

# Opening The Black Box

**Howdy!**  
**I'm an engineer at**  
**Acquia**

**Dustin Younse**  
**@milsyobtaf**

**<https://github.com/milsyobtaf/prez>**

# What Is Debugging?



**Glitch**    
@glitch

Follow



My code once took down a client's Intranet mid-demo. Tell us your coding screw-ups, so we can show new coders [#weallmakemistakes](#) 🙋

**Glitch**   @glitch

This Junior Dev nuked the prod db on 1st day of new job:  
[reddit.com/r/cscareerques...](https://reddit.com/r/cscareerques...)

Retweets  
**330**

Likes  
**617**



5:02 AM - 13 Jun 2017

 335

 330

 617



**Zach Holman**

@holman

Follow



Replying to @glitch

i shipped github to production in development mode, that was neat

Retweets

9

Likes

85



6:46 AM - 13 Jun 2017



2



9



85



**jennosaur js** 🏔️🏔️🏔️

@jennschiffer

Follow



i miiiight have also taken down the china nba site for a few min while switching the nets from nj to brooklyn (long after they moved fyi)

Likes  
**26**



6:24 AM - 13 Jun 2017



1



26



**K Cravens**

@CakeRavens

Follow



Replying to @glitch

My first client patch caused all their W2's to print with the "deceased" box checked. It was a nunnery. I KILLED AN ENTIRE NUNNERY.

Retweets  
**30**

Likes  
**155**



5:10 AM - 13 Jun 2017



3



30



155



**Dustin Younse**

@milsyobtaf

Follow



Replying to [@glitch](#)

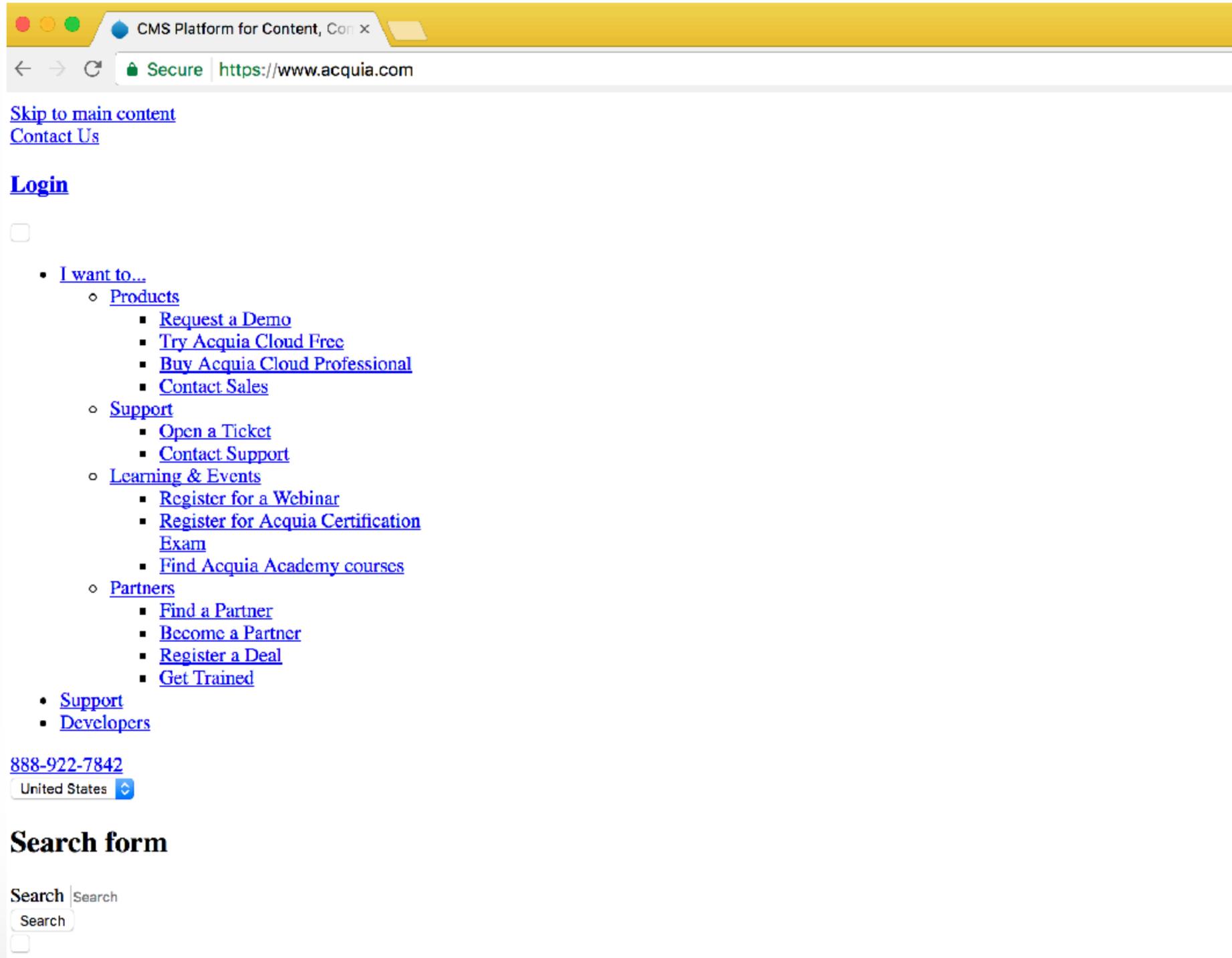
I took down a university library on the 1st day of the semester with a botched FTP transfer of .htaccess. Better than Finals Week I suppose.

