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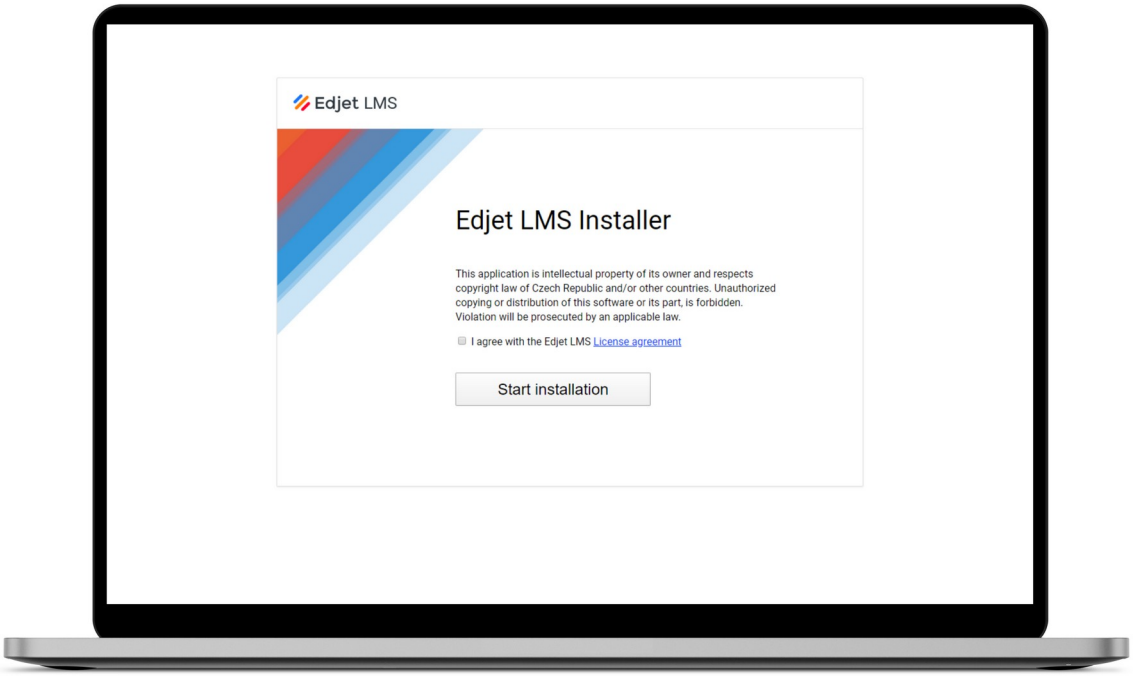
ADMIN MANUAL

Administering Edjet LMS Server 6.1



English

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Start with Edjet LMS Server

Sign-up for Edjet Enterprise Account

To begin with Edjet LMS, you need to sign up for your Edjet Enterprise Account.

If you Sign up, you will be able to:

- Activate Edjet LMS cloud trial
- Download Edjet LMS Server installer and license key
- Submit tickets to support
- Pay for services on-line
- View and download invoices
- Manage plans & licenses
- Manage account setting and billing address

Already have an Edjet Enterprise Account? Sign-in.

Download Edjet LMS Server installer

To start your free 30-day trial download the installation package:

1. Visit Edjet Enterprise account dashboard.
2. Click **Setup a new product.**
3. To register a server product, choose **Download the Free edition.**
4. Compare our licenses and then click **Choose license to continue.**
   License can be changed later. You will not be charged until you confirm an actual purchase with our support.
5. Choose latest version using the **Version to be downloaded** dropdown.
   Note: You can also choose older versions, if available to you.
6. Enter the **Server hostname.**
   Valid domain name or IP address, excluding protocol.
   See detailed technical information on Server hostname below
7. Enter **Server software stack** description.
8. When done, click **Start my free trial!**
9. Find your product and click **Download package.**

Server hostname

Understanding server hostname

- Server hostname is a main license restriction.
- The server name is an attribute set by the web server for each domain or virtual host, and is the value accessed in PHP as $_SERVER['SERVER_NAME']. This is fairly dependent o Apache SERVER_NAME value.

- Server hostname is a part of an installation URL – an address (Fully qualified domain name) where the Edjet LMS is accessible by people after the installation.
- To change the hostaname:
  - If you are using trial license, you can change create a new server product with a different hostname.
  - If you already purchased a lifetime license, please contact our support: support@edjet.com and we will be happy to help

Requirements

Software prerequisites

Before deploying Edjet LMS to your server, you need to install:

- Apache 2.4
- PHP 7.2
- PostgreSQL 10
- ionCube Loader 7.2

Other prerequisites are optional.

To send e-mail using local mail server:

- Exim4
- CRON

Warning: It is NOT recommended to use 3rd party LAMP/LAPP or similar software bundle to establish the web server environment.

Hardware requirements

The following installation requirements assume you have selected the options according to our guides (or kept default) during the installation process.

Requirements	Linux (Ububtu Server 18 LTS)		Windows (Windows Server 2019 64-bit)	
	Minimum	**Recommended**	**Minimum**	**Recommended**
Traditional hardware				
Processor	1 GHz (1C/1T)	2 GHz or faster (1C/2T)	1.4 GHz (1C/1T)	2 GHz or faster (2C/4T)
RAM	1.5 GB	4 GB or greater	1.5 GB	8 GB or greater
Storage*	5 GB	16 GB or greater (SSD)	35 GB	50 GB or greater (SSD)
Virtualized hardware (Cloud)				
AWS EC2 type	t2.micro	t2.medium	t2.medium	t2.large
Storage*	5GB	16 GB or greater (SSD, guaranteed IOPS)		16 GB or greater (SSD, guaranteed IOPS)
Network	low	moderate	low	moderate

*Please note that additional disk space is required for your data.

The minimum hardware required to install and run Edjet LMS Server are mainly determined by underlying technology like operating system, PostgreSQL, Apache or PHP.

If you need to optimize your system further, please reach out our Performance chapter or look at this software optimization tips.

Browser support

Screen support:

1. Admin desktop, tablet
2. Site – Responsive theme desktop, tablet, mobile
3. Site – Classic theme desktop

Support table:

OS	Browser	Module/Theme		
		Admin	Site – Responsive theme	Site – Classic theme
Windows	Chrome	Supported	Supported	Supported
Android	Chrome	X	Supported	X
Android	Firefox	X	Supported	X
Windows	Firefox	Supported	Supported	Supported
Windows	IE 9	Not supported	Not supported	Supported
Windows	IE 10	Not supported	Not supported	Supported
Windows	IE 11	Supported	Supported	Supported
Windows	Edge	Supported	Supported	Supported
MacOS	Safari	Supported	Supported	Supported
iOS	Safari	X	Supported	X

Note: Unlisted browsers are considered as not supported even if they might render correctly.

Setup a Linux-based server

Create an environment to run Edjet LMS on a Linux-based web server.

Supported Linux distributions

You can choose basically any Linux distribution of your preference.

This document guide you trough the setup of the server using the recommended **Ubuntu Server 18.04 LTS** operating system.

For more info about Ubuntu releases & news see https://wiki.ubuntu.com/Releases

Note: For Windows OS see "Setup a Windows Server server" chapter.

Launch a Linux server

You can use any cloud provider of your choice to launch virtual machine or use any other way to run a web server in-house.

Recommended: Follow tutorial on how to launch a virtual machine with Amazon EC2:

https://aws.amazon.com/getting-started/tutorials/launch-a-virtual-machine/

We recommend to choose Ubuntu Server 18 AMI over the of Amazon Linux AMI.

Update list of package manager repositories

This is a recommended step.

```
sudo apt-get update
```

Install and configure Apache

To install Apache 2.4 web server:

```
sudo apt-get install apache2
```

Enable mod_rewrite:

```
sudo a2enmod rewrite
sudo service apache2 restart
```

Enable the use of .htaccess for app directory /var/www/html

```
sudo vim /etc/apache2/sites-available/000-default.conf
```

Add the directive „AllowOverride All“:

```
<Directory /var/www/html/>
 Options FollowSymLinks MultiViews
 AllowOverride All
 Order allow,deny
 allow from all
</Directory>
```

Install and configure PostgreSQL

To install PostreSQL database:

```
sudo apt-get install postgresql
sudo apt-get install php-pgsql
```

Switch to psql:

```
sudo su postgres
psql
```

Create new role

Create new role (user) used by Edjet LMS app to connect to database:

```
CREATE ROLE template_c6 WITH LOGIN PASSWORD '*******' CREATEDB;
```

Use strong password and save it for later use!

Create new database

Create new empty database:

```
CREATE DATABASE learnis;
```

Set user as owner of database:

```
ALTER DATABASE learnis OWNER TO template_c6;
```

Quit psql:

```
\q
exit
```

Restart postgresql:

```
sudo service postgresql restart
```

Install and configure PHP

To install PHP:

```
sudo apt-get install libapache2-mod-php php php-gd php-zip php-xml
php-mbstring
```

Switch short open tag On

For Apache:

```
sudo vim /etc/php/7.2/apache2/php.ini
```

Line:

```
short_open_tag = Off
```

Change to:

```
short_open_tag = On
```

And for CLI too:

```
sudo vim /etc/php/7.2/cli/php.ini
```

Line:

```
short_open_tag = Off
```

Change to:

```
short_open_tag = On
```

Set max upload size

For Apache:

```
sudo vim /etc/php/7.2/apache2/php.ini
```

Line:

```
upload_max_filesize = 2M
post_max_size = 8M
```

Change to:

```
upload_max_filesize = 200M
post_max_size = 208M
```

Set max input vars

For Apache:

```
sudo vim /etc/php/7.2/apache2/php.ini
```

Line:

```
max_input_vars = 1000
```

Change to:

```
max_input_vars = 100000
```

Restart webserver

To apply any changes in php.ini:

```
sudo service apache2 restart
```

Install and configure ionCube Loader

To install ionCube Loader download Linux x64 loader:

```
sudo wget
http://downloads.ioncube.com/loader_downloads/ioncube_loaders_lin_
x86-64.tar.gz
```

Extract and move:

```
sudo tar zxvf ioncube_loaders_lin_x86-64.tar.gz
sudo mv ioncube /usr/local/
```

Add ioncube extension to php ini:

```
sudo vim /etc/php/7.2/apache2/conf.d/00-ioncube_loader.ini
```

Add line: `zend_extension=/usr/local/ioncube/ioncube_loader_lin_7.2.so`

Copy file: `sudo cp /etc/php/7.2/apache2/conf.d/00-ioncube_loader.ini /etc/php/7.2/cli/conf.d/`

Restart Apache:

sudo service apache2 restart

Install and configure Exim4 (optional)

You can use local mail server or external SMTP server to send you e-mails.

If you want to use local e-mail sever:

```
sudo apt-get install exim4
sudo dpkg-reconfigure exim4-config
```

Configure CRON (optional)

Required for automatic initiation of recurring tasks.

It is required by e-mailing component and for regular tmp cleanups and similar tasks.

Setup cron to run cron_launcher.php as often as you want.

Following example show how to enable 1 minute period:

```
sudo mkdir /etc/cron.1minute
```

edit /etc/`crontab` file - add this line: * * * * * root cd / && run-parts /etc/cron.1minute

Create file /etc/cron.1minute/edjet_lms_cron and run cron_launcher.php

```
sudo vim /etc/cron.1minute/edjet_lms_cron
```

file content:

```
#! /bin/sh
php /var/www/html/components/cron_launcher.php
```

Set execute permissions to file

```
sudo chmod +x /etc/cron.1minute/edjet_lms_cron
```

Troubleshooting

- Check <app_root>\config\cfg.ini.php file, variable "`platform`". This must match your platform (1 = Linux, 2 = Windows).
- Folder for temporary files must be edabled for writing by Open Office service owner and apache. This path is required to running the converting functuions and must be properly configured in <app_root>/config/config.php ('tmp_import_path') *Note: good idea is to ensure regular cleanup of tmp files within this temporary folder.*
- If installation fails or application crashes while using it even when all requirements are matched and php.ini directives mentioned in requirements are set up, then turn PHP error

messages on in php.ini:
display_errors = **On**
Please note: do not use display_errors = On in production!

Then please provide more info about error:

1) Provide operating system including version.
2) Provide what software did you use including versions.
2) Provide (copy & paste) text(s) or screenshot(s) of any error(s) displayed.
3) Provide any other additional info that can help us to find a solution for error.

Setup a Windows-based server

Create an environment to run Edjet LMS on a Windows Server platform.

Launch a Windows server

You can use any cloud provider of your choice to launch virtual machine or use any other way to run a web server in-house.

Recommended: Follow tutorial on how to launch a virtual machine with **Windows Server 2019 64-bit** on Amazon EC2.

https://aws.amazon.com/getting-started/tutorials/launch-windows-vm/

Install and configure Apache

To install Apache 2.4 webserver binaries VC16:

Download apache 2.4 from apache.org **32-bit**:

https://www.apachelounge.com/download/

(https://www.apachelounge.com/download/VS16/binaries/httpd-2.4.41-win32-VS16.zip)

Extract Apache 2.4 into “C:\Apache24\”

Be sure that you have installed the latest C++ Redistributable Visual Studio 2015,2017,2019 :

https://aka.ms/vs/16/release/vc_redist.x86.exe

Install httpd service:

To install as a service. Open command prompt as Administrator and type:

```
cd \Apache24\bin
.\httpd.exe -k install
```

Double click ApacheMonitor.exe, or put it in your Startup folder.

Start apache service in apacheMonitor.

To enable mod_rewrite uncomment in file “C:\Apache24\conf\httpd.conf” this line:

```
LoadModule rewrite_module modules/mod_rewrite.so
```

and change `AllowOverride None` to `AllowOverride All` in `<Directory "${SRVROOT}/htdocs">` section

- Tip: for more visit Apache website http://httpd.apache.org/

Install and configure PostgreSQL

Download PostgreSQL 10 **32-bit** from:

https://www.enterprisedb.com/downloads/postgres-postgresql-downloads

Install PostgreSQL 10:

- into “C:\PostgreSQL\“ folder
- check all components including pgAdmin4

To enable postgres support in php add in file “C:\apache2\conf\httpd.conf” this line:

```
LoadFile "C:\PostgreSQL\bin\libpq.dll"
```

Create PostgreSQL database

1) Run PgAdmin4
2) Log into PostgreSQL using “postgres” superuser
3) Create new role template_c6 (with password, enable login and enable create database)
4) Create **new empty** database named “learnis” with owner template_c6 [1)]
   Note: database encoding must be set to UTF-8 otherwise the installation will fail.

   [1)] You can choose different name according to your project name

Install and configure PHP

To install PHP:

Download PHP 7.2 from:

https://windows.php.net/downloads/releases/php-7.2.29-Win32-VC15-x86.zip

Copy all files from archive to C:\php.

Enable PHP 7.2 in file “C:\apache2\conf\httpd.conf” by adding this lines:

```
LoadModule php7_module "C:/php/php7apache2_4.dll"
AddHandler application/x-httpd-php .php

# configure the path to php.ini
PHPIniDir "C:/php"

<FilesMatch \.php$>
      SetHandler application/x-httpd-php
</FilesMatch>
```

Rename `php-production.ini` file to `php.ini`

Switch short open tag On

Open php.ini

Line:

```
short_open_tag = Off
```

Change to:

```
short_open_tag = On
```

Enable required extensions

Open php.ini

Enable pgsql extension (uncomment and change line):

```
extension=C:/php/ext/php_pgsql.dll
```

Enable mbstring extension (uncomment and change line):

```
extension=C:/php/ext/php_mbstring.dll
```

Enable GD library extension in php.ini file (uncomment and change line):

```
extension=C:/php/ext/php_gd2.dll
```

Enable Fileinfo extension in php.ini file (uncomment and change line):

```
extension=C:/php/ext/php_fileinfo.dll
```

Enable OpenSSL extension in php.ini file (uncomment and change line):

```
extension=C:/php/ext/php_openssl.dll
```

Enable LDAP extension in php.ini file (uncomment and change line):

```
extension=C:/php/ext/php_ldap.dll
```

Set correct timezone

Open php.ini

```
date.timezone = Europe/Dublin
```

Set max upload size

Open php.ini

```
upload_max_filesize = 500M
post_max_size = 508M
```

Set max input vars

Open php.ini

```
max_input_vars = 100000
```

Add PHP into Path

Add `C:\php` to windows environment variable `Path`

Create temporary PHP folder

Create folder C:\php\tmp

Stop/Start webserver

To apply any changes in php.ini, STOP Apache and START it again.

Note: RESTART will not work.

