



QGIS Server 3.44 User Guide

QGIS Project

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Introduction

QGIS Server is an open source WMS, WFS, OGC API for Features 1.0 (WFS3) and WCS implementation that, in addition, implements advanced cartographic features for thematic mapping. QGIS Server is a FastCGI/CGI (Common Gateway Interface) application written in C++ that works together with a web server (e.g., Apache, Nginx). It has Python plugin support allowing for fast and efficient development and deployment of new features.

QGIS Server uses QGIS as back end for the GIS logic and for map rendering. Furthermore, the Qt library is used for graphics and for platform-independent C++ programming. In contrast to other WMS software, the QGIS Server uses cartographic rules as a configuration language, both for the server configuration and for the user-defined cartographic rules.

As QGIS desktop and QGIS Server use the same visualization libraries, the maps that are published on the web look the same as in desktop GIS.

In the following sections, we will provide a sample configuration to set up a QGIS Server on Linux (Debian, Ubuntu and derivatives) and on Windows. For more information about server plugin development, please read `server_plugins`.

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A copy of the license is included in the section `gnu_fdl`.

2.1 Installation on Debian-based systems

We will give a short and simple installation how-to for a minimal working configuration on Debian based systems (including Ubuntu and derivatives). However, many other distributions and OSs provide packages for QGIS Server.

Белешка

In Ubuntu you can use your regular user, prepending `sudo` to commands requiring admin permissions. In Debian you can work as `admin` (`root`), without using `sudo`.

Requirements and steps to add official QGIS repositories to install QGIS Server on a Debian based system are provided in [QGIS installers page](#). You may want to install at least the latest Long Term Release.

Once the target version repository is configured and QGIS Server installed, you can test the installation with:

```
/usr/lib/cgi-bin/qgis_mapserv.fcgi
```

If you get the following output, the server is correctly installed.

Белешка

Depending on the version of QGIS, you might see slightly different output reported when you run `qgis_mapserv.fcgi`.

```
QFSFileEngine::open: No file name specified
Warning 1: Unable to find driver ECW to unload from GDAL_SKIP environment variable.
Warning 1: Unable to find driver ECW to unload from GDAL_SKIP environment variable.
Warning 1: Unable to find driver JP2ECW to unload from GDAL_SKIP environment_
↪variable.
Warning 1: Unable to find driver ECW to unload from GDAL_SKIP environment variable.
Warning 1: Unable to find driver JP2ECW to unload from GDAL_SKIP environment_
↪variable.
Content-Length: 206
Content-Type: text/xml; charset=utf-8
```

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```
<ServiceExceptionReport version="1.3.0" xmlns="https://www.opengis.net/ogc">
  <ServiceException code="Service configuration error">Service unknown or
  ↳ unsupported</ServiceException>
</ServiceExceptionReport>
```

Белешка

As seen below, QGIS reports a Status 400 code, which correctly identifies the request has failed because there is no active http session. This is not a bug and indicates the server is functioning properly.

```
Application path not initialized
Application path not initialized
Warning 1: Unable to find driver ECW to unload from GDAL_SKIP environment variable.
Warning 1: Unable to find driver ECW to unload from GDAL_SKIP environment variable.
Warning 1: Unable to find driver JP2ECW to unload from GDAL_SKIP environment
↳ variable.
"Loading native module /usr/lib/qgis/server/libdummy.so"
"Loading native module /usr/lib/qgis/server/liblandingpage.so"
"Loading native module /usr/lib/qgis/server/libwcs.so"
"Loading native module /usr/lib/qgis/server/libwfs.so"
"Loading native module /usr/lib/qgis/server/libwfs3.so"
"Loading native module /usr/lib/qgis/server/libwms.so"
"Loading native module /usr/lib/qgis/server/libwmts.so"
QFSFileEngine::open: No file name specified
Content-Length: 102
Content-Type: application/json
Server: QGIS FCGI server - QGIS version 3.22.6-Białowieża
Status: 400
[{"code":"Bad request error","description":"Requested URI does not match any
↳ registered API handler"}]
```

Let's add a sample project. You can use your own, or one from [Training demo data](#):

```
mkdir /home/qgis/projects/
cd /home/qgis/projects/
wget https://github.com/qgis/QGIS-Training-Data/archive/release_3.22.zip
unzip release_3.22.zip
mv QGIS-Training-Data-release_3.22/exercise_data/qgis-server-tutorial-data/world.
↳ qgs .
mv QGIS-Training-Data-release_3.22/exercise_data/qgis-server-tutorial-data/
↳ naturalearth.sqlite .
```

Of course, you can use your favorite GIS software to open this file and take a look at the configuration and available layers.

To properly deploy QGIS server you need a HTTP server. Recommended choices are [Apache](#) or [NGINX](#).

2.1.1 Apache HTTP Server

Белешка

In the following, please replace `qgis.demo` with the name or IP address of your server.

1. Install Apache and `mod_fcgid`:

```
apt install apache2 libapache2-mod-fcgid
```

2. You can run QGIS Server on your default website, but let's configure a `virtualhost` specifically for this, as follows.

1. In the `/etc/apache2/sites-available` directory, create a file called `qgis.demo.conf`, with this content:

```
<VirtualHost *:80>
    ServerAdmin webmaster@localhost
    ServerName qgis.demo

    DocumentRoot /var/www/html

    # Apache logs (different than QGIS Server log)
    ErrorLog ${APACHE_LOG_DIR}/qgis.demo.error.log
    CustomLog ${APACHE_LOG_DIR}/qgis.demo.access.log combined

    # Longer timeout for WPS... default = 40
    FcgidIOTimeout 120

    FcgidInitialEnv LC_ALL "en_US.UTF-8"
    FcgidInitialEnv PYTHONIOENCODING UTF-8
    FcgidInitialEnv LANG "en_US.UTF-8"

    # QGIS log
    FcgidInitialEnv QGIS_SERVER_LOG_STDERR 1
    FcgidInitialEnv QGIS_SERVER_LOG_LEVEL 0

    # default QGIS project
    SetEnv QGIS_PROJECT_FILE /home/qgis/projects/world.qgs

    # QGIS_AUTH_DB_DIR_PATH must lead to a directory writeable by the Server
    ↪ 's FCGI process user
    FcgidInitialEnv QGIS_AUTH_DB_DIR_PATH "/home/qgis/qgisserverdb/"
    FcgidInitialEnv QGIS_AUTH_PASSWORD_FILE "/home/qgis/qgisserverdb/qgis-
    ↪ auth.db"

    # Set pg access via pg_service file
    SetEnv PGSERVICEFILE /home/qgis/.pg_service.conf
    FcgidInitialEnv PGPASSFILE "/home/qgis/.pgpass"

    # if qgis-server is installed from packages in debian based distros this_
    ↪ is usually /usr/lib/cgi-bin/
    # run "locate qgis_mapserv.fcgi" if you don't know where qgis_mapserv.
    ↪ fcgi is
    ScriptAlias /cgi-bin/ /usr/lib/cgi-bin/
    <Directory "/usr/lib/cgi-bin/">
        AllowOverride None
        Options +ExecCGI -MultiViews -SymLinksIfOwnerMatch
        Require all granted
```

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```
</Directory>

<IfModule mod_fcgid.c>
    FcgidMaxRequestLen 26214400
    FcgidConnectTimeout 60
</IfModule>

</VirtualHost>
```

Белешка

Some of the above configuration options are explained in the Server *environment variables* and *pg_service* file sections.

- Let's now create the directories that will store the QGIS Server logs and the authentication database:

```
mkdir -p /var/log/qgis/
chown www-data:www-data /var/log/qgis
mkdir -p /home/qgis/qgisserverdb
chown www-data:www-data /home/qgis/qgisserverdb
```

Белешка

`www-data` is the Apache user on Debian based systems and we need Apache to have access to those locations or files. The `chown www-data...` commands change the owner of the respective directories and files to `www-data`.

- We can now enable the virtual host and the `fcgid` mod if it's not already done:

```
a2enmod fcgid
a2enmod rewrite
a2ensite qgis.demo
```

- Now restart Apache for the new configuration to be taken into account:

```
systemctl restart apache2
```

- Now that Apache knows that he should answer requests to `http://qgis.demo` we also need to setup the client system so that it knows who `qgis.demo` is. We do that by adding `127.0.0.1 qgis.demo` in the `hosts` file.

```
# Replace 127.0.0.1 with the IP of your server.
sh -c "echo '127.0.0.1 qgis.demo' >> /etc/hosts"
```

Важно

Remember that both the `qgis.demo.conf` and `/etc/hosts` files should be configured for your setup to work. You can also test the access to your QGIS Server from other clients on the network (e.g. Windows or macOS machines) by going to their `/etc/hosts` file and point the `qgis.demo` name to whatever IP the server machine has on the network (not `127.0.0.1` as it is the local IP, only accessible from the local machine). On **nix* machines the `hosts` file is located in `/etc`, while on Windows it's under the `C:\Windows\System32\drivers\etc` directory. Under Windows you need to start your text editor with administrator privileges before opening the `hosts` file.

QGIS Server is now available at `http://qgis.demo`. To check, type in a browser, as in the simple case:

```
http://qgis.demo/cgi-bin/qgis_mapserv.fcgi?SERVICE=WMS&VERSION=1.3.0&
REQUEST=GetCapabilities
```

2.1.2 NGINX HTTP Server

Белешка

In the following, please replace `qgis.demo` with the name or IP address of your server.

You can also use QGIS Server with [NGINX](#). Unlike Apache, NGINX does not automatically spawn FastCGI processes. The FastCGI processes are to be started by something else.

Install NGINX:

```
apt install nginx
```

- As a first option, you can use **spawn-fcgi** or **fcgiwrap** to start and manage the QGIS Server processes. Official Debian packages exist for both. When you have no X server running and you need, for example, printing, you can use *xvfb*.
- Another option is to rely on **Systemd**, the init system for GNU/Linux that most Linux distributions use today. One of the advantages of this method is that it requires no other components or processes. It's meant to be simple, yet robust and efficient for production deployments.

NGINX Configuration

The **include fastcgi_params**; used in the previous configuration is important, as it adds the parameters from `/etc/nginx/fastcgi_params`:

```
fastcgi_param  QUERY_STRING       $query_string;
fastcgi_param  REQUEST_METHOD     $request_method;
fastcgi_param  CONTENT_TYPE       $content_type;
fastcgi_param  CONTENT_LENGTH     $content_length;

fastcgi_param  SCRIPT_NAME        $fastcgi_script_name;
fastcgi_param  REQUEST_URI        $request_uri;
fastcgi_param  DOCUMENT_URI       $document_uri;
fastcgi_param  DOCUMENT_ROOT      $document_root;
fastcgi_param  SERVER_PROTOCOL    $server_protocol;
fastcgi_param  REQUEST_SCHEME     $scheme;
fastcgi_param  HTTPS              $https if_not_empty;

fastcgi_param  GATEWAY_INTERFACE  CGI/1.1;
fastcgi_param  SERVER_SOFTWARE    nginx/$nginx_version;

fastcgi_param  REMOTE_ADDR        $remote_addr;
fastcgi_param  REMOTE_PORT        $remote_port;
fastcgi_param  SERVER_ADDR        $server_addr;
fastcgi_param  SERVER_PORT        $server_port;
fastcgi_param  SERVER_NAME        $server_name;

# PHP only, required if PHP was built with --enable-force-cgi-redirect
fastcgi_param  REDIRECT_STATUS    200;
```

Moreover, you can use some *Promenljive okruženja* to configure QGIS Server. In the NGINX configuration file, `/etc/nginx/nginx.conf`, you have to use `fastcgi_param` instruction to define these variables as shown below:

```
location /qgisserver {
    gzip            off;
    include         fastcgi_params;
    fastcgi_param   QGIS_SERVER_LOG_STDERR 1;
    fastcgi_param   QGIS_SERVER_LOG_LEVEL  0;
    fastcgi_pass     unix:/var/run/qgisserver.socket;
}
```

FastCGI wrappers

Упозорење

fcgiwrap is easier to set up than **spawn-fcgi**, because it's already wrapped in a Systemd service. But it also leads to a solution that is much slower than using **spawn-fcgi**. With **fcgiwrap**, a new QGIS Server process is created on each request, meaning that the QGIS Server initialization process, which includes reading and parsing the QGIS project file, is done on each request. With **spawn-fcgi**, the QGIS Server process remains alive between requests, resulting in much better performance. For that reason, **spawn-fcgi** is recommended for production use.

spawn-fcgi

If you want to use **spawn-fcgi**:

1. The first step is to install the package:

```
apt install spawn-fcgi
```

2. Then, introduce the following block in your NGINX server configuration:

```
location /qgisserver {
    gzip            off;
    include         fastcgi_params;
    fastcgi_pass     unix:/var/run/qgisserver.socket;
}
```

3. And restart NGINX to take into account the new configuration:

```
systemctl restart nginx
```

4. Finally, considering that there is no default service file for **spawn-fcgi**, you have to manually start QGIS Server in your terminal:

```
spawn-fcgi -s /var/run/qgisserver.socket \
           -U www-data -G www-data -n \
           /usr/lib/cgi-bin/qgis_mapserv.fcgi
```

QGIS Server is now available at <http://qgis.demo/qgisserver>.

Белешка

When using **spawn-fcgi**, you may directly define environment variables before running the server. For example:

```
export QGIS_SERVER_LOG_STDERR=1
```

Of course, you can add an init script to start QGIS Server at boot time or whenever you want. For example with **systemd**:

1. Edit the file `/etc/systemd/system/qgis-server.service` with this content:

```

[Unit]
Description=QGIS server
After=network.target

[Service]
;; set env var as needed
;Environment="LANG=en_EN.UTF-8"
;Environment="QGIS_SERVER_PARALLEL_RENDERING=1"
;Environment="QGIS_SERVER_MAX_THREADS=12"
;Environment="QGIS_SERVER_LOG_LEVEL=0"
;Environment="QGIS_SERVER_LOG_STDERR=1"
;; or use a file:
;EnvironmentFile=/etc/qgis-server/env

ExecStart=spawn-fcgi -s /var/run/qgisserver.socket -U www-data -G www-data -n /
↳usr/lib/cgi-bin/qgis_mapserv.fcgi

[Install]
WantedBy=multi-user.target

```

2. Then enable and start the service:

```
systemctl enable --now qgis-server
```

Упозорење

With the above commands spawn-fcgi spawns only one QGIS Server process.

fcgiwrap

Using **fcgiwrap** is much easier to setup than **spawn-fcgi** but it's much slower.

1. You first have to install the corresponding package:

```
apt install fcgiwrap
```

2. Then, introduce the following block in your NGINX server configuration:

```

1 location /qgisserver {
2     gzip             off;
3     include          fastcgi_params;
4     fastcgi_pass      unix:/var/run/fcgiwrap.socket;
5     fastcgi_param     SCRIPT_FILENAME /usr/lib/cgi-bin/qgis_mapserv.fcgi;
6 }

```

3. Finally, restart NGINX and **fcgiwrap** to take into account the new configuration:

```
systemctl restart nginx
systemctl restart fcgiwrap
```

QGIS Server is now available at <http://qgis.demo/qgisserver>.

Systemd

QGIS Server needs a running X Server to be fully usable, in particular for printing. In the case you already have a running X Server, you can use systemd services.

This method, to deploy QGIS Server, relies on two Systemd units to configure: a **Socket unit** and a **Service unit**.

1. The **QGIS Server Socket unit** defines and creates a file system socket, used by NGINX to start and communicate with QGIS Server. The Socket unit has to be configured with `Accept=false`, meaning that the calls to the `accept()` system call are delegated to the process created by the Service unit. It is located in `/etc/systemd/system/qgis-server@.socket`, which is actually a template:

```
[Unit]
Description=QGIS Server Listen Socket (instance %i)

[Socket]
Accept=false
ListenStream=/var/run/qgis-server-%i.sock
SocketUser=www-data
SocketGroup=www-data
SocketMode=0600

[Install]
WantedBy=sockets.target
```

2. Now enable and start sockets:

```
for i in 1 2 3 4; do systemctl enable --now qgis-server@$i.socket; done
```

3. The **QGIS Server Service unit** defines and starts the QGIS Server process. The important part is that the Service process' standard input is connected to the socket defined by the Socket unit. This has to be configured using `StandardInput=socket` in the Service unit configuration located in `/etc/systemd/system/qgis-server@.service`:

```
[Unit]
Description=QGIS Server Service (instance %i)

[Service]
User=www-data
Group=www-data
StandardOutput=null
StandardError=journal
StandardInput=socket
ExecStart=/usr/lib/cgi-bin/qgis_mapserv.fcgi
EnvironmentFile=/etc/qgis-server/env

[Install]
WantedBy=multi-user.target
```

Белешка

The QGIS Server *environment variables* are defined in a separate file, `/etc/qgis-server/env`. It could look like this:

```
QGIS_PROJECT_FILE=/etc/qgis/myproject.qgs
QGIS_SERVER_LOG_STDERR=1
QGIS_SERVER_LOG_LEVEL=3
```

4. Now start socket service:

```
for i in 1 2 3 4; do systemctl enable --now qgis-server@$i.service; done
```

5. Finally, for the NGINX HTTP server, let's introduce the configuration for this setup:

```

upstream qgis-server_backend {
    server unix:/var/run/qgis-server-1.sock;
    server unix:/var/run/qgis-server-2.sock;
    server unix:/var/run/qgis-server-3.sock;
    server unix:/var/run/qgis-server-4.sock;
}

server {
    ...

    location /qgis-server {
        gzip off;
        include fastcgi_params;
        fastcgi_pass qgis-server_backend;
    }
}

```

6. Now restart NGINX for the new configuration to be taken into account:

```
systemctl restart nginx
```

Thanks to Oslandia for sharing [their tutorial](#).

2.1.3 Xvfb

QGIS Server needs a running X Server to be fully usable, in particular for printing. On servers it is usually recommended not to install it, so you may use `xvfb` to have a virtual X environment.

If you're running the Server in graphic/X11 environment then there is no need to install `xvfb`. More info at <https://www.itopen.it/qgis-server-setup-notes/>.

1. To install the package:

```
apt install xvfb
```

2. Create the service file, `/etc/systemd/system/xvfb.service`, with this content:

```

[Unit]
Description=X Virtual Frame Buffer Service
After=network.target

[Service]
ExecStart=/usr/bin/Xvfb :99 -screen 0 1024x768x24 -ac +extension GLX +render -
➔noreset

[Install]
WantedBy=multi-user.target

```

3. Enable, start and check the status of the `xvfb.service`:

```
systemctl enable --now xvfb.service
systemctl status xvfb.service
```

4. Then, according to your HTTP server, you should configure the **DISPLAY** parameter or directly use **`xvfb-run`**.

- Using Apache:
 1. Add to your *Fcgid* configuration (see *Apache HTTP Server*):

```
FcgidInitialEnv DISPLAY ":99"
```

- Restart Apache for the new configuration to be taken into account:

```
systemctl restart apache2
```

- Using NGINX

- With spawn-fcgi using xvfb-run:

```
xvfb-run /usr/bin/spawn-fcgi -f /usr/lib/cgi-bin/qgis_mapserv.fcgi \
-s /tmp/qgisserver.socket \
-G www-data -U www-data -n
```

- With the **DISPLAY** environment variable in the HTTP server configuration.

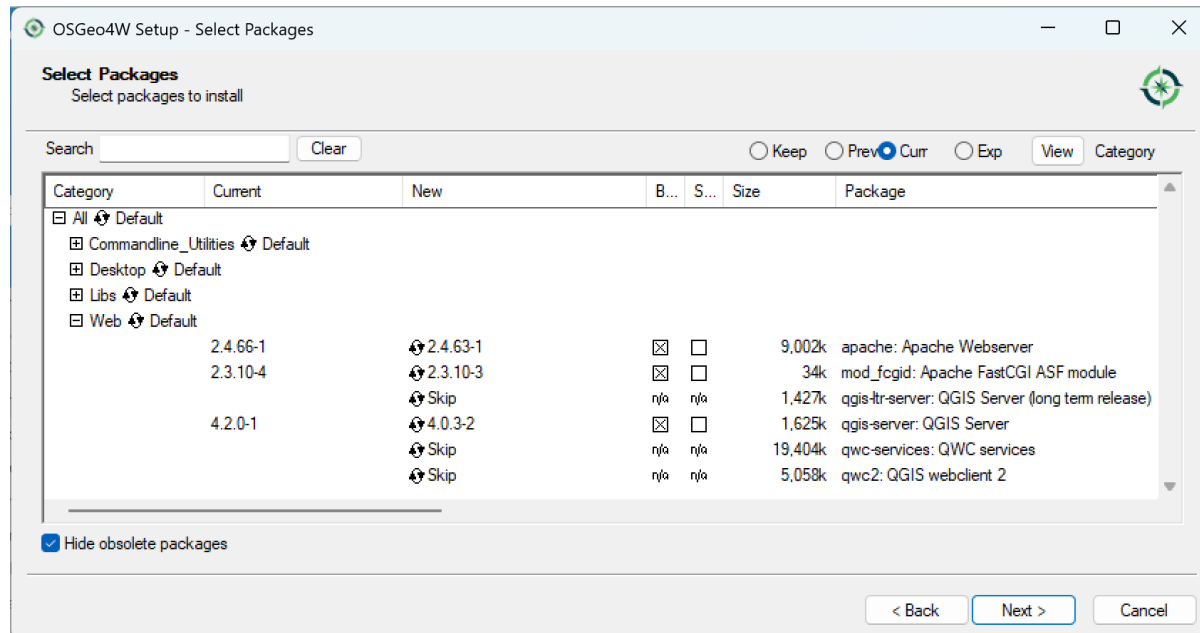
```
fastcgi_param DISPLAY ":99";
```

2.2 Installation on Windows

QGIS Server can also be installed on Windows systems using the OSGeo4W network installer (<https://qgis.org/resources/installation-guide/#windows>).

A simple procedure is the following:

- Download and run the OSGeo4W installer
- Follow the „Advanced Install” and install the **QGIS Desktop**, **QGIS Server apache** and **mod_fcgid** packages.



- Apache is not directly installed as a service on Windows. You need to:

- Right-click the `OSGeo4W.bat` file at the root of the `C:\OSGeo4W\` folder (if the default installation paths have been used) and select *Run as administrator*
- In the console, run `apache-install.bat`, which will output

```
> apache-install.bat
Installing the 'Apache OSGeo4W Web Server' service
The 'Apache OSGeo4W Web Server' service is successfully installed.
Testing httpd.conf....
Errors reported here must be corrected before the service can be started.
...
```

The service is started as you can notice in the report. But the server may fail to run due to missing custom configuration.

4. Edit the `C:\OSGeo4w\apps\apache\conf\httpd.conf` file with the following changes (various other combinations are possible):

Табела2.1: Apache configuration update

Svrha	Existing config	Replacement
(Optional) Customize the address to listen to using an IP and/or port, You can and add as many entries as you wish.	<code>Listen \${SRVPORT}</code>	<code>Listen localhost:8080</code>
Indicate where to find the script files	<code>ScriptAlias /cgi-bin/ "\$ ↪{SRVROOT}/cgi-bin/"</code>	<code>ScriptAlias /cgi-bin/ ↪"C:/OSGeo4w/apps/qgis/ ↪bin/"</code>
Provide permissions on the script folder	<code><Directory "\${SRVROOT}/ ↪cgi-bin"> AllowOverride None Options None Require all granted </Directory></code>	<code><Directory "C:/OSGeo4w/ ↪apps/qgis/bin"> SetHandler cgi- ↪script AllowOverride None Options ExecCGI Require all granted </Directory></code>
Enable file extensions to use for script files. Uncomment and complete	<code>#AddHandler cgi-script . ↪cgi</code>	<code>AddHandler cgi-script . ↪cgi .exe</code>
Add more OSGeo4W custom configuration variables	<code># parse OSGeo4W apache_ ↪conf files IncludeOptional "C:/ ↪OSGeo4w/httpd.d/httpd_ ↪*.conf"</code>	<code># parse OSGeo4W apache_ ↪conf files IncludeOptional "C:/ ↪OSGeo4w/httpd.d/httpd_ ↪*.conf" SetEnv GDAL_DATA "C:/ ↪OSGeo4w/share/gdal" SetEnv QGIS_AUTH_DB_DIR_ ↪PATH "C:/OSGeo4w/apps/ ↪qgis/resources" # default QGIS project SetEnv QGIS_PROJECT_ ↪FILE "C:/Users/*Your_ ↪USERNAME*/qgis_ ↪projects/qgis-server- ↪tutorial-data/world. ↪qgs"</code>

5. Restart the Apache web server

```
> apache-restart.bat
```

6. Let's add a sample project. You can use your own, or one from [Training demo data](#). Make sure that you place it in the same folder that your `QGIS_PROJECT_FILE` environment variable is pointing to:

```
> "C:/Users/*Your USERNAME*/qgis_projects/qgis-server-tutorial-data/world.qgs"
```

7. Open browser window to testing a GetCapabilities request to QGIS Server. Replace `localhost:8080` with the IP and port you set to listen.

```
http://localhost:8080/cgi-bin/qgis_mapserv.fcgi.exe?SERVICE=WMS&VERSION=1.3.0&
→REQUEST=GetCapabilities
```

A XML file with the capabilities should be returned. Your server is ready to use.

2.3 Serve a project

Now that QGIS Server is installed and running, we just have to use it.

Obviously, we need a QGIS project to work on. Of course, you can fully customize your project by defining contact information, precise some restrictions on CRS or even exclude some layers. Everything you need to know about that is described later in [Configure your project](#).

But for now, we are going to use a simple project already configured and previously downloaded in `/home/qgis/projects/world.qgs`, as described above.