10:21 AM - 14 Jun 2017



# What Is Debugging?

# Nothing But Text?



The screenshot shows a web browser window with the URL <https://www.acquia.com>. The page content is as follows:

[Skip to main content](#)  
[Contact Us](#)

**Login**

- [I want to...](#)
  - [Products](#)
    - [Request a Demo](#)
    - [Try Acquia Cloud Free](#)
    - [Buy Acquia Cloud Professional](#)
    - [Contact Sales](#)
  - [Support](#)
    - [Open a Ticket](#)
    - [Contact Support](#)
  - [Learning & Events](#)
    - [Register for a Webinar](#)
    - [Register for Acquia Certification Exam](#)
    - [Find Acquia Academy courses](#)
  - [Partners](#)
    - [Find a Partner](#)
    - [Become a Partner](#)
    - [Register a Deal](#)
    - [Get Trained](#)
- [Support](#)
- [Developers](#)

[888-922-7842](#)  
United States 

**Search form**

Search

# Nothing But Text?

- CSS aggregated but not cached
- JS blocked in the browser
- File permissions in sites/default/files

# Debugging vs Troubleshooting

- Mostly a semantic difference
- 5 minutes vs 5 hours?
- “Fixed” vs understood and corrected

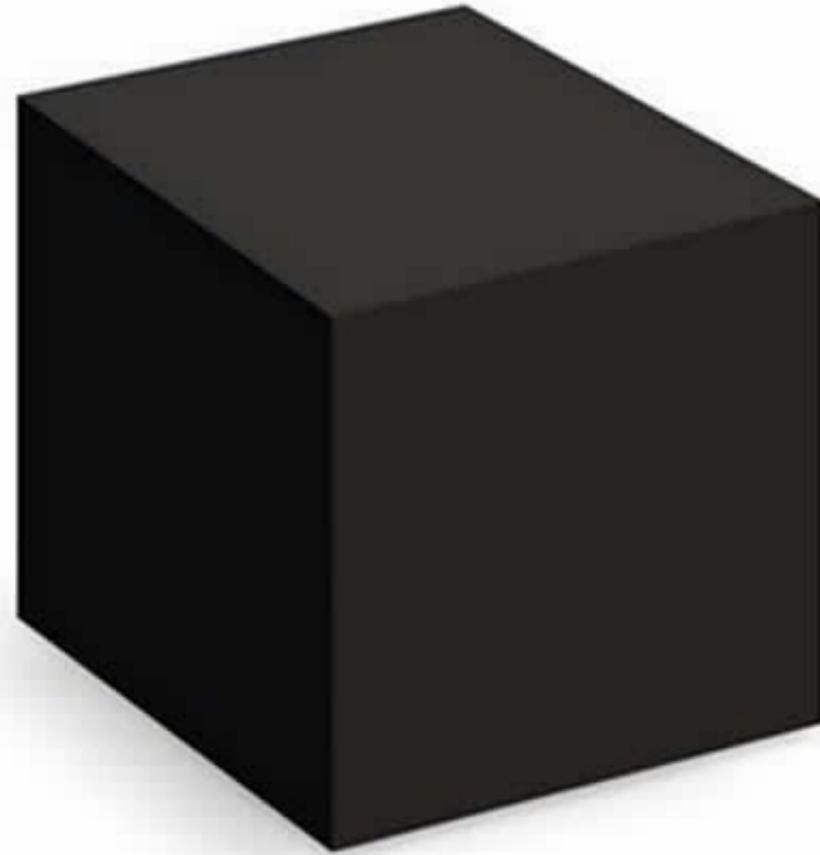
# What Is The Black Box?

# A Familiar Story?

- Non-technical education
- Self taught web skills
- Above average Googling abilities
- Late nights staring at error messages

