



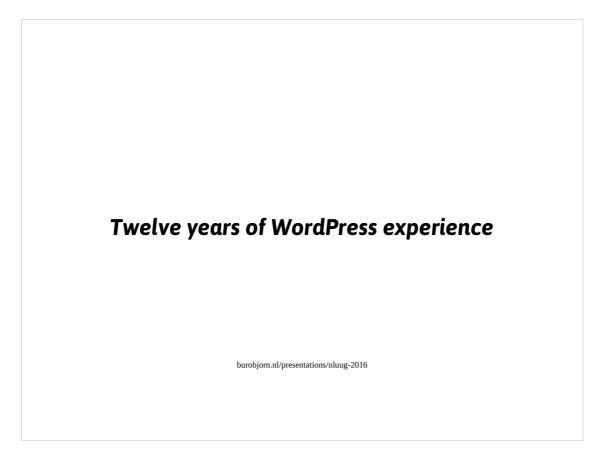
Hi!

My name is Björn Wijers. Burobjorn is the name of my company.



burobjorn.nl/presentations/nluug-2016

I'm a freelance software developer with a background in Interaction Design. I've worked as a self-employed professional for more than 10 years now. My clients range from small businesses, large corporations, non-profits, public broadcasters and the Dutch government.



I've been working with WordPress for roughly twelve years.

I've written plugins, both opensource as well as custom in-house, send in patches, created themes, translated and in general try to contribute to the WordPress ecosystem as much as I'm able to.



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My biggest achievement thus far with WordPress was being the leaddeveloper responsible for creating the intranet of The Dutch Tax Services (De Belastingdienst). Off course I didn't do this alone. We did this together as a small team of great people.

Currently:

Migrating 3500 ASP sites → WordPress
 Voorjebuurt civic crowdfunding platform

And always interested in new cool projects...

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Currently I'm consulting at a company migrating roughly 3500 websites classic ASP to WordPress, supporting an awesome civic crowdfunding platform called Voorjebuurt and I'm always looking for great new projects to work on.

Besides WordPress I like to tinker with mostly opensource software and a bit of hardware. I also organize a monthly tech/geeky meetup in Utrecht called BEEA. See BEEA.nl

Enough about me.



Today I'd like to talk about 'The Good, the Bad and The Ugly of powering 25% of the Web'. So what's with this percentage?

Ps: The title is a pun based on the title of a Western from the late sixties from the previous century featuring Clint Eastwood among others. See http://www.imdb.com/title/tt0060196/

'Lies, damned lies, and statistics'

Historical yearly trends in the usage of content management systems for websites

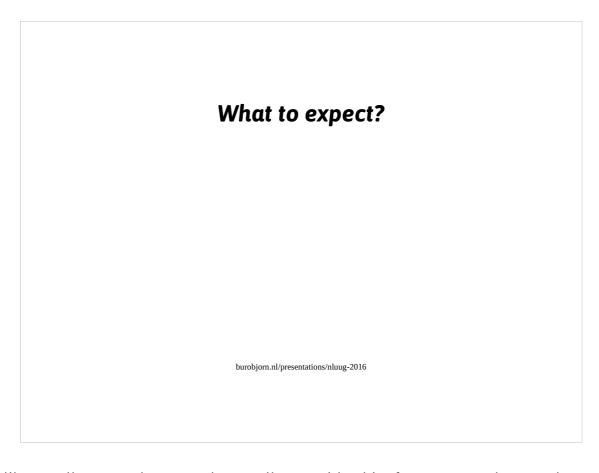
This report shows the historical trends in the usage of content management since January 2011.



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At the beginning of this year 25% of the top 10 million sites (popularity ranked by Alexa) is powered by WordPress according to W3Techs (https://w3techs.com/technologies). At this moment it supposedly has increased towards 27% already, as you can see in the figure on the slide. Personally I have some doubts surrounding this percentage and I'd welcome you to do your own research into these numbers, nonetheless WordPress is popular and you will or already have been in contact with WordPress. So what can you expect in this talk on WordPress?

Source statistics diagram (screenshot taken on 2016-11-16): https://w3techs.com/technologies/history_overview/content_management/all



I'd like to talk to you about WordPress. I'll start with a bit of context on what WordPress is and where it came from. Starting from this historical perspective I'll continue to look into customizing WordPress and introduce topics I assume might be interesting to the audience here.

My goal is to make sure the people here at the NLUUG conference can start developing with / for WordPress and get enough information to seek and find solutions for your particular needs regardless if you are a developer, sysadmin or an interested layman.

I'll introduce to you the Good, The Bad and The Ugly of WordPress.

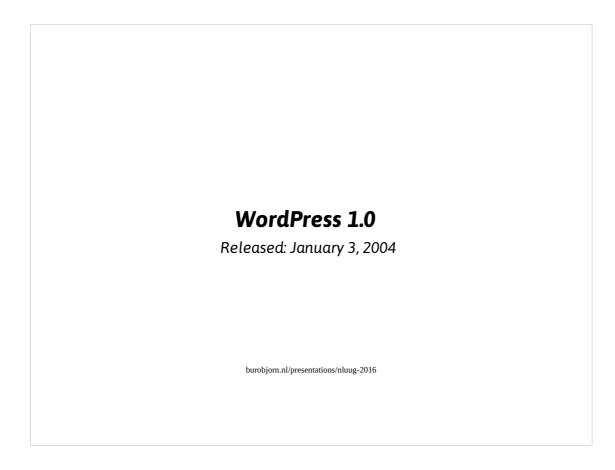
Oh, do not hesitate to interrupt me to ask questions!

