Drupal 8, where did the code go? From info hook to plugin

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Here's What's In the Talk

- Background and "What's a plugin?"
- Example of a core info hook conversion
- Simple but common plugin example: adding new tabs (a.k.a. local tasks)
- Configurable plugins (ConfigEntity based)
  - Adding a custom block
  - Adding a custom text filter
- Considerations for defining your own plugins

Who Am I?

- Drupal 5, 6, 7, 8 core contributor
- Drupal Security Team
- Acquia Engineering
- Helped create some Drupal 8 plugins including SearchPlugin, MenuLinks, LocalTasks, LocalActions, ContextualLinks
- DrupalCamp NJ organizer

Photo by amazeelabs, by-nc-sa

https://www.drupal.org/u/pwolanin

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Drupal 8 Background

I'll assume you know something about:

- The DIC/container/service container
  - The container is an object that contains instances of stateless "services" (the current request, the current user, URL generator, etc)
- The new routing system - names instead of paths.
  - a route name is just a machine name connected to a path and callbacks to provide, title, content, access etc. - like a D7 menu router
- Namespaced classes (PHP 5.3+) like `\Drupal\search\Plugin\Block\SearchBlock`

Plugins

- Encapsulate some re-useable functionality inside a class that implements one or more specific interfaces
- Plugins combine what in Drupal 7 was an info hook and a number of implementation hooks and possibly configuration: e.g. `hook_search_info()` and `hook_search_execute()`, etc., or `hook_block_info()` and `hook_block_view()`, `_configure()`, `_save()`
- Evolved from ctools and views plugins, but have quite different mechanisms to discover them

Plugin Manager and IDs

- Every plugin type has a manager - registered as a service (available from the container) and used to find and instantiate the desired plugin instance(s)
- Each plugin has an ID, which may be in its definition, or generated as a derivative
- For a given plugin ID one single class will be used for all plugin instances using that plugin ID
- A plugin instance is specified by the combination of plugin ID and its configuration values, potentially coming from a ConfigEntity

“The Drop is always moving”

drupal.org/node/65922

http://flickr.com/photos/alkalinezoo/32265389/

7.x: hook_image_toolkits()

```
/**
 * Implements hook_image_toolkits().
 */
function system_image_toolkits() {
  include_once DRUPAL_ROOT . '/' . drupal_get_path('module',
'system') . '/' . 'image.gd.inc';
  return array(
    'gd' => array(
      'title' => t('GD2 image manipulation toolkit'),
      'available' => function_exists('image_gd_check_settings') &&
         image_gd_check_settings(),
    ),
  );
}
```

8.x: GD Image Toolkit Plugin

```
/**
 * Defines the GD2 toolkit for image manipulation within Drupal.
 *
 * @ImageToolkit(
 *   id = "gd",
 *   title = @Translation("GD2 image manipulation toolkit")
 * )
 */
class GDToolkit extends ImageToolkitBase {
  //... more methods ..//

  public static function isAvailable() {
    // GD2 support is available.
    return function_exists('imagegd2');
  }

  //... more methods ..//
}
```

8.x: ImageToolkitManager

```
class ImageToolkitManager extends DefaultPluginManager {
  // ... various methods ... //

  /**
   * Gets a list of available toolkits.
   */
  public function getAvailableToolkits() {
    // Use plugin system to get list of available toolkits.
    $toolkits = $this->getDefinitions();

    $output = array();
    foreach ($toolkits as $id => $definition) {
      if (call_user_func($definition['class'] . '::isAvailable')) {
        $output[$id] = $definition;
      }
    }
    return $output;
  }
}
```

7.x: image_desaturate() Function

```
/**
 * Converts an image to grayscale.
 *
 * @param $image
 *   An image object returned by image_load().
 *
 * @return
 *   TRUE on success, FALSE on failure.
 *
 * @see image_load()
 * @see image_gd_desaturate()
 */
function image_desaturate(stdClass $image) {
  return image_toolkit_invoke('desaturate', $image);
}
```

8.x: Image::desaturate() via Plugin

```php
/**
 * Defines an image object to represent an image file.
 *
 * @see \Drupal\Core\ImageToolkit\ImageToolkitInterface
 * @see \Drupal\image\ImageEffectInterface
 */
class Image implements ImageInterface {
  //... more methods ..//

  public function apply($operation, array $arguments = array()) {
    return $this->getToolkit()->apply($operation, $arguments);
  }

  public function desaturate() {
    return $this->apply('desaturate', array());
  }

  //... more methods ..//
}
```

7.x: Operation by Function Prefix

```php
/**
 * Convert an image resource to grayscale.
 *
 * Note that transparent GIFs loose transparency when desaturated.
 *
 * @param $image
 *   An image object. The $image->resource value will be modified.
 * @return
 *   TRUE or FALSE, based on success.
 *
 * @see image_desaturate()
 */
function image_gd_desaturate(stdClass $image) {
  // PHP using non-bundled GD does not have imagefilter.
  if (!function_exists('imagefilter')) {
    watchdog('image', 'The image could not be desaturated.');
    return FALSE;
  }
  return imagefilter($image->resource, IMG_FILTER_GRAYSCALE);
}
```

8.x: Operations Are Also Plugins

```php
/**
 * Defines GD2 Desaturate operation.
 *
 * @ImageToolkitOperation(
 *   id = "gd_desaturate",
 *   toolkit = "gd",
 *   operation = "desaturate",
 *   label = @Translation("Desaturate"),
 * )
 */
class Desaturate extends GDImageToolkitOperationBase {

  protected function execute(array $arguments) {
    // PHP using non-bundled GD does not have imagefilter.
    if (!function_exists('imagefilter')) {
      $this->logger->notice("The image could not be desaturated");
      return FALSE;
    }
    return imagefilter($this->getToolkit()->getResource(),
                       IMG_FILTER_GRAYSCALE);
  }
}
```