# What Is Drupal?

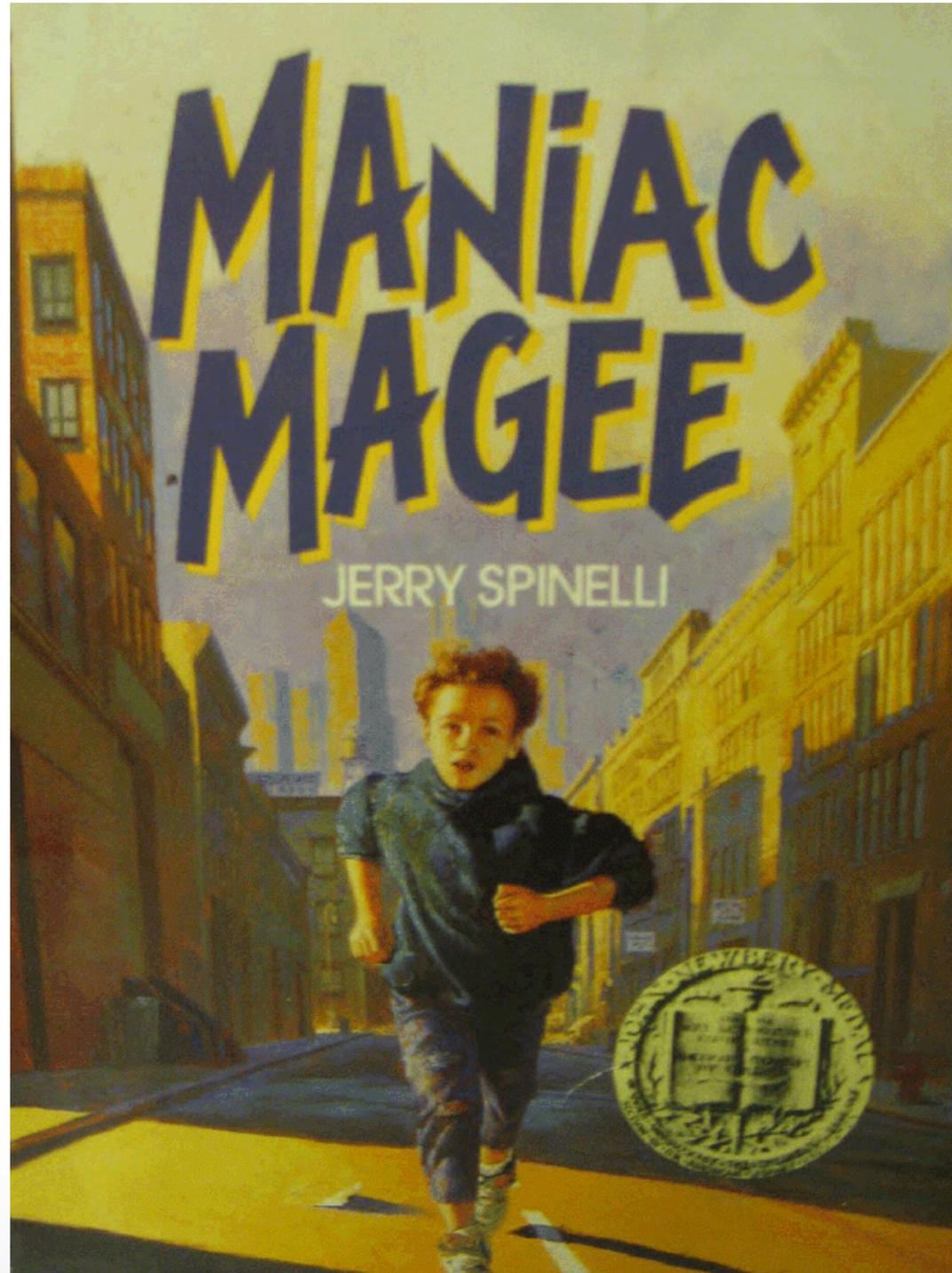
# Mental Model of Drupal



# Mental Model of Drupal



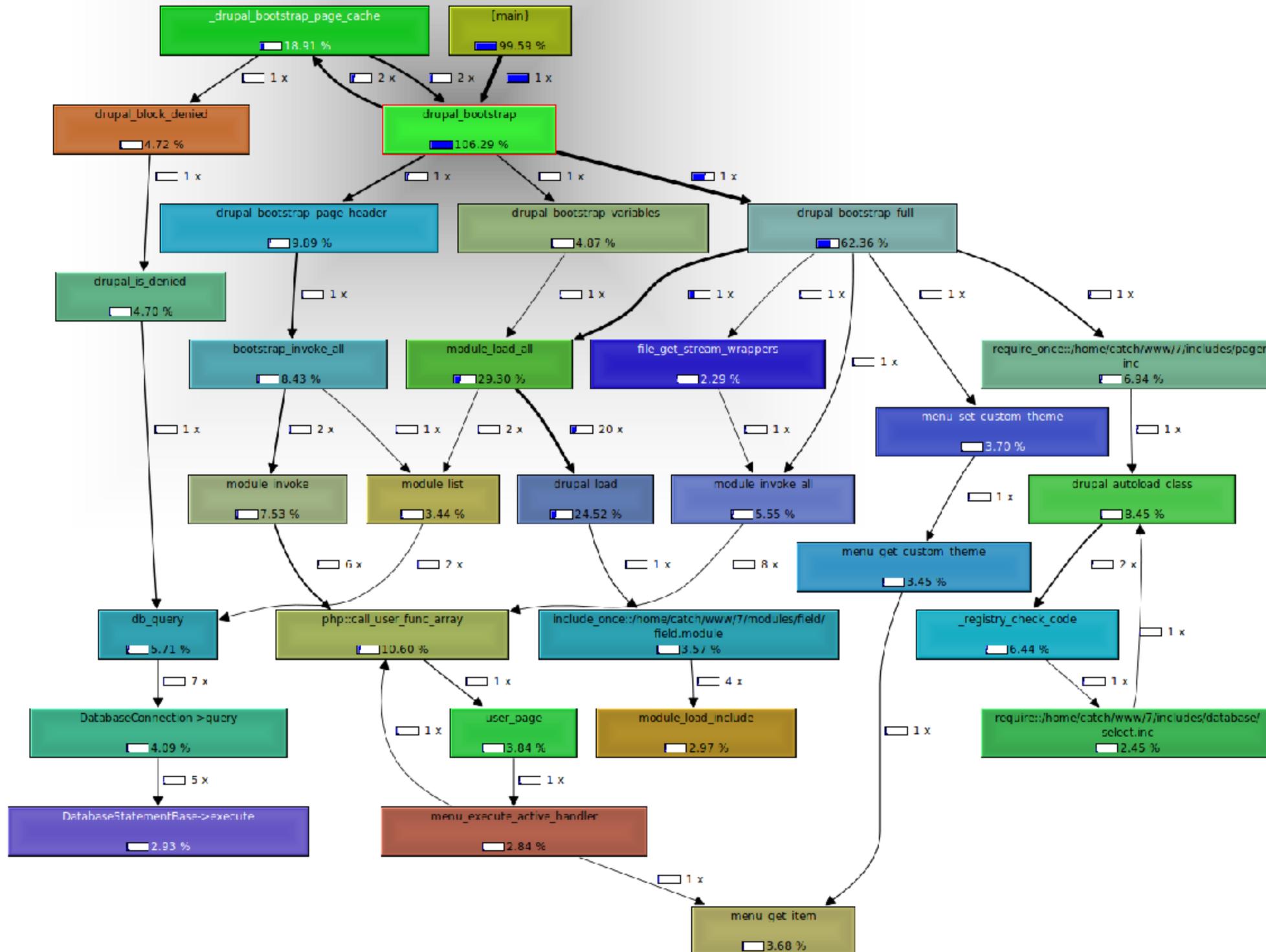
# Mental Model of Drupal



# Mental Model of Drupal

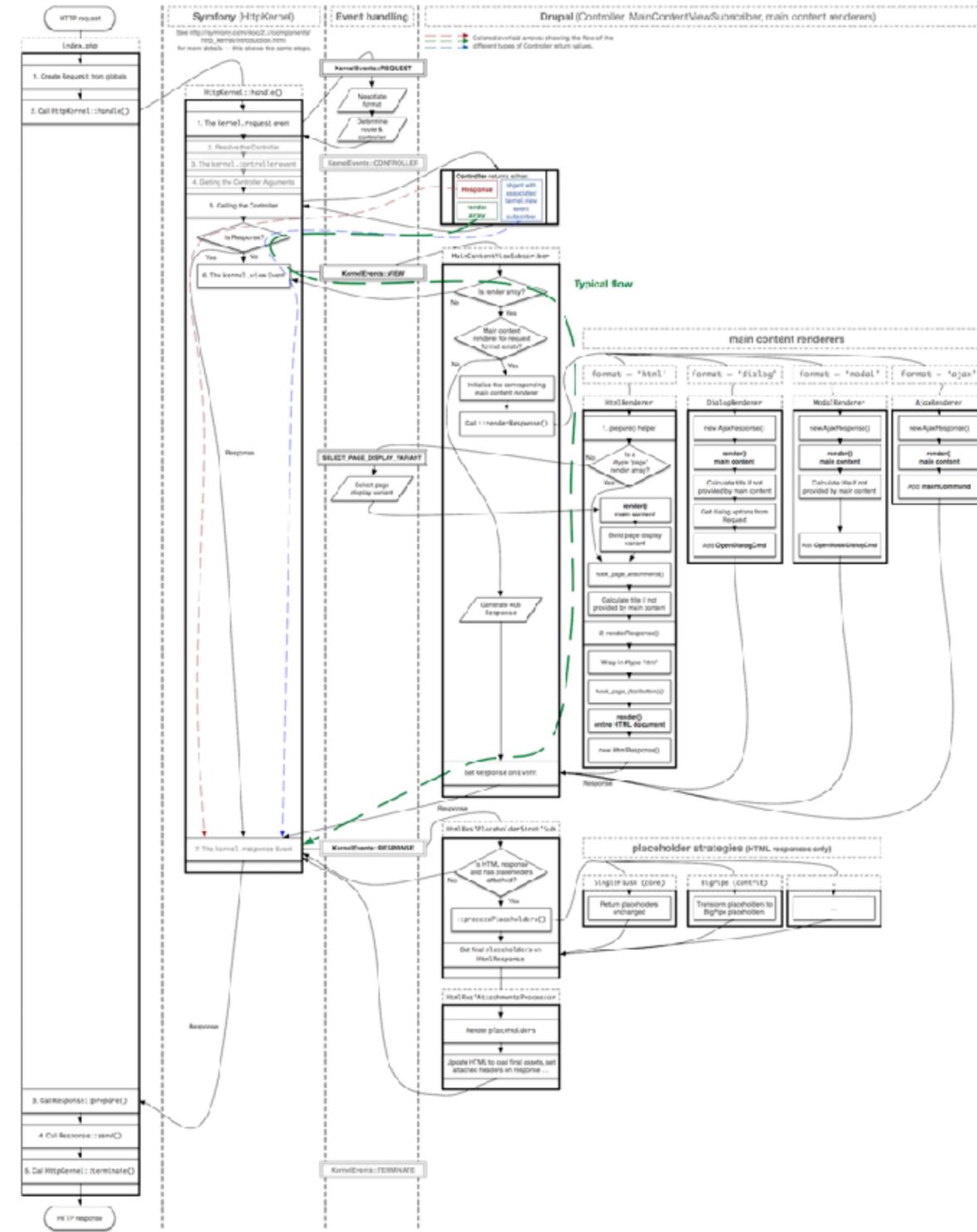


# Mental Model of Drupal



# Mental Model of Drupal

Request handling and rendering flow



**Explanation**

Some parts are greyed out because they're of lesser importance; they do happen, but are not crucial for understanding the flow.

**Example GET index.**

Typically the format will be `html`, but it could also be `xml`, `css`, `media`, `print`, `full`, `json`, and `atom`. (See Symfony's Request and Response.)

Example: `index.php` → `systemAdminView`

The view has the following structure:

```

    controller: 'Drupal\SystemController\SystemAdminMainBookPage'
    title: 'Administration'
    controller is set to 'Drupal\SystemController\SystemAdminMainBookPage'
  
```

`Drupal\SystemController\SystemAdminMainBookPage` is called, it returns a `render array` with its page.

`MainContentNewSubscriber` only looks at the `render array` if the `render array` is an object, then it'll call the `KernelEvents::VIEW` event subscriber to turn it into a `Response`.

`MainContentNewSubscriber` looks at the available main content renderers services. These are tagged with `renderer_content_renderer`. Distributed modules can add additional renderers.

The flow for all four formats supported in core in their request is displayed next, but the explanations below only apply to the `html` renderer.

If an untagged format was requested, a 403 response is generated.