"WordPress is web software you can use to create a beautiful website, blog, or app. We like to say that WordPress is both free and priceless at the same time"

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So what's WordPress? And what's the background of it?

Nowadays WordPress is a web application which can be used in lots of situation, but it used to be a simple blog application. Let's start at the beginning.



Let's go back to the first 1.0 release of WordPress. Notable developers at that time are : Matt Mullenweg & Mike Little.

The technology stack at that time consisted of

Programming Language: PHP4

Database: MySQL 3 ~ 4 Webserver: Apache 1.3 ~ 2.0

WordPress was made with a tiny bit of Javascript (mostly for the WYSIWYG editor), loads of html, oldskool CSS styling and plenty of PHP.

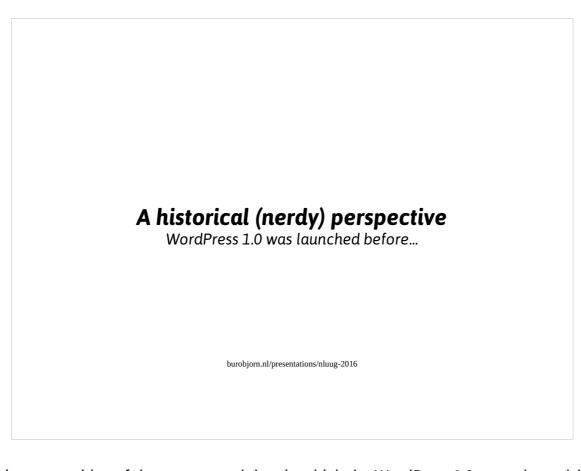
It's main purpose: providing you with a simple blog



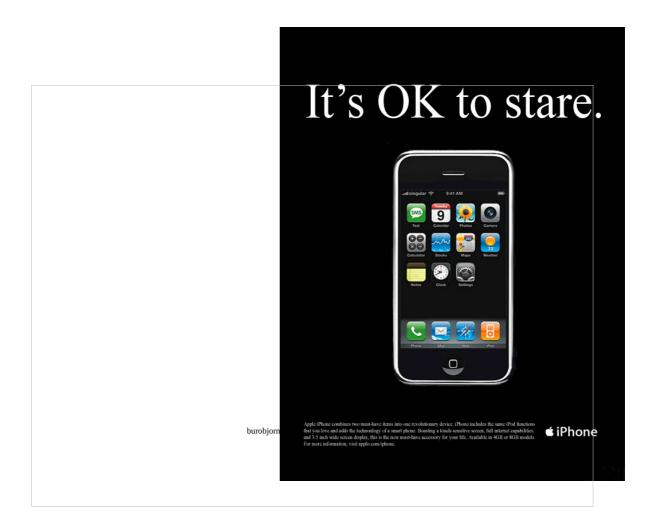
To give you an idea of WordPress at that this, here's the admin interface of WordPress 1.0.1 Pretty oldschool, if you'd ask me:)

Source image (downloaded on 2016-11-16):

http://planetozh.com/blog/2008/12/a-journey-through-five-years-of-wordpress-interface/



To give you an idea of the context and time in which the WordPress 1.0 was released, let's put things into a historical perspective



WordPress 1.0 was released **roughly 3 years before** Apple's first iPhone

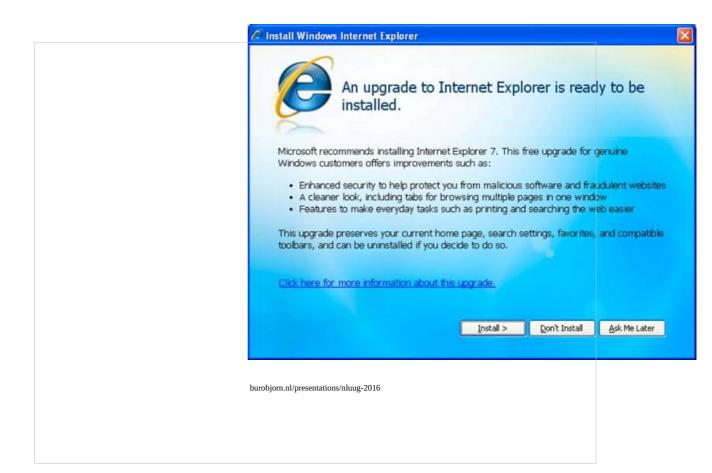
Image Source (downloaded 2016-11-16): http://www.langleytoday.ca/guest-column-consumer-culture/



WordPress 1.0 was released **roughly 3 years before** Asus' Eee PC / Netbook which might be considered the device evolved into the current tablets..

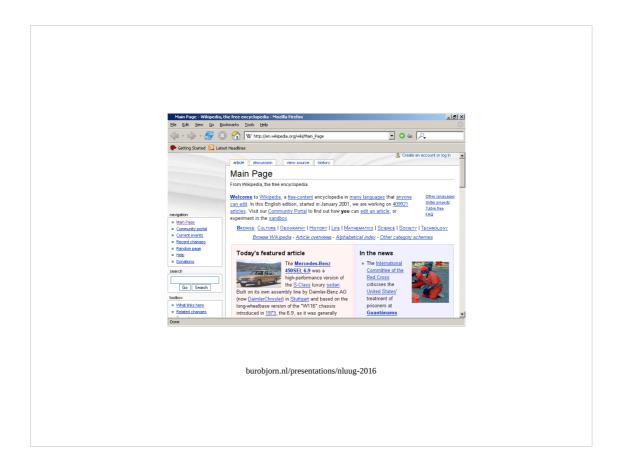
Image Source (downloaded 2016-11-16): https://en.wikipedia.org/wiki/File:ASUS_Eee_White_Alt.jpg

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WordPress 1.0 was released roughly 2 years before Microsoft's Internet Explorer 7!!

