

DXF(2D) 도면 GeoServer 배포 자동화

발표자

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차례

- 발표자 소개
- 교육내용 개요
- In QGIS
- Automation
 - Concept 1 : AnotherDXFImporter
 - Concept 2 : GeoServer Rest API
- 정리

소개

- Alziotsystem - <https://alziotsystem.com/>
- 발표자 : 전종수
- 블로그 - <https://t2ols.tistory.com/>
- GitHub - <https://github.com/t2ols>

강의 대상자 : 초급

2. 발표내용 소개 및 준비사항

DXF(2D) 활용사례(토목분야)

- 설계 산출물 활용을 위한 방법
- GIS 기반 설계 도면 시각화
- DigitalTwin – 3D Intergration
(SHP 예외)

- 평면도
- 포장개기평면도
- 비옥토채취계획평면도
- 토지이용계획도
- 발파계획평면도
- 구조물개기평면도
- 토지이동계획도



개발환경

- 교육 notebook : 8G, i5 1.6
- 코드(Python)에서 사용하는 라이브러리
QGIS Desktop(3.26), PyQGIS, GDAL(3.5.2)
- GeoServer 2.18 (+openjdk 1.8, + CSS Plugin)
- 교육진행 환경
[OSGeo4W](#), OSGeoLive(Virtual BOX)
WebServer(NodeJS,http-server)
- git https://github.com/t2ols/FOSS4FKR_2022.git



운영환경

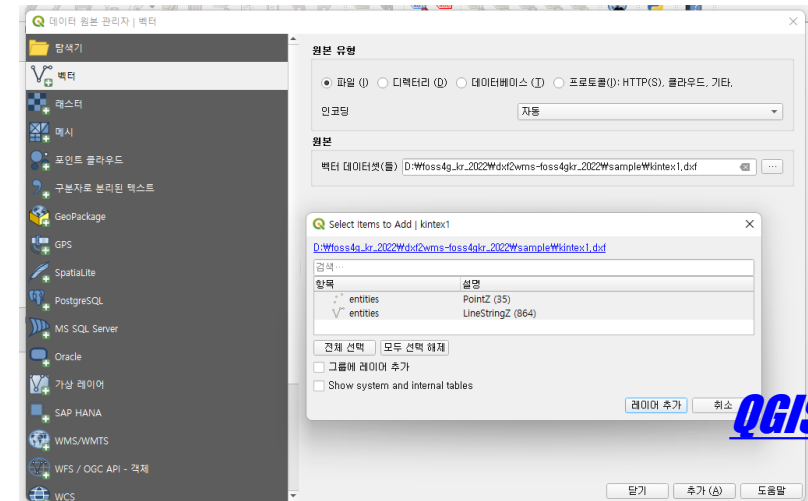
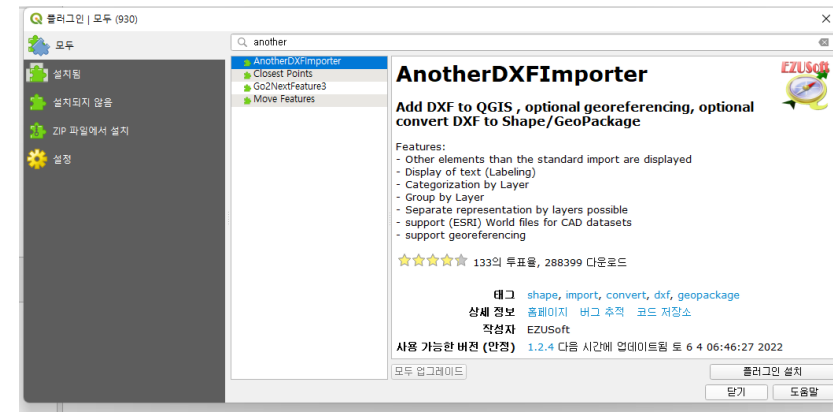
- 충분한 사양의 PC
Tile 작업 시 필요한 디스크 용량
Tile 이후의 디스크 용량
Linux 환경의 멀티 프로세싱
- 실 운영 시스템
WINDOWS + CONDA + qgis



3. In QGIS

DXF Import Plugin - AnotherDXFImporter

- AnotherDXFImporter Plugin 확인
- QGIS에서 기본적으로 DXF import를 지원함



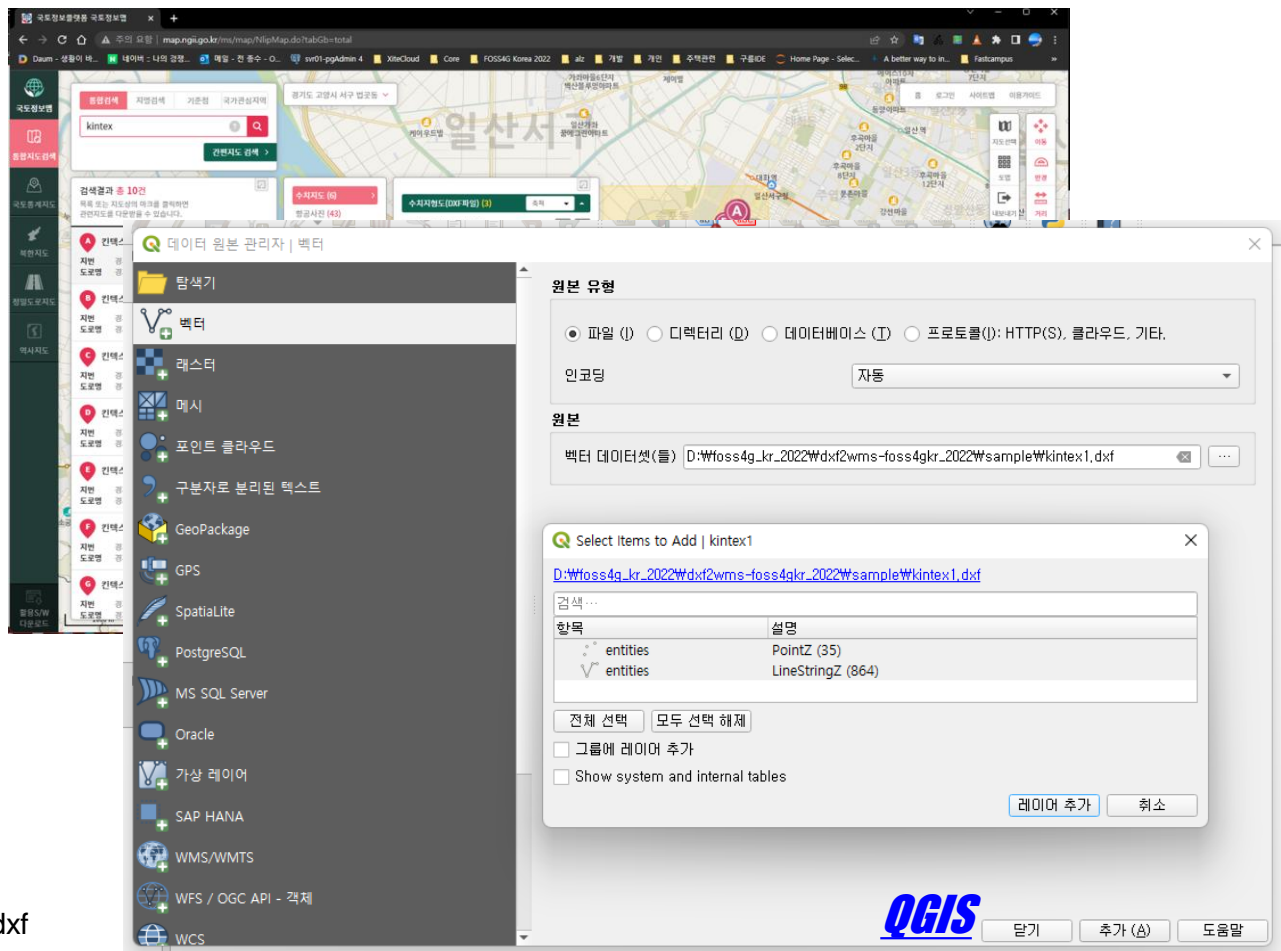
QGIS에서 DXF 파일 SHP 파일로 일괄 변환하기

<https://foss4g.tistory.com/1137>

Work in QGIS

- 벡터레이어 추가
점, 선, 면
한글 관련 Encoding
- DXF layer 갯수 오류
- 전체 도면의 범위 확인 필요
- 샘플 DXF
국토정보플랫폼
-국토정보맵
EPSG:5186

