Drupal Development

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Drupal Development

- Extending Drupal's functionalty to do whatever you want it to.
- Covers Modules, Themes, Install Profiles.

Contents

Drush

Drush

- Drush is a command line tool that allows you to interact with Drupal.
- Almost anything you can do through the inferface can be done through Drush.
- Most useful for clearing Drupal caches, logging in, managing configuration, and performing updates.

Drush

- To install Drush require it through composer.

```
composer require drush/drush
```

- You can now ensure drush is installed by running Drush on its own.

```
./vendor/bin/drush
```

- This will tell you the commands available.

Drush - Commands

- Get some information about the site using the `status` command.

```
./vendor/bin/drush status
```

Drush - Commands

- Clear Drupal caches using the `cache:rebuild` or `cr` command.

```
./vendor/bin/drush cache:rebuild
./vendor/bin/drush cr
```

Drush - Commands

- Log in as the admin user with the `user:login` or `uli` command.

```
./vendor/bin/drush user:login
./vendor/bin/drush uli
```

- Log in as a user by passing a user ID.

```
./vendor/bin/drush uli --uid=5
```

Try it!

- Install Drush using:

```
composer require drush/drush
```

- Try some commands out.

Setting Up Drupal For Development

Setting Up Drupal

- Lots of options exist to ease development in Drupal.
- This includes turning off the Drupal cache, forcing autodiscovery of templates and services on every page load and preventing permission hardening.
- Adding these options makes Drupal development easier.

Setting Up Drupal

- Let's change some settings to make development easier.

Setting Up Drupal

- Drupal has a `site/example.settings.local.php` file.
- Copy this to `site/default/settings.local.php` .
- You can use this command.

```
cp site/example.settings.local.php site/default/settings.local.php
```

Setting Up Drupal

- Uncomment the following from the bottom of the `sites/default/settings.php` file.

```
if (file_exists($app_root . '/' . $site_path . '/settings.local.php')) {
  include $app_root . '/' . $site_path . '/settings.local.php';
}
```

- Note: You may need to reset permissions on the settings.php file using `chmod` .

Setting Up Drupal

- Drupal will check the permissions of your settings.php files and ensure they are secure.
- If they aren't Drupal will set them correctly, which makes altering settings.php files difficult.
- To turn this off make sure this setting is enabled.

```
$settings['skip_permissions_hardening'] = TRUE;
```

Setting Up Drupal

- To turn off the permanent caches uncomment any line that looks like this.

```
$settings['cache']['bins']['x'] = 'cache.backend.null';
```

Setting Up Drupal

- The settings.local.php file will also include a `sites/development.services.yml` file.
- This turns on cacheability headers and turns allows backend cache classes to be pucked up.
- The file looks like this.

```
parameters:
  http.response.debug_cacheability_headers: true
services:
  cache.backend.null:
    class: Drupal\Core\Cache\NullBackendFactory
```

Setting Up Drupal

- Twig debugging and auto reload are configured in the `sites/development.services.yml` file.

```
parameters:
  twig.config:
    debug: true
    auto_reload: true
    cache: false
  http.response.debug_cacheability_headers: true
services:
  cache.backend.null:
    class: Drupal\Core\Cache\NullBackendFactory
```

Setting Up Drupal

- Ensuring the setting has taken.

```
drush php:eval "var_export(\Drupal::getContainer()
   ->getParameter('twig.config'));"
```

Setting Up Drupal

- Twig debugging comments.

```
<!-- THEME DEBUG -->
<!-- THEME HOOK: 'block' -->
<!-- FILE NAME SUGGESTIONS:
   * block--umami-account-menu.html.twig
   * block--system-menu-block--account.html.twig
   x block--system-menu-block.html.twig
   * block--system.html.twig
   * block.html.twig
-->
<!-- BEGIN OUTPUT from 'core/profiles/demo_umami/themes/umami/templates
<nav role="navigation" aria-labelledby="block-umami-account-menu-menu"
```

Try it!

- Turn on Drupal debug settings.
- Clear caches.
- Look at the HTML source for twig debug messages.
- Look at the site headers for cache debugging output.
- Look through the rest of the options.

Devel

Devel

- The Devel module is a good way of finding out more about the current state of Drupal.
- The Web Profiler is a sub module that can be used to drill into routes, database queries, hooks, cache systems and other things.

Try it!

- Install Devel and Web Profiler.
- See it in action.

Modules

What Is A Module?

- Adds a feature to a site.
- Can be turned on or off.
- Can define extra functionality or hook into and override other parts of Drupal.

Types Of Module

- **Core** - Included in Drupal itself.
- **Contributed** - Any third party module you install. Referred to as "contrib".
- **Custom** - Any module you build yourself.

Writing A Module

The *.info.yml File

- Contains information about the module including what it does and what version on Drupal it is compatable with.
- In YAML format.
- The bare minimum required for a Drupal module to be picked up.

mymodule.info.yml

```
name: 'My Module'
type: module
description: 'My amazing module.'
core_version_requirement: ^8 || ^9
```

Documentation

Documentation

- A module should include a readme file.
- This should include:
  - Module functionality and how to use it.
  - Configuration options.
  - Available hooks/events.

