COMP6205: Web Development

Content Management Systems (CMS)

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December 17
What is a Content Management System (CMS)?

- Using the term “CMS” is like using the term “vehicle.”
- Vehicle might actually refer to a bus, a tractor, a limousine, a spaceship, or a hovercraft
  - they are all machines that take people from one place to another.
- In the same way, a CMS is something that manages your content.
  - but each type of content management system support different kind of resources, manages them for different purposes and for different reasons.
Common Features of a CMS

- A software platform that aids in the management of content on a server.
- It provides different levels of access depending on role.
- A CMS serves as a store for a wide range of information assets, including text, image databases and so on.
- It facilitates workflow management system.
- A presentation layer displays the content to regular website to visitors based on a set of templates.
- Administration is typically done through browser-based interfaces.
Different Types of CMS

• **Web Content Management Systems (CMS)**
  - A CMS designed to simplify web-based publications for users who author web based content
  - Users with little or no knowledge of HTML can create and manage Web sites content.

• **CMS typical functions:**
  - Create / maintain Web sites
  - Add / edit / delete pages, documents, news, images, files, forms, events, blogs, ...
  - Manage navigation, users, permissions, SEO, ...

• **Examples:** WordPress, Joomla, Drupal
Different Types of CMS – Cont.

- **Enterprise Content Management System** (ECMS)
- A set of defined *processes, strategies and tools* that allow a business to effectively *obtain, organize, store* and *deliver* critical information to its employees, business stakeholders and content and documents.
  - **Intranet-like tool** that allows everyone in the company to access, manage, and review documents, templates, media, and other information assets.
  - Also it may include collaborative features like wikis.
  - Can be essential in a highly litigated industry, like healthcare.
  - **Examples:** SharePoint, HyperOffice, Oracle WebCenter Content, IBM Enterprise Content Manager
ECMS Manages All Content Types, (Unstructured)

- Graphics
- Different file formats (PDF, MSWord)
- Sound
- Video
- Web Content
- E-mail
- FAX
- Paper
Technologies To Manage Unstructured Data

• Document Management
• Web Content Management
• Digital Asset Management
• Electronic Records Management
• Business Process Management
• Enterprise Report Management
• Information Lifecycle Management
ECM Applications

- **Education**
  - Student Records
  - Standardized Tests
- **HealthCare**
  - Patient Records
  - Claim Processing
- **Transportation**
  - Proof of Delivery
- **Insurance**
  - Applications
  - Insurance Claims
- **Legal**
  - Client Records
  - Case Reports
- **Government**
  - Historical Records
  - Compliance Documents
- **Banking/Financial Services**
  - Mortgage Documents
  - Transactions
Types of Content Management Systems

• **Learning Content Management System (LCMS)**
  – Stores, manages, and publishes or allows users to experience **learning and training content**.
  – Examples: Absorb LMS, Accord LMS, Moodle, ..
Similarities Between Different CMS Types

• Storing content
• Controlling access to content
• Checking content in and out
• Managing the lifecycle of content – from creation through to final disposition (archive or destruction)
• Allowing automatic and on-demand version control (know the history of changes and when each one was published)
• Searching for content
• Publishing content (sometimes)
• Providing analytics or reports
Benefits of CMS

- Allows multiple authors to contribute to and share content
- Controls access to content based on user roles
- Separates content from design
- Aids in easy storage and retrieval of content
- Saves development time
- Reduces repetitive duplicate input
- Access site from any device with Internet access
- Less technical knowledge is required to create/manage new content
Benefits of CMS Systems

• WYSIWYG editor
  – No need for advanced HTML or CSS skills
  – Can paste content from a word processor

• Web-based access
  – Edit content from any computer
  – Staff can change content immediately
    • No waiting for Web admin to upload the content
  – Support for many types of documents and files
What is a Content Management System (CMS)?
CMS Components

• There is no standard set of components but these are some common aspects of CMS:

1. The Database (ODBC, SQL)
2. The Middleware Language (PHP, ASP, ColdFusion, Django, Joomla, Drupal. . .)
3. The Business Logic Layer (programs and scripts that deliver the right content to the right audiences)
4. The Presentation Layer (HTML, XML, XSLT CSS, JavaScript and AJAX that formats the . . .)
5. Content (text, images, video, audio files, etc).
6. The Administrative Layer (authorizations, logins, rights)
7. The Approval System (the organizational chain of command)
8. The Workflow System (the personnel with various rights to access and knowledge of their roles and sequences)
Key Features