Script
sejong.dxf

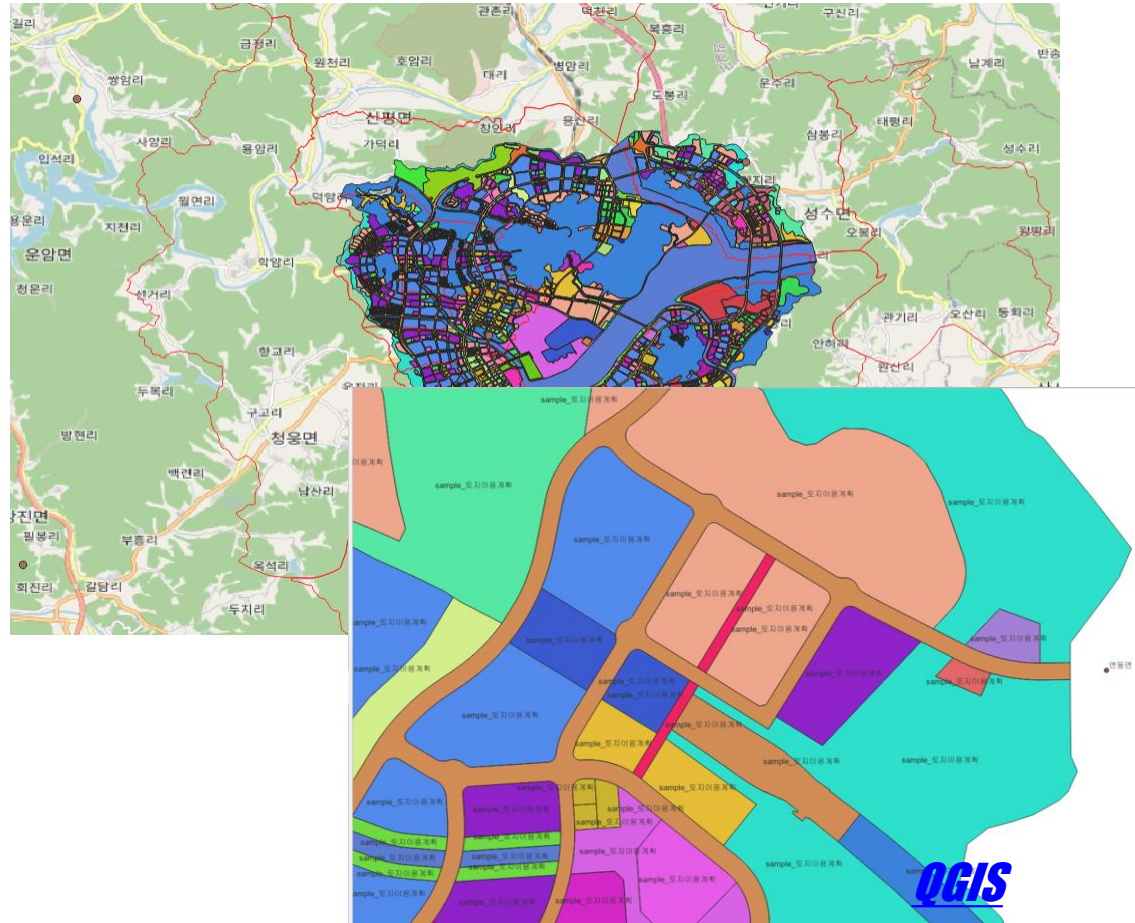


QGIS

닫기 (C) 추가 (A) 도움말

Styling in QGIS

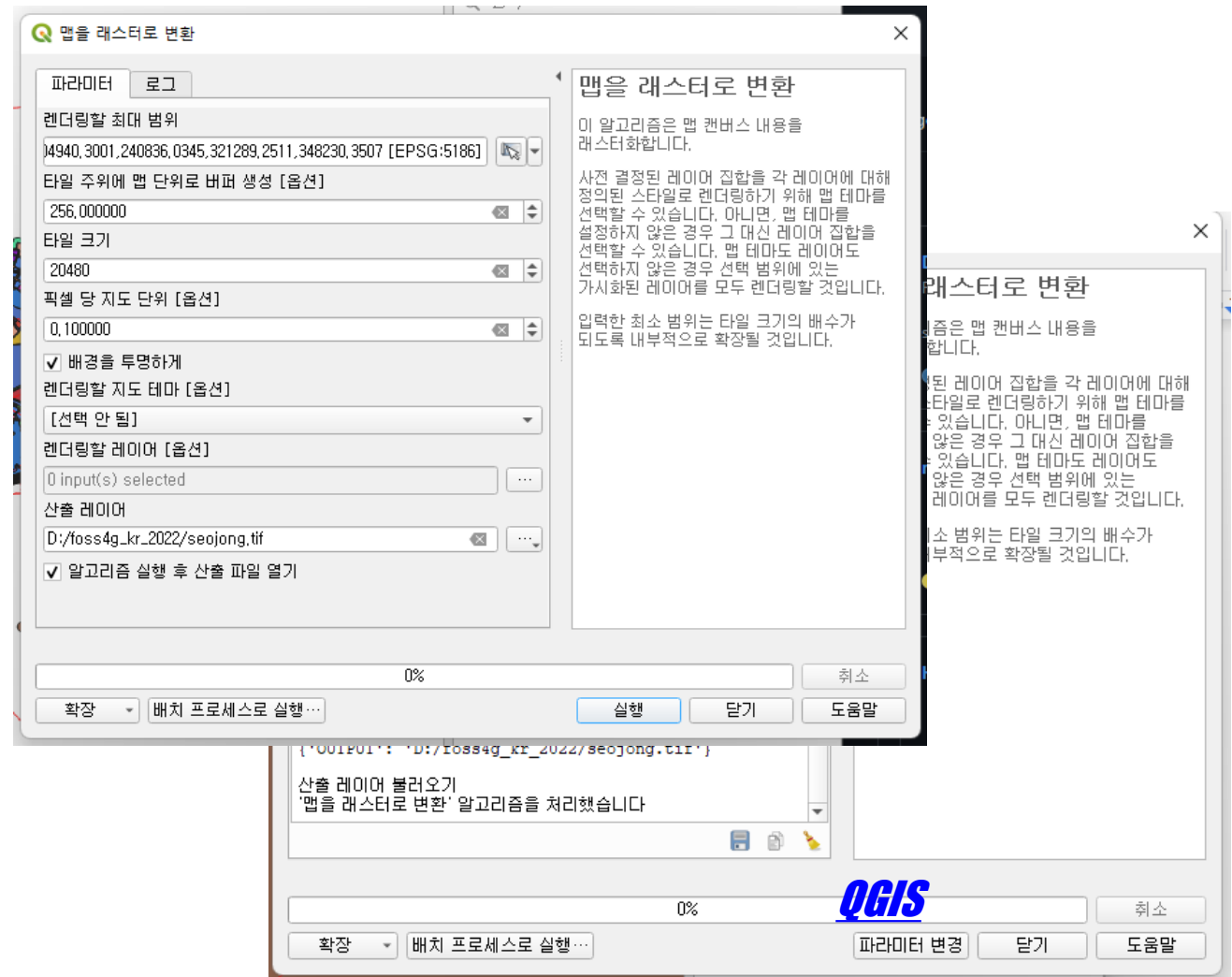
- 레이어 스타일링
Label
Symbols
Color
- 실 설계 도면의 DXF 스타일
이 반영 됨
- GeoServer CSS 스타일링