What About Hooks?

http://flickr.com/photos/avelino_maestas/2532426169/

Hooks Still Have Their Place

- Most plugin managers invoke an `_alter` hook so the modules can add to or alter the plugins' definitions
- For example, `hook_block_alter()` allows you to alter the block plugin definitions
- Info hooks that simply return a data array, without associated code and logic, were not candidates to become plugins (but may have become YAML)
- Others like `hook_cron()` or `hook_entity_access()` are still present

Plugin Discovery

- The discovery of plugins is basically the same as invoking an info hook (and, in fact, it can even be implemented that way)
- Discovery gives you an array of plugin definitions, each of which is just an array of keys and values
- The discovery process fills in defaults, such a `'provider'` which is the name of the module providing the plugin
- Discovery can make derivatives (many from one) like `FieldUiLocalTask` - one tab per bundle

Plugin Discovery & Config in Core

- YAML based:

  MenuLink, LocalTask, LocalAction, ContextualLink

- Annotation, some config, but no config entity:

  ImageToolkit, Archiver

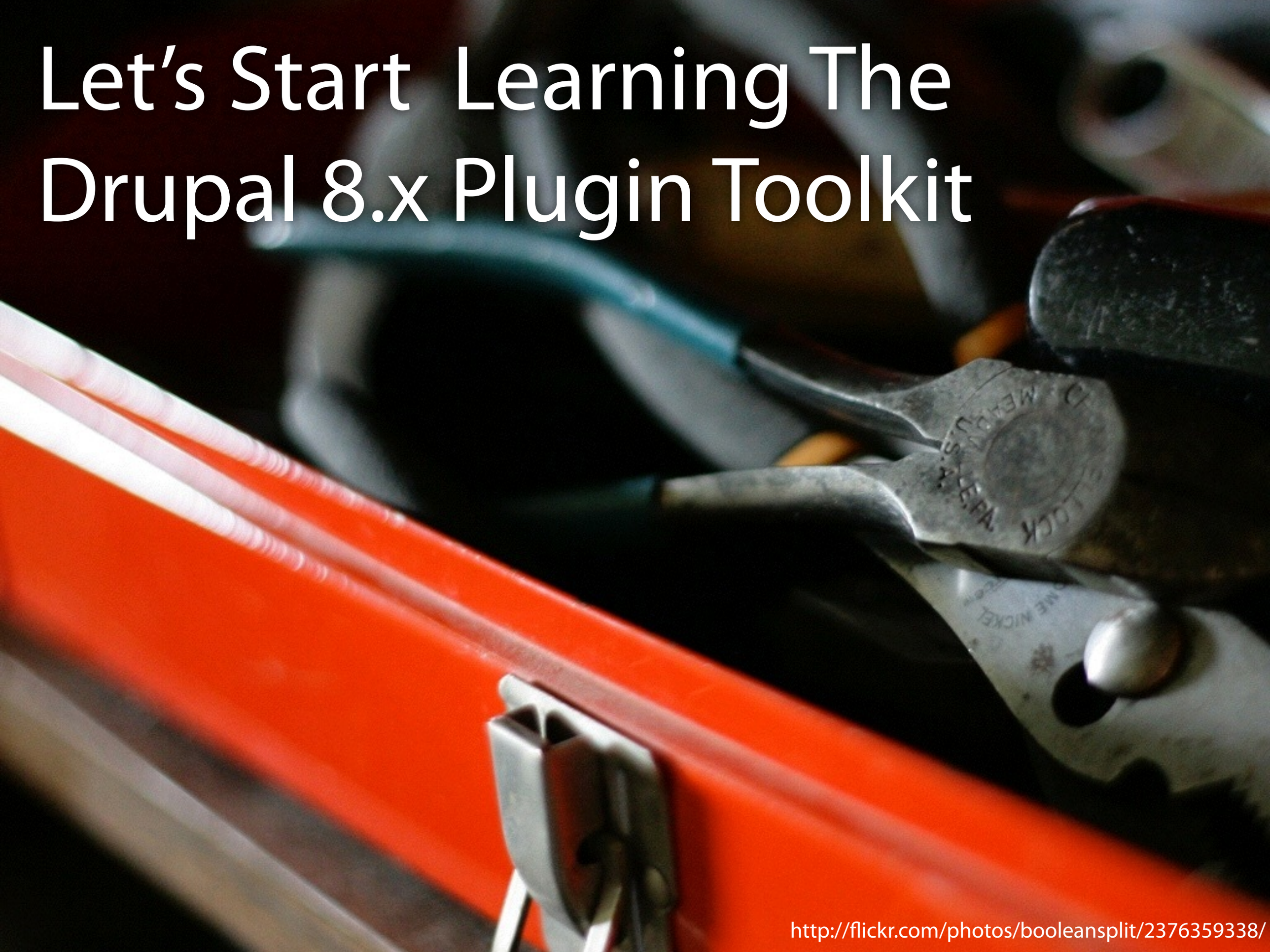
- Annotation and config entity (many) including:

  Block, ViewsDisplay, ImageEffect, SearchPlugin

- Not a pure Plugin but uses Annotation discovery:

  Entity (Node, User, etc.)

