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Dublin Core Properties

A dublin core property allows us to use properties from dublin core by simply defining a property as DCProperty.

```python
>>> from zope.dublincore import property
>>> from zope.interface import implementer
>>> from zope.annotation.interfaces import IAttributeAnnotatable
>>> @implementer(IAttributeAnnotatable)
... class DC(object):
...     title = property.DCProperty('title')
...     author = property.DCProperty('creators')
...     authors = property.DCListProperty('creators')

>>> obj = DC()

>>> obj.title = u'My title'
>>> print(obj.title)
My title

Let's see if the title is really stored in dublin core:

```python

```python
>>> from zope.dublincore.interfaces import IZopeDublinCore

>>> print(IZopeDublinCore(obj).title)
My title

Even if a dublin core property is a list property we can set and get the property as scalar type:

```python

```python

```python

DCListProperty acts on the list:

```python

```python
Dublin Core metadata as content data

Sometimes we want to include data in content objects which mirrors one or more Dublin Core fields. In these cases, we want the Dublin Core structures to use the data in the content object rather than keeping a separate value in the annotations typically used. What fields we want to do this with can vary, however, and we may not want the Dublin Core APIs to constrain our choices of field names for our content objects.

To deal with this, we can use specialized adapter implementations tailored to specific content objects. To make this a bit easier, there is a factory for such adapters.

Let’s take a look at the simplest case of this to start with. We have some content object with a `title` attribute that should mirror the Dublin Core `title` field:

```python
>>> @implementer(IAttributeAnnotatable)
... class Content(object):
...     title = u''
...     description = u''
```

To avoid having a discrepancy between the `title` attribute of our content object and the equivalent Dublin Core field, we can provide a specific adapter for our object:

```python
>>> from zope.dublincore import annotatableadapter

>>> factory = annotatableadapter.partialAnnotatableAdapterFactory(['title'])
```

This creates an adapter factory that maps the Dublin Core `title` field to the `title` attribute on instances of our `Content` class. Multiple mappings may be specified by naming the additional fields in the sequence passed to `partialAnnotatableAdapterFactory()`. (We’ll see later how to use different attribute names for Dublin Core fields.)

Let’s see what happens when we use the adapter.

When using the adapter to retrieve a field set to use the content object, the value stored on the content object is used:

```python
>>> content = Content()
>>> adapter = factory(content)

>>> print(adapter.title)

>>> content.title = u'New Title'
>>> print(adapter.title)
New Title
```

If we set the relevant Dublin Core field using the adapter, the content object is updated:

```python
>>> adapter.title = u'Adapted Title'
>>> print(content.title)
Adapted Title
```
Dublin Core fields which are not specifically mapped to the content object do not affect the content object:

```python
>>> adapter.description = u"Some long description."
>>> print(content.description)
>>> print(adapter.description)
Some long description.
```

### Using arbitrary field names

We’ve seen the simple approach, allowing a Dublin Core field to be stored on the content object using an attribute of the same name as the DC field. However, we may want to use a different name for some reason. The `partialAnnotatableAdapterFactory()` supports this as well.

If we call `partialAnnotatableAdapterFactory()` with a mapping instead of a sequence, the mapping is used to map Dublin Core field names to attribute names on the content object.

Let’s look at an example where we want the `abstract` attribute on the content object to be used for the `description` Dublin Core field:

```python
>>> @implementer(IAttributeAnnotatable)
...     class Content(object):
...         abstract = u"
```

We can create the adapter factory by passing a mapping to `partialAnnotatableAdapterFactory()`:

```python
>>> factory = annotatableadapter.partialAnnotatableAdapterFactory(
...     {"description": "abstract"})
```

We can check the effects of the adapter as before:

```python
>>> content = Content()
>>> adapter = factory(content)

>>> print(adapter.description)
```

```python
>>> content.abstract = u"What it's about."
>>> print(adapter.description)
What it's about.
```

Limitations

The current implementation has a number of limitations to be aware of; hopefully these can be removed in the future.