**Example `BlockPageAttachments`.**

The main content must already be rendered, because it might set the page title.

The result of a full page display variant is a `Page` object, not an array.

`hook_page_attachments()` operates on `Page`.

**Only accepts render arrays of type `page`!**

Renders the 3 parts of the HTML: `body`, `page`, `foot`, `page`, `bottom` (where `page` corresponds to `type` "page" and `foot` to `page.footer`). These render the entire HTML. (E.g. the `index.html` template.)

Note that `HtmlResponse` as well as `ApiResponse` at the point will contain `attachments` as `asset` objects, `headers`, ... but also `placeholder`.

**CustomPlaceholderStrategy looks at the available placeholder strategies. These are tagged with `placeholder_strategy`.**

Custom modules can add additional renderers.

Placeholder strategies can transform standard Drupal placeholders (designed for non-deferred rendering) into other placeholders, which may be replaced with the final markup using any way possible. For example: `ogp:cs` ...

`ogp:cs` is a contrib module during 4.7.x, will be in 4.7.x core. See <https://www.drupal.org/project/ogp>.

Process all other `HtmlResponse` attachments `asset` objects, `HTML`, `headers`, `headers`, ...

`ogp:cs` placeholders rendered at the end of `render()`, after `main` is sent.

**Example response for the path `index`.**

Start At The Beginning

# When All You Have Is A Hammer



# Text Editors

- “Text Editors”
- Text Editors
- IDEs

# “Text Editors”

- Notepad (Windows)
- Text Edit (Mac)
- Nano (Linux / Mac)

