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CMS comparison and analysis from the perspective of a developer

Master’s thesis

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Declaration

Herewith I declare that this thesis is based on my own work. All ideas, major views and data from different sources by other authors are used only with a reference to the source. The thesis has not been submitted for any degree or examination in any other university.

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(*date*)	(*signature*)

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(*kuupäev*)	(*allkiri*)

CMS'ide võrdlus ja analüüs arendaja vaatenurgast

Annotatsioon

Käesoleva töö eesmärk on analüüsida ja anda lühiülevaade kolmest hetkel populaarseimast sisuhaldustarkvarast (CMS), võrrelda nende peamisi omadusi ning rakendusi ja püüda välja arendada kolm malli, mis töötavad kolmel erineval mootoril. Selleks tuleb kindlaks teha iga sisuhaldustarkvara (edaspidi CMS) tugevused ja nõrkused, kirjeldada väljaarendamisprotsessi ja võrrelda neid üksteisega, et leida, milline CMS sobib paremini uuele kasutajale ning milline professionaalsele veebiarendajale, ja millised probleemid ilmnesid loomisprotsessi käigus.

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 61 leheküljel, 3 peatükki, 43 joonist, 3 tabelit.

CMS comparison and analysis from the perspective of a developer

Abstract

The purpose of this work is to analyze and give a short overview of three most popular free content management systems (CMS) existing at the moment, compare their main features, functions and try to develop three own templates which will be operating on three different engines. Identify strengths and weaknesses of each CMS, describe the process of development and compare them with each other in order to find out which CMS suits a novice better and which suits a professional web developer and see problems encountered in the process of creation.

The degree work is in English and contains 61 pages, 3 chapters, 43 figures, 3 tables.

Content

List of figures

List of tables

Glossary of abbreviations and terminology

Back end What is inside the program and what the user does not see.

CMS Content management system is a computer program that allows publishing, editing and modifying content as well as maintenance from a central interface. CMSs are often used to run websites containing blogs, news, and shopping. [1]

CSS Cascading Style Sheets is a style sheet language used for describing the look and formatting of a document written in a markup language

Framework In computer programming, a software framework is an abstraction in which software providing generic functionality can be selectively changed by additional user-written code. A software framework is a universal, reusable software platform to develop software applications, products and solutions. Software frameworks include support programs, compilers, code libraries, tool sets, and application programming interfaces that bring together all the different components to enable development of a project or solution.

Front end Part of software that interacts with the user.

HTML Hyper Text Markup Language is the main markup language for creating web pages and other information that can be displayed in a web browser.

JavaScript Is a dynamic computer programming language. It is most commonly used as part of web browsers, whose implementations allow client-side scripts to interact with the user, control the browser. It is also being used in server-side programming, game development and the creation of desktop and mobile applications.

jQuery Is a cross-platform JavaScript library designed to simplify the client-side scripting of HTML.

PHP Is a server-side scripting language designed for web development but also used as a general-purpose programming language.

Plugin Is a software component that adds a specific feature to an existing software application.

Responsive web design (RWD) A site designed with RWD adapts the layout to the viewing environment by using fluid, proportion-based grids, flexible images, and CSS3 media queries, an extension of the @media rule.

SEF URL Search engine friendly URL.

SEO Search engine optimization is the process of affecting the visibility of a website or a web page in a search engines.

URL A uniform resource locator also known as web address, particularly when used with HTTP, is a specific character string that constitutes a reference to a resource. In most web browsers, the URL of a web page is displayed on top inside an address bar. An example of a typical URL would be "http://en.example.org/ ".

XML Extensible Markup Language is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.

1. Introduction

1.1 Relevance of the topic

Web is being developed every minute and the creation of webpages is quite popular nowadays. Webpages are used almost for everything: blogs, company sites, e-shops, personal webpages, forums, social webpages, search engines, message boards, promo sites and for a lot of other types of sites. The aim of creating webpages is to bring information to an unlimited number of people. Creating a website may turn out to be very difficult because there are many elements which we must take into consideration, such as the creation of a content, design, SEO and many other things.

1.2 Why do we need webpages?

- A webpage is a representation and activity of a company.
- It is an interactive marketing tool. Products will be displayed and advertised all over the world.
- It makes it possible to communicate with customers directly.
- An opportunity to beat other competitors in the market.
- 24 hour global presence. The Internet is always active and people around the world can find any information at their convenience.
- Gain a larger client base.
- Market expansion
- Cheaper and more flexible than printed advertisement.
- Customers can quickly and easily give their feedback on your product or service.
- It makes it possible to create a demand on services and products as they are on online portal.

The appearance of content management systems (CMS) made a big breakthrough in the development of web pages and their designs. Newest CMSs are used to create projects of any complexity. Free content management systems are widely spread. Their main advantage is the ability to create sites without any knowledge of HTML, CSS, PHP and other programming languages. It gives an opportunity to add, delete, and modify the content within minutes and without much effort.

Using CMS enables to add a textual content and different media materials like videos, photos, animation, scripts and so on. These features do greatly diversify any site content and also attract new visitors.

Currently there are more than 1000 different, free and paid templates and they are being developed all the time, so, there will not be any troubles with creativity for web developers. If a creator has at least some knowledge and experience in HTML, CSS or PHP he can redesign a webpage the way he wants.

1.3 Advantages of CMS

Here are some advantages of using CMS instead of a simple HTML webpage:

- **Secure content** - only authorized people can access the content.
- **Fast creation of new articles** – any signed in user who is given the rights to make changes in the website can quickly and easily publish, edit and update the content.
- **SEO friendly** - CMS helps to optimize a website so that the users can easily find your information.
- **User hierarchy** – different levels of access to different content can be given to different users.
- **Archive** – all activity can be tracked and the main administrator can see who made changes on the webpage and at what time.
- **Remote access** – website can be edited from anywhere where is the Internet connection.
- **Convenience** - main advantages of the system is a convenience for the unprepared users. Study of the system takes minimum of time.
- **Economy** – system helps to save time and money.
- **Multi templates** - supports any webpage design in any quantity.
- **Multiple webpages** - ability to create any number of websites in one admin panel.
- **Functionality** - with this system can be implemented most of the new technical possibilities. Site functionality can be expanded by adding additional software like modules or plugins.
- **Documentation** – popular CMSs have hundreds pages of good documentation.
- **Development flexibility** - non-technical users can easily publish content.
- **Content is separate from design** – content can be changed without a risk of damaging the design.

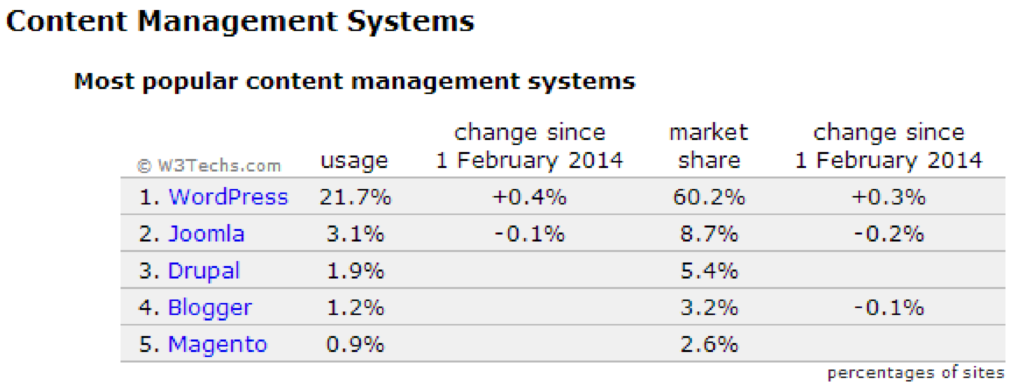
- **Unlimited number of pages** – there is no limit in creation pages. Creation of pages is much easier than in conventional webpages.
- **Daily update** – if there is no time to write articles everyday CMS provides a facility to schedule your content so that you can write 10s article and schedule it for next 10 days.

1.4 Statistics

At the moment there are more than 1000 different free and paid CMSs. They are being developed and improved all the time. Periodically new content management systems appear. Here is the list of the most popular at the moment:

- Joomla
- Drupal
- WordPress
- Magento
- Blogger
- 1C- Bitrix
- TYPO3
- vBulletin
- Moguta
- …

It is difficult to find the right statistics of most popular CMSs because the percentage of users in different sources varies depending on a region of the research. Having analyzed several different sources it becomes clear that 3 most popular free CMSs at the moment are WordPress, Joomla and Drupal. [2]



Content Management Systems

Most popular content management systems

© W3Techs.com	usage	change since 1 February 2014	market share	change since 1 February 2014
1. WordPress	21.7%	+0.4%	60.2%	+0.3%
2. Joomla	3.1%	-0.1%	8.7%	-0.2%
3. Drupal	1.9%		5.4%	
4. Blogger	1.2%		3.2%	-0.1%
5. Magento	0.9%		2.6%	

percentages of sites

Figure 1. CMS statistics

1.5 Goals of the project and expected results

1.5.1 For whom this project is

This project is designed basically for the people who are slightly more experienced than novices in the web development, for people who want to create webpages and have some experience in HTML, CSS and PHP, but do not have a lot of knowledge about CMSs, how they work, which one is better, what advantages and drawbacks each one has and which is more suitable for their needs.

Target group:

- Novice bloggers
- Freelancers
- Amateurs
- Novice web developers
- Companies, where content is frequently updated
- Back-end / Front-end developers

In this project will not describe HTML code, just only the most important features of the syntax of each CMS.

1.5.2 Goals of the project

The purpose of the project is to analyze, compare and to give a short overview about content management systems, their main functions, possibilities, creation of template features, code differences, difficulties that can appear during development or using that systems and much more.

This project will analyze 3 most popular CMSs: WordPress, Joomla and Drupal. They will be compared from different points of views:

- ease of installation
- documentation
- user-friendly interface / comfortable admin panel
- development friendly
- search engine optimization (SEO)
- availability of modules (plugins)
- creation of modules
- template development

Also, three templates will be developed under every CMS and the development process will be described and compared with each other in order to find out which CMS suits better a novice and which is better a professional web developer.

1.5.3 Expected results

Expected results from this project are:

- compare systems during the development process and give all obtained information about CMSs, which will be helpful for target groups to start a development
- get experience for the author of this project, as he previously worked a little with these systems, but did not know all their features and how to develop themes and modules
- compare and analyze systems from different points of views and make a conclusion for each point

2. CMS comparison

2.1 CMS installation

For webpages a web server is needed. Each CMS has its own requirements for a web server to work well and fast. To start the comparison and analysis of popular CMS, a web server should be chosen where to install selected CMSs.

For this project there is no need to purchase paid hosting for the installation and development of a web page. Instead of that a local web server Denwer will be used.

2.1.1 Web server

The term ‘web server’ can refer to either the hardware (a computer) or the software (a computer application) which helps to deliver a web content which can be accessed through the Internet.

The most common use of web servers is to host websites and deliver web pages to clients, but there are other uses such as gaming, data storage or running enterprise applications. [3]

Denwer

Denwer is a set of distributions to create and debug sites on a local PC without having to connect to the Internet by running Windows. After installation a fully functional Web server Apache is available. The main advantage of Denwer is that it is easy in use and has a high working speed.

Denwer was installed on author’s personal computer. Installation of Denwer is quick and easy. Current version of Denwer 3 includes: Apache 2.2.22 + SSL, PHP 5.3.13, MySQL 5.5 and phpMyAdmin 3.5. These server parameters perfectly fit selected systems.

Before installation of our CMSs it is necessary to create 3 databases, one for each CMS. It can be done in phpMyAdmin which is included in Denwer installation. phpMyAdmin tool can be found in *//localhost/Tools/phpMyAdmin.*

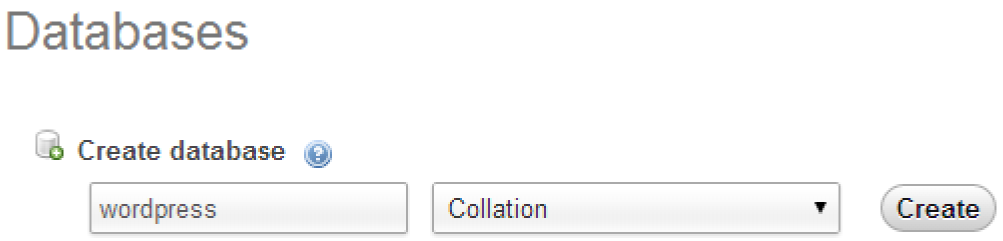


Figure 2. Creating databases

After downloading installation files from official webpages, were created three subfolders in home directory and inserted folders with CMS there in www directory. Example: *"C:\Denwer\home\wordpress\www\"*. To start the installation, go to the local address like *wordpress/* in your browser and proceed to the installation guide.

2.1.2 WordPress installation

At the beginning WordPress suggests to create configuration file named *wp-config.php*. After that it is necessary to fill several forms to access the database: database name, user name, password, database host and table prefix.

Next step is to fill several fields (username, password) which will be used for logging in to the admin panel of WordPress. Now the installation is complete and author can proceed to the creation of web page. The installation is very easy and fast.

2.1.3 Joomla installation

First step is to fill forms for entering as admin (user name, password). Next is the connection to the database the same way as it was in WordPress. The third step is to check whether the database suits Joomla requirements and verification of the information entered in previous steps. At the end it is necessary to delete the installation folder. The installation of Joomla is also fast and easy.