- Only simple string properties, like `title`, are supported. This is largely because other field types have not been given sufficient thought. Attempting to use this for other fields will cause a `ValueError` to be raised by `partialAnnotatableAdapterFactory()`.
- The CMF-like APIs are not supported in the generated adapters. It is not clear that these APIs are used, but content object implementations should be aware of this limitation.
Time annotators

Time annotators store the creation resp. last modification time of an object. We will use a simple `Content` class as our example.

```python
>>> class Content(object):
...     created = None
...     modified = None
```

The annotations are stored on the `IZopeDublinCore` adapter. This dummy adapter reads and writes from/to the context object.

```python
>>> from zope.component import provideAdapter
>>> from zope.dublincore.interfaces import IZopeDublinCore
>>> class DummyDublinCore(object):
...     def __init__(self, context):
...         self.__dict__['context'] = context
...     def __getattr__(self, name):
...         return getattr(self.context, name)
...     def __setattr__(self, name, value):
...         setattr(self.context, name, value)

>>> provideAdapter(DummyDublinCore, (Content,), IZopeDublinCore)
```

Created annotator

The created annotator sets creation and modification time to current time.

```python
>>> content = Content()
It is registered for the `ObjectCreatedEvent`:
```

```python
>>> from zope.dublincore import timeannotators
>>> timeannotators._NOW = 'NOW'
>>> from zope.component import provideHandler
>>> from zope.dublincore.timeannotators import CreatedAnnotator
>>> from zope.lifecycleevent.interfaces import IObjectCreatedEvent
>>> provideHandler(CreatedAnnotator, (IObjectCreatedEvent,))
```

Both `created` and `modified` get set:

```python
>>> content.created
'NOW'
```

```python
>>> content.modified
'NOW'
```

The created annotator can also be registered for (object, event):

```python
>>> from zope.component import subscribers
>>> provideHandler(CreatedAnnotator, (None, IObjectCreatedEvent,))
```
Both `created` and `modified` get set this way, too:

```python
clicked = Content()
>>> ignored = subscribers((clicked, ObjectCreatedEvent(clicked)), None)
clicked.created
'NOW'
clicked.modified
'NOW'
```

## Modified annotator

The modified annotator only sets the modification time to current time.

```python
clicked = Content()
```

It is registered for the `ObjectModifiedEvent`:

```python
>>> from zope.dublincore.timeannotators import ModifiedAnnotator
>>> from zope.lifecycleevent.interfaces import IObjectModifiedEvent
>>> provideHandler(ModifiedAnnotator, (IObjectModifiedEvent,))
>>> from zope.lifecycleevent import ObjectModifiedEvent
>>> notify(ObjectModifiedEvent(clicked))
```

Only `modified` gets set:

```python
>>> print(clicked.created)
None
>>> print(clicked.modified)
'NOW'
```

The modified annotator can also be registered for (object, event):

```python
>>> provideHandler(ModifiedAnnotator, (None, IObjectModifiedEvent,))
>>> content = Content()
>>> ignored = subscribers((content, ObjectModifiedEvent(content)), None)
```

`modified` gets set, this way, too:

```python
>>> print(content.created)
None
>>> print(content.modified)
'NOW'
```
Dublin Core interfaces

```
interface zope.dublincore.interfaces.IDublinCoreElementItem
    A qualified dublin core element

    value
        Value
        The element value

    qualification
        Qualification
        The element qualification
```

```
interface zope.dublincore.interfaces.IGeneralDublinCore
    Dublin-core data access interface

    The Dublin Core, http://dublincore.org/, is a meta data standard that specifies a set of standard data elements. It provides flexibility of interpretation of these elements by providing for element qualifiers that specialize the meaning of specific elements. For example, a date element might have a qualifier, like “creation” to indicate that the date is a creation date. In addition, any element may be repeated. For some elements, like subject, and contributor, this is obviously necessary, but for other elements, like title and description, allowing repetitions is not very useful and adds complexity.

    This interface provides methods for retrieving data in full generality, to be compliant with the Dublin Core standard. Other interfaces will provide more convenient access methods tailored to specific element usage patterns.

    getQualifiedCreators()
        Return a sequence of Creator IDublinCoreElementItem.

    getQualifiedSources()
        Return a sequence of Source IDublinCoreElementItem.

    getQualifiedRights()
        Return a sequence of Rights IDublinCoreElementItem.
```
getQualifiedSubjects()  
Return a sequence of Subject IDublinCoreElementItem.