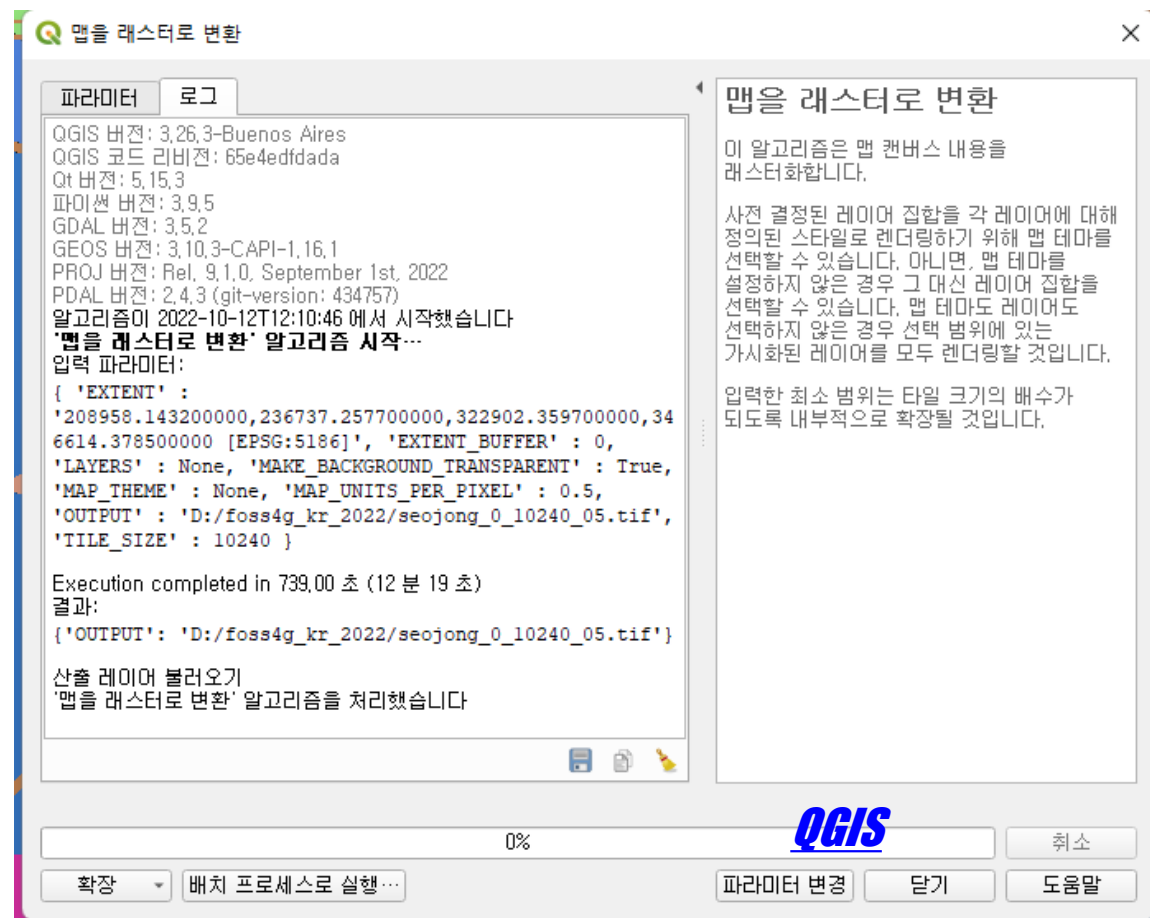
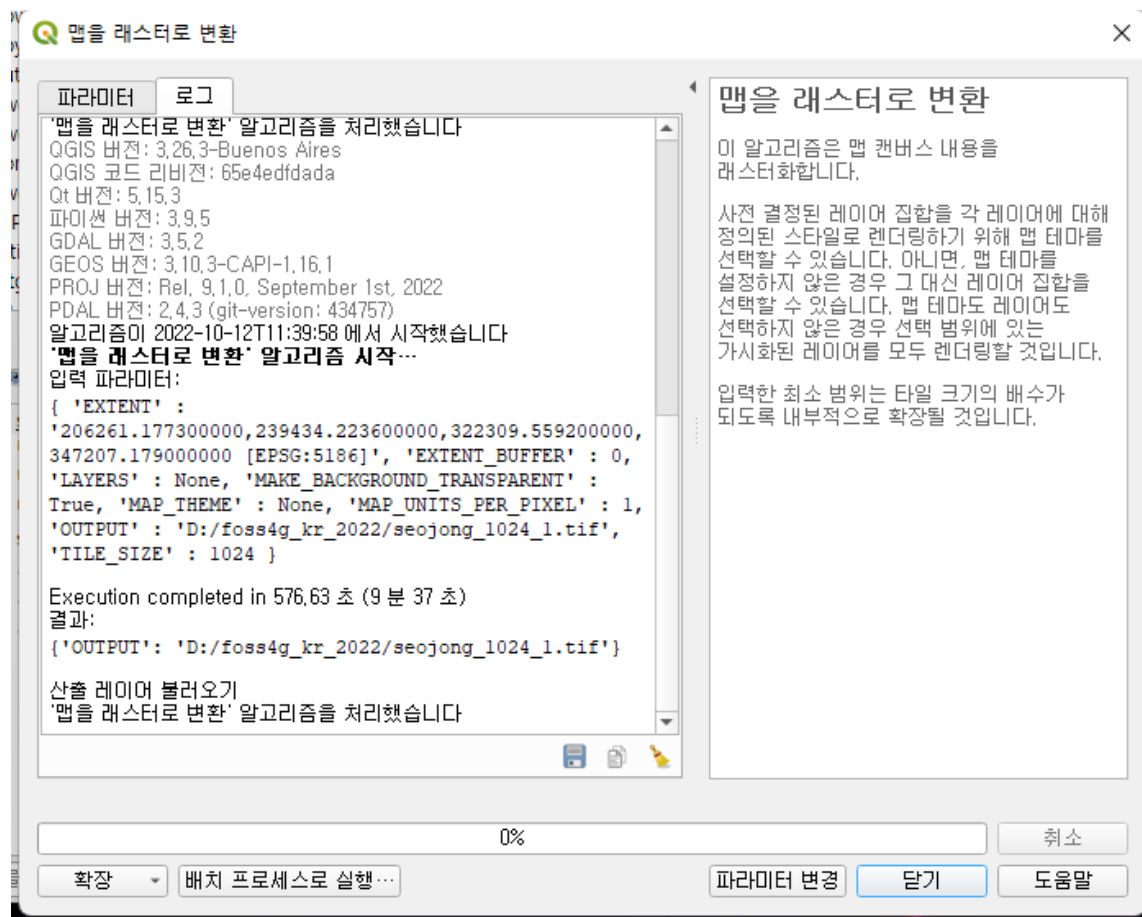
Rasterize - map2tiff

- 좌표계 확인(프로젝트)
- 랜더링 범위(용량 확인)
- 버퍼 (중첩도선명도)
- 타일크기
- 픽셀당지도단위(Resolution)
- 배경을 투명하게
- 산출 레이어 : 파일 저장

* 옵션에 따른 파일용량 확인
buffer 0 크기 10240 ppm 0.5



Rasterize - map2tiff



gdal2tiles(TMS)

- output 위치 설정
- zoom Level
(Viewer level 확인)

```
gdal2tiles.bat -p mercator -w all -r average -a 0.0  
D:/foss4g_kr_2022/seojong_0_10240_05.tif  
D:\foss4g_kr_2022\seojong_0_10240_05
```



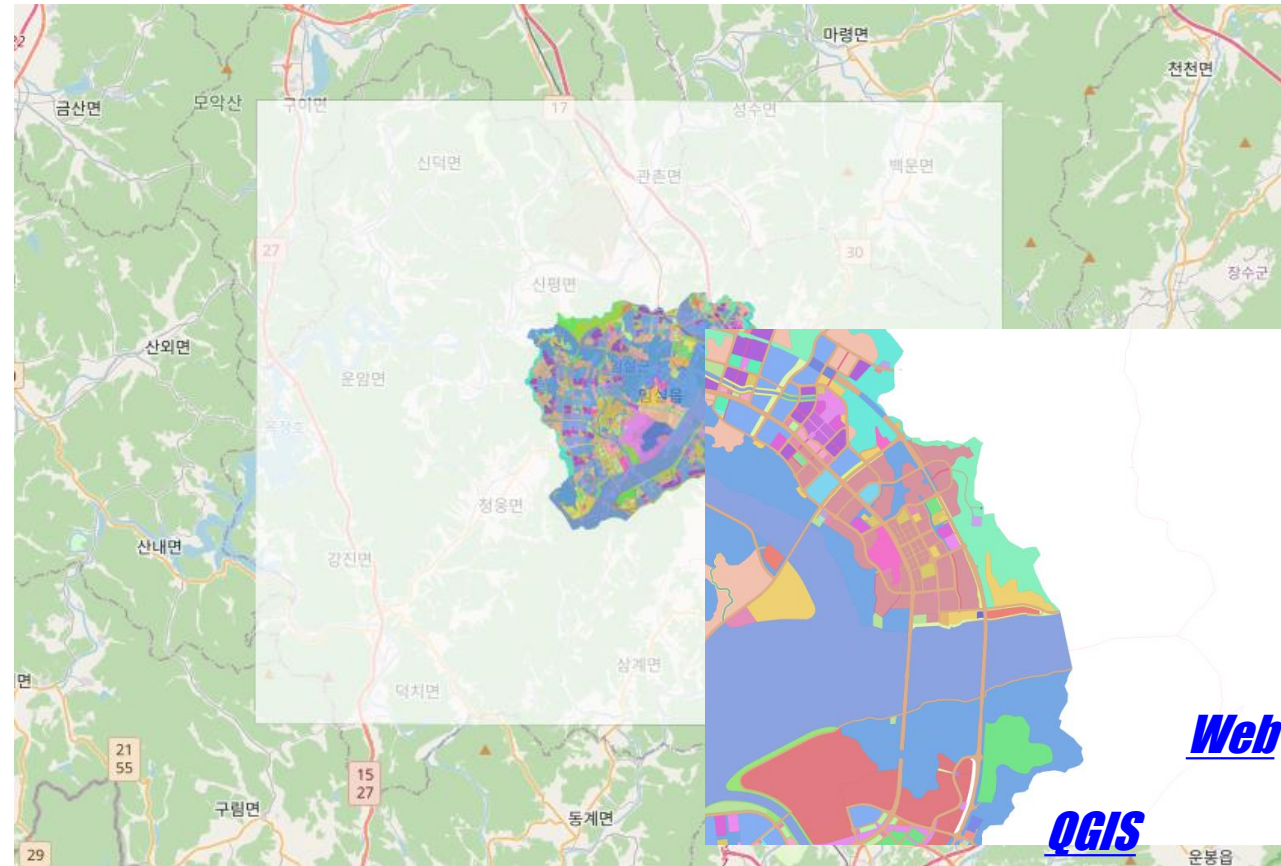
결과물 - Web Viewer

googlemap

leaflet

default web viewer

이름	수정된 날짜	유형	크기
10	2022-10-12 오후 1:15	파일 폴더	
11	2022-10-12 오후 1:15	파일 폴더	
12	2022-10-12 오후 1:15	파일 폴더	
13	2022-10-12 오후 1:15	파일 폴더	
14	2022-10-12 오후 1:15	파일 폴더	
15	2022-10-12 오후 1:15	파일 폴더	
16	2022-10-12 오후 1:14	파일 폴더	
17	2022-10-12 오후 12:28	파일 폴더	
googlemaps.html	2022-10-12 오후 12:28	Chrome HTML D...	28KB
leaflet.html	2022-10-12 오후 12:28	Chrome HTML D...	5KB
openlayers.html	2022-10-12 오후 12:28	Chrome HTML D...	5KB
tilemapresource.xml	2022-10-12 오후 12:28	XML 문서	2KB