Let's Start Learning The Drupal 8.x Plugin Toolkit



http://flickr.com/photos/booleansplit/2376359338/

Pre-requisite: a Drupal 8 Module

- As in Drupal 7, code is provided by modules - so you need a module. You need a .info.yml file - like a .info file for Drupal 7
- You no longer need even an empty .module file
- The only remaining code in .module files are a few hook implementations: most code lives in classes

modules/mymodule/mymodule.info.yml

```
name: 'My test module'
type: module
description: 'DrupalCon demo.'
core: 8.x
```

Adding Two Tabs:

For most uses, just add a YAML file listing your tabs:

mymodule/mymodule.links.tasks.yml

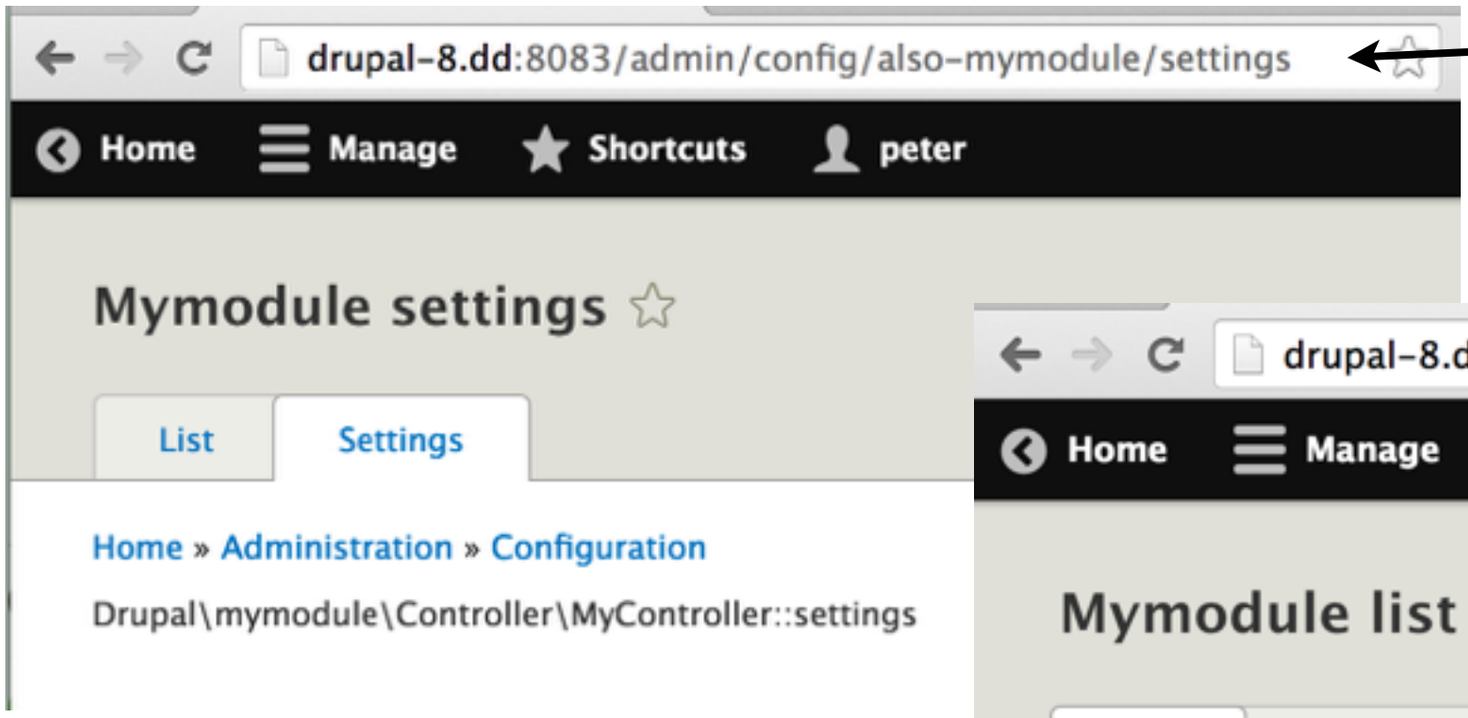
```
mymodule.list_tab:
  route_name: mymodule.list
  title: 'List'
  base_route: mymodule.list

mymodule.settings_tab:
  route_name: mymodule.settings
  title: 'Settings'
  base_route: mymodule.list
```