getQualifiedRelations()  
Return a sequence of Relation IDublinCoreElementItem.

getQualifiedLanguages()  
Return a sequence of Language IDublinCoreElementItem.

getQualifiedTitles()  
Return a sequence of Title IDublinCoreElementItem.

getQualifiedContributors()  
Return a sequence of Contributor IDublinCoreElementItem.

getQualifiedIdentifiers()  
Return a sequence of Identifier IDublinCoreElementItem.

getQualifiedDescriptions()  
Return a sequence of Description IDublinCoreElementItem.

getQualifiedTypes()  
Return a sequence of Type IDublinCoreElementItem.

getQualifiedFormats()  
Return a sequence of Format IDublinCoreElementItem.

getQualifiedDates()  
Return a sequence of Date IDublinCoreElementItem.

getQualifiedCoverages()  
Return a sequence of Coverage IDublinCoreElementItem.

getQualifiedPublishers()  
Return a sequence of Publisher IDublinCoreElementItem.

interface zope.dublincore.interfaces.IWritableGeneralDublinCore  
Provide write access to dublin core data

This interface augments IStandardDublinCore with methods for writing elements.

setQualifiedPublishers(qualified_publishers)  
Set the qualified Publishers elements.

The argument must be a sequence of Publisher IDublinCoreElementItem.

setQualifiedTypes(qualified_types)  
Set the qualified Types elements.

The argument must be a sequence of Type IDublinCoreElementItem.

setQualifiedLanguages(qualified_languages)  
Set the qualified Languages elements.

The argument must be a sequence of Language IDublinCoreElementItem.

setQualifiedContributors(qualified_contributors)  
Set the qualified Contributors elements.

The argument must be a sequence of Contributor IDublinCoreElementItem.

setQualifiedCreators(qualified_creators)  
Set the qualified Creator elements.

The argument must be a sequence of Creator IDublinCoreElementItem.
setQualifiedRelations (qualified_relations)
Set the qualified Relations elements.

The argument must be a sequence of Relation IDublinCoreElementItem.

setQualifiedCoverages (qualified_coverages)
Set the qualified Coverages elements.

The argument must be a sequence of Coverage IDublinCoreElementItem.

setQualifiedSources (qualified_sources)
Set the qualified Sources elements.

The argument must be a sequence of Source IDublinCoreElementItem.

setQualifiedFormats (qualified_formats)
Set the qualified Formats elements.

The argument must be a sequence of Format IDublinCoreElementItem.

setQualifiedSubjects (qualified_subjects)
Set the qualified Subjects elements.

The argument must be a sequence of Subject IDublinCoreElementItem.

setQualifiedIdentifiers (qualified_identifiers)
Set the qualified Identifiers elements.

The argument must be a sequence of Identifier IDublinCoreElementItem.

setQualifiedDates (qualified_dates)
Set the qualified Dates elements.

The argument must be a sequence of Date IDublinCoreElementItem.

setQualifiedTitles (qualified_titles)
Set the qualified Title elements.

The argument must be a sequence of IDublinCoreElementItem.

setQualifiedDescriptions (qualified_descriptions)
Set the qualified Descriptions elements.

The argument must be a sequence of Description IDublinCoreElementItem.

setQualifiedRights (qualified_rights)
Set the qualified Rights elements.