Documentation

- Many developers include a readme file. Good to read if you want to know more about a module.
- Markdown format is preferred.
- Can also use plain text.

```
README.md
```

README template: https://bit.ly/3KaXi5Q

README Template

- Preferred on larger files.

```
CONTENTS OF THIS FILE
---------------------

 * Introduction
 * Requirements
 * Recommended modules
 * Installation
 * Configuration
 * Troubleshooting
 * FAQ
 * Maintainers
```

Hooks

The simplest building block of any module.

What Is A Hook?

Hooks allow you to:

- Alter forms.
- Alter theme elements before rendering.
- React to events.
- Register plugins and templates.

Any module can define custom hooks.

Naming Hooks

- Hooks are named after the module they appear in.

```
hook_form_alter()
```

Becomes:

```
mymodule_form_alter()
```

- The hook_form_alter() hook is called every time a form is created.

Naming Hooks

- Some hooks also change their name based on context.

```
hook_node_insert($entity)
```

Is used to detect a node being inserted.

Can also be:

```
hook_user_insert($entity)
```

To detect users being inserted.

Some Popular Hooks

- `hook_form_alter($form, $fotm_state, $id)`
- `hook_theme($existing, $type, $theme, $path)`
- `hook_preprocess_page(&$variables)`
- `hook_theme_suggestions_alter(&$suggestions, $variables, $hook)`
- `hook_node_insert($entity)`
- `hook_node_update($entity)`
- `hook_update_9001(&$sandbox)`

Example Hook

- Use a hook_form_alter() hook to alter a form.

```
use Drupal\Core\Form\FormStateInterface;

function mymodule_form_alter(&$form,
FormStateInterface $form_state, $form_id) {
 if ($form_id == 'node_article_form') {
  $form['title']['widget'][0]['value']['#default_value'] = t('title');
 }
}
```

Example Hook

- Use a hook to register a toolbar link.

```
use Drupal\Core\Url;

function mymodule_toolbar() {
  $items = [];
  $items['monkey'] = [
    '#type' => 'toolbar_item',
    'tab' => [
      '#type' => 'link',
      '#title' => t('Home'),
      '#url' => Url::fromRoute('<front>'),
    ],
    '#weight' => 50,
  ];
  return $items;
}
```

Example Hook

- Preprocess a the page title to change information..

```
function mymodule_preprocess_page_title(&$variables) {
 $node = \Drupal::routeMatch()->getParameter('node');
 if ($node) {
  $variables['title'] = [
   '#markup' => 'Node Title:'.$node->getTitle()];
 }
}
```

Hooks

- Drupal documentation on hooks, includes a list of available hooks in core.
- https://bit.ly/3NIK7Ad

Try It!

- Create the file `mymodule.module`.
- Add a hook to alter a form.
- Flush caches!

Translation

Translation

- Why talk about multilingual code so early?
- It's baked into everything Drupal does. Drupal is multilingual from the start.
- You will see either t() or $this->t() a lot.
- These functions will register the translation with the Drupal translation system.

t() Usage

- To use both t() and $this->t() just pass in a string.

```
$translated = t('String');
```

```
$translated = $this->t('String');
```

- Best practice is to pass it directly into where it is needed, rather than store in a variable.

Passing Arguments

Pass escaped output (should be your default choice).

```
$t = t('Value = @value', ['@value' => '123']);
```

Wrap in tags.

```
$t = t('Value = %value', ['%value' => '123']);
```

Escape (used for URLs)

```
$t = t('<a href=":url">@variable</a>',
  [':url' => $url, '@variable' => $variable]);
```

Controllers

Controllers

- Page responses in Drupal are created by a **Controller**. This can be a page of content or an API response.
- A controller is a PHP class that contains methods.
- Methods that return page responces are called **actions**.
- Actions are registered using **Routes**.

Controllers

- Parameters can be passed to the controller, which are registered with the route.
- An action should return an array of content ready to be rendered or a response object.
- Multiple routes can use the same controller with different action methods.

Routes

- All controllers need a route.
- This tells Drupal what controller to use when a path is requested.
- Defined in a *.routes.yml file.

Routes

Create a file at mymodule.routing.yml.

```
mymodule.controller_action:
  path: '/mycontroller/action'
  defaults:
    _controller: '\Drupal\mymodule\Controller\MyController::action'
    _title: 'My Controller'
  requirements:
    _access: 'TRUE'
```

Controller

A basic controller class looks like this.

```php
<?php

namespace Drupal\mymodule\Controller;

use Drupal\Core\Controller\ControllerBase;

class MyController extends ControllerBase {
  public function action() {
    // return a render array or a new response object.
  }
}
```

Controller Return A Response

Return a Response() object.

```
namespace Drupal\mymodule\Controller;

use Drupal\Core\Controller\ControllerBase;
use Symfony\Component\HttpFoundation\Response;

class MyController extends ControllerBase {
  public function action() {
    return new Response('Response.');
  }
}
```

Different Types Of Response Objects Exist

- **Response** - Text based response.
- **HtmlResponse** - A HTML response.
- **JsonResponse** - JSON response.
- **XmlResponse** - XML response.
- **RedirectResponse** - Redirect to another page.
- **CacheableResponse** - A response that contains Drupal cache metadata.