Install and configure ionCube Loader

Download ioncube loader from:
https://downloads.ioncube.com/loader_downloads/ioncube_loaders_win_vc15_x86.zip

```
Copy ioncube_loader_win_7.2.dll from downloaded archive to C:\php\
```

```
ext\
```

Add this line to php.ini file:

```
zend_extension=C:/php/ext/ioncube_loader_win_7.2.dll
```

Configure Task Scheduler

Task Scheduler is required for required for automatic initiation of recurring tasks – used in e-mailing component or for regular tmp cleanups and similar tasks.

Launch Windows Task Scheduler (Start > Administrative Tools > Task scheduler)

Add new task triggered as often as you want (recommended period is 5 minute) with action Start a program – C:\php\php.exe C:\Apache24\htdocs\components\cron_launcher.php

Troubleshooting

- Check C:\apache2\htdocs\config\cfg.ini.php file, variable `"platform"`. This must match your platform (1 = Linux, 2 = Windows).
- Folder for temporary files must be enabled for writing by Open Office service owner and apache. This path is required to running the converting functions and must be properly configured in config/config.php ('tmp_import_path')
  Note: good idea is to ensure regular cleanup of tmp files within this temporary folder.
- If installation fail even when all requirements are matched and php.ini directives mentioned above are set up, then first use this php.ini directive to turn PHP error messages on:
  display_errors = **On**
  Please note: do not use display_errors = On in production!
  Then please provide more info about error:
  1) Provide operating system including version.
  3) Provide (copy & paste) text(s) or screenshot(s) of any error(s) displayed.
  4) Provide any other additional info that can help us to find a solution for error.

Edjet LMS Server installation

Application is installed automatically using Installer app.

Prerequisites

- Make sure to read and match requirements and environment setup for your platform
- Make sure to enable JavaScript in your browser and allow pop-up windows for URL of the installation
- Important: Do the full backup of the server before you begin the installation, specially if there are any other apps or services running.

Legal notice: We are not responsible for any damage made to you software, server or data.

Upload installer to your server

Upload installer to the server via SFTP and unzip the package:

1. Use any SFTP client to **upload** the Edjet LMS installation **package to server** to /home/ubuntu folder.
2. **Clear all files** (including hidden, .htaccess etc) in the folder /var/www/html
   `sudo rm -rf /var/www/html/{*,.*}`
   Note: notices about "." and ".." folders cannot be deleted can be shown.

1) **Install unzip**
   `sudo apt-get install unzip`
2) **Extract the archive to var/www/html**
   `sudo unzip /home/ubuntu/edjet_lms_downloadable_x.x.x.zip -d /var/www/html`
   Note: replace the "x.x.x" by the version to be installed.
3) **Change permissions** for /var/www/html folder:
   `sudo chmod -R 775 /var/www/html`
   `sudo chown -R www-data:www-data /var/www/html`
   Note: This is recommended step as we need the installer to be able to write permissions otherwise the installation will fail.

Launch Edjet LMS Installer

Visit <serverHostname>/admin/service/appmanager/install.php address using browser.

Note: See detailed technical information on Server hostname in this document

Start installation

To start the Edjet LMS installation:

1) Click the **License agreement** link and read it.
2) Click the checkbox **I agree with the Edjet License Agreement.**
3) Click **Start installation.**

Environment requirements check

The Installer automatically check your system configuration against the requirements.

Please, review the statuses and resolve any problems.

If your server matches all the requirements, click **Next**.

Connect to database

To connect to your database:

1. Enter **Database name** “learnis”.
2. Enter **Schema name** “template_c6”.
3. Enter **Host** “127.0.0.1” // detected by installer, can be changed.
4. Enter **User** “template_c6”.
5. Enter **Password** – use a password you set during installation.
6. When done, click **Next**.

Installation Wizard will check database connection at this point. If everything is OK, the page Profile is displayed.

Create Superadmin account

Create the profile to be able to sign in to Edjet LMS as a platform owner:

1. Keep the **Protocol and domain** as detected (recommend).
   Note: If needed, you can override this values
   For more information see Installation URL below
2. Enter the **Superadmin password**.
3. Click **Install**.

Note: Use strong password and keep it on safe place for later use.

Installation URL

Edjet LMS can be installed and accessed on any qualified domain name.

It supports https:// protocol and port numbers.

Examples of valid installation URLs:

- http://project.com, http://www.project.com, http://subdomain.project.com:722
- https://project.com, https://www.project.com, https://subdomain.project.co:722
- http://localhost, http://127.0.0.1, http://192.168.1.100:30500

Changing installation URL after installation

However the hostname and installation URL can be changed after the installation, to avoid this migration it is recommended to install using a real hostname.

If you need to establish a test or staging environments, use virtualization (virtual servers).

“hosts” file can be used for temporary or permanent URL routing (alter the DNS) and to access multiple installations.

For detailed information on how to change installation URL see chapter “Change installation URL (domain)”

Installation progress and status

Page with installation progress is displayed.

- You can see the progress of the installation in the console.
- Installation should take few seconds, 30s top depending on performance of your server.
- Any errors will be displayed in output area and can be copied and sent to our support easily for investigation.

After an installation is finished, the page is updated with the message **Installation finished successfully**.

Get address of your Edjet LMS Server

After successful installation, there are two links on installation page.

1. To open **Admin panel** in new tab click **Login to Edjet LMS admin**.
2. To open **Learner portal** in new tab click **Show homepage**.

Important: Please bookmark these addresses for instructing your users later on.

Further steps

Check platform flag

Please check the flag in \config\cfg.ini.php file, variable `"platform"`.

The flag must match your platform:

- 1 = Linux
- 2 = Windows

Note: Incorrect setting can cause some issues.

Change passwords of the default accounts

Default accounts are only for first steps with new system, so they have password set to 1234, which is potential security problem.

Important: If the application is publicly accessible over the internet, mind the security and go to Setup → Administrators and:

1. **Change default passwords** for Admin, Trainer and Webmaster users to some strong one,
2. and / or deactivate (or delete) all unused default accounts.

Create new accounts

1. As a next step you can create new accounts and assign user roles to users as needed

Setup & Personalize the system

1. Go to Setup → Websites, select current site and personalize the system.
2. Go to Setup → System to configure external SMTP server or Active Directory

Troubleshooting installation

If installation fails and yo want to try again, drop the database schema and all installation files from installation folder.

If installation is not able to write/update on whole folder and all installation files, the installation will fail. See how to change permissions for Linux above.

Project structure

Project files and folders.

Folder	Description
admin/	Bootstrap file *index.php* for launching administration. Administration page “admin” is now created as CMS page Folder /admin/ was removed from .htaccess.
admin/service/	Service utilities for application installation, package creation, Localization Strings, export and import, serialize tool and component DB setup (component_columns).
class/	Folder with some of application classes.
config/	Application configuration files (general, Media Library, paths and folders, wysiwyg editor)
help/	Folder containig static „Help this page“ html files.
include/	Include folder containg 3rd party libs.
interfaces/	Application interfaces.
io/	Templates of printouts and records etc.
js/	Javascript files and libs.
repository/zip/	Temporary folder for downloading on-the-fly compressed archives from Media Library.
site/	Folder containing bootstrap file *index.php* for launching websites.
site/class/	Application logic of the sites.
static/	Folder for static html files, css or images.
templates/	Default system templates root folder (admin, docs, site)
templates/admin/	Default templates with admin UI skin assets - (css + images) and templates (.tpl.php)
templates/docs/	Default templates for /io/ (messaging, printout, reporting, xml)
templates/site/	Default folder with site themes.
templates/site/<themename>/editor/	TinyMCE editor content template files.

Administrator account

Sign in to Edjet LMS admin

Sign in as Superadmin

To enter the admin panel using Superadmin account:

1. Click **Login to Edjet LMS**, or visit the admin address.
2. Enter **User name** – use “superadmin”.
3. Enter **Password** – use a password you set during installation.
4. Click **Sign In.**

Default user accounts

Edjet LMS comes with a few default user accounts you can use to sign in right after the installation:

Admin

To sign in as Admin:

1. Go to Edjet LMS admin sign in page.
2. Enter **User name** – admin.
3. Enter **Password** – 1234.
4. Click **Sign In.**

Instructor

To sign in as Instructor:

1. Go to Edjet LMS admin sign in page.
2. Enter **User name** – trainer.
3. Enter **Password** – 1234.
4. Click **Sign In.**

Learner

To sign in as Learner:

1. Go to Edjet LMS learner portal sign in page.
2. Enter **User name** – student.
3. Enter **Password** – 1234.
4. Click **Sign In.**

Important: See chapter “Change passwords of the default accounts”.

Account overview

Following topics are common to all administrator roles – Superadmin, Admin and Trainer:

- Sign in to Edjet LMS admin
- Change your language settings
- Navigate to Learner Portal
- Reset password – lost password
- Change your name and e-mail address
- Change your password
- Sign out of Edjet LMS

All topics are **covered in the Trainer manual** – chapter Edjet LMS account.

Accessing support

Support – Czech republic

Visit http://www.cover.cz/podpora

Support – Slovakia

Visit http://www.covermedia.sk/podpora

System administration

Activate Edjet LMS Server

After the installation, the license is expired and the application is locked in read-only mode.

You need to activate the trial or use the purchased lifetime license.

Edjet LMS can be activated using license key.

- A **trial license key** can be downloaded via Edjet Enterprise account for free
- A **lifetime license key** can be purchased via Edjet Enterprise account.

To activate Edjet LMS Server using license key:

1. Sign in to Edjet Enterprise Account.
2. Click **My Products → Downloadable instances** in the menu.
3. Click **Download license key** and save the license key file to your local computer.
4. Sign in to Edjet LMS using Superadmin account.
5. Click **Setup → System** in the menu.
6. Click tab **License key**.
7. Click **Browse** and find a downloaded license key file (named lic.txt) on your computer
8. Click **Open**.
9. When done, click **Save**
   Note: If *Save* button is disabled, there is more active administrators in system than allowed by license. To continue, you must deactivate some administrators first.

Congratulations! Edjet LMS is activated and ready to use.

About server licenses

License is a set of parameters on how you can deploy the system and use it according to Edjet license agreement and law.

License restrictions

- Hostname
- Active administrators
- Active learners

Troubleshooting

Problem: A server hostname doesn't match license restrictions

1. Symptoms: A message about server doesn't match license restrictions appear and system is switched into read-only mode
2. Solutions:

a) Hostname in the license key and the server hostname and installation URL must match

b) You can manage your license via Edjet Enterprise Account or contact our support, or you can adjust your server settings

Problem: Amount of active administrators/learners exceeded

3. Symptoms: A message about amount of active users appear and Edjet LMS admin is switched into read-only mode
4. Solutions:
   a) Purchase license with more active users
   b) Disable or delete some user accounts

Purchase Edjet LMS Server license

Edjet LMS **lifetime license** can be purchased via Edjet Enterprise account.

You can also contact our support that will be happy to help you processing your request:

E-mail: support@edjet.com

Server license will be activated after receiving a payment. This can take 1-2 business days depending on type of transaction. In the meantime we will issue a temporary license key for you.

Setup HTTPS connection

To setup or change domain (hostname) and configure HTTPS:

System was originally installed to "**http:**//www.project.com" and it was also a production domain where application was accessed.

The goal

Reconfigure Edjet LMS to to support HTTPS protocol, so the application should be available on "**https:**//www.project.com" in production.

Note: Application files will physically remain in the same location.

Prerequisites

We assume the application to be properly configured on original server with IP / address entered during the installation process.

That is needed because you will have to access the *Setup section* via *Administration* in order to finish this tutorial (otherwise you will be incorrectly redirected by system and you will not be able to access the *Setup section* and modify the data in database).

You need have properly generated and installed SSL certificate on you web server.

If you are not able to match the prerequisites, please see the solution in *Troubleshooting* section below.

How to setup HTTPS

Follow theese steps:

1. Log into *Administration* as an **superadmin** and navigate to *Setup > Websites*
2. There should be one record with **server name** www.project.com. Click **Edit**.
3. On tab **Basic properties** please **change ALL values http://**www.project.com **to your new** domain with SSL support (**https://**www.project.com)
   *Note: Please be **careful on slashes**. The mistake can cause the system to malfunction.*
4. When done click **Save**.
5. Locate **file** <approot>/config/cfg.ini.php and open it for editing
   Note: please make sure to keep the encoding of the file at UTF-8 when rewriting the file!
6. Look for **key** "core_domain" - change value **http://**www.project.com to your new production domain **https://**www.project.com
   Note: Please be careful on slashes again.
7. **Save** the file.
8. Now we can redirect all queries from "http://..." to "https://..." to **avoid** the instance of system to be **accessible on old and new address** (which is not wanted as system can be configured to be correctly working only on one address (URL) at the same time); this is important namely when the system was already running on the "http://..." address.
   Please **modify** <approot>/.htaccess file, as shown below:
   - locate second line with #WWW comment a change "http://..." to "https://..."
   - after that line, add following lines (and replace project.com with your domain name):
   #redirect all queries to https
   RewriteCond %{HTTPS} off
   RewriteRule ^(.*)$ https://www.project.com/$1 [R=301,QSA,L]
9. Save the .htaccess file
10. Reconfigure also to your CRON or whatever you use to running Launcher

Troubleshooting

If you are **not able to access the Admin section**, use any available postgreSQL tool (PgAdminIII for example) to **access the database** directly. Locate table "settings", look for columns "domain", "repository", "domain_admin", "domain_io", "domain_noHttp" - change ALL values to your new production domain.

Note: Please be careful on slashes. The mistake can cause the system to malfunction.

Change installation URL (domain)

How to change installation domain (hostname) of the Edjet LMS Server already installed on your server.

Prerequisites

We assume the application to be properly configured on original server with IP / address entered during the installation process.

That is needed because you will have to access the *Setup section* via *Administration* in order to finish this tutorial (otherwise you will be incorrectly redirected by system and you will not be able to access the *Setup section* and modify the data in database).

If you are not able to match the prerequisites, please see the solution in *Troubleshooting* section

below.

Synopsis

System was originally installed to „192.168.0.1“ and it was also a production domain where application was accessed.

Later we need to change the production domain – application should be available on „www.project.com“ in production.

Also, the application files will physically remain in original location (192.168.0.1).

How to change a production domain after installation

Follow these steps:

1. Setup new DNS records for new production domain (www.project.com) first:
   A records for „www.project.com“ (and also possibly „project.com“ for non-www format) must be routing to IP of production server, where the instance is physically placed. In this case the records should looks like this:
   A record for www.project.com: 192.168.0.1
   A record for project.com: 192.168.0.1
   Note: propagate of new DNS records may take up to 24-48 hrs depending on DNS records update time setting (TTL cache)
2. Log into *Administration* as an **superadmin** and navigate to *Setup > Websites*
3. There should be one record with **server name** 192.168.0.1. Click **Edit**.
4. On tab **Basic properties** please **change ALL values** 192.168.0.1 **to your new** production domain (www.project.com)
   *Note: Please be **careful on slashes**. The mistake can cause the system to malfunction.*
5. When done click **Save**.
6. Locate **file** <approot>/config/cfg.ini.php and open it for editing
   Note: please make sure to keep the encoding of the file at UTF-8 when rewriting the file!
7. Look for **keys** "domain_noHttp" and "core_domain" - **change BOTH values** 192.168.0.1 to your new production domain (www.project.com)
   Note: Please be careful on slashes again.
8. **Save** the file.
9. To **avoid** the instace of system to be **accessible on both addresses**, which is not wanted as system can be configured to be correctly working only on one production domain at the same time, please **modify** <approot>/.htaccess file, as shown below:
10. Locate **second** line with #WWW comment:
    #WWW
    ##RewriteCond …
    #WWW
    ##RewriteRule … [R=301,QSA,L]
11. Add following lines to line under the **second** #WWW conditions:
    #redirect all queries to production domain
    RewriteCond %{HTTP_HOST} ^192.168.0.1$
    RewriteRule ^(.*)$ http://www.project.com/$1 [R=301,QSA,L]

12. Save the .htaccess file
13. Go to your cron folders, for example CRON.10minutes and locate launcher file and add new domain into task. Remove old one.

Troubleshooting

If you are **not able to access the Admin section**, use any available postgreSQL tool (PgAdminIII for example) to **access the database** directly. Locate table "settings", look for columns "domain", "repository", "domain_admin", "domain_io", "domain_noHttp" - change ALL values (should be 192.168.0.1) to your new production domain (www.project.com)

Note: Please be careful on slashes. The mistake can cause the system to malfunction.

Customize your Learner portal

Customize a portal logo

To add your logo to your portal:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Next to **Logo**, click [+] icon.
5. If your logo is placed on your device, click **Upload** in the toolbar and browse the file from your device.
6. If your logo is already uploaded in the Media Library, browse and select the file there.
7. Select the logo using checkbox and click **Load items**.
8. Click **Save** in the toolbar.