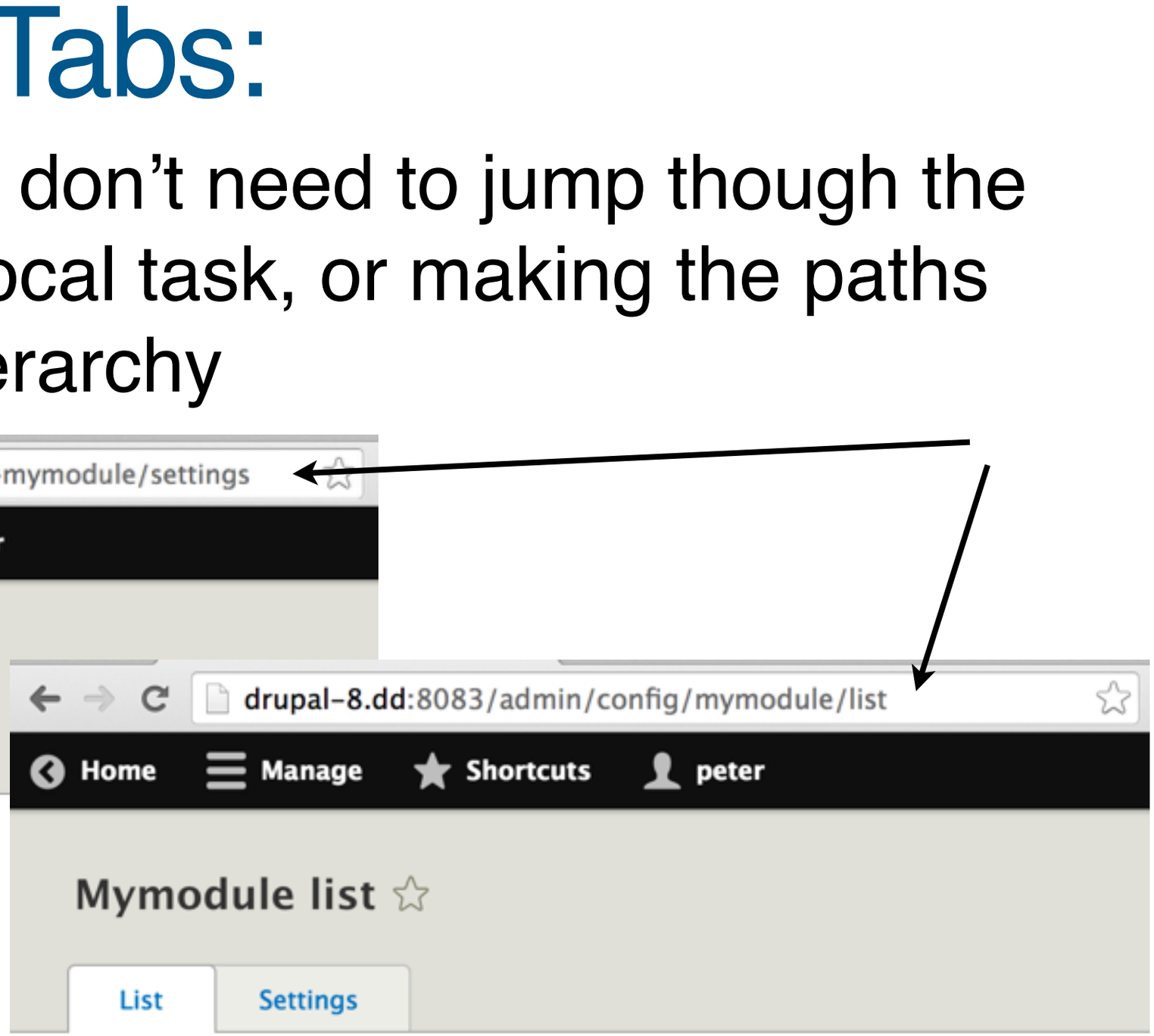
Plugin ID

Local tasks reference a base route which groups them

Adding Two Tabs:

Unlike Drupal 7 you don't need to jump though the hoops of a default local task, or making the paths align in a certain hierarchy





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LocalTask Plugins Need Routes:

Of course, those routes need to be defined or pre-existing: **mymodule/mymodule.routing.yml**

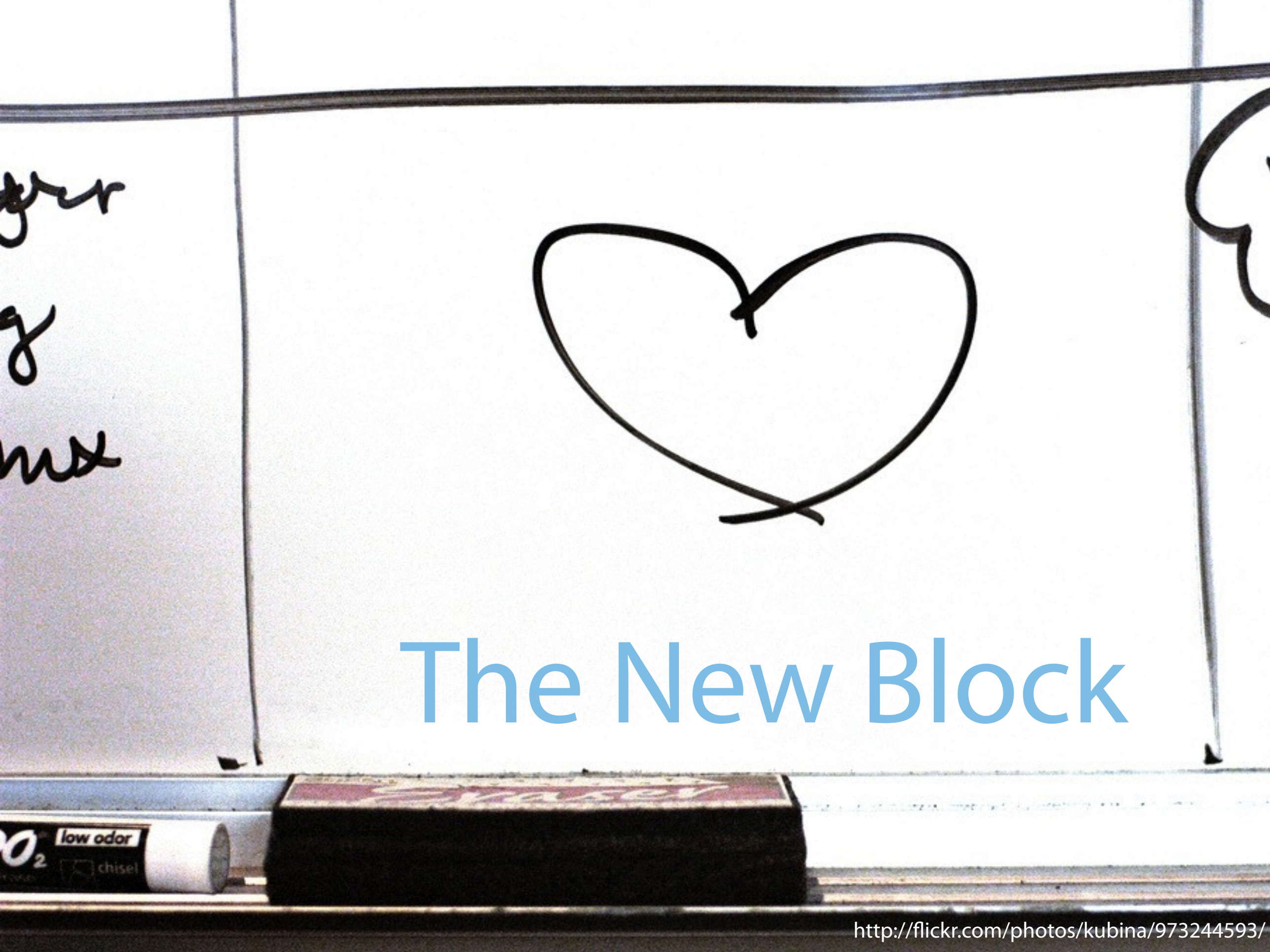
```
mymodule.list:
  path: '/admin/config/mymodule/list'
  defaults:
    _controller: '\Drupal\mymodule\Controller\MyController::dolist'
    _title: 'Mymodule list'
  requirements:
    _access: 'TRUE'

mymodule.settings:
  path: '/admin/config/also-mymodule/settings'
  defaults:
    _controller: '\Drupal\mymodule\Controller\MyController::settings'
    _title: 'Mymodule settings'
  requirements:
    _access: 'TRUE'
```