Try It!

- Create a route.
- Add a controller for the route.
- Return a response object.

Hint: Some cache clearing may be needed.

Render Arrays

Render Arrays

- Render arrays are a hierarchical structure of elements that Drupal will convert into markup.
- This is how we generate output in Drupal.
- Render arrays take a number of different parameters, but largely depend on what type of rendering you are trying to do.

Render Arrays

- Render arrays should be built up and returned as a single array from the rendering method.

```
public function action() {
  $build = [];
  $build['text'] = [
    '#plain_text' => t('Escaped text'),
  ];
  return $build;
}
```

Render Arrays

There are 3 main ways to use a render array.

- Direct properties
- Templates
- Render element types

Render Arrays - Direct Properties

- Drupal will look for the presence of 'plain_text' or 'markup' in the render array.
- These are used to generate either escaped text output or for simple blocks of HTML.
- These should be used sparingly as theme and render elements allow of better control over markup.

Render Arrays - Direct Properties

The 'plain_text' property will fully escape all output.

```
$build['text'] = [
  '#plain_text' => t('Escaped text'),
];
```

Output:

```
Escaped text
```

Render Arrays - Direct Properties

The 'markup' property will allow some HTML elements to be included in the output. Script tags will be escaped to prevent cross site scripting issues.

```
$build['markup'] = [
  '#markup' => '<p>' . t('Markup') . '</p>',
];
```

Output:

```
<p>Markup</p>
```

Render Arrays - Direct Properties

The tags allows can be controlled via n 'allowed_tags' property.

```
$build['markup'] = [
  '#markup' => '<p>' . t('Markup') . '</p>',
  '#allowed_tags' => ['div']
];
```

Output:

```
Markup
```

Render Arrays - Templates

- These are generated from the hook_theme() hook.
- There are a few Drupal core templates, but any module can add more.
- They use the 'theme' property in the render array.

Render Arrays - Templates

- The item_list template can be used to print a list of items.

```
$build['item_list'] = [
  '#theme' => 'item_list',
  '#title' => $this->t('Title'),
  '#list_type' => 'ul',
  '#items' => [1, 2, 3,],
];
```

Output:

```
<h3>Title</h3>
<ul><li>1</li><li>2</li><li>3</li></ul>
```

Render Arrays - Render Elements

- Render elements are classes that will render out content.
- They are registered in Drupal through a plugin interface.
- Default render elements are `ElementInterface` objects.
- Form elements are also render elements, of the type `FormElementInterface`, which extends `ElementInterface`.

Render Arrays - Render Elements

- Render elements use the 'type' property.

```
$build['link'] = [
  '#type' => 'link',
  '#title' => t('Link Example'),
  '#url' => \Drupal\Core\Url::fromRoute('entity.node.canonical',
    ['node' => 1]),
];
```

Output:

```
<a href="/node/1">Link Example</a>
```

Try It!

- Change your controller to return a render array.
- Populate the render array with some content.

Hint: `#plain_text`, `#markup`, `'#theme' => 'item_list'`, `'#type' => 'link'` might be useful.

Menu Links

Menu Plugins

- You can inject menu items into Drupals menu system.
- Stored in the `*.links.menu.yml` file.
- These menu items are not editable.

```
mymodule.controller_action:
  title: 'MyModule Controller'
  description: 'A controller with an action.'
  route_name: mymodule.controller_action
  parent: system.admin
```

Menu link is created under /admin.

Try it!

- Create a route.
- Create a controller to listen to that route.
- Return some content.
- Add a menu plugin to the controller.

Passing Parameters To Routes

- This is known as adding a wildcard to a route.

```
mymodule.controller_action:
  path: '/mycontroller/action/{parameter}'
  defaults:
    _controller: '\Drupal\mymodule\Controller\MyController::action'
    _title: 'My Controller'
  requirements:
    _access: 'TRUE'
```

Controller With Parameter

A basic controller looks like this.

```php
<?php
namespace Drupal\mymodule\Controller;

use Drupal\Core\Controller\ControllerBase;

class MyController extends ControllerBase {
  public function action($parameter) {
    // return a render array
  }
}
```

Note the name "parameter" needs to match the variable $parameter.

Route Permissions

- The requirements section allows you to detail simple permissions for routes.

```
mymodule.controller_action:
  path: '/mycontroller/action/{parameter}'
  defaults:
    _controller: '\Drupal\mymodule\Controller\MyController::action'
    _title: 'My Controller'
  requirements:
    _permission: 'access content'
```

Try It!

- Add a parameter to your route.
- Add a parameter to your controller.
- Make it do something interesting in your controller.

Hint: Use dynamic functions like `str_repeat()`, `rand()`, `date()`, `range()`.

Forms

Forms

- In Drupal, all forms are generated using the Form API.
- It's like a render array, but for form fields.
- By default, all forms use POST.
- They are registered using the routing.yml file.