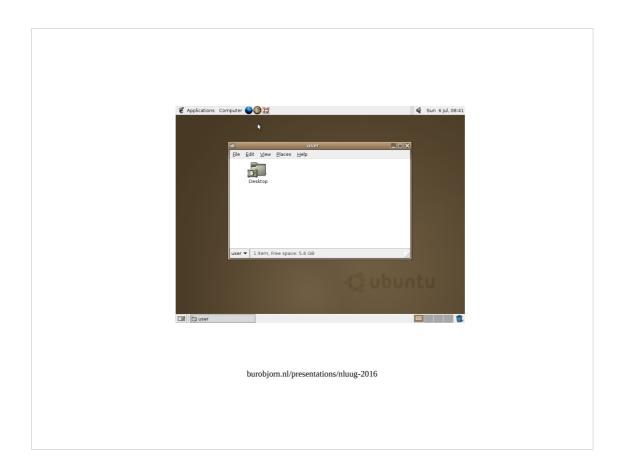
Image Source (downloaded 2016-11-16): https://www.microsoft.com/latam/technet/downloads/itdowns/IE7/images/screen4_big.j pg



WordPress 1.0 was released roughly 10 months before Mozilla's Firefox 1.0 release

Image Source (downloaded 2016-11-16):

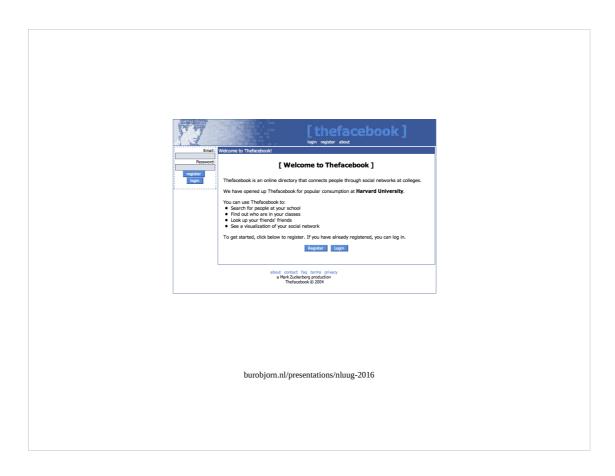
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WordPress 1.0 was released **roughly 9 months before** Ubuntu's first release known as 'Warty Warthog'

Image Source (downloaded 2016-11-16):

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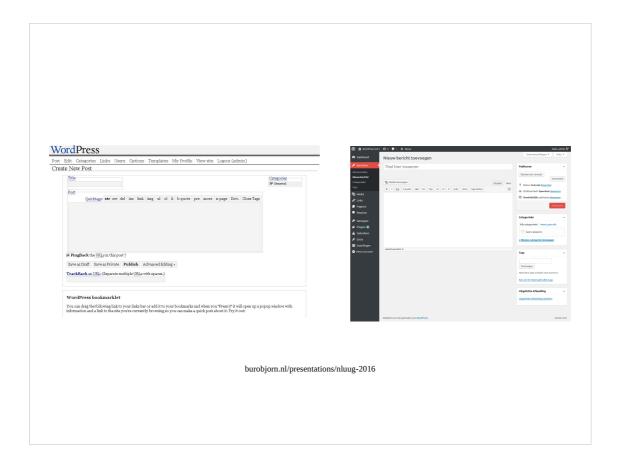


WordPress 1.0 was released roughly **a month before** Facebook was launched..

Image Source (downloaded 2016-11-16): By Source, Fair use, https://en.wikipedia.org/w/index.php?curid=21400927.



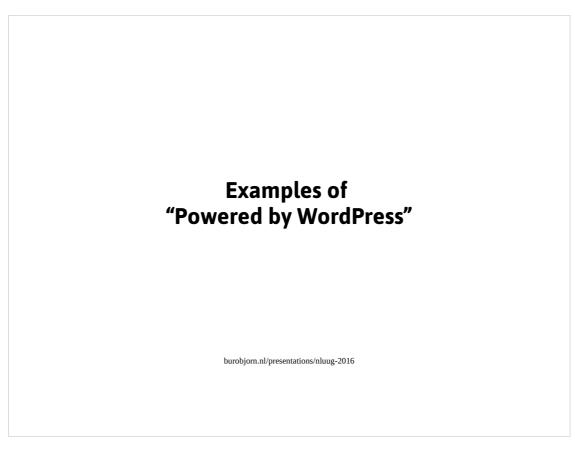
So WordPress is pretty old in Internet terms, but still going strong as you can see.