# Text Editors

- Notepad++ (Windows)
- Dreamweaver (Mac / Windows)
- Sublime Text (Mac / Linux / Windows)
- Atom (Mac / Linux / Windows)
- vim (Mac / Linux)

# Integrated Development Environments

- PHPStorm (Mac / Linux / Windows)
- Eclipse (Mac / Linux / Windows)
- Komodo (Mac / Linux / Windows)

# Operating Systems With Built In Text Editors

- emacs (Mac / Linux / Unix / Everything else)

# Development Environments

- On your server
- On your machine
- On your machine, but it acts like the server

# Development Environments

- FTP Development
  - “Cowboy coding”
- Local Environments
  - MAMP / LAMP / Vagrant
- Next generation
  - Kalabox / Lando CLI
  - DrupalVM

# FTP Development

- FTP Development
  - “Cowboy coding”
  - No version control up front
  - Little debugging visibility
    - Log files (maybe), debug statements
    - Watchdog logs (maybe)

# Debug Statements in Code

- `print_r()`
  - Raw dump of a variable or context, no formatting
- `print_r($node);`
  - `<pre><?php print_r($node); ?></pre>`
- `dsm()` / `kint()`
  - Formatted dump of a variable or context
- `dsm($node);`

# Local Development

- MAMP / Dev Desktop / Native LAMP
  - Code runs entirely locally
  - Added bonus of offline work, no internet required
- `print_r()`, `dsm()`, `kint()`, but also more
- `xdebug`

# Local Development: The Next Generation

- Kalabox / Lando with Pantheon / Acquia integration
- DrupalVM and other custom Vagrant boxes
- `print_r()`, `dsm()`, `kint()`, `xdebug`
- Very accurate performance profiling
  - XHProf
  - Blackfire
  - Tidewater

What's xdebug?