Creating A Form

Add a route to point to a Form class.

```
mymodule.form:
  path: '/my-form'
  defaults:
    _form: '\Drupal\mymodule\Form\MyForm'
    _title: 'My Form'
  requirements:
    _access: 'TRUE'
```

Creating A Form

- Add a class to the directory `src/Form/MyForm.php` .
- Blueprint of a form class (*on next slide*).
- The return of the buildForm() method is a form render array.

```php
namespace Drupal\mymodule\Form;

use Drupal\Core\Form\FormBase;
use Drupal\Core\Form\FormStateInterface;

class MyForm extends FormBase {
  public function getFormId() {
    return 'mymodule-myform';
  }

  public function buildForm(array $form,
   FormStateInterface $form_state
    ) {
    return $form;
  }

  public function submitForm(array &$form,
   FormStateInterface $form_state) {
    $this->messenger()->addStatus($this->t('Form submitted'));
  }
}
```

Creating A Form

- The form API is an extension of the render array.
- Form elements extend the `FormElementInterface`.
- The most common form elements are:
  - textfield
  - radios
  - checkbox
  - checkboxes
  - select
  - submit
- Normal render elements can also be used.

Creating A From

- The following is a simple form.

```
public function buildForm(array $form, FormStateInterface $form_state)
  $form['description'] = [
    '#markup' => '<p>' . $this->t('Fill in the form') . '</p>'
  ];
  $form['name'] = [
    '#type' => 'textfield',
    '#title' => $this->t('Name'),
    '#required' => TRUE,
  ];
  $form['submit'] = [
    '#type' => 'submit',
    '#value' => $this->t('Submit'),
  ];
  return $form;
}
```

Form Submission

- Form submissions automatically pass through the submitForm() method.

```
public function submitForm(array &$form,
 FormStateInterface $form_state) {
  $name = $form_state->getValue('name');

  $this->messenger()->addStatus(
    $this->t('Submitted the name %name', ['%name' => $name]));
}
```

Form Validation

- Form validation happens in the validateForm() method (if implemented).
- If any errors are triggered then the submit handler is not called.
- Note that if you set the field to be "#required" then it will automatically get validated.

Form Validation

```
public function validateForm(array &$form,
 FormStateInterface $form_state) {
  $name = $form_state->getValue('name');

  if ($name === 'Bob') {
    // Name is Bob, trigger error!
    $form_state->setErrorByName('name', $this->t('Name is Bob. Cannot c
  }
}
```

Try it!

- Create a route for a form.
- Create a form.
- Submit the form.

Services And Dependency Injection

Resources

- #! code - Drupal 9: An Introduction To Services And Dependency Injection

Content Entities

Content Entities

- Entities in Drupal represent "things".
- Nodes, users, comments, taxonomy terms are all entities.

Content Entities - Bundles

- Entites can have sub-types, called bundles.
- Bundles inherit all of the functionality of the entity.
- Think of them as extended classes.

Content Entities - Bundles

Entity	Bundles
Node	Articles, Basic Page
Media	Image, Video
Vocabulary	Category, Tags

Content Entities - Bundles

- Use methods on the entity to get this information.

```
$node->getEntityTypeId(); // node
$node->bundle(); // article
$node->getType(); // article
```

- Use these methods to ensure that the entity type you want is correct.

Content Entities - Preprocess Hooks

- Entities are often injected into preprocess steps via the varaibles array.

```
function mytheme_preprocess_node(&$variables) {
  /** @var \Drupal\node\NodeInterface $node */
  $node = $variables['node'];
  if ($node->getType() == 'article') {
    // Article specific action.
  }
}
```

Content Entites - Loading

- Load node by ID:

```
$entity_id = 123;
$entity = \Drupal::entityTypeManager()
  ->getStorage('node')
  ->load($entity_id);
```

Content Entites - Loading

- Load node by ID using the shorthand:

```
$node \Drupal\node\Entity\Node::load(123);
```

Content Entites - Loading

- Load node by field value:

```
$value = 'some value';
$entity = \Drupal::entityTypeManager()
  ->getStorage('node')
  ->loadByProperties(['field_name' => $value]);
```

Content Entites - Creation

- Create a node.

```
$node = \Drupal::entityTypeManager()
  ->getStorage('node')
  ->create([
  'title' => 'Article title',
  'type' => 'article',
]);

$node->save();

$newArticleId = $node->id();
```

Content Entites - Creation

- Create a node, using the shorthand.

```
$node = \Drupal\node\Entity\Node::create([
  'title' => 'Article title',
  'type' => 'article',
]);

$node->save();

$newArticleId = $node->id();
```

Content Entites - Creation

- Create a user, using the shorthand.

```
$user = \Drupal\user\Entity\User::create([
  'name' => 'some.user',
  'mail' => 'user@example.com',
  'pass' => 'password'
]);

$user->addRole('administrator');

$user->save();
```

Content Entites - Fields

- Content entities are fieldable.
- Use the typed data API to interact with these fields.
- See https://www.drupal.org/docs/drupal-apis/typed-data-api

Content Entites - Fields

- Get a value from a field.

```php
// Get the first value.
$value = $entity->get('title')->value;
// Get all values.
$value = $entity->get('title')->getValue()[0]['value'];
```

- Note that the 'value' attribute may change depending on the field type.
- Entity references have the property `target_id`.

```php
$value = $entity->get('field_article_term')->target_id;
```

Content Entites - Fields

- Remember the cardinality of fields.

```
$values = $entity->get('field_article_list')->getValue();
foreach ($values as $value) {
  // $value contains the 'value' of the field.
}
```

Content Entites - Fields

- A shorthand is also available.

```
$value = $entity->title->value;
$value = $entity->field_article_summary->value;
```

Content Entites - Fields

- Set a value to a field.

```
$node->set('title', 'new title');
$node->get('title')->setValue(['new title']);
```

- Remember to `save()` the entity after setting a field value!