2.1.4 Drupal installation

The installation is done in several stages. Firstly Drupal asks to select a type of installation:

- standard with all usual settings and modules
- minimal, where only a few modules are enabled

Next step is to fill the information about the database, the same way as it is in both previous CMSs. The installation asks to create a username and password for the admin panel. In general, the installation is as simple as it was in Joomla and WordPress.

2.1.5 Conclusion

Installation processes are almost identical and very simple. It took no more than 10 minutes for the author to install each system.

2.2 CMS Description

The author analyzed a huge number of sources (webpages, books), tested installed systems on his computer and made a short description about each CMS.

2.2.2 WordPress

WordPress is one of the most popular CMS nowadays. It is completely customizable and can be used for websites, blogs, e-commerce sites etc.

The software is built by hundreds of community volunteers, and there are thousands of plugins and themes available to transform your site into almost anything you can imagine. Over 60 million people have chosen WordPress.

First release was on May 27, 2003. As of February 19, 2014, version 3.8 had been downloaded more than 20 million times. Since 2003 WordPress released 22 versions. [4]

Awards: [4]

- In 2007, WordPress won a Packt Open Source CMS Award.
- In 2009, WordPress won the Packt best Open Source CMS Awards.
- In 2010, WordPress won the Hall of Fame CMS category in the 2010 Open Source Awards.
- In 2011, WordPress won the Open Source Web App of the Year Award at The Critters

WordPress can do:

- Business website
- Ecommerce website
- Forum
- Aggregation website
- Member website
- Job Board website
- Resume website
- Portfolio
- Magazine

Current version is 3.9

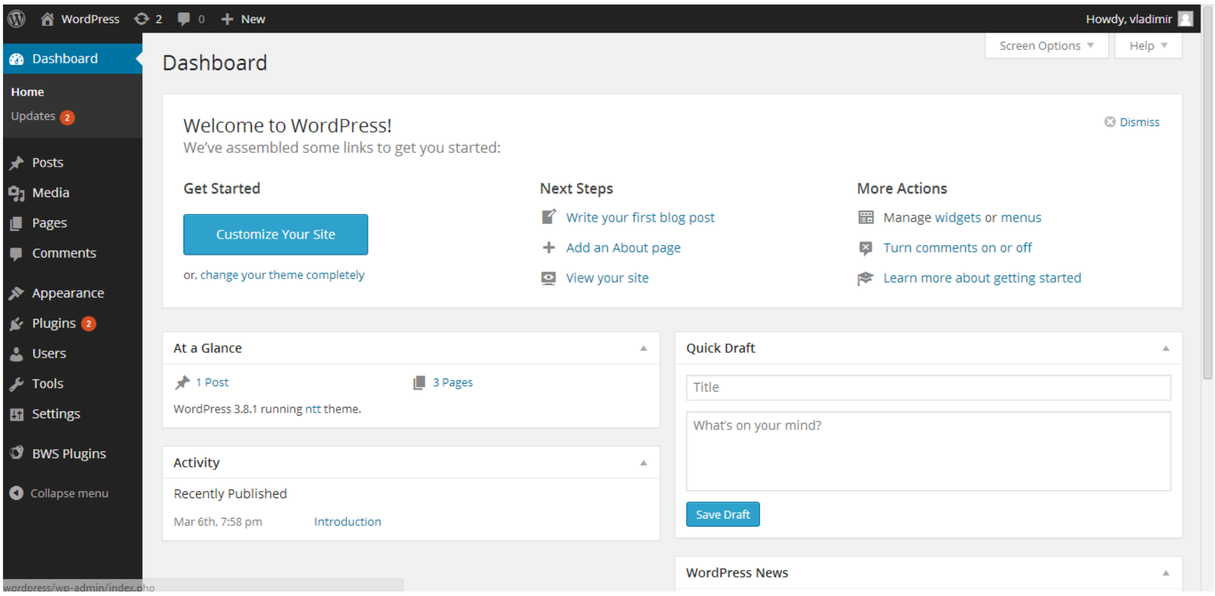


Figure 3. Admin panel in WordPress

Advantages

- WordPress has a big variety of themes, plugins, widgets, galleries, forums, online shopping and so on.
- WYSIWYG (What You See Is What You Get) editor makes life much easier for those who have problems with HTML and other languages.
- There is no need to have technical experience. Admin panel is easier to understand by intuition than it is in other CMS.
- PHP and CSS files can be edited right in the admin panel.
- It is a powerful tool for developers and designers.
- WordPress has more than 30 000 plugins.

Disadvantages

- WordPress gives many opportunities, so the main problem can be to understand how to use all available features.
- Large load on the server (hosting)

2.2.1 Joomla

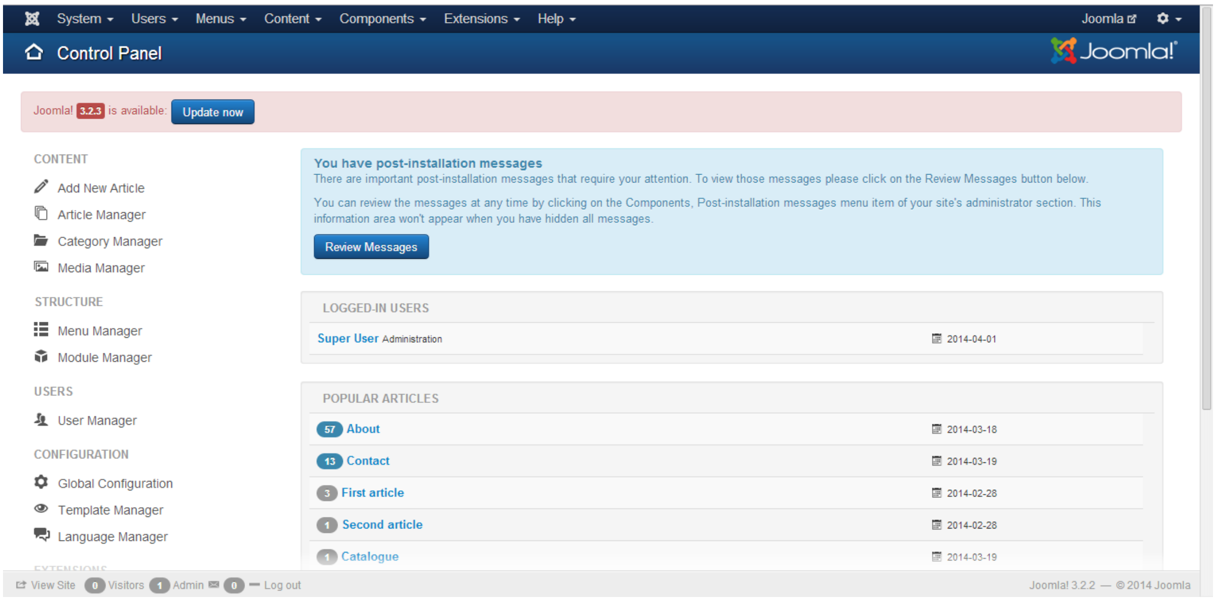
Joomla is one on the best CMS, which enables users to build websites and powerful online applications. Many aspects such as its ease-of-use and extensibility have made Joomla one of most popular website software available nowadays. Besides, Joomla is an open source solution which is available to everyone free of charge.

The first release was on 17 August 2005. As of February 2014, Joomla has been downloaded over 50 million times. Since 2005 Joomla released 8 versions. [5]

Joomla can do:

- Corporate web sites or portals
- Corporate intranets and extranets
- Online magazines, newspapers, and publications
- E-commerce and online reservations
- Government applications
- Small business web sites
- Non-profit and organizational web sites
- Community-based portals
- School and church web sites
- Personal or family homepages

Current version is 3.3.0



Joomla! 3.2.3 is available:

You have post-installation messages

There are important post-installation messages that require your attention. To view those messages please click on the Review Messages button below.

You can review the messages at any time by clicking on the Components, Post-installation messages menu item of your site's administrator section. This information area won't appear when you have hidden all messages.

LOGGED-IN USERS

Super User Administration	2014-04-01

POPULAR ARTICLES

57 About	2014-03-18
13 Contact	2014-03-19
3 First article	2014-02-28
1 Second article	2014-02-28
1 Catalogue	2014-03-19

Joomla! 3.2.2 — © 2014 Joomla

Figure 4. Admin panel in Joomla

Advantages

- There is a big number of tools and tutorials available to users.
- It is very easy to use and anyone can make a website using Joomla with no technical knowledge of HTML.
- It has various attractive themes and templates.
- Joomla has a large community and if you are face some technical problem in maintaining your website you can submit a report or a bug and your problem will be fixed in real time.
- Joomla has thousands of free plugins available at the homepage.
- Links generated by the script are very friendly and are made for a better search engine optimization

Disadvantages

- Makes the website heavy to load and run.
- Learning how to use Joomla will take longer time than learning other CMS.
- Some of its plug-ins work with only some particular scripts

2.2.3 Drupal

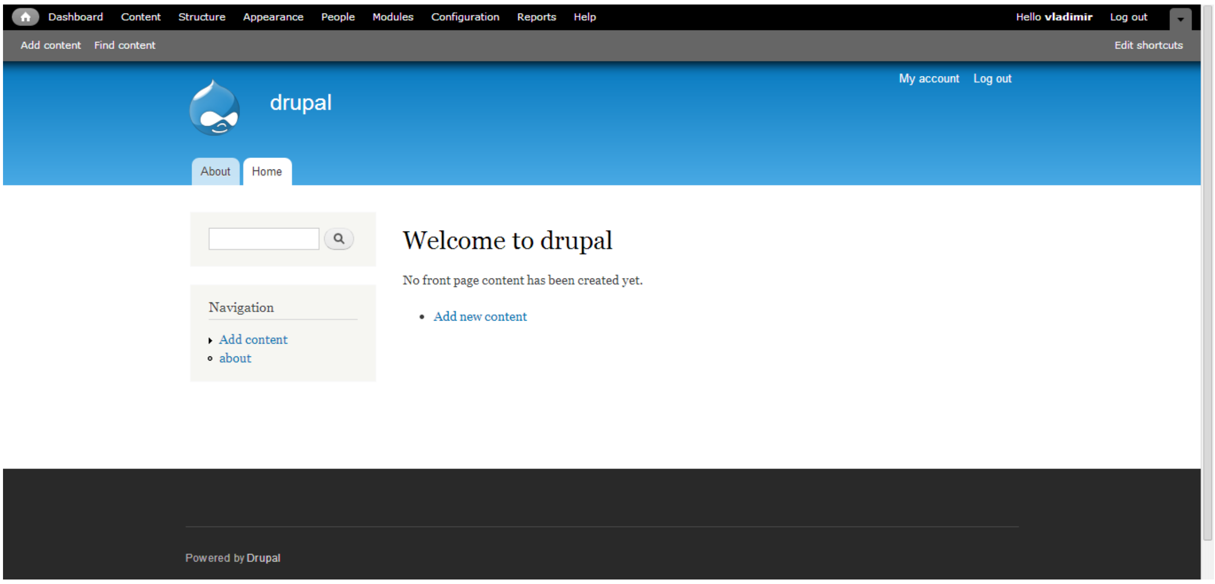
Drupal is an open source content management platform powering millions of websites and applications. It is built, used and supported by an active and diverse community of people all over the world. [6]

From July 2007 to June 2008, Drupal was downloaded more than 1.4 million times. As of February 2014, more than 1,015,000 sites are using Drupal. Since 2001 Drupal released 11 versions. [7]

Drupal can do:

- Landing pages
- Applications
- E-commerce solutions
- Personal webpages
- Blogs
- Small business
- Forums

Current version is 7.



Welcome to drupal

No front page content has been created yet.

- Add new content

Figure 5. Admin panel in Drupal

Advantages

- The presence of *hooks*, which help to avoid any problems in the system.
- With every new version Drupal is becoming easier in use.
- Drupal has a large community.
- Drupal has more than 26 000 modules.
- A huge number of modules which enable to add many features to a website, such as user blogs, forums, profiles, and so on.

Disadvantages

- Drupal is complicated and definitely not suitable for novice users. In order to customize modules in Drupal it requires some additional skills in programming.
- Drupal requires advanced technical equipment otherwise it may cause some problems in performance.
- Very few really good free and paid themes.

2.2.4 Conclusion

Here is a table of a short comparison of main features of every content management system, which contains the information about popularity, update frequency, installation time, one click installation, number of free themes and plugins and what for they are used better.