Tip: To check your changes click **View portal** in the menu.

Recommendations for logo graphics

It is recommended to prepare the graphics at sufficient resolution for high-DPI displays:

- Width: 450px
- Height: 150px
- Format: jpeg or png

Note: You can upload your logo with even higher resolution, but bear in mind to optimize for fast loading.

Customize a portal color scheme

To change colors used on the portal:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Click on color control you want to set and use palette to pick a color.
   Tip: You can also paste HEX code directly to input.
5. To confirm the color click on colored icon in right bottom corner.
6. Click **Save** in the toolbar.

Colors that can be changed

Basic settings

- Primary color (basic, darker and lighter variant)

- Secondary color (basic, darker and lighter variant)
- Text color
- Page background color

Advanced options let you specify colors on element basis:

- Heading H1 to H6
- Links
- Menu
- Button

Using custom CSS code

You can use any CSS code modify a look and feel of the Learner portal.

To add custom CSS:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Click **Advanced options** and scroll down to **Custom CSS code**.
5. Paste you CSS code.
6. Click **Save** in the toolbar.

Using custom HTML code

You can add your HTML code to be included in the HEAD tag:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Click **Advanced options** and scroll down to **Custom HTML code**.
5. Paste you HTML code.
6. Click **Save** in the toolbar.

Customize visual editor styles

You can add custom styles to be available to use in WYSIWYG editor:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Click **Advanced options** and scroll down to **Custom editor styles**.
5. Insert custom styles in a format required by TinyMCE WYSIWYG editor.
6. Click **Save** in the toolbar.

Reset theme customization

To reset any customization done to your learner portal:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Appearance** tab.
4. Scroll down to **Reset theme**.
5. Click **Reset**.
6. Click **Save** in the toolbar.

Customize portal name and company name

Portal name is visible in the page title and elsewhere on the portal.

To change portal name:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **General** tab.
4. Enter **Site name**.
5. Click **Save** in the toolbar.

Company name is visible in the copyright notice in the page footer.

To change company name:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **General** tab.
4. Enter **Company name**.
5. Click **Save** in the toolbar.

Customize portal login page

You can change few things on the login page:

- Image background
- Lead text
- Content

Change image background

To change image used as background on the login page:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Login page** tab.

4. Next to **Image background**, click [+] icon.
5. If your image is placed on your device, click **Upload** in the toolbar and browse the file from your device.
6. If your image is already uploaded in the Media Library, browse and select the file there.
7. Select the image using checkbox and click **Load items**.
8. Click **Save** in the toolbar.

Tip: To check your changes click **View portal** in the menu and change URL to "<yourPortalDomain>/login" to see a Login page without need to log out.

Change texts and content

To change texts or content on the login page:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Login page** tab.
4. Customize **Lead text** and **Content** using editor.
   Note: You can use localization strings, normal text, images or any other content or formatting.
5. Click **Save** in the toolbar.

Tip: To check your changes click **View portal** in the menu and change URL to "<yourPortalDomain>/login" to see a Login page without need to log out.

Setup 3rd party analytic tools

You can add a custom code to enable 3rd party analytic for your learning portal, independent on Edjet LMS analytic.

Code is added to every page right before body end tag.

To add a code:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **Analytic tools** tab.
4. Enter a code obtained form 3rd party into the **Google Analytics** input.
5. Click **Save** in the toolbar.

Note: You can use other provider than Google Analytics, unless it have some special requirements.

Disable learner sign up

To disable learner sign option on the login page:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.

3. Click **Login page** tab.
4. Uncheck **Allow sign up** option.
5. Click **Save** in the toolbar.

Note: You can re-enable learner sign up by checking the option again.

Disable learner profile

To disable learner profile from the learner portal:

1. Sign in to Edjet LMS admin.
2. From **Learner portal** menu, click **Customization**.
3. Click **General** tab.
4. Uncheck **Allow My profile** option.
5. Click **Save** in the toolbar.

Note: You can re-enable learner profile by checking the option again.

Setup Extended portal

Create a new page on your portal

To create a new public page within your website.

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Click the **New page** in the toolbar.
4. Click **Page** in the dialog.
5. Enter page **Name**.
6. If this page should be a home page, keep the **Link** empty.
   Note: Find out more about setting a page as a home page.
7. Click **Generate** icon next to the **Link**, or enter the link value manually.
   Note: Only lower case, numbers, dash and underscore (a-z, 0-9, -, _) characters are allowed.
8. You can also enter the **Lead text**.
   Note: Lead text will be rendered, if your page use the Perex widget.
9. Enter the **Content**.
   Note: Learn how to use visual editor to create and edit responsive content.
10. Click **Save** in the toolbar.

Notes:

- By default, new page is not publicly accessible.
  Learn how to manage page privacy.
- New page is added to the sub-level of initially selected page.
- You can navigate existing pages using pages panel on the left.

Manage page settings

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click it's name.
3. Click **Properties** tab.
4. Change page settings to your wish.
5. Click **Save** in the toolbar.

Preview your pages and website

To view a page on your website while editing pages:

1. From **Pages**, find the page in pages list and click on it's name.
2. If you have unsaved changes, click **Save** in the toolbar.
3. Click **Preview** in the toolbar.

Organize pages in your website

You can organize pages within your website using drag and drop.

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. To reorder page:
   - drag the page by it's name and drop it to new position.
4. To create a sub-page:
   - drag page by it's name and drop it to new position, while hover over the page name that should be a new parent page (note: node should be expanded prior to drop).

Tip: The position is NOT saved automatically on drop so remember to save the page after each reorder.

Manage page SEO settings

Optimize your page SEO settings to improve your site visibility in search engines such as Google.

This include:

- entering a link to create a page URL
- adding page meta tags such as the page title and description

Update page link and add or edit page meta data

To add or edit meta data of your page:

1. Sign in Edjet LMS admin.
1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click on it.
3. Check a **Link** you're entered as you created a page.
   Find out more about page link and address URL.
4. Click **Metadata** tab.
5. Enter your page **Title** as it is meant to appear on search engines results pages.
   Note: If you leave the page title empty, the page name is used.
6. Enter a page **Description**: Describe your page's content to draw users into clicking on it from search results.
7. You can also change other advanced metadata:
   - Keywords
   - Alternative H1
   - Robots
   - Author

8. Click **Save** in the toolbar.

Please note: Any changes done on your website can take up to several days to apply to search engines result pages, depending on search engine crawling conditions of your website.

Page link and page URL address

URL address of your page is an important SEO factor of the page.

A good URL should be both user friendly and SEO friendly.

Page URL format can looks like this:

`https://YourDomain.com/accounting-courses`

Where:

- "YourDomain.com" – your domain, an address where the LMS is installed to and based on website settings also an address of a home page.
- "accounting-courses" – link of specific page of your website
  You can manage page **Link** right from the page edit page.

Another example show an URL of the multi-lingual website:

`https://YourDomain.com/es/cursos-de-contabilidad`

Where:

- "es" – the link of the website language version

Add, reorder or remove page attachments

You can attach files to your page so visitor can view or download it.

Attaching files to page

To attach a file to a page:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click page name in the pages panel.
3. Click **Attachments** tab.
4. Click **Load items**.
5. Find or upload your files.
6. Select the file/s using checkbox.
7. Click **Load items**.

Change the order of attachments

To reorder attachments:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click **page name** in the pages panel.
3. Click **Attachments** tab.

4. Find an attachment.
5. Drag **move** icon up or down.
6. You can move other attachments too.
7. Click **Save** in the toolbar.

Remove attachments

To remove a widget:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click **page name** in the pages panel.
3. Click **Attachments** tab.
4. Find attachment/s and use checkbox to select.
5. Click **Remove items**.
6. Click **Save** in the toolbar.

Set a page as the home page

The home page acts like the main page on your site and it is the page that your website address leads to.

Page is determined as home page, if it has an empty link.

Important: At the same time, there can be only one home page in each website language version. For example, if you have an English and German version of your website, the recommendation is to set two home pages – one for English version and one for German version.

To set or change your site's home page:

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Choose a website and language version from the **Website** dropdown.
4. If there is already any home page (any page with empty link), click on it's name, enter appropriate **Link** to it and click **Save**.
5. Find the page you want to be a home page and click the **page name**.
6. Clear the **Link** value – delete any characters from the input.
7. Click **Save** in the toolbar.

Troubleshooting

- Message “Highlighted item must be unique in language version.”
  Solution: Find the page with empty link within a current language version, and add a link to it.

Set up a redirect from one URL to another

You can set up a 301 redirect to tell search engines that the URL of a page in your site has changed

and tells them where to go to find the new page.

If you are creating a new site to replace a previously published site, we recommend that you create new pages with URLs that match the ones from your old website.

If you want URLs that are different than the old URLs, you can retain your SEO rankings and avoid “Page not found” errors (404 errors) by creating 301 redirects from your old pages to your new ones.

Before setting up a 301 redirect please note the following:

- If you are using a Edjet LMS Server, it is recommended to use server-side redirects whenever possible (mod_rewrite, .htaccess)
- Make sure that your domain is properly connected to Edjet LMS.
  Note: Technically the redirect will work even with the temporary domain and after the connection your domain there should be no difference, but it is recommended to use a production domain from the beginning to eliminate risks of loosing SEO rankings.
- Format of old URL must match Edjet LMS page link format (e.g. www.yourdomain.com/about-us) This is only relevant if you are redirecting an URLs from you old website.
  For example: Redirecting of URL with a # is not supported.
- There is no limit on how many 301 redirects you can create per site.

Initial setup – recommended

It is recommended to create a dummy page and place all your pages with redirects as a sub-pages in order to keep things organized.

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Choose a website and language version from the **Website** dropdown.
4. Click **New page…** in the toolbar.
5. Enter **Name** – use value **301 redirects.**
6. Enter **Link** – use value **301-redirects.**
7. Click **Deactivate** in the toolbar.

Note: You need to do this for each language version.

To set up a 301 redirect

If the page with URL to redirect already exists in Edjet LMS:

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Choose a website and language version from the **Website** dropdown.
4. Find the page in website navigator and click on it's name.
5. Click **Appearance** tab.

6. Click **Choose** next to **Redirect to page**.
7. Find a page and **select it** using checkbox.
8. Click **OK**.
9. Click **Save** in the toolbar.

Optional: Now you can move the page under the **301 redirects page**.

To set up a 301 redirect

If the page with URL to redirect doesn't exists in Edjet LMS:

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Choose a website and language version from the **Website** dropdown.
4. Optional: Select the **301 redirects** page in the website navigator.
5. Click **New page…** in the toolbar and choose option **Page**.
6. Enter **Name** – use some meaningful value so you can identify the redirect**.**
7. Enter **Link** – use your OLD link**,** without domain (e.g. my-old-url)
   Note: If your old URL contains a "/", you will need to create a page structure according to your OLD folder structure using sub-pages.
8. Click **Appearance** tab.
9. Click **Choose** button next to **Redirect to page**.
10. Find a page to redirect to and **select it** using checkbox.
11. Click **OK**.
12. Click **Save** in the toolbar.

Hiding a page from the menu

Every page you add will appear on your site's menu, unless it is hidden.

To hide a page from your navigation menu:

1. Sign in Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Pages**.
3. Click the **page name** in the pages panel.
4. Click **Properties** in toolbar.
5. Click **General** tab.
6. Set the **Show in menu** option to **off**.

To unhide a page from your navigation menu set the **Show in menu** option to **on**.

Notes:

- Your site visitors are unable to access hidden pages unless you link to them.
- The pages are hidden from the site but they still can appear in search engines, according to it's privacy. More information about hiding a page from search engines.

Deactivate a page

You can disable access to all users to your page and make it hidden.

When you deactivate a page:

- Nobody but owner of the page can view it.
- The page including it's settings and content are not altered in any way.
- You can activate the page any time.

To deactivate the page:

1. Sign in Edjet LMS admin.
1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click **Edit**.
3. Click **Deactivate** in the toolbar.

To re-activate the forum click **Activate** in the toolbar.

You can deactivate and activate the pages as often as you need.

Edit or delete page

To edit or delete a page you must be either owner or has edit permission.

Edit a page

To edit the page:

1. Sign in Edjet LMS admin.
1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the forum and click **Edit**.
3. Make your changes.
4. Click **Save** in the toolbar.

Delete a page

Tip: Before deleting the page, please consider to deactivate the page instead.

When you delete the page:

- No one can access the page anymore.
- Important: Page deletion can't be undone.

To delete the page:

5. Sign in Edjet LMS admin.
1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click **Delete** in the toolbar.
3. To confirm deletion click **OK** in the dialog.

Using page masters and layouts

The master page allows you to define content that appears across of your website throughout all of your pages, such as a header, navigation menu or footer.

An Edjet LMS website can have as many masters as you want, but typically just one is enough for a small to medium site.

Note: A master page does not represent a physical page on the website, but rather a design component assigned to pages to ensure a uniform look.

To create different pages than your standard content page, for example a home page or sub-page with sub-menu each page can have a different layout, even if it use the same page master.

Your page's content differs from page to page.

Create a new master page

To create a new master page to be used by the pages in the website:

1. Sign in Edjet LMS admin.
1. Click **Learner portal** in the main menu, then **Master pages**.
2. Click **New master page** in the toolbar.
3. Enter the **Name** – use value **Website**.
4. Click **Appearance** tab.
5. Set **Master Page Template** to **website.tpl.php** option
6. Click **Save** in the toolbar.

Use custom page layout

Custom page layout works the same as regular page layouts, but there is no need to create a dedicated reusable page layout.

This is advantageous when you create a page with a totally unique layout. For example, if you want to create a contact page and there will be no other page with the same layout on your website.

To create a custom layout for your page:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click on it.
3. Click **Properties** in the toolbar.
4. Click **Design** tab.
5. Click **Custom page layout** option.
6. Choose **Page layout template** option:
    - If you want 1-column layout, choose **1_col_grid_12.tpl.php**
    - If you want 2-column layout with narrow left column, choose **2_cols_grid_3_9.tpl.php**
    - You can also choose any other layout.
7. Click **Save and close** in the toolbar.
   At this point, the zones coded in the template are detected and listed in the UI.

Next, you can start adding a widgets to your layout.

Tip: If you are using Edjet LMS Server having access to the template files, you can go ahead and code your own page layout templates.

Add content or functionality using widgets

Widgets are the basic building blocks of page template and are used to modify, view and control page appearance and functionality.

Widgets are inserted into a widget zones, that are coded in the templates. Each zone can contain any number of widgets, listed in specific order.

Edjet LMS provides you with out-of-the-box web parts that cover any common scenario like navigation menus, data lists and more. Every widget is highly customizable via it's parameterized design and behavior.

Widgets can be added to:

- master page,
- page layout,
- custom page layout,
- or page template.

Add a logo widget to the website

Important: If you just want to change logo on the Learner portal, please follow this article.

Logo widget render image that is clickable and links to homepage.

To add a logo widget to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.
2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzNew_Head** zone.
4. Click **New row.**
5. Choose **IncludeTemplate** and click **OK**.
6. Enter following code into the **Properties**:
   ```
   'tpl' => 'includes/logo.tpl.php'
   ```
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Learn how to upload your own logo.

Add a menu widget to the website

This menu configuration rendered a main menu. Depending on configuration it render first-level or multi-level responsive navigation.

To add a logo widget to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.

2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzNew_Head** zone.
4. Click **New row.**
5. Choose **Menu** and click **OK**.
6. Enter following code into the **Properties**:
```
'tpl' =>
'webparts/navigation/menu_horizontal_dropdown.tpl.php',
'show_denied_items' => false,
'user_auth_hide_uid' => 'login'
```
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Add a page title

A Title widget render page name as a title.

Depending on design of you website, the Title widget can be added to the:

- Master page
- Page layout – recommended way
- To the page using custom layout

Display the title on the page using widget

The recommended way is to add a widget to the page layout:

1. Click **Learner portal** in the main menu, then **Page layouts**.
2. Find the page layout and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzPageTop** zone.
4. Click **New row.**
5. Choose **IncludeTemplate** and click **OK**.
6. Enter following code into the **Properties**:
```
'tpl' => 'includes/title.tpl.php'
```
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Enter the page title

Now, go ahead and create new page using the page layout you've created and just enter the Title.

Other options to add a page title

Aside adding a title widget, there are other options how to add a title or heading to a page:

- If you need more control over the HTML markup, you can use the HTML code widget instead to render the title.

- You can also enter the static title manually using the Visual Editor, assuming there is a content widget on the page.

Add a page content widget

A Content widget render a content created using visual editor.