The argument must be a sequence of Rights IDublinCoreElementItem.

interface zope.dublincore.interfaces.IDCDescriptiveProperties
Basic descriptive meta-data properties

description
Description

The first unqualified Dublin Core ‘Description’ element value.

title
Title

The first unqualified Dublin Core ‘Title’ element value.

interface zope.dublincore.interfaces.IDCTimes
Time properties
modified
Modification Date
The date and time that the object was last modified in a meaningful way.

created
Creation Date
The date and time that an object is created. This is normally set automatically.

interface zope.dublincore.interfaces.IDCPublishing
Publishing properties

expires
Expiration Date
The date and time that the object should become unpublished.

effective
Effective Date
The date and time that an object should be published.

interface zope.dublincore.interfaces.IDCEXtended
Extended properties
This is a mixed bag of properties we want but that we probably haven’t quite figured out yet.

publisher
Publisher
The first unqualified Dublin Core ‘Publisher’ element value.

contributors
Contributors
The unqualified Dublin Core ‘Contributor’ element values

subjects
Subjects
The unqualified Dublin Core ‘Subject’ element values

creators
Creators
The unqualified Dublin Core ‘Creator’ element values

interface zope.dublincore.interfaces.ICMFDublinCore
This interface duplicates the CMF dublin core interface.

Publisher()
Dublin Core element - resource publisher
Return full formal name of the entity or person responsible for publishing the resource.
The first unqualified Dublin Core Publisher element value is returned as a unicode string if an unqualified
element is defined, otherwise, an empty unicode string is returned.

Identifier()
Return the URL of the resource.
This value is computed. It is included in the output of qualifiedIdentifiers with the qualification ‘url’.
Description()
    Return the resource description
    Return a natural language description of this object.
    The first unqualified Dublin Core Description element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

Contributors()
    Return the resource contributors
    Return any additional collaborators.
    The unqualified Dublin Core Contributor element values are returned as a sequence of unicode strings.

Creator()
    Return the resource creators.
    Return the full name(s) of the author(s) of the content object.
    The unqualified Dublin Core Creator element values are returned as a sequence of unicode strings.

Title()
    Return the resource title.
    The first unqualified Dublin Core Title element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

Rights()
    Return the resource rights.
    Return a string describing the intellectual property status, if any, of the resource. for the resource.
    The first unqualified Dublin Core Rights element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

EffectiveDate()
    Return the effective date
    The value of the first Dublin Core Date element qualified by ‘effective’ is returned as a unicode string if a qualified element is defined, otherwise, an empty unicode string is returned. The string is formatted ‘YYYY-MM-DD H24:MN:SS TZ’.

ModificationDate()
    Date resource last modified.
    The value of the first Dublin Core Date element qualified by ‘modification’ is returned as a unicode string if a qualified element is defined, otherwise, an empty unicode string is returned. The string is formatted ‘YYYY-MM-DD H24:MN:SS TZ’.

Language()
    Return the resource language.
    Return the RFC language code (e.g., ‘en-US’, ‘pt-BR’) for the resource.
    The first unqualified Dublin Core Language element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

ExpirationDate()
    Date resource expires.
    The value of the first Dublin Core Date element qualified by ‘expiration’ is returned as a unicode string if a qualified element is defined, otherwise, an empty unicode string is returned. The string is formatted ‘YYYY-MM-DD H24:MN:SS TZ’.
Date ()
Return the default date

The first unqualified Dublin Core Date element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned. The string is formatted ‘YYYY-MM-DD H24:MN:SS TZ’.

Format ()
Return the resource format.

Return the resource’s MIME type (e.g., ‘text/html’, ‘image/png’, etc.).

The first unqualified Dublin Core Format element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

CreationDate ()
Return the creation date.

The value of the first Dublin Core Date element qualified by ‘creation’ is returned as a unicode string if a qualified element is defined, otherwise, an empty unicode string is returned. The string is formatted ‘YYYY-MM-DD H24:MN:SS TZ’.

Type ()
Return the resource type

Return a human-readable type name for the resource.

The first unqualified Dublin Core Type element value is returned as a unicode string if an unqualified element is defined, otherwise, an empty unicode string is returned.

Subject ()
Return the resource subjects.