- Automated templates
- Easily editable content
- Scalable feature sets
- Web standards upgrades
- Workflow management
- Delegation
- Document management
- Content virtualization
Key Features

Automated templates

• Create standard output templates (usually HTML and XML) that can be automatically applied to new and existing content

• Allows the appearance of all content to be changed from one central place.
Key Features

Easily editable content

- Once content is separated from the visual presentation of a site, it usually becomes much easier and quicker to edit and manipulate.

- For example most of WCMS platforms includes WYSIWYG editing tools allowing non-technical individuals to create and edit content.
Key Features

Scalable feature sets

- Most WCMS software includes plug-ins or modules that can be easily installed to extend an existing site's functionality.

Web standards upgrades

- Active WCMS software usually receives regular updates that include new feature sets and keep the system up to current web standards.
Key Features

Workflow management

- Workflow is the process of creating cycles of sequential and parallel tasks that must be accomplished in the CMS. e.g:
  - A content creator submits a story
  - The copy editor cleans it up
  - The editor-in-chief approves it.
  - Only then is it published.

Sample Roles

- Content Editors, Content Approvers, Web Developers, CMS Administrators
Key Features

Delegation

- Allows various user groups to have limited privileges over specific content on the website.
- Spreads out the responsibility of content management.
Key Features

Document management

• Provides a means of managing the life cycle of a document:
  – initial creation
  – revisions
  – publication
  – archive
  – document destruction.
Key Features

Content virtualization

- Allows each user to work within a virtual copy of the entire Web site
- Enables changes to be viewed and/or executed in-context prior to submission.
Key Features

Separation of concerns

– Content/presentation, data/business logic

• Visual consistency
  – Page layout, formatting, navigation
  – Each page must choose a template

• More findable, usable, accessible
  – Easier compliance with Web standards
  – Easier Search Engine Optimization
Key Features

Efficiency and quality assurance

• Specialisation of roles
  – Content, edit/publish, design, code, admin
• Better content management tools
  – Workflows – assure key pages are reviewed
  – Version history – view and roll back changes
• Better admin tools
  – User and permissions management
  – Global search and replace - URLs, Web authors
• Remix content
  – No redundant copies of information
  – Form data, RSS feeds, A-Z, sitemap, breadcrumbs
What it does not do

• Does not write content or create images!
• Does not create site structure – needs planning
• Is not a design tool
• Does not automatically link pages in to a site and make them visible
• It is not fully WYSIWYG
Selection Criteria

- Free or relatively low cost
- Maturity, stability, performance
- Flexible open-source development framework
- Ease of use
  - Good match for expertise of technical staff
  - Installation, configuration, customization
  - Integration with existing systems/apps
  - Edit and manage many content types
  - Manage users, roles and workflows
  - Documentation and support
Some CMS systems

• Commercial
  – Microsoft SharePoint
  – Adobe Contribute
  – CSU Department of Web Communications

• Open Source WCMS
  – Drupal (PHP/MySQL)
  – Joomla! (PHP/MySQL)
  – Plone (Python)
  – Alfresco (Java)

• List of Content Management Systems
Examples of WCMS - WordPress

- WordPress is one of the world's leading blog and Web CMS systems
  - Open-source (free) software
  - Written with PHP and MySQL database
  - Stores all Web site contents in the database and images/files in the file system
  - Very powerful, Easy-to-use, SEO friendly
  - Very large community – themes, plugins, ...
  - Official Web site: [www.wordpress.org](http://www.wordpress.org)
  - create your new WordPress.com site!
    - [https://wordpress.com/](https://wordpress.com/)
What is WordPress?

• Is a content publishing tool for the web. Originally designed as a “blogging” tool, it is now a fully featured, custom website, creation tool.

• Is good for:
  
  – Rapid development of and attractive, easy to use, publicly accessible web sites.
  
