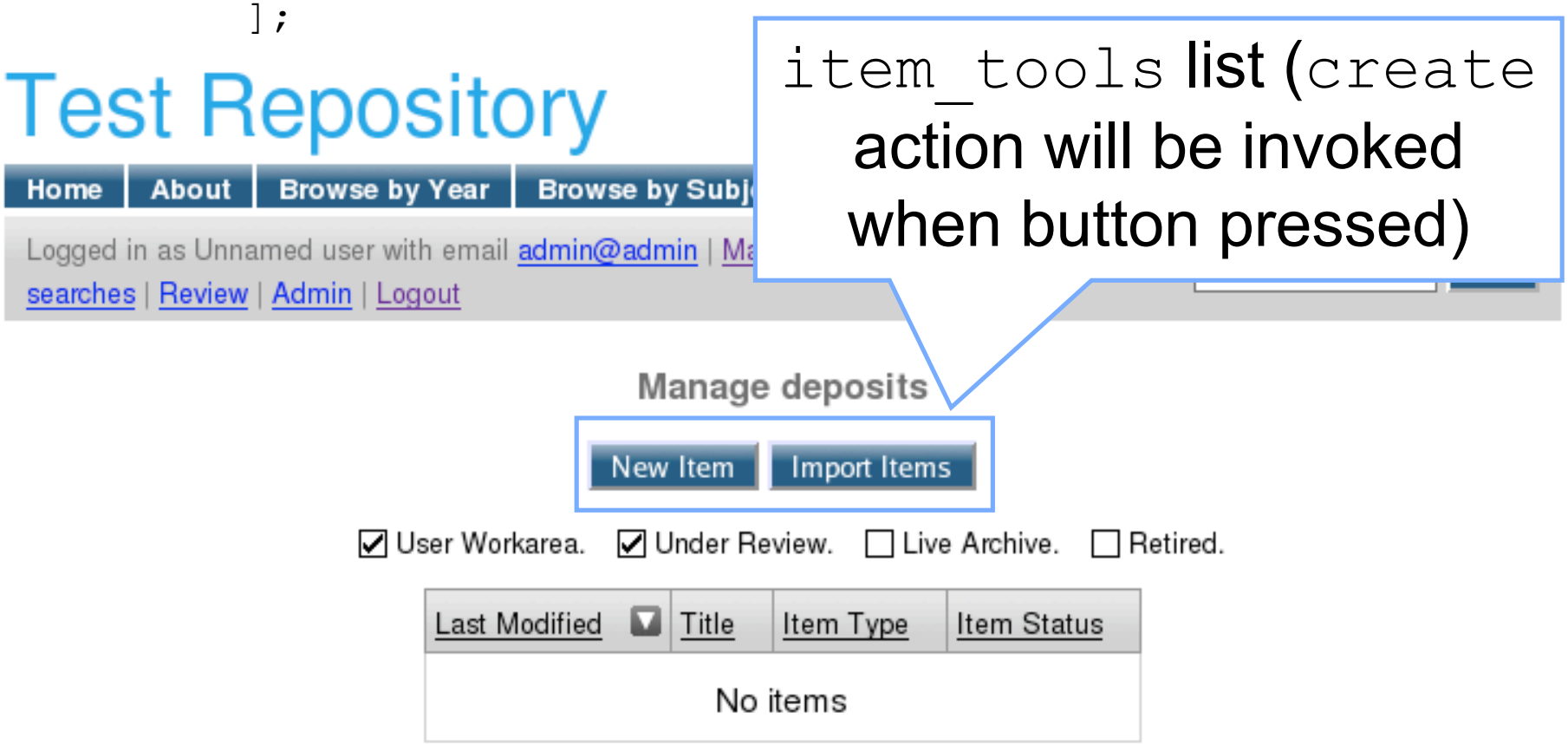
Item ID:	186
Revision:	3
Item Status:	User Workarea

`eprint_view_tabs` list (each tab is a single screen plugin)

Registration Example: New Item

```
$self->{appears} = [
  { place => "item_tools", position => 100,
    action => "create", },
];
```

`item_tools` list (`create` action will be invoked when button pressed)