Table 1. Short comparison

	WordPress	**Joomla**	**Drupal**
Popularity (downloads)	140 + million	30 + million	15 + million
Free themes	2 000 +	900 +	1 800 +
Free plugins	30 000 +	7 800 +	26 000 +
One click installation	Yes	Yes	Yes
Manual installation time	5 minutes	10 minutes	10 minutes
Updates frequency	42 days	36 days	51 days
Best used for	Blogs, corporate websites, small-medium size websites	e-commerce, social networking sites	One size fits all

2.3 Features comparison

The author spent several months researching and testing systems. Were analyzed following items that will be discussed in this chapter:

- system requirements were compared and was made a table with comparison which can be used in searching necessary hosting
- the author tried to create pages in every system and described all options available during this process
- the author used admin panel for several month and made conclusions about their usability
- were discovered plenty of sources and identified which system is better for SEO and which plugins are needed to make optimization better
- the author understood the basic knowledge in modules creation, read official and non-official documentations
- the author found information about what languages were used to make this systems and from how many lines of code systems consist
- were read most of the articles in documentations as well as other tutorials and books

2.3.1 System Requirements

Here is ta short comparison of minimal system requirements for a webserver needed for the installation. [8] [9] [10]

Table 2. System requirements comparison

	WordPress 3.x	Joomla 3.x	Drupal 7
PHP	5.2.4 +	5.3.1 +	5.2.5 +
MySQL	5.0 +	5.1 +	5.0.15 +
PostgreSQL	-	8.3.18 +	8.3 +
MSSQL	-	10.50.1600.1+	-
The mod_rewrite Apache module	+	-	-
Nginx	1.0	1.0	1.0
Microsoft IIS	7	7	7
Apache	2.x +	2.x +	2.x +

2.3.2 Page creation

In all CMSs creation of pages is very easy. Pages can be created in Page section and filled with the required information.

WordPress has many settings while creating a page. Pictures, video and audio files can be added in the visual editor. Pictures can be uploaded, inserted from URL or selected from already uploaded images. When inserting a picture there are some options for editing: alignment, title, caption, link, size and description. Different templates can be assigned to a page during creation. There are also options to publish a page immediately or on certain date. Visibility and page status can be changed too.

Joomla has a little bit more functional visual editor. Only pictures can be inserted. They have almost the same options which are in WordPress. The status and visibility of a page can be changed. There are more options for publishing a page: start date, finish date, meta description, meta tags, author, modified by and a lot of others. It takes much longer time to understand all possible options.

Drupal does not have a visual editor. It accepts only tags and HTML. It can be difficult for inexperienced users. Drupal has a very poor choice of options, but there is an interesting solution, it has an ability to edit page content directly when viewing the webpage. A problem with limited options can be fixed by additional modules. For example, adding pictures can be fixed by the module IMCE or by other similar modules.

2.3.3 Usability of the administration panel

WordPress

WordPress has a very nice and intuitive interface. The main menu is on the left side. All settings, functions and all buttons can be easily found and used. Menu is logically structured. In comparison to Joomla menu WordPress menu is weaker in functionality and in the number of functions.

Main menu includes:

- **Post -** creation and editing posts and managing categories
- **Media** – uploading and editing media files
- **Pages** - creation of new pages and editing of existing
- **Comments** – managing comments
- **Appearance** – changing themes, creation menus, build in editor of template files
- **Plugins** – installing new plugins, updating existing, changing plugins settings
- **Users** – managing users
- **Tools –** different tools for WordPress
- **Settings –** main settings of WordPress

Joomla

In Joomla the interface is a little confusing. They have menus on the top and on the left side. The menu has too many options and sometimes it is very hard to find the desired function. Sometimes one function can have so many options to choose that it takes a long time to figure out what to do and what to choose.

Top main menu includes:

- **System –** contains information about global configurations and system information.
- **Users –** managing users, creating groups, assigning access levels.
- **Menus –** managing menus
- **Content –** uploading media files, managing articles and categories.
- **Components –** contains information about banners, contacts, updates, newsfeeds and other.
- **Extensions –** extension manager, uploading and installing themes, modules, languages and plugins.
- **Help –** links to official documentation, forum, help file and link to many other useful pages.

Menu on the left side contains a quick access to essential functions:

- Adding new article
- Article manager
- Media manager
- Menu and module manager
- User manager
- Global configurations
- Template and language manager

Drupal

In Drupal the administration panel is also intuitive and comfortable. Admin panel is always on the top and it is active all the time during web page viewing. Drupal menu also loses in functionality to WordPress and to Joomla.

Main menu includes:

- **Dashboard –** home page
- **Content –** managing content
- **Structure –** managing menus, block, taxonomy and content types.
- **Appearance** – managing themes
- **People -** managing users, assigning access levels.
- **Modules** – enabling / disabling modules and changing their configurations.
- **Configuration** – contains a lot of configurations about users, content, media, system, interface, development, web services.
- **Reports** – contains message errors
- **Help** – help files

2.3.4 SEO optimization

WordPress

WordPress has hundreds of plug-ins to fully optimize a blog. It has a built-in SEO setting for permanent links, adding meta-descriptions of keywords and more. Also, WordPress has built-in functionality to add tags to your posts. Plugins like Yoast SEO, All in One SEO powerful tools when in Joomla there is a big shortage of quality SEO plugins.

WordPress site loads much faster than Joomla. WordPress allows adding an alt tag for each image.

WordPress has some amazing plug-ins for creating links between the posts for relinking. The same thing happens to the creation of a custom 404 error pages. It is really easy to create a custom 404 page with plugins.

Joomla

Joomla is user-friendly CMS for SEO. In Joomla there is almost a complete control over a website SEO. Joomla developers have paid a great attention to SEO in the latest version. There is an opportunity to enable SEF URL-addresses, URL rewriting to suit your needs. Also a description of the global meta, meta keywords, and add meta description, title, keywords can be added to each post. Unfortunately, Joomla does not have an advanced level of SEO features such as NOINDEX control and DoFollow for a particular menu item.

Drupal

Drupal was built to be friendly for any search systems. Drupal is called as very powerful and flexible system, basic installation package already has the support CNC, tags and configured *robots.txt* file, but if we want to search engines to work better it is necessary to correct this system a little by a number of different modules. In Drupal 7 the installation package already has a module Path, enabling the creation of synonyms of user friendly URLs when creating pages.

Table 3. SEO comparison

	WordPress	Joomla	Drupal
URL	quickly and easily customizable, besides - automatically creates a link	generated from the index.php, automatically inserted with title	not generated automatically, can be entered manually
Visual editor	Yes	Yes. To insert the text directly to the main page did not work. This can be done through the Global Configuration	No
404	Yes	Yes	Yes
Sitemap	No	No	No
Description	not at all, need to use the module	For main pages and articles is customizable	in general it is not possible to use it for the article.
Modules	It is enough to use one module WordPress SEO by Yoast	3 SEO-plugins (Custom Page Title, JCrawler, ARTIO JoomSEF).	Additionally need to use 8 modules (globalredirect, Meta Tags, path_redirect, pathauto, transliteration, xmlsitemap, Search 404, Seo checklist).
Title	For the main page and articles can be customized.	Cannot be configured in the admin panel	For the main page and articles can be customized.

2.3.6 Creation of modules

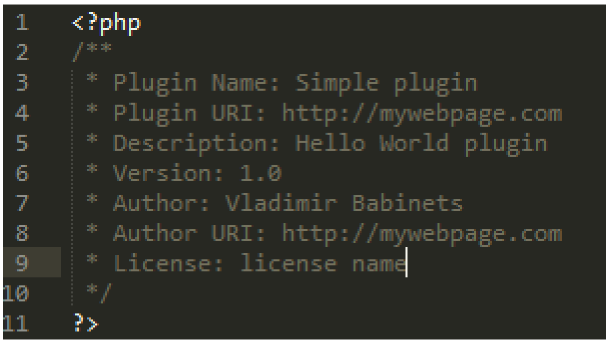
Modules are a complementary means of extending the functionality of a web site. Basically, the main task of any module is to display the required information. They are located in the left and right column of the webpage or in any other position, provided in the template. An example of the modules is a navigation menu, the calendar, a list of popular articles, etc. Moreover, most of the modules installed in the system can be copied and publish multiple times with different parameters.

Basic knowledge of object-oriented programming in PHP, a little HTML and CSS are needed to start developing modules.

WordPress [11]

WordPress Plugin must have at least one PHP file. It could also contain JavaScript files, CSS, images, languages, etc. The top of Plugin's main PHP file must contain a standard Plugin information header. This header lets WordPress recognize that Plugin exists. Without the header, Plugin will never be activated and will never run.

The minimum information that WordPress needs to recognize Plugin:



```
<?php
/**
 * Plugin Name: Simple plugin
 * Plugin URI: http://mywebpage.com
 * Description: Hello World plugin
 * Version: 1.0
 * Author: Vladimir Babinets
 * Author URI: http://mywebpage.com
 * License: license name
 */
?>
```

Figure 6. WordPress Plugin information

Installation of a plugin can be done in different ways

- Simply insert folder with files into the needed directory and activate it in the admin panel.
- Folder can be uploaded in the admin panel. Only in *.zip* format.
- Admin panel has search of plugins. Found plugins can be easily installed in one click.

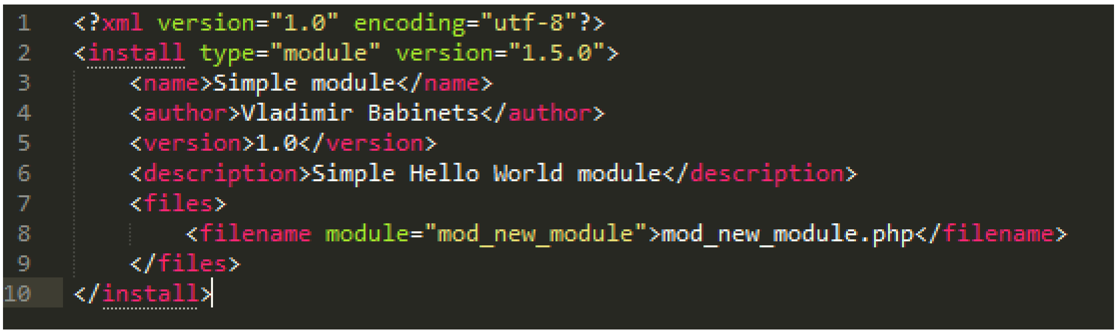
After installation plugins can be activated or deactivated. If a plugin is activated, then WordPress will execute its code every time. A plugin can also be deactivated, it means the plugin files remain in place, but the code will not be executed.

Joomla

Simple module must have at least two files, the main PHP file, which contains the executable code and XML file containing all attributes and configurations.

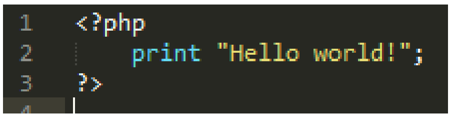
Simple "Hello World" module [12]

To start developing a module, a folder in the modules directory should be created. The name of the folder can be any, for example *mod_new_module*, where *new_module* is the name of our extension. New folder should include two files: *mod_new_module.php* and *mod_new_module.xml*



```xml
<?xml version="1.0" encoding="utf-8"?>
<install type="module" version="1.5.0">
    <name>Simple module</name>
    <author>Vladimir Babinets</author>
    <version>1.0</version>
    <description>Simple Hello World module</description>
    <files>
        <filename module="mod_new_module">mod_new_module.php</filename>
    </files>
</install>
```

Figure 7. mod_new_module.xml



```php
<?php
    print "Hello world!";
?>
```

Figure 8. mod_new_module.php

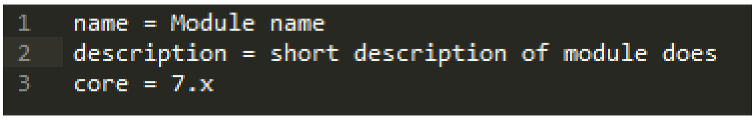
The installation of a created module is the same as the installation of a template. Following files should be archived in *.zip* format and installed in Extension manager. After the installation plugins can be activated or deactivated, settings can be changed.

Admin panel has plugin search and additional modules can be found there and installed in one click.

Drupal

Create a PHP file and save it under the name *new_module.module*. Drupal does not use *.php* extension in files. If you add it, the module will not work. Drupal knows that file with the extension *.module* has format of PHP.

All modules must have file *modulename.info*, which contains META-module required information.



```
name = Module name
description = short description of module does
core = 7.x
```

Figure 9. modulename.info

Mandatory information:

- **Name -** displays name of a module. First word must be capitalized.
- **Description -** Short description, preferably in one line. Limitation for the field size is 255 characters.
- **Core –** version on Drupal for which module was written. Module can not specify a secondary version of Drupal. 7. x – correct, 7.1 – not correct.

Optional information:

- **Files -** Drupal now supports a dynamic-loading code registry.
- **Dependencies -** An array of other modules that your module requires.
- **Style sheets -** Drupal allows to add CSS files in the module's .info file.
- **Scripts -** Drupal allows adding JavaScript in the module's .info.

Installation of a plugin can be done in different ways:

- Simply insert a folder with a plugin into the needed directory and activate it in the admin panel in Module tab.
- Folder can be uploaded in the admin panel.
- Plugin can be installed from a URL.
- Admin panel has a link to Drupal webpage where is Plugin search. Found plugins can be easily installed in any of three first methods.