4. 자동화

자동화 전략

- 상용 및 솔루션 도입 검토
- 수작업 프로세스를 전환
PyQGIS, Python Script
- DXF 입력 유지
- 현 운영 시스템 통합 고려

Like AnotherDXFImporter

GitHub

<https://github.com/EZUSoft/AnotherDXF2Shape.git>

PyQGIS CookBook

https://docs.qgis.org/3.22/en/docs/pyqgis_developer_cookbook/index.html

한글

https://docs.qgis.org/2.8/ko/docs/pyqgis_developer_cookbook/index.html

PyQGIS

QGIS 라이브러리 설정

QGIS install

Conda QGIS

(OSGEO4W, OSGEOLive)

GUI 관련 이슈

1.4.1. Using PyQGIS in standalone scripts

To start a standalone script, initialize the QGIS resources at the beginning of the script:

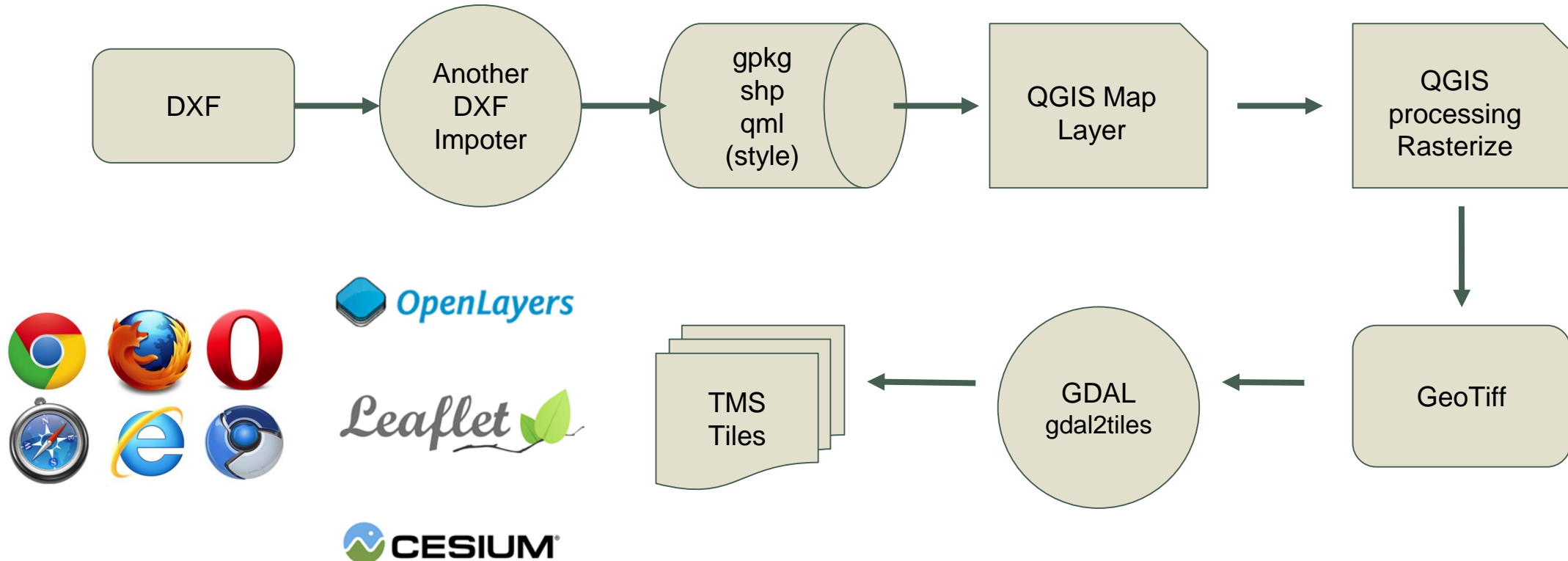
```
1 from qgis.core import *
2
3 # Supply path to qgis install location
4 QgsApplication.setPrefixPath("/path/to/qgis/installation", True)
5
6 # Create a reference to the QgsApplication. Setting the
7 # second argument to False disables the GUI.
8 qgs = QgsApplication([], False)
9
10 # Load providers
11 qgs.initQgis()
12
13 # Write your code here to load some layers, use processing
14 # algorithms, etc.
15
16 # Finally, exitQgis() is called to remove the
17 # provider and layer registries from memory
18 qgs.exitQgis()
```

1.4.2. Using PyQGIS in custom applications

The only difference between Using PyQGIS in standalone scripts and a custom PyQGIS application is that you pass `True` instead of `False` to `QgsApplication` to indicate that we plan to use a GUI.

```
1 from qgis.core import *
2
3 # Supply the path to the qgis install location
4 QgsApplication.setPrefixPath("/path/to/qgis/installation", True)
5
6 # Create a reference to the QgsApplication.
7 # Setting the second argument to True enables the GUI. We need
8 # this since this is a custom application.
9
10 qgs = QgsApplication([], True)
11
12 # Load providers
13 qgs.initQgis()
14
15 # Write your code here to load some layers, use processing
16 # algorithms, etc.
17
18 # Finally, exitQgis() is called to remove the
19 # provider and layer registries from memory
20 qgs.exitQgis()
```

Processing

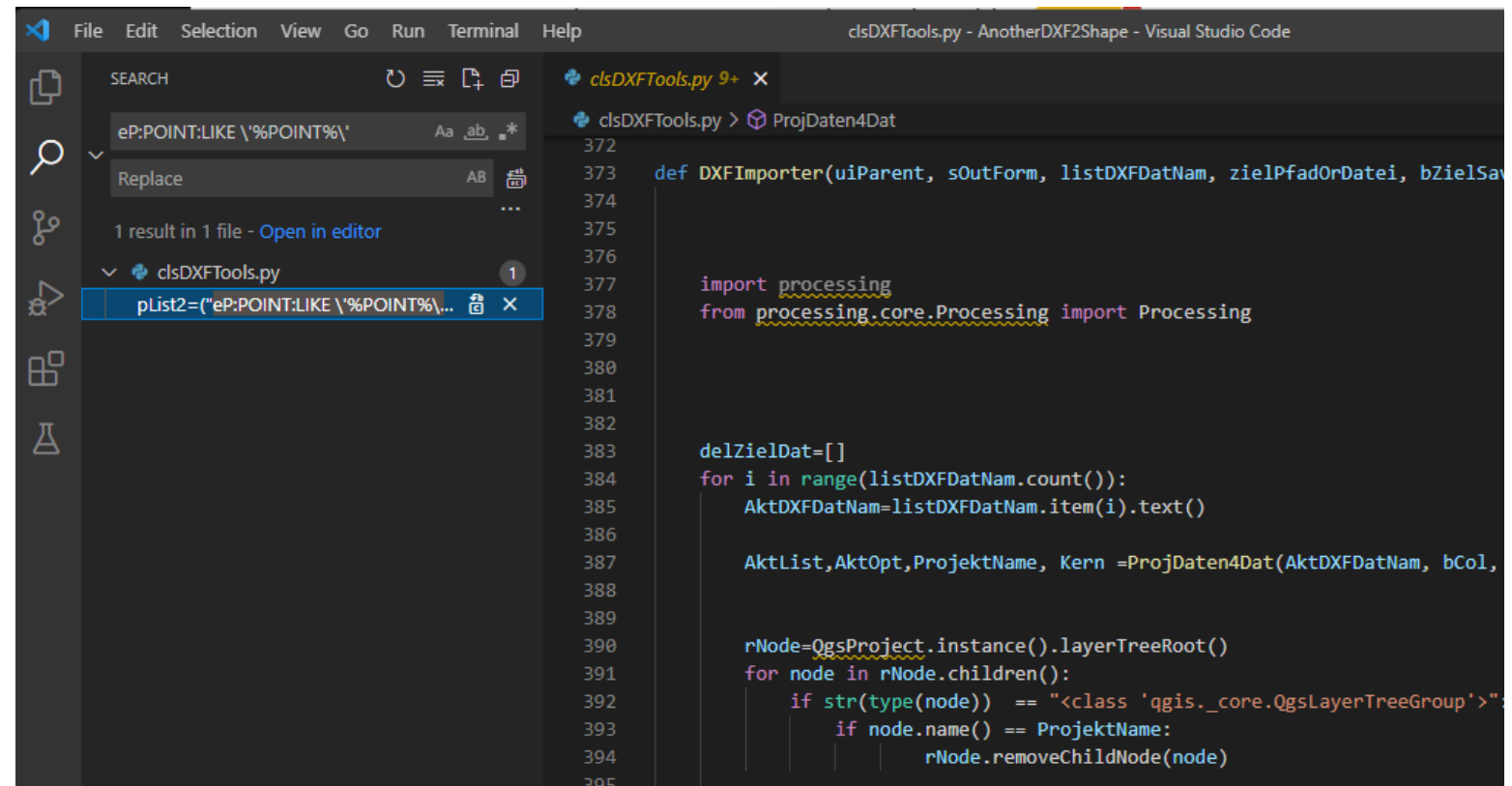


From AnotherDXFImporter

Load Geometry
& Layer(Table)