By opening the project and taking a quick look on layers, we know that 4 layers are currently available:

- airports
- places
- countries
- countries_shapeburst

You don't have to understand the full request for now but you may retrieve a map with some of the previous layers thanks to QGIS Server by doing something like this in your web browser to retrieve the *countries* layer:

- If you followed the above instructions to install an Apache HTTP Server:

```
http://qgis.demo/cgi-bin/qgis_mapserv.fcgi?MAP=/home/qgis/projects/world.qgs&
→LAYERS=countries&SERVICE=WMS&VERSION=1.3.0&REQUEST=GetMap&CRS=EPSG:4326&
→WIDTH=400&HEIGHT=200&BBOX=-90,-180,90,180
```

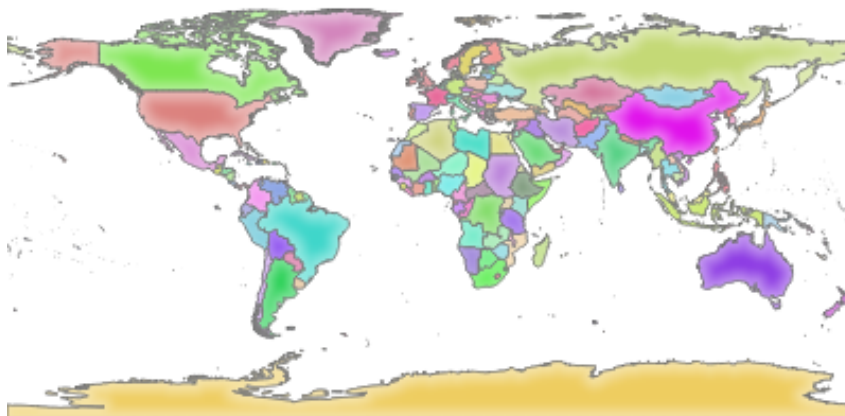
- If you followed the above instructions to install an NGINX HTTP Server:

```
http://qgis.demo/qgisserver?MAP=/home/qgis/projects/world.qgs&LAYERS=countries&
→SERVICE=WMS&VERSION=1.3.0&REQUEST=GetMap&CRS=EPSG:4326&WIDTH=400&HEIGHT=200&
→BBOX=-90,-180,90,180
```

- If you followed the instructions for Windows:

```
http://localhost:8080/cgi-bin/qgis_mapserv.fcgi.exe?SERVICE=WMS&
→LAYERS=countries&VERSION=1.3.0&REQUEST=GetMap&CRS=EPSG:4326&WIDTH=400&
→HEIGHT=200&BBOX=-90,-180,90,180
```

If you obtain the next image, then QGIS Server is running correctly:



Слика2.1: Server response to a basic GetMap request

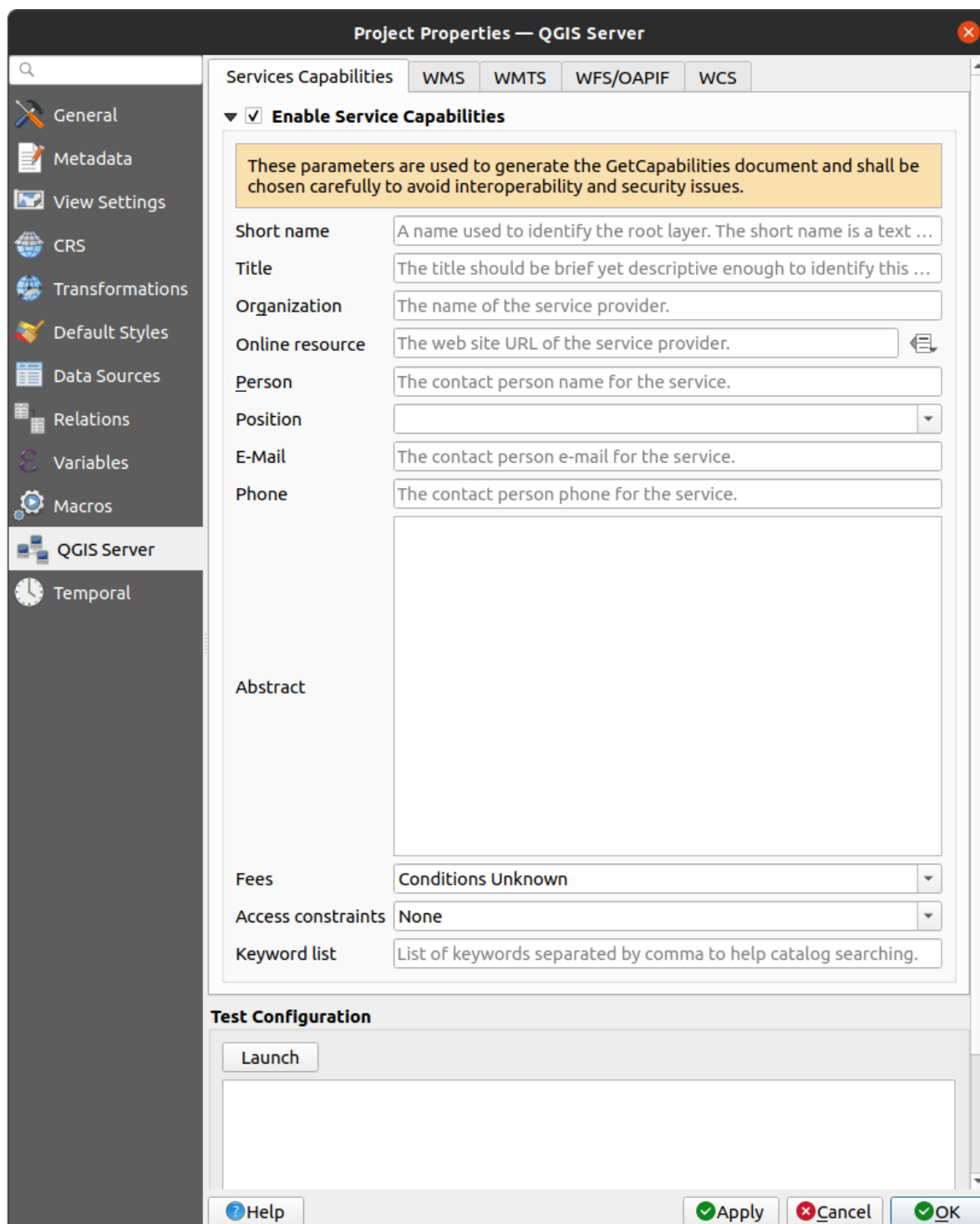
Note that you may define **QGIS_PROJECT_FILE** environment variable to use a project by default instead of giving a **MAP** parameter (see *Promenljive okruženja*).

Na primer sa spawn-fcgi:

```
export QGIS_PROJECT_FILE=/home/qgis/projects/world.qgs
spawn-fcgi -f /usr/lib/bin/cgi-bin/qgis_mapserv.fcgi \
-s /var/run/qgisserver.socket \
-U www-data -G www-data -n
```

2.4 Configure your project

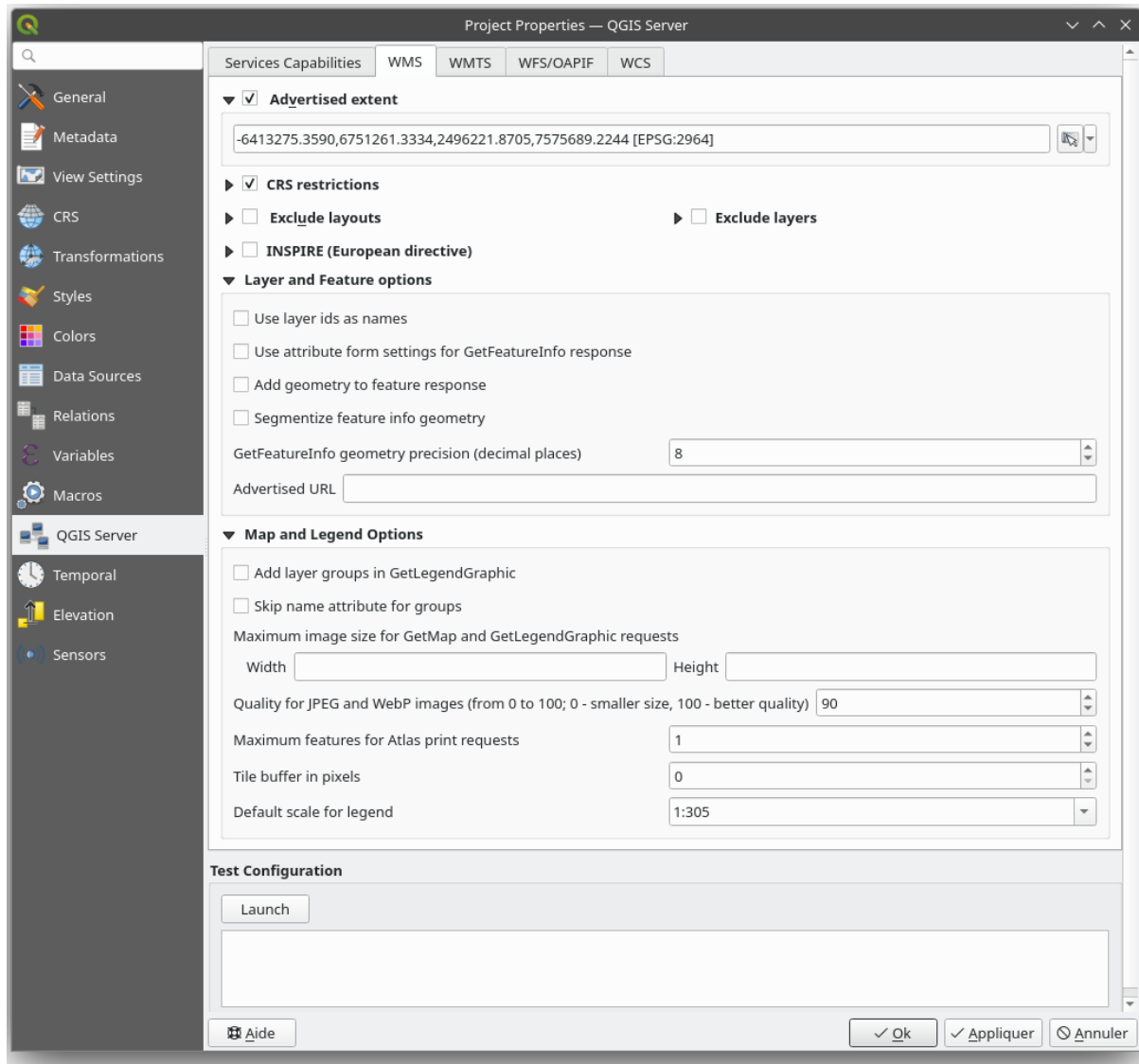
To provide a new QGIS Server WMS, WFS, OAPIF or WCS, you have to create a QGIS project file with some data or use one of your current projects. Define the colors and styles of the layers in QGIS and the project CRS, if not already defined. Then, go to the *QGIS Server* menu of the *Project ► Properties...* dialog and provide some information about the OWS in the *Service Capabilities* tab.



Слика2.2: Definitions for a QGIS Server WMS/WFS/WCS project

You have to *Enable Service Capabilities* first, if it is deactivated. This will appear in the GetCapabilities response of the WMS, WFS or WCS. If you don't check ☒ *Enable Service capabilities*, QGIS Server will use the information given in the `wms_metadata.xml` file located in the `cgi-bin` folder.

2.4.1 WMS capabilities



Слика2.3: Definitions in the WMS tab

In the *WMS* tab, you can define the options for the WMS capabilities.

- Check *Advertised extent* to define the extent advertised in the WMS *GetCapabilities* response. The spatial extent selector widget helps you enter the extent as a *xmin*, *xmax*, *ymin*, *ymax* text or pick it from the map canvas, layers, bookmarks...
- By checking ☒ *CRS restrictions*, you can restrict in which coordinate reference systems (CRS) QGIS Server will offer to render maps. It is recommended that you restrict the offered CRS as this reduces the size of the WMS *GetCapabilities* response. Use the  button below to select those CRSs from the Coordinate Reference System Selector, or click *Used* to add the CRSs used in the QGIS project to the list.
- If you have print layouts defined in your project, they will be listed in the *GetProjectSettings* response, and they can be used by the *GetPrint* request to create prints, using one of the print layouts as a template. This is a QGIS-specific extension to the WMS 1.3.0 specification. If you want to exclude any print layout from being published by the WMS, check ☒ *Exclude layouts* and click the  button below. Then, select a print layout from the *Select print layout* dialog in order to add it to the excluded layouts list.

- If you want to exclude any layer or layer group from being published by the WMS, check  *Exclude Layers* and click the  button below. This opens the *Select restricted layers and groups* dialog, which allows you to choose the layers and groups that you don't want to be published. Use the `Shift` or `Ctrl` key if you want to select multiple entries. It is recommended that you exclude from publishing the layers that you don't need as this reduces the size of the WMS GetCapabilities response which leads to faster loading times on the client side.

- *Layer and Feature Options*

You can receive requested GetFeatureInfo as plain text, XML and GML. The default is XML.

- If you check  *Use layer ids as name*, layer ids will be used to reference layers in the GetCapabilities response or GetMap `LAYERS` parameter. If not, layer name or short name if defined (see vectorservermenu) is used.

By default, layer names are used to expose layers through WMS. If multiple layers have the same name, they will be merged to a single WMS layer and cannot be requested individually. You need to take care of these layers being compatible with each other. Using the *Use layer ids as name* option ensures that multiple layers with the same name can be requested as individual layers.

- If you wish, you can check  *Add geometry to feature response*. This will include the bounding box for each feature in the GetFeatureInfo response. See also the `WITH_GEOMETRY` parameter.
- As many web clients can't display circular arcs in geometries you have the option to segmentize the geometry before sending it to the client in a GetFeatureInfo response. This allows such clients to still display a feature's geometry (e.g. for highlighting the feature). You need to check the  *Segmentize feature info geometry* to activate the option.
- You can also use the *GetFeatureInfo geometry precision* option to set the precision of the GetFeatureInfo geometry. This enables you to save bandwidth when you don't need the full precision.
- If one of your layers uses the Map Tip display (i.e. to show text using expressions) this will be listed inside the GetFeatureInfo output. If the layer uses a Value Map for one of its attributes, this information will also be shown in the GetFeatureInfo output.
- If you want QGIS Server to advertise specific request URLs in the WMS GetCapabilities response, enter the corresponding URL in the *Advertised URL* field.

- *Map and Legend Options*

- When a layer group is passed to GetLegendGraphic request, all of its leaf layers are added to the legend picture (however without the groups' labels). Check the  *Add layer groups in GetLegendGraphic* option if you want to also insert the layer groups (and subgroups) names into the layer tree, just like in QGIS Desktop legend.
- When QGIS project contains layer groups, they are listed in WMS capabilities document alongside with layers. If a group (its name as listed in capabilities) is included in WMS GetMap `LAYERS` parameter alongside with names of layers in that group, QGIS would duplicate the layers: once for the group and once for specific layer. If you check the  *Skip name attribute for groups* option, GetCapabilities will only return title attribute for the group but not its name attribute, making it impossible to include groups in list of layers of GetMap request.
- Furthermore, you can restrict the maximum size of the maps returned by the requests by entering the maximum width and height into the respective fields under *Maximum image size for GetMap and GetLegendGraphic requests*.
- You can change the *Quality for JPEG and WebP images* factor. The quality factor must be in the range 0 to 100. Specify 0 for maximum compression, 100 for no compression.
- You can change the limit for atlas features to be printed in one request by setting the *Maximum features for Atlas print requests* field.
- When QGIS Server is used in tiled mode (see `TILED` parameter), you can set the *Tile buffer in pixels*. The recommended value is the size of the largest symbol or line width in your QGIS project.

- Depending on whether the map uses a projected CRS or a geographic CRS and if there is no information to evaluate the map unit sized symbols, you can provide reference for size through either a *Default scale for legend* or *Default map units per mm in legend*.

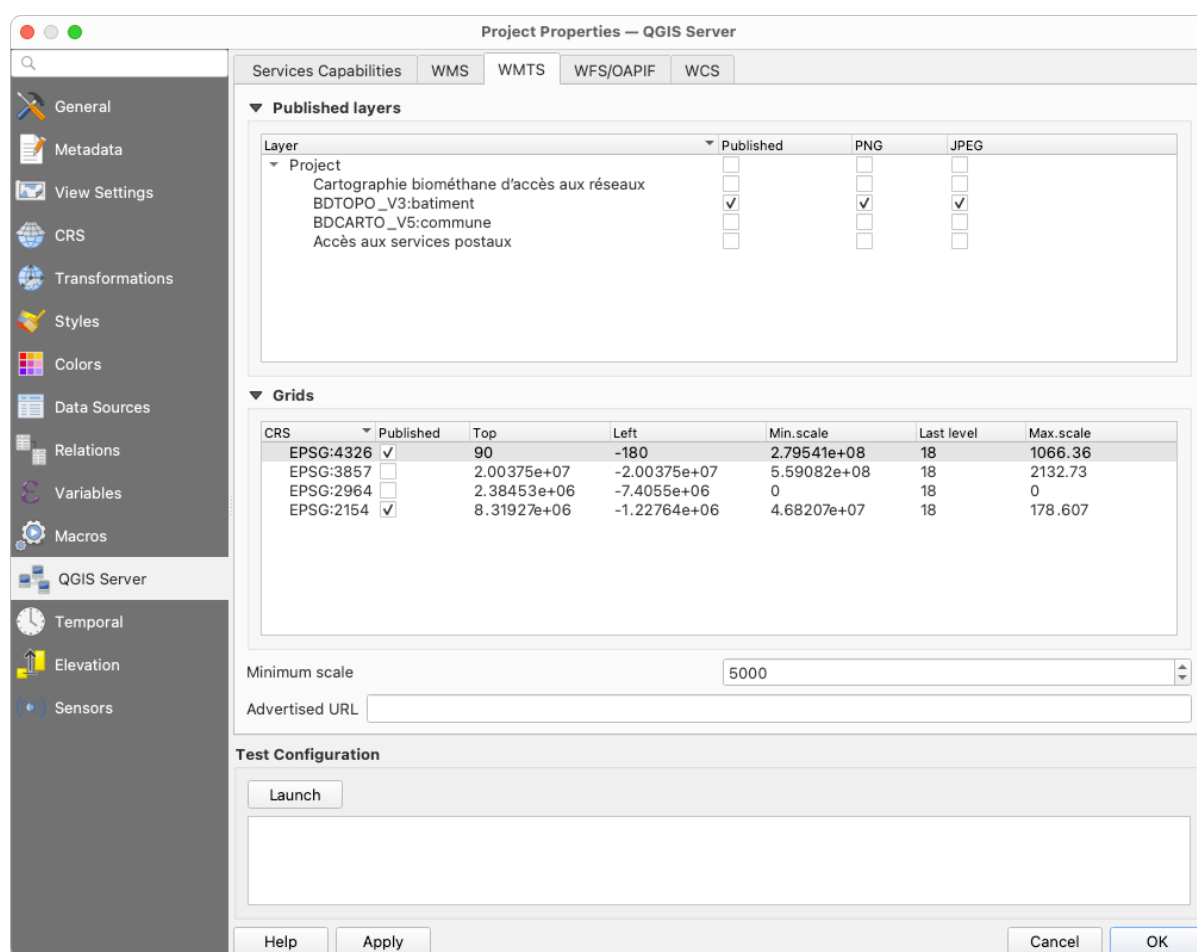
2.4.2 WMTS capabilities

In the *WMTS* tab you can select the layers you want to publish as WMTS and specify if you want to publish as PNG or JPEG.

Under *Grids*, for each *restricted CRS*, you can indicate whether the tile matrices should be published and configure their top-left corner, minimum and maximum scales and the last level of the tile matrices. Note that for EPSG:3857 and EPSG:4326 CRS, only the last level of the tile matrices can be edited.

You can also set a *Minimum scale* for the tiles display.

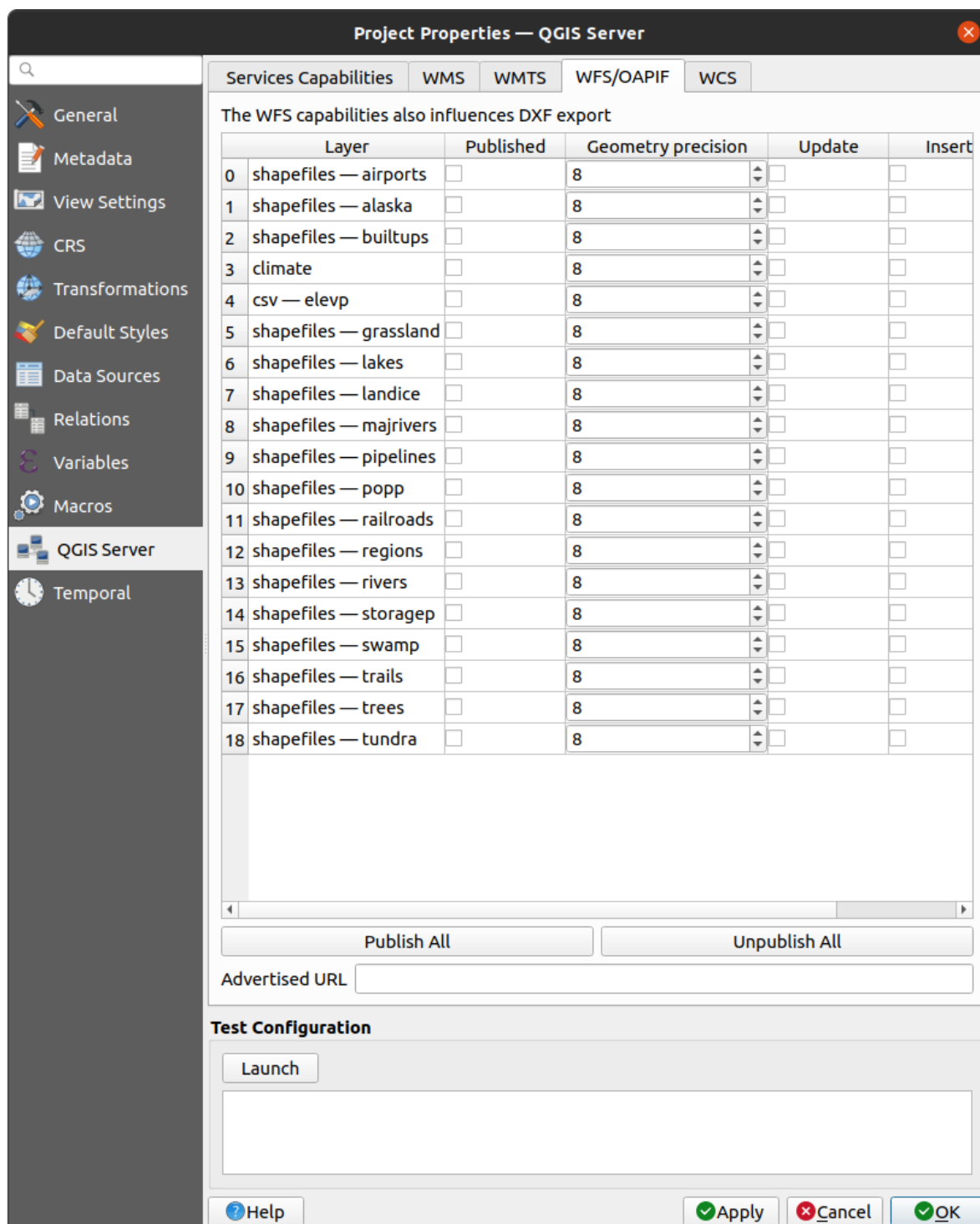
If you enter a URL in the *Advertised URL* field, QGIS Server will advertise this specific URL in the WMTS Get-Capabilities response.



Слика2.4: Definitions in the WMTS tab

2.4.3 WFS/OAPIF capabilities

In the *WFS/OAPIF* tab, you can select the layers you want to publish as WFS or OAPIF, and specify if they will allow update, insert and delete operations.



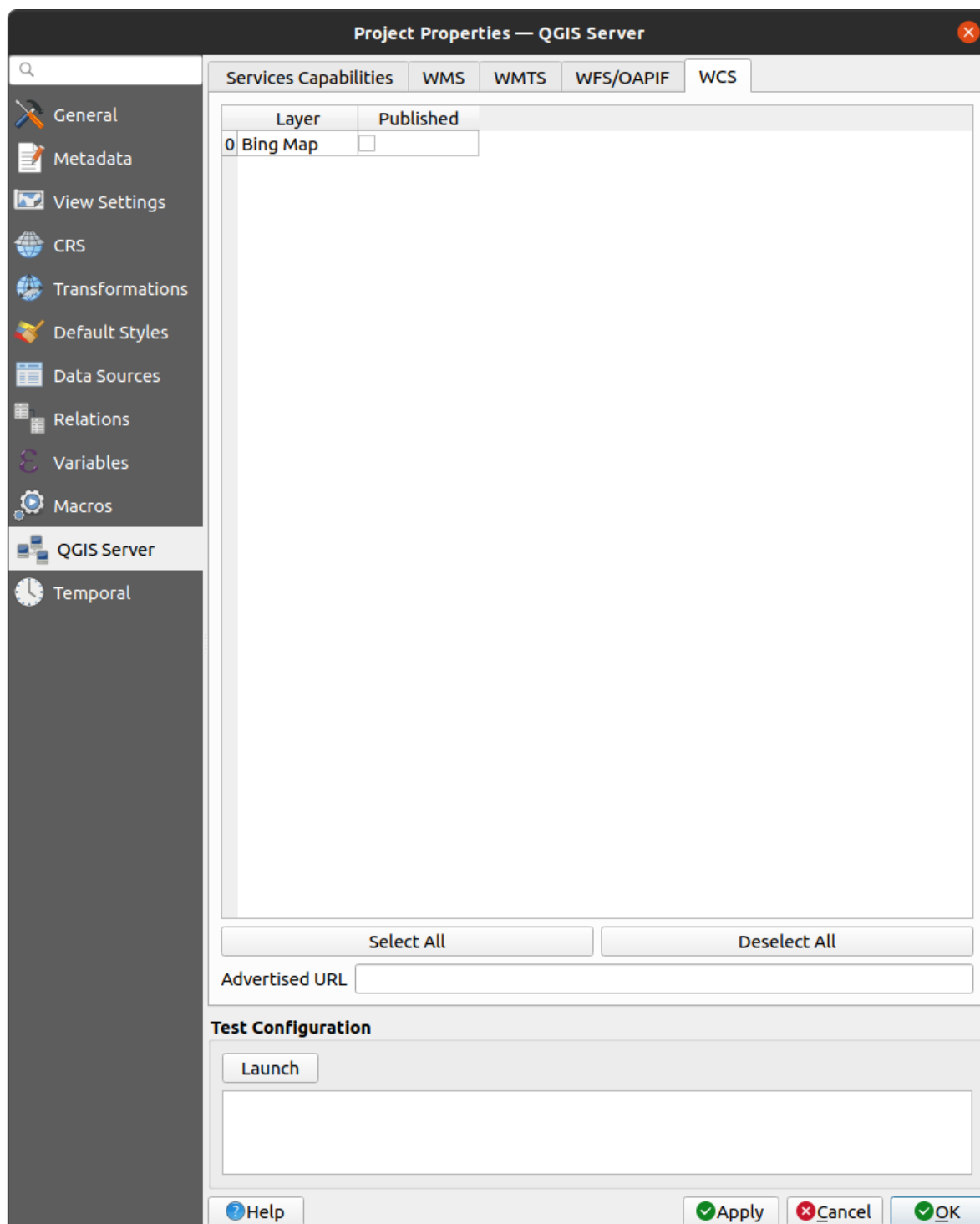
Слика2.5: Definitions in the WFS/OAPIF tab

If you enter a URL in the *Advertised URL* field, QGIS Server will advertise this specific URL in the WFS GetCapabilities response.

2.4.4 WCS capabilities

In the *WCS* tab, you can select the layers that you want to publish as WCS.

If you enter a URL in the *Advertised URL* field of the *WCS capabilities* section, QGIS Server will advertise this specific URL in the WCS GetCapabilities response.



Слика2.6: Definitions in the WCS tab

2.4.5 Fine tuning your OWS

Apart from configuring metadata individually for each layer, in QGIS you can fine tune your group of WMS layers. This is useful if you want the group to appear as a single entity in the WMS GetCapabilities, instead of exposing only its child layers. By setting metadata at the group level, you can provide a clearer description of related layers and improve the usability of your service. To configure metadata for a group of layers:

1. In the *Layers* panel, right-click the desired layer group and select *Set Group WMS Data*.
2. In the dialog that opens, fill in the information:

- a *Description*: the abstract of the layer group.
- a *Attribution*: the attribution of the layer group.
- a *Metadata URL*: the URL of a metadata document for the layer group.
- a *Legend URL*: the URL of a legend image for the layer group.

3. Optionally, you can check  *Compute TIME dimension from children* to have QGIS Server compute the TIME dimension for the group based on the TIME dimensions of its child layers.

For vector layers, the *Fields* tab of the *Layer ► Layer Properties* dialog allows you to define for each attribute if it will be published or not. By default, all the attributes are published by your WMS and WFS. If you don't want a specific attribute to be published, uncheck the appropriate checkbox in the *Configuration* column:

- *Do not expose in WFS*
- *Do not expose in WMS*

You can overlay watermarks over the maps produced by your WMS by adding text annotations or SVG annotations to the project file. See the *sec_annotations* section for instructions on creating annotations. For annotations to be displayed as watermarks on the WMS output, the *Fixed map position* checkbox in the *Annotation text* dialog must be unchecked. This can be accessed by double clicking the annotation while one of the annotation tools is active. For SVG annotations, you will need either to set the project to save absolute paths (in the *General* menu of the *Project ► Properties...* dialog) or to manually modify the path to the SVG image so that it represents a valid relative path.