2.3.7 Lines of code and usage of languages

Here is the short comparison of what languages are used in every CMS and how many lines of code are in each system. [13] [14] [15]

WordPress

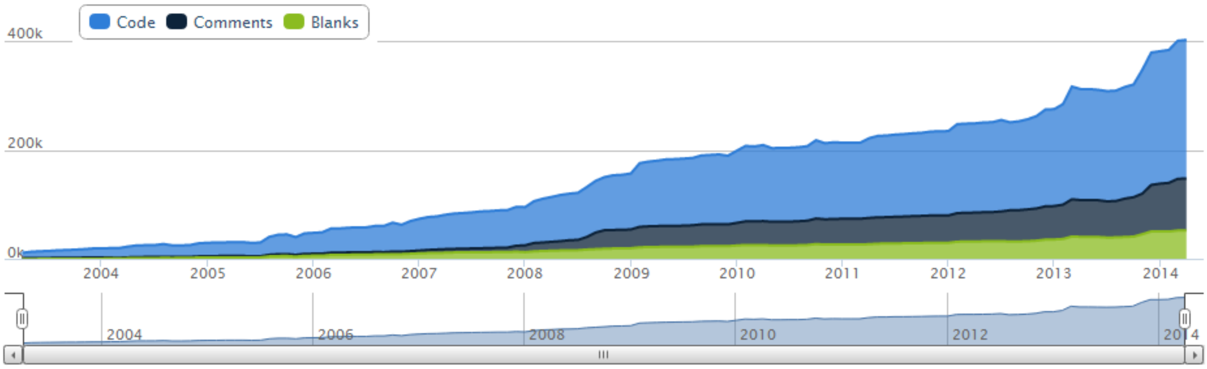
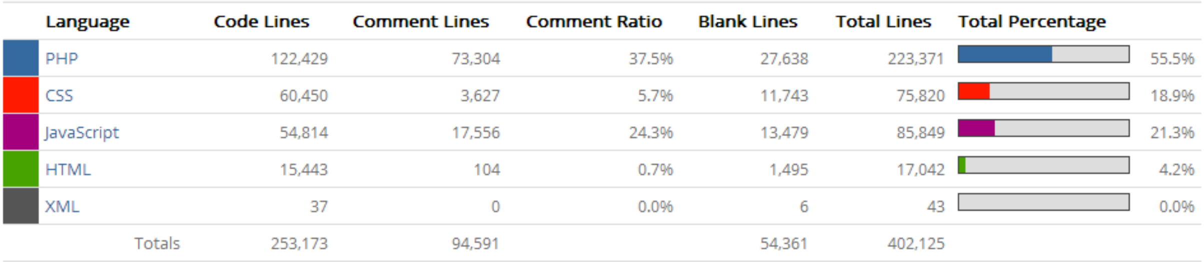


Figure 10. Lines of code (WordPress)



Language	Code Lines	Comment Lines	Comment Ratio	Blank Lines	Total Lines	Total Percentage
PHP	122,429	73,304	37.5%	27,638	223,371	55.5%
CSS	60,450	3,627	5.7%	11,743	75,820	18.9%
JavaScript	54,814	17,556	24.3%	13,479	85,849	21.3%
HTML	15,443	104	0.7%	1,495	17,042	4.2%
XML	37	0	0.0%	6	43	0.0%
Totals	253,173	94,591		54,361	402,125	

Figure 11. Usage of languages (WordPress)

Joomla

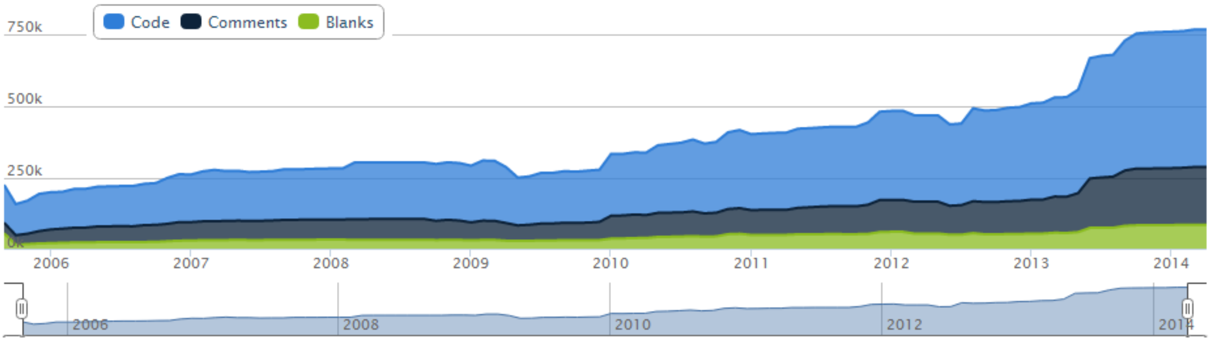
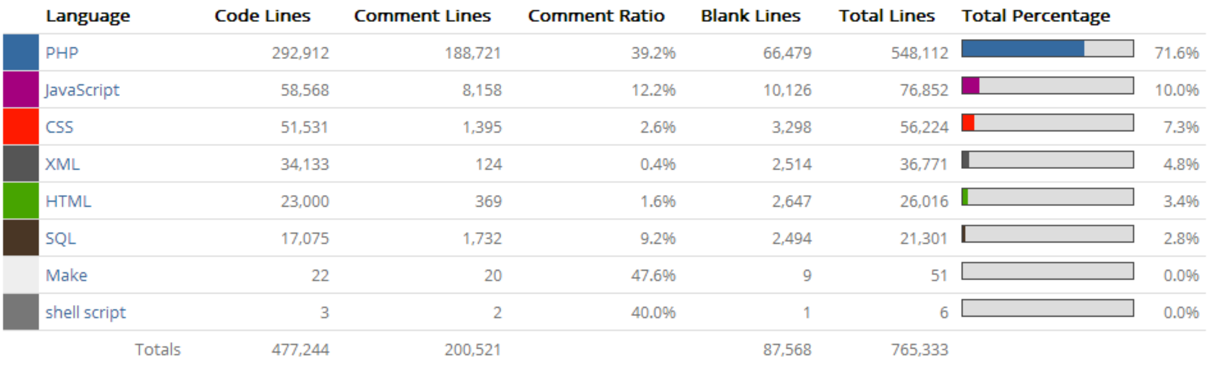


Figure 12. Lines of code (Joomla)



Language	Code Lines	Comment Lines	Comment Ratio	Blank Lines	Total Lines	Total Percentage
PHP	292,912	188,721	39.2%	66,479	548,112	71.6%
JavaScript	58,568	8,158	12.2%	10,126	76,852	10.0%
CSS	51,531	1,395	2.6%	3,298	56,224	7.3%
XML	34,133	124	0.4%	2,514	36,771	4.8%
HTML	23,000	369	1.6%	2,647	26,016	3.4%
SQL	17,075	1,732	9.2%	2,494	21,301	2.8%
Make	22	20	47.6%	9	51	0.0%
shell script	3	2	40.0%	1	6	0.0%
Totals	477,244	200,521		87,568	765,333	

Figure 13. Usage of languages (Joomla)

Drupal

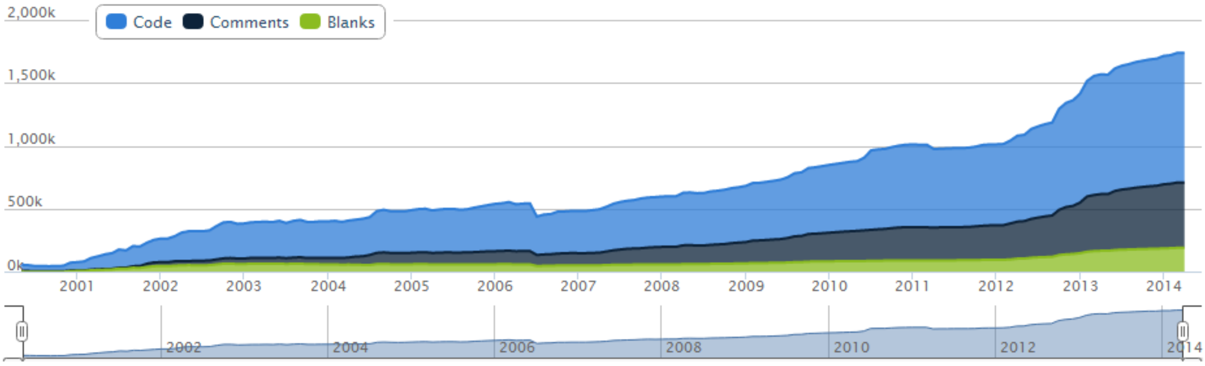
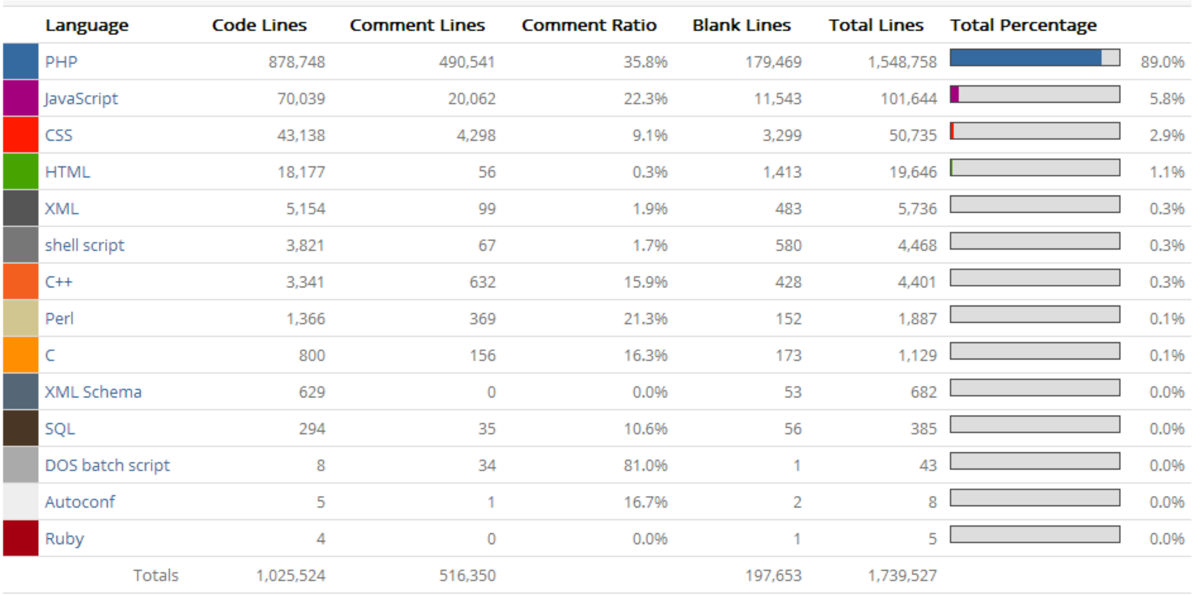


Figure 14. Lines of code (Drupal)



Language	Code Lines	Comment Lines	Comment Ratio	Blank Lines	Total Lines	Total Percentage
PHP	878,748	490,541	35.8%	179,469	1,548,758	89.0%
JavaScript	70,039	20,062	22.3%	11,543	101,644	5.8%
CSS	43,138	4,298	9.1%	3,299	50,735	2.9%
HTML	18,177	56	0.3%	1,413	19,646	1.1%
XML	5,154	99	1.9%	483	5,736	0.3%
shell script	3,821	67	1.7%	580	4,468	0.3%
C++	3,341	632	15.9%	428	4,401	0.3%
Perl	1,366	369	21.3%	152	1,887	0.1%
C	800	156	16.3%	173	1,129	0.1%
XML Schema	629	0	0.0%	53	682	0.0%
SQL	294	35	10.6%	56	385	0.0%
DOS batch script	8	34	81.0%	1	43	0.0%
Autoconf	5	1	16.7%	2	8	0.0%
Ruby	4	0	0.0%	1	5	0.0%
Totals	1,025,524	516,350		197,653	1,739,527	

Figure 15. Usage of languages (Drupal)

2.3.8 Documentation

WordPress

WordPress has very good, understandable and very detailed official documentation named Codex. It has clear explanations and instructions how it works. It discusses the technical aspects of writing code for developers to know how to create own templates and plugins. Everything is done step by step with examples, so for beginners there will not be any troubles. Documentation is written in several different languages. Documentation is not complicated. You can easily find everything you may need in several minutes.

Most important parts included in the documentation:

- Using Themes / Plugins
- Theme development
- Writing a Plugin
- Downloading / installing / upgrading WordPress
- WordPress features overview
- Frequently Asked Questions

Codex is an encyclopedia of WordPress. It is an open wiki, and anyone can add and edit most of the pages. To start editing it is important to create an account.

Joomla

Joomla documentation is also very good. Currently, there are 4494 articles written and maintained by Joomla community members. In comparison to WordPress documentation, Joomla is a little bit complicated and confused. Sometimes it is hard to find the necessary information and it takes more time to find it. Relying only on official documentation it is hard to create what you need, so other tutorials and documentations should be used.

Main parts included in the documentation:

- Learn More About Joomla
- Beginners
- Administrators
- Developers

Drupal

Drupal documentation is confused. It is difficult to find what you want. Some pages are not complete and important parts are missing. Therefore it is necessary to use other documentations and tutorials that can be found in the internet or in books. Drupal also enables to edit documentation if you are a registered user. Each page has its status whether it is complete or not.

Main parts included in the documentation:

- Understanding Drupal
- Installation guide
- Administration and gecurity guide
- Structure guide
- Site building guide
- Multilingual guide
- Theming guide
- Mobile guide

3. Development of a template

Why to create your own template?

- To create your own unique design. Website design plays a big role in the promotion.
- For convenience. When creating page you can arrange all items as you want.