Try it!

- Load an entity using ::load().
- Pull a value out of a field.
- Change the value of a field.
- Create an entity using ::create().

Drupal Cache

Drupal Cache

- Drupal has a robust and dynamic cache system.
- Can be used as a static cache bin or as a dynamic cache.
- It's important to understand what the components are.
- Ideally, you want to cache as much as possible in the page.
- For anonymous users you typically want the entire page cached.

Cache Meta Data

- Added to render arrays and plugins to inform Drupal about how to cache the data.
- This can include cache expiry time, tags or context.
- The cache will bubble up the page, adding to the cache information of parent elements.
- The entire page cache is goverened by the cache meta data within it.

Cache Expiry Time

- Sets the maximum time that the cache can be used for, in seconds.

Cache for an hour.

```
'#cache' => [
  'max-age' => 3600,
]
```

Cache Expiry Time

Cache forever.

```
'#cache' => [
  'max-age' => \Drupal\Core\Cache\Cache::PERMANENT,
]
```

Cache Tags

- Cached data can be cached to show that it refernces something.
- This means that when upstream caches are cleared the tagged caches can also be cleared.
- For example, a page of content is saved. The cache of that page can be flushed from cached pages, views or anywhere else it is used.

Cache Tags

Create a cache tag for current user.

```
$cacheTags = User:load(\Drupal::currentUser()->id())->getCacheTags();
...
'#cache' => [
  'tags' => $cacheTags,
]
```

Create a cache tags for node 1 and node 2.

```
'#cache' => [
  'tags' => ['node:1', 'node:2'],
]
```

Cache Contexts

- This tells Drupal how to the data should be cached on the site.
- For example, the context "user.roles" will store the cache for each user role.

```
'#cache' => [
  'contexts' => ['user.roles', 'url.path_is_front'],
]
```

Cache Contexts

- Cache Contexts are hierarchical, so Drupal will cache the most granular variation to avoid unnecessary variations as they bubble up the layers.
- For example, when caching a page per user its pointless to also cache a block on that page per user role.

Cache Methods

- Some plugins (e.g Blocks) extend the CacheableDependencyInterface interface.
- This gives them access to the methods getCacheContexts(), getCacheTags(), and getCacheMaxAge().
- The methods getCacheTags() getCacheContexts() must return an array informing Drupal of the tags and contexts.

```php
public function getCacheTags() {
  // With this when your node change your block will rebuild.
  if ($node = \Drupal::routeMatch()->getParameter('node')) {
    // If there is node add its cachetag.
    $tags = ['node:' . $node->id()]
    return Cache::mergeTags(parent::getCacheTags(), $tags);
  }
  // Return default tags instead.
  return parent::getCacheTags();
}

public function getCacheMaxAge() {
  return Cache::PERMANENT;
}

public function getCacheContexts() {
  return ['url'];
}
```

Cache Recap

- Cache expiry time govern how long the cache can be kept for.
- Cache tags identify specific items between different caches.
- Cache contexts identify generics.
- Cache bubbles up to the top of the page.

Cache Review

- The Cache Review module can be used to inspect the cache on a Drupal site.

  https://www.drupal.org/project/cache_review

- It shows how expiry time, tags and contexts work together to cache a page.

Try it!

- Install the Cache Review module.
- Look at how the cache expiry, tags and context bubble up the page.

Cache API

- Get and set data from the Drupal cache.
- Integrates with cache tags if needed.

Get data from cache.

```
\Drupal::cache()->get('cache_id');
```

Save data to cache.

```
\Drupal::cache()->set('cache_id', $data, $max_age, $cache_tags);
```

Cache API

```
use Drupal\Core\Cache\Cache;

$uid = \Drupal::currentUser()->id();
$cache_id = 'something:' . $uid;

if ($cache = \Drupal::cache()->get($cache_id)) {
  return $cache->data;
}

$data = massive_calculation();
$cache_tags[] = 'uid:' . $uid;

\Drupal::cache()->set($cache_id, $data, Cache::PERMANENT, $cache_tags);

return $item;
```

Try it!

- Create a controller action.
- Use the sleep() function to make the action take a long time.
- Use the cache system to cache the output and reduce the load time.

Hint: Use max-age to prevent the action from being cached.

Templates

Templates

- Tell Drupal about custom templates you want to use.
- Defined with a hook_theme() hook in modules or themes.