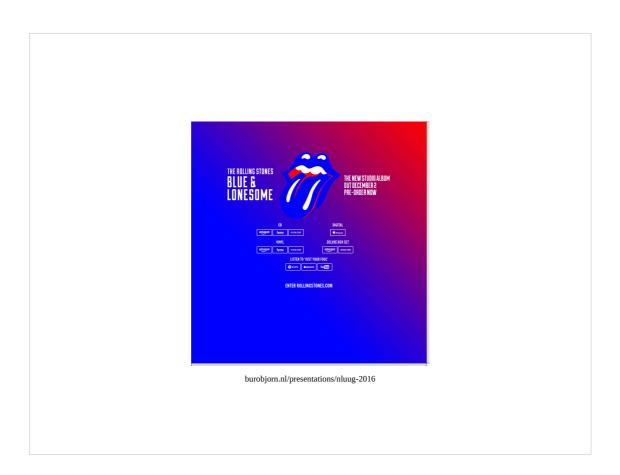
And lots of it has had the time to evolve as you can see for instance in the UI between 1.0 and the current stable 4.6.1 version.

Image (left) Source: (downloaded on 2016-11-16):

http://planetozh.com/blog/2008/12/a-journey-through-five-years-of-wordpress-interface/

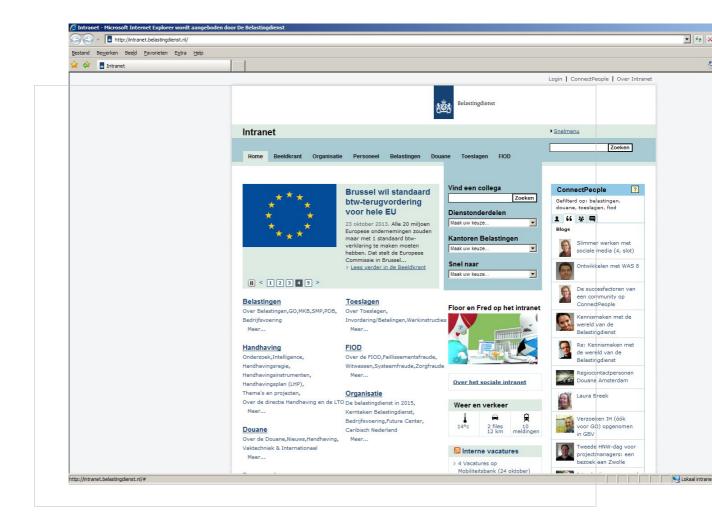


Now to give you an idea of the types of things WordPress is used for. Here are some examples:



The Rolling Stones website

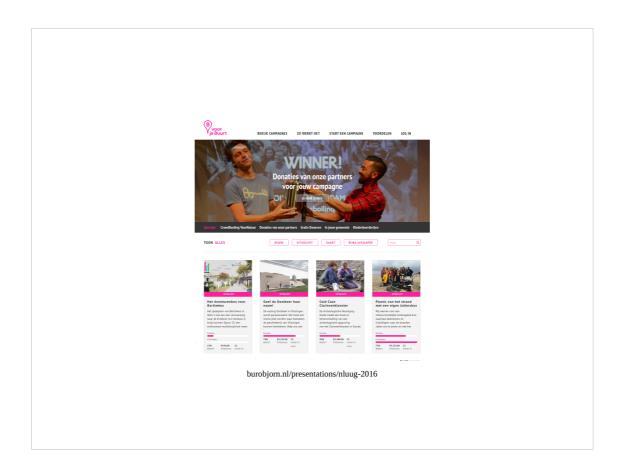
Image source (screenshot taken on 2016-11-16): http://www.rollingstones.com/.



The Dutch Tax Services intranet

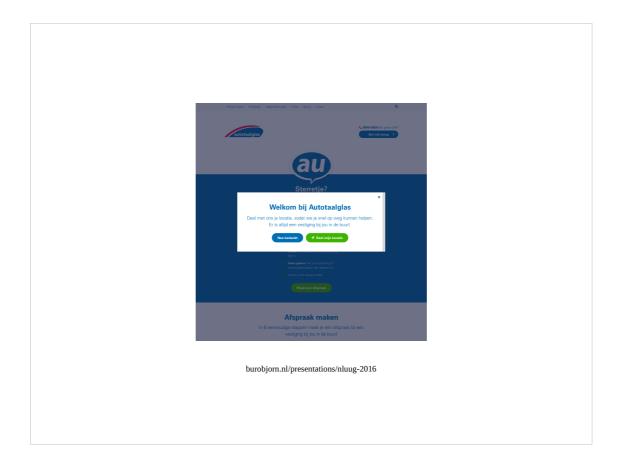
Image Source:

Private URL, screenshot date unknown. Probably somewhere in 2014.



Civic crowdfunding platform Voorjebuurt.nl

Source Image (screenshot taken 2016-11-16): https://voorjebuurt.nl



Autotaalglas, one the main companies in the Netherlands to get a broken windshield of your car fixed. This is using WordPress not only for the website, but also for providing the mobile app with data and connects to old AS-400 legacy systems.

Have a look at the interesting usecase presentation by the Dutch company LevelLevel at WordPress.tv (

http://wordpress.tv/2016/10/28/taeke-reijenga-autotaalglas-a-case-study/)

Image Source (screenshot 2016-11-16):

https://www.autotaalglas.nl



So WordPress evolved into something more than just a blogging application. It became a CMS, framework and nowadays since the integration of a REST API in version 4.4: a REST provider for other applications such as mobile apps.