This part will cover and describe the most important parts in development process with all problems encountered. Development process will be compared with each other in order to find out which CMS suits better a novice and which suits professional web developers. The distinctive sides of each system will be examined here as well.

For this task a simple HTML webpage template made with Bootstrap will be taken. The webpage will be modified so, that it could work with selected content management systems. Important PHP tags needed for working with engines will be inserted. Main features how to include Bootstrap styles and scripts will be described, how to create menu and display it, how to display the content, how to assign different templates to different pages. Required structures of templates will be described, minimal set of files and what information needed for engines they must contain to recognize templates and many other things.

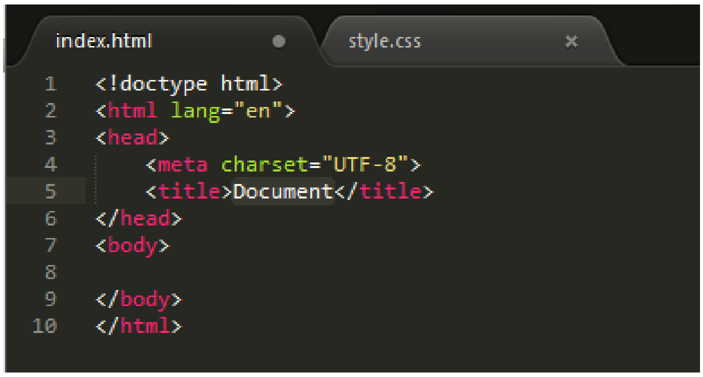
3.1 Code editors

For beginners to start developing something like webpages or software the best way is to start from text editors with no visual editor, what makes it possible to learn better the syntax of the language.

There are plenty of text editors like Notepad++, Sublime Text, Brackets, Atom and many others. The most popular is Notepad++ as it is compact and very functional with a lot of plugins and what is more, it is free of charge as it is an open source project.

3.1.1 Sublime Text 2

Sublime Text 2 was selected for the development in this project. It is partly free and every two hours appears a message with the request to purchase the license. However, Sublime is famous for its high speed work and user-friendly interface, as well as the ability to change the colour scheme. It supports many hotkeys which speed up coding. Sublime Text is not open source software, nevertheless its functionality is extendable with lots of free and paid plugins. Emmet and View in Browser plugins will be used in the development. [16]



```html
<!doctype html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
</head>
<body>

</body>
</html>
```

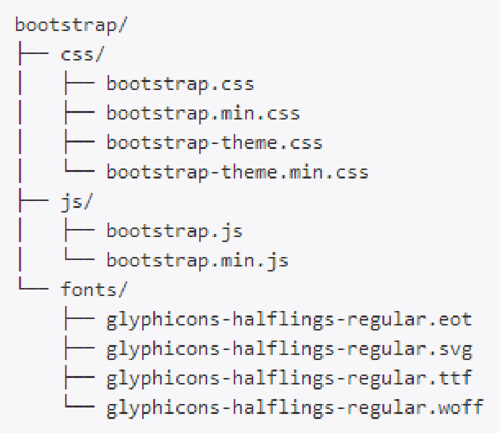
Figure 16. Sublime Text 2

3.2 Bootstrap

Bootstrap is a front-end framework for developing responsive websites and web applications. It contains HTML, CSS and JavaScript design templates as well as buttons, forms, navigation and other interface components. [17]

Design is not very necessary in this project, but to make it look more beautiful, a simple design created with Bootstrap 3 will be used.

Structure of Bootstrap:



```
bootstrap/
├── css/
│   ├── bootstrap.css
│   ├── bootstrap.min.css
│   ├── bootstrap-theme.css
│   └── bootstrap-theme.min.css
├── js/
│   ├── bootstrap.js
│   └── bootstrap.min.js
└── fonts/
    ├── glyphicons-halflings-regular.eot
    ├── glyphicons-halflings-regular.svg
    ├── glyphicons-halflings-regular.ttf
    └── glyphicons-halflings-regular.woff
```

Figure 17. Structure of Bootstrap

3.3 WordPress

Minimal set of required files in a theme for WordPress consists of two files: [18] [19]

- style.css
- index.php

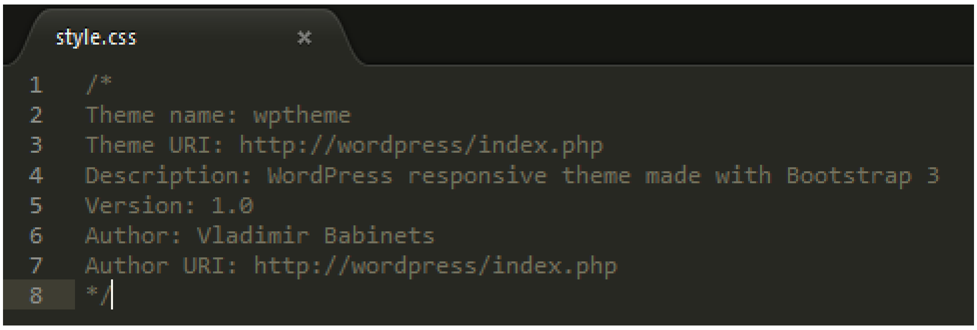
Typical template files include:

- header.php
- style.css
- index.php
- footer.php
- functions.php
- single.php
- comments.php
- wp_bootstrap_navwalker.php

In addition to CSS styles for our theme, on the top file *style.css* must provide details about the theme in the form of comments, otherwise WordPress would not recognize it.

Required fields:

- **Theme name** - this should be a clear name that starts with the letter.
- **Theme URI** – link to the webpage.
- **Description** – should contain a brief description of the webpage. This description is displayed when choosing a template
- **Author –** authors name
- **Author URI –** link to author’s webpage.

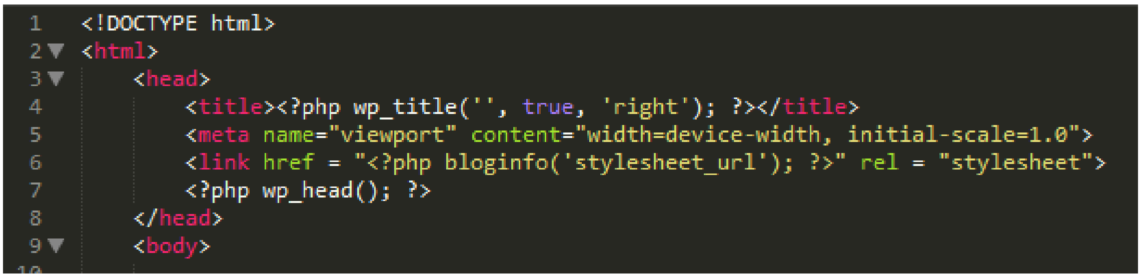


```
/*
Theme name: wptheme
Theme URI: http://wordpress/index.php
Description: WordPress responsive theme made with Bootstrap 3
Version: 1.0
Author: Vladimir Babinets
Author URI: http://wordpress/index.php
*/
```

Figure 18. Information about theme in style.css

Connection of Bootstrap

A custom HTML layout made with Bootstrap will be used here. To make Bootstrap works properly it is necessary to import styles in <head> tag:

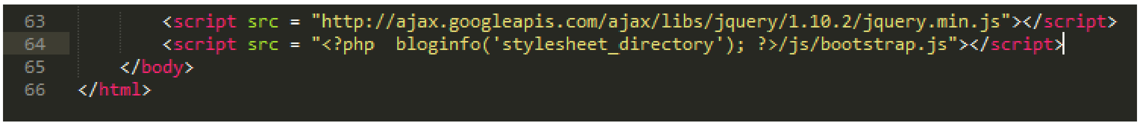


```
<!DOCTYPE html>
<html>
    <head>
        <title><?php wp_title('', true, 'right'); ?></title>
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <link href = "<?php bloginfo('stylesheet_url'); ?>" rel = "stylesheet">
        <?php wp_head(); ?>
    </head>
    <body>
```

Figure 19. Connection of styles

Webpage optimization

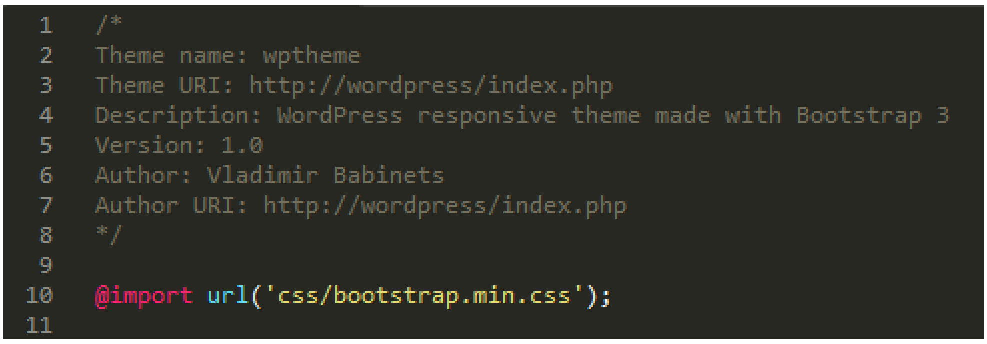
In order to load a webpage faster it is important to insert JavaScript and jQuery libraries before closing </body> tag. Web page will be loaded firstly and then will be loaded JavaScript and other scripts.



```
            <script src = "http://ajax.googleapis.com/ajax/libs/jquery/1.10.2/jquery.min.js"></script>
            <script src = "<?php  bloginfo('stylesheet_directory'); ?>/js/bootstrap.js"></script>
    </body>
</html>
```

Figure 20. Connection of JavaScript and jQuery

In file *style.css* bootstrap styles should be imported. Here can be added our own styles.

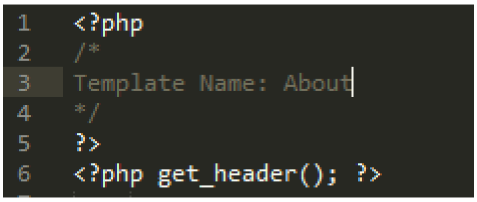


```
/*
Theme name: wptheme
Theme URI: http://wordpress/index.php
Description: WordPress responsive theme made with Bootstrap 3
Version: 1.0
Author: Vladimir Babinets
Author URI: http://wordpress/index.php
*/

@import url('css/bootstrap.min.css');

```

Figure 21. Importing bootstrap styles

Different templates for different pages

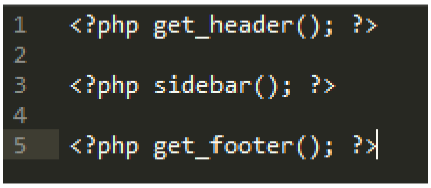
To assign different designs to different pages it is necessary to create *.php* files with required design. At the top of the file, PHP tag with template name as a comment should be inserted. When creating a page, there is a dropdown menu on the right, where a new template can be chosen.



```
<?php
/*
Template Name: About
*/
?>
<?php get_header(); ?>
```

Figure 22. Template declaration

Template tags are used to display information dynamically. Files *header.php* and *footer.php* contain information and design for header and footer. They can be added to any page with simple WordPress tags.



```
<?php get_header(); ?>

<?php sidebar(); ?>

<?php get_footer(); ?>
```

Figure 23. Adding header, footer and sidebar

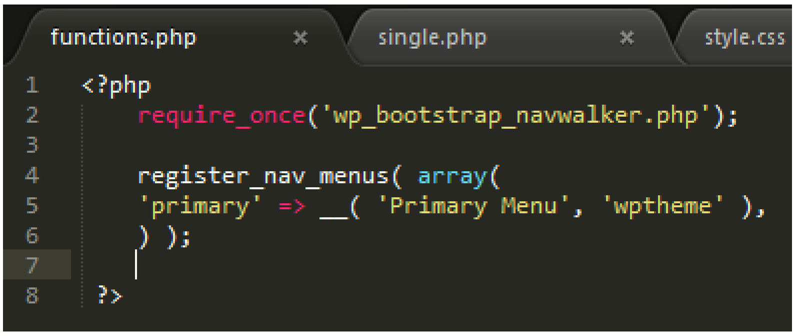
Difficulties

Creating menu

By default, in bootstrap the menu is created by using unordered list, but WordPress does not recognize it. This problem can be fixed by a custom WordPress nav walker class which fully implements the Bootstrap 3.0+ navigation style in a custom theme using the WordPress built in the menu manager. [20]

Installation of WordPress nav walker

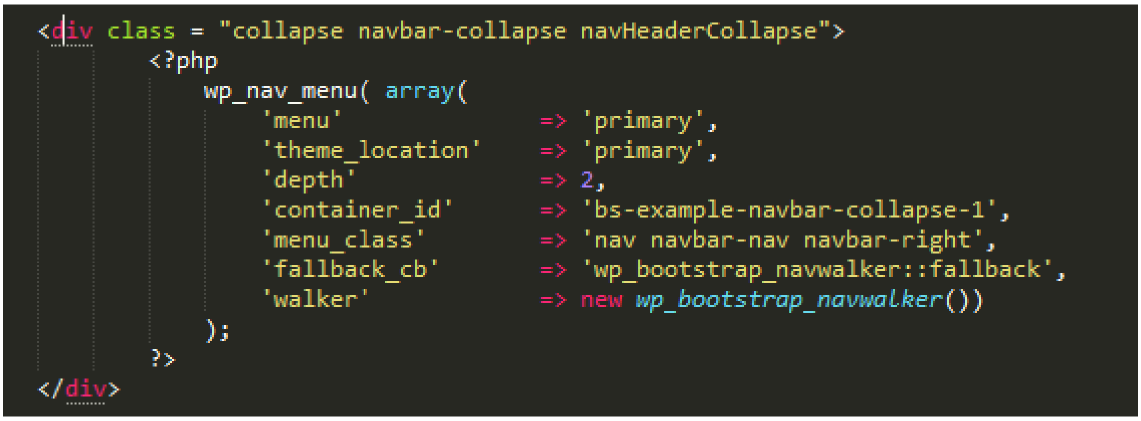
File *wp_bootstrap_navwalker.php* should be extracted in the root directory where all files are located. In the file *functions.php* should be included a line to load this *wp_bootstrap_navwalker.php* and also a declaration of a new menu.



```
<?php
    require_once('wp_bootstrap_navwalker.php');

    register_nav_menus( array(
    'primary' => __( 'Primary Menu', 'wptheme' ),
    ) );

?>
```

Figure 24. Installation of WordPress nav walker

In *header.php* in the menu class it is necessary to replace the unordered list by the following *wp_nav_menu array.*



```
<div class = "collapse navbar-collapse navHeaderCollapse">
        <?php
            wp_nav_menu( array(
                'menu'              => 'primary',
                'theme_location'    => 'primary',
                'depth'             => 2,
                'container_id'      => 'bs-example-navbar-collapse-1',
                'menu_class'        => 'nav navbar-nav navbar-right',
                'fallback_cb'       => 'wp_bootstrap_navwalker::fallback',
                'walker'            => new wp_bootstrap_navwalker())
            );
        ?>
</div>
```

Figure 25. wp_nav_menu array

After installation in Admin panel the option to create menus in Appearance tab will be available.