LocalTask Plugin Keys:

The plugin configuration options and defaults are on the LocalTaskManager class

```
class LocalTaskManager extends DefaultPluginManager implements LocalTaskManagerInterface {
  protected $defaults = array(
    // (required) The name of the route this task links to.
    'route_name' => '',
    // Parameters for route variables when generating a link.
    'route_parameters' => array(),
    // The static title for the local task.
    'title' => '',
    // The route name where the root tab appears.
    'base_route' => '',
    // The plugin ID of the parent tab (or NULL for the top-level tab).
    'parent_id' => NULL,
    // The weight of the tab.
    'weight' => NULL,
    // The default link options.
    'options' => array(),
    // Default class for local task implementations.
    'class' => 'Drupal\Core\Menu\LocalTaskDefault',
    // The plugin id. Set by the plugin system based on the top-level YAML key.
    'id' => '',
  );
}
```



The New Block

http://flickr.com/photos/kubina/973244593/

Blocks as Plugins

- Each custom block is defined in code as a class
- When the admin places the block into a region in a theme, a configuration object is created to track that setting
- The config object is a ConfigEntity - it's an abstraction on top of CMI (storing your Drupal configuration in YAML files) - it makes it convenient to list, load, etc. using entity functions.
- Drupal can easily list the active block instances
- Note - you don't need to worry about the config!