2.5 Integration with third parties

QGIS Server provides standard OGC web services like [WMS](#), [WFS](#), [etc.](#) thus it can be used by a wide variety of end user tools.

2.5.1 Integration with QGIS Desktop

QGIS Desktop is the map designer where QGIS Server is the map server. The maps or QGIS projects will be served by the QGIS Server to provide OGC standards. These QGIS projects can either be files or entries in a database (by using *Project ► Save to ► PostgreSQL* in QGIS Desktop).

Furthermore, dedicated update workflow must be established to refresh a project used by a QGIS Server (ie. copy project files into server location and restart QGIS Server). For now, automated processes (as server reloading over message queue service) are not implemented yet.

2.5.2 Integration with MapProxy

[MapProxy](#) is a tile cache server and as it can read and serve any WMS/WMTS map server, it can be directly connected to QGIS server web services and improve end user experience.

2.5.3 Integration with QWC2

[QWC2](#) is a responsive web application dedicated to QGIS Server. It helps you to build a highly customized map viewer with layer selection, feature info, etc.. Also many plugins are available like authentication or print service, the full list is available in this [repository](#).

QGIS Server je u stanju da opslužuje podatke prema standardnim protokolima kako ih opisuje **Open Geospatial Consortium (OGC)**:

- WMS 1.1.1 i 1.3.0
- WFS 1.0.0 i 1.1.0
- OGC API - Features (WFS3)
- WCS 1.0.0 i 1.1.1
- WMTS 1.0.0

Pored originalnog standarda podržani su dodatni parametri i zahtevi proizvođača koji uveliko poboljšavaju mogućnosti prilagođavanja njegovog ponašanja zahvaljujući mehanizmu za iscrtavanje QGIS-a.

3.1 Osnove

Ovaj odeljak opisuje pojmove i parametre koje servisi međusobno dele. Neki od njih su standardni i definisani u OGC specifikacijama, dok su drugi veoma specifični za QGIS Server.

Standardni pojmovi:

Pojam	Opis
<i>SERVICE</i>	Naziv servisa
<i>REQUEST</i>	Naziv zahteva

Pojmovi specifični za QGIS Server:

Pojam	Opis
<i>MAP</i>	QGIS projektna datoteka
<i>FILE_NAME</i>	Naziv preuzete datoteke
<i>Kratak naziv</i>	Definicija kratkog naziva

3.1.1 SERVICE

Ovaj standardni parametar omogućava zadavanje naziva servisa koji se koristi za određeni *zahtev* i mora biti formiran kao `SERVICE=NAME`.

Primer URL-a za **WMS** servis:

```
http://localhost/qgisserver?
SERVICE=WMS
&...
```

Белешка

Nije dostupno za servise zasnovane na REST-u kao što je *WFS3 (OGC API Features)*.

3.1.2 REQUEST

Ovaj standardni parametar omogućava zadavanje naziva zahteva koji se izvršava za određeni *servis* i mora biti formiran kao `REQUEST=RequestName`.

Primer URL-a za zahtev **GetCapabilities**:

```
http://localhost/qgisserver?
REQUEST=GetCapabilities
&...
```

Белешка

Nije dostupno za servise zasnovane na REST-u kao što je *WFS3 (OGC API Features)*.

3.1.3 MAP

Ovaj parametar specifičan za QGIS Server omogućava definisanje datoteke QGIS projekta koja se koristi. Može biti apsolutna putanja ili putanja relativna u odnosu na lokaciju izvršne datoteke servera `qgis_mapserv.fcgi`. `MAP` je podrazumevano obavezan jer je zahtevu potreban QGIS projekat da bi zapravo radio. Međutim, promenljiva okruženja **QGIS_PROJECT_FILE** može se koristiti za definisanje podrazumevanog QGIS projekta. U tom konkretnom slučaju `MAP` više nije obavezan parametar. Za više informacija pogledajte poglavlje *Napredna konfiguracija*.

Primer URL-a:

```
http://localhost/qgisserver?
MAP=/tmp/QGIS-Training-Data/exercise_data/qgis-server-tutorial-data/world.qgs
&...
```

3.1.4 FILE_NAME

Ako je ovaj parametar specifičan za QGIS Server postavljen, odgovor servera biće poslat klijentu kao priložena datoteka sa zadatim nazivom datoteke.

Primer URL-a za čuvanje XML **GetCapabilities** dokumenta:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetCapabilities
&FILE_NAME=wms_capabilities.xml
&...
```

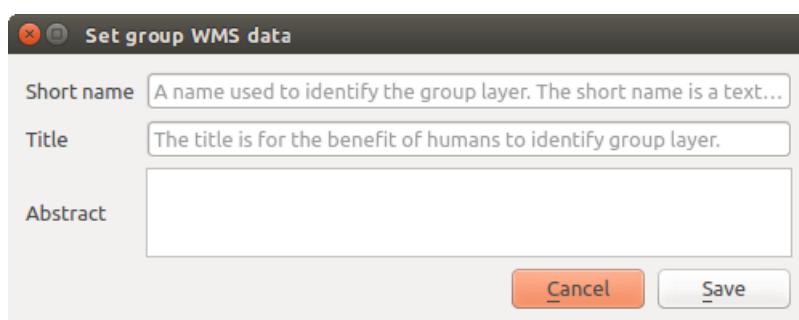
Белешка

Nije dostupno za servise zasnovane na REST-u kao što je *WFS3 (OGC API Features)*.

3.1.5 Kratak naziv

Više elemenata ima i **kratak naziv** i **naslov**. Kratak naziv je tekstualna niska koja se koristi za komunikaciju mašina-mašina, dok je naslov za potrebe ljudi. Na primer, skup podataka može imati opisni naslov „*Maksimalna temperatura atmosfere*“ i biti zahtevan pomoću skraćenog kratkog naziva „*ATMAX*“. Naslov, kratak naziv i apstrakt možete postaviti za:

- **Slojeve:** kliknite desnim tasterom na sloj i izaberite *Svojstva... ► QGIS Server ► Opis*.
- **Grupe:** kliknite desnim tasterom na grupu i izaberite *Postavi WMS podatke grupe*
- **Projekat:** idite na *Projekat ► Svojstva... ► QGIS Server ► Mogućnosti servisa*.



Слика3.1: Дијалог Postavi WMS podatke grupe

Dakle, kratak naziv može se koristiti za identifikaciju ovih stavki pri radu sa QGIS Serverom. Na primer, sa standardnim parametrom `LAYERS`:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&LAYERS=shortname1,shortname2
&...
```

3.2 Web Map Service (WMS)

WMS standardi **1.1.1** i **1.3.0** implementirani u QGIS Serveru pružaju HTTP interfejs za zahtevanje slika karte ili legende generisanih iz QGIS projekta. Tipičan WMS zahtev definiše QGIS projekat koji se koristi, slojeve za iscrtavanje, kao i format slike koji se generiše. Dostupna je i osnovna podrška za **Styled Layer Descriptor (SLD)**.

Specifikacije:

- [WMS 1.1.1](#)
- [WMS 1.3.0](#)
- [SLD 1.1.0 WMS profile](#)

Standardni zahtevi koje pruža QGIS Server:

Zahtev	Opis
<i>GetCapabilities</i>	Vraća XML metapodatke sa informacijama o serveru
<i>GetMap</i>	Vraća kartu
<i>GetFeatureInfo</i>	Preuzima podatke (geometriju i vrednosti) za poziciju piksela
<i>GetLegendGraphic</i>	Vraća simbole legende
<i>GetStyle(s)</i>	Vraća XML dokument sa opisom stila u SLD-u
<i>DescribeLayer</i>	Vraća informacije o dostupnosti WFS-a i WCS-a za vektorske odnosno rasterske slojeve

Zahtevi specifični za QGIS Server:

Zahtev	Opis
<i>GetPrint</i>	Vraća QGIS prikaz
<i>GetProjectSettings</i>	Vraća specifične informacije o QGIS Serveru
<i>GetSchemaExtension</i>	Vraća XML metapodatke o opcionim proširenim mogućnostima

3.2.1 GetCapabilities

Standardni parametri za zahtev **GetCapabilities** prema OGC WMS 1.1.1 i 1.3.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetCapabilities)
<i>VERSION</i>	Ne	Verzija servisa

Zahtev **GetCapabilities** podržava i sledeće parametre specifične za QGIS Server:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetCapabilities
```

3.2.2 GetMap

Standardni parametri za zahtev **GetMap** prema OGC WMS 1.1.1 i 1.3.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetMap)
<i>VERSION</i>	Da	Verzija servisa
<i>LAYERS</i>	Ne	Slojevi za prikaz
<i>STYLES</i>	Ne	Stil slojeva
<i>SRS / CRS</i>	Da	Koordinatni referentni sistem
<i>BBOX</i>	Da	Obuhvat karte
<i>WIDTH</i>	Da	Širina slike u pikselima

наставак на следећој страни

Табела 3.1 – настављено са претходне стране

Parametar	Obavezno	Opis
<i>HEIGHT</i>	Da	Visina slike u pikselima
<i>FORMAT</i>	Ne	Format slike
<i>TRANSPARENT</i>	Ne	Prozirna pozadina
SLD	Ne	URL SLD-a koji se koristi za stilizovanje
SLD_BODY	Ne	Ugrađeni SLD (XML) koji se koristi za stilizovanje

Pored standardnih, QGIS Server podržava *obeležavanje*, *spoljne WMS slojeve*, kao i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>BGCOLOR</i>	Ne	Zadaje boju pozadine
<i>DPI</i>	Ne	Zadaje izlaznu rezoluciju
<i>IMAGE_QUALITY</i>	Ne	JPEG kompresija
<i>OPACITIES</i>	Ne	Neprozirnost sloja ili grupe
<i>FILTER</i>	Ne	Podskup objekata
<i>SELECTION</i>	Ne	Istakni objekte
FILE_NAME	Ne	Naziv preuzete datoteke
		Samo za <code>FORMAT=application/dxf</code>
<i>FORMAT_OPTIONS</i>	Ne	Opcije zadatog formata datoteke
		Samo za <code>FORMAT=application/dxf</code>
<i>TILED</i>	Ne	Rad u režimu pločica

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetMap
&MAP=/home/qgis/projects/world.qgs
&LAYERS=mylayer1,mylayer2,mylayer3
&STYLES=style1,default,style3
&OPACITIES=125,200,125
&CRS=EPSG:4326
&WIDTH=400
&HEIGHT=400
&FORMAT=image/png
&TRANSPARENT=TRUE
&DPI=300
&TILED=TRUE
```

VERSION

Ovaj parametar omogućava zadavanje verzije servisa koja se koristi. Dostupne vrednosti za parametar `VERSION` su:

- 1.1.1
- 1.3.0

U zavisnosti od broja verzije, treba očekivati manje razlike, kako je objašnjeno u nastavku za sledeće parametre:

- CRS / SRS
- BBOX

LAYERS

Ovaj parametar omogućava zadavanje slojeva koji se prikazuju na karti. Nazivi moraju biti razdvojeni zarezom.

Pored toga, QGIS Server je uveo neke opcije za izbor slojeva po:

- ID-ju sloja: opcija projekta koja omogućava izbor slojeva po njihovom ID-ju nalazi se u kartici *QGIS Server* ► *WMS* dijaloga *Projekat* ► *Svojstva...*. Označite polje *Koristi ID-jeve slojeva kao nazive* da biste aktivirali ovu opciju.
- po *kratkim nazivu*

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&LAYERS=mylayerid1,mylayerid2
&...
```

STYLES

Ovaj parametar se može koristiti za zadavanje stila sloja u koraku iscrtavanja. Stilovi moraju biti razdvojeni zarezom. Naziv podrazumevanog stila je `default`.

SRS / CRS

Ovaj parametar omogućava naznačavanje prostornog referentnog sistema izlazne karte u WMS **1.1.1** i mora biti formiran kao `EPSG:XXXX`. Imajte u vidu da je `CRS` takođe podržan ako je trenutna verzija **1.1.1**.

Za WMS **1.3.0** parametar `CRS` je poželjniji, ali je i `SRS` podržan.

Imajte u vidu da, ako su u zahtevu naznačena oba parametra `CRS` i `SRS`, presudna je trenutna verzija naznačena u parametru `VERSION`.

U sledećem slučaju, parametar `SRS` se zadržava bez obzira na parametar `VERSION`, jer `CRS` nije naznačen:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&SRS=EPSG:2854
&...
```

U sledećem slučaju, parametar `SRS` se zadržava umesto `CRS` zbog parametra `VERSION`:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.1.1
&CRS=EPSG:4326
&SRS=EPSG:2854
&...
```

U sledećem slučaju, parametar `CRS` se zadržava umesto `SRS` zbog parametra `VERSION`:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&CRS=EPSG:4326
&SRS=EPSG:2854
&...
```

BBOX

Ovaj parametar omogućava zadavanje obuhvata karte u jedinicama prema tekućem CRS-u. Koordinate moraju biti razdvojene zarezom.

Parametar BBOX se formira kao `min_a,min_b,max_a,max_b`, ali se definicija osa `a` i `b` razlikuje u zavisnosti od trenutnog parametra `VERSION`:

- u WMS **1.1.1**, redosled osa je uvek istok/sever
- u WMS **1.3.0**, redosled osa zavisi od autoriteta CRS-a

Na primer, u slučaju EPSG:4326 i WMS **1.1.1**, `a` je geografska dužina (istok), `b` geografska širina (sever), što daje zahtev poput:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.1.1
&SRS=epsg:4326
&BBOX=-180,-90,180,90
&...
```

Ali u slučaju WMS **1.3.0**, redosled osa definisan u EPSG bazi podataka je sever/istok, pa je `a` geografska širina, `b` geografska dužina:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&CRS=epsg:4326
&BBOX=-90,-180,90,180
&...
```

WIDTH

Ovaj parametar omogućava zadavanje širine izlazne slike u pikselima.

HEIGHT

Ovaj parametar omogućava zadavanje visine izlazne slike u pikselima.

FORMAT

Ovaj parametar se može koristiti za zadavanje formata slike karte. Dostupne vrednosti su:

- jpg
- jpeg
- image/jpeg
- image/png
- image/png; mode=1bit
- image/png; mode=8bit
- image/png; mode=16bit
- image/webp
- application/dxf: samo slojevi koji imaju pravo čitanja u WFS servisu izvoze se u DXF formatu
- application/pdf

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS&VERSION=1.3.0
&REQUEST=GetMap
&FORMAT=application/dxf
&LAYERS=Haltungen, Normschacht, Spezialbauwerke
&CRS=EPSG%3A21781
&BBOX=696136.28844801,245797.12108743,696318.91114315,245939.25832905
&WIDTH=1042
&HEIGHT=811
&FORMAT_OPTIONS=MODE:SYMBOLLAYERSYMBOLGY;SCALE:250
&FILE_NAME=plan.dxf
```

TRANSPARENT

Ovaj logički parametar se može koristiti za zadavanje prozirnosti pozadine. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

Međutim, ovaj parametar se zanemaruje ako je format slike naznačen sa `FORMAT` različit od PNG.

BGCOLOR

Ovaj parametar omogućava naznačavanje boje pozadine slike karte. Međutim, ne može se kombinovati sa parametrom `TRANSPARENT` u slučaju PNG slika (prozirnost ima prioritet). Boja može biti u doslovnom ili heksadecimalnom zapisu.

Primer URL-a sa doslovnim zapisom:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&BGCOLOR=green
&...
```

Primer URL-a sa heksadecimalnim zapisom:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&BGCOLOR=0x00FF00
&...
```

DPI

Ovaj parametar se može koristiti za zadavanje željene izlazne rezolucije.

IMAGE_QUALITY

Ovaj parametar se koristi samo za JPEG slike. Podrazumevano je JPEG kompresija -1.

Podrazumevanu vrednost možete promeniti po QGIS projektu u meniju *OWS Server ► WMS mogućnosti* dijaloga *Projekat ► Svojstva...*. Ako želite da je zamenite u zahtevu `GetMap`, to možete uraditi pomoću parametra `IMAGE_QUALITY`.

OPACITIES

Lista vrednosti neprozirnosti razdvojenih zarezima. Neprozirnost se može podesiti na nivou sloja ili grupe. Dozvoljene vrednosti su u opsegu od 0 (potpuno prozirno) do 255 (potpuno neprozirno).

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&WIDTH=400
&HEIGHT=200
&CRS=EPSG:4326
&LAYERS=countries,places
&BBOX=42,-6,52,15
&OPACITIES=255,0
```



Слика3.2: Лево OPACITIES=255, 0 а десно OPACITIES=255, 255

FILTER

Podskup slojeva može se izabrati parametrom `FILTER`. Sintaksa je u osnovi ista kao za QGIS nisku podskupa. Međutim, postoje neka ograničenja radi izbegavanja SQL injekcija u baze podataka preko QGIS Servera. Ako se u parametru pronade opasna niska, QGIS Server će vratiti sledeću grešku:

```
<ServiceExceptionReport>
  <ServiceException code="Security">The filter string XXXXXXXXXX has been rejected
  because of security reasons.
  Note: Text strings have to be enclosed in single or double quotes. A space
  between each word / special character is mandatory.
  Allowed Keywords and special characters are IS, NOT, NULL, AND, OR, IN, =, <, <=, >, >=, !=,
  ', ', (, ), DMETAPHONE, SOUNDEX.
  Not allowed are semicolons in the filter expression.</ServiceException>
</ServiceExceptionReport>
```

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&VERSION=1.3.0
&WIDTH=400
&HEIGHT=300
&CRS=EPSG:4326
&BBOX=41,-6,52,10
&LAYERS=countries_shapeburst,countries,places
&FILTER=countries_shapeburst,countries:"name" = 'France';places: "name" = 'Paris'
```



Слика3.3: Odgovor servera na GetMap zahtev sa parametrom FILTER

U ovom primeru, isti filter "name" = 'France' primenjuje se na slojeve countries i countries_shapeburst, dok se filter "name" = 'Paris' primenjuje samo na places.

Белешка

Moguće je vršiti pretrage atributa preko GetFeatureInfo i izostaviti parametar X/Y ako je prisutan FILTER. QGIS Server tada vraća informacije o objektima koji se podudaraju i generiše kombinovani granični pravougaonik u XML izlazu.

SELECTION

Parametar SELECTION može istaći objekte sa jednog ili više slojeva. Vektorski objekti mogu se izabrati prosleđivanjem lista ID-jeva objekata razdvojenih zarezima.

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&LAYERS=mylayer1,mylayer2
&SELECTION=mylayer1:3,6,9;mylayer2:1,5,6
&...
```

Sledeća slika prikazuje odgovor na GetMap zahtev pomoću opcije SELECTION, npr. <http://myserver.com/...&SELECTION=countries:171,65>.

Pošto ti ID-jevi objekata u izvornom skupu podataka odgovaraju **Francuskoj** i **Rumuniji**, oni su istaknuti žutom bojom.



Слика3.4: Odgovor servera na GetMap zahtev sa parametrom SELECTION

FORMAT_OPTIONS

Ovaj parametar se može koristiti za zadavanje opcija izabranog formata. Samo za `FORMAT=application/dxf` u GetMap zahtevu. Uzima listu parova ključ:vrednost razdvojenih tačkom i zarezom:

- **SCALE:** koristi se za pravila simbologije, filtere i stilove (ne za stvarno skaliranje podataka - podaci ostaju u izvornoj razmeri).
- **MODE:** odgovara opcijama izvoza koje nudi dijalog za izvoz DXF-a u QGIS Desktopu. Moguće vrednosti su `NOSYMBOLLOGY`, `FEATURESYMBOLLOGY` i `SYMBOLLAYERSYMBOLLOGY`.
- **LAYERATTRIBUTES:** zadaje polje ili, u slučaju više slojeva, listu polja razdvojenih zarezima koja sadrže vrednosti za nazive DXF slojeva - ako nije zadato, koriste se izvorni nazivi QGIS slojeva.
- **USE_TITLE_AS_LAYERNAME:** ako je uključeno, naslov sloja koristiće se kao naziv sloja.
- **CODEC:** zadaje kodek koji se koristi za kodiranje. Podrazumevano je `ISO-8859-1`; važeće vrednosti potražite u dijalogu za izvoz DXF-a u QGIS desktopu.
- **NO_MTEXT:** Koristi `TEXT` umesto `MTEXT` za natpise.
- **FORCE_2D:** Prisili 2D izlaz. Ovo je potrebno za širinu polilinije.

TILED

Iz razloga performansi, QGIS Server se može koristiti u režimu pločica. U tom režimu klijent zahteva nekoliko malih pločica fiksne veličine i sastavlja ih u celu kartu. Pri tome simboli na granici ili blizu granice između dve pločice mogu izgledati odsečeno, jer su prisutni samo na jednoj od pločica.

Postavite parametar `TILED` na `TRUE` da biste QGIS Serveru zadali rad u režimu *pločica* i primenu *Bafera pločice* podešenog u QGIS projektu (pogledajte *Configure your project*).

Kada je `TILED` postavljeno na `TRUE` i kada je u QGIS projektu podešen bafer pločice različit od nule, objekti izvan obuhvata pločice se iscrtavaju kako bi se izbegli odsečeni simboli na granicama pločica.

`TILED` je podrazumevano `FALSE`.

3.2.3 GetFeatureInfo

Standardni parametri za zahtev **GetFeatureInfo** prema OGC WMS 1.1.1 i 1.3.0 specifikacijama:

Parametar	Obavezno	Opis
<code>SERVICE</code>	Da	Naziv servisa (WMS)
<code>REQUEST</code>	Da	Naziv zahteva (GetFeatureInfo)
<code>VERSION</code>	Ne	Verzija servisa
<code>QUERY_LAYERS</code>	Da	Slojevi nad kojima se vrši upit
<code>LAYERS</code>	Da	Slojevi za prikaz (isto kao <code>QUERY_LAYERS</code>)
<code>STYLES</code>	Ne	Stil slojeva
<code>SRS / CRS</code>	Da	Koordinatni referentni sistem
<code>BBOX</code>	Ne	Obuhvat karte
<code>WIDTH</code>	Da	Širina slike u pikselima
<code>HEIGHT</code>	Da	Visina slike u pikselima
<code>TRANSPARENT</code>	Ne	Prozirna pozadina
<code>INFO_FORMAT</code>	Ne	Izlazni format
<code>FEATURE_COUNT</code>	Ne	Maksimalan broj objekata koji se vraćaju
<code>I</code>	Ne	Kolona piksela tačke nad kojom se vrši upit
<code>X</code>	Ne	Isto kao parametar <code>I</code> , ali u WMS 1.1.1
<code>J</code>	Ne	Red piksela tačke nad kojom se vrši upit
<code>Y</code>	Ne	Isto kao parametar <code>J</code> , ali u WMS 1.1.1
<code>WMS_PRECISION</code>	Ne	Preciznost (broj cifara) koja se koristi pri vraćanju geometrije (pogledajte <i>kako dodati geometriju u odgovor objekta</i>). Podrazumevana vrednost je <code>-1</code> , što znači da se koristi preciznost definisana u projektu.

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<code>MAP</code>	Da	QGIS projektna datoteka
<code>FILTER</code>	Ne	Podskup objekata
<code>FI_POINT_TOLERANCE</code>	Ne	Tolerancija u pikselima za tačkaste slojeve
<code>FI_LINE_TOLERANCE</code>	Ne	Tolerancija u pikselima za linijske slojeve
<code>FI_POLYGON_TOLERANCE</code>	Ne	Tolerancija u pikselima za poligonske slojeve
<code>FILTER_GEOM</code>	Ne	Filtriranje geometrije
<code>WITH_DISPLAY_NAME</code>	Ne	Dodaj naziv za prikaz objekta u izlaz
<code>WITH_MAPTIP</code>	Ne	Dodaj savete na karti u izlaz
<code>WITH_GEOMETRY</code>	Ne	Dodaj geometriju u izlaz

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetMap
&MAP=/home/qgis/projects/world.qgs
&LAYERS=mylayer1,mylayer2,mylayer3
&CRS=EPSG:4326
&WIDTH=400
&HEIGHT=400
&INFO_FORMAT=text/xml
&TRANSPARENT=TRUE
&QUERY_LAYERS=mylayer1
&FEATURE_COUNT=3
&I=250
&J=250
```

INFO_FORMAT

Ovaj parametar se može koristiti za zadavanje formata rezultata. Dostupne vrednosti su:

- text/xml
- text/html
- text/plain
- application/vnd.ogc.gml
- application/json

QUERY_LAYERS

Ovaj parametar zadaje slojeve koji se prikazuju na karti. Nazivi se razdvajaju zarezom.

Pored toga, QGIS Server uvodi opcije za izbor slojeva po:

- kratkom nazivu
- ID-ju sloja

Više informacija potražite u parametru `LAYERS` definisanom u *GetMap*.

FEATURE_COUNT

Ovaj parametar zadaje maksimalan broj objekata po sloju koji se vraćaju. Na primer, ako je `QUERY_LAYERS` postavljeno na `layer1, layer2` a `FEATURE_COUNT` na 3, tada će biti vraćeno najviše 3 objekta sa `layer1`. Isto tako, najviše 3 objekta biće vraćeno sa `layer2`.

Podrazumevano se vraća samo 1 objekat po sloju.

I

Ovaj parametar, definisan u WMS 1.3.0, omogućava vam da zadate kolonu piksela tačke upita.

X

Isti parametar kao `I`, ali definisan u WMS 1.1.1.

J

Ovaj parametar, definisan u WMS 1.3.0, omogućava vam da zadate red piksela tačke upita.

Y

Isti parametar kao J, ali definisan u WMS 1.1.1.

FI_POINT_TOLERANCE

Ovaj parametar zadaje toleranciju u pikselima za tačkaste slojeve.

FI_LINE_TOLERANCE

Ovaj parametar zadaje toleranciju u pikselima za linijske slojeve.

FI_POLYGON_TOLERANCE

Ovaj parametar zadaje toleranciju u pikselima za poligonske slojeve.

FILTER_GEOM

Ovaj parametar zadaje WKT geometriju sa kojom objekti moraju da se preseku.

WITH_DISPLAY_NAME

Ovaj parametar zadaje da li se naziv za prikaz objekta dodaje u izlaz.

Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

WITH_MAPTIP

Ovaj parametar zadaje da li se saveti na karti dodaju u izlaz.

Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE
- HTML_FI_ONLY_MAPTIP: kao TRUE, s tom razlikom da HTML odgovor na zahtev za informacije o objektu sadrži samo savet na karti. Time se dobija potpuna kontrola nad HTML odgovorom pomoću npr. ugrađenog uređivača saveta na karti za sloj.

WITH_GEOMETRY

Ovaj parametar zadaje da li se geometrije dodaju u izlaz. Da biste koristili ovu mogućnost, prvo morate omogućiti opciju *Dodaj geometriju u odgovor objekta* u QGIS projektu. Pogledajte *Podesite svoj projekat*.

Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

3.2.4 GetLegendGraphic

Standardni parametri za zahtev **GetLegendGraphic** prema OGC WMS 1.1.1 i 1.3.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetLegendGraphic)
<i>VERSION</i>	Ne	Verzija servisa
<i>LAYERS</i>	Da	Slojevi za prikaz
<i>STYLES</i>	Ne	Stil slojeva
<i>SRS / CRS</i>	Ne	Koordinatni referentni sistem
<i>BBOX</i>	Ne	Obuhvat karte
<i>WIDTH</i>	Ne	Širina slike u pikselima
<i>HEIGHT</i>	Ne	Visina slike u pikselima
<i>FORMAT</i>	Ne	Format legende
<i>TRANSPARENT</i>	Ne	Prozirna pozadina

Pored standardnih, QGIS Server podržava dodatne parametre za promenu veličine elemenata legende ili svojstava fonta za naslove slojeva i natpise stavki:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>SRCWIDTH</i>	Ne	Širina karte
<i>SRCHEIGHT</i>	Ne	Visina karte
<i>SHOWFEATURECOUNT</i>	Ne	Dodaj broj objekata
<i>RULE</i>	Ne	Simbol pravila koji se iscrtava
<i>RULELABEL</i>	Ne	Iscrtavanje natpisa stavki
<i>BOXSPACE</i>	Ne	Razmak između okvira legende i sadržaja (mm)
<i>LAYERSPACE</i>	Ne	Vertikalni razmak između slojeva (mm)
<i>LAYERTITLESPACE</i>	Ne	Vertikalni razmak između naslova sloja i stavki (mm)
<i>SYMBOLSPACE</i>	Ne	Vertikalni razmak između simbola i stavki (mm)
<i>ICONLABELSPACE</i>	Ne	Horizontalni razmak između simbola i natpisa (mm)
<i>SYMBOLWIDTH</i>	Ne	Širina pregleda simbola (mm)
<i>SYMBOLHEIGHT</i>	Ne	Visina pregleda simbola (mm)
<i>LAYERTITLE</i>	Ne	Iscrtavanje naslova sloja
<i>LAYERFONTFAMILY</i>	Ne	Familija fonta sloja
<i>LAYERFONTBOLD</i>	Ne	Podebljano iscrtavanje naslova sloja
<i>LAYERFONTSIZE</i>	Ne	Veličina fonta naslova sloja (pt)
<i>LAYERFONTITALIC</i>	Ne	Kurzivno iscrtavanje naslova sloja
<i>LAYERFONTCOLOR</i>	Ne	Boja naslova sloja
<i>ITEMFONTFAMILY</i>	Ne	Familija fonta stavke
<i>ITEMFONTBOLD</i>	Ne	Podebljano iscrtavanje natpisa stavke
<i>ITEMFONTSIZE</i>	Ne	Veličina fonta natpisa stavke (pt)
<i>ITEMFONTITALIC</i>	Ne	Kurzivno iscrtavanje natpisa stavke
<i>ITEMFONTCOLOR</i>	Ne	Boja natpisa stavke
<i>SHOWRULEDETAILS</i>	Ne	Dodaje tekst pravila u JSON izlaz
<i>ADDLAYERGROUPS</i>	Ne	Dodaje grupe slojeva u JSON izlaz

BBOX

Ovaj parametar se može koristiti za zadavanje geografske oblasti za koju treba izgraditi legendu (njegov format opisan je *ovde*), ali se ne može kombinovati sa parametrom *RULE*. Parametar *SRS/CRS* postaje obavezan kada se koristi parametar *BBOX*.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
```

(наставак на следећој страни)

(настављено са претходне стране)

```
&LAYERS=countries,airports
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
```

Белешка

Kada je parametar BBOX definisan, legenda se naziva *legenda zasnovana na sadržaju*.