  – Mixing blog content with static content for an informative and up-to-date “news” type web site.
Installing and Running WordPress

• Installing WordPress
  – In the cloud (use WordPress as service)
    • Just create and account at www.wordpress.com
  – At your Web hosting provider
    • Download it (e.g. wordpress-4.6.1.zip)
    • Unzip it in some public directory at the server
    • Create the database and run the install script
  – Self-hosted
    • Install XAMP + WordPress at your local machine
    • XAMP = Windows + Apache + MySQL + PHP
WordPress Dashboard

• The WordPress Dashboard is:
  – The administrative interface of WordPress
  – Create / edit / delete pages, posts, categories, tags, comments, documents, images, files, ...
  – Manage users, themes, widgets, plugins, settings, ...

• User-friendly UI
  – WYSIWYG editor
  – Media library
WordPress Themes

- Typical WordPress themes consist of
  - Main index template – index.php
  - Page template – page.php
  - Header – header.php
  - Footer – footer.php
  - Sidebar – sidebar.php
  - Comments template – comments.php
  - Styles – styles.css
  - Theme functions – styles.css
Why use Wordpress?

• **Open Source Software:** This basically means the software is free to download and use

• **Easy to Install:** Good web hosting companies offer quick one click installation of wordpress and have optimised systems to work seamlessly with the platform.

• **Great Themes:** A theme provides the look of your website, there are many good free themes and premium (paid) themes available to give your site the feel you want.

• **Plugins:** Plugins add additional features to your website
Why use Wordpress?

- **S.E.O:** SEO (Search Engine Optimization) this is making your site search engine friendly and getting it to appear high up in the search engine results page.
  - Generally wordpress is very SEO friendly but there are also some excellent SEO plugins to fine tune your website.

- **Simple CMS:** CMS (Content Management System) this allows the user to publish and edit their content easily and quickly.

- **Expandable and Adaptable:** A wordpress business website can be as big as you want it to be, from a simple blog page to large website with a number of complex features including ecommerce.
Joomla WCMS

https://www.joomla.org/
Joomla WCMS

• Open Source - i.e. free

• But you'll have to pay somebody to personalise it, install it, back up the database every week and sort out hiccups

• Latest Release Joomla! 3.6.4

• Main technologies: PHP, MySQL

• Also uses JavaScript, HTML, CSS
Joomla WCMS

Users:

• Front end access only:
  – Author: can create content.
  – Editor: Can create and edit content
  – Publisher: Can publish content

• Front and Back end access:
  – Manager: Can change menus & site structure
  – Administrator: Can install/uninstall modules
Joomla WCMS

Features:

- On-line editing
- Restricted access levels
- Workflow management
- Polls: plugin for displaying the vote results
- Contact Forms
- Site statistic display
- Detailed statistics for admin
- Search function
- PDF for readers
- RSS
Joomla WCMS

Operation:

• Menu led not page led
• (Entering an article does not display it)
• Menu item controls:
  – Articles
  – Modules (menus, polls, statistics etc)
  – Layout on page
• Same article on different menu can appear differently
Joomla WCMS

• About Joomla!
  
  https://www.joomla.org/about-joomla.html

• Getting Started with Joomla!
  
  https://www.joomla.org/about-joomla/getting-started.html

• Joomla! Trainings:
  
  https://community.joomla.org/joomla-training.html
# Requirements for Joomla! 3.x

<table>
<thead>
<tr>
<th>Software</th>
<th>Recommended</th>
<th>More information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHP</strong>&lt;sup&gt;[1]&lt;/sup&gt; (Magic Quotes GPC off)</td>
<td>5.6 or 7.0 +</td>
<td><a href="https://secure.php.net">https://secure.php.net</a></td>
</tr>
<tr>
<td><strong>MySQL</strong>&lt;sup&gt;[2]&lt;/sup&gt; (InnoDB support required)</td>
<td>5.5.3 +</td>
<td><a href="https://www.mysql.com">https://www.mysql.com</a></td>
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<tr>
<td><strong>SQL Server</strong></td>
<td>10.50.1600.1 +</td>
<td><a href="https://www.microsoft.com/sql">https://www.microsoft.com/sql</a></td>
</tr>
<tr>
<td><strong>PostgreSQL</strong></td>
<td>9.1 +</td>
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<tr>
<td><strong>Apache</strong>&lt;sup&gt;[3]&lt;/sup&gt; (with mod_mysql, mod_xml, and mod_zlib)</td>
<td>2.4 +</td>
<td><a href="https://www.apache.org">https://www.apache.org</a></td>
</tr>
<tr>
<td><strong>Nginx</strong></td>
<td>1.8 +</td>
<td><a href="https://www.nginx.com/resources/wiki/">https://www.nginx.com/resources/wiki/</a></td>
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<tr>
<td><strong>Microsoft IIS</strong>&lt;sup&gt;[6]&lt;/sup&gt;</td>
<td>7</td>
<td><a href="https://www.iis.net">https://www.iis.net</a></td>
</tr>
</tbody>
</table>
Examples of WCMS – Drupal