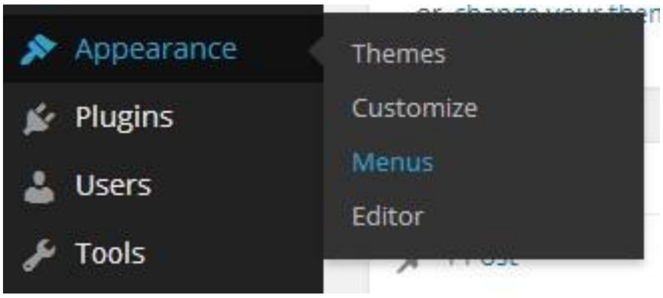
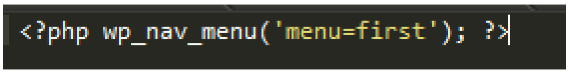


Figure 26. Menu tab

The menu structure can be customized in different ways:

- subcategories can be created in the shape of a dropdown menu with different levels
- buttons of the menu can lead to pages or posts

Another way to insert menu is to insert another special function in the right place in the template. *First* is the name of the menu.

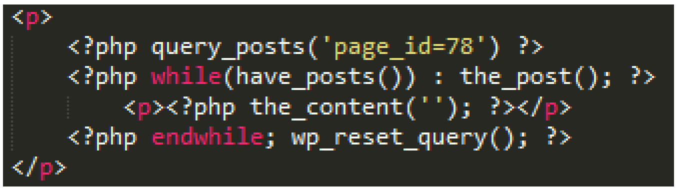


```
<?php wp_nav_menu('menu=first'); ?>
```

Figure 27. Function to insert menu (WordPress)

Content output

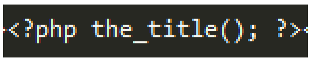
To display a text in the needed place in the HTML layout it is neccessary to insert specific PHP function to the output content. The following function will display a post with id=78.



```
<p>
    <?php query_posts('page_id=78') ?>
    <?php while(have_posts()) : the_post(); ?>
        <p><?php the_content(''); ?></p>
    <?php endwhile; wp_reset_query(); ?>
</p>
```

Figure 28. Content output

To display a title simply insert following PHP tag in the special place.



```
<?php the_title(); ?>
```

Figure 29. Title output

Conclusion

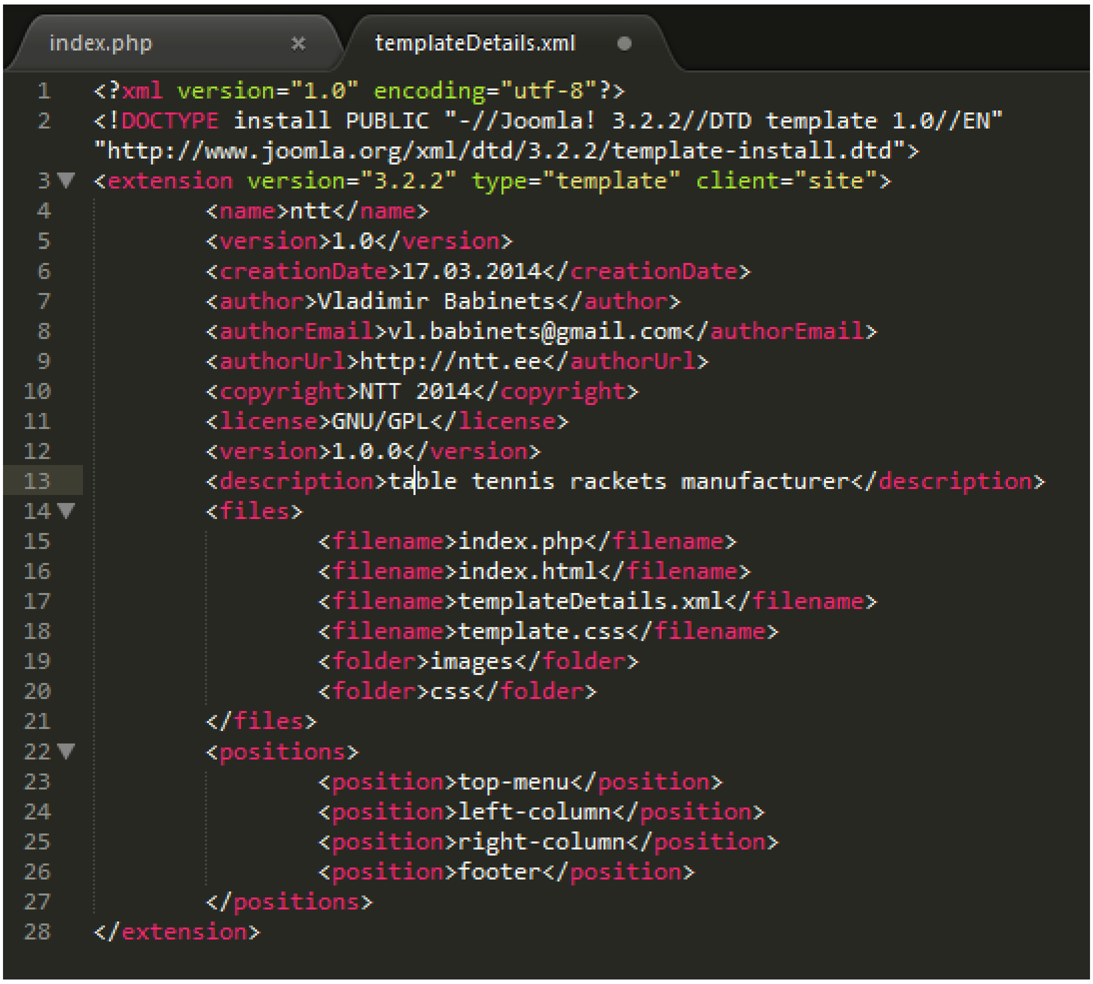
Creating a simple template is not difficult. WordPress documentation is very clear and understandable. Everything what may be needed in the development is described in details and step by step. Besides that there are many tutorials and video lessons in the Internet and if something stays unclear it can be found there. In the author’s opinion, creating templates on WordPress is the easiest and suits better novices.

3.4 Joomla

Minimal set of required files in a theme for Joomla consists of several files:

- index.php
- template.css
- templateDetails.xml
- images – folder with images
- css – folder with css styles

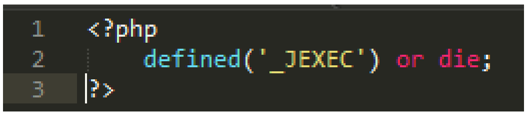
File *templateDetails.xml* must contain information about a template: name of the webpage, version, creation date, author name, description, author e-mail files included in a template, position of modules and others. [21]



```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE install PUBLIC "-//Joomla! 3.2.2//DTD template 1.0//EN"
"http://www.joomla.org/xml/dtd/3.2.2/template-install.dtd">
<extension version="3.2.2" type="template" client="site">
        <name>ntt</name>
        <version>1.0</version>
        <creationDate>17.03.2014</creationDate>
        <author>Vladimir Babinets</author>
        <authorEmail>vl.babinets@gmail.com</authorEmail>
        <authorUrl>http://ntt.ee</authorUrl>
        <copyright>NTT 2014</copyright>
        <license>GNU/GPL</license>
        <version>1.0.0</version>
        <description>table tennis rackets manufacturer</description>
        <files>
                <filename>index.php</filename>
                <filename>index.html</filename>
                <filename>templateDetails.xml</filename>
                <filename>template.css</filename>
                <folder>images</folder>
                <folder>css</folder>
        </files>
        <positions>
                <position>top-menu</position>
                <position>left-column</position>
                <position>right-column</position>
                <position>footer</position>
        </positions>
</extension>
```

Figure 30. templateDetails.xml

Each *.php* file must contain on the top of file a PHP tag which makes it impossible to connect to the file directly for security reasons.

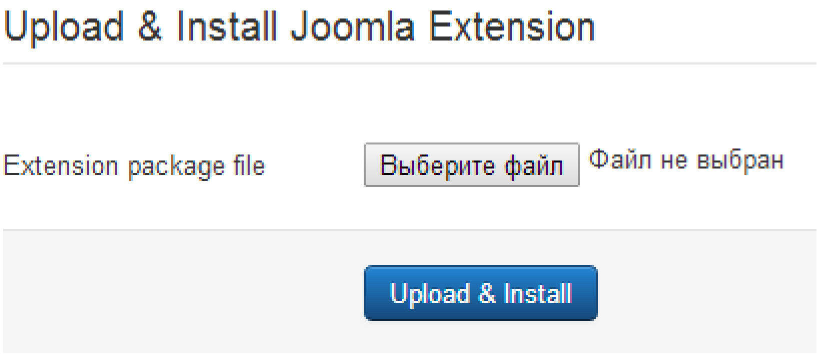


```
<?php
    defined('_JEXEC') or die;
?>
```

Figure 31. Limited access

Installation of a template

To install a created template, the folder with files should be archived only in *.zip* format. In the extension manager it is necessary to upload *.zip* file. After that in the template manager it is simple to activate this theme and set it as a default.



Upload & Install Joomla Extension

Extension package file Файл не выбран

Figure 32. Uploading and installing theme

It is important that the folder with images should contain at least one photo, otherwise Joomla installation shows an error.

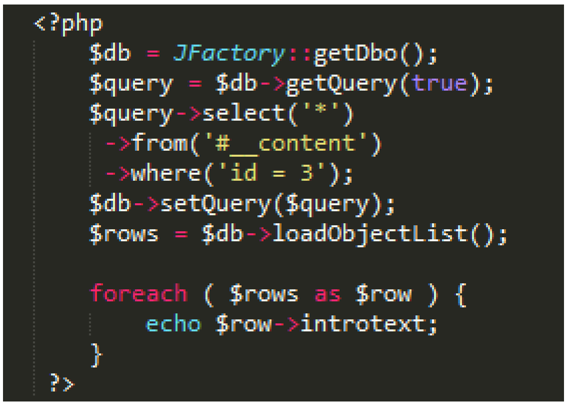
Different templates for different pages

In order to create different templates for each page, several folders which contain files for a template should be created. Archive each folder in *.zip* format and install them using the Extension manager. Then it will be necessary to create a menu and in the template manager for each menu item assign the desired template.

Content output

Create necessary articles in the article manager. In order to derive a certain text in our template a specific code should be inserted in the right place. Where id = 3 is the number of a specific article.

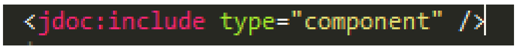
Text output occurs in this way:



```
<?php
    $db = JFactory::getDbo();
    $query = $db->getQuery(true);
    $query->select('*')
      ->from('#__content')
      ->where('id = 3');
    $db->setQuery($query);
    $rows = $db->loadObjectList();

    foreach ( $rows as $row ) {
        echo $row->introtext;
    }
 ?>
```

Figure 33. Articles output

This code is used to display the content. In the code this line should be inserted there where we want to output the content.



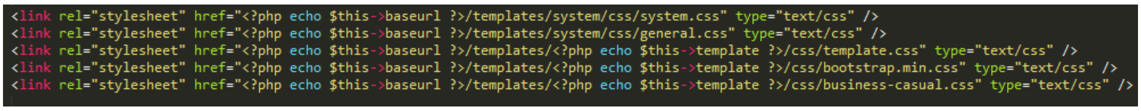
```
<jdoc:include type="component" />
```

Figure 34. Inserting components

Code *<jdoc:include type="head"* /> inserts into the page header detailed information, which is set in the settings of Joomla.