# xdebug: Step Through Debugging

- Hitting pause on code execution
- Inspecting the current state of “the stack”
- Modifying values *live*

Something Is Broken!



Relax.



**DHH**

@dhh

Unless you're making software for rockets, self-driving cars, or pacemakers, ease off on the "mission critical" bullshit, yeah?

RETWEETS

**353**

LIKES

**968**



7:22 AM - 15 Feb 2017

50

353

968

Relax.

# Remember Cobble's Knot



# What's Broken?

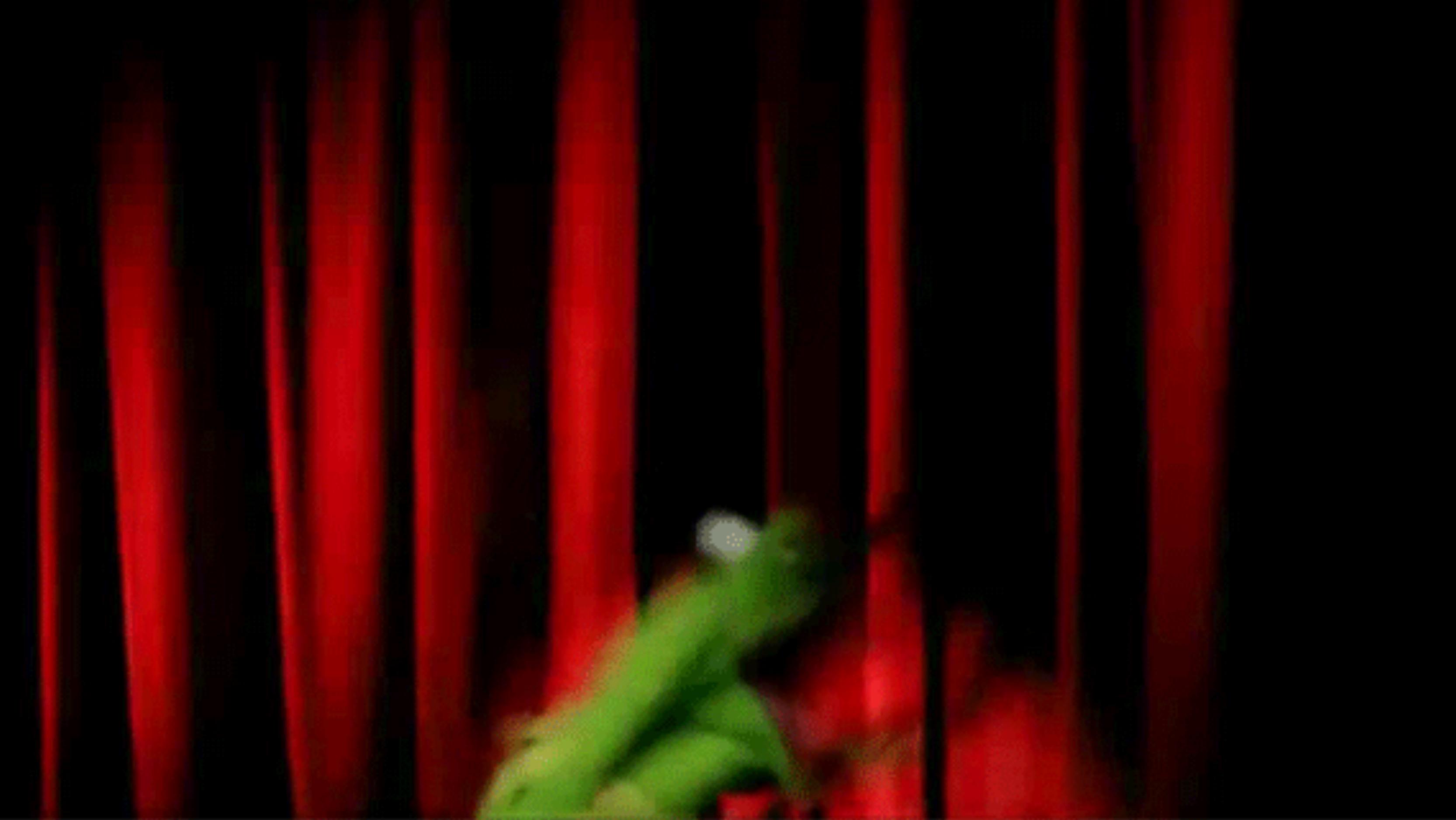
- Is something not showing up?
  - New content - is it published?
  - Old content - are permissions set properly?
- Is something showing up that shouldn't?
  - Raw HTML and Javascript in a WYSIWYG field?