To add a widget to the page layout:

1. Click **Learner portal** in the main menu, then **Page layouts**.
2. Find the website page layout and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzMainZone** zone.
4. Click **New row.**
5. Choose **IncludeTemplate** and click **OK**.
6. Enter following code into the **Properties**:
   ```
   'tpl' => 'includes/content.tpl.php'
   ```
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Tip: Learn how to use the Visual Editor to create a content.

Add a sign in button to the website

Sign in button will redirect user to the URL of login page upon click.

To add a button to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.
2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzNew_Head** zone.
4. Click **New row.**
5. Choose **HTML code** and click **OK**.
6. Enter following code into the **Properties**:
   ```
   'content' => '<div class="wpSignInButton">
   <div class="wpSignInButton__icon"><a class="btnIcon btnIcon--
   default wpSignInButton__iconLink" href="/ap/login"><i
   class="fa fa-sign-in fa-24" aria-hidden="true"></i><span
   class="displayNone">' . Lang::put('sign_in') . '</span></a></
   div></div>'
   ```
7. If a login page URL is different than <InstallationAddress>/ap/login, you need to adjust “href” property in code above.
8. Click **Apply settings and close** in the toolbar.
9. Click **Save** in the toolbar.

Add a page placeholder to the website

Page placeholder widget defines, where the page layout is inserted into the master page.

To add page placeholder to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.
2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpz_PagePlaceholder** zone.
4. Click **New row.**
5. Choose **PagePlaceholder** and click **OK**.
6. Keep the widget **Properties** empty.
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Add a website language switch to website

Language switch allow visitors of your website to navigate to other language versions of a multi-lingual site.

To add page placeholder to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.
2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzNew_Footer** zone.
4. Click **New row.**
5. Choose **IncludeTemplate** and click **OK**.
6. Enter following code into the **Properties**:
   `'tpl' => 'includes/languages.tpl.php'`
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Add a sub-menu to the page

A Menu widget is used to generate multi-level responsive sub-menu.

There are two ways:

- Create a new page layout with the sub-menu and apply the layout to your pages.
  Recommended if you have more than one page with the same layout with sub-menu.
- Use custom page layout just on the specific page.

To create a page layout with a sub-menu:

1. Click **Learner portal** in the main menu, then **Page layouts**.
2. Click **New page layout** in the toolbar.
3. Enter a **Name**.
4. Click **Appearance** tab.
5. Choose **Page layout template** option: **2_cols_grid_3_9.tpl.php**
6. Click **Save** in the toolbar.

At this point, the zones coded in the template are detected and listed in the UI.

7. Click **Appearance** tab.
8. Click **Edit** next to the zone: **wpz_LeftColumn** zone.
9. Click **New row.**
10. Choose **Menu** and click **OK**.
11. Enter following code into the **Properties**:
```
'tpl' => 'webparts/navigation/menu_vertical_list.tpl.php',
'starting_level' => '1', 'generation_scale' =>
WebPartZone::SCALE_CURR_BRANCH
```
12. Click **Apply settings and close** in the toolbar.
13. Click **Save** in the toolbar.

* This apply to the desktop view. On mobile, the menu is hidden by default as all levels are generated by main navigation (hamburger menu).

Next, you need to apply your page layout to your pages that should render the sub-menu.

Add a footer content and scripts

Footer loads values from system configuration and generate dynamic values like current year.

Footer scripts widget enable the Google Analytics scripts on your website.

To add a widgets to the master page:

1. Click **Learner portal** in the main menu, then **Master pages**.
2. Find the website master page and click **Edit**.
3. In **Design** section, click **Edit** next to the **wpzNew_Footer** zone.
4. Click **New row.**
5. Choose **IncludeTemplate** and click **OK**.
6. Enter following code into the **Properties**:
```
'tpl' => 'includes/footer_basic.tpl.php'
```
7. Click **New row.**
8. Choose **IncludeTemplate** and click **OK**.
9. Enter following code into the **Properties**:
```
'tpl' => 'includes/footer_scripts.tpl.php'
```
10. Click **Apply settings and close** in the toolbar.
11. Click **Save** in the toolbar.

Edit, reorder or remove widgets

To edit or delete a widgets, edit permission is required.

Edit a widget

To edit a widgets properties:

1. Click **Learner portal** in the main menu.
2. Find the page, master page or page layout and click **Edit**.
3. Find the zone and click **Edit** next to the zone name.
4. Find a widget and update widget **properties.**
5. Click **Apply settings and close** in the toolbar.
6. Click **Save** in the toolbar.

Note: You can use the same method to edit a widget on the page, page layout or page template.

Tip: If you need to change a widget type, you need to remove the widget and re-add it with new type.

Change the order of widgets

To reorder a widgets:

1. Click **Learner portal** in the main menu.
2. Find the page, master page or page layout and click **Edit**.
3. Find the zone and click **Edit** next to the zone name.
4. Drag **move** icon up or down to move widgets.
5. Click **Apply settings and close** in the toolbar.
6. Click **Save** in the toolbar.

Note: You can use the same method to reorder a widgets on the page, page layout or page template.

Remove a widget

To remove a widget:

1. Click **Learner portal** in the main menu.
2. Find the page, master page or page layout and click **Edit**.
3. Find the zone and click **Edit** next to the zone name.
4. Find a widget.
5. Click **remove** icon.
6. If you need to remove multiple widgets, select them using checkbox and click **Remove items** below the widget list.
7. Click **Apply settings and close** in the toolbar.
8. Click **Save** in the toolbar.

Note: You can use the same method to remove a widget from the page, page layout or page template.

Create a page layout

You can create responsive, single-column or multi-column layouts to use by many pages of your website.

Layout use pre-coded responsive templates and CSS grid system without any coding.

To create a page layout:

1. Click **Learner portal** in the main menu, then **Page layouts**.
2. Click **New page layout** in the toolbar.
3. Enter a **Name**.
4. In **Design** section, choose **Page layout template** option:
   - If you want 1-column layout, choose **1_col_grid_12.tpl.php**
   - If you want 2-column layout with narrow left column, choose **2_cols_grid_3_9.tpl.php**
   - You can also choose any other layout.
5. Click **Save** in the toolbar.
   At this point, the zones coded in the template are detected and listed in the UI.

Next, you can start adding a widgets to your layout.

Tip: If you are an Edjet LMS Server user having access to the template files, you can go ahead and code your own page layout templates.

Add, reorder or remove related pages

You can attach pages somehow related to your page and use the Related pages widget to list these pages so visitor can view and the files.

Attaching files to page

To attach a file to a page:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click page name in the pages panel.
3. Click **Attachments** tab.
4. Click **Add**.
5. Find or upload your files.
6. Select the file/s using checkbox.
7. Click **Load items**.

Change the order of attachments

To reorder attachments:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click page name in the pages panel.
3. Click **Attachments** tab.
4. Find an attachment.
5. Drag **move** icon up or down.
6. You can move other attachments too.

7. Click **Save** in the toolbar.

Remove attachments

To remove a widget:

1. Click **Learner portal** in the main menu, then **Pages**.
2. Find the page and click page name in the pages panel.
3. Click **Attachments** tab.
4. Find attachment/s and use checkbox to select.
5. Click **Remove items**.
6. Click **Save** in the toolbar.

Exclude page from the XML sitemap

As a part of the SEO tools included in Edjet LMS, every page you add to your website will be included in the sitemap XML feed, unless it is excluded.

Tip: You can find out more about XML sitemaps here and here.

If this is unwanted, you can remove a page from the XML sitemap:

1. From Dashboard, go to **Website** → **Structure**.
2. Choose a website and language version from the **Website** dropdown.
3. Click the **page name** in the pages panel.
4. Click **Appearance** tab.
5. Set the **XML sitemap** option to **off**.

To include a removed page back in the XML sitemap change the **XML sitemap** option to **on**.

Notes:

- Your site visitors are still able to access excluded pages as usual.
- The pages are excluded from the site but they still can appear in search engines, according to it's privacy. More information about hiding a page from search engines.

Manage settings

Show case – Setup a public multi-lingual website

Require Superadmin role.

If you are a cloud customer, please contact our support.

Setup a public multi-lingual website and configure which language version should be displayed when user visit an installation address of the LMS:

1. Sign in to Edjet LMS admin.
2. Click **Learner portal** in the main menu, then **Websites**.
3. Find the website name Master and click **Edit**.
4. Click **Languages** tab.
5. Find the language with ID 1 and click **Edit**.
   Note: By default there is only one language listed.
6. Enter the **Name** – use value **Auto** // or as required
7. Enter the **Link** – use value **ap** // Learning site will be placed in "/ap" folder (or as required)
   Note: Any page of the Learning site now has an URL with this folder, for example the login page: <installation address>/ap/login
8. Enter **Unique identificator** – use value **learnis_app**.
9. Click **Save and overview** in the toolbar.
10. Click **New item** in the toolbar.
11. Enter the **Name** – use value **EN** // or as required
12. Keep the **Link** empty // makes English language a default language
13. Click **Save and overview** in the toolbar.
    Note: If you website should have only one language, close the window and you are done.
14. Click **New item**.
15. Enter the **Name** – use value **DE** // or as required
16. Enter the **Link** – use value **de** // German website will be placed in "/de" folder
17. Click **Save and overview** in the toolbar.
    Note: If you website should have more language versions, repeat the steps and create more languages according to your needs.
18. Click **X** to close the popup window.
19. Optional: Click **Refresh** in your browser to see the changes made.

Performance

Hardware decisions

Before choosing the server and installing the system we recommend you to make a few hardware configuration decisions based on a some calculations.

1) How many **concurrent users** you want/need to handle?
2) What will be the **character of the load**? Peaks?
3) What are the **requirements for storage**? I/O bandwidth, size, redundancy, speed (latency)?
4) How many **total data you expect to store**? Videos? Hi-res photos?
5) Are there any other **specific issues**? Public e-learning portal, public courses f.e.?

Based on this we should be able to decide:

- how much RAM...
- how many CPUs / cores – frequency, cache...
- what disk type – SATA, SCSI, SSD...
- what disk configuration – which RAID...
- how many machines – one server, farm with load balancer, cloud solution...

How much RAM?

Amount of the RAM has usually the biggest impact on the performance. So, get as much as you can. Of course, on the other hand, it is not economical to over-estimate the required memory. It can be very expensive mistake.

For calculating the RAM we need to estimate the number required **concurrent users,** the **average size of processes** (Apache and PostgreSQL process) combined in one HTTP request and the **amount of RAM used by OS** and **other services**.

Concurrent users

The load on the server at a particular time depends on the number of concurrent users.

Not on the total number of user accounts and not on the number of users logged-in. The term "concurrent users" is used to mean those users for whom the server is actively doing something – **sending HTTP requests** by clicking is the most often.

As the concurrent users activity is **quite random**, it is hard to measure and calculate with. So when calculating the exact concurrency is the only ways to strictly mean a number of active web server processes – *concurrent processes*.

Concurrent processes

Every user's click generates a HTTP request to the server and require an Apache sub-process, and, if the database is involved in the particular part of the application, also the PostgreSQL sub-process. Each of which consume some memory and also it require an webserver connection and database

connection.

Size of the processes

Edjet LMS is a quite complex application. One HTTP request, like a rendering a page with a course content, require approx. 40-75 MB of RAM. Statistically there is more processes of the more complex ones, so we calculate with the average size of the **68 MB***. This includes both Apache and PostgreSQL process.

** This is only informative. Environment used: Edjet LMS Server 3.6.1, Debian 6 with 24GB of memory. On different versions and different configs the size may wary. Windows Server processes size may be quite different! Please make your own investigation on this for your particular situation.*

OS memory consumption

It depend on many things. Best way is to install configuration of your choice and see what are the demands.

For more info see:
Requirements and Environment setup for Linux
Requirements and Environment setup for Windows

For standard Linux distribution suitable for webserver, if you don't want to spent a time with this, use about the 1 GB per each 8 GB of installed memory.

Calculation

For **150 concurrent processes** it is:

150 x 68 = 10.2 GB of RAM.

So your option will be probably 16 GB of RAM, so add more 2 GB for OS:

10.2 + 2 = 12.2 GB

And you have also some spare RAM for additional tasks like running backups f.e.

See following table for calculated estimates*:

Required amount of concurrent processes	Estimated amount of RAM needed
100	8 GB
200	16 GB
450	32 GB
850	64 GB
1700	128 GB
3000	224 GB

* for simplicity let's assume one physical server dedicated only to LMS

What storage?

Disk types

Fast SSD are the best option. In the cloud, you can set higher IOPS.

Disk configuration

If you don't have any specific requirements go with 4 SATA disk in RAID 10 (RAID 1+0).

What CPU?

More CPUs is better. But it is not only speed that matters. As the LAPP stack running on Unix machines is very well scaling using multi-threaded architecture, the biggest impact on performance has more cores (threads or vCPUs in cloud). This is most important namely for environment with high concurrency.

To understand the impact of number of cores and to see what is possible to handle with various configurations, please see the *Performance test report* chapter.

Optimizations

There are other possible server-side optimizations to speed up the entire application. This is supposed to be tuned based on analysis of the real situation to determine the bottlenecks.

Apache configuration

All changes are recommended to do using Apache .conf file.
After changes restart the webserver (stop+start can be not enough).

Note: All following setting are done on Apache 2.2.16 on Debian 6

Option	Recommended value
MaxClients	Set to number of calculated concurrent processes. *Note: when going above 256 you need to change ServerLimit option too (default is 256), need to add (is not listed by default).*
KeepAliveTimeout	Set this number to lower values (5s f.e.) then default (15s) if this is the problem. We recommend to set this based on real-life tests and real-life audience.

PostgreSQL configuration

All changes are recommended to do using PostgreSQL .conf file.
After changes restart the PostgreSQL.

Note: All following setting are done on PostgreSQL 8.4 on Debian 6 with 24GB RAM.

Option	Recommended value
shared_buffers*	Set allocation of 25% available free memory to PostgreSQL - 5,5GB
effective_cache_size*	Set allocation of 50% available free memory to PostgreSQL - 11 GB
max_connections	Set to at least to Apache MaxClients option

* need to change kernel SHMMAX to value of combined needed amount of memory, in this case 50% of available free memory with some spare space - 12 GB.

How to change SHMMAX option on Debian 6

- add to /etc/sysctl.conf this line:
  `kernel.shmmax = <value in bytes>`

- apply new setting by running:
  `sysctl -p /etc/sysctl.conf`

Further tuning

Webserver

- Apache tuning – minimizing the memory footprint (unused modules, custom compilation)
- Change MPM module from prefork to worker (less memory usage, better for more CPUs)
- Choosing a different webserver faster and less memory consuming than Apache (nginx, lightppd,...)

Connection pooling

If the bottleneck is a number of connections, setup a pgpool or other connection pooling software.

Kernel

Tune kernel parameters according to webserver and postgres needs (SHMMAX etc.).

Enable gzip compression support

Turn on zlib.output_compression for example on your server.

Also the compression should be set for various possible mimetypes:

- HTML

- CSS

- JS

- other cacheable mimetypes

Database performance issues

Performance problems can be often solved by optimization of database views and functions after analysis of current bottlenecks. Also, an indexes can be build to speed and lower the load.

Load tests

Testing of the app/server performance cannot be done properly without a right tools. There is many load or stress test tools so let's pick at least this two:

ab - ApacheBench

Apachebench is available out of the box with Apache.