The unqualified Dublin Core Subject element values are returned as a sequence of unicode strings.

interface zope.dublincore.interfaces.IZopeDublinCore
Extends: zope.dublincore.interfaces.IGeneralDublinCore, zope.dublincore.interfaces.ICMFDublinCore, zope.dublincore.interfaces.IDCDescriptiveProperties, zope.dublincore.interfaces.IDCTimes, zope.dublincore.interfaces.IDCPublishing, zope.dublincore.interfaces.IDCExtended

Zope Dublin Core properties

interface zope.dublincore.interfaces.IWriteZopeDublinCore
Extends: zope.dublincore.interfaces.IZopeDublinCore, zope.dublincore.interfaces.IWritableGeneralDublinCore

Zope Dublin Core properties with generate update support
CHAPTER 3

Hacking on zope.dublincore

Getting the Code

The main repository for zope.dublincore is in the Zope Foundation Github repository:

https://github.com/zopefoundation/zope.dublincore

You can get a read-only checkout from there:

$ git clone https://github.com/zopefoundation/zope.dublincore.git

or fork it and get a writeable checkout of your fork:

$ git clone git@github.com/jrandom/zope.dublincore.git

The project also mirrors the trunk from the Github repository as a Bazaar branch on Launchpad:

https://code.launchpad.net/zope.dublincore

You can branch the trunk from there using Bazaar:

$ bzr branch lp:zope.dublincore

Working in a virtualenv

Installing

If you use the virtualenv package to create lightweight Python development environments, you can run the tests using nothing more than the python binary in a virtualenv. First, create a scratch environment:

$ /path/to/virtualenv --no-site-packages /tmp/hack-zope.dublincore

Next, get this package registered as a “development egg” in the environment:
Running the tests

Run the tests using the build-in setuptools testrunner:

```
$ /tmp/hack-zope.dublincore/bin/python setup.py test
running test
........
Ran 80 tests in 0.000s
OK
```

If you have the nose package installed in the virtualenv, you can use its testrunner too:

```
$ /tmp/hack-zope.dublincore/bin/easy_install nose ...
$ /tmp/hack-zope.dublincore/bin/nosetests
........
Ran 80 tests in 0.000s
OK
```

If you have the coverage package installed in the virtualenv, you can see how well the tests cover the code:

```
$ /tmp/hack-zope.dublincore/bin/easy_install nose coverage ...
$ /tmp/hack-zope.dublincore/bin/nosetests --with coverage
running nosetests

<table>
<thead>
<tr>
<th>Name</th>
<th>Stmts</th>
<th>Miss</th>
<th>Cover</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>zope/dublincore.py</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/annotatableadapter.py</td>
<td>73</td>
<td>73</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/browser.py</td>
<td>0</td>
<td>0</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/browsermetadataedit.py</td>
<td>21</td>
<td>21</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/creatorannotator.py</td>
<td>24</td>
<td>24</td>
<td>100%</td>
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<tr>
<td>zope/dublincore/dcsv.py</td>
<td>92</td>
<td>92</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/dcterms.py</td>
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<td>65</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/interfaces.py</td>
<td>72</td>
<td>72</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/property.py</td>
<td>66</td>
<td>66</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/timeannotators.py</td>
<td>27</td>
<td>27</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/xmlmetadata.py</td>
<td>173</td>
<td>173</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>zope/dublincore/zopedublincore.py</td>
<td>198</td>
<td>!98</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL                          |  811  |  811 | 100%  |         |
Ran 86 tests in 0.000s
OK
```
Building the documentation

zope.dublincore uses the nifty Sphinx documentation system for building its docs. Using the same virtualenv you set up to run the tests, you can build the docs:

```
$ /tmp/hack-zope.dublincore/bin/easy_install Sphinx
...  
$ bin/sphinx-build -b html -d docs/_build/doctrees docs docs/_build/html
...  
built succeeded.
```