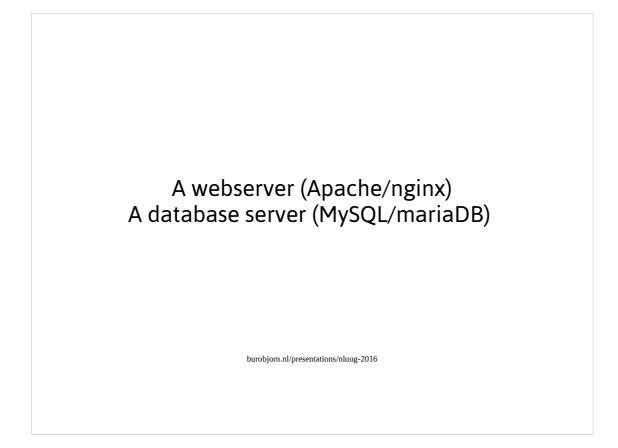
Basic ingredients of WordPress are still the same... burobjorn.nl/presentations/nhuug-2016

However the basics are still the same..



I've underlined Javascript because the role of Javascript in WordPress has increased (and probably will increase even more) in the last few years.

Basic requirements of WordPress are also still the same... burobjom.nl/presentations/nluug-2016



Notice that the recommended servers now include nginx and mariaDB.

The latter is probably due to the influence of Oracle on MySQL and their history of killing any opensource projects they touch.

The Good

WordPress is a software application In production for almost thirteen years. Battle-hardened & user-refined by numerous people & projects.

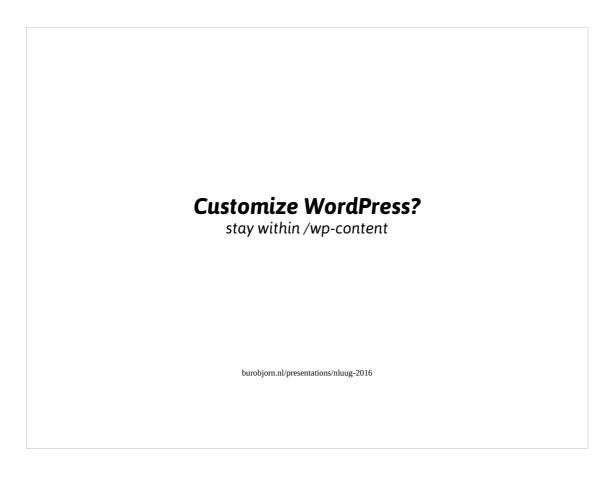
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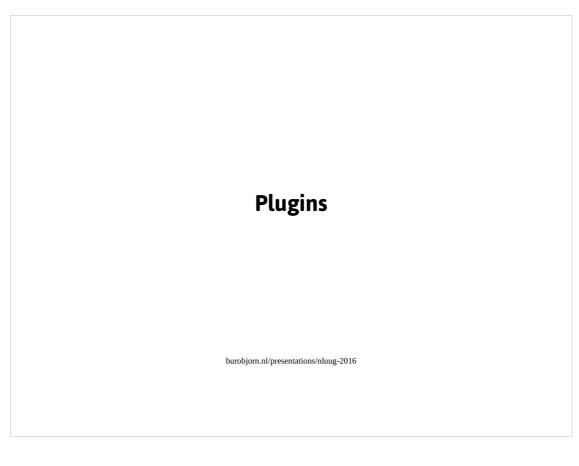
Although there is an ongoing process of refactoring and fixing the legacy code with better code it's far from done...



It attracts & NEEDS a different type of person than those interested in the latest shiny technology.



Okay, now that you've gotten an idea of where WordPress is coming from how can you change it to fit your needs? First rule: you may only change things within the wp-content directory!



You may add, remove plugins which add or remove WordPress functionality

Myplugin.php

```
<?php
/*
Plugin Name: My Plugin
Plugin URI: http://plugin_URI.ext
Description: My plugin is a mockup plugin
Version: 1.0
Author: BjornW
Author URI: http://Auteur_URI.ext
License: GPL2
*/
?>
```

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This is the most basic plugin. It does nothing at all, but it will be parsed by WordPress as a plugin due to the use of these 'magic comments'. Using these lines WordPress knows that the file is a WordPress plugin.



There are also mu-plugins. These were part of WordPress Multisite (hence mu-plugins) but have been integrated into WordPress since version 3.0 in which WordPress Mu became part of the WordPress codebase (one codebase → easier to maintain).

The 2 most important things to know about these are:

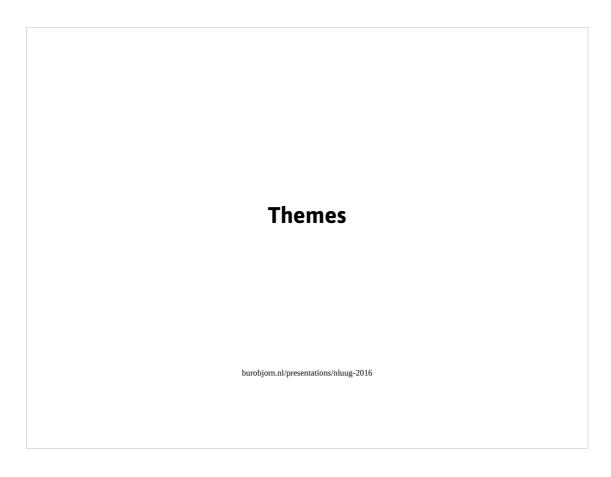
- 1) They will run automatically and you cannot de-activate them from the wp-admin interface.
- 2) You cannot place these in subdirectories in wp-content/mu-plugins unless you write some code to load the files in the subdirectories.



So there was a time when there were 2 WordPress versions: WordPress and WordPress MU.