WIDTH

Ovaj parametar se podrazumevano ne koristi, ali postaje obavezan kada je postavljen parametar `RULE`. U tom slučaju omogućava zadavanje širine izlazne slike u pikselima.

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=getlegendgraphic
&LAYER=testlayer%20%C3%A8%C3%A9
&RULE=rule1
&WIDTH=30
&HEIGHT=30
```

HEIGHT

Ovaj parametar se podrazumevano ne koristi, ali postaje obavezan kada je postavljen parametar `RULE`. U tom slučaju omogućava zadavanje visine izlazne slike u pikselima.

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYER=testlayer%20%C3%A8%C3%A9
&RULE=rule1
&WIDTH=30
&HEIGHT=30
```

FORMAT

Ovaj parametar se može koristiti za zadavanje formata slike legende. Dostupne vrednosti su:

- image/jpeg
- image/png
- application/json

Za JSON, simboli su kodirani u Base64, a većina drugih opcija vezanih za raspored ili fontove ne uzima se u obzir jer se legenda mora izgraditi na strani klijenta. Parametar `RULE` ne može se kombinovati sa ovim formatom.

Primer URL-a sa odgovarajućim JSON izlazom:

```
http://localhost/qgisserver?
SERVICE=WMS&
REQUEST=GetLegendGraphic&
LAYERS=airports&
FORMAT=application/json
```

I odgovarajući JSON izlaz:

```
{
  "nodes": [
    {
      "icon": "<base64 icon>",
      "title": "airports",
      "type": "layer"
    }
  ],
  "title": ""
}
```

SRCWIDTH

Ovaj parametar se može definisati kada je postavljen parametar `RULE`. U tom slučaju, vrednost `SRCWIDTH` prosleđuje se osnovnom zahtevu `GetMap` kao parametar `WIDTH`, dok se parametar `WIDTH` zahteva `GetLegendGraphic` koristi za veličinu slike legende.

SRCHEIGHT

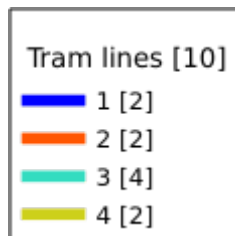
Ovaj parametar se može definisati kada je postavljen parametar `RULE`. U tom slučaju, vrednost `SRCHEIGHT` prosleđuje se osnovnom zahtevu `GetMap` kao parametar `HEIGHT`, dok se parametar `HEIGHT` zahteva `GetLegendGraphic` koristi za veličinu slike legende.

SHOWFEATURECOUNT

Ovaj parametar se može koristiti za aktiviranje broja objekata u legendi. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- `TRUE`
- `FALSE`

Na primer:



RULE

Ovaj parametar je dostupan na slojevima sa iscrtavanjem *Zasnovano na pravilima* i omogućava izgradnju legende samo sa imenovanim simbolom pravila. Ne može se kombinovati sa parametrom `BBOX`. `HEIGHT` i `WIDTH` moraju biti zadati.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=mylayer,
&RULE=myrulename,
&WIDTH=20,
&HEIGHT=20
```

RULELABEL

Ovaj parametar omogućava kontrolu iscrtavanja natpisa stavke. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE: prikaži natpis stavke
- FALSE: sakrij natpis stavke
- AUTO: sakrij natpis stavke za slojeve sa iscrtavanjem *Jedan simbol*

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries,airports
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&RULELABEL=AUTO
```



Слика3.5: Iscrtavanje legende bez natpisa za slojeve sa jednim simbolom

BOXSPACE

Ovaj parametar omogućava zadavanje razmaka između okvira legende i sadržaja u milimetrima. Podrazumevano je vrednost razmaka 2 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&BOXSPACE=0
```



Слика3.6: Levo BOXSPACE=0 a desno BOXSPACE=15

LAYERSPACE

Ovaj parametar omogućava zadavanje vertikalnog razmaka između slojeva u milimetrima. Podrazumevano je vrednost razmaka 3 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&LAYERSPACE=0
```



Слика3.7: Levo LAYERSPACE=0 a desno LAYERSPACE=10

LAYERTITLESPACE

Ovaj parametar omogućava zadavanje vertikalnog razmaka između naslova sloja i stavki koje slede, u milimetrima. Podrazumevano je vrednost razmaka 3 mm.

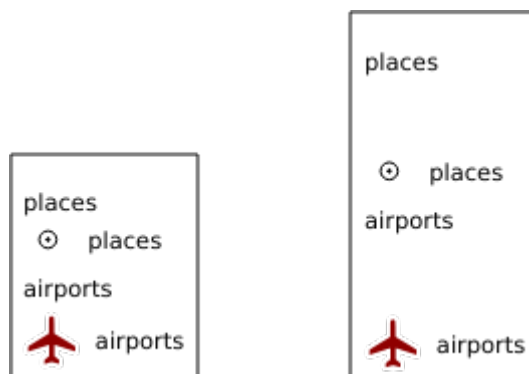
Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
```

(наставак на следећој страни)

(настављено са претходне стране)

```
&TRANSPARENT=TRUE
&LAYERTITLESPACE=0
```



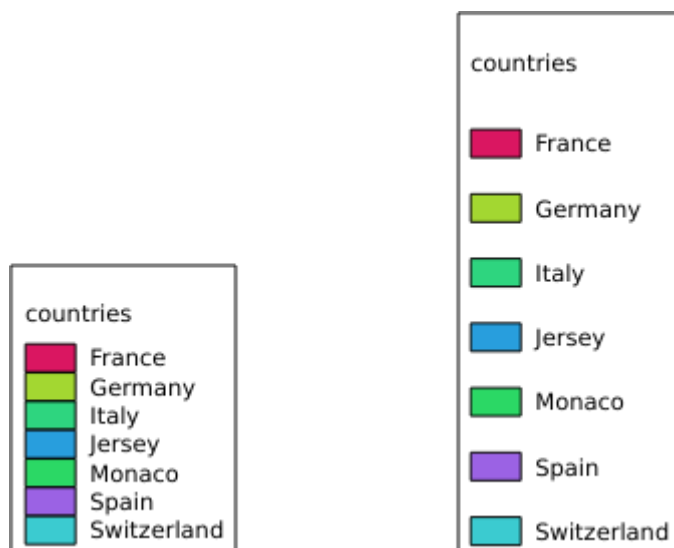
Слика3.8: Лево LAYERTITLESPACE=0 а десно LAYERTITLESPACE=10

SYMBOLSPACE

Ovaj parametar omogućava zadavanje vertikalnog razmaka između simbola i stavke koja sledi, u milimetrima. Podrazumevano je vrednost razmaka 2 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&SYMBOLSPACE=0
```



Слика3.9: Лево SYMBOLSPACE=0 а десно SYMBOLSPACE=5

ICONLABELSPACE

Ovaj parametar omogućava zadavanje horizontalnog razmaka između simbola i teksta natpisa, u milimetrima. Podrazumevano je vrednost razmaka 2 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=getlegendgraphic
&LAYERS=countries,
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&ICONLABELSPACE=0
```



Слика3.10: Лево ICONLABELSPACE=0 а десно ICONLABELSPACE=10

SYMBOLWIDTH

Ovaj parametar omogućava zadavanje širine pregleda simbola u milimetrima. Podrazumevano je vrednost širine 7 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries,
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&SYMBOLWIDTH=2
```



Слика3.11: Levo SYMBOLWIDTH=2 a desno SYMBOLWIDTH=20

SYMBOLHEIGHT

Ovaj parametar omogućava zadavanje visine pregleda simbola u milimetrima. Podrazumevano je vrednost visine 4 mm.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries,
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&SYMBOLHEIGHT=2
```



Слика3.12: Levo SYMBOLHEIGHT=2 a desno SYMBOLHEIGHT=6

LAYERTITLE

Ovaj parametar zadaje da li se iscrtaava naslov sloja.

Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE (podrazumevana vrednost)
- FALSE

LAYERFONTFAMILY

Ovaj parametar zadaje familiju fonta koja se koristi za iscrtavanje naslova sloja.

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries
&LAYERFONTFAMILY=monospace
```

LAYERFONTBOLD

Ovaj parametar zadaje da li se naslov sloja iscrtava podebljano. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&LAYERFONTBOLD=TRUE
```



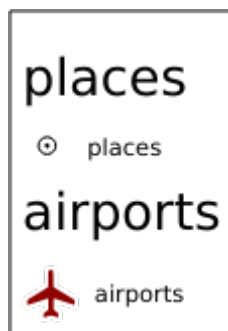
Слика3.13: Legenda sa LAYERFONTBOLD=TRUE

LAYERFONTSIZE

Ovaj parametar zadaje veličinu fonta za iscrtavanje naslova sloja u tačkama.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&LAYERFONTSIZE=20
```

Слика3.14: Legenda sa `LAYERFONTSIZE=20`

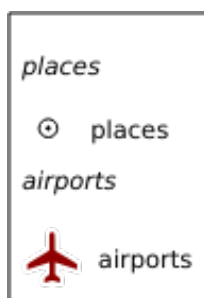
LAYERFONTITALIC

Ovaj parametar zadaje da li se naslov sloja iscertava kurzivom. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&LAYERFONTITALIC=TRUE
```

Слика3.15: Legenda sa `LAYERFONTITALIC=TRUE`

LAYERFONTCOLOR

Ovaj parametar zadaje boju naslova sloja. Boja može biti doslovna (red, green, ..) ili u heksadecimalnom zapisu (0xFF0000, 0x00FF00, ...).

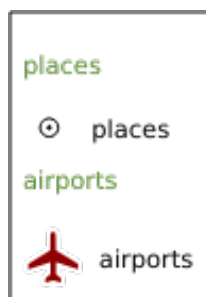
Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
```

(наставак на следећој страни)

(настављено са претходне стране)

```
&TRANSPARENT=TRUE
&LAYERFONTCOLOR=0x5f9930
```



Слика3.16: Legenda са LAYERFONTCOLOR=0x5f9930

ITEMFONTFAMILY

Ovaj parametar zadaje familiju fonta koja se koristi za iscrtavanje natpisa stavke.

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=countries
&ITEMFONTFAMILY=monospace
```

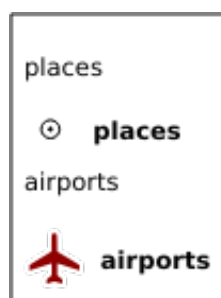
ITEMFONTBOLD

Ovaj parametar zadaje da li se natpis stavke iscrtava podebljano. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&ITEMFONTBOLD=TRUE
```



Слика3.17: Legenda са ITEMFONTBOLD=TRUE

ITEMFONTSIZE

Ovaj parametar zadaje veličinu fonta za iscrtavanje naslova sloja u tačkama.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&ITEMFONTSIZE=20
```



Слика3.18: Legenda sa ITEMFONTSIZE=30

ITEMFONTITALIC

Ovaj parametar zadaje da li se natpis stavke iscrtava kurzivom. Dostupne vrednosti su (bez razlikovanja velikih i malih slova):

- TRUE
- FALSE

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&ITEMFONTITALIC=TRUE
```



Слика3.19: Legenda sa ITEMFONTITALIC=TRUE

ITEMFONTCOLOR

Ovaj parametar zadaje boju natpisa stavke. Boja može biti doslovna (red, green, ..) ili u heksadecimalnom zapisu (0xFF0000, 0x00FF00, ...).

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetLegendGraphic
&LAYERS=airports,places
&BBOX=43.20,-2.93,49.35,8.32
&CRS=EPSG:4326
&TRANSPARENT=TRUE
&ITEMFONTCOLOR=0x5f9930
```



Слика3.20: Legenda sa ITEMFONTCOLOR=0x5f9930

SHOWRULEDETAILS

Ovaj parametar zadaje da li će JSON izlaz sadržati i detalje o pravilu koje je generisalo stavku legende. Ovaj parametar ima efekta samo kada je iscrtavač zasnovan na pravilima ili kategorizovan.

Primer URL-a sa odgovarajućim JSON izlazom:

```
http://localhost/qgisserver?
SERVICE=WMS&
REQUEST=GetLegendGraphic&
LAYERS=airports&
FORMAT=application/json&
SHOWRULEDETAILS=TRUE
```

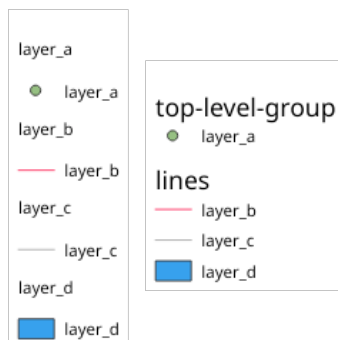
I odgovarajući JSON izlaz:

```
{
  "nodes": [
    {
      "icon": "<base64 icon>",
      "title": "airports",
      "type": "layer",
      "rule": "type = 'airport'"
    }
  ],
  "title": ""
}
```

ADDLAYERGROUPS

Ovaj parametar zadaje da li će JSON izlaz prikazivati i nazive grupa slojeva (i podgrupa) u stavci legende. Moguće vrednosti su:

- TRUE: prikaži natpise grupa
- FALSE (podrazumevano): sakrij natpise grupa



Слика3.21: Legenda bez (levo) i sa (desno) prikazom natpisa grupa slojeva

Odgovarajući JSON izlaz koji prikazuje naziv grupa izgledao bi ovako:

```
{ "nodes":
  [{ "nodes":
    [{ "icon":
      ↪"iVBORw0KGgoAAAANSUhEUgAAABQAAAAUCAYAAACNiR0NAAACXBIWXMAABY1AAAWJQFJUiTwAAAAUklEQVQ4jWNgGAXDHZ
      ↪37l28evBKKisr/
      ↪0+a7IMiNi93C15DcUpgM4wYQ5nwuZAcMIQNvHv3LuO83C0kG0hysoFZRrJNo2AYAQC87BpkGQj1fwAAAABJRU5ErkJggg==
      ↪",
        "title":"layer_a", "type":"layer"
      },
    { "nodes":
      [{ "icon":
        ↪"iVBORw0KGgoAAAANSUhEUgAAABMAAAAUCAyAAABvVQZ0AAAACXBIWXMAABY1AAAWJQFJUiTwAAAAHULEQVQ4jWNgGAWjYCO
        ↪8aaEeMglEwYAAAAIoCzTtn5XoAAAAASUVORK5CYII=",
          "title":"layer_b", "type":"layer"
        },
        { "icon":
          ↪"iVBORw0KGgoAAAANSUhEUgAAABMAAAAUCAyAAABvVQZ0AAAACXBIWXMAABY1AAAWJQFJUiTwAAAAHULEQVQ4jWNgGAWjYCO
          ↪z0AlwMLAwMDAnXmQKoYxUcWUUCNGDRs1bNSwYWYYACXDAsvQaTuVAAAAAE1FTkSuQmCC",
            "title":"layer_c", "type":"layer"
          },
          "title":"lines", "type":"group"
        },
        { "icon":
          ↪"iVBORw0KGgoAAAANSUhEUgAAABMAAAATCAyAAABYUDbMAAAACXBIWXMAABY1AAAWJQFJUiTwAAAAKklEQVQ4jWNUV1X/
          ↪z0AlwMLAwMDAnXmQKoYxUcWUUCNGDRs1bNSwYWYYACXDAsvQaTuVAAAAAE1FTkSuQmCC",
            "title":"layer_d", "type":"layer"
          },
          "title":"top-level-group", "type":"group"
        },
        "title":""
      ],
    }
  ]
}
```

3.2.5 GetStyle(s)

Standardni parametri za zahtev **GetStyle** (ili **GetStyles**) prema OGC WMS 1.1.1 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetStyle ili GetStyles)
<i>LAYERS</i>	Da	Slojevi nad kojima se vrši upit

Zahtev **GetStyle** podržava i sledeće parametre specifične za QGIS Server:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetStyles
&LAYERS=mylayer1,mylayer2
```

3.2.6 DescribeLayer

Standardni parametri za zahtev **DescribeLayer** prema OGC WMS 1.1.1 i 1.3.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (DescribeLayer)
<i>LAYERS</i>	Da	Slojevi koji se opisuju
<i>SLD_VERSION</i>	Da	Verzija SLD-a

Zahtev **DescribeLayer** podržava i sledeće parametre specifične za QGIS Server:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=DescribeLayer
&SLD_VERSION=1.1.0
&LAYERS=mylayer1
```

XML dokument izgleda ovako:

```
<DescribeLayerResponse xmlns="http://www.opengis.net/sld" xmlns:xsi="http://www.w3.
↪org/2001/XMLSchema-instance" xmlns:ows="http://www.opengis.net/ows" xmlns:xlink=
↪"http://www.w3.org/1999/xlink" xmlns:se="http://www.opengis.net/se"
↪xsi:schemaLocation="http://www.opengis.net/sld http://schemas.opengis.net/sld/1.
↪1.0/DescribeLayer.xsd">
  <Version>1.1.0</Version>
```

(nastavak na sledećoj strani)

```

<LayerDescription>
  <owsType>wfs</owsType>
  <se:OnlineResource xlink:href="http://localhost/qgisserver" xlink:type=
↪ "simple"/>
  <TypeName>
    <se:FeatureTypeName>my_vector_layer</se:FeatureTypeName>
  </TypeName>
</LayerDescription>
<LayerDescription>
  <owsType>wcs</owsType>
  <se:OnlineResource xlink:href="http://localhost/qgisserver" xlink:type=
↪ "simple"/>
  <TypeName>
    <se:FeatureTypeName>my_raster_layer</se:FeatureTypeName>
  </TypeName>
</LayerDescription>
</DescribeLayerResponse>

```

SLD_VERSION

Ovaj parametar omogućava zadavanje verzije SLD-a. Dostupna je samo vrednost 1.1.0.

3.2.7 GetPrint

QGIS Server ima mogućnost da pravi izlaz štampanog prikaza u pdf ili pikselском formatu. Prozori štampanog prikaza u objavljenom projektu koriste se kao šabloni. U zahtevu **GetPrint** klijent ima mogućnost da zada parametre sadržanih karata i natpisa prikaza.

Zahtev **GetPrint** podržava *obeležavanje*, *spoljne WMS slojeve*, kao i sledeće parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetPrint)
<i>VERSION</i>	Ne	Verzija servisa
<i>LAYERS</i>	Ne	Slojevi za prikaz
<i>TEMPLATE</i>	Da	Šablon prikaza koji se koristi
<i>SRS / CRS</i>	Da	Koordinatni referentni sistem
<i>FORMAT</i>	Ne	Izlazni format
<i>FORMAT_OPTIONS</i>	Ne	Opcije zadatog formata datoteke Samo za <code>FORMAT=application/pdf</code>
<i>ATLAS_PK</i>	Ne	Objekti atlasa
<i>STYLES</i>	Ne	Stil slojeva
<i>TRANSPARENT</i>	Ne	Prozirna pozadina
<i>OPACITIES</i>	Ne	Neprozirnost sloja ili grupe
<i>SELECTION</i>	Ne	Istakni objekte
<i>mapX:EXTENT</i>	Ne	Obuhvat karte „X“
<i>mapX:LAYERS</i>	Ne	Slojevi karte „X“
<i>mapX:STYLES</i>	Ne	Stil slojeva karte „X“
<i>mapX:SCALE</i>	Ne	Razmera slojeva karte „X“
<i>mapX:ROTATION</i>	Ne	Rotacija karte „X“
<i>mapX:GRID_INTERVAL_X</i>	Ne	Interval mreže na x osi karte „X“
<i>mapX:GRID_INTERVAL_Y</i>	Ne	Interval mreže na y osi karte „X“

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetPrint
&MAP=/home/qgis/projects/world.qgs
&CRS=EPSG:4326
&FORMAT=png
&TEMPLATE=Layout%201
&map0:EXTENT=-180,-90,180,90
&map0:LAYERS=mylayer1,mylayer2,mylayer3
&map0:OPACITIES=125,200,125
&map0:ROTATION=45
```

Imajte u vidu da šablon prikaza može sadržati više od jedne karte. Na taj način, ako želite da podesite određenu kartu, morate koristiti parametre `mapX:`, gdje je `x` pozitivan broj koji možete dobiti zahtevom **GetProjectSettings**.

Na primer:

```
<WMS_Capabilities>
...
<ComposerTemplates xsi:type="wms:_ExtendedCapabilities">
<ComposerTemplate width="297" height="210" name="Druckzusammenstellung 1">
<ComposerMap width="171" height="133" name="map0"/>
<ComposerMap width="49" height="46" name="map1"/></ComposerTemplate>
</ComposerTemplates>
...
</WMS_Capabilities>
```

TEMPLATE

Ovaj parametar se može koristiti za zadavanje naziva šablona prikaza koji se koristi za štampanje.

FORMAT

Ovaj parametar zadaje format slike karte. Dostupne vrednosti su:

- png (podrazumevana vrednost)
- image/png
- jpg
- jpeg
- image/jpeg
- svg
- image/svg
- image/svg+xml
- pdf
- application/pdf

Ako je parametar `FORMAT` različit od jedne od ovih vrednosti, vraća se izuzetak.

FORMAT_OPTIONS

Ovaj parametar se može koristiti za zadavanje opcija izabranog formata. Samo za `FORMAT=application/pdf` u `GetPrint` zahtevima. Uzima listu parova ključ:vrednost razdvojenih tačkom i zarezom:

- `RASTERIZE_WHOLE_IMAGE`: da li ceo pdf treba izvesti kao sliku. Podrazumevano: `false`.

- **FORCE_VECTOR_OUTPUT**: da li pdf treba izvesti kao vektor. Podrazumevano: false.
- **APPEND_GEOREFERENCE**: da li informacije o georeferenciranju treba dodati u pdf. Podrazumevano: true.
- **EXPORT_METADATA**: da li metapodatke treba dodati u pdf. Podrazumevano: true.
- **TEXT_RENDER_FORMAT**: postavlja format iscrtavanja teksta za izvoz pdf-a. Može biti `AlwaysOutlines` (podrazumevano) ili `AlwaysText`.
- **SIMPLIFY_GEOMETRY**: da li geometrije objekata treba uprostiti. Podrazumevano: true.
- **WRITE_GEO_PDF**: da li treba izvesti geoprostorni PDF. Podrazumevano: false.
- **USE_ISO_32000_EXTENSION_FORMAT_GEOREFERENCING**: da li treba koristiti Iso32000 georeferenciranje. Podrazumevano: false.
- **USE_OGC_BEST_PRACTICE_FORMAT_GEOREFERENCING**: da li treba koristiti OGC georeferenciranje po najboljoj praksi. Podrazumevano: false.
- **EXPORT_THEMES**: lista tema karte razdvojenih zarezima koje se koriste za izvoz geoprostornog PDF-a
- **PREDEFINED_MAP_SCALES**: lista razmera karte razdvojenih zarezima za iscrtavanje karte
- **LOSSLESS_IMAGE_COMPRESSION**: da li slike ugrađene u pdf moraju biti kompresovane algoritmom bez gubitaka. Podrazumevano: false.
- **DISABLE_TILED_RASTER_RENDERING**: da li rasteri treba da budu bez pločica u pdf-u. Podrazumevano: false.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetPrint
&MAP=/home/qgis/projects/world.qgs
&CRS=EPSG:4326
&FORMAT=pdf
&TEMPLATE=Layout%201
&FORMAT_OPTIONS=FORCE_VECTOR_OUTPUT:TRUE;TEXT_RENDER_FORMAT:AlwaysOutlines;
↪PREDEFINED_MAP_SCALES:250
```

ATLAS_PK

Ovaj parametar omogućava aktiviranje iscrtavanja atlasa naznačavanjem objekata koje želimo da odštamamo. Da biste dobili atlas sa svim objektima, može se koristiti simbol `*` (u skladu sa maksimalnim brojem objekata dozvoljenim u konfiguraciji projekta).

Kada je **FORMAT** jednako `pdf`, vraća se jedan PDF dokument koji kombinuje strane objekata. Za sve ostale formate vraća se jedna strana.

mapX:EXTENT

Ovaj parametar zadaje obuhvat stavke karte u prikazu kao `xmin,ymin,xmax,ymax`.

mapX:ROTATION

Ovaj parametar zadaje rotaciju karte u stepenima.

mapX:GRID_INTERVAL_X

Ovaj parametar zadaje gustinu linija mreže u pravcu X.

mapX:GRID_INTERVAL_Y

Ovaj parametar zadaje gustinu linija mreže u pravcu Y.

mapX:SCALE

Ovaj parametar zadaje razmeru karte za stavku karte u prikazu. Ovo je korisno za obezbeđivanje vidljivosti slojeva i natpisa zasnovane na razmeri, čak i ako klijent i server imaju različite algoritme za računanje imenioca razmere.

mapX:LAYERS

Ovaj parametar zadaje slojeve za stavku karte u prikazu. Više informacija o ovom parametru potražite u *GetMap slojevi*.

mapX:STYLES

Ovaj parametar zadaje stilove slojeva definisane u određenoj stavci karte u prikazu. Više informacija o ovom parametru potražite u *GetMap stilovi*.

3.2.8 GetProjectSettings

Ovaj tip zahteva radi slično kao *GetCapabilities*, ali je specifičniji za QGIS Server i omogućava klijentu da pročita dodatne informacije koje nisu dostupne u izlazu *GetCapabilities*:

- početna vidljivost slojeva
- informacije o vektorskim atributima i njihovim tipovima uređivanja
- informacije o redosledu slojeva i redosledu iscrtavanja
- lista slojeva objavljenih u WFS-u
- prikaz da li je grupa u stablu slojeva međusobno isključiva

Zahtev **GetProjectSettings** podržava sledeće parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetProjectSettings)

3.2.9 GetSchemaExtension

Zahtev **GetSchemaExtension** omogućava preuzimanje opcionih proširenih mogućnosti i operacija WMS servisa, kako ih implementira QGIS Server.

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>SERVICE</i>	Da	Naziv servisa (WMS)
<i>REQUEST</i>	Da	Naziv zahteva (GetSchemaExtension)

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetSchemaExtension
```

XML dokument izgleda ovako:

```
<schema xmlns="http://www.w3.org/2001/XMLSchema" xmlns:wms="http://www.opengis.net/
↪wms" xmlns:qgs="http://www.qgis.org/wms" targetNamespace="http://www.qgis.org/wms
↪" elementFormDefault="qualified" version="1.0.0">
  <import namespace="http://www.opengis.net/wms" schemaLocation="http://schemas.
↪opengis.net/wms/1.3.0/capabilities_1_3_0.xsd"/>
  <element name="GetPrint" type="wms:OperationType" substitutionGroup="wms:_
↪ExtendedOperation"/>
  <element name="GetStyles" type="wms:OperationType" substitutionGroup="wms:_
↪ExtendedOperation"/>
</schema>
```

3.2.10 Spoljni WMS slojevi

QGIS Server omogućava uključivanje slojeva sa spoljnih WMS servera u WMS *GetMap* i WMS *GetPrint* zahteve. Ovo je posebno korisno ako veb klijent koristi spoljni sloj podloge na veb karti. Iz razloga performansi, takve slojeve treba da zahteva direktno veb klijent (ne kaskadno preko QGIS servera). Za štampanje, međutim, ovi slojevi treba da budu kaskadni preko QGIS servera kako bi se pojavili na odštampanoj karti.