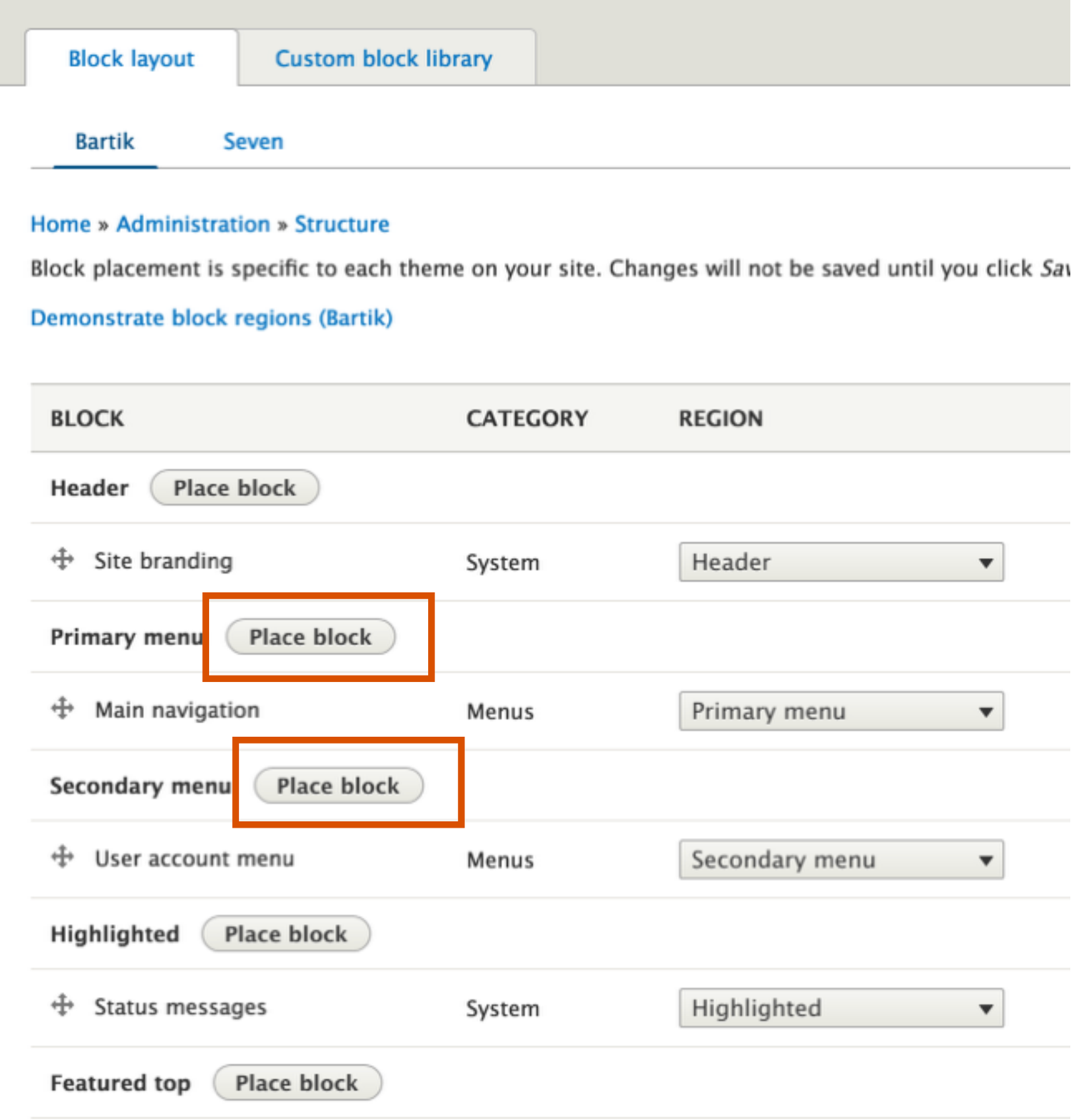
Blocks Implementation

- Blocks implement the `\Drupal\Core\Block\BlockPluginInterface`
- If you extend the abstract `\Drupal\Core\Block\BlockBase` class then all you need to implement is the `build()` method
- `build()` is basically the same as `hook_block_view()` in Drupal 7
- For example, I added to my module `\Drupal\mymodule\Plugin\Block\MyBlock`

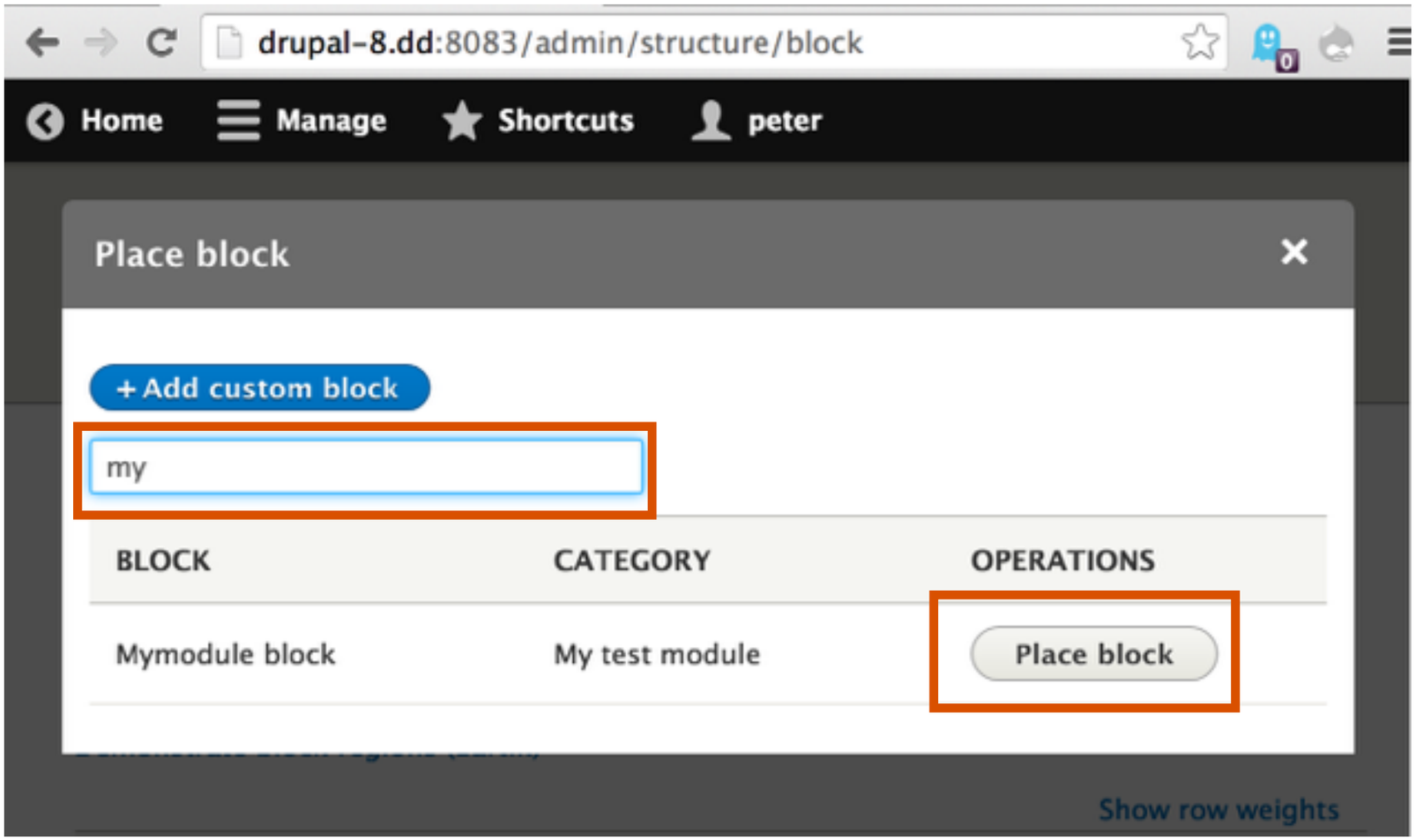
Side Note - PSR-4

- When I add the Block to my module:
  `\Drupal\mymodule\Plugin\Block\MyBlock`
- This is at the corresponding file path (under the Drupal root directory):
  `modules/mymodule/src/Plugin/Block/MyBlock.php`
- Note that the class name and the path match up under `src/`
- This mapping of class name to path is how the class can be automatically found and loaded

```php
/**
 * Provides a block with 'Mymodule' links.
 *
 * @Block(
 *   id = "mymodule_my_block",
 *   admin_label = @Translation("Mymodule block")
 * )
 */
class MyBlock extends BlockBase {
  public function build() {
    return [
      'first_link' => [
        '#type' => 'link',
        '#title' => $this->t('Mymodule List'),
        '#url' => Url::fromRoute('mymodule.list'),
      ],
      'second_link' => [
        '#type' => 'link',
        '#title' => $this->t('Mymodule Settings'),
        '#url' => Url::fromRoute('mymodule.settings'),
      ],
    ];
  }
}
```