WordPress MU allowed you to use one codebase for multiple sites. So you could have multiple websites being run from the same codebase. It would use the same database and just add tables per site to it

WordPress has been merged into WordPress since version 3. and you can use WordPress to power multiple sites in a network. Have a look at the WordPress documentation for the details on how to set this up. It's a bit more advanced than a basic WordPress installation.



Themes also reside in the wp-content directory and are used to change the look and feel of the WordPress frontend. So it allows you to change the look and feel of your website for your visitors.

Style.css & empty index.html

/*

Theme Name: Minimaal

Theme URI: https://burobjorn.nl

Author: Björn Wijers <burobjorn@burobjorn.nl>

Author URI: https://burobjorn.nl Description: Most minimal theme

Version: 1.0

License: GNU General Public License v2 or later

License URI: http://www.gnu.org/licenses/gpl-2.0.html

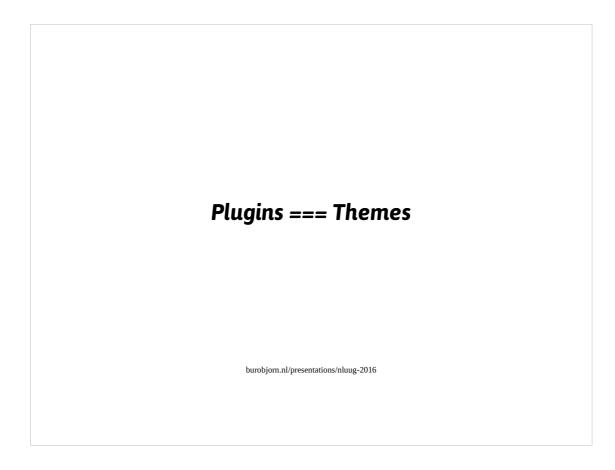
Tags: example

Text Domain: twentyfifteen

*/

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The most basic theme consists of a style.css file with the 'magic comments' as seen on the slide and an empty index.php file. It does nothing and will display a white screen when visiting your website, but WordPress executes it as a valid theme without a problem.



Under the hood, plugins and themes are very much the same. And in general you can achieve most of what you want in both a plugin or a theme.

The Good Freely available on WordPress.org: 47734 plugins 4304 themes

The Bad 47734 plugins & 4304 themes Without any quality assurance...

The ugly

Each plugin or theme has all rights within your installation and may be auto-updated* or 'phone home*'...

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Basically you hand over the keys of the Kingdom when you are installing plugins or themes. So make sure you can trust a plugin or theme before installing it!



Without actions and filters you would not be able to easily change the default behavior of the WordPress core. WordPress' actions and filter are similar to even listeners. They allow you to hook into a certain event and add & remove code or in the case of filters replace certain values to fit your needs.

Nowadays WordPress has so many actions and filters that you should never have to patch WordPress' code in order to change it.

Action (add/remove) example

```
/** Assume a well-written class **/
function __construct() {
   add_action('before_delete_post', array( $this, 'my_function'), 10, 1);
}
function my_function ($post_id) {
   // use the post_id to perform actions before the delete has been run
}
```

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The code on the slide is a simplistic example of how to implement a basic action from within a class.

In this case we'll hook into the 'before_delete_post' hook. This will execute just before a post is removed from WordPress and allows you to for instance make a copy of the the post before the original is removed.

In the code you can see that this action will call the 'my_function' method in our assumed class.

The number 10 indicates the priority of the action. As an unwritten rule anything below 10 is WordPress Core territory and anything above 10 is plugin/themes territory. By hooking into an action with a lower or higher priority you are able to execute your code just before someone else's code (or just after it).

The number 1 indicates the number of arguments your custom function needs to receive.