Templates

- Custom templates can be deinfed using hook_theme().

```
function my_module_theme() {
  return [
    'my_custom_template' => [
      'variables' => [
        'description' => '',
        'some_list' => [],
      ],
    ],
  ];
}
```

Template

- The new hook can be used just like any other theme.

```
$build = [];
$build['content'] = [
  '#theme' => 'my_custom_template',
  '#description' => $this->t('A description.'),
  '#some_list' => ['item1', 'item2'],
];
```

Template

- The custom theme needs a custom template.
- The *templates* directory is the default location for templates in a module.
- Our hook will use *templates/my_custom_template.html.twig*.

```
<p>{{ description }}</p>

{% for list_item in some_list %}
  {{ list_item }}
{% endfor %}
```

Try it!

- Create a hook_theme().
- Create a twig file.
- Render it in a normal render array.

Hint: Some cache clearing may be needed.

CSS & JavaScript

Asset Libraries

- CSS and JavaScript are loaded using asset libraries.
- Defined in a *.libraries.yml file.
- A library can contain both CSS and JavaScript files.
- Can collect together functionality.
- Dependencies can be used to ensure libraries are loaded together.

Define A Library

- A library file in a module.

```
some_library:
  version: 1.x
  css:
    layout:
      css/some-library-layout.css: {}
    theme:
      css/some-library-theme.css: {}
  js:
    js/some-library.js: {}
  dependencies:
    - core/jquery
```

CSS Style Types

- There are 5 types of CSS types which control how the order in which the CSS files are loaded.

```
base
layout
component
state
theme
```

Libraries Attachment

- hook_page_attachments() can attach any library to any page.

```
function mymodule_page_attachments(array &$attachments) {
  $attachments['#attached']['library'][] = 'mymodule/some_library';
}
```

Try it!

- Create CSS code to change the background colour of the site.
- Create a library.
- Inject CSS into the site.

Libraries Attachment

- Attach the library to any render array.
- For example, in a controller:

```
public function action() {
  $build = [];

  $build['#attached']['library'][] = 'mympdule/some_library';

  return $build;
}
```

Try it!

- Inject the library into a controller.
- Make sure the library appears at the bottom of the page.

Hint: The *footer* setting will come in handy here.

JavaScript Behaviours

JavaScript Behaviours

- You can register your JavaScript with Drupal.
- This means that the JavaScript will be loaded at appropriate times.
- After page has loaded or when the DOM has been updated.

JavaScript Behaviours

- Inject your JavaScript file through a library.
- Use `Drupal.behaviours` to attach new functionalty.

```
(function($){
  Drupal.behaviors.mymodule = {
    attach: function (context) {
      //...
    }
  };
})(jQuery);
```

- Avoid collisions by adding your module name.

JavaScript Behaviours

- The `context` variable is important.
- It contains the elements being changed.
- When the page is first loaded then this will be the entire DOM.
- For ajax requests this will be the elements that have changed after the request.

JavaScript Behaviours

- Use `context` to give context to jQuery.

```
$('#some-element', context).click(function (e) {
  console.log('Clicked!');
});
```

JavaScript Behaviours

- The opposite of `attach` is `detach`.
- This reacts upon DOM elements being removed from the page.
- Important to detach some actions as they would otherwise keep running. e.g. a polling event for a Vue.js application.

JavaScript Behaviours

- A file containing both `attach` and `detach`.

```
(function($){
  Drupal.behaviors.mymodule = {
    attach: function (context) {
      //...
    },
    detach: function (context, setting, trigger) {
      if (trigger == 'unload') {
        //...
      }
    }
  };
})(jQuery);
```

JavaScript Behaviours - References

- Drupal JavaScript Docs: attach
- Drupal JavaScript Docs: detach
- Lullabot: Understanding JavaScript behaviors in Drupal

Try it!

- Inject a JavaScript file using a library.
- Do something interesting on the page.
- Use this as a template.

```
(function($){
  Drupal.behaviors.mymodule = {
    attach: function (context) {
      //...
    }
  };
})(jQuery);
```

Plugins

Plugins

- Provide functionality through a common interface.
- Most things in Drupal are actually plugins.
- Entity types, fields, blocks, image formats, routes are all plugins.
- You can also define custom plugins.

Plugins

- Plugins can be defined through YAML files and PHP classes.

Plugins - Menu Item

- Menu links can be defined through YAML files.
- The file `*.links.menu.yml` controlls this in your module.
- This will create a menu item to a page of content.

```yaml
mymodule.some_menu_item:
  title: 'A page'
  description: 'A description of the link'
  parent: system.admin_config_system
  route_name: entity.node.canonical
  route_parameters:
    node: 123
```

- Use the `menu_name` to attach this to a specific menu.

Try it!

- Add a menu plugin to your module.
- It will live in a file called `mymodule.links.menu.yml` .

Plugins - Input Filter

- Simplest plugin is an input filter.
- This changes the text of a text area as it is rendered.
- The original text of the field is not altered.

```php
namespace Drupal\mymodule\Plugin\Filter;

use Drupal\filter\FilterProcessResult;
use Drupal\filter\Plugin\FilterBase;
/**
 * My amazing filter.
 * @Filter(
 *   id = "myamazingfilter",
 *   title = @Translation("My amazing filter"),
 *   description = @Translation("An amazing filter"),
 *   type =
Drupal\filter\Plugin\FilterInterface::TYPE_TRANSFORM_REVERSIBLE
 * )
 */
class MyAmazingFilter extends FilterBase {
  public function process($text, $langcode) {
    $result = new FilterProcessResult($text);
    $result->setProcessedText(str_replace('foo', 'bar',
        $result->getProcessedText));
    return $result;
  }
}
```

Try it!