Blocks Admin Page Has a New Function: **Place block**



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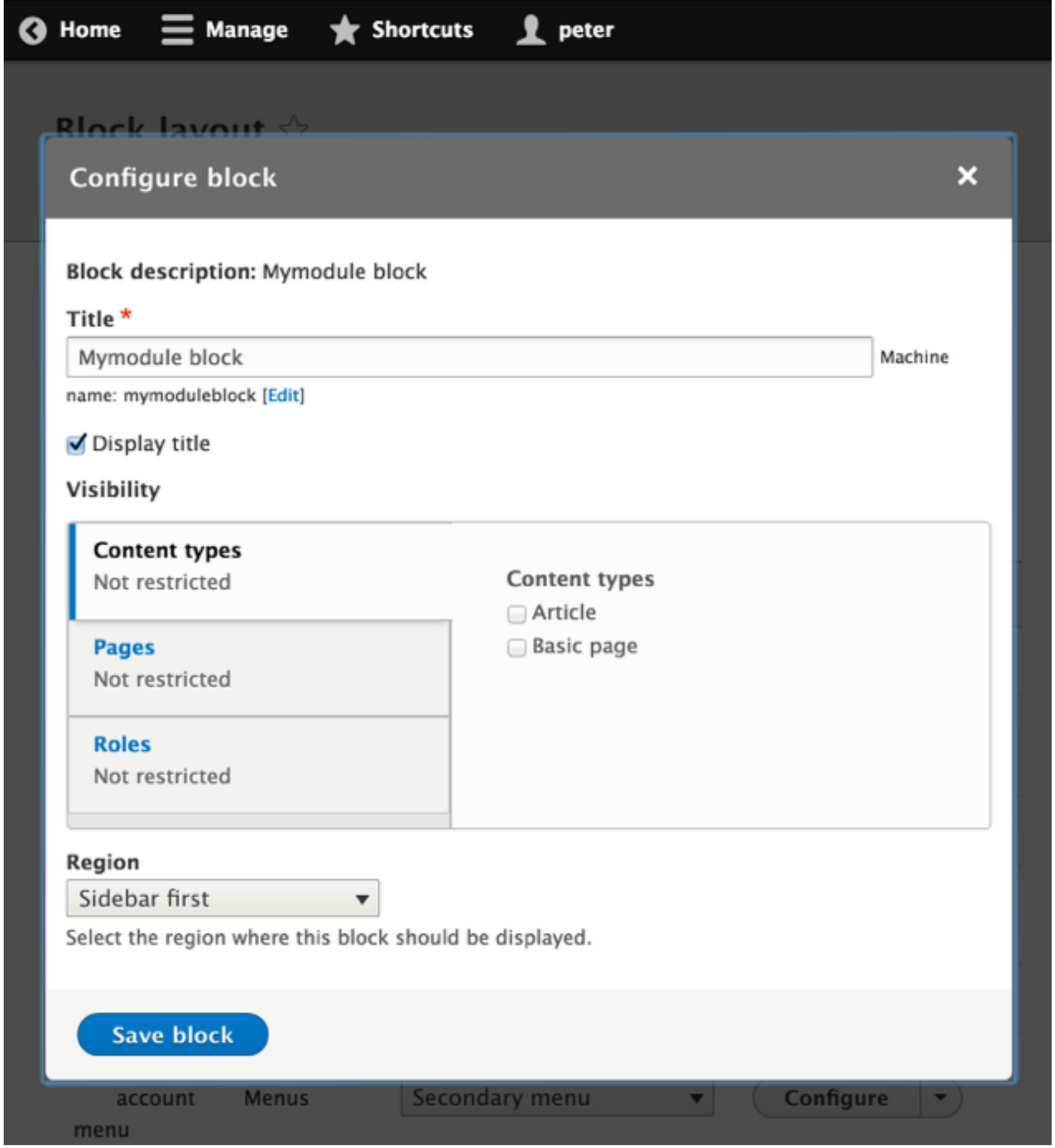

Save the Block to Create a New Plugin Instance

Manage Shortcuts peter

Drupal 8 local

Home

Mymodule block

Mymodule List

Mymodule Settings

Search

Welcome to Drupal 8 local

No front page content has been created yet.

Add content

Block Hook to Plugin Comparison

Drupal 7.x	Drupal 8.x
hook_block_info()	BlockManagerInterface:: **getDefinitions**()
hook_block_view($delta)	BlockPluginInterface:: **build**()
?	BlockPluginInterface:: **access**(AccountInterface $account)
hook_block_configure($delta)	BlockPluginInterface:: **blockForm**($form, $form_state)
?	BlockPluginInterface:: **blockValidate**($form, $form_state)
hook_block_save($delta, $edit)	BlockPluginInterface:: **blockSubmit**($form, $form_state)

Block Discovery and Annotations

- Each Plugin type must be in the expected class namespace for your module - for blocks:
  `namespace Drupal\mymodule\Plugin\Block;`
- Most core plugins have a custom annotation class - you have to use the right one for your plugin
- The annotation class provides both a documentation of the possible keys in the plugin definition and default values
- There is also a generic Plugin annotation class

```php
/**
 * Defines a Block annotation object.
 *
 * @Annotation
 */
class Block extends Plugin {
  /**
   * The plugin ID.
   *
   * @var string
   */
  public $id;

  /**
   * The administrative label of the block.
   *
   * @var \Drupal\Core\Annotation\Translation
   *
   * @ingroup plugin_translatable
   */
  public $admin_label;

    //... more properties ..//
}
```