Filter (replace) example

```
/** Assume a well-written class **/
function __construct() {
   add_filter( 'wp_mail_from_name', array( $this, 'set_from_name' ) );
}

function set_from_name ($current_name) {
   return 'Bjorn';
}

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```

On this slide I've written a small example of how to use a filter. The filter is called 'wp_mail_from_name' and allows you to set a name in the From header of any mail sent from WordPress.

As you might have noticed, the numbers 10 and 1 are absent. By default WordPress will use priority 10 and the amount of arguments the filter has. So in this case I know that there will be only 1 argument and I have omitted this from the code.

The 'set_from_name' methode is called each time the 'wp_mail_from_name' filter is executed and it will receive the current from name. In this case it will be ignored and the code will return my (hardcoded) name.

Keep in mind filters need to return values! Without it you may break things as filters are often chained together. So don't break the chain:)

The Good

Almost anything can be changed in WordPress without touching the default (Core) code

The Bad

Performance issues and side-effects will occur if you're doing this the wrong way.

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Sadly it's rather easy to do this the wrong way. I recommend to always look at the WordPress code as a reference since most documentation cannot be trusted due to the high speed of development. In other words: the code is the documentation.

The UglyIt is hard to determine when and which action or filter to use.

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You may use the WordPress codex

(https://codex.wordpress.org/Plugin_API/Action_Reference), but I also recommend to look at the code itself to get a better idea of when and which action to use.

Customizer jargon:

Custom Post Type
Custom Taxonomy
Attachments (media files)
Roles / Capabilities (Users)
Short Codes
Templates (Page)

Metadata (Post 'customfields' / User / Taxonomy / Site 'options')

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There's more than just actions and filters off course. To give you an idea I've put up some jargon used in the WordPress world.

Custom Post Types can be considered as data types molded to your liking. The basis of these types are the general Post/Page type. Have a look at make.wordpress.org to learn more about it.

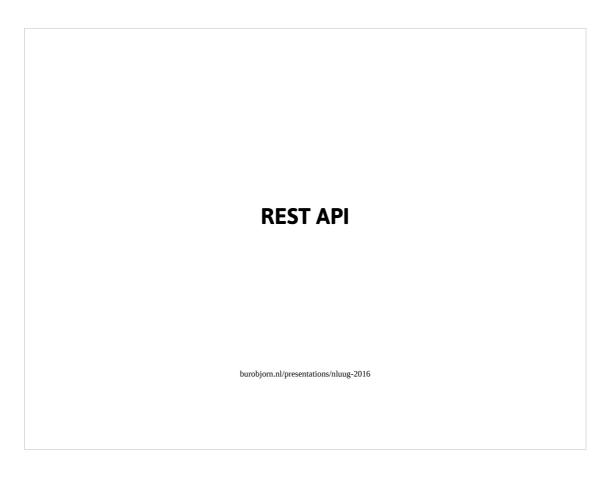
Custom Taxonomy allows you to combine and group Custom Post Types into taxonomies. Out of the box WordPress has the category and tags taxonomy, but you can add your own. For instance a custom taxonomy 'genre' which can group your custom post type 'films' into the appropriate genres.

Attachments are media types such as images, videos, pdf files etc. Have a look at the WordPress codex for a bit more background information on these. Oh and in 4.7 PDF files will get previews which makes it easier to work with them.

Shortcodes are basic tokens you may insert in your content which will be replaced with other content using code. Try to avoid them if you can, since using shortcodes will litter your database with tokens that may not be replaced if a plugin or theme has been disabled.

A theme consists of Templates. A lot of them are predefined, such as single.php for a single Post or Page, but you can also add your own for instance as Page Templates. This allows you to switch the layout or usage of a WordPress page. I'm quite fond of these and prefer to use them instead of shortcodes.

There's a lot of places where you can add extra data (metadata) to a data entity. In general metadata is defined by a key-value pair and the id of the corresponding entity. For instance a site id, a user id, taxonomy term id or a post id. Have a look at it on the WordPress Codex. It enables a lot of interesting use cases!



Since version 4.4 WordPress has a REST api built in, which allows you to connect WordPress to other applications via REST. For example, you may use WordPress to add data to your mobile application which retrieves this data via REST.

The Good

Use WordPress as a REST provider for other applications such as mobile apps.

The Bad It too soon to have bad things yet ;)

The Ugly It's not yet feature complete and quite new.

Not really ugly...it's a work in progress..

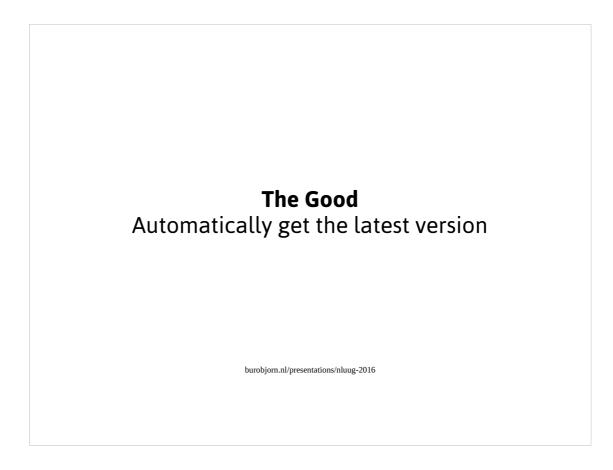


WordPress has an auto-updater since version 3.7 (?).

It will keep your WordPress installation up to date. It works similar to Chrome & Firefox's auto-update mechanism. Off course it relies on having access to the updates server (single-point-of-failure) and having write permission.

You are also able to disable it in WordPress (although I'd disable it via permissions in your filesystem and firewall just to be sure). By default it will not update plugins or themes automagically although you can configure WordPress in such a way that it will update those as well. Translations are updated automatically.

For simple WordPress sites without a lot of plugins or themes this works 99% of the time without any issues, for more complex websites I'd prefer other update methods (for instance via Git or wp-cli).



And make sure your simple website has the latest security updates...

The Bad Third-party plugins or themes may break your site...

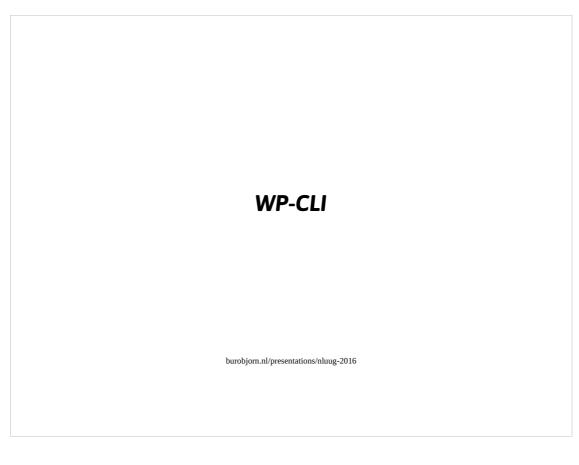
Although personally I've had never any problems with the auto-updater. This is probably because I only use it for simple websites and not for more complex setups.

The Ugly

The auto-update mechanism needs write permission to replace the old version...

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Yeah...there's always a trade-off between security and ease of use.



WP-CLI (wp-cli.org) is a commandline application which allows you to use all of WordPress' admin interface functionality and more from the commandline. And it's scriptable!

It makes it really easy to setup and configure a WordPress installation from for instance a configuration tool like Ansible.

The Good

A command-line (scriptable) client for WordPress' admin interface.

The Bad It's not included by default burobjorn.nl/presentations/nluug-2016

It should be part of core WordPress.

The Ugly

Support for third-party plugins or theme functionality may not be supported or break wp-cli

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As always, bad plugins or themes may rain on your parade...



A few words about WordPress' database use.

- It is not using a database abstraction layer which makes it hard to transition from for instance MySQL to Postgress. Although to be honest, I've never had to move from one database to another during a project's lifecycle.
- It is using one object to deal with the database, which enables you to replace it with another one. For instance HyperDB which is designed with master-slaves and all kinds of more 'enterprise' use of database. You can download it from WordPress.org
- In a multisite installation you'll still use one database with 12 tables per sites besides some overhead tables. Yes, it looks ugly, but it has proven itself over the years as the more scalable solution.
- WordPress places serialized data in the database which sucks for database migrations from test to production for instance.

The Good

Fairly simple database model with 12 tables accessible via one global (ouch) object (\$wpdb) acting as a 'abstraction layer'

The Bad

Using serialized arrays and URLS all over the place makes deployment & database harder* than it IMHO should be.

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WP-DB-Migrate is a great Python script to help you with migrating databases.

The Ugly
WordPress MU installations use 12 tables per site
+ mu overhead tables. Lots of sites = lots of tables.



WordPress security or to be honest web application security in general is a topic in itself. However I'd say that WordPress has seen some good changes in this area and might be considered pretty ok nowadays. Unless you start installing plugins and themes..these may or may not be secure. And more often those claiming to help security are the ones causing the most issues..

The GoodDefault WordPress is pretty ok*, nowadays

The Bad

It's still a web application, so secure it by all means necessary on different levels. Be careful with plugins & themes!

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Security of webapplications is a multi-layered beast which depends on so many variables that it is hard to give any advice in a talk like this. So I'd recommend to have a good look at OWASP and general web application security best practices!

The Ugly

WordPress leaks lots of information by default and has no brute-force protection by default

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At least, install some kind of brute-force protection against brute-force login attacks. A possible solution is wpfail2ban plugin in conjuction with fail2ban. See https://bjornjohansen.no/using-fail2ban-with-wordpress



The file wp-config.php is arguable the most important file in a WordPress installation. It holds all configuration for your WordPress installation and you can use it to modify certain things, such as setting the language of the installation or to enable debugging. In the next slide I will discuss some useful constants which allow you to tune your WordPress installation. For more information have a look at https://codex.wordpress.org/Editing_wp-config.php