# Work From The Bottom Up

- Log Files
  - You should learn how to find your log files before you need your log files
- multitail
  - Linux / Mac utility to easily view logs with more options than tail

# Where Is It Broken?

- Custom Module
- template.php / .theme file
- Theme Template



# The Scientific Method

# Finally, Debugging

- Change **one** thing at a time
- Test that change
- Repeat

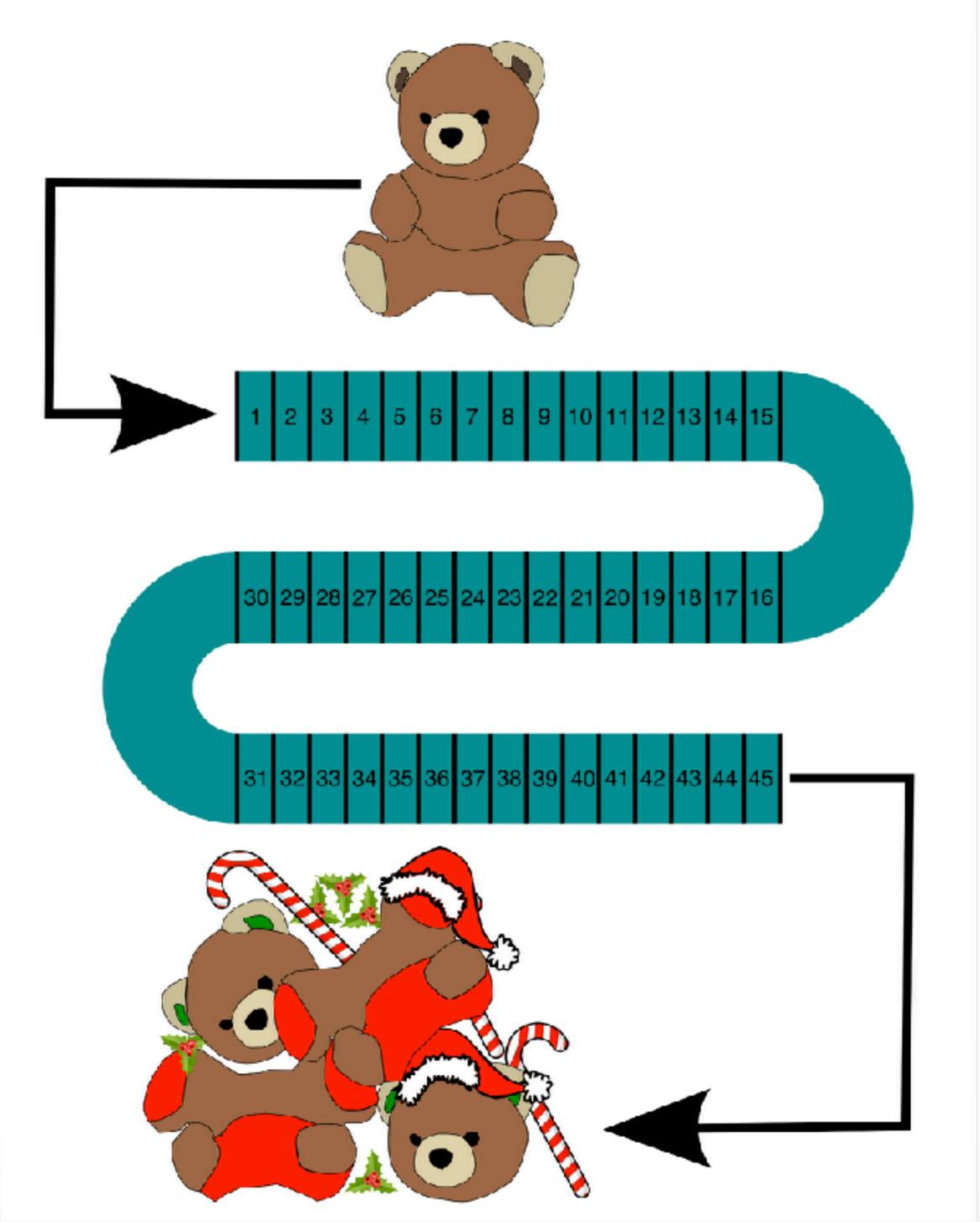
# git Is Your Friend

- Save your progress as you work
  - Recreate your Features or config yml
- Makes rabbit holes manageable