- Create an input filter plugin.
- Make it do something interesting.
- Assign it to an input filter format.
- Use it with some filtered content (node, block etc).

Custom Blocks

Custom Blocks

- Add a class to src\Plugin\Block.
- Needs a @Block annotation.
- Extends Drupal\Core\Block\BlockBase.
- The build() method returns content as a render array.

Custom Block

```php
namespace Drupal\mymodule\Plugin\Block;

use Drupal\Core\Block\BlockBase;

/**
 * Provides a custom block.
 *
 * @Block(
 *   id = "mymodule_custom_block",
 *   label = "MyModule Custom Block",
 *   admin_label = @Translation("MyModule Custom Block"),
 * )
 */
class ArticleHeaderBlock extends BlockBase {
  public function build() {}
}
```

Custom Block

- Implement ContainerFactoryPluginInterface to use services.
- You can then use the create()/__construct() mechanism to pull in the services needed.

```php
namespace Drupal\mymodule\Plugin\Block;

use Drupal\Core\Block\BlockBase;
use Drupal\Core\Plugin\ContainerFactoryPluginInterface;
use Symfony\Component\DependencyInjection\ContainerInterface;

/**
 * Provides a 'Article Header' block.
 *
 * @Block(
 *  id = "hashbangcode_article_header",
 *  label = "Article Header",
 *  admin_label = @Translation("Article Header"),
 * )
 */
class ArticleHeaderBlock extends BlockBase implements ContainerFactoryP
}
```

Try it!

- Create a block.
- Output some content.
- Place the block on your site.

Configure Blocks

- The blockForm()/blockSubmit() allows configuration options to be saved to the block.

```
public function blockForm($form, FormStateInterface $form_state) {
  $form['setting'] = [
    '#type' => 'textfield',
    '#default_value' => $this->configuration['setting'],
  ];
  return $form;
}

public function blockSubmit($form, FormStateInterface $form_state) {
  $this->configuration['setting'] = $form_state->getValue('setting');
}
```

Try it!

- Add a configuration form to your block.
- Pull out the configuration value into the block content.

Block Caches

- The methods getCacheTags() getCacheContexts() must return an array informing Drupal of the tags and contexts.

```
public function getCacheTags() {
 $node = \Drupal::routeMatch()->getParameter('node');
 return Cache::mergeTags(parent::getCacheTags(),
    ['node:'.$node->id()]);
}

public function getCacheContexts() {
  return Cache::mergeContexts(parent::getCacheContexts(),
    ['route']);
}
```

Upates

Updates

- Modules can provide update hooks to update older versions of the module.
- Mainly involved with updating database tables but can also be used to add defaults for new config items.

Updates

- The hook hook_update_N() is used to run updates.
- This must be placed into a mymodule.install file.

```
function mymodule_update_9001(&$sandbox = NULL) {

}
```

- Each update hook is run in sequence. 9001, 9002, 9003 etc.

Updates

- Updates can be run by visiting `update.php` or by running `drush updatedb`.
- Drush updates are preferred due to page timeouts and cli memory considerations.

Updates

- Update a configuration item.

```
function mymodule_update_9001(&$sandbox = NULL) {
  \Drupal::service('config.factory')
    ->getEditable('system.performance')
    ->set('css.preprocess', FALSE)
    ->set('js.preprocess', FALSE)
    ->save();
}
```

Updates

- Create a new table.

```
function mymodule_update_9001(&$sandbox = NULL) {
  $spec = [
  'description' => 'A table to store a field.',
  'fields' => [
    'myfield1' => [
      'description' => 'Myfield1.',
      'type' => 'varchar',
      'length' => 255,
      'not null' => TRUE,
      'default' => '',
    ],
    'primary key' => ['myfield1'],
  ];
  $schema = Database::getConnection()->schema();
  $schema->createTable('mytable', $spec);
}
```

Try it!

- Create an update hook.

Dependencies

Dependencies

- Drupal can install other modules or include third party libraries automatically.

Dependencies

- Enforce Drupal module dependencies.

```
name: My Module
type: module
description: 'My module'
core_version_requirement: ^8.8 || ^9

dependencies:
 - drupal:user
 - metatag:metatag
```

Dependencies

- Include library dependencies.

```
mymdoule.admin:
  version: VERSION
  css:
    theme:
      css/mymodule.admin.css: {}
  js:
    js/mymodule.admin.js: {}
  dependencies:
    - core/jquery
    - core/drupal
```

Default Configuration

Default Configuration

- Drupal can install configuration for you when you install the module.
- Useful for installing entity types or adding fields.
- Configuration files in **module/config/install** will be installed.
- Configuration files in **module/config/optional** will be installed if all their dependencies are met.

Default Configuration

```
config/
  install/
    mymodule.settings.yml
  optional/
    pathauto.pattern.mymodule.yml
```

- mymodule.settings.yml will be installed.
- pathauto.pattern.mymodule.yml will be installed if the Path Auto module is installed.