set Coordinate

Add style attribute



The screenshot shows the Visual Studio Code interface. On the left, the Search panel is open, displaying a search for 'eP:POINT:LIKE' in the file 'clsDXFTools.py'. The search results show a match on line 372. The main editor window displays the 'clsDXFTools.py' file, which contains a Python script for importing DXF data. The script defines a class 'DXFImporter' and includes methods for loading geometry and layers. The code is as follows:

```
372
373
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392
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394
395
```

```
def DXFImporter(uiParent, sOutForm, listDXFDatNam, zielPfadOrDatei, bZielSav):

    import processing
    from processing.core.Processing import Processing

    delZielDat=[]
    for i in range(listDXFDatNam.count()):
        AktDXFDatNam=listDXFDatNam.item(i).text()

        AktList,AktOpt,ProjektName, Kern =ProjDaten4Dat(AktDXFDatNam, bCol,

        rNode=QgsProject.instance().layerTreeRoot()
        for node in rNode.children():
            if str(type(node)) == "<class 'qgis._core.QgsLayerTreeGroup'>":
                if node.name() == ProjektName:
                    rNode.removeChildNode(node)
```

dxfg2pkg

AnotherDXFImporter

window command

실행환경 스크립트 : osgeorun.bat

PYTHON, QGIS, GDAL, QT

```
D:\foss4g_kr_2022\dxfg2wms-foss4gkr_2022>python dxfg2pkgAll.py
Wrong char in 'ogr_style' at EntityHandle: AF61 (Check your choose charset)한국국제전시장
Wrong char in 'ogr_style' at EntityHandle: AF61 (Check your choose charset)한국국제전시장
Wrong char in 'ogr_style' at EntityHandle: AF61 (Check your choose charset)한국국제전시장
Wrong char in 'ogr_style' at EntityHandle: AF61 (Check your choose charset)한국국제전시장
```

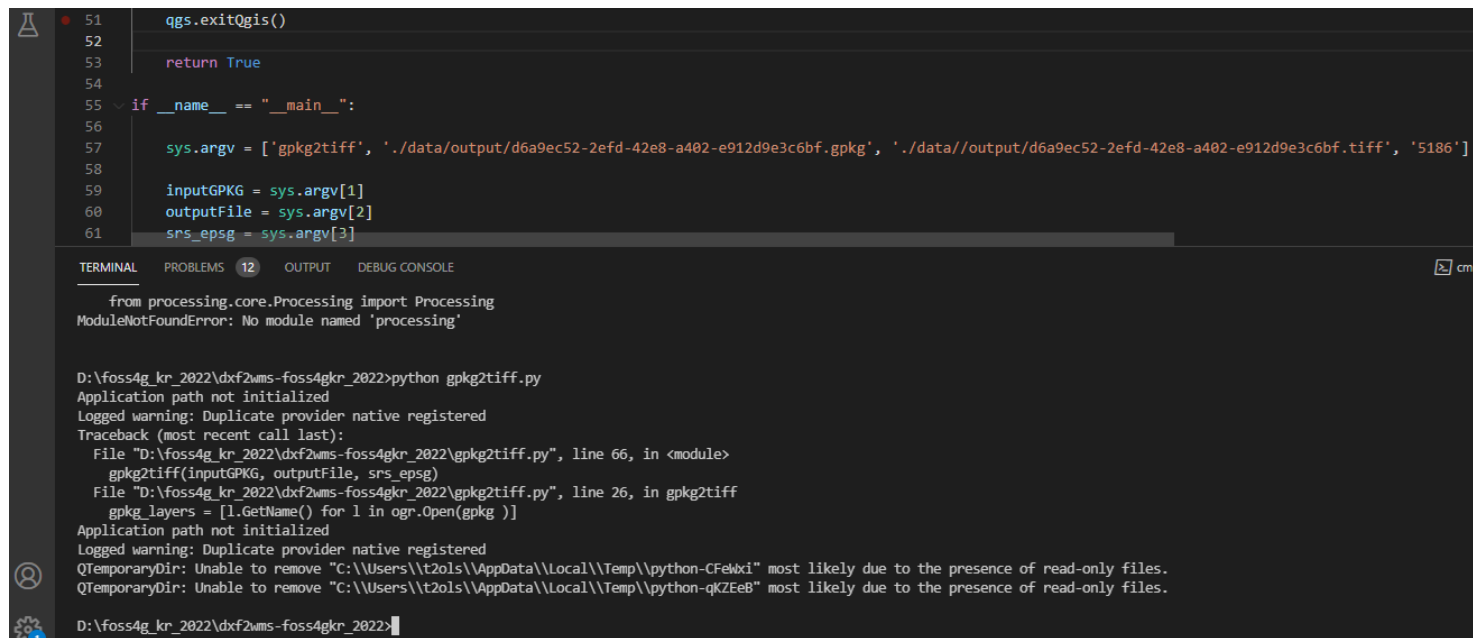
```
Wrong char in 'ogr_style' at EntityHandle: B033 (Check your choose charset)대화용
Warning 1: Value of field 'styleName' has 38 characters, whereas maximum allowed is 30.
Warning 1: Value of field 'styleName' has 38 characters, whereas maximum allowed is 30.
Warning 1: Value of field 'styleName' has 39 characters, whereas maximum allowed is 30.
From {projectOrgName}.dxf To {_projectTranceName}.gpkg
d6a9ec52-2efd-42e8-a402-e912d9e3c6bf
```

```
D:\foss4g_kr_2022\dxfg2wms-foss4gkr_2022>
```

gpkg2tiff - rasterize

Process parameter

Extent, Buffer, Transparent, map init per pixel, tile size



```
51 qgs.exitQgis()
52
53 return True
54
55 if __name__ == "__main__":
56
57     sys.argv = ['gpkg2tiff', './data/output/d6a9ec52-2efd-42e8-a402-e912d9e3c6bf.gpkg', './data/output/d6a9ec52-2efd-42e8-a402-e912d9e3c6bf.tiff', '5186']
58
59     inputGPKG = sys.argv[1]
60     outputFile = sys.argv[2]
61     srs_epsg = sys.argv[3]
```

```
from processing.core.Processing import Processing
ModuleNotFoundError: No module named 'processing'
```

```
D:\foss4g_kr_2022\dx2wms-foss4gkr_2022>python gpkg2tiff.py
Application path not initialized
Logged warning: Duplicate provider native registered
Traceback (most recent call last):
  File "D:\foss4g_kr_2022\dx2wms-foss4gkr_2022\gpkg2tiff.py", line 66, in <module>
    gpkg2tiff(inputGPKG, outputFile, srs_epsg)
  File "D:\foss4g_kr_2022\dx2wms-foss4gkr_2022\gpkg2tiff.py", line 26, in gpkg2tiff
    gpkg_layers = [l.GetName() for l in ogr.Open(gpkg)]
Application path not initialized
Logged warning: Duplicate provider native registered
QTemporaryDir: Unable to remove "C:\\Users\\t20ls\\AppData\\Local\\Temp\\python-CFwxi" most likely due to the presence of read-only files.
QTemporaryDir: Unable to remove "C:\\Users\\t20ls\\AppData\\Local\\Temp\\python-qKEeB" most likely due to the presence of read-only files.
```

```
D:\foss4g_kr_2022\dx2wms-foss4gkr_2022>
```

tiff2tiles - gdal2tiles

gdal excute
qgis processing or python script

```
16  
17     return True  
18  
19  ∨ if __name__ == "__main__":  
20  
21     sys.argv = ['tiff2tiles', './data/output/d6a9ec52-2efd-42e8-a402-e912d9e3c6bf.tiff',  
22  
23     # argv = gdal.GeneralCmdLineProcessor(sys.argv)  
24     # print(argv)  
25
```