Spoljni slojevi mogu se dodati u parametar LAYERS kao EXTERNAL_WMS:<layername>. Parametri za spoljne WMS slojeve (npr. url, format, dpiMode, crs, layers, styles) kasnije se mogu zadati kao servisni parametri <layer-name>:<parameter>. U *GetMap* zahtevu, to bi moglo izgledati ovako:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetMap
&LAYERS=EXTERNAL_WMS:basemap,layer1,layer2
&OPACITIES=100,200,255
&STYLES=,,
&basemap:url=http://externalserver.com/wms.fcgi
&basemap:format=image/jpeg
&basemap:dpiMode=7
&basemap:crs=EPSG:2056
&basemap:layers=orthofoto
&basemap:styles=default
```

Slično, spoljni slojevi mogu se koristiti u *GetPrint* zahtevima:

```
http://localhost/qgisserver?
SERVICE=WMS
&REQUEST=GetPrint
&TEMPLATE=A4
&map0:layers=EXTERNAL_WMS:basemap,layer1,layer2
&map0:EXTENT=<minx,miny,maxx,mxy>
&OPACITIES=100,200,255
&basemap:url=http://externalserver.com/wms.fcgi
&basemap:format=image/jpeg
&basemap:dpiMode=7
&basemap:crs=EPSG:2056
&basemap:layers=orthofoto
&basemap:styles=default
```

3.2.11 Obeležavanje (redlining)

Ova mogućnost je dostupna i može se koristiti sa *GetMap* i *GetPrint* zahtevima.

Mogućnost obeležavanja može se koristiti za prosleđivanje geometrija i natpisa u zahtevu, koje server preklapa preko standardno vraćene slike (karte). Time se korisniku omogućava da istakne ili možda doda neke komentare (natpise) na neke oblasti, lokacije itd. koje nisu na standardnoj karti.

Zahtev *GetMap* je u formatu:

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetMap
&HIGHLIGHT_GEOM=POLYGON((590000 5647000, 590000 6110620, 2500000 6110620, 2500000
↪5647000, 590000 5647000))
&HIGHLIGHT_SYMBOL=<StyledLayerDescriptor><UserStyle><Name>Highlight</Name>
↪<FeatureTypeStyle><Rule><Name>Symbol</Name><LineSymbolizer><Stroke><SvgParameter
↪name="stroke">%23ea1173</SvgParameter><SvgParameter name="stroke-opacity">1</
↪SvgParameter><SvgParameter name="stroke-width">1.6</SvgParameter></Stroke></
↪LineSymbolizer></Rule></FeatureTypeStyle></UserStyle></StyledLayerDescriptor>
&HIGHLIGHT_LABELSTRING=Write label here
&HIGHLIGHT_LABELSIZE=16
&HIGHLIGHT_LABELCOLOR=%23000000
&HIGHLIGHT_LABELBUFFERCOLOR=%23FFFFFF
&HIGHLIGHT_LABELBUFFERSIZE=1.5
```

Ekvivalent *GetPrint* je u formatu (imajte u vidu da se parametar mapX: dodaje da bi se naznačilo koja karta ima obeležavanje):

```
http://localhost/qgisserver?
SERVICE=WMS
&VERSION=1.3.0
&REQUEST=GetPrint
&map0:HIGHLIGHT_GEOM=POLYGON((590000 5647000, 590000 6110620, 2500000 6110620,
↪2500000 5647000, 590000 5647000))
&map0:HIGHLIGHT_SYMBOL=<StyledLayerDescriptor><UserStyle><Name>Highlight</Name>
↪<FeatureTypeStyle><Rule><Name>Symbol</Name><LineSymbolizer><Stroke><SvgParameter
↪name="stroke">%23ea1173</SvgParameter><SvgParameter name="stroke-opacity">1</
↪SvgParameter><SvgParameter name="stroke-width">1.6</SvgParameter></Stroke></
↪LineSymbolizer></Rule></FeatureTypeStyle></UserStyle></StyledLayerDescriptor>
&map0:HIGHLIGHT_LABELSTRING=Write label here
&map0:HIGHLIGHT_LABELSIZE=16
&map0:HIGHLIGHT_LABELCOLOR=%23000000
&map0:HIGHLIGHT_LABELBUFFERCOLOR=%23FFFFFF
&map0:HIGHLIGHT_LABELBUFFERSIZE=1.5
```

Evo slike koju daje gornji zahtev, na kojoj su poligon i natpis nacrtani preko normalne karte:



Слика3.22: Odgovor servera na GetMap zahtev sa parametrima obeležavanja

Vidite da u ovom zahtevu postoji nekoliko parametara za kontrolu mogućnosti obeležavanja. Puna lista uključuje:

- **HIGHLIGHT_GEOM**: Možete dodati POINT, MULTILINESTRING, POLYGON itd. Podržava višedelne geometrije. Evo primera: `HIGHLIGHT_GEOM=MULTILINESTRING((0 0, 0 1, 1 1))`. Koordinate treba da budu u CRS-u GetMap/GetPrint zahteva.
- **HIGHLIGHT_LABELBUFFERCOLOR**: Ovaj parametar kontroliše boju bafera natpisa.
- **HIGHLIGHT_LABELBUFFERSIZE**: Ovaj parametar kontroliše veličinu bafera natpisa.
- **HIGHLIGHT_LABELCOLOR**: Ovaj parametar kontroliše boju natpisa.
- **HIGHLIGHT_LABEL_DISTANCE**: kontroliše rastojanje između objekta (npr. tačke ili linije) i natpisa u mm
- **HIGHLIGHT_LABELFONT**: Ovaj parametar kontroliše font natpisa (npr. Arial)
- **HIGHLIGHT_LABEL_HORIZONTAL_ALIGNMENT**: postavlja natpis horizontalno na tačku pomoću zadatog poravnanja (npr. 'left', 'center', 'right')
- **HIGHLIGHT_LABEL_ROTATION**: kontroliše rotaciju natpisa u stepenima
- **HIGHLIGHT_LABELSIZE**: Ovaj parametar kontroliše veličinu natpisa.
- **HIGHLIGHT_LABELSTRING**: Ovom parametru možete proslediti tekst natpisa.
- **HIGHLIGHT_LABEL_VERTICAL_ALIGNMENT**: postavlja natpis vertikalno na tačku pomoću zadatog poravnanja (npr. 'top', 'half', 'bottom')

- **HIGHLIGHT_SYMBOL**: Ovo kontroliše kako je geometrija ocrтана i možete promeniti širinu, boju i neprozirnost poteza.

3.3 Web Feature Service (WFS)

WFS standardi **1.0.0** i **1.1.0** implementirani u QGIS Serveru pružaju HTTP interfejs za upite nad geografskim objektima iz QGIS projekta. Tipičan WFS zahtev definiše QGIS projekat koji se koristi i sloj nad kojim se vrši upit.

Dokument sa specifikacijama prema broju verzije servisa:

- [WFS 1.0.0](#)
- [WFS 1.1.0](#)

Standardni zahtevi koje pruža QGIS Server:

Zahtev	Opis
<i>GetCapabilities</i>	Vraća XML metapodatke sa informacijama o serveru
<i>GetFeature</i>	Vraća izbor objekata
<i>DescribeFeatureType</i>	Vraća opis tipova objekata i svojstava
<i>Transaction</i>	Omogućava umetanje, ažuriranje ili brisanje objekata

3.3.1 GetCapabilities

Standardni parametri za zahtev **GetCapabilities** prema OGC WFS 1.0.0 i 1.1.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WFS)
<i>REQUEST</i>	Da	Naziv zahteva (GetCapabilities)
<i>VERSION</i>	Ne	Verzija servisa

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

VERSION

Ovaj parametar omogućava zadavanje verzije servisa koja se koristi. Dostupne vrednosti za parametar `VERSION` su:

- 1.0.0
- 1.1.0

Ako u zahtevu nije naznačena verzija, podrazumevano se koristi 1.1.0.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&...
```

3.3.2 GetFeature

Standardni parametri za zahtev **GetFeature** prema OGC WFS 1.0.0 i 1.1.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WFS)
<i>REQUEST</i>	Da	Naziv zahteva (GetFeature)
<i>VERSION</i>	Ne	Verzija servisa
<i>TYPENAME</i>	Ne	Nazivi slojeva
<i>FEATUREID</i>	Ne	Filtriraj objekte po ID-jevima
<i>OUTPUTFORMAT</i>	Ne	Izlazni format
<i>RESULTTYPE</i>	Ne	Tip rezultata
<i>PROPERTYNAME</i>	Ne	Nazivi svojstava koja se vraćaju
<i>MAXFEATURES</i>	Ne	Maksimalan broj objekata koji se vraćaju
<i>SRSNAME</i>	Ne	Koordinatni referentni sistem
<i>FILTER</i>	Ne	OGC Filter Encoding
<i>BBOX</i>	Ne	Obuhvat karte
<i>SORTBY</i>	Ne	Sortiraj rezultate

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>STARTINDEX</i>	Ne	Straničenje
<i>GEOMETRYNAME</i>	Ne	Tip geometrije koja se vraća
<i>EXP_FILTER</i>	Ne	Filtriranje izrazima

TYPENAME

Ovaj parametar omogućava zadavanje naziva slojeva i obavezan je ako *FEATUREID* nije postavljen.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=GetFeature
&TYPENAME=countries
```

FEATUREID

Ovaj parametar omogućava zadavanje ID-ja određenog objekta i formira se kao *typename.fid,typename.fid,...*

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&FEATUREID=countries.0,places.1
```

XML odgovor:

```
<wfs:FeatureCollection xmlns:wfs="http://www.opengis.net/wfs" xmlns:ogc="http://
↪www.opengis.net/ogc" xmlns:gml="http://www.opengis.net/gml" xmlns:ows="http://
↪www.opengis.net/ows" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:qgs="http://
```

(наставак на следећој страни)

(настављено са претходне стране)

```

↪/www.qgis.org/gml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
↪xsi:schemaLocation="http://www.opengis.net/wfs http://schemas.opengis.net/wfs/1.
↪1.0/wfs.xsd http://www.qgis.org/gml http://192.168.1.15/qgisserver?SERVICE=WFS&
↪VERSION=1.1.0&REQUEST=DescribeFeatureType&TYPENAME=countries,places&
↪OUTPUTFORMAT=text/xml; subtype=gml/3.1.1">
  <gml:boundedBy>
    ...
  </gml:boundedBy>
  <gml:featureMember>
    <qgs:countries gml:id="countries.1">
      ...
    </qgs:countries>
  </gml:featureMember>
  <gml:featureMember>
    <qgs:places gml:id="places.1">
      ...
    </qgs:places>
  </gml:featureMember>
</wfs:FeatureCollection>

```

OUTPUTFORMAT

Ovaj parametar se može koristiti za zadavanje formata odgovora. Ako je `VERSION` veća ili jednaka 1.1.0, podrazumevani format je GML3. U suprotnom se koristi GML2.

Dostupne vrednosti su:

- gml2
- text/xml; subtype=gml/2.1.2
- gml3
- text/xml; subtype=gml/3.1.1
- geojson
- application/vnd.geo+json,
- application/vnd.geo json
- application/geo+json
- application/geo json
- application/json

Primer URL-a:

```

http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&FEATUREID=countries.0
&OUTPUTFORMAT=geojson

```

GeoJSON odgovor:

```

{
  "type": "FeatureCollection",
  "bbox": [
    -180,
    -90,

```

(nastavak na sledećoj strani)

(настављено са претходне стране)

```

    180,
    83.6236
  ],
  "features": [
    {
      "bbox": [
        -61.891113,
        16.989719,
        -61.666389,
        17.724998
      ],
      "geometry": {
        "coordinates": [
          "... "
        ],
        "type": "MultiPolygon"
      },
      "id": "countries.1",
      "properties": {
        "id": 1,
        "name": "Antigua and Barbuda"
      },
      "type": "Feature"
    }
  ]
}

```

RESULTTYPE

Ovaj parametar se može koristiti za zadavanje vrste rezultata koji se vraća. Dostupne vrednosti su:

- results: podrazumevano ponašanje
- hits: vraća samo broj objekata

Primer URL-a:

```

http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=GetFeature
&RESULTTYPE=hits
&...

```

PROPERTYNAME

Ovaj parametar se može koristiti za zadavanje određenog svojstva koje se vraća. Svojstvo mora biti mapirano sa TYPENAME ili FEATUREID:

Primer ispravnog URL-a:

```

http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&PROPERTYNAME=name
&TYPENAME=places

```

Nasuprot tome, sledeći URL će vratiti izuzetak:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&PROPERTYNAME=name
&TYPENAME=places,countries
```

```
<ServiceExceptionReport xmlns="http://www.opengis.net/ogc" version="1.2.0">
  <ServiceException code="RequestNotWellFormed">There has to be a 1:1 mapping
  ↪ between each element in a TYPENAME and the PROPERTYNAME list</ServiceException>
</ServiceExceptionReport>
```

MAXFEATURES

Ovaj parametar omogućava ograničavanje broja objekata koje zahtev vraća.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&TYPENAME=places
&MAXFEATURES=1000
```

Белешка

Ovaj parametar može biti koristan za poboljšanje performansi kada su vektorski slojevi u pozadini obimni.

SRSNAME

Ovaj parametar omogućava naznačavanje prostornog referentnog sistema izlaznog odgovora, kao i CRS-a za BBOX, i mora biti formiran kao EPSG:XXXX.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&TYPENAME=places
&SRSNAME=EPSG:32620
```

FILTER

Ovaj parametar omogućava filtriranje odgovora pomoću jezika **Filter Encoding** definisanog [OGC Filter Encoding standardom](#). Na primer:

```
http://localhost/qgisserver?
SERVICE=WFS&
REQUEST=GetFeature&
TYPENAME=places&
FILTER=<Filter><PropertyIsEqualTo><PropertyName>name</PropertyName><Literal>Paris</
  ↪ Literal></PropertyIsEqualTo></Filter>
```

U slučaju više naziva tipova, filteri moraju biti u zagradama:

```
http://localhost/qgisserver?
SERVICE=WFS
```

(наставак на следећој страни)

(настављено са претходне стране)

```
&REQUEST=GetFeature
&TYPENAME=places,countries
&FILTER=(<Filter><PropertyIsEqualTo><PropertyName>name</PropertyName><Literal>Paris
↪</Literal></PropertyIsEqualTo></Filter>)<Filter><PropertyIsEqualTo>
↪<PropertyName>name</PropertyName><Literal>France</Literal></PropertyIsEqualTo></
↪Filter>)
```

Filtriraj objekte koji se seku sa poligonom:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&VERSION=1.1.0
&TYPENAME=places
&FILTER=<Filter xmlns="http://www.opengis.net/ogc">
  <Intersects>
    <PropertyName>geometry</PropertyName>
    <Polygon xmlns="http://www.opengis.net/gml" srsName="EPSG:4326">
      <exterior>
        <LinearRing>
          <posList>
            -0.6389 42.5922
            10.2683 51.9106
            14.5196 41.0320
            -0.6389 42.5922
          </posList>
        </LinearRing>
      </exterior>
    </Polygon>
  </Intersects>
</Filter>
```

BBOX

Ovaj parametar omogućava zadavanje obuhvata karte u jedinicama prema tekućem CRS-u. Koordinate moraju biti razdvojene zarezom.

Parametar SRSNAME može zadati CRS obuhvata. Ako nije zadat, koristi se CRS sloja.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&TYPENAME=places
&BBOX=-11.84,42.53,8.46,50.98
```

Parametar FEATUREID ne može se koristiti sa BBOX. Svaki pokušaj rezultiraće izuzetkom:

```
<ServiceExceptionReport xmlns="http://www.opengis.net/ogc" version="1.2.0">
  <ServiceException code="RequestNotWellFormed">FEATUREID FILTER and BBOX
  ↪parameters are mutually exclusive</ServiceException>
</ServiceExceptionReport>
```

SORTBY

Ovaj parametar omogućava sortiranje rezultujućih objekata prema vrednostima svojstava i mora biti formiran kao `propertyname SORTRULE`.

Dostupne vrednosti za `SORTRULE` u slučaju opadajućeg sortiranja:

- D
- +D
- DESC
- +DESC

Dostupne vrednosti za `SORTRULE` u slučaju rastućeg sortiranja:

- A
- +A
- ASC
- +ASC

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&TYPENAME=places
&PROPERTYNAME=name
&MAXFEATURES=3
&SORTBY=name DESC
```

Odgovarajući rezultat:

```
<wfs:FeatureCollection xmlns:wfs="http://www.opengis.net/wfs" xmlns:ogc="http://
↳www.opengis.net/ogc" xmlns:gml="http://www.opengis.net/gml" xmlns:ows="http://
↳www.opengis.net/ows" xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:qgs="http:/
↳www.qgis.org/gml" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
↳xsi:schemaLocation="http://www.opengis.net/wfs http://schemas.opengis.net/wfs/1.
↳1.0/wfs.xsd http://www.qgis.org/gml http://192.168.1.15/qgisserver?SERVICE=WFS&
↳VERSION=1.1.0&REQUEST=DescribeFeatureType&TYPENAME=places&OUTPUTFORMAT=text/xml;
↳subtype=3Dgml/3.1.1">
  <gml:boundedBy>
    ...
  </gml:boundedBy>
  <gml:featureMember>
    <qgs:places gml:id="places.90">
      <qgs:name>Zagreb</qgs:name>
    </qgs:places>
  </gml:featureMember>
  <gml:featureMember>
    <qgs:places gml:id="places.113">
      <qgs:name>Yerevan</qgs:name>
    </qgs:places>
  </gml:featureMember>
  <gml:featureMember>
    <qgs:places gml:id="places.111">
      <qgs:name>Yaounde</qgs:name>
    </qgs:places>
  </gml:featureMember>
</wfs:FeatureCollection>
```

GEOMETRYNAME

Ovaj parametar se može koristiti za zadavanje vrste geometrije koja se vraća za objekte. Dostupne vrednosti su:

- extent
- centroid
- none

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=GetFeature
&GEOMETRYNAME=centroid
&...
```

STARTINDEX

Ovaj parametar je standardan u WFS 2.0, ali je proširenje za WFS 1.0.0.

Zapravo, može se koristiti za preskakanje nekih objekata u skupu rezultata, a u kombinaciji sa MAXFEATURES omogućava straničenje kroz rezultate.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=GetFeature
&STARTINDEX=2
&...
```

EXP_FILTER

Ovaj parametar omogućava filtriranje odgovora pomoću QGIS izraza. Znak ; se koristi za razdvajanje filtera u slučaju više naziva tipova.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&REQUEST=GetFeature
&TYPENAME=places,countries
&EXP_FILTER="name"='Paris';"name"='France'
```

3.3.3 DescribeFeatureType

Standardni parametri za zahtev **DescribeFeatureType** prema OGC WFS 1.0.0 i 1.1.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WFS)
<i>REQUEST</i>	Da	Naziv zahteva (DescribeFeatureType)
<i>VERSION</i>	Ne	Verzija servisa
<i>OUTPUTFORMAT</i>	Ne	Format odgovora
<i>TYPENAME</i>	Ne	Nazivi slojeva

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=DescribeFeatureType
&TYPENAME=countries
```

Izlazni odgovor:

```
<schema xmlns:ogc="http://www.opengis.net/ogc" xmlns:xsd="http://www.w3.org/2001/
↳XMLSchema" xmlns="http://www.w3.org/2001/XMLSchema" xmlns:qgs="http://www.qgis.
↳org/gml" xmlns:gml="http://www.opengis.net/gml" targetNamespace="http://www.qgis.
↳org/gml" version="1.0" elementFormDefault="qualified">
  <import schemaLocation="http://schemas.opengis.net/gml/3.1.1/base/gml.xsd"
↳namespace="http://www.opengis.net/gml"/>
  <element type="qgs:countriesType" substitutionGroup="gml:_Feature" name=
↳"countries"/>
  <complexType name="countriesType">
    <complexContent>
      <extension base="gml:AbstractFeatureType">
        <sequence>
          <element minOccurs="0" type="gml:MultiPolygonPropertyType" maxOccurs="1"
↳name="geometry"/>
          <element type="long" name="id"/>
          <element nillable="true" type="string" name="name"/>
        </sequence>
      </extension>
    </complexContent>
  </complexType>
</schema>
```

3.3.4 Transaction

Ovaj zahtev omogućava ažuriranje, brisanje ili dodavanje jednog ili više objekata pomoću XML dokumenta. Akcija *delete* može se izvršiti POST zahtevom, kao i pomoću parametra *OPERATION*, dok se operacije *add* i *update* mogu izvršiti samo POST zahtevom.

Standardni parametri za zahtev **Transaction** prema OGC WFS 1.0.0 i 1.1.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WFS)
<i>REQUEST</i>	Da	Naziv zahteva (Transaction)
<i>VERSION</i>	Ne	Verzija servisa
<i>FILTER</i>	Ne	OGC Filter Encoding
<i>BBOX</i>	Ne	Obuhvat karte
<i>FEATUREID</i>	Ne	Filtriraj objekte po ID-jevima
<i>TYPENAME</i>	Ne	Nazivi slojeva

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka
<i>OPERATION</i>	Ne	Zadajte operaciju
<i>EXP_FILTER</i>	Ne	Filtriranje izrazima

OPERATION

Ovaj parametar omogućava brisanje objekta bez korišćenja POST zahteva sa posebnim XML dokumentom.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WFS
&VERSION=1.1.0
&REQUEST=Transaction
&OPERATION=DELETE
&FEATUREID=24
```

Белешка

Parametri FEATUREID, BBOX i FILTER međusobno se isključuju i imaju prioritet ovim redosledom.

Dodavanje objekata

Primer POST zahteva:

```
wget --post-file=add.xml "http://localhost/qgisserver?SERVICE=WFS&
REQUEST=Transaction"
```

sa dokumentom *add.xml*:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:Transaction service="WFS" version="1.0.0" xmlns:wfs="http://www.opengis.net/
wfs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ogc="http://www.
opengis.net/ogc" xmlns="http://www.opengis.net/wfs" updateSequence="0"
xmlns:xlink="http://www.w3.org/1999/xlink" xsi:schemaLocation="http://www.
opengis.net/wfs http://schemas.opengis.net/wfs/1.0.0/WFS-capabilities.xsd"
xmlns:gml="http://www.opengis.net/gml" xmlns:ows="http://www.opengis.net/ows">
  <wfs:Insert idgen="GenerateNew">
    <qgs:places>
      <qgs:geometry>
        <gml:Point srsDimension="2" srsName="http://www.opengis.net/def/crs/EPSG/0/
4326">
          <gml:coordinates decimal="." cs="," ts=" ">-4.6167,48.3833</
gml:coordinates>
        </gml:Point>
      </qgs:geometry>
      <qgs:name>Locmaria-Plouzané</qgs:name>
    </qgs:places>
  </wfs:Insert>
</wfs:Transaction>
```

Ažuriranje objekata

Primer POST zahteva:

```
wget --post-file=update.xml "http://localhost/qgisserver?SERVICE=WFS&
↳REQUEST=Transaction"
```

sa dokumentom *update.xml*:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:Transaction service="WFS" version="1.0.0" xmlns:wfs="http://www.opengis.net/
↳wfs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ogc="http://www.
↳opengis.net/ogc" xmlns="http://www.opengis.net/wfs" updateSequence="0"
↳xmlns:xlink="http://www.w3.org/1999/xlink" xsi:schemaLocation="http://www.
↳opengis.net/wfs http://schemas.opengis.net/wfs/1.0.0/WFS-capabilities.xsd"
↳xmlns:gml="http://www.opengis.net/gml" xmlns:ows="http://www.opengis.net/ows">
  <wfs:Update typeName="places">
    <wfs:Property>
      <wfs:Name>name</wfs:Name>
      <wfs:Value>Lutece</wfs:Value>
    </wfs:Property>
    <ogc:Filter>
      <ogc:FeatureId fid="24"/>
    </ogc:Filter>
  </wfs:Update>
</wfs:Transaction>
```

Brisanje objekata

Primer POST zahteva:

```
wget --post-file=delete.xml "http://localhost/qgisserver?SERVICE=WFS&
↳REQUEST=Transaction"
```

sa dokumentom *delete.xml*:

```
<?xml version="1.0" encoding="UTF-8"?>
<wfs:Transaction service="WFS" version="1.0.0" xmlns:wfs="http://www.opengis.net/
↳wfs" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:ogc="http://www.
↳opengis.net/ogc" xmlns="http://www.opengis.net/wfs" updateSequence="0"
↳xmlns:xlink="http://www.w3.org/1999/xlink" xsi:schemaLocation="http://www.
↳opengis.net/wfs http://schemas.opengis.net/wfs/1.0.0/WFS-capabilities.xsd"
↳xmlns:gml="http://www.opengis.net/gml" xmlns:ows="http://www.opengis.net/ows">
  <wfs:Delete typeName="places">
    <ogc:Filter>
      <ogc:FeatureId fid="24"/>
    </ogc:Filter>
  </wfs:Delete>
</wfs:Transaction>
```

3.4 Web Coverage Service (WCS)

WCS standardi **1.0.0** i **1.1.1** implementirani u QGIS Serveru pružaju HTTP interfejs za pristup rasterskim podacima, koji se nazivaju *coverage*, iz QGIS projekta.