Connection of Bootstrap styles

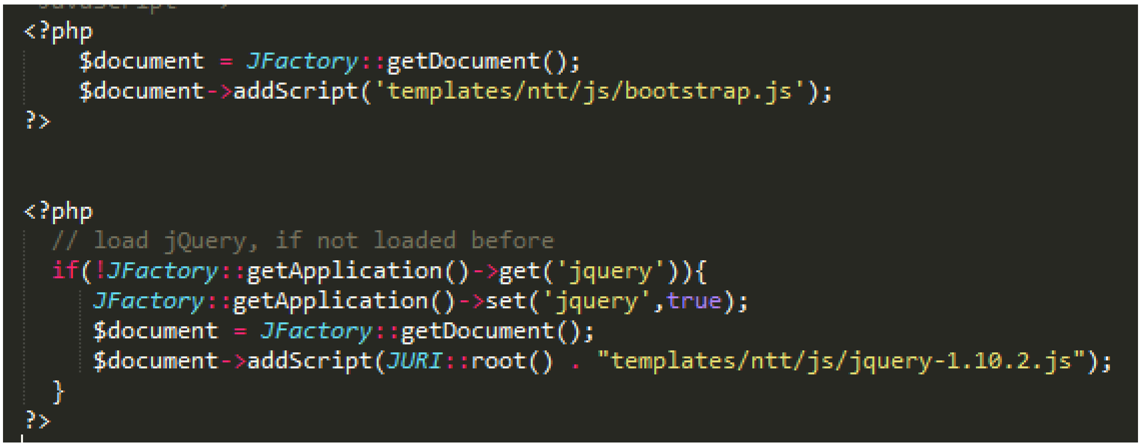
To make Bootstrap works properly it is necessary to import styles in *<head>* tag. PHP tag *echo $this->baseurl* indicates webpage URL and *$this->template path* to the template folder.



```
<link rel="stylesheet" href="<?php echo $this->baseurl ?>/templates/system/css/system.css" type="text/css" />
<link rel="stylesheet" href="<?php echo $this->baseurl ?>/templates/system/css/general.css" type="text/css" />
<link rel="stylesheet" href="<?php echo $this->baseurl ?>/templates/<?php echo $this->template ?>/css/template.css" type="text/css" />
<link rel="stylesheet" href="<?php echo $this->baseurl ?>/templates/<?php echo $this->template ?>/css/bootstrap.min.css" type="text/css" />
<link rel="stylesheet" href="<?php echo $this->baseurl ?>/templates/<?php echo $this->template ?>/css/business-casual.css" type="text/css" />
```

Figure 35. Connection of styles

Connecting of JavaScript and jQuery libraries can be done this way.

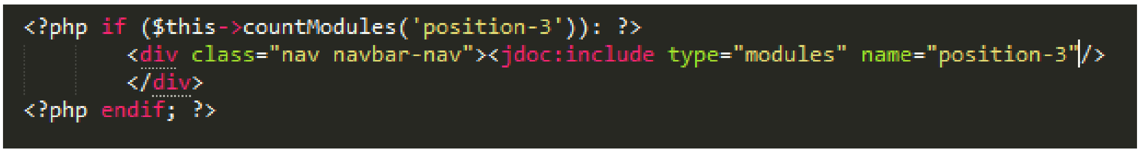


```
<?php
    $document = JFactory::getDocument();
    $document->addScript('templates/ntt/js/bootstrap.js');
?>


<?php
  // load jQuery, if not loaded before
  if(!JFactory::getApplication()->get('jquery')){
     JFactory::getApplication()->set('jquery',true);
     $document = JFactory::getDocument();
     $document->addScript(JURI::root() . "templates/ntt/js/jquery-1.10.2.js");
  }
?>
```

Figure 36. Connection of jQuery and Bootstrap.js

Inserting menu

Inserting the menu module into the template in the right place can be done the following way. When creating a menu, the menu position must be chosen. Then this position should be used in PHP tag.



```
<?php if ($this->countModules('position-3')): ?>
        <div class="nav navbar-nav"><jdoc:include type="modules" name="position-3"/>
        </div>
<?php endif; ?>
```

Figure 37. Inserting menu in Joomla

Conclusion

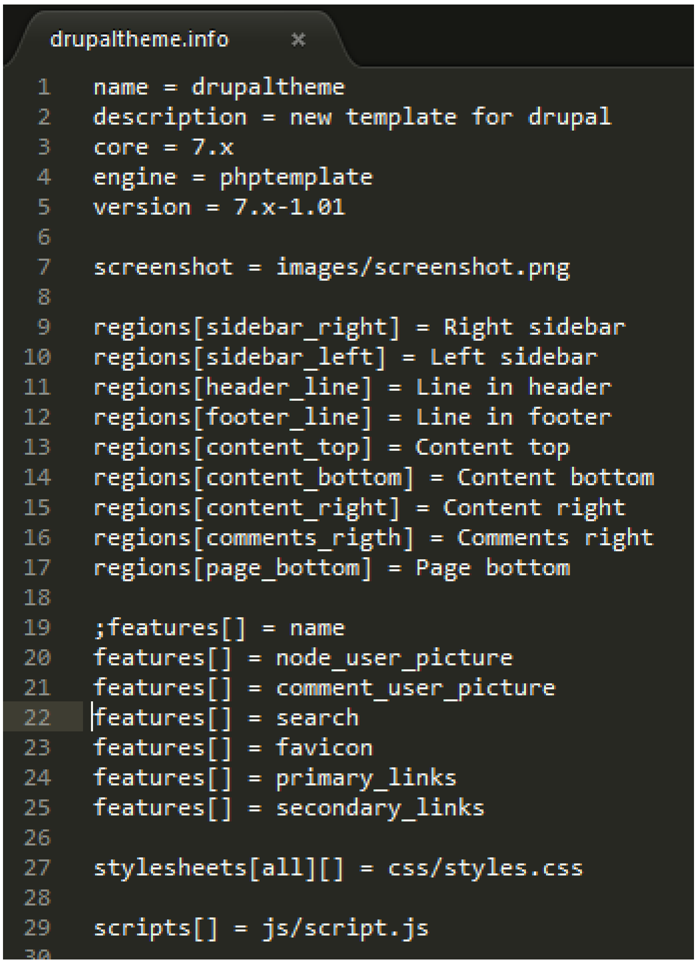
In the author’s opinion for beginners, creating a template is a bit more complicated than creating on WordPress. Joomla has a quite confusing admin panel. There is no good official documentation how to create a template step by step. There are many custom tutorials in the Internet. Development takes more time to figure out how everything works, but when you deal with all, Joomla is very powerful tool for development and has more different options than WordPress. Joomla requires some level of technical coding for better performance.

3.5 Drupal

First, we need to create a directory in themes folder with the name of our theme. For example the name of the theme will be *drupaltheme*.

In the created folder create directories: css, js, images and templates for styles, scripts, images and templates respectively. Also create the *template.php* file in which the logic will be written and *drupaltheme.info* which is a simple text file containing the data, usually the parameters required to describe the structure and the content and settings of the theme.

drupaltheme.info file contains all the needed information. This will be enough for Drupal to see and identify our theme. [22]



```
name = drupaltheme
description = new template for drupal
core = 7.x
engine = phptemplate
version = 7.x-1.01

screenshot = images/screenshot.png

regions[sidebar_right] = Right sidebar
regions[sidebar_left] = Left sidebar
regions[header_line] = Line in header
regions[footer_line] = Line in footer
regions[content_top] = Content top
regions[content_bottom] = Content bottom
regions[content_right] = Content right
regions[comments_rigth] = Comments right
regions[page_bottom] = Page bottom

;features[] = name
features[] = node_user_picture
features[] = comment_user_picture
features[] = search
features[] = favicon
features[] = primary_links
features[] = secondary_links

stylesheets[all][] = css/styles.css

scripts[] = js/script.js
```

Figure 38. drupaltheme.info

Name - is mandatory. This should be a clear name which starts with a letter.

Description - recommended and should contain a brief description of the webpage. This description is displayed when choosing a template.

Screenshot – is optional. It points to Drupal, where to find a preview of the new theme. This preview image will also be displayed on the page Appearance.

Core - is a required value. In all currently supported versions of Drupal it is needed to specify the version of Drupal.

Engine - indicates the type of mechanism used by a theme. In most cases it is required. Template mechanism is a mean of communication of a template with the core of Drupal. There are several mechanisms which can be used. Here are the most popular ones:

- PHPTtemplate
- XTemplate
- Plain PHP
- Smarty Engine

Regions - determines the block area available for the theme.

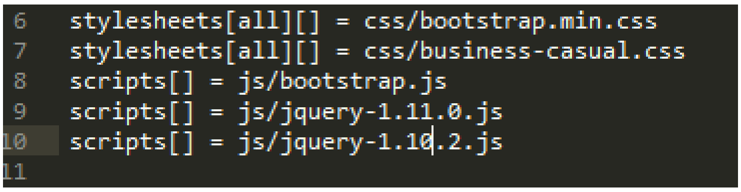
For index page in Drupal 7 answers file *page.tpl.php*. It is a simple HTML-page with PHP-operators.

Installation of a template

Installation of a new theme in Drupal is very easy. Simply insert a folder with files in the directory with themes and Drupal will recognize it and a new theme will be displayed in the Appearance tab. There it can be activated, settings can be changed and it can be set as a default template for the webpage.

Connection of Bootstrap styles and JavaScript

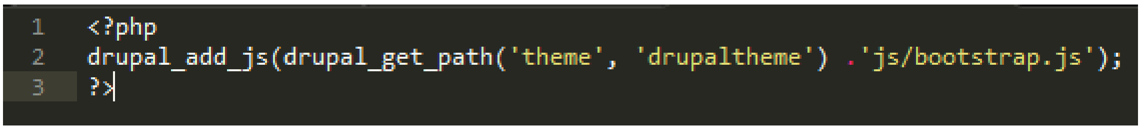
Connection of styles, JavaScript and jQuery can be done different ways. The easiest way is to declare them in the *drupaltheme.info* file.



```
stylesheets[all][] = css/bootstrap.min.css
stylesheets[all][] = css/business-casual.css
scripts[] = js/bootstrap.js
scripts[] = js/jquery-1.11.0.js
scripts[] = js/jquery-1.10.2.js
```

Figure 39. Connection of styles (Drupal)

One of the ways to connect styles is to declare them in the *template.php* file, where all logic of our template is located.

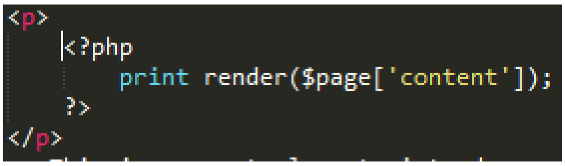


```
<?php
drupal_add_js(drupal_get_path('theme', 'drupaltheme') .'js/bootstrap.js');
?>
```

Figure 40. Another way of connection style and JavaScript (Drupal)

Content output

If we want to display our content in specific places, the following code must be inserted in the needed position.

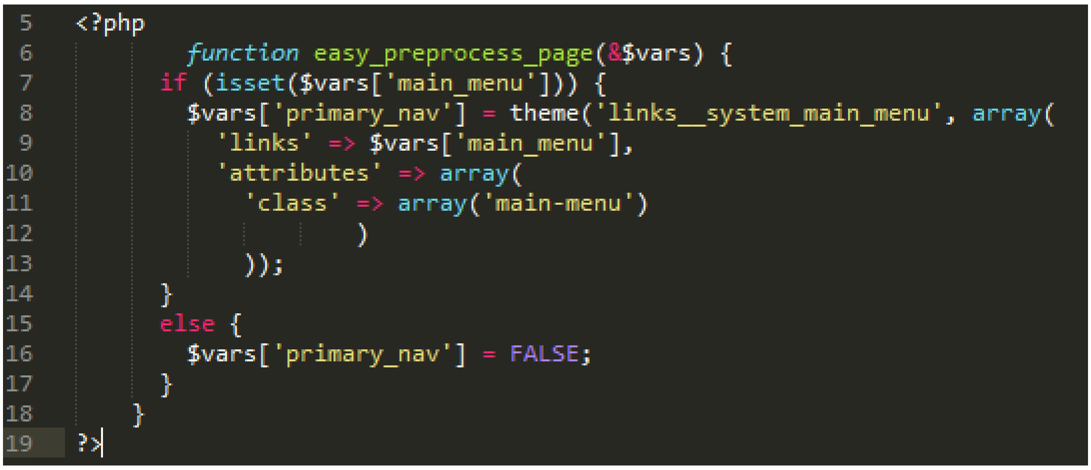


```
<p>
    <?php
        print render($page['content']);
    ?>
</p>
```

Figure 41. Content output (Drupal)