Coding Standards

Coding Standards

- Drupal has a number of coding standards covering PHP, JavaScript, YAML and CSS.
- Following them will make your module better, more secure, more maintainable and usable by third parties.

Coding Standards

```
phpcs --standard=Drupal,DrupalPractice
  --extensions=php,module,inc,install,test,profile,theme,css,info,txt,
  md,yml path/to/directory
```

Themes

Themes

- Themes are created by Drupal themes.
- This is a collection of templates, styles, JavaScript and preprocess methods that allow Drupal to be customised.
- Themes can be extended from other themes or created as stand alone.

Themes

- Themes are kept in the `themes` directory in the Drupal web root.
- Just like modules, themes are separated into `contrib` and `custom` directories.

Themes - *.info.yml

- A theme needs *.info.yml file.
- This needs to contain the following as a minimum.

```
name: "Our Theme"
type: theme
core_version_requirement: ^8 || ^9
description: 'This is our theme'
base theme: classy
```

Themes - Base Themes

- There are a number of build in base themes to use.

```
bartik - the default theme
claro - the new admin theme
classy - a basic theme that adds classes
olivero - the new default theme
seven - the default admin theme
stable or stable9 - basic theme
stark - a bare bones theme
starterkit_theme - a new starter kit theme
```

Themes - Base Themes

- If you want to create a stand alone theme use this:

```
base theme: false
```

Themes - Regions

- Regions are added to yout *.info.yml file.
- Drupal will define some default regions.

```
regions:
  sidebar_first: 'Left sidebar'
  sidebar_second: 'Right sidebar'
  content: 'Content'
  header: 'Header'
  primary_menu: 'Primary menu'
  secondary_menu: 'Secondary menu'
  footer: 'Footer'
  highlighted: 'Highlighted'
  help: 'Help'
  page_top: 'Page top'
  page_bottom: 'Page bottom'
  breadcrumb: 'Breadcrumb'
```

Themes - Libraries

- Libraries can be added to your theme.
- Create a library using a *.libraries.yml file.
- Inject a reference to the library in the *.info.yml file.

```
libraries:
  - mytheme/theme_library
```

- You can reference any library in the site, but best practice is to include the library with the theme.

Themes - Templates

- Templates can be overridden.
- Use the theme debugger to see what templates are being used.
- Copy the file (and rename if needed) to override the template.

Themes - Templates

- Some useful templates:
  - html.html.twig - The outermost elements of the page.
  - page.html.twig - The basic pathe structure, including the regions.
  - node.html.twig - The internal content of the node.

Themes - Suggestions

- Tempaltes will be selected based on their name.
- A list of suggestions will be used to pick the most relevant template.
- For example, the node.html.twig template can be overwridden using one of the following:

```
node--<node ID>--<view_mode>.html.twig
node--<node ID>.html.twig
node--<bundle>--<view_mode>.html.twig
node--<bundle>.html.twig
node--<view_mode>.html.twig
```

- Order is top to bottom.

Themes - Suggestions

- To override the node.html.twig template you need to create a copy of the file and rename it.
- To override an article node when viewed in full mode add the following file.

```
node.html.twig -> node--article-full.html.twig
```

Themes - Suggestion Hooks

Add template suggestions for custom theme elements.

```
hook_theme_suggestions_HOOK(array $variables)
```

Alter any template suggestions to add your own suggestions.

```
hook_theme_suggestions_HOOK_alter(array &$suggestions, $variables)
```

These hooks must be placed in *.theme or *.module files (or at least be available at any time).

Themes - Suggestion Hooks

- Use a hook_theme_suggestions_HOOK_alter() hook.

```
function mytheme_theme_suggestions_node_alter(
array &$suggestions,
array $variables
) {
    $suggestions[] = 'node__common';
}
```

- Create the template `node--common.html.twig`

Themes - Suggestion Hooks

- Remember the order of suggestions. Adding a suggestion like this will override all template suggestions.
- Convention is to separate parts of the suggestion with a double underscore (__),
- All '_' are translated to '-' in the template filename.
- Remember view modes when adding suggestions.
- NOTE: Suggestions are cached!

Themes - Twig

- Twig is a template engine.
- `{{ var }}` to print a property called "var".
- Twig understands arrays and objects and with automatically find the relevant part.
  `{{ var.prop }}` will mean Twig searches through, `var['prop']`, `var->prop`, `var->getProp()`.

Themes - Twig

- Twig control strictures are contained in `{% %}` tags.
- For example, to print `var` if it contains something:

```
{% if var %}
  {{ var }}
{% endif %}
```

Final Notes

Design Philosophy

- Think about modules in the most generic way possible. Even when naming it.
- Use contfiguration to control what your module acts upon.
- You should be thinking "this might make a good contrib module".
- Collaboration over competition.

Community

- Drupal follows a Code of Conduct.
  - Be considerate
  - Be respectiful
  - Be collaborative
  - When we disagree, we consult others
  - When we are unsure, we ask for help
  - Step down considerately

Community Working Group

- If you have a problem, the Community Working Group can help.