Specifikacije:

- WCS 1.0.0
- WCS 1.1.1

Standardni zahtevi koje pruža QGIS Server:

Zahtev	Opis
<i>GetCapabilities</i>	Vraća XML metapodatke sa informacijama o serveru
<i>DescribeCoverage</i>	Preuzima XML dokument sa dodatnim informacijama o coverage-ima
<i>GetCoverage</i>	Preuzima coverage

3.4.1 GetCapabilities

Standardni parametri za zahtev **GetCapabilities** prema OGC WCS 1.1.1 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WCS)
<i>REQUEST</i>	Da	Naziv zahteva (GetCapabilities)
<i>VERSION</i>	Ne	Verzija servisa

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WCS
&VERSION=1.1.1
&REQUEST=GetCapabilities
```

Primer XML dokumenta kada je jedan rasterski sloj (pod nazivom T20QPD_20171123T144719_TCI) objavljen u QGIS projektu za WCS servis:

```
<WCS_Capabilities xmlns="http://www.opengis.net/wcs" xmlns:xlink="http://www.w3.
→org/1999/xlink" xmlns:gml="http://www.opengis.net/gml" xmlns:xsi="http://www.w3.
→org/2001/XMLSchema-instance" version="1.0.0" updateSequence="0"
→xsi:schemaLocation="http://www.opengis.net/wcs http://schemas.opengis.net/wcs/1.
→0.0/wcsCapabilities.xsd">
  <Service>
    ...
  </Service>
  <Capability>
    ...
  </Capability>
  <ContentMetadata>
    <CoverageOfferingBrief>
      <name>T20QPD_20171123T144719_TCI</name>
      <label>T20QPD_20171123T144719_TCI</label>
      <lonLatEnvelope srsName="urn:ogc:def:crs:OGC:1.3:CRS84">
        <gml:pos>-61.585973 16.331189</gml:pos>
        <gml:pos>-61.52537 16.400376</gml:pos>
      </lonLatEnvelope>
```

(nastavak na sledećoj strani)

(настављено са претходне стране)

```

</CoverageOfferingBrief>
</ContentMetadata>
</WCS_Capabilities>

```

VERSION

Ovaj parametar omogućava zadavanje verzije servisa koja se koristi. Trenutno se vrednost verzije interno ne koristi i uvek se vraća na 1.1.1.

3.4.2 DescribeCoverage

Ovaj zahtev omogućava preuzimanje dodatnih informacija o coverage-ima, kao što su format izvora podataka u pozadini, broj kanala itd. Standardni parametri za zahtev **DescribeCoverage** prema OGC WCS 1.1.1 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WCS)
<i>REQUEST</i>	Da	Naziv zahteva (DescribeCoverage)
<i>VERSION</i>	Ne	Verzija servisa
<i>COVERAGE</i>	Ne	Zadaje coverage slojeve (WCS 1.0.0)
<i>IDENTIFIER</i>	Ne	Zadaje coverage slojeve (WCS 1.1.1)

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

XML dokument za GeoTIFF rasterski sloj sa 3 kanala izgleda ovako:

```

<CoverageDescription xmlns:xlink="http://www.w3.org/1999/xlink" xmlns="http://www.
↪opengis.net/wcs" xmlns:gml="http://www.opengis.net/gml" xmlns:xsi="http://www.w3.
↪org/2001/XMLSchema-instance" updateSequence="0" version="1.0.0"
↪xsi:schemaLocation="http://www.opengis.net/wcs http://schemas.opengis.net/wcs/1.
↪0.0/DescribeCoverage.xsd">
  <CoverageOffering>
    <name>T20QPD_20171123T144719_TCI</name>
    <label>T20QPD_20171123T144719_TCI</label>
    <lonLatEnvelope srsName="urn:ogc:def:crs:OGC:1.3:CRS84">
      ...
    </lonLatEnvelope>
    <domainSet>
      ...
    </domainSet>
    <rangeSet>
      <RangeSet>
        <name>Bands</name>
        <label>Bands</label>
        <axisDescription>
          <AxisDescription>
            <name>bands</name>
            <label>bands</label>
            <values>
              <singleValue>1</singleValue>

```

(nastavak na sledećoj strani)

(настављено са претходне стране)

```

        <singleValue>2</singleValue>
        <singleValue>3</singleValue>
    </values>
</AxisDescription>
</axisDescription>
</RangeSet>
</rangeSet>
<supportedCRSs>
...
</supportedCRSs>
<supportedFormats nativeFormat="raw binary">
    <formats>GeoTIFF</formats>
</supportedFormats>
</CoverageOffering>
</CoverageDescription>

```

COVERAGE

Ovaj parametar, definisan u WCS 1.0.0, omogućava zadavanje slojeva nad kojima se vrši upit za dodatne informacije. Nazivi moraju biti razdvojeni zarezom.

Pored toga, QGIS Server je uveo opciju za izbor slojeva po kratkom nazivu. Kratak naziv sloja može se podesiti kroz *Svojstva* ► *Metapodaci* u meniju sloja. Ako je kratak naziv definisan, podrazumevano se koristi umesto naziva sloja:

```

http://localhost/qgisserver?
SERVICE=WCS
&REQUEST=DescribeCoverage
&COVERAGE=mylayer1name,mylayer2shortname

```

Белешка

COVERAGE je obavezan ako IDENTIFIER nije postavljen.

IDENTIFIER

Ovaj parametar zamenjuje parametar *COVERAGE* u WCS 1.1.1. Ali QGIS Server ne filtrira prema parametru VERSION, pa IDENTIFIER i COVERAGE imaju isti efekat.

Белешка

IDENTIFIER je obavezan ako COVERAGE nije postavljen. Ako su definisana oba parametra, IDENTIFIER i COVERAGE, uvek se prioritarno koristi COVERAGE.

3.4.3 GetCoverage

Ovaj zahtev omogućava preuzimanje coverage-a prema određenim ograničenjima, kao što su obuhvat ili CRS. Standardni parametri za zahtev **DescribeCoverage** prema OGC WCS 1.1.1 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WCS)
<i>REQUEST</i>	Da	Naziv zahteva (GetCoverage)
<i>VERSION</i>	Ne	Verzija servisa
<i>COVERAGE</i>	Ne	Zadaje coverage slojeve (WCS 1.0.0)
<i>IDENTIFIER</i>	Ne	Zadaje coverage slojeve (WCS 1.1.1)
<i>WIDTH</i>	Da	Širina odgovora u pikselima
<i>HEIGHT</i>	Da	Visina odgovora u pikselima
<i>BBOX</i>	Da	Obuhvat karte u jedinicama CRS-a
<i>CRS</i>	Da	Koordinatni referentni sistem obuhvata
<i>RESPONSE_CRS</i>	Ne	Koordinatni referentni sistem odgovora

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

BBOX

Ovaj parametar omogućava zadavanje obuhvata karte u jedinicama tekućeg CRS-a. Koordinate moraju biti razdvojene zarezom. Parametar BBOX se formira kao `minx,miny,maxx,maxy`.

Primer URL-a:

```
http://localhost/qgisserver?
SERVICE=WCS
&REQUEST=GetCoverage
&IDENTIFIER=T20QPD_20171123T144719_TCI
&BBOX=647533,1805950,660987,1813940
&CRS=EPSG:32620
```

CRS

Ovaj parametar omogućava naznačavanje prostornog referentnog sistema parametra BBOX i mora biti formiran kao EPSG:XXXX.

RESPONSE_CRS

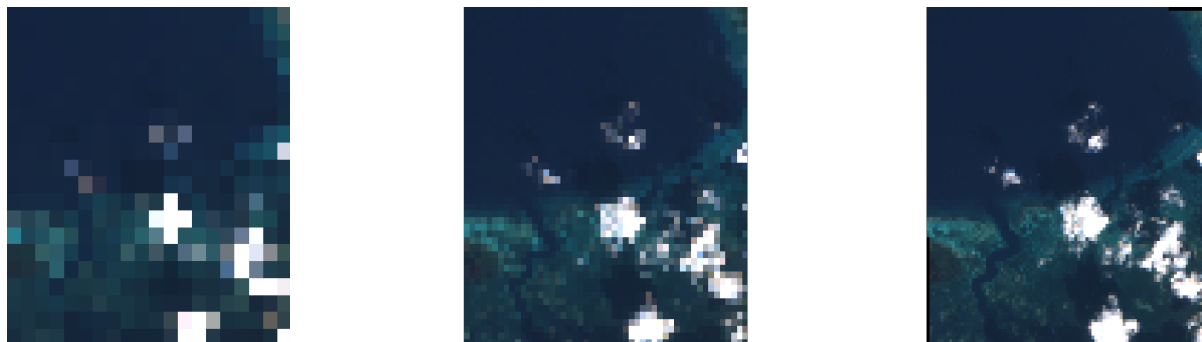
Ovaj parametar omogućava naznačavanje prostornog referentnog sistema izlaznog odgovora i mora biti formiran kao EPSG:XXXX. Podrazumevano se koristi CRS odgovarajućeg coverage sloja.

WIDTH

Ovaj parametar omogućava zadavanje širine izlazne slike u pikselima. Rezolucija slike odgovora zavisi od ove vrednosti.

HEIGHT

Ovaj parametar omogućava zadavanje visine izlazne slike u pikselima. Rezolucija slike odgovora zavisi od ove vrednosti.



Слика3.23: Слева наредно: WIDTH=20&HEIGHT=20, WIDTH=50&HEIGHT=50, WIDTH=100&HEIGHT=100

3.5 Web Map Tile Service (WMTS)

WMTS standard **1.0.0** implementiran u QGIS Serveru pruža HTTP interfejs za zahtevanje slika karte u pločicama, generisanih iz QGIS projekta. Tipičan WMTS zahtev definiše QGIS projekat koji se koristi, neke WMS parametre kao što su slojevi za iscrtavanje, kao i parametre pločica.

Dokument sa specifikacijama servisa:

- [WMTS 1.0.0](#)

Standardni zahtevi koje pruža QGIS Server:

Zahtev	Opis
<i>GetCapabilities</i>	Vraća XML metapodatke sa informacijama o serveru
<i>GetTile</i>	Vraća pločicu
<i>GetFeatureInfo</i>	Preuzima podatke (geometriju i vrednosti) za poziciju piksela

3.5.1 GetCapabilities

Standardni parametri za zahtev **GetCapabilities** prema OGC WMTS 1.0.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMTS)
<i>REQUEST</i>	Da	Naziv zahteva (GetCapabilities)

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/?
SERVICE=WMTS
&REQUEST=GetCapabilities
&MAP=/home/qgis/projects/world.qgs
```

3.5.2 GetTile

Standardni parametri za zahtev **GetTile** prema OGC WMTS 1.0.0 specifikacijama:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMTS)
<i>REQUEST</i>	Da	Naziv zahteva (GetTile)
<i>LAYER</i>	Da	Identifikator sloja
<i>FORMAT</i>	Da	Izlazni format pločice
<i>TILEMATRIXSET</i>	Da	Naziv piramide
<i>TILEMATRIX</i>	Da	Mreža
<i>TILEROW</i>	Da	Koordinata reda u mreži
<i>TILECOL</i>	Da	Koordinata kolone u mreži

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/?
SERVICE=WMTS
&REQUEST=GetTile
&MAP=/home/qgis/projects/world.qgs
&LAYER=mylayer
&FORMAT=image/png
&TILEMATRIXSET=EPSG:4326
&TILEROW=0
&TILECOL=0
```

FORMAT

Ovaj parametar se može koristiti za zadavanje formata slike pločice. Dostupne vrednosti su:

- jpg
- jpeg
- image/jpeg
- image/png

Ako je parametar *FORMAT* različit od jedne od ovih vrednosti, umesto njega se koristi podrazumevani format PNG.

TILEMATRIXSET

Ovaj parametar definiše CRS koji se koristi pri računanju piramide u pozadini. Format: EPSG:XXXX.

TILEMATRIX

Ovaj parametar omogućava definisanje matrice koja se koristi za izlaznu pločicu.

TILEROW

Ovaj parametar omogućava izbor reda pločice koja se preuzima unutar matrice.

TILECOL

Ovaj parametar omogućava izbor kolone pločice koja se preuzima unutar matrice.

3.5.3 GetFeatureInfo

Standardni parametri za zahtev **GetFeatureInfo** prema OGC WMTS 1.0.0 specifikaciji:

Parametar	Obavezno	Opis
<i>SERVICE</i>	Da	Naziv servisa (WMTS)
<i>REQUEST</i>	Da	Naziv zahteva (GetFeatureInfo)
<i>LAYER</i>	Da	Identifikator sloja
<i>INFOFORMAT</i>	Ne	Izlazni format
<i>I</i>	Ne	X koordinata piksela
<i>J</i>	Ne	Y koordinata piksela
<i>TILEMATRIXSET</i>	Da	Naziv piramide
<i>TILEMATRIX</i>	Mreža	
<i>TILEROW</i>	Da	Koordinata reda u mreži
<i>TILECOL</i>	Da	Koordinata kolone u mreži

Pored standardnih, QGIS Server podržava i sledeće dodatne parametre:

Parametar	Obavezno	Opis
<i>MAP</i>	Da	QGIS projektna datoteka

Primer URL-a:

```
http://localhost/?
SERVICE=WMTS
&REQUEST=GetFeatureInfo
&MAP=/home/qgis/projects/world.qgs
&LAYER=mylayer
&INFOFORMAT=image/html
&I=10
&J=5
```

INFOFORMAT

Ovaj parametar omogućava definisanje izlaznog formata rezultata. Dostupne vrednosti su:

- text/xml
- text/html
- text/plain
- application/vnd.ogc.gml

Podrazumevana vrednost je text/plain.

I

Ovaj parametar omogućava definisanje X koordinate piksela za koji želimo da preuzmemo informacije u pozadini.

J

Ovaj parametar omogućava definisanje Y koordinate piksela za koji želimo da preuzmemo informacije u pozadini.

3.6 OGC API Features

OGC API Features (OAPIF) is the first implementation of the new generation of OGC protocols. It is described by the [OGC API - Features - Part 1: Core](#) document.

The API can be reached on typical installations via `http://localhost/qgisserver/wfs3`.

Here is a quick informal summary of the most important differences between the well known WFS protocol and OAPIF:

- OAPIF is based on a [REST API](#)
- OAPIF must follow the [OPENAPI](#) specifications
- OAPIF supports multiple output formats but it does not dictate any (only GeoJSON and HTML are currently available in QGIS OAPIF) and it uses [content negotiation](#) to determine which format is to be served to the client
- JSON and HTML are first class citizens in OAPIF
- OAPIF is self-documenting (through the `/api` endpoint)
- OAPIF is fully navigable (through links) and browsable

Важно

While the OGC API Features implementation in QGIS can make use of the `MAP` parameter to specify the project file, no extra query parameters are allowed by the OPENAPI specification. For this reason it is strongly recommended that `MAP` is not exposed in the URL and the project file is specified in the environment by other means (i.e. setting `QGIS_PROJECT_FILE` in the environment through a web server rewrite rule).

Белешка

The **API** endpoint provides comprehensive documentation of all supported parameters and output formats of your service. The following paragraphs will only describe the most important ones.

3.6.1 Resource representation

The implementation of OGC API Features in QGIS Server currently supports the following resource representation (output) formats:

- HTML
- JSON

The format that is actually served will depend on content negotiation, but a specific format can be explicitly requested by appending a format specifier to the endpoints.

Supported format specifier extensions are:

- `.json`
- `.html`

Additional format specifier aliases may be defined by specific endpoints:

- `.openapi`: alias for `.json` supported by the **API** endpoint
- `.geojson`: alias for `.json` supported by the **Features** and **Feature** endpoints

3.6.2 Endpoints

The API provides a list of endpoints that the clients can retrieve. The system is designed in such a way that every response provides a set of links to navigate through all the provided resources.

Endpoints points provided by the QGIS implementation are:

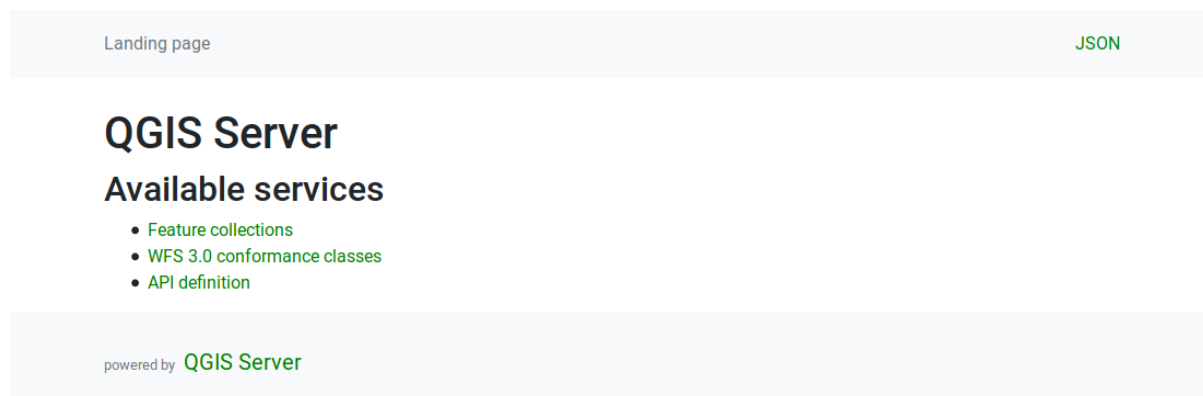
Назив	Path	Opis
Landing Page	/	General information about the service and provides links to all available endpoints
Conformance	/conformance	Information about the conformance of the service to the standards
API	/api	Full description of the endpoints provided by the service and the returned documents structure
Collections	/collections	List of all collections (i.e. 'vector layers') provided by the service
Collection	/collections/{collectionId}	Information about a collection (name, metadata, extent etc.)
Features	/collections/{collectionId}/items	List of the features provided by the collection
Feature	/collections/{collectionId}/items/{featureId}	Information about a single feature

Similar to WFS-T (transactional Web Feature Service), it is possible to add, update and delete features (CRUD). The respective requests are described on „/api”.

Landing Page

The main endpoint is the **Landing Page**. From that page it is possible to navigate to all the available service endpoints. The **Landing Page** must provide links to

- the API definition (path `/api` link relations `service-desc` and `service-doc`),
- the Conformance declaration (path `/conformance`, link relation `conformance`), and
- the Collections (path `/collections`, link relation `data`).



Слика3.24: Server OAPIF landing page

API Definition

The **API Definition** is an OPENAPI-compliant description of the API provided by the service. In its HTML representation it is a browsable page where all the endpoints and their response formats are accurately listed and documented. The path of this endpoint is `/api`.

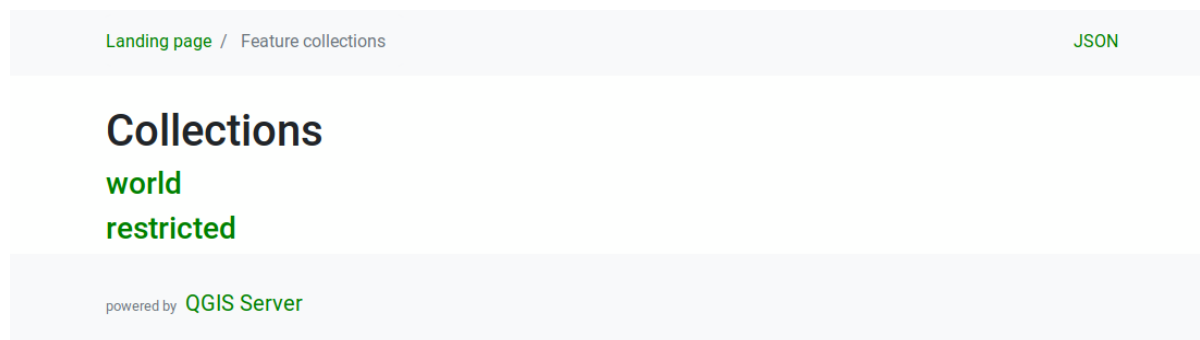
The API definition provides a comprehensive and authoritative documentation of the service, including all supported parameters and returned formats.

Белешка

This endpoint is analogue to WFS's `GetCapabilities`

Collections list

The collections endpoint provides a list of all the collections available in the service. Since the service „serves” a single QGIS project the collections are the vector layers from the current project (if they were published as WFS in the project properties). The path of this endpoint is `/collections/`.

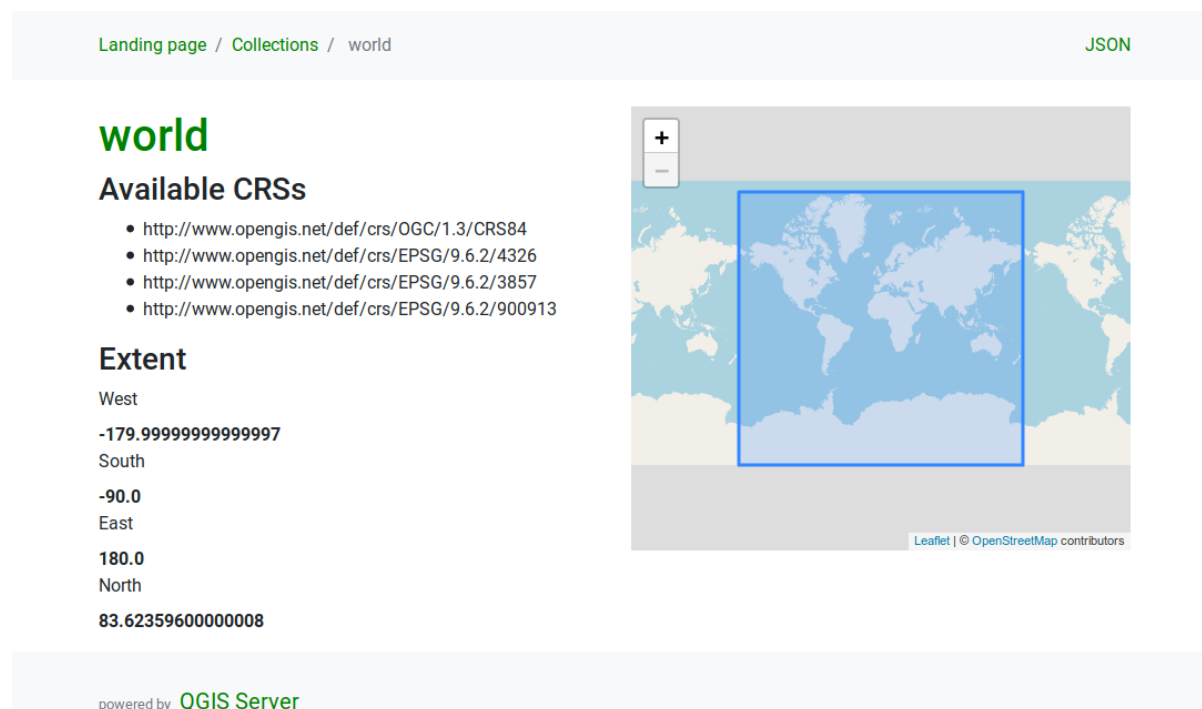


Слика3.25: Server OAPIF collections list page

Collection detail

While the collections endpoint does not provide detailed information about each available collection, that information is available in the `/collections/{collectionId}` endpoints. Typical information includes the extent, a description, CRSs and other metadata.

The HTML representation also provides a browsable map with the available features.



Слика3.26: Server OAPIF collection detail page

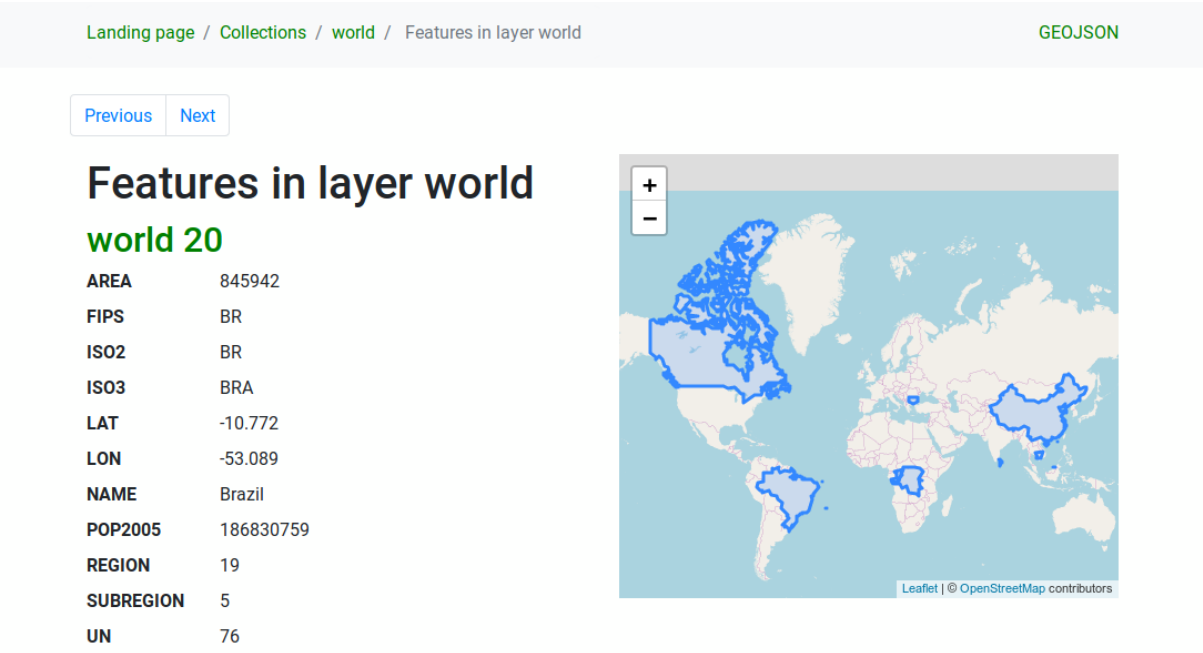
Features list

This endpoint provides a list of all features in a collection knowing the collection ID. The path of this endpoint is `/collections/{collectionId}/items`.

The HTML representation also provides a browsable map with the available features.

Белешка

This endpoint is analogue to `GetFeature` in WFS 1 and WFS 2.



Слика3.27: Server OAPIF features list page

Feature detail

This endpoint provides all the available information about a single feature, including the feature attributes and its geometry. The path of this endpoint is `/collections/{collectionId}/items/{itemId}`.

The HTML representation also provides a browsable map with the feature geometry.



Слика3.28: Server OAPIF feature detail page

3.6.3 Pagination

Pagination of a long list of features is implemented in the OGC API through `next` and `prev` links, QGIS server constructs these links by appending `limit` and `offset` as query string parameters.

Primer URL-a:

```
http://localhost/qgisserver/wfs3/collection_one/items.json?offset=10&limit=10
```

Белешка

The maximum acceptable value for `limit` can be configured with the `QGIS_SERVER_API_WFS3_MAX_LIMIT` server configuration setting (see: *Promenljive okruženja*).

3.6.4 Feature filtering

The features available in a collection can be filtered/searched by specifying one or more filters.

Date and time filter

Collections with date and/or datetime attributes can be filtered by specifying a `datetime` argument in the query string. By default the first date/datetime field is used for filtering. This behavior can be configured by setting a „Date” or „Time” dimension in the *QGIS Server ► Dimension* section of the layer properties dialog.

The date and time filtering syntax is fully described in the *API Definition* and also supports ranges (begin and end values are included) in addition to single values.

URL examples:

Returns only the features with date dimension matching 2019-01-01

```
http://localhost/qgisserver/wfs3/collection_one/items.json?datetime=2019-01-01
```

Returns only the features with datetime dimension matching 2019-01-01T01:01:01

```
http://localhost/qgisserver/wfs3/collection_one/items.json?datetime=2019-01-01T01:01:01
```

Returns only the features with datetime dimension in the range 2019-01-01T01:01:01 - 2019-01-01T12:00:00