Filtering Text

http://flickr.com/photos/pinksherbet/253412963/

7.x Info Hook

```
/**
 * Implements hook_filter_info().
 *
 * @ingroup project_issue_filter
 */
function project_issue_filter_info() {
  $filters['filter_project_issue_link'] = array(
    'title' => t('Project issue to link filter'),
    'description' => t('Converts references to project issues
                        (in the form of [#12345]) into links.'),
    'process callback' => '_project_issue_filter',
    'tips callback' => '_project_issue_filter_tips',
    'cache' => TRUE,
  );
  return $filters;
}
```

8.x Plugin With Annotation

```
/**
 * Provides a filter to format a node ID as a link.
 *
 * @Filter(
 *   id = "mymodule_node_link",
 *   module = "mymodule",
 *   title = @Translation("Format a node ID as a link")
 * )
 */
class NodeLinkFilter extends FilterBase {
  public function process($text, $langcode) {
    $regex = '(?:(?<!\w)\[(#\d+(?:-[\d\.]+)?)\](?!\w))|…';
    $callback = function($matches) { ... }
    $text = preg_replace_callback("/$regex/", $callback, $text);
    return new FilterProcessResult($text);
  }

  // ... more code ...//

  public function tips($long = FALSE) {
    return $this->t('Node ID numbers (ex. [#12345]) turn into
links automatically.');
  }
}
```

drupal-8.dd:8083/node/1

Manage Shortcuts peter Edit

My account Log out

Drupal 8 local

Home

Home

Search

First test post

View Edit Delete

Here's a 1st node.

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drupal-8.dd:8083/admin/config/content/formats

Back to site | Manage | Shortcuts | peter

Text formats and editors

Home » Administration » Configuration » Content authoring

Text formats define how text is filtered for output and how HTML tags and other text is displayed, replaced, or removed. **Improper text format configuration is a security risk.** Learn more on the Filter module help page.

Text formats are presented on content editing pages in the order defined on this page. The first format available to a user will be selected by default.

+ Add text format

Show row weights

NAME	TEXT EDITOR	ROLES	OPERATIONS
Basic HTML	CKEditor	Authenticated user,Administrator	Configure

drupal-8.dd:8083/admin/config/content/formats/manage/basic_html

Images larger than these dimensions will be scaled down.

Enabled filters

- [x] Limit allowed HTML tags and correct faulty HTML
- [ ] Display any HTML as plain text
- [ ] Convert line breaks into HTML (i.e.
 and <p>)
- [ ] Convert URLs into links
- [ ] Format a node ID as a link
- [x] Align images

  Uses a data-align attribute on <img> tags to align images.
- [x] Caption images

  Uses a data-caption attribute on <img> tags to caption images.
- [x] Restrict images to this site

  Disallows usage of <img> tag sources that are not hosted on this site by replacing them with a placeholder image.
- [ ] Correct faulty and chopped off HTML
- [x] Track images uploaded via a Text Editor

  Ensures that the latest versions of images uploaded via a Text Editor are displayed.

Filter processing order

drupal-8.dd:8083/node/2/edit

Home | Manage | Shortcuts | peter

Body (Edit summary)

Let me tell you about [#1]

Text format Basic HTML | About text formats

- Allowed HTML tags: <a href hreflang>   <cite> <blockquote cite> <code> <ul type> <ol start type> <dl> <dt> <dd> <h2 id> <h3 id> <h4 id> <h5 id> <h6 id>
  <img src alt height width data-entity-type data-entity-uuid data-align data-caption>
- Node ID numbers (ex. [#12345]) turn into links automatically.
- You can align images (`data-align="center"`), but also videos, blockquotes,

Author: peter

Create new revision

▸ MENU SETTINGS

▸ URL PATH SETTINGS

▸ AUTHORING INFORMATION

▸ PROMOTION OPTIONS

drupal-8.dd:8083/node/2

Manage Shortcuts peter Edit

My account Log out

Drupal 8 local

Home

Home

Search

A second post

View Edit Delete

Let me tell you about First test post

Tools

drupal-8.dd:8083/node/1

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Creating Your Own Plugins

- You want to upgrade your module to Drupal 8 and it defined an info hook or had a ctools plugin type
- Use annotation based discovery by default
- It keeps the meta-data together with the class and is suited for typical plugin types where the actual class (code) is different for each plugins
- YAML discovery is good for a case like local tasks where the vast majority use a common class, but a few will implement a different one (for example, to provide a dynamic title)

Plugin and General 8.x Resources

- Demo code used for this presentation: drupal.org/sandbox/pwolanin/2087657
- *Converting 7.x modules to 8.x* drupal.org/update/modules/7/8
- *Plugin API in Drupal 8* drupal.org/developing/api/8/plugins
- *Why Plugins?* drupal.org/node/1637614
- *Unraveling the Drupal 8 Plugin System* drupalize.me/blog/201409/unravelling-drupal-8-plugin-system

Drupal 8 Features I Mentioned

- Widespread use of interfaces makes it easier to replace almost any implementation
- Tabs are grouped regardless of path hierarchy
- Route name rather than system path is unique
- Multiple routes can serve the same path (HTML vs. JSON or GET vs. POST)
- YAML as a standard for config and data files
- Multiple instances of the same block
- Each block instances has a config entity

To Sum It Up

- Plugins are a way to combine the discovery of available functionality with the actual implementation of the functionality
- In Drupal 7, the combination of an info hook and multiple other hook functions (potentially in different files) served the same purpose
- When defining your own plugins, use Annotation-based discovery unless you have a very clear reason for a different type

How Was It? ~ Please evaluate:

events.drupal.org/node/8702

Thank you!