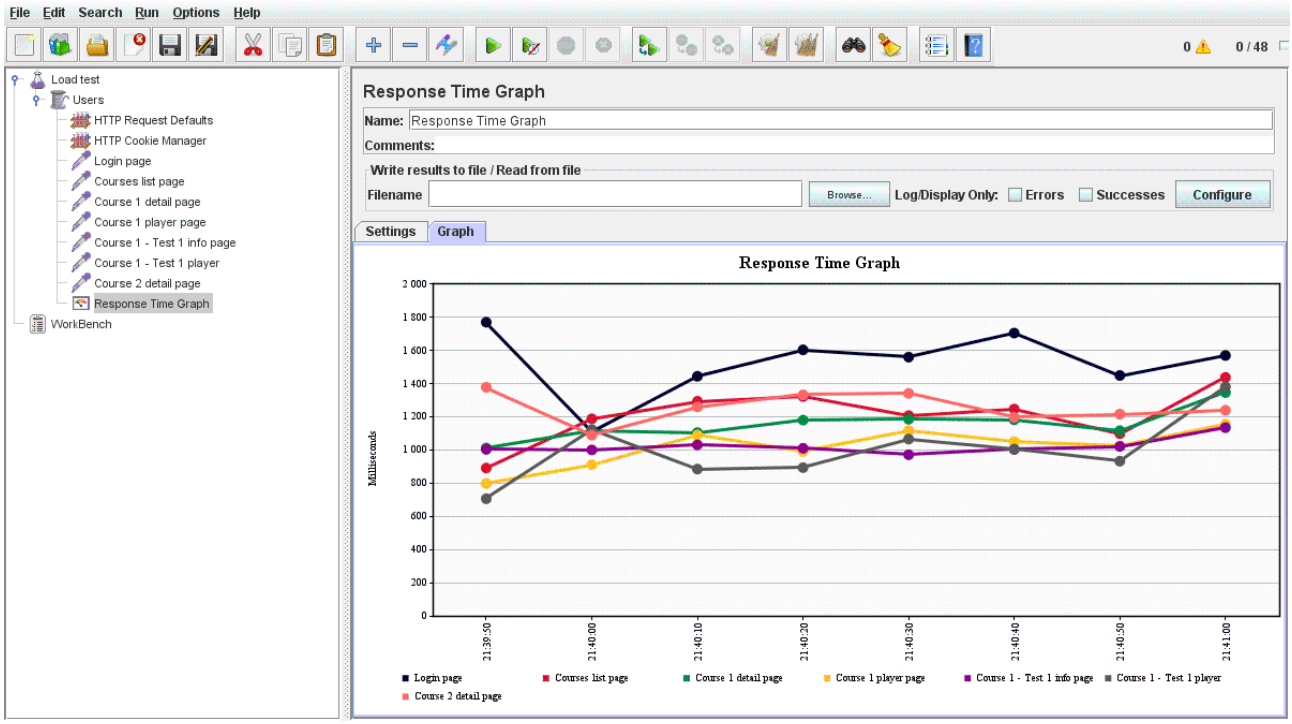
ab is a tool for benchmarking your Apache Hypertext Transfer Protocol (HTTP) server. It is designed to give you an impression of how your current Apache installation performs. This especially shows you how many requests per second your Apache installation is capable of serving.

It is operated from command line. Opensource.

http://httpd.apache.org/docs/2.2/programs/ab.html

JMeter

The Apache JMeter™ desktop application is open source software, a 100% pure Java application designed to load test functional behavior and measure performance. It was originally designed for testing Web Applications but has since expanded to other test functions.



On image: Examples of load test visualisation using graph in JMeter

JMeter simulates the concurrent users nicely, can export logs to CSV,...

Opensource, written in JAVA. Has UI which allows to set up load tests for non-programmers.

https://jmeter.apache.org

Caching

Also whole caching subsystem is implemented for two reasons – speed and server load (both processing and bandwidth load). There are several types of caching involved in server-client interactions:

Type	Level or technique
Application cache	Images cache (class ImageGenerator, fce getSrc & loadScr) Localization strings cache CSS images - sprites technique
Browser cache	Expiration of cache in browser (set via HTTP headers)

Images cache

This type of cache is implemented everywhere the image is processed via imageGenerator class.

ImageGenerator class

This class is placed in <*approot*>\class\class_imagegenerator.php

Class is using this methods:

- **loadSrc –** used for loading the url of cached image (string)
- **getSrc** - used for loading the url of cached image (output echo)

getSrc

This class is used for caching images. When image from Media-library is used in page (anywhere in system, both admin and site – depending on used template) then following procedure is applied:

- first *hash* of original image is acquired
- then required image dimensions are acquired (input for method, defined in template typically)
- then other parameters are acquired (if any) like „square“, „crop“, „watermark“ etc.
- in other step this data are compared to existing files in *image cache directory*
- if file **is matched**, then this cached image path is returned into method
- if file **is not matched**, then appropriate cached image is built via GD library and cached image path is returned into method

Image cache directory / path
Both values are defined in *config.php*.
Default value is: *tmp\cache\images*

Cached file name format options
This format is defined in *cfg.ini.php* in section *System* in variable *image_cache_format*.
Format can consists from following parts:

- *info*: required paramerers (dimensions + other options...)
- *hash*: *filehash* (sha1) of image (used for image ID and security issues – protecting files)
- *ext*: extension of image (jpg, gif, png)
- *filename*: name of image (returned value is with extension)

Default format is `info_hash.ext`
Example of file name of cached image
150_150__4f3b0172bb9866239cbf9ba1a3d5c23543a01518.jpg

Example of syntax of using imagegenerator in templates:

```
ImageGenerator::loadSrc(security::image_getFullPath($value['image_
path'] . $value['image_filename']), 180, 220, true, true, true);
```

For more examples see *code_examples.tpl.php.*

Localization strings cache

This type of cache is implemented everywhere the localization string is processed via Lang class.
Cache folder is located in system files repository: /tmp/cache/localization_strings/

Performance report

Disclaimer

This report was proceeded by our staff with intention to provide customers with information on what performance they can expect from Edjet LMS. We put maximum effort to setup environment and application to perform as much unbiased tests as possible. Anyway, the performance of the application depends on many circumstances, such as:

- computer hardware
- network configuration
- client configuration
- operating system and software configuration & condition
- LMS content
- number of items in database

As this is not a complete list, even other conditions may interfere with the tests.

Warning: We do not provide any guarantee, that the same values will be achieved with different configurations and/or conditions and we are in no case liable for any loss resulting from using this report.

Methodology

All tests performed and presented here are synthetic tests by it's nature. However, we try to simulate the real users behavior as truly as possible.

All tests were repeated multiple times (at least 3 times). Data presented here are from average test run (best and worst results were excluded out). If there was more than one result remaining, the "most average" was hand picked.

Apache and Postgres was restarted before each test run.

Test case scenario

Following operations were performed **in one loop**:

1) Visit Login page URL and sign user in
2) Visit URL of Courses list page
3) Visit URL of Course 1 detail page
4) Visit URL of Course 1 player page
5) Visit URL of Test 1 info page and start the Test 1 and generate test attempt (14 questions, random questions, random answers, unlimited attempt; otherwise kept default settings)
6) Visit URL of Test player, loading test attempt generated forwarded to first question
7) Visit URL of Course 2 detail page

Ramp-up Period [1]: always 1s

[1] How long should take to get all the threads started.

Test software used

Apache JMeter (2.11 r1554548) on Windows 7 64-bit

Application version

Edjer LMS Server 3.6.2

Database items

Please note: amount of items in database is increasing during tests as they perform all kinds of queries (including INSERT).

Table	Item count
users	1.000~6.500
test_attempts	1.500~15.000
attempt_answers	50.000~500.000
attempt_questions	17.000~170.000
course_visit_history	7.000~21.000
courses_progress	4.000~12.000

Configuration A

Server	**Physical dedicated production grade web server (tuned)** 32GB RAM 1x Xeon Quadcore 3.5Ghz 1TB storage (hardware Raid1) 100 Mbps network Remote location with ~30ms latency
Hardware	Motherboard SuperMicro X9SCI-LN4F Intel Xeon SingleProc SATA [1Proc] Processor Intel Xeon-IvyBridge E3-1270-V2-Quadcore [3.5GHz] RAM slot 1 Kingston 8GB DDR3 2rx8 8GB DDR3 2rx8 [8GB] RAM slot 2 Kingston 8GB DDR3 2rx8 8GB DDR3 2rx8 [8GB] RAM slot 3 Kingston 8GB DDR3 2rx8 8GB DDR3 2rx8 [8GB] RAM slot 4 Kingston 8GB DDR3 2rx8 8GB DDR3 2rx8 [8GB] Drive Controller Adaptec \ 5405 Z \ SATA/SAS RAID Battery Adaptec Super Capacitor ZMM-100CC Hard Drive 1 Western Digital WD RE4 WD1003FBYX [1000GB] Hard Drive 2 Western Digital WD RE4 WD1003FBYX [1000GB] Hard Drive 3+4 Empty Remote Mgmt Card SuperMicro Nuvoton WPCM450 - Onboard IPMI-KVM Power Supply SuperMicro PWS-605P-1H 600W Backplane SuperMicro BPN-SAS-815TQ 4 Port Passive
System & software	Debian 6.0.5-64 PHP 5.3.3 Apache 2.2.16, mpm_prefork_module PostgreSQL 8.4.20 IonCube loader 4.2.2 Linux (64 bits) Munin 1.4.5 top
Storage configuration	2x 1TB in Raid1 (hardware)
Network (public)	Max speed 100 Mbps
Network (private)	Max speed 100 Mbps

Apache & Postgres setup

set Apache MaxClients to 140

set Postgre max_connections to 150

set Postgre working_mem to 32MB

set Postgre random_page_cost to 2.0

set Postgre shared_buffers to 5,5GB

set Postgre effective_cache_size to 11GB

apache KeepAliveTimeout = 15s (default)

other = default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
A#1	1	25	147ms	6,8/s*	175	25,0s	0%
A#2	8	25	226ms	33,8/s*	1400	41,4s	0%
A#3	16	15	386ms	39,3/s	1680	42,7s	0%
A#4	24	10	570ms	39,4/s	1680	42,6s	0%
A#5	32	10	771ms	39,2/s	2240	57,1s	0%
A#6	48	5	1135ms	38,4/s	1680	43,7s	0%
A#7	64	5	1530ms	38,0/s	2240	58,9s	0%
A#8	96	5	2400ms	37,8/s	3360	88,8s	0%
A#9	128	5	3187ms	37,4/s	4480	119,7s	0%
A#10	128	~800	3374ms	37,9/s	~30000	~13min	0,43%

For explanation of headers see "Legend to Summary table" chapter.

Test case A#1

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	25	182	179	185	177	236	0,00%	59,9/min	13,9
Courses list page	25	116	115	117	115	137	0,00%	1,0/sec	17,6
Course 1 detail p...	25	120	119	119	118	141	0,00%	1,0/sec	18,5
Course 1 player p...	25	132	131	135	129	153	0,00%	1,0/sec	23,5
Course 1 - Test 1 ...	25	209	212	217	105	238	0,00%	1,0/sec	57,2
Course 1 - Test 1 ...	25	154	133	237	131	247	0,00%	1,0/sec	58,1
Course 2 detail p...	25	116	116	117	115	123	0,00%	1,0/sec	18,2
TOTAL	175	147	131	212	105	247	0,00%	6,8/sec	199,6

Graph Results

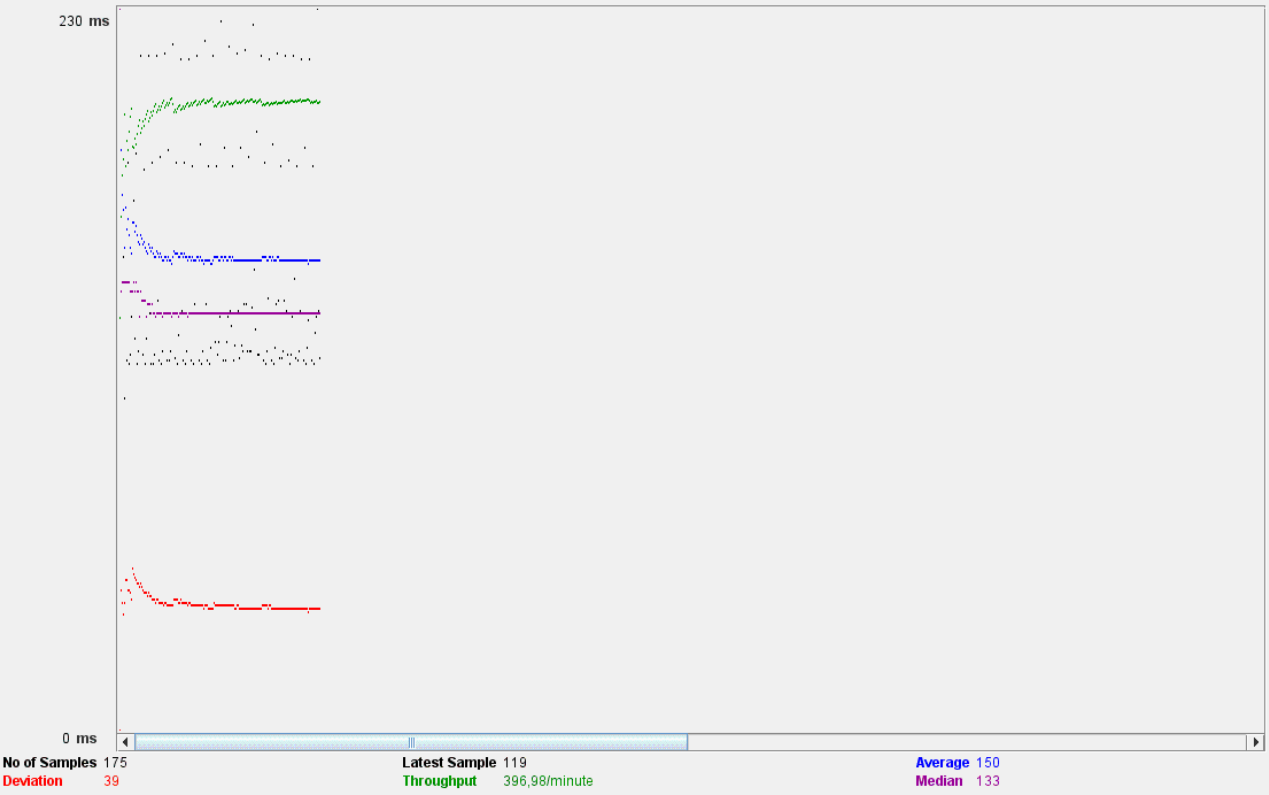
Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Graphs to Display Data Average Median Deviation Throughput



No of Samples 175 Latest Sample 119 Average 150

Deviation 39 Throughput 396,98/minute Median 133

Test case A#2

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	200	252	252	277	208	312	0,00%	4,9/sec	68,9
Courses list page	200	175	172	209	126	247	0,00%	4,9/sec	86,6
Course 1 detail p...	200	183	181	216	134	258	0,00%	4,9/sec	91,2
Course 1 player p...	200	200	193	239	138	546	0,00%	4,9/sec	115,9
Course 1 - Test 1 ...	200	322	316	373	136	1475	0,00%	4,9/sec	282,5
Course 1 - Test 1 ...	200	271	246	388	134	1423	0,00%	4,9/sec	287,5
Course 2 detail p...	200	176	171	216	118	245	0,00%	5,0/sec	89,8
TOTAL	1400	226	206	324	118	1475	0,00%	33,8/sec	998,1

Graph Results

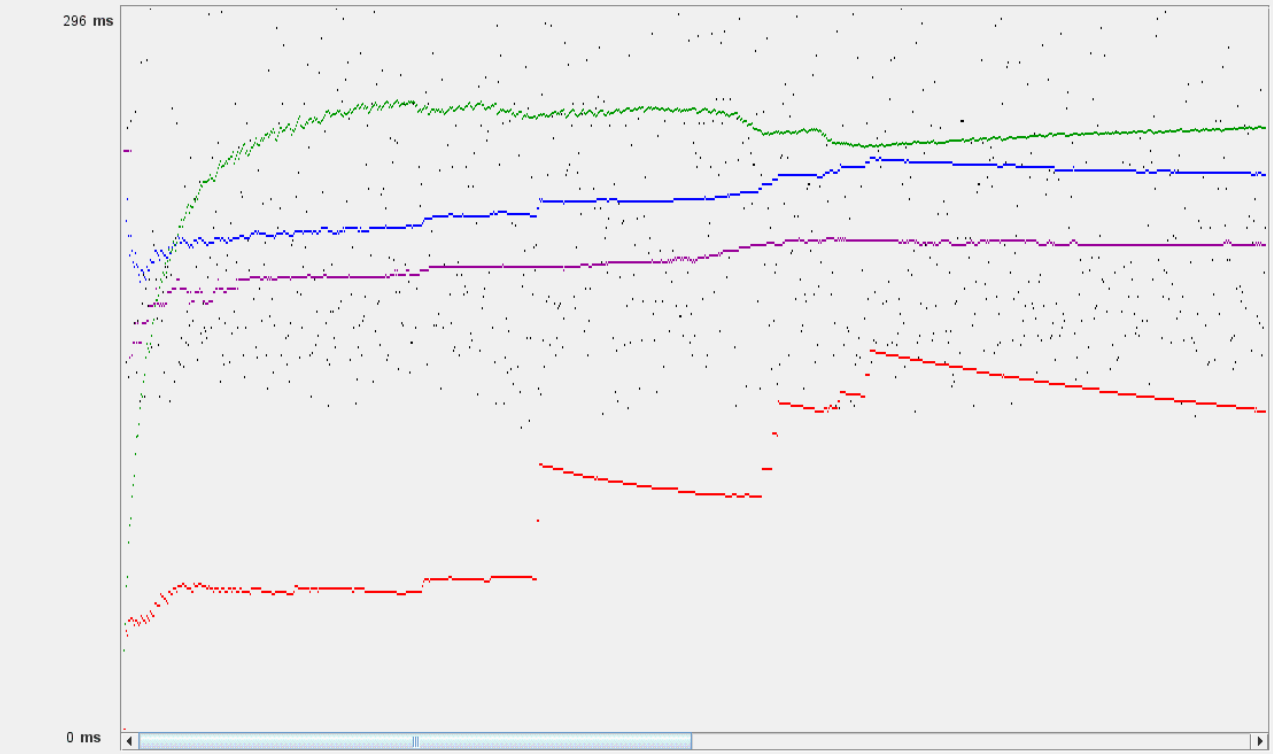
Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Graphs to Display Data Average Median Deviation Throughput