```
http://localhost/qgisserver/wfs3/collection_one/items.json?datetime=2019-01-01T01:01:01/2019-01-01T12:00:00
```

Bounding box filter

A bounding box spatial filter can be specified with the `bbox` parameter:

The order of the comma separated elements is:

- Lower left corner, WGS 84 longitude
- Lower left corner, WGS 84 latitude
- Upper right corner, WGS 84 longitude
- Upper right corner, WGS 84 latitude

Белешка

The OGC specifications also allow a 6 item bbox specifier where the third and sixth items are the Z components, this is not yet supported by QGIS server.

Primer URL-a:

```
http://localhost/qgisserver/wfs3/collection_one/items.json?bbox=-180,-90,180,90
```

If the CRS of the bounding box is not [WGS 84](#), a different CRS can be specified by using the optional parameter `bbox-crs`. The CRS format identifier must be in the [OGC URI](#) format:

Primer URL-a:

```
http://localhost/qgisserver/wfs3/collection_one/items.json?bbox=913191,5606014,
↪913234,5606029&bbox-crs=http://www.opengis.net/def/crs/EPSG/9.6.2/3857
```

Attribute filters

Attribute filters can be combined with the bounding box filter and they are in the general form: `<attribute name>=<attribute value>`. Multiple filters can be combined using the AND operator.

Primer URL-a:

filters all features where attribute name equals „my value”

```
http://localhost/qgisserver/wfs3/collection_one/items.json?attribute_one=my%20value
```

Partial matches are also supported by using a * („star”) operator:

Primer URL-a:

filters all features where attribute name ends with „value”

```
http://localhost/qgisserver/wfs3/collection_one/items.json?attribute_one=*value
```

3.6.5 Feature sorting

It is possible to order the result set by field value using the `orderby` query parameter.

The results are sorted in ascending order by default. To sort the results in descending order, a boolean flag (`sortdesc`) can be set:

```
http://localhost/qgisserver/wfs3/collection_one/items.json?orderby=name&sortdesc=1
```

3.6.6 Attribute selection

The feature attributes returned by a *Features list* call can be limited by adding a comma separated list of attribute names in the optional `properties` query string argument.

Primer URL-a:

returns only the name attribute

```
http://localhost/qgisserver/wfs3/collection_one/items.json?properties=name
```

3.6.7 Customize the HTML pages

The HTML representation uses a set of HTML templates to generate the response. The template is parsed by a template engine called `inja`. The templates can be customized by overriding them (see: *Template overrides*). The

template has access to the same data that are available to the JSON representation and a few additional functions are available to the template:

Custom template functions

- `escape( string )`: escapes XHTML tag angle brackets
- `path_append( path )`: appends a directory path to the current url
- `path_chomp( n )`: removes the specified number „n” of directory components from the current url path
- `json_dump( )`: prints the JSON data passed to the template
- `static( path )`: returns the full URL to the specified static path. For example: „static(„/style/black.css”)” with a root path „http://localhost/qgisserver/wfs3” will return „http://localhost/qgisserver/wfs3/static/style/black.css”.
- `links_filter( links, key, value )`: Returns filtered links from a link list
- `content_type_name( content_type )`: Returns a short name from a content type, for example „text/html” will return „HTML”
- `nl2br( text )`: Returns the input text with all newlines replaced by „
” tags
- `starts_with( string, prefix )`: returns true if a string begins with the provided string prefix, false otherwise

Template overrides

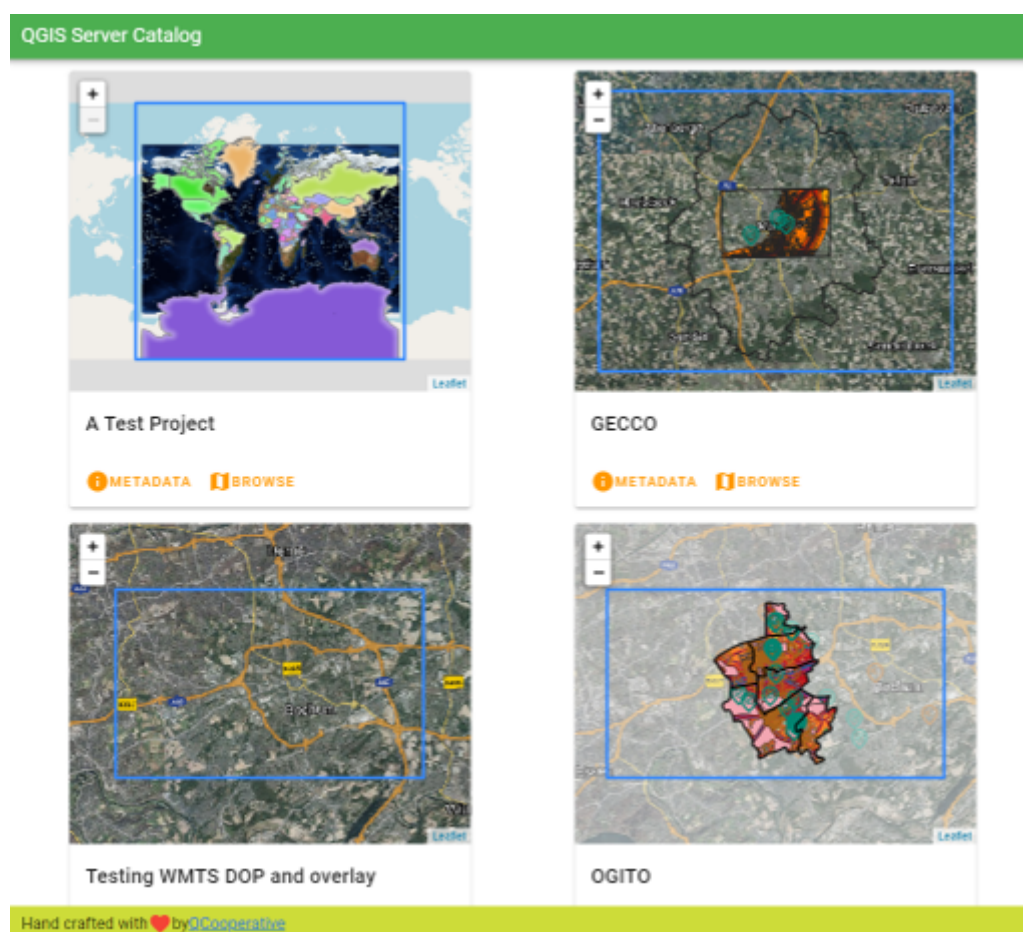
Templates and static assets are stored in subdirectories of the QGIS server default API resource directory (`/usr/share/qgis/resources/server/api/` on a Linux system), the base directory can be customized by changing the environment variable `QGIS_SERVER_API_RESOURCES_DIRECTORY`.

A typical Linux installation will have the following directory tree:

```
/usr/share/qgis/resources/server/api/
├── ogc
│   ├── schema.json
│   ├── static
│   │   ├── jsonFormatter.min.css
│   │   ├── jsonFormatter.min.js
│   │   └── style.css
│   └── templates
│       └── wfs3
│           ├── describeCollection.html
│           ├── describeCollections.html
│           ├── footer.html
│           ├── getApiDescription.html
│           ├── getFeature.html
│           ├── getFeatures.html
│           ├── getLandingPage.html
│           ├── getRequirementClasses.html
│           ├── header.html
│           ├── leaflet_map.html
│           └── links.html
```

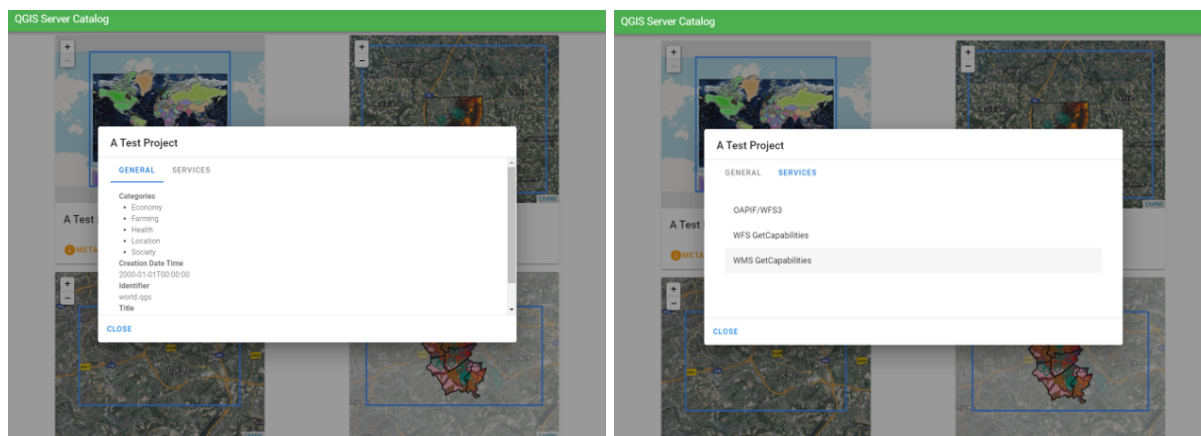
To override the templates you can copy the whole tree to another location and point `QGIS_SERVER_API_RESOURCES_DIRECTORY` to the new location.

The QGIS Server Catalog is a simple catalog that shows the list of QGIS projects served by the QGIS Server. It provides a user-friendly fully browsable website with basic mapping capabilities to quickly browse the datasets exposed through those QGIS projects. The catalog can be configured using the environment variables starting with QGIS_SERVER_LANDING_PAGE (see *Promenljive okruženja*).



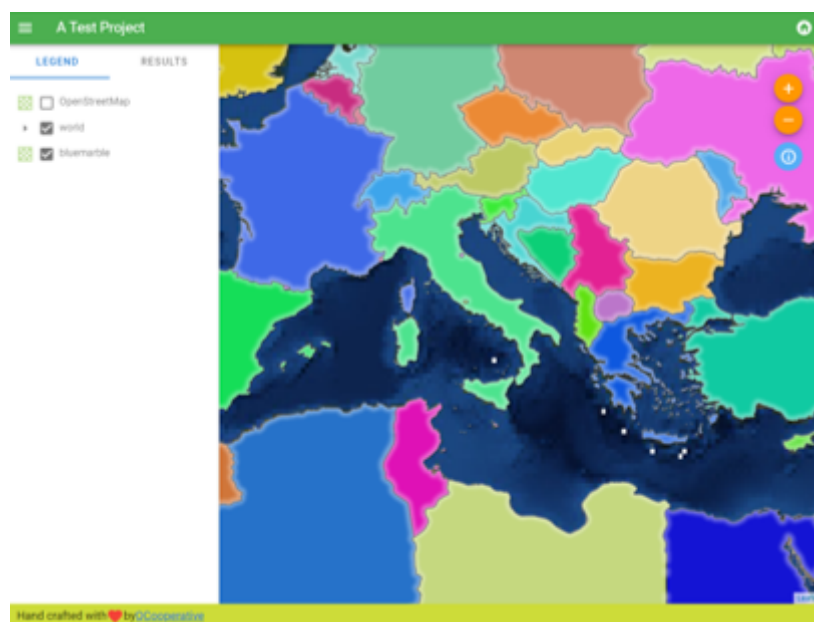
Слика4.1: Server Catalog project list page

You can consult the metadata associated to a project and the services that it provides. Links to those services are also given.



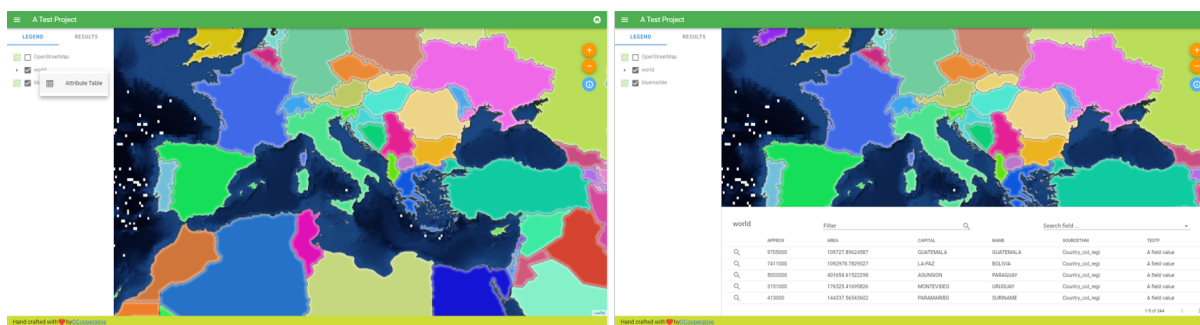
Слика4.2: Server Catalog, metadata associated to a project and services (links to) that it provides.

By browsing a project, it is listed the dataset that it serves.



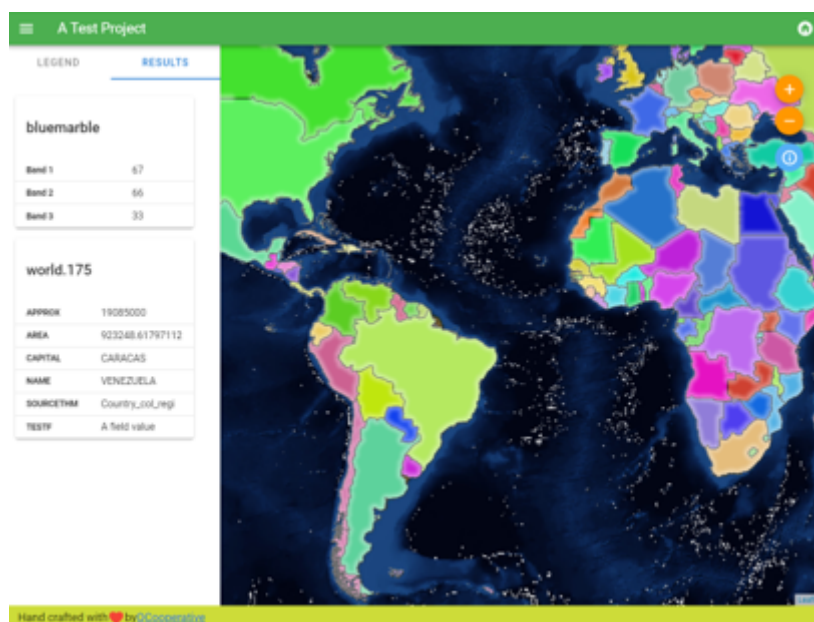
Слика4.3: Browsing a dataset served by a project in the Server Catalog

Use Right click on a layer to display the attribute table associated to it.



Слика4.4: Attribute table associated to a layer

It is possible to consult information of the elements in the map as shown in the image below:



Слика4.5: Consulting information of a map element

5.1 List of plugins

Plugins can also be installed on QGIS Server.

Some plugins designed for server can be found on the official [QGIS repository](#).

Install only plugins you need for your own purpose. On QGIS server, plugins are like hooks into QGIS server, they can alter inputs or outputs of QGIS server. They can produce unexpected result if you don't know how the plugin works. Please refer to their respective documentation or the application that needs QGIS server plugins to know which plugin can be useful for you.

5.2 Location of plugins

By default, on Debian based systems, QGIS Server will look for plugins located in `/usr/lib/qgis/plugins`. The default value is displayed when QGIS Server is starting, in the logs. It's possible to set a custom path by defining the environment variable `QGIS_PLUGINPATH` in the web server configuration.

5.3 Installation

5.3.1 Manually with a ZIP

As an example, to install the **HelloWorld** plugin for testing the server, using a specific folder, you first have to create a directory to hold server plugins. This will be specified in the virtual host configuration and passed on to the server through an environment variable:

```
mkdir -p /var/www/qgis-server/plugins
cd /var/www/qgis-server/plugins
wget https://github.com/elpaso/qgis-helloserver/archive/master.zip
unzip master.zip
mv qgis-helloserver-master HelloServer
```

Упозорење

According to its [description](#), HelloServer plugin is designed for development and demonstration purposes. Do not keep this plugin for production if you don't need it.

5.3.2 With a command line tool

If you need to install and regularly upgrade plugins which are stored in the QGIS plugin repository, you may use the [QGIS-Plugin-Manager](#). It's a tool to help you manage plugins from the command line.

The installation is using pip. Installing in a virtual environment is a good practice but not required:

```
pip3 install qgis-plugin-manager
```

To upgrade the tool:

```
pip3 install --upgrade qgis-plugin-manager
```

Then, you can use the `qgis-plugin-manager` executable from the command line:

```
cd /var/www/qgis-server/plugins
qgis-plugin-manager list
```

QGIS server version 3.19.0
List all plugins in /var/www/qgis-server/plugins

```
-----
↪ | Folder          | Name                  | Version | Experimental | ↪
↪ | QGIS min | QGIS max | Author                  | Action Δ      |
-----
↪ |-----
↪ |wfsOutputExtension |wfsOutputExtension |1.6.2    |              | 3.
↪ 0          |          |3Liz          |          |              |
↪ |qgis_server_render_geojson |GeoJson Renderer |v0.4     |              | 3.
↪ 4          |          |Matthias Kuhn (OPENGIS.ch) |          |              |
↪ |DataPlotly        |Data Plotly        |3.7.1    |              | 3.
↪ 4          |3.98          |Matteo Ghetta (Faunalia)  |Upgrade to 3.8.1 |
-----
↪ |-----
```

We suggest you to read the full documentation in the [readme file](#) to know how to install or upgrade plugins with this tool.

5.4 HTTP Server configuration

5.4.1 Apache

To be able to use server plugins, FastCGI needs to know where to look. So, we have to modify the Apache configuration file to indicate the `QGIS_PLUGINPATH` environment variable to FastCGI:

```
FcgidInitialEnv QGIS_PLUGINPATH "/var/www/qgis-server/plugins"
```

Moreover, a basic HTTP authorization is necessary to play with the HelloWorld plugin previously introduced. So we have to update the Apache configuration file a last time:

```
# Needed for QGIS HelloServer plugin HTTP BASIC auth
<IfModule mod_fcgid.c>
    RewriteEngine on
```

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(настављено са претходне стране)

```
RewriteCond %{HTTP:Authorization} .  
RewriteRule .* - [E=HTTP_AUTHORIZATION:%{HTTP:Authorization}]  
</IfModule>
```

Then, restart Apache:

```
systemctl restart apache2
```

5.5 How to use a plugin

Test the server with the HelloWorld plugin:

```
wget -q -O - "http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=HELLO"  
HelloServer!
```

You can have a look at the default GetCapabilities of the QGIS server at:

```
http://localhost/cgi-bin/qgis_mapserv.fcgi?SERVICE=WMS&VERSION=1.3.0&  
↪REQUEST=GetCapabilities
```


Napredna konfiguracija

6.1 Beleženje u dnevnik

Da biste beležili zahteve poslate serveru, morate postaviti sledeću promenljivu okruženja:

- `QGIS_SERVER_LOG_STDERR`

Sledećim promenljivama beleženje se može dodatno prilagoditi:

- `QGIS_SERVER_LOG_LEVEL`
- `QGIS_SERVER_LOG_PROFILE`

6.2 Promenljive okruženja

Neke aspekte QGIS Server-a možete konfigurisati postavljanjem **promenljivih okruženja**.

U zavisnosti od HTTP servera i načina na koji pokrećete QGIS Server, postoji nekoliko načina za definisanje ovih promenljivih. Ovo je u potpunosti opisano u *Apache HTTP Server*.

Naziv i opis	Podrazumevano	Servisi
QGIS_OPTIONS_PATH Zadaje putanju do direktorijuma sa podešavanjima. Radi na isti način kao opcija <code>--optionspath</code> QGIS aplikacije. Traži datoteku podešavanja u <code><QGIS_OPTIONS_PATH>/QGIS/QGIS3.ini</code> .	"	Sve
QGIS_PLUGINPATH Korisno ako koristite Python dodatke za server, ovo postavlja folder u kojem se traže Python dodaci.	"	Sve

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Табела 6.1 – настављено са претходне стране

Naziv i opis	Podrazumevano	Servisi
QGIS_PROJECT_FILE Datoteka projekta .qgs ili .qgz, obično prosleđena kao parametar u niski upita (sa <i>MAP</i>); možete je postaviti i kao promenljivu okruženja (na primer korišćenjem Apache modula <i>mod_rewrite</i>).	”	Sve
Белешка Takođe možete naznačiti projekat sačuvan u PostgreSQL-u, npr. <code>postgresql://localhost:5432?sslmode=disable&dbname=mydb&schema=myschema&project=</code> ili unutar geopackage datoteke, npr. <code>geopackage:/path/to/geopackage/file.gpkg?projectName=myProjectName</code>.		
QGIS_SERVER_ALLOWED_EXTRA_SQL_TOKENS Lista niski razdvojenih zarezima koje predstavljaju dozvoljene dodatne SQL tokene prihvaćene kao komponente filtera objekata.	”	WMS
QGIS_SERVER_API_RESOURCES_DIRECTORY Bazni direktorijum za sve statičke resurse OGC API-ja (kao što je OA-PIF/WFS3) (HTML šabloni, CSS, JS, ...)	zavisi od pakovanja	OA-PIF/WFS3
QGIS_SERVER_APPLICATION_NAME Naziv aplikacije koji se koristi, na primer pri povezivanju sa bazom podataka radi identifikacije povezane instance QGIS server-a	QGIS3 server	Sve
QGIS_SERVER_API_WFS3_MAX_LIMIT Maksimalna vrednost za <i>limit</i> u OA-PIF/WFS3 zahtevu za objektima.	10000	OA-PIF/WFS3
QGIS_SERVER_CACHE_DIRECTORY Zadaje direktorijum mrežne keš memorije u sistemu datoteka.	cache u direktorijumu profila	Sve
QGIS_SERVER_CACHE_SIZE Postavlja veličinu mrežne keš memorije u bajtovima.	50 MB	Sve
QGIS_SERVER_CAPABILITIES_CACHE_SIZE Maksimalan broj mogućnosti projekta koje se keširaju.	40	Sve
QGIS_SERVER_DISABLE_GETPRINT Ovo je opcija na nivou projekta za poboljšanje vremena čitanja projekta onemogućavanjem učitavanja rasporeda. Aktiviranje ove opcije onemogućava QGIS WMS GetPrint zahtev. Pоставите ovu zastavicu QGIS projekta da se rasporedi ne učitavaju.	false	WMS
QGIS_SERVER_FORCE_READONLY_LAYERS Prisiljava QGIS Server da otvori sve slojeve u režimu samo za čitanje	false	Sve
QGIS_SERVER_IGNORE_BAD_LAYERS „Loši“ slojevi su slojevi koji se ne mogu učitati. Podrazumevano ponašanje QGIS Server-a je da projekat smatra nedostupnim ako sadrži loš sloj. Podrazumevano ponašanje može se zameniti postavljanjem ove promenljive na 1 ili <i>true</i> . U tom slučaju, „loši“ slojevi će jednostavno biti zanemareni, a projekat će se smatrati ispravnim i dostupnim.	false	Sve
QGIS_SERVER_LANDING_PAGE_PREFIX Prefiks komponente putanje bazne URL adrese određene stranice	”	Sve
QGIS_SERVER_LANDING_PAGE_PROJECTS_DIRECTORIES Direktorijumi koje servis određene stranice koristi za pronalaženje .qgs i .qgz projekata	”	Sve
QGIS_SERVER_LANDING_PAGE_PROJECTS_PG_CONNECTIONS PostgreSQL niske za povezivanje koje servis određene stranice koristi za pronalaženje projekata	”	Sve

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Табела 6.1 – настављено са претходне стране

Naziv i opis	Podrazumevano	Servisi
QGIS_SERVER_LOG_FILE Zadajte putanju i naziv datoteke. Uverite se da server ima odgovarajuće dozvole za upisivanje u datoteku. Datoteka bi trebalo da se napravi automatski, samo pošaljite neke zahteve serveru. Ako je nema, proverite dozvole.	”	Sve
Упозорење QGIS_SERVER_LOG_FILE je zastareo od QGIS 3.4, umesto njega koristite QGIS_SERVER_LOG_STDERR. Podrška za beleženje u datoteku biće uklonjena u QGIS 5.0.		
QGIS_SERVER_LOG_LEVEL Zadajte željeni nivo dnevnika. Dostupne vrednosti su: 0 ili INFO (beleži sve zahteve) 1 ili WARNING 2 ili CRITICAL (beleži samo kritične greške, pogodno za produkcione svrhe)	0	Sve
QGIS_SERVER_LOG_PROFILE Dodaje detaljne informacije o profilu u dnevnike, deluje samo kada je QGIS_SERVER_LOG_LEVEL=0	false	Sve
QGIS_SERVER_LOG_STDERR Aktivira beleženje u stderr. Ova promenljiva nema efekta kada je QGIS_SERVER_LOG_FILE postavljena. 0 ili false (neosetljivo na velika/mala slova) 1 ili true (neosetljivo na velika/mala slova)	false	Sve
QGIS_SERVER_MAX_THREADS Broj niti koje se koriste kada je aktivirano paralelno iscertavanje. Ako je vrednost -1, koristi broj procesorskih jezgara.	-1	Sve
QGIS_SERVER_OVERRIDE_SYSTEM_LOCALE Postavlja LOCALE koji QGIS server koristi. Podrazumevana vrednost je prazna (bez zamene). Primer: de_CH.utf8	”	Sve
QGIS_SERVER_PARALLEL_RENDERING Aktivira paralelno iscertavanje za WMS GetMap zahteve. Podrazumevano je onemogućeno (false). Dostupne vrednosti su: 0 ili false (neosetljivo na velika/mala slova) 1 ili true (neosetljivo na velika/mala slova)	false	WMS
QGIS_SERVER_PROJECT_CACHE_CHECK_INTERVAL Kontroliše interval periodične strategije za poništavanje keša, u milisekundama. Podrazumevano je 0, što bira nasleđeni nadzornik sistema datoteka.		Sve
QGIS_SERVER_PROJECT_CACHE_SIZE Postavlja maksimalan broj datoteka QGIS projekata (.qgs/.qgz) koje se čuvaju u kešu servera. Ovo može poboljšati performanse pri opsluživanju istih projekata više puta.	100	Sve

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Табела 6.1 – настављено са претходне стране

Naziv i opis	Podrazumevano	Servisi
QGIS_SERVER_PROJECT_CACHE_STRATEGY Definiše metod za poništavanje keša projekta. Dostupne strategije su: <code>filesystem</code>: koristi strategiju nadzornika sistema datoteka <code>periodic</code>: koristi vrednost poslednje izmene projekta za proveru promena u konfiguraciji projekta. Zgodno na atipičnim sistemima datoteka, kao što je NFS, ili kada je datoteka projekta sačuvana u sistemu baze podataka kao što je PostgreSQL. <code>off</code>: potpuno onemogućava interno poništavanje keša	filesystem	Sve
QGIS_SERVER_SERVICE_URL Ovo je opcija za postavljanje URL-a servisa ako nije prisutan u projektu. URL servisa se definiše iz (po redosledu prioriteta): - Vrednost definisana u projektu po servisu - Promenljiva okruženja <code>QGIS_SERVER_<service>_SERVICE_URL</code> - Promenljiva okruženja <code>QGIS_SERVER_SERVICE_URL</code> - Zaglavlje <code>X-Qgis-<service>-Service-Url</code> - Zaglavlje <code>X-Qgis-Service-Url</code> - Izgradnja iz zaglavlja <code>Forwarded</code> - Izgradnja iz zaglavlja <code>X-Forwarded-Host</code> i <code>X-Forwarded-Proto</code> - Izgradnja iz zaglavlja <code>Host</code> i protokola servera - Izgradnja iz naziva servera i protokola servera. U poslednja četiri slučaja, rezultujući URL servisa zasniva se na parametru <code>MAP</code> datom u niski upita i na dolaznom zahtevu putanje.	"	Sve
QGIS_SERVER_SHOW_GROUP_SEPARATOR Definiše da li za numeričke vrednosti treba koristiti separator grupa (npr. separator hiljada) (npr. u <code>GetFeatureInfo</code> odgovorima). Podrazumevana vrednost je 0. 0 ili <code>false</code> (neosetljivo na velika/mala slova) 1 ili <code>true</code> (neosetljivo na velika/mala slova)	false	WMS
QGIS_SERVER_TRUST_LAYER_METADATA Ovo je opcija na nivou projekta za poboljšanje vremena čitanja projekta korišćenjem obuhvata vektorskih slojeva definisanih u metapodacima projekta i onemogućavanjem provere jedinstvenosti primarnog ključa PostgreSQL/PostGIS sloja. Poverenje metapodacima sloja može se prisiliti postavljanjem ove promenljive na 1 ili <code>true</code> . Obuhvat vektorskog sloja tada će biti onaj definisan u projektu, a primarni ključ PostgreSQL/PostGIS sloja definisan u izvoru podataka smatra se jedinstvenim bez provere. Ne koristite je ako obuhvat slojeva nije fiksiran tokom korišćenja projekta.	false	Sve
QGIS_SERVER_WCS_SERVICE_URL Ovo je opcija za postavljanje URL-a servisa ako nije prisutan u projektu. Za više informacija pogledajte QGIS_SERVER_SERVICE_URL .	"	WCS
QGIS_SERVER_WFS_SERVICE_URL Ovo je opcija za postavljanje URL-a servisa ako nije prisutan u projektu. Za više informacija pogledajte QGIS_SERVER_SERVICE_URL .	"	WFS
QGIS_SERVER_WMS_MAX_HEIGHT Maksimalna visina za WMS zahtev. Koristi se konzervativnija vrednost između ove i projektne. Ako je vrednost -1, znači da nema postavljenog maksimuma.	-1	WMS

наставак на следећој страни

Табела 6.1 – настављено са претходне стране

Naziv i opis	Podrazumevano	Servisi
QGIS_SERVER_WMS_MAX_WIDTH Maksimalna širina za WMS zahtev. Koristi se konzervativnija vrednost između ove i projektne. Ako je vrednost -1, znači da nema postavljenog maksimuma.	-1	WMS
QGIS_SERVER_WMS_SERVICE_URL Ovo je opcija za postavljanje URL-a servisa ako nije prisutan u projektu. Za više informacija pogledajte QGIS_SERVER_SERVICE_URL .	"	WMS
QGIS_SERVER_WMTS_SERVICE_URL Ovo je opcija za postavljanje URL-a servisa ako nije prisutan u projektu. Za više informacija pogledajte QGIS_SERVER_SERVICE_URL .	"	WMTS
QUERY_STRING Niska upita, obično prosleđena od strane veb servera. Ova promenljiva može biti korisna pri testiranju QGIS server binarne datoteke iz komandne linije. Na primer za testiranje GetCapabilities zahteva iz komandne linije ka projektu koji takođe zahteva PostgreSQL vezu definisanu u pg_service.conf datoteci: PGSERVICEFILE=/etc/pg_service.conf \ QUERY_STRING="MAP=/home/projects/world.qgs& ↪SERVICE=WMS&REQUEST=GetCapabilities" \ /usr/lib/cgi-bin/qgis_mapserv.fcgi Rezultat treba da bude ili sadržaj GetCapabilities odgovora ili, ako nešto nije u redu, poruka greške.	"	Sve

6.3 Rezime podešavanja

Kada se QGIS Server pokreće, imate rezime svih podešivih parametara zahvaljujući promenljivama okruženja. Osim toga, prikazuje se i trenutno korišćena vrednost i njeno poreklo.

Na primer sa spawn-fcgi:

```
export QGIS_OPTIONS_PATH=/home/user/.local/share/QGIS/QGIS3/profiles/default/
export QGIS_SERVER_LOG_STDERR=1
export QGIS_SERVER_LOG_LEVEL=2
spawn-fcgi -f /usr/lib/cgi-bin/qgis_mapserv.fcgi -s /tmp/qgisserver.sock -U www-
↪data -G www-data -n

QGIS Server Settings:

- QGIS_OPTIONS_PATH / '' (Override the default path for user configuration): '/
↪home/user/.local/share/QGIS/QGIS3/profiles/default/' (read from ENVIRONMENT_
↪VARIABLE)

- QGIS_SERVER_PARALLEL_RENDERING / '/qgis/parallel_rendering' (Activate/
↪Deactivate parallel rendering for WMS getMap request): 'true' (read from INI_
↪FILE)

- QGIS_SERVER_MAX_THREADS / '/qgis/max_threads' (Number of threads to use when_
↪parallel rendering is activated): '4' (read from INI_FILE)

- QGIS_SERVER_LOG_LEVEL / '' (Log level): '2' (read from ENVIRONMENT_VARIABLE)

- QGIS_SERVER_LOG_STDERR / '' (Activate/Deactivate logging to stderr): '1'_
```

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(настављено са претходне стране)

```
↪(read from ENVIRONMENT_VARIABLE)

- QGIS_PROJECT_FILE / '' (QGIS project file): '' (read from DEFAULT_VALUE)

- MAX_CACHE_LAYERS / '' (Specify the maximum number of cached layers): '100'↪
↪(read from DEFAULT_VALUE)

- QGIS_SERVER_CACHE_DIRECTORY / '/cache/directory' (Specify the cache↪
↪directory): '/root/.local/share/QGIS/QGIS3/profiles/default/cache' (read from↪
↪DEFAULT_VALUE)

- QGIS_SERVER_CACHE_SIZE / '/cache/size' (Specify the cache size): '52428800'↪
↪(read from INI_FILE)

Ini file used to initialize settings: /home/user/.local/share/QGIS/QGIS3/profiles/
↪default/QGIS/QGIS3.ini
```

U ovom konkretnom slučaju znamo da se vrednosti **QGIS_SERVER_MAX_THREADS** i **QGIS_SERVER_PARALLEL_RENDERING** čitaju iz ini datoteke pronađene u direktorijumu **QGIS_OPTIONS_PATH** (koji se definiše preko promenljive okruženja). Odgovarajući unosi u ini datoteci su **/qgis/max_threads** i **/qgis/parallel_rendering**, a njihove vrednosti su **true** i **4** niti.

6.4 Veza sa datotekom servisa

Da biste apache učinili svesnim PostgreSQL datoteke servisa (pogledajte odeljak Datoteka za povezivanje sa PostgreSQL servisom), potrebno je da vaša *.conf datoteka izgleda ovako:

```
SetEnv PGSERVICEFILE /home/web/.pg_service.conf

<Directory "/home/web/apps2/bin/">
    AllowOverride None
    . . . . .
```

6.5 Dodavanje fontova na vaš linux server

Imajte u vidu da možete koristiti QGIS projekte koji upućuju na fontove koji podrazumevano možda ne postoje na drugim mašinama. To znači da ako podelite projekat, može izgledati drugačije na drugim mašinama (ako fontovi ne postoje na ciljnoj mašini).

Da biste obezbedili da se ovo ne desi, samo treba da instalirate fontove koji nedostaju na ciljnoj mašini. To je na desktop sistemima obično trivijalno (dvoklik na fontove).

Za linux, ako nemate instalirano desktop okruženje (ili preferirate komandnu liniju), potrebno je da:

- Na sistemima zasnovanim na Debian-u:

```
sudo su
mkdir -p /usr/local/share/fonts/truetype/myfonts && cd /usr/local/share/fonts/
↪truetype/myfonts

# copy the fonts from their location
cp /fonts_location/* .

chown root *
cd .. && fc-cache -f -v
```

- Na sistemima zasnovanim na Fedora-i:

```
sudo su
mkdir /usr/share/fonts/myfonts && cd /usr/share/fonts/myfonts

# copy the fonts from their location
cp /fonts_location/* .

chown root *
cd .. && fc-cache -f -v
```

Razvojni server

Proizvodna instalacija i raspoređivanje QGIS server-a obično uključuje podešavanje komponente veb servera (npr. Apache ili Nginx) koja može da prosleđuje HTTP zahteve koji dolaze od klijenata binarnoj aplikaciji QGIS server-a FastCGI.

Ako želite brzo da testirate QGIS server na lokalnoj mašini bez konfigurisanja i instaliranja kompletnog veb servera, možete koristiti QGIS Development Standalone server.

Ovo je nezavisna aplikacija koja pruža veoma jednostavan veb server spreman da služi datotekama vašeg projekta.

Упозорење

Samostalni razvojni server nije razvijen sa namenom da se koristi u produkciji, nije proveren na bezbednosne ranjivosti ili druge stresne uslove koji se normalno javljaju na javno izloženom serveru.

Da biste pokrenuli server:

```
$ qgis_mapserver
```

Podrazumevani port koji razvojni server sluša je 8000. Primer izlaza:

```
QGIS Development Server listening on http://localhost:8000
CTRL+C to exit
127.0.0.1 [lun gen 20 15:16:41 2020] 5140 103ms "GET /wfs3/?MAP=/tests/testdata/
↪qgis_server/test_project.qgs HTTP/1.1" 200
127.0.0.1 [lun gen 20 15:16:41 2020] 3298 2ms "GET /wfs3/static/jsonFormatter.min.
↪js HTTP/1.1" 200
127.0.0.1 [lun gen 20 15:16:41 2020] 1678 3ms "GET /wfs3/static/jsonFormatter.min.
↪css HTTP/1.1" 200
127.0.0.1 [lun gen 20 15:16:41 2020] 1310 5ms "GET /wfs3/static/style.css HTTP/1.1
↪" 200
127.0.0.1 [lun gen 20 15:16:43 2020] 4285 13ms "GET /wfs3/collections?MAP=/tests/
↪testdata/qgis_server/test_project.qgs HTTP/1.1" 200
```

Server ima nekoliko opcija koje se mogu proslediti kao argumenti komandne linije. Možete ih sve videti pozivanjem servera pomoću `-h`.

```
Usage: qgis_mapserver [options] [address:port]
QGIS Development Server

Options:
-h, --help           Displays this help.
-v, --version        Displays version information.
-l <logLevel>        Sets log level (default: 0)
                     0: INFO
                     1: WARNING
                     2: CRITICAL
-p <projectPath>     Path to a QGIS project file (*.qgs or *.qgz),
                     if specified it will override the query string MAP argument
                     and the QGIS_PROJECT_FILE environment variable

Arguments:
addressAndPort        Listen to address and port (default: "localhost:8000")
                     address and port can also be specified with the environment
                     variables QGIS_SERVER_ADDRESS and QGIS_SERVER_PORT
```

Containerized deployment

There are many ways to use containerized application, from the most simple (simple Docker images) to sophisticated (Kubernetes and so on).

Белешка

This kind of deployment needs the [docker application](#) to be installed and running. Check this [tutorial](#).

Путоказ

Docker run pre packaged application (aka images) which can be retrieved as sources (Dockerfile and resources) to build or already built from registries (private or public).

Белешка

QGIS Debian-Ubuntu package downloads need a valid gpg authentication key. Please refer to the [installation pages](#) to update the following Dockerfile.

8.1 Simple docker images

As the docker image does not exist in a public registry, you will need to build it. To do so create a directory `qgis-server` and within its directory:

- create a file `Dockerfile` with this content:

```
FROM debian:bookworm-slim

ENV LANG=en_EN.UTF-8

RUN apt-get update \
    && apt-get install --no-install-recommends --no-install-suggests --allow-
```

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(настављено са претходне стране)

```

↪unauthenticated -y \
    gnupg \
    ca-certificates \
    wget \
    locales \
    && localedef -i en_US -f UTF-8 en_US.UTF-8 \
    # Add the current key for package downloading
    # Please refer to QGIS install documentation (https://www.qgis.org/fr/site/forusers/alldownloads.html#debian-ubuntu)
↪&& mkdir -m755 -p /etc/apt/keyrings \
    && wget -O /etc/apt/keyrings/qgis-archive-keyring.gpg https://qgis.org/downloads/qgis-archive-keyring.gpg \
↪# Add repository for latest version of qgis-server
    # Please refer to QGIS repositories documentation if you want other version
↪(https://qgis.org/resources/installation-guide/#repositories)
    && echo "deb [signed-by=/etc/apt/keyrings/qgis-archive-keyring.gpg] https://qgis.org/debian bookworm main" | tee /etc/apt/sources.list.d/qgis.list \
↪&& apt-get update \
    && apt-get install --no-install-recommends --no-install-suggests --allow-
↪unauthenticated -y \
    qgis-server \
    spawn-fcgi \
    xauth \
    xvfb \
    && apt-get remove --purge -y \
    gnupg \
    wget \
    && rm -rf /var/lib/apt/lists/*

RUN useradd -m qgis

ENV TINI_VERSION v0.19.0
ADD https://github.com/krallin/tini/releases/download/\${TINI\_VERSION}/tini /tini
RUN chmod +x /tini

ENV QGIS_PREFIX_PATH /usr
ENV QGIS_SERVER_LOG_STDERR 1
ENV QGIS_SERVER_LOG_LEVEL 2

COPY cmd.sh /home/qgis/cmd.sh
RUN chmod -R 777 /home/qgis/cmd.sh
RUN chown qgis:qgis /home/qgis/cmd.sh

USER qgis
WORKDIR /home/qgis

ENTRYPOINT ["/tini", "--"]

CMD ["/home/qgis/cmd.sh"]

```

- create a file `cmd.sh` with this content:

```

#!/bin/bash

[[ $DEBUG == "1" ]] && env

```

(наставка на следећој страни)

(настављено са претходне стране)

```
exec /usr/bin/xvfb-run --auto-servernum --server-num=1 /usr/bin/spawn-fcgi -p 5555 \
↪ -n -d /home/qgis -- /usr/lib/cgi-bin/qgis_mapserv.fcgi
```

- build the image with:

```
docker build -f Dockerfile -t qgis-server ./
```

8.1.1 First run

To run the server you will need a QGIS project file. You can use one of yours or pick [this sample](#).

To do so, create a directory `data` within the directory `qgis-server` and copy your file in it. To comply with the following explanations, rename it to `osm.qgs`.

Белешка

You may need to add advertised URLs under the *QGIS Server* tab of the *Project ► Properties* if the GetCapabilities are broken. For example if your server is exposed on port 8080, you will put this for advertised URL `http://localhost:8080/qgis-server/`. More information available in section [Configure your project](#) and subsequent.

Now, you can run the server with:

```
docker network create qgis
docker run -d --rm --name qgis-server --net=qgis --hostname=qgis-server \
  -v $(pwd)/data:/data:ro -p 5555:5555 \
  -e "QGIS_PROJECT_FILE=/data/osm.qgs" \
  qgis-server
```

Options used:

- **-d**: run in the background
- **--rm**: remove the container when it is stopped
- **--name**: name of the container to be created
- **--net**: (previously created) sub network
- **--hostname**: container hostname, for later referencing
- **-v**: local data directory to be mounted in the container
- **-p**: host/container port mapping
- **-e**: environment variable to be used in the container

To check, type `docker ps | grep qgis-server` and you should see a line with **qgis-server**:

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
↪ PORTS		NAMES		
4de8192da76e	qgis-server	"/tini -- /home/qgis..."	3 seconds ago	Up 2 seconds
↪ 0.0.0.0:5555->5555/tcp		qgis-server		

8.1.2 Usable sample

As the server is only accepting fastcgi connections, you need an HTTP server that handles this protocol. To do so we have to create a simple Nginx configuration file and start a Nginx image.

Create a file `nginx.conf` in the current directory with this content:

```
server {
    listen 80;
    server_name _;
    location / {
        root /usr/share/nginx/html;
        index index.html index.htm;
    }
    location /qgis-server {
        proxy_buffers 16 16k;
        proxy_buffer_size 16k;
        gzip off;
        include fastcgi_params;
        fastcgi_pass qgis-server:5555;
    }
}
```

And type this command:

```
docker run -d --rm --name nginx --net=qgis --hostname=nginx \
    -v $(pwd)/nginx.conf:/etc/nginx/conf.d/default.conf:ro -p 8080:80 \
    nginx:1.13
```

To check capabilities availability, type in a browser <http://localhost:8080/qgis-server/?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabilities>

8.1.3 Cleanup

To cleanup the running images, type:

```
docker stop qgis-server nginx
```

8.2 Docker stacks

The previous method is scriptable, but not easily packageable nor standardized or easily manageable.

To work with a docker image set you could use a docker stack managed by an orchestrator. In a stack, the images are working in the same private network, and you can start / stop the whole stack or deploy the stack to other workers. There are many orchestrators, for example Swarm, Kubernetes and Mesos.

In the following, we will present simple configurations for testing purposes. They are not suitable for production.

8.2.1 Swarm/docker-compose

Docker now has its own orchestrator: Swarm (compatible with docker-compose files). You have to [enable it](#) (the Mac version will also work with Linux).

Stack description

Now that you have Swarm working, create the service file (see [Deploy to Swarm](#)) `qgis-stack.yaml`:

```
version: '3.7'

services:
  qgis-server:
    # Should use version with utf-8 locale support:
    image: qgis-server:latest
    volumes:
```

(наставак на следећој страни)

(настављено са претходне стране)

```

- REPLACE_WITH_FULL_PATH/data:/data:ro
environment:
- LANG=en_EN.UTF-8
- QGIS_PROJECT_FILE=/data/osm.qgs
- QGIS_SERVER_LOG_LEVEL=0 # INFO (log all requests)
- DEBUG=1 # display env before spawning QGIS Server

nginx:
  image: nginx:1.13
  ports:
  - 8080:80
  volumes:
  - REPLACE_WITH_FULL_PATH/nginx.conf:/etc/nginx/conf.d/default.conf:ro
  depends_on:
  - qgis-server

```

To deploy (or update) the stack, type:

```
docker stack deploy -c qgis-stack.yaml qgis-stack
```

Check the stack deployment status until you obtain **1/1** in the **replicas** column:

```
docker stack services qgis-stack
```

Something like:

ID	NAME	MODE	REPLICAS	
↪ IMAGE	PORTS			
gmx7ewlvwsqt	qgis_nginx	replicated	1/1	↪
↪ nginx:1.13	*:8080->80/tcp			
10v2e7c143u3	qgis_qgis-server	replicated	1/1	↪
↪ qgis-server:latest				

To check WMS capabilities, type in a web browser <http://localhost:8080/qgis-server/?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabilities>

Cleanup

To cleanup, type:

```
docker stack rm qgis-stack
```

8.2.2 Kubernetes

Installation

If you have a **Docker Desktop** installation, using Kubernetes (aka k8s) is pretty straight forward: [enable k8s](#).

If not, follow the [minikube tutorial](#) or [microk8s for Ubuntu](#).

As Kubernetes installation can be really complex, we will only focus on aspects used by this demo. For further / deeper information, check the [official documentation](#).

microk8s

microk8s needs extra steps: you have to enable the registry and tag the qgis-server image in order to have Kubernetes to find the created images.

First, enable the registry:

```
microk8s enable dashboard dns registry
```

Then, tag and push the image to your newly created registry:

```
docker tag qgis-server 127.0.0.1:32000/qgis-server && docker push 127.0.0.1:32000/
↪qgis-server
```

Finally, add or complete the `/etc/docker/daemon.json` to have your registry **127.0.0.1:32000** listed in the **`insecure-registries`** field:

```
{
  "insecure-registries": ["127.0.0.1:32000"]
}
```

Creating manifests

Kubernetes describes the objects to deploy in yaml manifests. There are many different kinds, but we will only use deployments (handle pods, i.e. docker images) and services to expose the deployments to internal or external purposes.

Deployment manifests

Create a file `deployments.yaml` with this content:

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: qgis-server
  namespace: default
spec:
  replicas: 1
  selector:
    matchLabels:
      myLabel: qgis-server
  template:
    metadata:
      labels:
        myLabel: qgis-server
    spec:
      containers:
        - name: qgis-server
          image: localhost:32000/qgis-server:latest
          imagePullPolicy: Always
          env:
            - name: LANG
              value: en_EN.UTF-8
            - name: QGIS_PROJECT_FILE
              value: /data/osm.qgs
            - name: QGIS_SERVER_LOG_LEVEL
              value: "0"
            - name: DEBUG
              value: "1"
          ports:
            - containerPort: 5555
          volumeMounts:
            - name: qgis-data
              mountPath: /data/
```

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(настављено са претходне стране)

```

    volumes:
      - name: qgis-data
        hostPath:
          path: REPLACE_WITH_FULL_PATH/data

---
apiVersion: apps/v1
kind: Deployment
metadata:
  name: qgis-nginx
  namespace: default
spec:
  replicas: 1
  selector:
    matchLabels:
      myLabel: qgis-nginx
  template:
    metadata:
      labels:
        myLabel: qgis-nginx
    spec:
      containers:
        - name: qgis-nginx
          image: nginx:1.13
          ports:
            - containerPort: 80
          volumeMounts:
            - name: nginx-conf
              mountPath: /etc/nginx/conf.d/
          volumes:
            - name: nginx-conf
              configMap:
                name: nginx-configuration

---
kind: ConfigMap
apiVersion: v1
metadata:
  name: nginx-configuration
data:
  nginx.conf: |
    server {
      listen 80;
      server_name _;
      location / {
        root /usr/share/nginx/html;
        index index.html index.htm;
      }
      location /qgis-server {
        proxy_buffers 16 16k;
        proxy_buffer_size 16k;
        gzip off;
        include fastcgi_params;
        fastcgi_pass qgis-server:5555;
      }
    }

```

Service manifests

Create a file `services.yaml` with this content:

```
apiVersion: v1
kind: Service
metadata:
  name: qgis-server
  namespace: default
spec:
  type: ClusterIP
  selector:
    myLabel: qgis-server
  ports:
    - port: 5555
      targetPort: 5555
---
apiVersion: v1
kind: Service
metadata:
  name: qgis-nginx
  namespace: default
spec:
  type: NodePort
  selector:
    myLabel: qgis-nginx
  ports:
    - port: 80
      targetPort: 80
      nodePort: 30080
```

Deploying manifests

To deploy the images and services in Kubernetes, one can use the dashboard (click on the + on the upper right) or the command line.

Белешка

When using the command line with `microk8s` you will have to prefix each command with *microk8s*.

To deploy or update your manifests:

```
kubectl apply -f ./
```

To check what is currently deployed:

```
kubectl get pods,services,deployment
```

You should obtain something like:

NAME	READY	STATUS	RESTARTS	AGE
pod/qgis-nginx-54845ff6f6-8skp9	1/1	Running	0	27m
pod/qgis-server-75df8ddd89-c7t7s	1/1	Running	0	27m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	
↔ AGE					
service/Kubernetes	ClusterIP	10.152.183.1	<none>	443/TCP	

(наставка на следећој страни)

(настављено са претходне стране)

↪ 5h51m					
service/qgis-exec-server	ClusterIP	10.152.183.218	<none>	5555/TCP	↪
↪ 35m					
service/qgis-nginx	NodePort	10.152.183.234	<none>	80:30080/TCP	↪
↪ 27m					
service/qgis-server	ClusterIP	10.152.183.132	<none>	5555/TCP	↪
↪ 27m					
NAME	READY	UP-TO-DATE	AVAILABLE	AGE	
deployment.apps/qgis-nginx	1/1	1	1	27m	
deployment.apps/qgis-server	1/1	1	1	27m	

To read nginx/qgis logs, type:

```
kubectl logs -f POD_NAME
```

To check WMS capabilities, type in a web browser <http://localhost:30080/qgis-server/?SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabilities>

Cleanup

To clean up, type:

```
kubectl delete service/qgis-server service/qgis-nginx deployment/qgis-nginx ↪
↪ deployment/qgis-server configmap/nginx-configuration
```

8.3 Cloud deployment

Managing your own cluster of servers to handle the deployment of containerized applications, is a complex job. You have to handle multiple issues, such as hardware, bandwidth and security at different levels.

Cloud deployment solutions can be a good alternative when you do not want to focus on infrastructure management.

A cloud deployment may use proprietary mechanisms, but they are also compatible with the stages explained previously (*docker images* and *stack management*).

8.3.1 AWS usecase

With Amazon AWS, through [ECS \(Elastic Container Service\)](#) functionalities, you can use docker-compose or Kubernetes compatible wrappers to manage your stack. You will have to create an [image registry](#) for your custom images to be accessible.

To use docker-compose alike functionalities, you need to install the **ecs-cli** client and have [proper permissions / roles](#). Then, with the help of the `ecs-cli compose` commands, you can reuse the *stack description*.

To use Kubernetes, you can use the AWS web console or the command line tool `eksctl` and have the [proper permissions / roles](#). Then with a well configured kubectl environment, you can reuse the *Kubernetes manifests*.

Frequently Asked Question

- *What are the differences between QGIS Desktop and QGIS Server?*

QGIS Desktop has a graphical user interface and allows you to create and modify maps. QGIS Server is a server application serving your QGIS project files to end user applications via OGC web services like [WMS](#), [WFS](#), etc..

- *What is OGC?*

The [OGC \(Open Geospatial Consortium\)](#) is an international not for profit organization committed to making quality open standards for the global geospatial community.

- *Name some other web mapping servers?*

ArcGIS server, Geoserver, Mapserver, Mapnik etc.

- *How to compare QGIS server to other web mapping servers? (2021/01/01)*

Features	QGIS Server	GeoServer	ArcGIS Server
Since	2006	2001	1999
Licence	GPL	GPL	commercial
Commercial support	Multiple companies	Multiple companies	ESRI and its vendors network
Technology	C++/python	Java	C++
Tile cache	yes	yes (via Geo-WebCache)	yes
3D	Ne	Ne	Da
Querying	FES (2.0) and OGC (1.0) filters	CQL and OGC filters	OGC filters
Report generation	yes	yes	yes
Server administration	yes via third parties (LizMap, QWC2, etc.)	web + API REST	web + API REST
GIS project Layer/symbology edition	complete via dedicated GUI	simple via web interface	complete via dedicated GUI

- *What are the OGC specification versions implemented in QGIS server compared to other web mapping servers? (2021/01/01)*

OGC standards	QGIS Server	GeoServer	ArcGIS Server
WMS (Web Map Service)	1.3.0 - 1.1.1	1.3.0 - 1.1.1	1.3.0 - 1.1.1
WFS (Web Feature Service)	1.1.0 - 1.0.0	2.0.0 - 1.0.0	2.0.0 - 1.0.0
OAPIF (aka WFS3)	1.0.0	no	no
WMTS (Web Map Tile Service)	1.0.0	1.0.0	1.0.0
WCS (Web Coverage Service)	1.0.0	2.0.1 - 1.0.0	2.0.1 - 1.0.0
WPS (Web Processing Service)	no	1.0.0	1.0.0
CSW (Catalogue Service for the Web)	no	2.0.2	no
SLD (Styled Layer Descriptor)	yes	yes	yes

- *What is a tile cache?*

Maps are often static. As most mapping clients render WMS (Web Map Service) data every time they are queried, this can result in unnecessary processing and increased wait times.

The tile cache optimizes this experience by saving (caching) map images, or tiles, as they are requested, in effect acting as a proxy between client (such as OpenLayers or Google Maps) and server (any WMS-compliant server). As new maps and tiles are requested, QGIS server intercepts these calls and returns pre-rendered tiles if stored, or calls the QGIS engine to render new tiles as necessary. Thus, once tiles are stored, the speed of map rendering increases by many times, creating a much improved user experience.

- *What is PostgreSQL?*

PostgreSQL is a powerful, open source object-relational database companion for QGIS.

- *What is PostGIS?*

PostGIS is a spatial database extender for PostgreSQL object-relational database. It adds support for geographic objects allowing location queries to be run in SQL.