Inserting menu

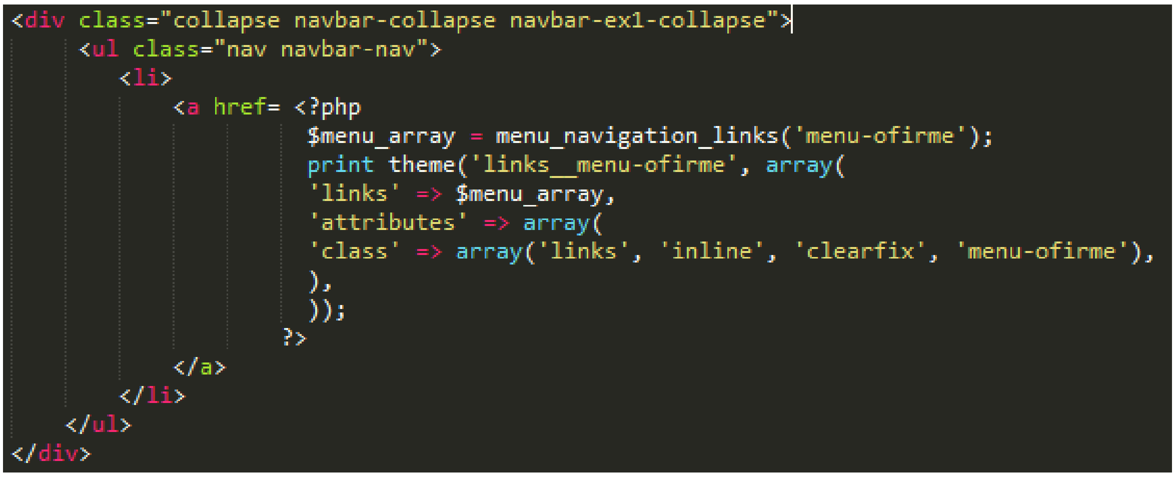
In *template.php* the following code must be inserted to help to display the menu.



```
<?php
        function easy_preprocess_page(&$vars) {
       if (isset($vars['main_menu'])) {
         $vars['primary_nav'] = theme('links__system_main_menu', array(
           'links' => $vars['main_menu'],
           'attributes' => array(
             'class' => array('main-menu')
                     )
             ));
       }
       else {
         $vars['primary_nav'] = FALSE;
       }
     }
?>
```

Figure 42. Menu insertion (function.php)

In *page.tpl.php* file it is needed to insert the following code in any position to display menu.



```
<div class="collapse navbar-collapse navbar-ex1-collapse">
     <ul class="nav navbar-nav">
        <li>
            <a href= <?php
                      $menu_array = menu_navigation_links('menu-ofirme');
                      print theme('links__menu-ofirme', array(
                      'links' => $menu_array,
                      'attributes' => array(
                      'class' => array('links', 'inline', 'clearfix', 'menu-ofirme'),
                      ),
                      ));
                    ?>
            </a>
        </li>
    </ul>
</div>
```

Figure 43. Display menu (Drupal)

Different templates for different pages

Assigning different templates to different pages can be done in different ways. One way is to create several *.php* files named like *page--node--2.tpl.php* with a required page structure, where 2 is the ID of created page. Simply insert all created files in our template folder.

One more important thing is always clear cache after some changes in the code or when creating or inserting new *.php* files in the template directory. Cache can be successfully cleared in Configuration tab, then Development unit and then in Performance menu press Clear all caches.

Difficulties

When trying to connect JavaScript and jQuery libraries, Drupal core did not recognize them. The solution to this problem is to install an addition module named jQuery Update. After installing this module and enabling it Drupal started to recognize scripts.

Conclusion

Template creation is not as easy as it is in WordPress. Some level of programming experience is needed. Documentation is a little bit confused, it takes a lot of time to read and understand. Without sided tutorials it is hard to create a template. Drupal is too powerful tool as Joomla and development process also takes more time. It is not good to start learning CMSs with Drupal. Unfortunately there are not so many tutorials in the Internet.

Conclusion

The main aim of this project was to analyze three popular CMSs existing at the moment. These are WordPress, Joomla and Drupal. Create a short overview about content management systems, about their main functions, possibilities, creating template features and code differences.

During this project pros and cons of each CMS were considered and described. Functions, features, possibilities and development processes were compared and analyzed. Conclusions were made on the following items.

During this project, author reached his goals. Author compared content management systems from the viewpoint of development and provided all necessary information which will be helpful for target groups to start a development. Author got experience in development of themes and plugins. Author has analyzed, compared and tested systems from different point of views and made conclusions for each point.

Here is the short conclusion for each point which was described during this project:

Ease of installation

Generally, installations are identical and very simple. It will not take more than 10 minutes even to an unprepared person.

WordPress and **Joomla** installations are simple, but **Drupal** installation can be a little misleading as there is an option to select one of two types of installation and for an unprepared person it can be a little hard to decide which one he needs.

Comfortable admin panel and User-friendly interface

In author's opinion **WordPress** and **Drupal** have very nice and intuitive interface. All settings, functions and all buttons can be easily found and used.

In **Joomla** interface is a little confusing and has too many options and sometimes it is very hard to find the desired function.

Search engine optimization (SEO)

Basically all CMSs are good for search engine optimization. All CMSs typically perform quite well by default, but with the addition of the right modules and configurations, they can be ideal for SEO.

Availability of modules (plugins)

The winner is WordPress as it has more than 30 000 free plugins which can be very helpful in developing webpages. In spite of this Drupal and Joomla have sufficient plugins and everyone can find what he wants.

WordPress	– 30 000+
Joomla	– 7 800+
Drupal	– 26 000+

Development friendly

CMSs are development friendly. Anyone with knowledge of programming can make plugin for his needs. In addition, there are many tutorials and books written on this topic with examples, if there are any problems.

Documentation

In general, all documentations are good. If there is something missing it can be easily found in the Internet or books. Author's choice is WordPress documentation as it is most user-friendly and all needed information can be found there. Everything is written point by point, it is easy to navigate among chapters. Main advantage of WordPress is that official documentation is in many languages including Russian. Joomla and Drupal are only in English.

Template development

Development of a template for **WordPress** is easier than for other systems. WordPress has very good documentation, all highlights are written clear. Only in some cases it is necessary to use additional documentation and tutorials. Everything is done quite simply and easily. Almost everyone who does not have any experience can make a simple template.

Development for **Joomla** is more complicated. There is no clear documentation; therefore it is essential to use other sources. It takes more time to understand how everything works and what is what.

As for **Drupal,** development is also complicated. You must have some programming knowledge. Documentation is not as detailed as in WordPress. There are many nuances that must be considered during the development process.

Problems encountered

During this project the author faced several problems:

- Problems with Denwer. During installation on Windows 8.1 some errors occurred. Problem was solved by installing Denwer on Windows 7.
- Problems with connection of Bootstrap styles. Some methods do not work. Problems were solved by using other methods.

Further development of this project:

- Create own content management system that will comply with all author’s requirements.
- Delve into the structure of systems.
- Consider the deeper nuances of development.
- Modules development
- Development of a full-fledged site

Summary

WordPress is the best choice for beginners. Ideal for simple web pages: everyday blogging and news sites and for anyone who is looking for an easy-to-manage site. Add-ons make it easy to expand the functionality of the site.

Joomla is good for e-commerce type of sites, but requires at least some level of technical coding. Joomla enables building a site with more content and structure flexibility than WordPress offers, but still with fairly easiness and intuitive usage. Supports E-commerce, social networking and others.

Drupal is the most complicated, but also the most powerful CMS. It also requires a certain level of technical coding. For complex and advanced sites it requires a complex data organization, as well as for community platform sites with multiple users.

Kokkuvõtte

Selle töö eesmärk oli analüüsida kolme hetkel populaarset sisuhaldustarkvara (CMS). Need on WordPress, Joomla and Drupal. Luua sisuhaldustarkvarade kohta lühiülevaade - kirjeldada nende peamisi rakendusi, kasutusvõimalusi, loomis mallide omadusi ja koodierinevusi.

Tööprojekti käigus analüüsiti ja kirjeldati iga CMS´i plusse ja miinuseid. Võrreldi ja analüüsiti rakendusi, omadusi, võimalusi ja arendusprotsesse. Järeldustele jõuti allpoolkirjeldatud punktides.

Selle projekti autor saavutas oma eesmärke. Autor võrreldes CMS süsteemide arengu seisukohalt ja esitab kogu vajalikku informatsiooni, mis on kasulik sihtrühmadele arengu alistamiseks. Autor sai kogemust mallide ja pluginate arengust. Autor analüüsis, võrreldes ja testis erinevate süsteeme vaatenurgaid ning tegi vajalikke järeldusi iga punkti kohta

Lühikokkuvõte iga kirjeldatud punkti kohta.

Paigaldamis lihtsus

Üldiselt on installatsiooniprotsessid identsed ja väga lihtsad. Isegi asjatundmatul kasutajal ei kulu tööks üle kümne minuti.

WordPress`i ja **Joomla** paigaldamine on lihtne. **Drupal**`i installeerimine võib olla veidi keerulisem, kuna saab valida ühe kahest paigaldusvõimalusest. Asjatundmatul programmi kasutajal võib olla keeruline arvata, kumb võimalus talle paremini sobib.

Mugav halduspaneel ja kasutajasõbralik kasutajaliides.

WordPress`il ja **Drupal**'il on väga meeldiv ja loogiline kasutajaliides. Kõik sätted, funktsioonid ja töökäsud on lihtsalt leitatavad ja kasutatavad.

Joomla kasutajaliides on veidi segadusseajav. Seal on palju erinevaid valikuvõimalusi ja mõnikord on keerukas leida vajalikku funktsiooni.

Otsingumootoritele optimeerimine (SEO)

Põhimõtteliselt on kõik sisuhaldustarkvarad head otsingumootoritele optimeerimiseks. Nende vaikesätted on küllaltki head, kuid õigete moodulite lisamisel ja heal konfigureerimisel on nad otsingumootoritele optimeerimiseks ideaalsed.

Moodulite (pistikprogrammide) kättesaadavus

Võitjaks on WordPress, millel on üle 30 000 tasuta pistikprogrammi, mis võivad olla suureks abiks netilehekülgede arendamisel. Siiski on piisavalt pistikprogramme ka Drupal`il ja Joomlal ning igaüks saab leida endale vajaliku.

WordPress - 30 000+
Drupal - 26 000 +
Joomla - 7800+

Arendussõbralikkus

CMS´id on arendussõbralikud. Igaüks, kellel on teadmisi programmeerimisest võib luua oma vajadustele vastava pistikprogrammi. Lisaks, juhul kui sellega peaks tekkima probleeme, on eelpoolnimetatud teemal kirjutatud palju juhtnööre ja raamatuid.

Dokumentatsioon

Üldiselt on kogu dokumentatsioon hea. Kui midagi on puudu, on see lihtsalt leitav Internetist või raamatutest. Siinkirjutaja arvates on parim WordPress`i dokumentatsioon, kuna see on kasutajasõbralikem ja sealt leiab kogu vajaliku informatsiooni. Kõik on samm-sammult kirjas ning peatükkides lihtne orienteeruda. Üks peamisi WordPress´i eeliseid on selle dokumentatsiooni kättesaadavus paljudes keeltes, sh vene keeles. Joomla ja Drupal on vaid inglise keeles.

Malliarendus

WordPress´i malliarendus on lihtsam kui teistes süsteemides. WordPress´i dokumentatsioon on väga hea ja kogu oluline informatsioon on selgelt välja toodud. Ainult mõnedel juhtudel on vaja eraldi dokumentatsiooni ja juhtnööre. Kõik on lihtsalt tehtav ja ka kogemuse puudumisel saab luua lihtsa malli.

Joomla arendus on keerukam. Ei ole selget dokumentatsiooni, seega on hädavajalik teiste allikate kasutamine. On vaja rohkem aega, et aru saada, kuidas kõik töötab ja mis on mis.

Drupali arendus on samuti keerukas. Kasutajal peab olema programmeerimis teadmisi. Dokumentatsioon ei ole sama detailne kui WordPress´il. On palju nüansse, mida töö käigus tuleb arvesse võtta.

Probleemid

Selle tööprojekti käigus puutus autor kokku mitmete probleemidega:

- Probleemid Denwer´iga. Windows 8.1-le installeerimisel ilmnesid mõned vead. Probleemi lahendas Denwer´i installeerimine Windows 7-le.
- Probleemid Bootstrap-stiilide ühendusega. Mõned meetodid ei tööta ja lahenduseks tuli kasutada teisi.

Selle projekti edasine arendus

- Luua oma CMS mis vastab kõigile nõuetele
- Süveneda süsteemide ülesehitusse
- Lahti mõtestada arenduse sügavamad nüansid
- Malli ja moodulite arendus
- Täielikult valmis lehekülje väljaarendamine

Resümee

WordPress on parim valik algajaile. See on ideaalne lihtsate veebilehekülgede jaoks: igapäevablogimine ning uudistelehekülјed ning kõigile, kellel on vaja kergesti kasutatavat veebilehekülge. Pistikprogrammid teevad lehekülje funktsioonide täiendamise lihtsaks.

Joomla on hea e-müügi lehekülgedele, kuid vajab teatud tasemel tehnilisi teadmisi programmeerimiskeelest. Joomla võimaldab keerukama, sisukama ja paindlikuma struktuuriga veebilehekülje ehitamist kui WordPress. Siiski on seda kasutada suhteliselt lihtne ja loogiline. Toetab e-müüki, sotsiaalvõrke jne.

Drupal on keerulisim, kuid ka võimsaim CMS. Selle kasutamiseks on vaja kõrgemal tasemel kooditundmist. Keerukama ülesehitusega lehekülgede ja arvuka kasutajate hulgaga kogukonna platvormi veebilehe jaoks vajab Drupal keerulist andmete organiseerimist.

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