No of Samples 1400 Latest Sample 118 Average 224

Deviation 116 Throughput 1 887,51/minute Median 198

Test case A#3

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	240	456	408	491	233	3584	0,00%	5,8/sec	80,5
Courses list page	240	292	284	383	153	1201	0,00%	5,8/sec	101,2
Course 1 detail p...	240	296	290	374	145	1168	0,00%	5,8/sec	106,8
Course 1 player p...	240	334	336	434	137	536	0,00%	5,8/sec	135,7
Course 1 - Test 1 ...	240	543	543	717	141	1964	0,00%	5,8/sec	323,9
Course 1 - Test 1 ...	240	487	461	696	140	1861	0,00%	5,8/sec	336,5
Course 2 detail p...	240	292	298	382	118	470	0,00%	5,8/sec	104,9
TOTAL	1680	386	342	577	118	3584	0,00%	39,3/sec	1155,3

Graph Results

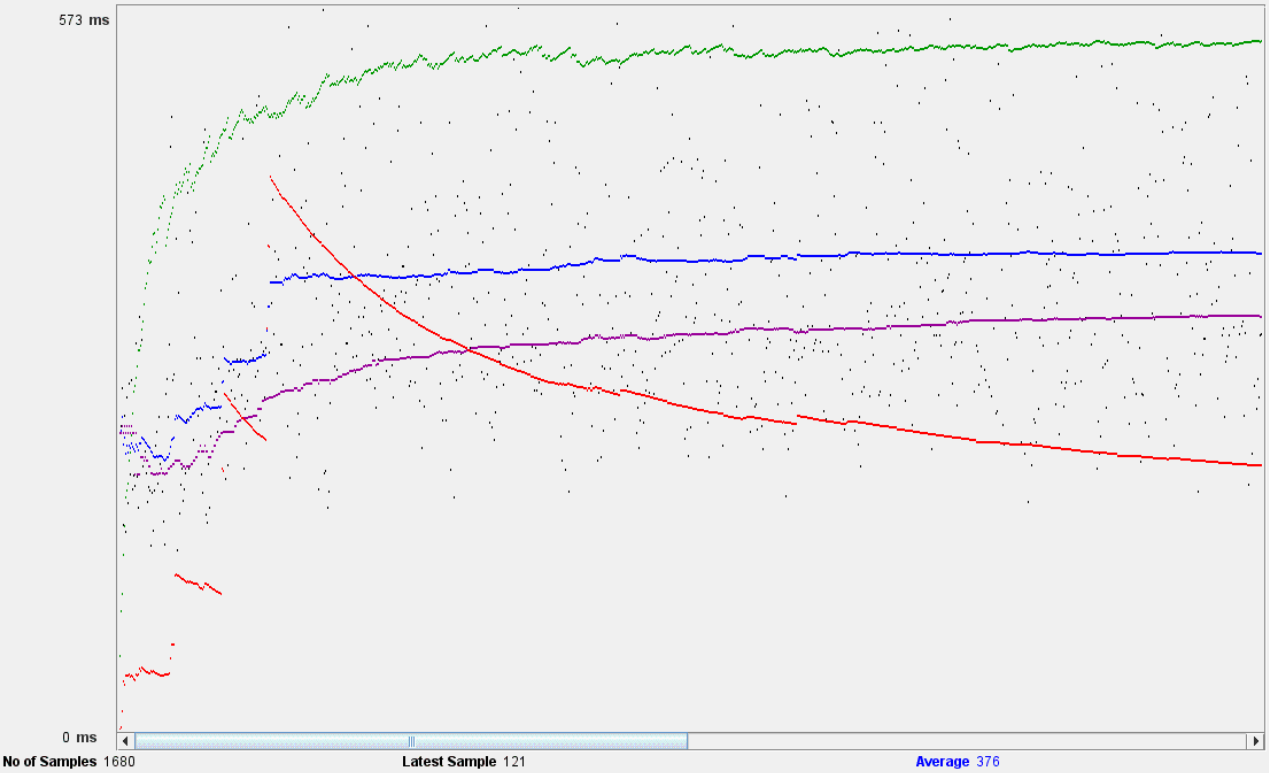
Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Graphs to Display Data Average Median Deviation Throughput



No of Samples 1680 Latest Sample 121 Average 376

Deviation 185 Throughput 2 322,69/minute Median 337

Test case A#4

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	240	722	626	780	247	3992	0,00%	5,8/sec	80,9
Courses list page	240	408	423	518	172	872	0,00%	5,8/sec	101,6
Course 1 detail p...	240	426	441	550	165	1298	0,00%	5,8/sec	107,0
Course 1 player p...	240	475	502	617	159	1047	0,00%	5,8/sec	136,1
Course 1 - Test 1 ...	240	778	789	1095	158	2514	0,00%	5,8/sec	315,7
Course 1 - Test 1 ...	240	753	699	1157	174	2652	0,00%	5,8/sec	338,3
Course 2 detail p...	240	424	421	551	123	1392	0,00%	5,8/sec	105,3
TOTAL	1680	570	491	904	123	3992	0,00%	39,4/sec	1150,9

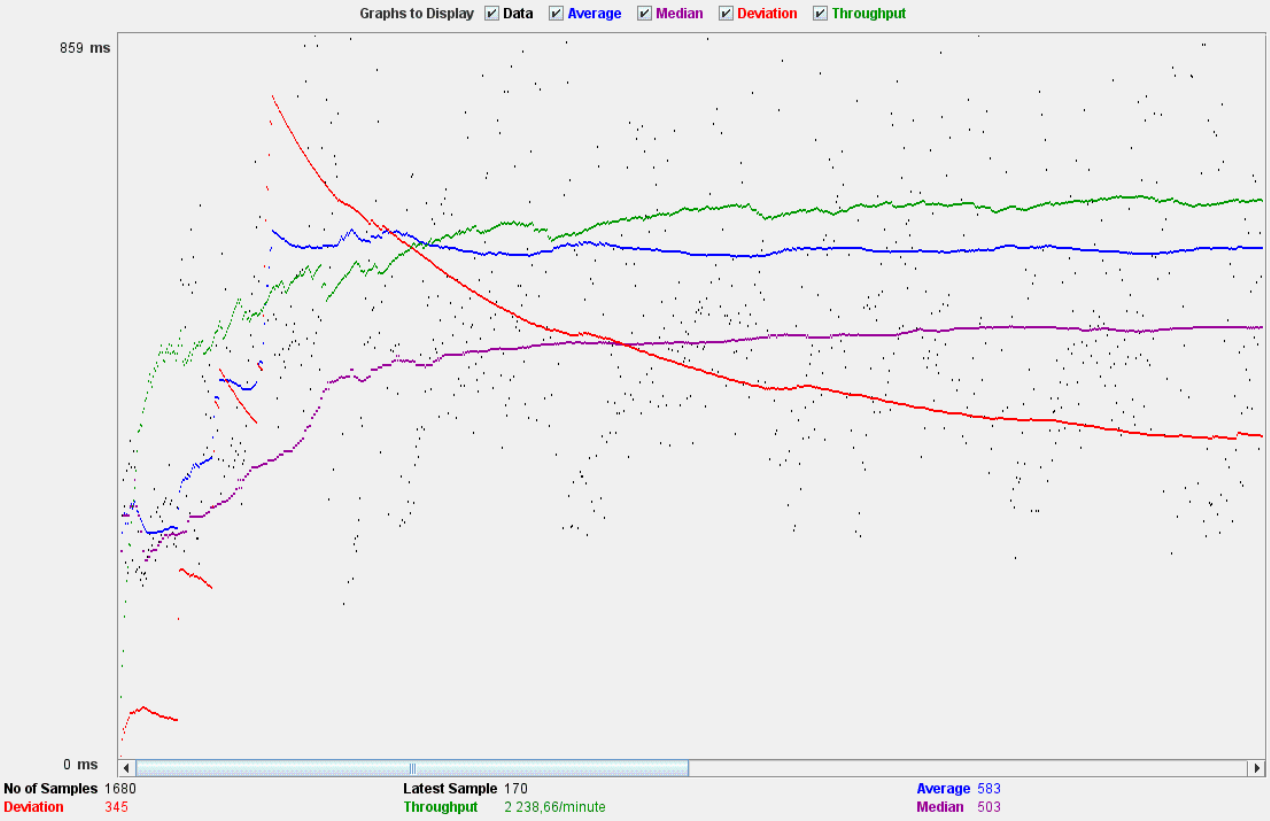
Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure



Test case A#5

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	320	915	846	1052	265	4685	0,00%	5,7/sec	79,6
Courses list page	320	559	576	710	211	838	0,00%	5,7/sec	99,9
Course 1 detail p...	320	593	616	745	189	2010	0,00%	5,7/sec	105,4
Course 1 player p...	320	663	669	843	167	1402	0,00%	5,7/sec	134,3
Course 1 - Test 1 ...	320	1031	1045	1415	235	2704	0,00%	5,7/sec	313,2
Course 1 - Test 1 ...	320	1065	1043	1573	137	2961	0,00%	5,8/sec	337,4
Course 2 detail p...	320	575	581	755	120	2076	0,00%	5,8/sec	105,1
TOTAL	2240	771	680	1197	120	4685	0,00%	39,2/sec	1144,5

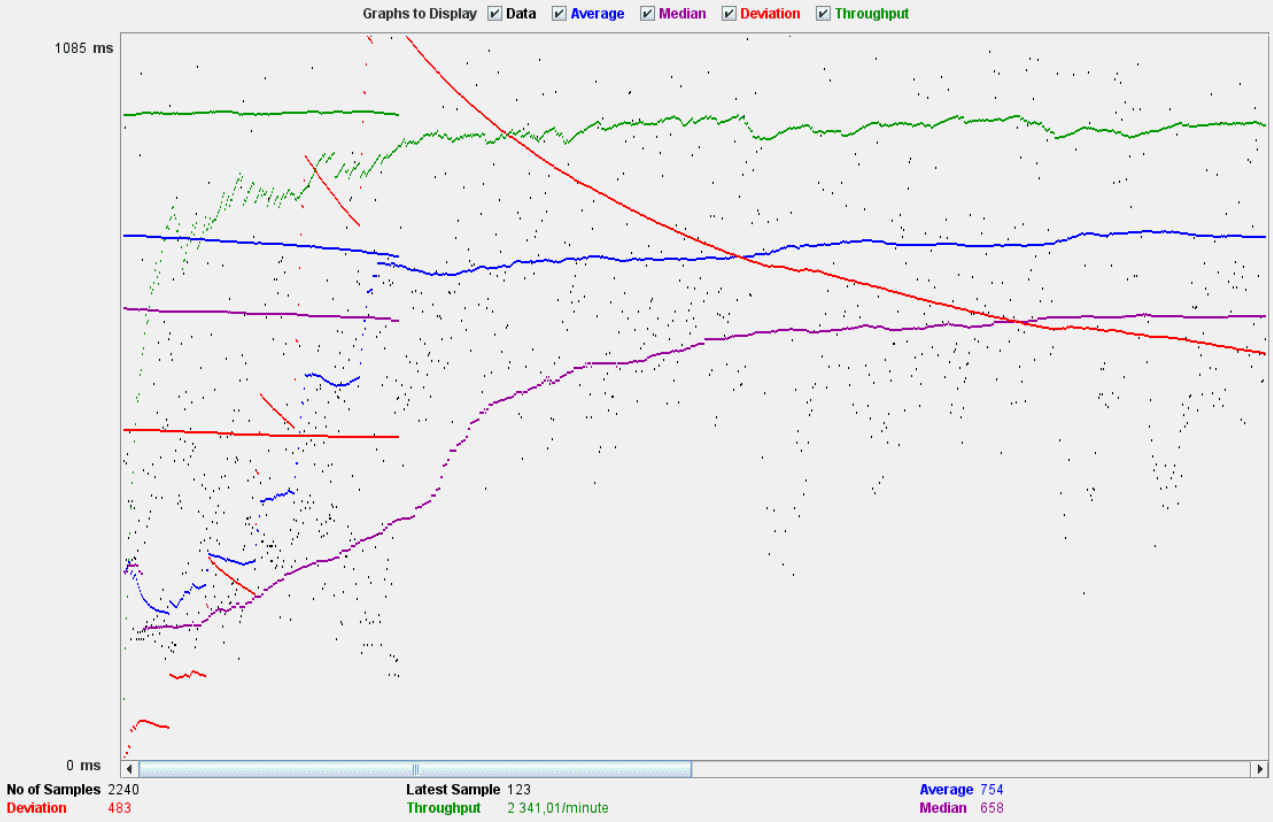
Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure



Test case A#6

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	240	1661	1307	3766	258	5979	0,00%	5,9/sec	82,8
Courses list page	240	789	817	1064	212	1359	0,00%	5,9/sec	102,8
Course 1 detail p...	240	829	879	1096	201	1366	0,00%	5,8/sec	107,4
Course 1 player p...	240	916	973	1202	232	1704	0,00%	5,8/sec	136,1
Course 1 - Test 1 ...	240	1311	1333	1815	161	3135	0,00%	5,7/sec	286,3
Course 1 - Test 1 ...	240	1638	1706	2256	364	3420	0,00%	5,7/sec	333,9
Course 2 detail p...	240	797	833	1103	158	1918	0,00%	5,7/sec	103,3
TOTAL	1680	1135	999	1766	158	5979	0,00%	38,4/sec	1098,9

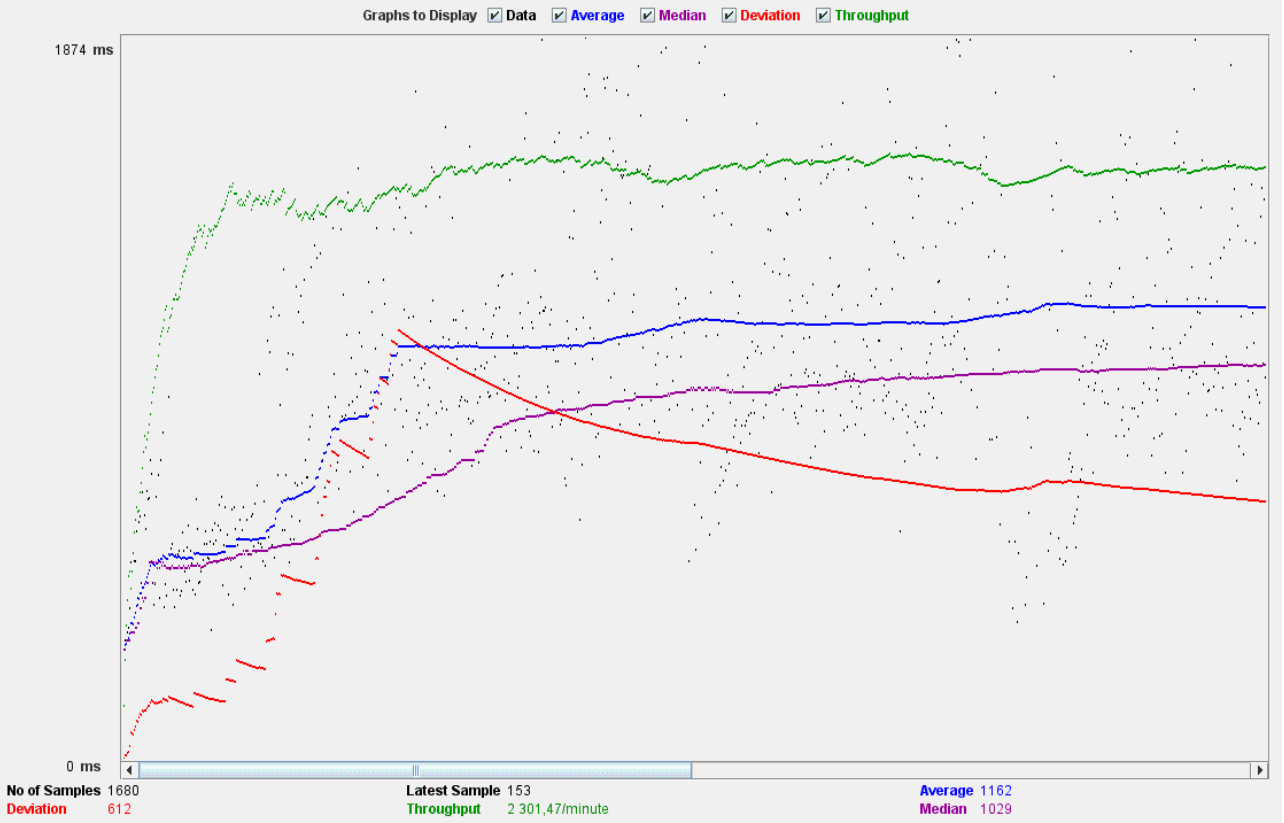
Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure



Test case A#7

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	320	2170	1768	5151	302	6755	0,00%	6,0/sec	83,5
Courses list page	320	1062	1121	1406	207	1786	0,00%	5,9/sec	103,5
Course 1 detail p...	320	1137	1165	1517	216	2324	0,00%	5,8/sec	107,5
Course 1 player p...	320	1283	1321	1691	240	2551	0,00%	5,8/sec	134,6
Course 1 - Test 1 ...	320	1734	1755	2492	196	3743	0,00%	5,7/sec	283,3
Course 1 - Test 1 ...	320	2211	2269	3057	480	4125	0,00%	5,6/sec	327,8
Course 2 detail p...	320	1114	1161	1579	143	2588	0,00%	5,6/sec	101,1
TOTAL	2240	1530	1353	2402	143	6755	0,00%	38,0/sec	1087,6

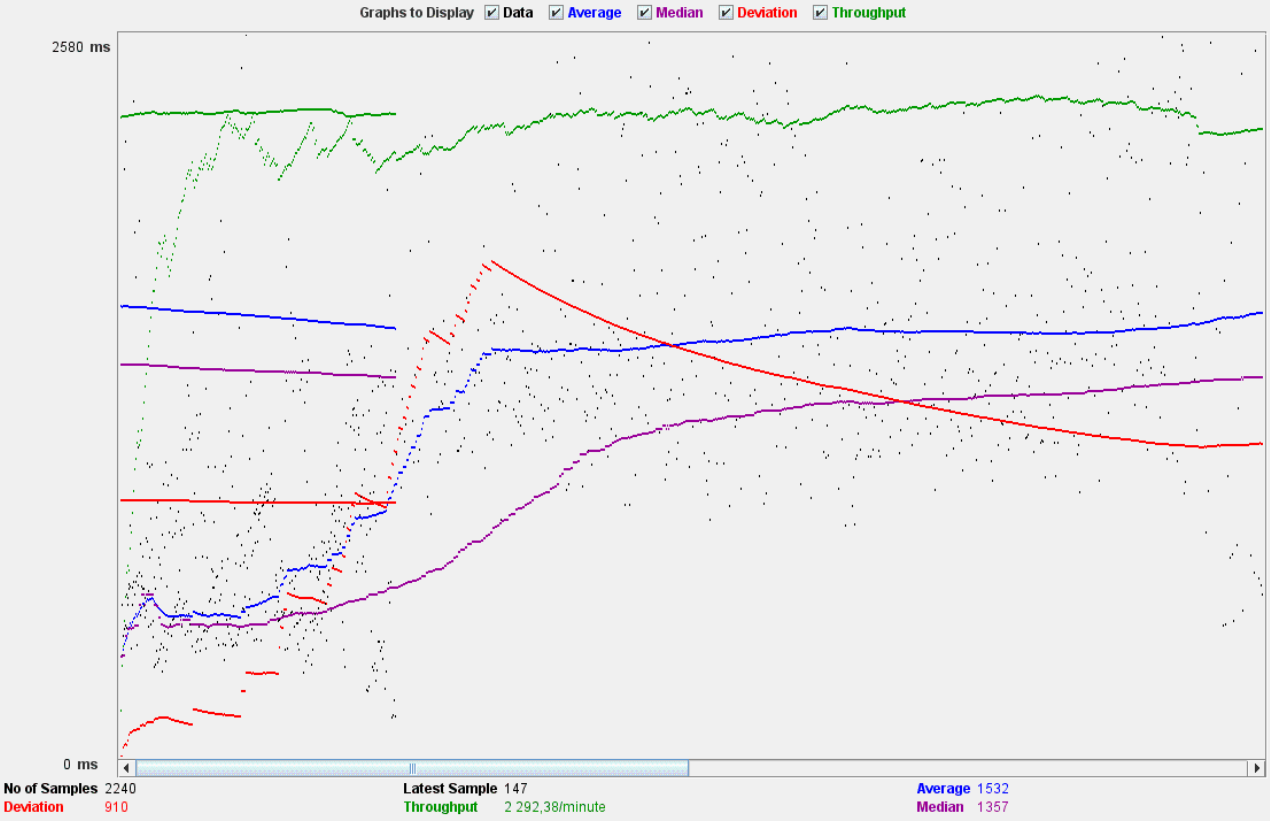
Graph Results

Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure



Test case A#8

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	480	3123	2841	5708	515	8462	0,00%	5,7/sec	80,2
Courses list page	480	1756	1818	2225	435	3182	0,00%	5,7/sec	99,3
Course 1 detail p...	480	1889	1947	2431	549	3010	0,00%	5,6/sec	103,5
Course 1 player p...	480	2028	2098	2506	519	3233	0,00%	5,6/sec	131,5
Course 1 - Test 1 ...	480	2728	2838	3669	547	6393	0,00%	5,6/sec	280,6
Course 1 - Test 1 ...	480	3481	3547	4536	617	6827	0,00%	5,6/sec	330,1
Course 2 detail p...	480	1797	1856	2382	216	4447	0,00%	5,7/sec	102,5
TOTAL	3360	2400	2188	3636	216	8462	0,00%	37,8/sec	1082,6

Graph Results

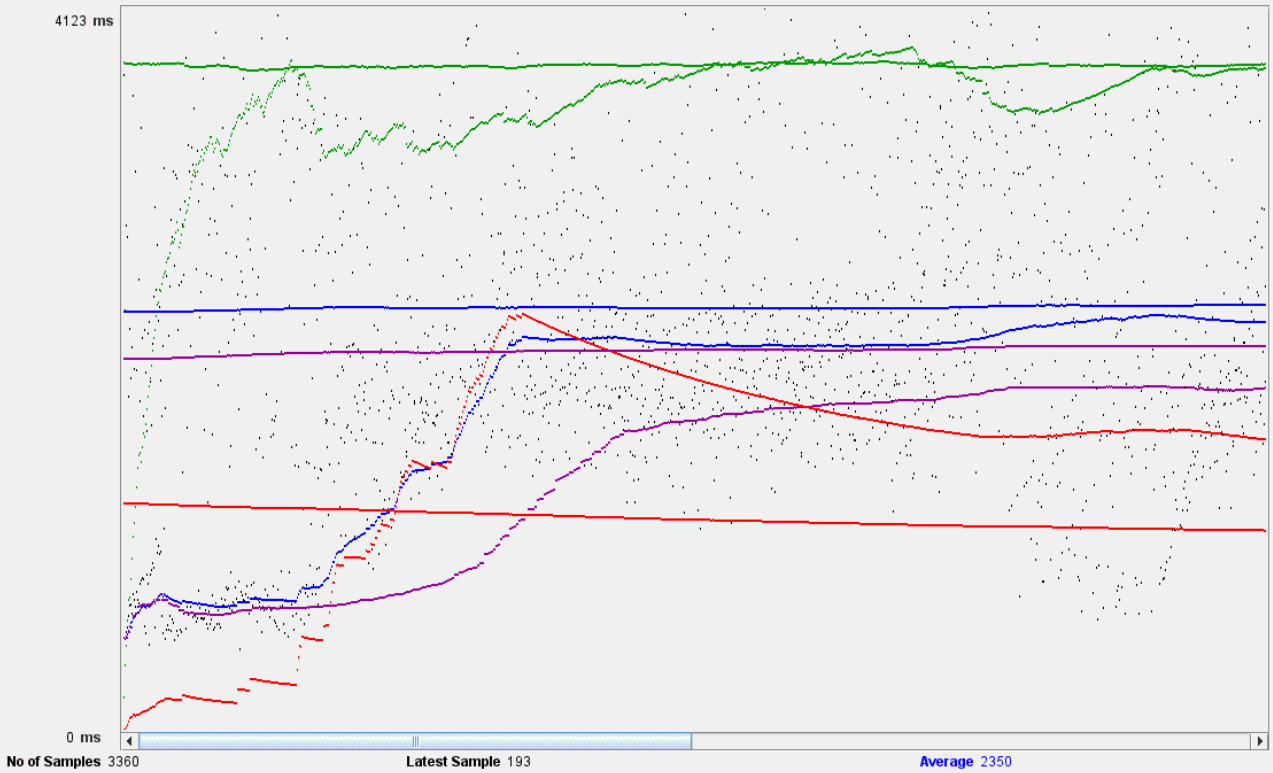
Name: Graph Results

Comments:

Write results to file / Read from file

Filename Browse... Log/Display Only: Errors Successes Configure

Graphs to Display Data Average Median Deviation Throughput



No of Samples 3360 Latest Sample 193 Average 2350

Deviation 1134 Throughput 2 285,01/minute Median 2143

Test case A#9

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename | Browse... | Log/Display Only: Errors Successes | Configure

Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	640	4165	3691	8119	289	11327	0,00%	5,9/sec	82,7
Courses list page	640	2314	2381	3008	237	4620	0,00%	5,8/sec	102,1
Course 1 detail p...	640	2451	2561	3141	265	4369	0,00%	5,8/sec	106,4
Course 1 player p...	640	2713	2764	3395	312	7362	0,00%	5,6/sec	132,1
Course 1 - Test 1 ...	640	3888	3886	5503	183	8810	0,00%	5,5/sec	277,5
Course 1 - Test 1 ...	640	4511	4602	6122	718	9049	0,00%	5,4/sec	320,9
Course 2 detail p...	640	2264	2368	3212	210	6605	0,00%	5,5/sec	98,7
TOTAL	4480	3187	2872	4972	183	11327	0,00%	37,4/sec	1072,5

Test case A#10

Aggregate Report

Name: Aggregate Report

Comments:

Write results to file / Read from file

Filename | Browse... | Log/Display Only: Errors Successes | Configure

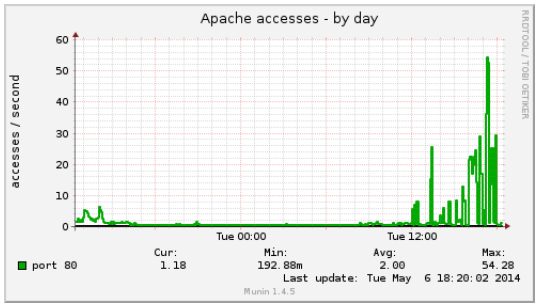
Label	# Samples	Average	Median	90% Line	Min	Max	Error %	Throughput	KB/sec
Login page	4287	3928	3835	4585	18	12378	0,42%	5,5/sec	76,3
Courses list page	4269	2548	2550	3087	172	5795	0,45%	5,5/sec	95,3
Course 1 detail p...	4249	2705	2706	3241	223	4912	0,35%	5,4/sec	100,1
Course 1 player p...	4233	2932	2928	3513	3	5349	0,45%	5,4/sec	126,6
Course 1 - Test 1 ...	4214	3928	3947	4654	149	7101	0,52%	5,4/sec	309,5
Course 1 - Test 1 ...	4192	4928	4902	5728	242	9683	0,45%	5,4/sec	315,7
Course 2 detail p...	4173	2658	2645	3213	27	4674	0,34%	5,4/sec	96,5
TOTAL	29617	3374	3141	4795	3	12378	0,43%	37,9/sec	1118,5

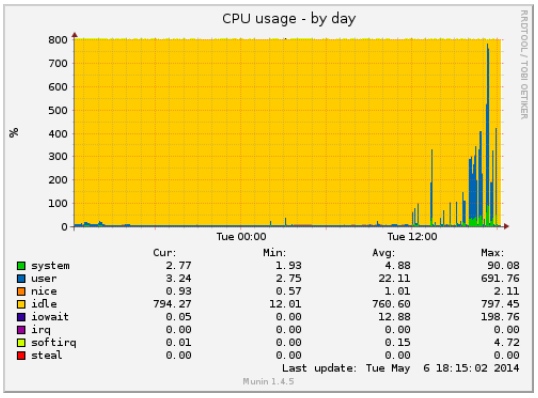
Monitoring

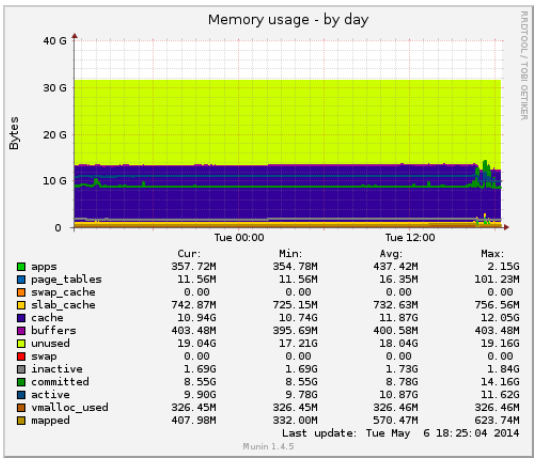
Top

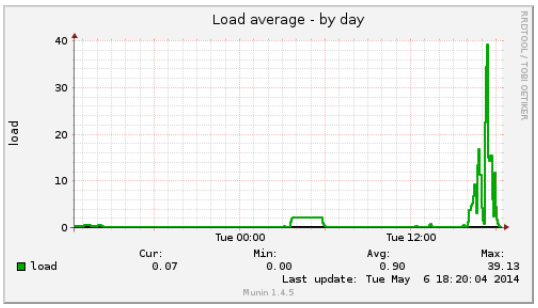
memory	12-15,5GB used
CPU	90% reached at 80 concurrent users

Munin






Memory usage - by day
Bytes
40 G
30 G
20 G
10 G
0
Tue 00:00
Tue 12:00
Cur: Min: Avg: Max:
apps 357.72M 354.78M 437.42M 2.15G
page_tables 11.56M 11.56M 16.35M 101.23M
swap_cache 0.00 0.00 0.00 0.00
slab_cache 742.87M 725.15M 732.63M 756.56M
cache 10.94G 10.74G 11.87G 12.05G
buffers 403.48M 395.69M 400.58M 403.48M
unused 19.04G 17.21G 18.04G 19.16G
swap 0.00 0.00 0.00 0.00
inactive 1.69G 1.69G 1.73G 1.84G
committed 8.55G 8.55G 8.78G 14.16G
active 9.90G 9.78G 10.87G 11.62G
vmalloc_used 326.45M 326.45M 326.46M 326.46M
mapped 407.98M 332.00M 570.47M 623.74M
Last update: Tue May 6 18:25:04 2014
Munin 1.4.5
RADTOOL / TOBI OETIKER


Load average - by day
load
40
30
20
10
0
Tue 00:00
Tue 12:00
Cur: Min: Avg: Max:
load 0.07 0.00 0.90 39.13
Last update: Tue May 6 18:20:04 2014
Munin 1.4.5
RADTOOL / TOBI OETIKER

Configuration B

Server B	**Virtualized entry level web server** (same as C, only 1x vCPU) 1,7GB RAM 1x CPU 2Ghz, shared resources 1x 128GB storage, shared resources 1 Gbps network Local network with ~1ms latency
Hardware	Standard virtualized hardware
System & software	Debian 6.0.5-64 PHP 5.3.3 Apache 2.2.16 PostgreSQL 8.4.20 IonCube loader 4.2.2 Linux (64 bits) Munin 1.4.5 top
Storage configuration	1x 128GB
Network (public)	-
Network (private)	LAN 1 Gbps

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
B#1	1	25	250ms	4,0/s	175	43,7s	0%
B#2	2	25	523ms	3,8/s	350	92,1s	0%
B#3	4	25	1148ms	3,5/s	700	3,3min	0%
B#5	8	25	2279ms	3,5/s	1400	6,6min	0%
B#6	16	15	4598ms	3,5/s	1680	8min	0%

For explanation see "Legend to Summary table" chapter.