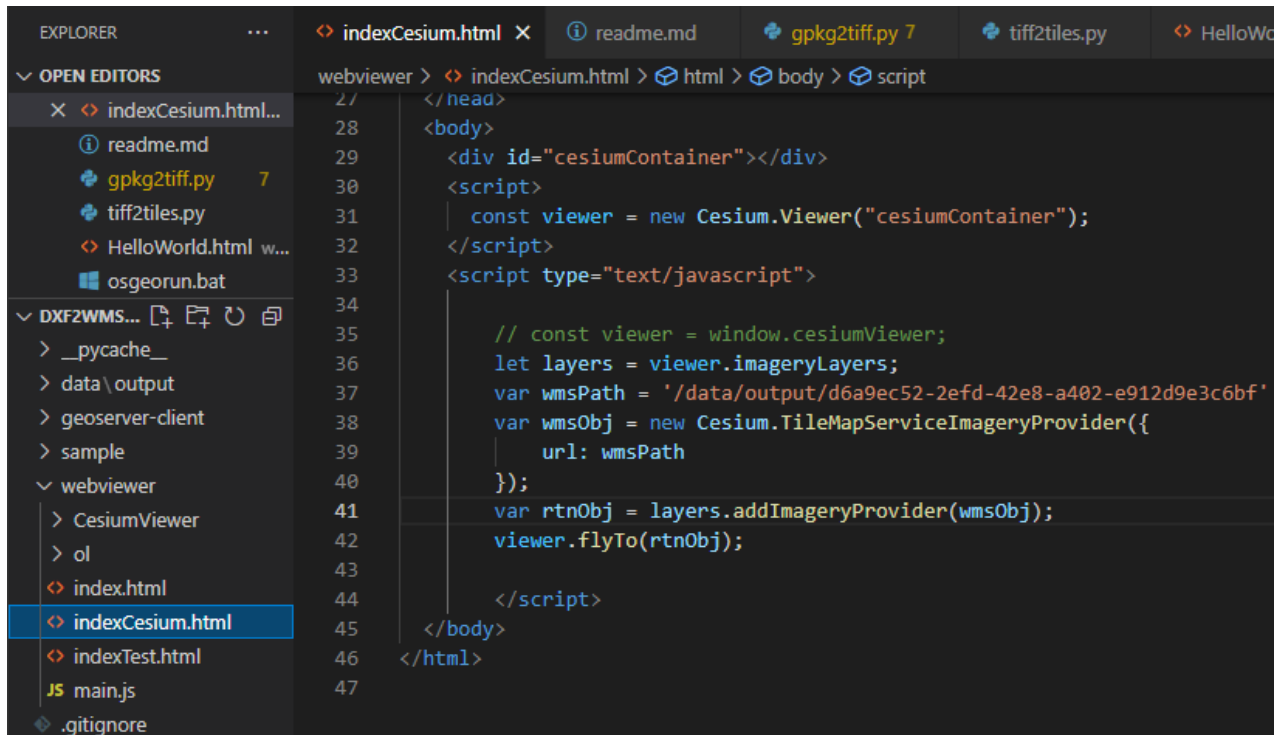
TERMINAL PROBLEMS 7 OUTPUT DEBUG CONSOLE

```
D:\foss4g_kr_2022\dxkf2wms-foss4gkr_2022>python tiff2tiles.py  
Generating Base Tiles:  
0...10...20...30...40...50...60...70...80...90...100  
Generating Overview Tiles:  
0...10...20...30...40...50...60...70...80...90...100  
  
D:\foss4g_kr_2022\dxkf2wms-foss4gkr_2022>
```

[Web](#)

[Code](#)

In CesiumJS



```
27 </head>
28 <body>
29   <div id="cesiumContainer"></div>
30   <script>
31     const viewer = new Cesium.Viewer("cesiumContainer");
32   </script>
33   <script type="text/javascript">
34
35     // const viewer = window.cesiumViewer;
36     let layers = viewer.imageryLayers;
37     var wmsPath = '/data/output/d6a9ec52-2efd-42e8-a402-e912d9e3c6bf';
38     var wmsObj = new Cesium.TileMapServiceImageryProvider({
39       url: wmsPath
40     });
41     var rtnObj = layers.addImageryProvider(wmsObj);
42     viewer.flyTo(rtnObj);
43   </script>
44 </body>
45 </html>
```

Script

D:\foss4g_kr_2022\dx2wms-foss4gkr_2022>http-server

<http://localhost:8081/webviewer/indexCesium.html>

Web

Code

Is Best?

Process Schedule
HDD Size
low Resolution



Next...

Deep dive

OGR2OGR in AnotherDXFImporter
DXF geometry load to gpkg

Add geometry Attribute - Style
font, angle, size, size_u, anchor, color, underline, plaintext, ...

d6a9ec52-2efd-42e8-a402-e912d9e3c6bfeP — Features Total: 35, Filtered: 35, Selected: 0

	fid	Layer	PaperSpace	SubClasses	RawCodeValues	Linetype	EntityHandle	Text	ogr_style	font
1	1	H0049141	거짓	NULL	NULL	NULL	AF61	한국국제전시장	LABEL(f:"Arial",....	Arial
2	2	H0049113	거짓	NULL	NULL	NULL	AF63	임시제1주차장	LABEL(f:"Arial",....	Arial
3	3	H0049113	거짓	NULL	NULL	NULL	AF64	임시제2주차장	LABEL(f:"Arial",....	Arial
4	4	H0049113	거짓	NULL	NULL	NULL	AF65	임시주차장	LABEL(f:"Arial",....	Arial
5	5	H0049113	거짓	NULL	NULL	NULL	AF66	임시제3주차장	LABEL(f:"Arial",....	Arial
6	6	H0049113	거짓	NULL	NULL	NULL	AF67	백송구름다리	LABEL(f:"Arial",....	Arial
7	7	H0049113	거짓	NULL	NULL	NULL	AF68	임시제4주차장	LABEL(f:"Arial",....	Arial
8	8	H0049145	거짓	NULL	NULL	NULL	AF6C	국화공원	LABEL(f:"Arial",....	Arial
9	9	H0049145	거짓	NULL	NULL	NULL	AF72	국화공원	LABEL(f:"Arial",....	Arial

모든 피처 표시

Web

QGIS

GeoServer

GeoServer is an open source server for sharing geospatial data.
Designed for interoperability, it publishes data from any major spatial data source using open standards.

Download

Stable	Maintenance	Development
2.21.1 Nightly	2.20.6 Nightly	2.22-M0 Main

News

- GeoServer 2.20.6 Released Sep 15, 2022 • Andrea Aime
- GeoServer 2.22-M0 Milestone Release Aug 22, 2022 • Jody Garnett
- GeoServer 2.21.1 Release Aug 1, 2022 • Jody Garnett
- GeoServer 2.20.5 Released Jul 1, 2022 • Andrea Aime
- GeoServer 2.21.0 Release May 24, 2022 • Ian Turton
- GeoServer 2.21-RC Release Candidate May 9, 2022 • Jody Garnett

OGC Implementation
GeoServer implements industry standard OGC protocols such as Web Feature Service (WFS), Web Map Service (WMS), and Web Coverage Service (WCS). Additional formats and publication options are available as extensions including Web Processing Service (WPS), and...

Part of a Vibrant Open Source Community
GeoServer is developed, tested, and supported as community-driven project by a diverse group of individuals and organizations around the world. We are proud to be a recognized Open Source Geospatial Foundation project.

Java OpenJDK

Geoserver Guide

[https://www.oss.kr/storage/app/public/oss/c0/77/\[GeoServer\]%20Solution%20Guide%20V0.95.pdf](https://www.oss.kr/storage/app/public/oss/c0/77/[GeoServer]%20Solution%20Guide%20V0.95.pdf)

CSS Plugin Install

GeoServer 2.21.x User Manual > Styling > CSS Styling > Installing the GeoServer CSS extension

Installing the GeoServer CSS extension

The CSS extension is listed among the other extension downloads on the GeoServer download page.