```
// disable external requests
define( 'WP_HTTP_BLOCK_EXTERNAL', true );
define( 'WP_ACCESSIBLE_HOSTS', 'api.wordpress.org,*.github.com' );

// disable auto-updater
define( 'AUTOMATIC_UPDATER_DISABLED', true );

// disable file editor & plugin theme updates
define( 'DISALLOW_FILE_MODS', true );

// disable file editor only
define( 'DISALLOW_FILE_EDIT', true );

// set trash time
define( 'EMPTY_TRASH_DAYS', 3 ); // 3 days

// set debugging true also for js scripts
define( 'WP_DEBUG', true );
define( 'SCRIPT_DEBUG', true );
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```

The first 2 constants defined in this slide allow you to limit connections to the outside world. Although I personally would not only use this, but also limit connections via a good-old firewall.

The third constant allows you to disable the auto-updater and the fourth even removes any traces of being able to update from within the WordPress interface.

The fifth 'DISALLOW_FILE_EDIT' should imho by default part of your wp-config.php file. This will prevent anyone with access to wp-admin to use an editor to change files. Personally I'd like the editor to be removed and made into a plugin.

The 'EMPTY_TRASH_DAYS constant allows you to set the time after which the WordPress trash bin will be emptied. By default this is 30 days.

The last 2 constants help you with debugging. On the https://codex.wordpress.org/Editing_wp-config.php you will see more ways of making debugging even easier.

The Good There are lots of extra options to configure WordPress to your liking.

The Bad

The documentation is not always clear and you may cause unwanted side-effects.



So if you're not fluent with PHP you may make a syntax error and your site will fail to load...

Questions? Remarks? Let me know!

...You may also ask me later..

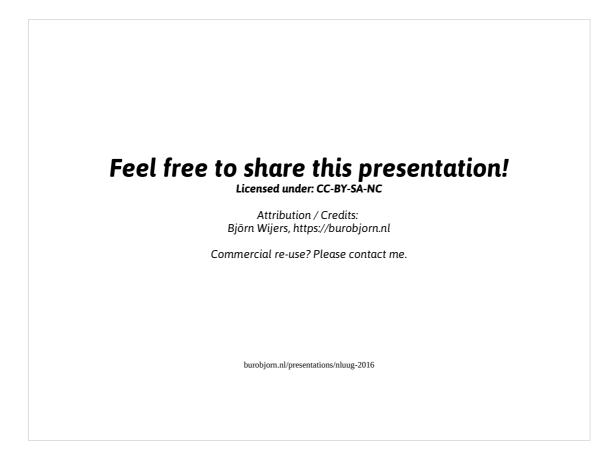
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Feel free to contact me with any questions or remarks related to this presentation.



Thanks for attending my presentation. Have fun with the other talks today!



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