Monitoring

Top

memory	0,4-0,65GB used
CPU	90% reached at 1 "concurrent" users

Configuration C

Server C	**Virtualized entry level web server** (same as B, only 2x vCPU) 1,7GB RAM 2x vCPU 2Ghz, shared resources 1x 128GB storage, shared resources 1 Gbps network Local network with ~1ms latency
Hardware	Standard virtualized hardware
System & software	Debian 6 PHP 5.3 Apache 2.2 PostgreSQL 8.4. IonCube loader 4.2.2 Linux (64 bits) top
Storage configuration	1x 128GB
Network (public)	-
Network (private)	LAN 1 Gbps

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
C#1	1	25	266ms	3,8/s*	175	46,0s	0%
C#2	2	25	275ms	7,2/s	350	48,6s	0%
C#3	4	25	561ms	7,0/s	700	100,0s	0%
C#5	8	25	1233ms	6,4/s	1400	3,6min	0%
C#6	16	15	2514ms	6,3/s	1680	4,4min	0%

For explanation see "Legend to Summary table" chapter.

Monitoring

Top

memory	0,4-0,65GB used
CPU	90% reached at 1 "concurrent" users

Configuration D

Server D	**Amazon AWS EC2 m3.2xlarge instance** 8 vCPU 26 ECU 30 Memory (GiB) Remote location with ~40ms latency
Hardware	Standard Amazon virtualized hardware http://aws.amazon.com/ec2/
System & software	Debian 6.0 64 bits base AMI PHP 5.3 Apache 2.2 PostgreSQL 8.4. IonCube loader 4.2.2 Linux (64 bits) top
Storage configuration	Attached 10GB EBS volume (standard IOPS)

EC2 instance configuration

1 - default

See *Amazon AWS EC2 configurations* chapter...

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
D#1	1	25	298ms	3,3/s*	175	53,0s	0%
D#2	8	25	400ms	19,6/s*	1400	71,4s	0%
D#3	16	15	637ms	24,4/s	1680	68,8s	0%
D#4	32	10	1280ms	24,0/s	2240	93,3s	0%
D#5	48	5	1900ms	23,8/s	1680	70,6s	0%
D#6	64	5	2529ms	23,9/s	2240	93,7s	0%

For explanation of headers see "Legend to Summary table" chapter.

Configuration E

Server E	**Amazon AWS EC2 c3.4xlarge instance** 16 vCPU 55 ECU 30 Memory (GiB) Remote location with ~40ms latency
Hardware	Standard Amazon virtualized hardware http://aws.amazon.com/ec2/
System & software	Debian 6.0 64 bits base AMI PHP 5.3 Apache 2.2 PostgreSQL 8.4. IonCube loader 4.2.2 Linux (64 bits) top
Storage configuration	Attached 10GB EBS volume (standard IOPS)

EC2 instance configuration

1 - default

See *Amazon AWS EC2 configurations* chapter...

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
E#1	1	25	279ms	3,6/s*	175	48,6s	0%
E#2	8	25	337ms	23,1/s*	1400	60,6s	0%
E#3	16	15	435ms	34,6/s*	1680	48,5s	0%
E#4	32	10	736ms	40,8/s	2240	54,9s	0%
E#5	48	5	1030ms	41,2/s	1680	40,7s	0%
E#6	64	5	1418ms	41,6/s	2240	53,8s	0%
E#7	96	5	2048ms	43,1/s	3360	78,0s	0%

For explanation of headers see "Legend to Summary table" chapter.

Configuration F

Server F	**Amazon AWS EC2 c3.8xlarge instance** 32 vCPU 108 ECU 60 Memory (GiB) Remote location with ~40ms latency
Hardware	Standard Amazon virtualized hardware http://aws.amazon.com/ec2/
System & software	Debian 6.0 64 bits base AMI PHP 5.3 Apache 2.2 PostgreSQL 8.4. IonCube loader 4.2.2 Linux (64 bits) top
Storage configuration	Attached 10GB EBS volume (standard IOPS)

EC2 instance configuration

1 - default

See *Amazon AWS EC2 configurations* chapter...

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
E#1	1	25	277ms	3,6/s*	175	48,6s	0%
E#2	8	25	308ms	25,5/s*	1400	54,9s	0%
E#3	16	15	308ms	38,5/s	1680	43,6s	0%
E#4	32	10	672ms	44,1/s	2240	50,7s	0%
E#5	48	5	1111ms	38,9/s	1680	43,2s	0%
E#6	64	5	1364ms	42,5/s	2240	52,7s	0%
E#7	96	5	2022ms	43,8/s	3360	76,7s	0%
E#8	128	5	2270ms	49,6/s	4480	90,3s	0%
E#9	150	5	2887ms	46,3/s	5250	113,4s	0%

For explanation see "Legend to Summary table" chapter.

Configuration G

Server G	**Amazon AWS EC2 c3.2xlarge instance** 8 vCPU 28 ECU 15 Memory (GiB) Remote location with ~40ms latency
Hardware	Standard Amazon virtualized hardware http://aws.amazon.com/ec2/
System & software	Debian 6.0 64 bits base AMI PHP 5.3 Apache 2.2 PostgreSQL 8.4. IonCube loader 4.2.2 Linux (64 bits) top
Storage configuration	Attached 10GB EBS volume (standard IOPS)

EC2 instance configuration

1 - default

See *Amazon AWS EC2 configurations* chapter...

Apache & Postgres setup

default

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
E#1	1	25	293ms	3,4/s	175		0%
E#2	8	25	369ms	21,3/s	1400		0%
E#3	16	15	604ms	25,7/s	1680		0%
E#4	32	10	1230ms	25,0/s	2240		0%
E#5	48	5	1803ms	25,0/s	1680		0%
E#6	64	5	2409ms	25,0/s	2240		0%

For explanation of headers see "Legend to Summary table" chapter.

Configuration H

Same as Configuration A, but reconfigured to use **mpm_worker_module** with default setting

App version: 3.7.1

Results

Summary

Overview of results by test case:

Test case	Users[1)]	Loops[2)]	Response time[3)]	Throughput[4)]	Total requests	Run time[5)]	Errors
A#1	1	25	161ms	6,2/s	175		0%
A#2	8	25	257ms	29,8/s	1400		0%
A#3	16	15	427ms	35,8/s	1680		0%
A#4	24	10	622ms	36,4/s	1680		0%
A#5	32	10	859ms	35,9/s	2240		0%
A#6	48	5	1289ms	35,4/s	1680		0%
A#7	64	5	1758ms	34,9/s	2240		0%
A#8	96	5	2653ms	35,0/s	3360		0,12%

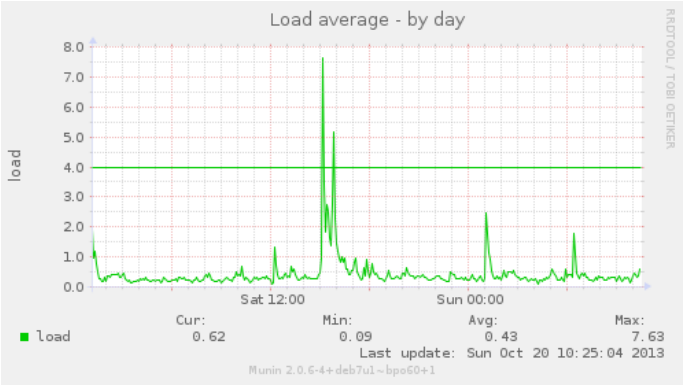
For explanation of headers see "Legend to Summary table" chapter.

Worker is 3 reqs/s slower than prefork at 24 users.

Conclusion

Conclusion depends on use case you can expect to experience.

High concurrency, unpredictable spikes



Use case Public facing multi-user (or even multi-tenant) environments

Setup variants To handle lot of concurrent users at a reasonable response times, we need (based on number of concurrent users) to use at least following hw configurations:

A) up to ~64 req/s: single server with 4 cores (8 threads) and 16-24GB of ram, or

B) up to ~128 req/s: single server with 2 processors, each with 4 cores (16 threads) and 32-48GB of ram, or

C) up to ~256 req/s: setup a cluster from 2 double-processor servers, one as a web server, one as a database server, dividing processing of apache and postgres to 2 different machines, or

D) even higher or unpredictable req/s: setup a dedicated server farm with capacity over-dimensioned to handle the spikes, or

E) even higher or unpredictable req/s: use cloud environment with auto scaling support, possibly off-loading the serving of static content to CDN

Bottlenecks The main bottleneck for high concurrency, if the servers does not swap to disk (has enough RAM), is usually the number of CPU threads available for parallel processing. In extreme cases the I/O performance can became an issue.

Costs This use case is the most expensive as multi-processor machines are very expensive and appropriate cloud environment is not easy to configure, but can be most economical (you don't pay for extra capacity when it is not used only to cover occasional spikes).

Recommended solution Recommended solution is the cloud environment with ability to auto-scale allowing you to scale your capacity up or down automatically according to conditions you define.

High speed response, limited concurrency

Use case Controlled environment (f.e. intanet)with predictable and relatively-low number of simultaneously working users with demand for low latency.

Bottleneck Response bottleneck for low latency, if the servers does not swap to disk (has enough RAM), is usually latency to remote server and slow CPU (low frequency of the processor).

Costs For cost optimization is essential to determine the amount of RAM based on number of concurrent users we must handle.

Recommended solution Without high concurrency demands the best option is single processor server with multi-core support (quad-core) with maximum GHz you can get placed on LAN.

How to understand reports?

We are using **Aggregate Report** which provides the decisive data.

For visualization of data we use Graph result.

Aggregate Report

The aggregate report creates a table row for each differently named request in your test. For each request, it totals the response information and provides request count, min, max, average, error rate, approximate throughput (request/second) and Kilobytes per second throughput. Once the test is done, the throughput is the actual through for the duration of the entire test.

The throughput is calculated from the point of view of the sampler target (e.g. the remote server in the case of HTTP samples). JMeter takes into account the total time over which the requests have been generated. If other samplers and timers are in the same thread, these will increase the total time, and therefore reduce the throughput value. So two identical samplers with different names will have half the throughput of two samplers with the same name. It is important to choose the sampler names correctly to get the best results from the Aggregate Report.

Label - The label of the sample. If "Include group name in label?" is selected, then the name of the thread group is added as a prefix. This allows identical labels from different thread groups to be collated separately if required.

 # Samples - The number of samples with the same label

Average - The average time of a set of results

Median - The median is the time in the middle of a set of results. 50% of the samples took no more than this time; the remainder took at least as long.

90% Line - 90% of the samples took no more than this time. The remaining samples at least as long as this. (90 th percentile)

Min - The shortest time for the samples with the same label

Max - The longest time for the samples with the same label

Error % - Percent of requests with errors

Throughput - the Throughput is measured in requests per second/minute/hour. The time unit is chosen so that the displayed rate is at least 1.0. When the throughput is saved to a CSV file, it is expressed in requests/second, i.e. 30.0 requests/minute is saved as 0.5.

Kb/sec - The throughput measured in Kilobytes per second

Times are in milliseconds.

Graph result

Warning: Graph Results MUST NOT BE USED during load test as it consumes a lot of resources (memory and CPU). This means, that results from graph are different (usually worse) than from Aggregate report. Graph results are also taken in different test-run than Aggregate report!

The Graph Results listener generates a simple graph that plots all sample times. Along the bottom of the graph, the current sample (black), the current average of all samples(blue), the current standard deviation (red), and the current throughput rate (green) are displayed in milliseconds.

The throughput number represents the actual number of requests/minute the server handled. This calculation includes any delays you added to your test and JMeter's own internal processing time. The advantage of doing the calculation like this is that this number represents something real - your server in fact handled that many requests per minute, and you can increase the number of threads

and/or decrease the delays to discover your server's maximum throughput. Whereas if you made calculations that factored out delays and JMeter's processing, it would be unclear what you could conclude from that number.

The following table briefly describes the items on the graph. Further details on the precise meaning of the statistical terms can be found on the web - e.g. Wikipedia - or by consulting a book on statistics.

- Data - plot the actual data values
- Average - plot the Average
- Median - plot the Median (midway value)
- Deviation - plot the Standard Deviation (a measure of the variation)
- Throughput - plot the number of samples per unit of time

The individual figures at the bottom of the display are the current values. "Latest Sample" is the current elapsed sample time, shown on the graph as "Data".

Legend to Summary table

[1)] Number of concurrent processes (threads) per second - simulating the users

[2)] Number of times to perform the test case

[3)] Average response of the application (in milliseconds) *including* latency to server

[4)] Requests per second

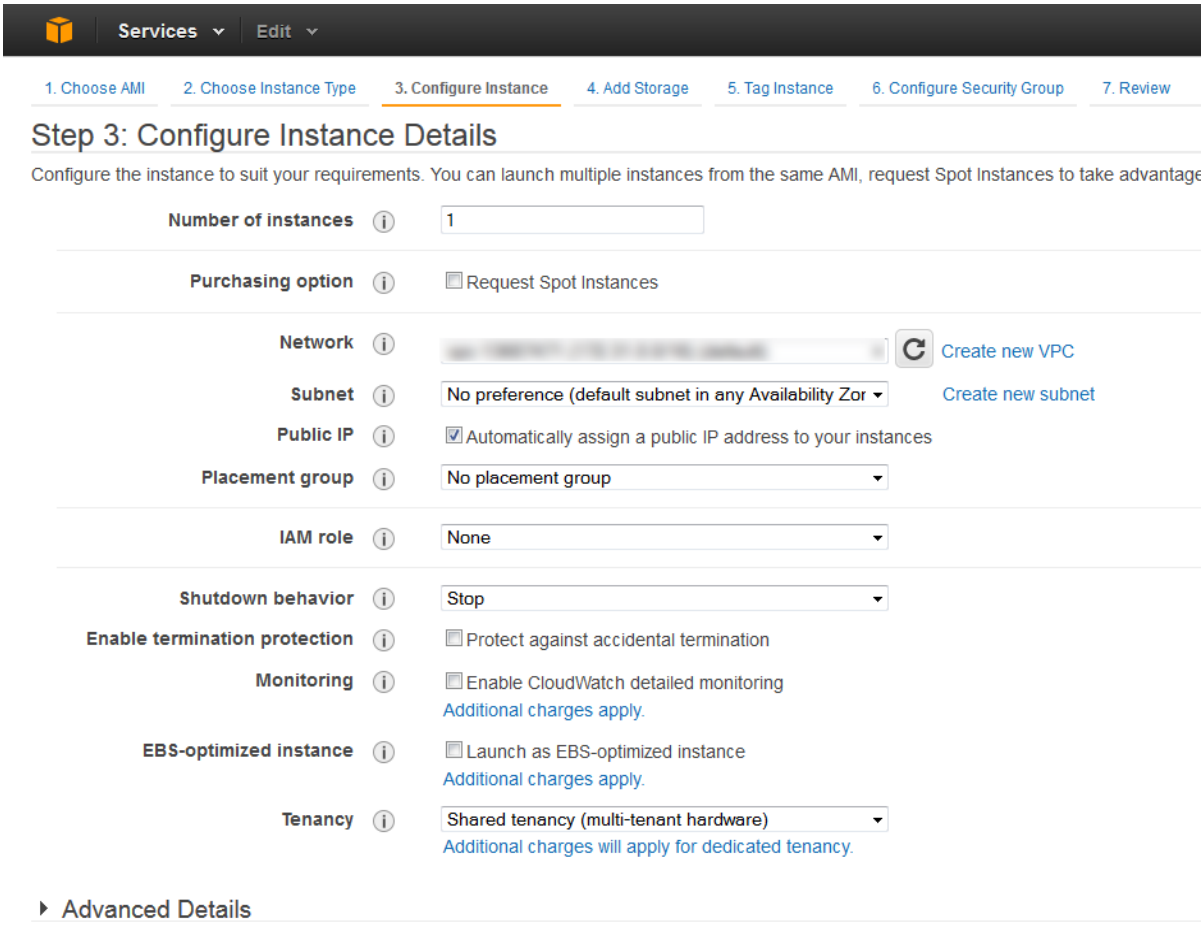
[5)] Total run time of whole test (in seconds)

* Max throughput is not reached as there is not enough requests per second.

Red rows = application responses times are considered too slow to be "interactive"...

Amazon AWS EC2 configurations

1 - Default configuration:


Services
Edit
1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Tag Instance
6. Configure Security Group
7. Review
Step 3: Configure Instance Details
Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot Instances to take advantage
Number of instances
1
Purchasing option
Request Spot Instances
Network
Create new VPC
Subnet
No preference (default subnet in any Availability Zor
Create new subnet
Public IP
Automatically assign a public IP address to your instances
Placement group
No placement group
IAM role
None
Shutdown behavior
Stop
Enable termination protection
Protect against accidental termination
Monitoring
Enable CloudWatch detailed monitoring
Additional charges apply.
EBS-optimized instance
Launch as EBS-optimized instance
Additional charges apply.
Tenancy
Shared tenancy (multi-tenant hardware)
Additional charges will apply for dedicated tenancy.
Advanced Details