- Drupal is open source content management software maintained and developed by a community of more than 35,000 developers around the world who have contributed to the project.

- It is distributed under the terms of the GNU General Public License (or "GPL"), which means anyone is free to download it and share it with others.

- Drupal is not, as is commonly quoted, just as a content management system (CMS).

- It's actually much more than that and it is a "content management framework"
Drupal 8

- Drupal 8 is the latest release on the Drupal journey, and one that is substantially more powerful than previous versions.
- Responsive Out of the Box and support for mobile and HTML5 and WYSIWYG in Its Core
- Better configuration management.
- Drupal 8 requires PHP 5.3.10 or higher, it uses Symfony - a flexible, fast and secure engine for PHP, stricter separation of concerns by introducing TWIG for templating
The Drupal Business Model

• Drupal is free.

• How is that possible?

• Drupal is run by volunteers working for Drupal businesses.

• Drupal is free: but Drupal sites often aren’t.

• Drupal is still led by it’s founder, Dries Buytaert.

• His company Acquia runs much of Drupal’s products, services and support.

• When you download and install Drupal, you are installing what is commonly called Drupal core.
Drupal Basic Concepts

- When you first start learning Drupal, there are some key terms that you will come across, which are used to define the components of the system. These are:
  - Modules
  - Entities
  - Nodes
  - Fields
  - Taxonomy
  - Blocks
  - Views
  - Themes
  - Hooks

- Understanding these terms and how they relate to one another will ease your journey into Drupal
Drupal Basic Concepts – Modules

- Drupal is highly modular in its design; you can switch on or off various bits of functionality by enabling/disabling modules, and you can also extend the system by adding new modules.

- Other systems may describe modules as plugins—the two are synonymous.

- The term Drupal core refers to the set of modules that are present in the main Drupal download that you have just installed.

- In Drupal 8, the core modules are located in the /core/modules folder.
Drupal Core

- Core represents the “engine” that powers a Drupal-based website, along with a number of out-of-the-box features that enable the creation of a relatively full-featured website.

- The primary components of Drupal core include capabilities to create and manage:
  - Content, file uploads/downloads, menus, user accounts, roles and permissions, taxonomy, discussion forums, views to extract and display content in various forms such as lists and tables, WYSIWYG-based content editor

- Drupal core also includes a feature-rich search engine, multilingual capabilities, and logging and error reporting.
Extending Drupal with Contributed Modules

- If you can't find your required functionality in the core it’s very likely that someone else has had the same functional requirement and has developed a solution to extend Drupal core to provide the functionality that you need.

- Visit the Drupal website at: [www.drupal.org/project/project_module](http://www.drupal.org/project/project_module). You will find a general list of categories and the current number of contributed modules.

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Administration</td>
<td>1145</td>
</tr>
<tr>
<td>Community</td>
<td>614</td>
</tr>
<tr>
<td>Content</td>
<td>1981</td>
</tr>
<tr>
<td>Content Display</td>
<td>1612</td>
</tr>
<tr>
<td>Content Construction Kit (CCK)</td>
<td>673</td>
</tr>
<tr>
<td>Developer</td>
<td>960</td>
</tr>
<tr>
<td>E-commerce</td>
<td>892</td>
</tr>
<tr>
<td>Media</td>
<td>778</td>
</tr>
<tr>
<td>Third-party Integration</td>
<td>1908</td>
</tr>
<tr>
<td>Utility</td>
<td>1959</td>
</tr>
</tbody>
</table>
Extending Drupal – Cont.