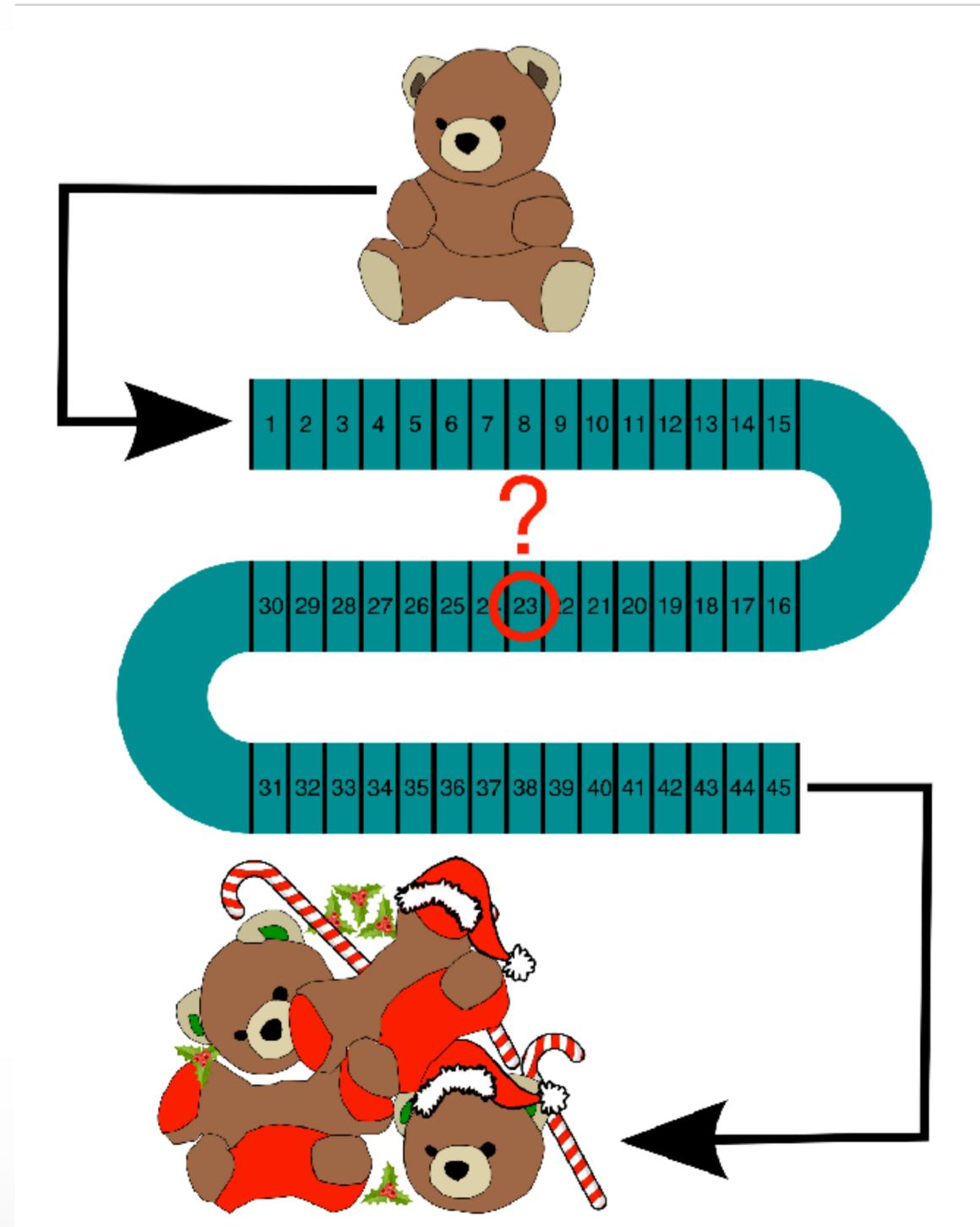
# git bisect Is Your Friend

- Let's you isolate changes between commits

# git bisect Is Your Friend



# git bisect Is Your Friend



# git diff Is Your Friend

- Remove your debug statements
- Ensure you only changed **as much** as you needed to change
- You only commit **dsm('Butts')**; to master **once**

# `git blame` Finds Your Enemies

# git blame ~~Finds Your Enemies~~

# git ~~blame~~ Is *Your* Friend

# git annotate Is *Your* Friend

- Can help you track down who wrote the offending code
  - This ***should not*** be a witch hunt
  - This ***should*** be a chance to find context for the issue

# Other Debugging Methods

# Debugging Techniques

- Walk away. Seriously.
- Talk to a coworker.
  - Talk to a rubber duck.
- Write it down. By hand.

Make The Future Easier

# Proactive Debugging

- watchdog() (D7)
- \Drupal::logger() (D8)
- syslog Module
  - <https://www.elastic.co/blog/hey-a-elastic-stack-and-x-pack>
  - <https://loggly.com>
  - <https://www.sumologic.com>
- Write a test!
  - Simpletest
  - Behat

- **The Art of Troubleshooting** by Jason Maxham
  - <https://artoftroubleshooting.com/book/>
- **Debugging: The 9 Indispensable Rules for Finding Even the Most Elusive Software and Hardware Problems** by David Agans
  - <http://debuggingrules.com>
- **Debugging During Development in Drupal 8** by Allie Jones
  - <https://www.gitbook.com/book/zivtech/debug-tools-for-drupal8/>
- **Using the PhpStorm Debugger** by JetBrains
  - [https://confluence.jetbrains.com/x/\\_idqAw](https://confluence.jetbrains.com/x/_idqAw)
- **Maniac Magee** by Jerry Spinelli
  - <https://www.worldcat.org/oclc/20422223>

**Further  
Reading**

**Thanks!**  
**Questions?**  
**War stories?**

**@milsyobtaf**

**<https://github.com/milsyobtaf/prez>**