The installation process is similar to other GeoServer extensions:

1. Download the [geoserver-2.21-SNAPSHOT-css-plugin.zip](#)

Script

Install CSS Plugin

D:\foss4g_kr_2022\util\geoserver-2.18.0-bin\bin\startup.bat

Web

GeoServer - WebUI

User [foss4g]

Workspace [foss4g]

Make DataStore(From gpkg)

Publish Layer

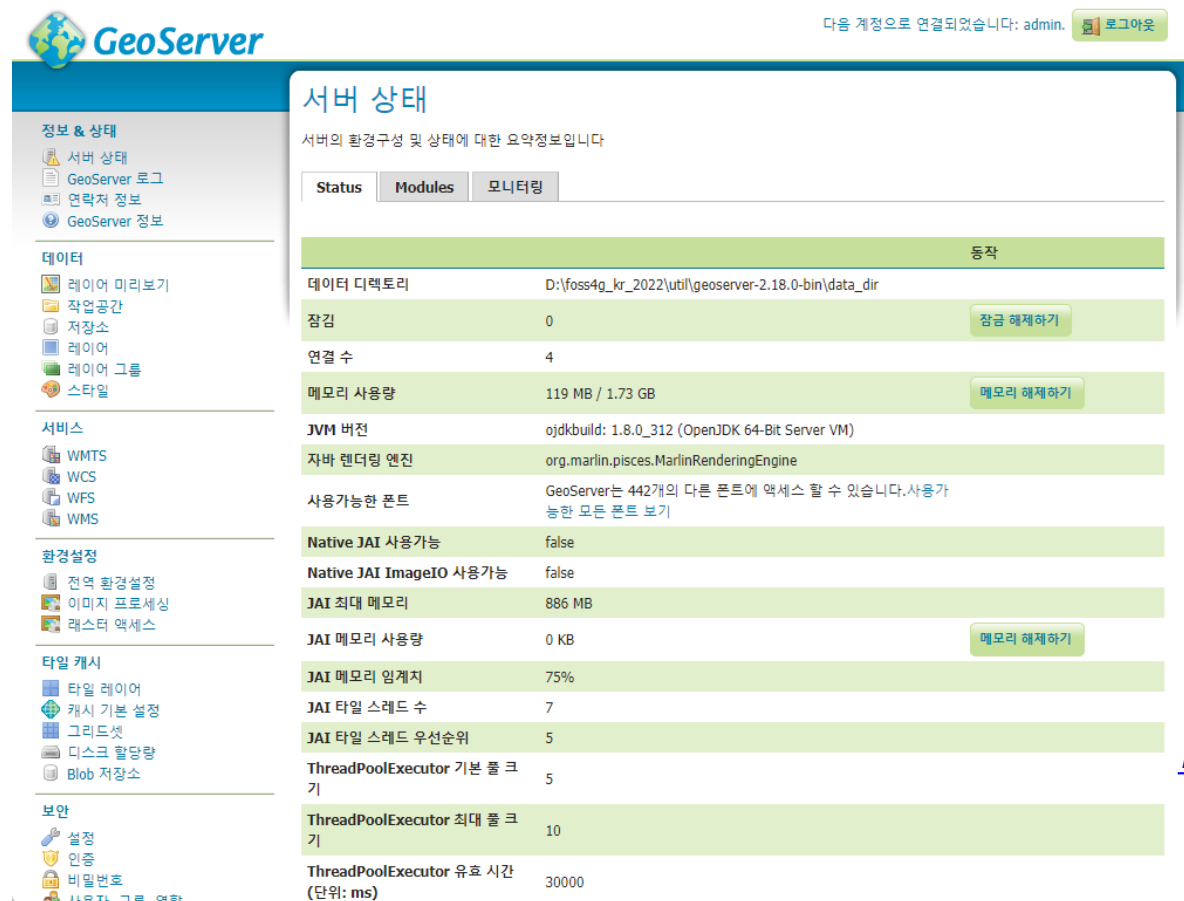
Create Style(CSS)

레이어 속성을 이용한 스타일

Apply Layer Style

Layer Group

Web Viewer



다음 계정으로 연결되었습니다: admin. [로그아웃](#)

서버 상태

서버의 환경구성 및 상태에 대한 요약정보입니다

[Status](#)
[Modules](#)
[모니터링](#)

동작	
데이터 디렉토리	D:\foss4g_kr_2022\util\geoserver-2.18.0-bin\data_dir
잠금	0 잠금 해제하기
연결 수	4
메모리 사용량	119 MB / 1.73 GB 메모리 해제하기
JVM 버전	ojdkbuild: 1.8.0_312 (OpenJDK 64-Bit Server VM)
자바 렌더링 엔진	org.marlin.pisces.MarlinRenderingEngine
사용가능한 폰트	GeoServer는 442개의 다른 폰트에 액세스 할 수 있습니다. 사용가능한 모든 폰트 보기
Native JAI 사용가능	false
Native JAI ImageIO 사용가능	false
JAI 최대 메모리	886 MB
JAI 메모리 사용량	0 KB 메모리 해제하기
JAI 메모리 임계치	75%
JAI 타일 스레드 수	7
JAI 타일 스레드 우선순위	5
ThreadPoolExecutor 기본 풀 크기	5
ThreadPoolExecutor 최대 풀 크기	10
ThreadPoolExecutor 유효 시간 (단위: ms)	30000

Web

GeoServer - Authentication(CORS)

```
vi /usr/geoserver-2.14.1/webapps/geoserver/WEB-INF/web.xml
```

내용 중 CORS에 해당되는 2곳에 대한 주석을 아래 그림처럼 해제합니다.

```

root@localhost/
<filter-name>Thread locals cleanup filter</filter-name>
<filter-class>org.geoserver.filters.ThreadLocalsCleanupFilter</filter-class>
<!--
  This filter cleans up thread locals Geotools is setting up for concurrency and performance
  reasons
-->
</filter>
<!-- Uncomment following filter to enable CORS -->
<filter>
  <filter-name>cross-origin</filter-name>
  <filter-class>org.eclipse.jetty.servlets.CrossOriginFilter</filter-class>
</filter>

<!--
  THIS FILTER MUST BE THE FIRST ONE, otherwise we end up with ruined chars in the input from the GUI
  See the "Note" in the Tomcat character encoding guide:
  http://wiki.apache.org/tomcat/FAQ/CharacterEncoding
-->
<filter-mapping>
  <filter-name>set character Encoding</filter-name>
  <url-pattern>/*</url-pattern>
</filter-mapping>

<!-- Uncomment following filter to enable CORS -->
<filter-mapping>
  <filter-name>cross-origin</filter-name>
  <url-pattern>/*</url-pattern>
</filter-mapping>

<filter-mapping>
  <filter-name>FlushSafeFilter</filter-name>
  <url-pattern>/*</url-pattern>
</filter-mapping>

```

작업공간 편집

기존 작업공간을 편집합니다

Basic Info

Security

이름

foss4g_pre

네임스페이스 URI

foss4g_pre

이 작업공간과 연결된 네임스페이스 URI

☒ 기본 작업공간으로 설정하기

☐ 분리된 작업공간

설정

☐ Grant access to any role

활성화

☐

Available Roles	Read	Write	Admin
ADMIN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ROLE_AUTHENTICATED	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ROLE_ANONYMOUS	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP_ADMIN	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

저장 Apply 취소

Script

<http://localhost:8081/webviewer/indexCesiumGeoserver.html>

Web

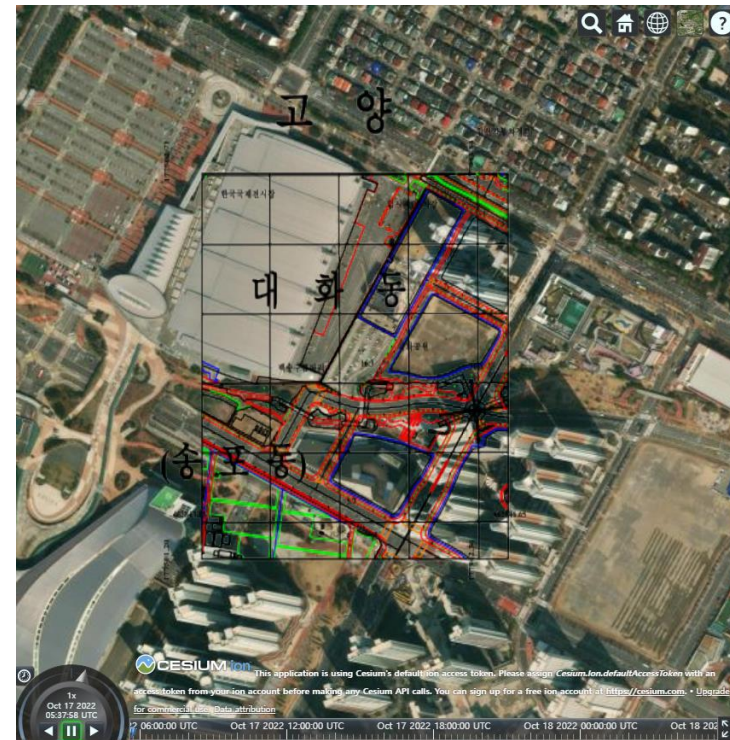
Code

Result - CesiumJS

```
<script>
  const viewer = new Cesium.Viewer("cesiumContainer");
</script>
<script type="text/javascript">

  // const viewer = window.cesiumViewer;
  let layers = viewer.imageryLayers;
  var wmsPath = '/data/output/d6a9ec52-2efd-42e8-a402-e912d9e3c6bf'
  var wmsObj = new Cesium.TileMapServiceImageryProvider({
    url: wmsPath
  });
  var rtnObj = layers.addImageryProvider(wmsObj);
  viewer.flyTo(rtnObj);

</script>
```



Script

<http://localhost:8081/webviewer/indexCesiumGeoserver.html>

Web

Code

GeoServer - RestAPI

Homepage RestAPI

<https://docs.geoserver.org/stable/en/user/rest/>

```
pip install geoserver-rest
```