- The most popular contributed modules, and the ones that you will likely want to install:

  - **Commerce**: A full-featured web storefront module that provides all of the mechanisms required to sell products, collect credit card payments, and manage shipments.
    - If you want to sell something on your website, this is the module you will want to use.

- **Display Suite**: Allows you to take full control of how your content is displayed using a drag-and-drop interface.

- **Calendar**: Provides the ability to create and render a list of events on a calendar.
Extending Drupal – Cont.

• **Backup and Migrate**: Handles scheduled backups of content in your Drupal database, with the ability to restore the database to a previous state based on one of the backup files created by this module.
  – This is a must-have module for any production website.

• **Google Analytics**: Provides a simple to use form for setting up Google Analytics on your site.
  – Google Analytics is a free service that tracks the number of visitors to your website, where those visitors came from, what search terms they used to find your site, the pages they visited, time they spent on your site, and many other useful metrics that will help you to improve your system.
Extending Drupal – Cont.

- **Pathauto**: Creates search engine–friendly URLs by automatically generating a “pretty” URL that is based on the page’s title (such as [www.example.com/examples](http://www.example.com/examples) instead of the default Drupal URL of [www.example.com?node=1234](http://www.example.com?node=1234)).

- **Scheduler**: Provides the ability to specify the date that a node will become published on the site, and the date when a node will no longer be published. This allows a content author to create a node now and have it not appear on the site until some date in the future.
Drupal Basic Concepts - Entities, Nodes and Fields

• **Entities**: everything you create in Drupal is referred to as an entity.

• **Nodes**: most viewable content you create will be of a particular type of entity known as a *node* entity.

• Node types: You may often hear the terms "node entity", "node type", and "content type" interchanged routinely, so it's a good idea to think of these terms as **synonymous**.

• **Fields**: all node entities contain a **Title** property and one or more fields,
  – an example of which is the **Body** field.
Drupal Basic Concepts - Taxonomy

• **Taxonomy**: One of the most powerful features of Drupal is the taxonomy system.

• The word taxonomy comes from the ancient Greek word meaning 'the practice and science of the classification of things.'

• The Drupal's taxonomy system is simply a means of enabling you to classify your content in many different ways.
Drupal Basic Concepts - Taxonomy

• The core taxonomy system allows you to define one or more vocabularies, each of which is a list of terms.

• For example, you may want to define an Article category vocabulary and associate it with your Article content type.

• The Article category vocabulary could contain terms such as "blog" and "news", thus enabling you to classify your Articles.

• The articles classified as blog appear on the blog page, and those categorized as news appearing on the news page.
Drupal Basic Concepts - Blocks

• If you have a layout that contains *sidebars*, *headers*, or *footers*, you will most likely have content that is repeated between pages.

• If you edit this content in one place, you would expect it to be updated on every page.

• This is where blocks come in.

• In Drupal 8, there is another entity type called a *block*.
Drupal Basic Concepts - Blocks

- A **block** is a piece of content that can be placed in a specific region of a page, and you can set rules that determine when (on which actual pages) the block appears, depending on various conditions such as the page URL or the currently logged in user's role(s).

A typical simple website page template
Drupal Basic Concepts - Blocks

• Because Drupal is a modular framework, modules can define a block that you can place on your site.
  – For example, the Commerce module provides a "Shopping cart" block.

• The important point to remember here is that much of the content on your Drupal site appears one way or another, as a series of blocks and blocks are placed within regions on the page.
Drupal Basic Concepts - Views

• Once you have started to create content, it won't be very long before you find yourself in a situation where you need to create lists of it, as follows:
  – A list of article titles with each title linked to the article detail.
  – A list of article "teasers" (shortened versions) linked to the full detail.
  – A list of articles associated with a particular taxonomy term.

• The core module **Views** is a powerful module that enables you to do all this and much more.
Drupal Basic Concepts - Views

- **Views** is a powerful and flexible query-building and content-display tool that can be used to build complex content listing pages to present your content the way you want.