You can also test the code snippets in the documentation:

```
$ bin/sphinx-build -b doctest -d docs/_build/doctrees docs docs/_build/doctest
...  
Doctest summary
============
  73 tests
  0 failures in tests
  0 failures in setup code
built succeeded.
Testing of doctests in the sources finished, look at the \results in _build/doctest/output.txt.
```

Using zc.buildout

Setting up the buildout

zope.dublincore ships with its own buildout.cfg file and bootstrap.py for setting up a development buildout:

```
$ /path/to/python2.6 bootstrap.py
...  
Generated script './bin/buildout'
$ bin/buildout
Develop: '/home/jrandom/projects/Zope/BTK/dublincore/.'
...  
Generated script './bin/sphinx-quickstart'.
Generated script './bin/sphinx-build'.
```

Running the tests

Run the tests:

```
$ bin/test --all
Running zope.testing.testrunner.layer.UnitTests tests:
  Set up zope.testing.testrunner.layer.UnitTests in 0.000 seconds.
  Ran 400 tests with 0 failures and 0 errors in 0.366 seconds.
Tearing down left over layers:
  Tear down zope.testing.testrunner.layer.UnitTests in 0.000 seconds.
```
Using `tox`

**Running Tests on Multiple Python Versions**

`tox` is a Python-based test automation tool designed to run tests against multiple Python versions. It creates a virtualenv for each configured version, installs the current package and configured dependencies into each virtualenv, and then runs the configured commands.

`zope.dublincore` configures the following tox environments via its tox.ini file:

- The py26, py27, py33, py34, and pypy environments builds a virtualenv with pypy, installs zope.dublincore and dependencies, and runs the tests via python setup.py test -q.
- The coverage environment builds a virtualenv with python2.6, installs zope.dublincore, installs nose and coverage, and runs nosetests with statement coverage.
- The docs environment builds a virtualenv with python2.6, installs zope.dublincore, installs Sphinx and dependencies, and then builds the docs and exercises the doctest snippets.

This example requires that you have a working python2.6 on your path, as well as installing tox:

```bash
$ tox -e py26
GLOB sdist-make: .../zope.interface/setup.py
py26 sdist-reinst: .../zope.interface/.tox/dist/zope.interface-4.0.2dev.zip
py26 runtests: commands[0]
.........
Ran 400 tests in 0.152s
OK

 Py26 summary

 Py26: commands succeeded
 congratulations :)```

Running `tox` with no arguments runs all the configured environments, including building the docs and testing their snippets:

```bash
$ tox
GLOB sdist-make: .../zope.interface/setup.py
py26 sdist-reinst: .../zope.interface/.tox/dist/zope.interface-4.0.2dev.zip
py26 runtests: commands[0]
...
Doctest summary
==============
73 tests
  0 failures in tests
  0 failures in setup code
  0 failures in cleanup code
build succeeded.

 Py26 summary

 Py26: commands succeeded
 py27: commands succeeded
 py32: commands succeeded
 pypy: commands succeeded
 coverage: commands succeeded
 docs: commands succeeded
 congratulations :)```

18 Chapter 3. Hacking on zope.dublincore
Contributing to zope.dublincore

Submitting a Bug Report

zope.dublincore tracks its bugs on Github:

https://github.com/zopefoundation/zope.dublincore/issues

Please submit bug reports and feature requests there.

Sharing Your Changes

Note: Please ensure that all tests are passing before you submit your code. If possible, your submission should include new tests for new features or bug fixes, although it is possible that you may have tested your new code by updating existing tests.

If have made a change you would like to share, the best route is to fork the Github repository, check out your fork, make your changes on a branch in your fork, and push it. You can then submit a pull request from your branch:

https://github.com/zopefoundation/zope.dublincore/pulls

If you branched the code from Launchpad using Bazaar, you have another option: you can “push” your branch to Launchpad:

$ bzr push lp:~jrandom/zope.dublincore/cool_feature

After pushing your branch, you can link it to a bug report on Launchpad, or request that the maintainers merge your branch using the Launchpad “merge request” feature.
CHAPTER 4

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