Python raw request RestAPI sample : Today

<https://gist.github.com/jgomo3/73f38cc5a91d85146ccf>

Web

Code

GeoServer - RestAPI

- Authorize
Create RestAPI user
Workspace 권한 부여 필요
- (Create Workspace 사용자 권한 등 처리 필요)
- Create DataStore(Tiff,GPKG)
(등록 후 재부팅 후에 상세 페이지 접근 가능 Bug?)
- Publish Layer(Vector, Raster) - FeatureType
- Apply Style (CSS) - Update Layer
- Create LayerGroup
- WebViewer

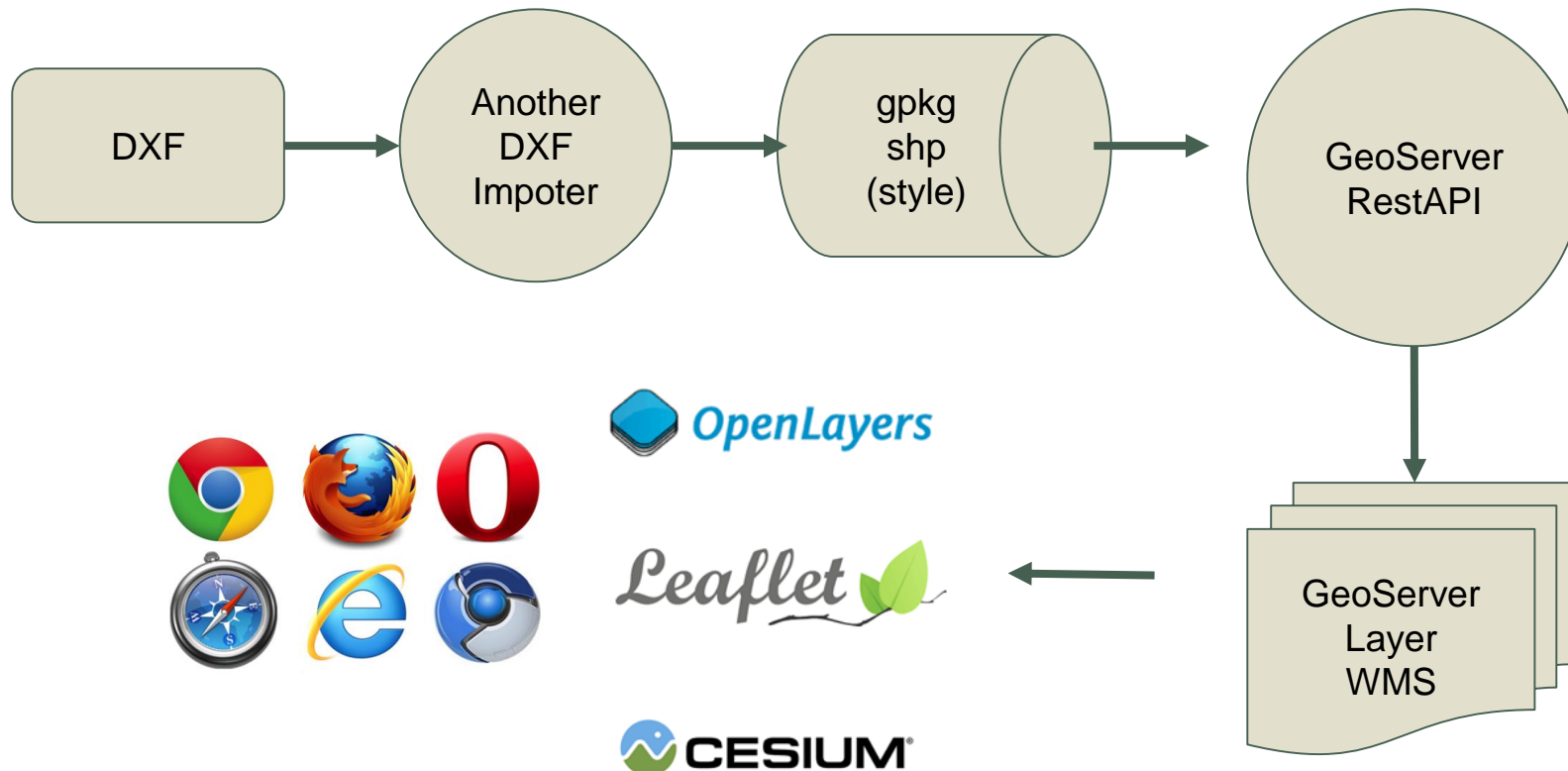
Web

Code

정리

- Processing Flow
- 한계점
gpkg 생성에 따른 QGIS 의존성(GUI 개발환경, server os)
- 개선방향
DXF Geometry 추출 프로세스 개선 (OGR2OGR)
Authentication 개선 (Proxy, Authorize Header 등)

Processing



No QGIS - GDAL

도형 추출

```

opt = '-append -update --config DXF_ENCODING "' + ogrCharSet + '" '

opt = opt + '--config DXF_INCLUDE_RAW_CODE_VALUES TRUE '
opt = opt + ('%s -nlt %s %s -sql "select *, ogr_style from entities where OGR_GEOMETRY %s" -nln "%s"' % (cmdOpt,v[1],optGCP,v[2], gpkgTable)
if bGen3D:
    opt = opt + ' -dim 3 '

pList={'INPUT':korrdXFDatNam,'OPTIONS':opt,'OUTPUT': korrgPKGDatNam}

"""
ogr2ogr -append -update ^
".\\output\\sample.gpkg" ".\\data\\sample.dxf" ^
--config DXF_ENCODING "UTF-8" ^
--config DXF_INCLUDE_RAW_CODE_VALUES TRUE ^
--config DXF_TRANSLATE_ESCAPE_SEQUENCES FALSE ^
--config DXF_MERGE_BLOCK_GEOMETRIES TRUE ^
--config DXF_INLINE_BLOCKS TRUE -dim 2 ^
-nlt POINT ^
-sql "select *, ogr_style from entities where OGR_GEOMETRY LIKE '%POINT%' " ^
-nln "e986663f-065e-4f25-aaed-d3238a8ca41eeP"

"""

pAntw=processing.run('gdal:convertformat',pList)

```

gpkg processing

```

Layer = QgsVectorLayer(sLayer, layerName+'('+v[0]+')',"ogr")
Layer.setCrs(mLay_crs)

Layer.setSubsetString( "Layer = '" + layerName + "'" )

if Layer.featureCount() < 0: Layer=None

Layer = QgsProject.instance().addMapLayer(Layer, False)

```

Authentication

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GeoServer 2.23.x User Manual » Security » Tutorials » Configuring HTTP Header Proxy Authentication

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Configuring HTTP Header Proxy Authentication

Introduction

Proxy authentication is used in multi-tier system. The user/principal authenticates at the proxy and the proxy provides the authentication information to other services.

This tutorial shows how to configure GeoServer to accept authentication information passed by HTTP header attribute(s). In this scenario GeoServer will do no actual authentication itself.

Prerequisites

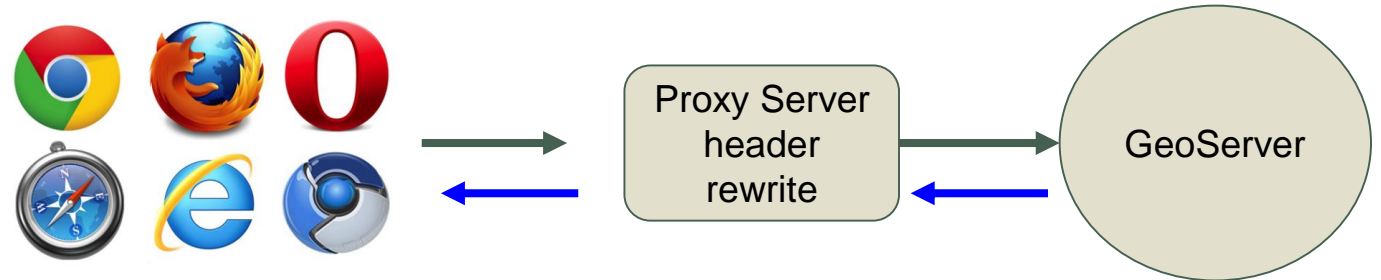
This tutorial uses the [curl](#) utility to issue HTTP request that test authentication. Install curl before proceeding.

Note: Any utility that supports setting HTTP header attributes can be used in place of curl.

Configure the HTTP header filter

1. Sta
2. Execute the same command but specify the `--header` option.:

```
curl -v --header "sdf09rt2s: admin" -G "http://localhost:8080/geoserver/wfs?request=getcapabilities"
```



Q&A

강의 소스

https://github.com/t2ols/FOSS4GKR_2022

QGIS Desktop 실행환경

QGIS <https://qgis.org/ko/site/forusers/download.html>

OSGEO4W : <https://trac.osgeo.org/osgeo4w/>

GeoServer : <https://geoserver.org/release/stable/>

CSS Extensions : <https://sourceforge.net/projects/geoserver/files/GeoServer/2.21.2/extensions/geoserver-2.21.2-css-plugin.zip/download>

주의) GeoServer 버전과 CSS Extention 버전 일치

GeoServer 지원 JDK

jdk 1.8 : <https://github.com/ojdkbuild/ojdkbuild>

감사합니다