- You can specify the number of items to display in a list and publish your view to a specific URL (a page) or as a block to be included on one or more pages.
Drupal Basic Concepts - Themes

• A *theme* is the Drupal component that defines how the pages on your website are structured and the visual aspects of those pages - defines attributes of your website such as:
  – How many columns of information exist on a page.
  – Whether a page has a banner at the top.
  – Whether a page has a footer.
  – Where navigational menus appear (at the top of the page, under the banner, in the right column, and so on).
  – The colors used on the page.
  – The font and font size used for various elements on a page
  – Graphical elements, such as logos.
  – Hundreds of free themes that are available at [www.drupal.org/project/project_theme](http://www.drupal.org/project/project_theme)
Drupal Basic Concepts - Themes

• A Drupal theme is the engine that provides the framework for the visual layout and design of your site, including bringing together the CSS, JavaScript, images, and colours.

• A Drupal theme itself determines the visual design of the website you are building.

• All themes have a settings page allowing you to change certain elements of the display, for example the colour scheme used or whether to display the site logo and name.

• The Standard profile installation ships with the Bartik theme. This theme is comprised of 17 page regions into which you can place one or more blocks.

• The 17 regions are shown in the following diagram.
Bartik Theme - Regions

Secondary menu

Primary menu

Highlighted

Featured top

Themes

Breadcrumb

Sidebar first	Content	Sidebar second

Featured bottom first	Featured bottom second	Featured bottom third

Footer first	Footer second	Footer third	Footer fourth

Footer fifth
Drupal Basic Concepts - Hooks

• An important concept in Drupal is the concept of module hooks.

• A module can expose one or more hooks empowering other modules to modify its behaviour.

• This means that if a module doesn't do exactly what you want, you can use a hook to "hook into" the process and change that module's behaviour without having to change the original module code.
Users, Roles and Permissions

• In order to log in to your Drupal 8 site, you will need a user account.

• A site maintenance account was created automatically when you installed Drupal, and the user can perform all actions on this site.

• You may hear this user referred to as *user 1*, which is a reference to the user ID in the database.

• A user is another form of *entity*, and like all other entity types, this means that you can add fields to the user definition in order to include more information in the user account such as forename, surname, and telephone number.
Users, Roles, and Permissions

• Each user is assigned one or more roles, and roles have permissions attached to determine exactly what the user is permitted to do when logged into the site.

• Standard roles are:
  – *Anonymous user*: Assigned to anyone not logged into the site - visitors
  – *Authenticated user*: This is assigned to anyone “logged in to the site
  – *Administrator*: This is for site owners, site maintainers, and site builders

• You can, and most likely will, create additional roles for use on your site.
Installing Drupal

- To install Drupal and get it up and running you need to install Acquia Dev Desktop - available for both PC and Mac users
  - During installation of Acquia Dev Desktop it will prompt you to select a Drupal distribution
  - Scroll down until you see the Drupal 8 installation, and click the Install button next to it.
Installing Drupal – Cont.

• In the next step Acquia Dev Desktop installs required software such as PHP engine, MySQL and Apache on your local host.

• You can accept the default settings and click Finish. However, you may want to change the local site name.
Configuring Drupal 8

- After the basic installation process is complete, you have some configuration work to do.

- You need to choose the language you want to use for your Drupal site.

- On the next screen, you can choose the standard installation or the minimal installation.

- The next screen prompts you for information about the database you’ll be using and asks for a database username.

- In a production Drupal installation, you would set up a MySQL database prior to installing Drupal.
The final screen, “Configure site” is where you enter a valid e-mail address for the site, as well as an admin username, password, and e-mail address.

In addition, you can choose your default country and time zone settings.
Configuring Drupal 8 - Cont.

• Your new Drupal 8 site is up and running on your local machine
Drupal - Architecture

- **Users**
  - User's login to Drupal
  - Drupal uses PHP to run user code

- **Drupal**
  - Give permission to users to login

- **Administrator**
  - PHP sends user code via web servers like Apache, IIS etc

- **Web Server**
  - Accesses user data from data and sends back to user

- **Database**
No False Promises

- HUGE learning curve beyond the basics
- Quicker, but good sites still take time
- Cheaper, but may cost £XX,XXX or more
- More Options, but custom work often needed
- Drupal is not right for every site
- WordPress = very easy, but less features
- Joomla = easier, but less flexibility
References

- Book: *Web Content Management: Systems, Features, and Best Practices*
References

- https://www.acquia.com/resources
- https://www.tutorialspoint.com/drupal/drupal_architecture.htm

- Book