Screen Plugin: Define Functionality

- 3 types of screen plugin
- Render only
  - define how to produce output display
  - examples: *Admin::Status*, *EPrint::Details*
- Action only (no output display)
  - define how to carry out action(s)
  - examples: *Admin::IndexerControl, EPrint::Move, EPrint::NewVersion*
- Combined (interactive)
  - define how to produce output/carry out action(s)
  - examples: *EPrint::RejectWithEmail, EPrint::Edit, User::Edit*

Screen Plugins: Displaying Messages

- Action plugins produce no output display but can still display messages to user
  - `add_message(type, message)`
  - register a message that will be displayed to the user on the next screen they see
    - type can be
      - error
      - warning
      - message (informational)

Screen Plugin Template: Render Only

- Register
  - subclass `EPrints::Plugin::Screen`
    - inherits all the mechanics so you don't have to worry about them
    - could subclass existing plugin e.g. EPrint, User
  - define where plugin `appears`
    - in constructor `new()` of plugin module
  - define who can view plugin (if required)
    - `can_be_viewed` function
      - e.g. check user privileges
- Define functionality
  - define `render` function
    - produce output display using API `render_` methods

Screen Plugin Template: Action Only

- Register
  - subclass `EPrints::Plugin::Screen`
  - define `actions` supported
  - define where actions `appear`
  - define who can use actions
    - `allow_ACTION` function(s)
- Define functionality
  - define `action_ACTION` function(s)
    - carry out the action
    - use `add_message` to show result/error
    - redirect to a different screen when done

Screen Plugin Template: Combined

- `render` function usually displays links/buttons which invoke the plugin's actions
  - e.g. EPrint::Remove
  - registers remove and cancel actions
  - `render` function displays *Are you sure?* screen
    - OK/Cancel buttons invoke `remove`/`cancel` actions

Scripting Techniques: Writing Command Line Scripts

Command Line Scripts

- Usually stored in `bin` directory
- Add batch/offline processes to your repository
  - e.g. duplicate detection – compare each record to every other record
  - e.g. file integrity - check stored MD5 sums against actual MD5 sums

Connecting to the Repository

- Command line scripts (and CGI scripts) must explicitly connect to the repository by creating a new Session object
  - `new(mode, repositoryid)`
    - set mode to 1 for command line scripts
    - set mode to 0 for CGI scripts
- And disconnect from the repository when complete
  - `terminate()`
    - performs necessary cleanup

Using Render Functions

- XHTML is good for building Web pages
  - but not so good for command line output!
    - often no string equivalent
  - use `tree_to_utf8()`
  - extracts a string from the result of any rendering method
  - `tree_to_utf8(`
    `eprint->render_citation)`

Search and Modify Template

- Common pattern for command line tools
  - Connect to repository
  - Get desired dataset
  - Search dataset
  - Apply function to matching results
    - modify result
    - commit changes
  - Disconnect from repository

Example: lift_embargos

- Removes access restrictions on documents with expired embargos
  - Connect to repository
  - Get `document` dataset
  - Search dataset
    - embargo date field earlier than today's date
  - Apply function to matching results
    - remove access restriction
    - clear embargo date
    - commit changes
  - Disconnect from repository

Scripting Techniques: Writing CGI Scripts

CGI Scripts

- Usually stored in `cgi` directory
- Largely superceded by screen plugins but can still be used to add e.g. custom reports to your repository
- Similar template to command-line scripts but build Web page output using API `render_` methods

Building Pages

- In Screen plugins, mechanics of sending Web pages to the user's browser are handled by the plugin subsystem
  - need to do this yourself with CGI scripts
  - methods provided by the Session object
- `build_page(title, body)`
  - wraps your XHTML document in the archive template
- `send_page()`
  - flatten page and send it to the user

Summary

- ✓ Use the core API to manipulate data in the API
  - ✓ individual data objects
    - ✓ EPrint, Document, User
  - ✓ sets of data objects
    - ✓ DataSet, List, Search
- ✓ Wrap this in a plugin or script
  - ✓ Session, Repository
  - ✓ Web output using render_ methods
  - ✓ templates

⇒ Next: **hands-on** exercises designed to get you started with these techniques