**설치 환경**

**Ubuntu 18.04.4 LTS**

**1. Swap 파일 생성**

**# cd /**

**# swapoff -a**

**# fallocate -l 8G /swapfile**

**# chmod 600 /swapfile**

**# mkswap /swapfile**

**# swapon /swapfile**

**# free -tm**

              total        used        free      shared  buff/cache   available

Mem:          64373        1307       61792          16        1273       62504

Swap:          8191           0        8191

Total:        72565        1307       69984

**2. 라이브러리 설치**

**# apt-get update**

**# sudo apt-get install make cmake g++ libboost-dev libboost-system-dev libboost-filesystem-dev libexpat1-dev zlib1g-dev lua5.2 liblua5.2-dev libluajit-5.1-dev git-core tar unzip wget bzip2 build-essential autoconf libtool libxml2-dev libgeos-dev libgeos++-dev libpq-dev libbz2-dev libproj-dev munin-node munin libprotobuf-c-dev protobuf-c-compiler libfreetype6-dev libpng-dev libtiff5-dev libicu-dev libgdal-dev libcairo2-dev libcairomm-1.0-dev apache2 apache2-dev libagg-dev ttf-unifont libgeotiff-epsg libmapnik-dev vim**

**3. 소프트웨어 업그레이드**

**# apt update**

**# reboot**

**4. PostgreSQL 데이터베이스 서버 및 PostGIS Extension 설치**

**# apt install postgresql postgresql-contrib postgis postgresql-10-postgis-2.4**

**# sudo -u postgres -i**

**$ createuser osm**

**$ createdb -E UTF8 -O osm gis**

**$ psql -c "CREATE EXTENSION postgis;" -d gis**

CREATE EXTENSION

**$ psql -c "CREATE EXTENSION hstore;" -d gis**

CREATE EXTENSION

**$ psql -c "ALTER TABLE spatial\_ref\_sys OWNER TO osm;" -d gis**

ALTER TABLE

**$ exit**

**5. 사용자 계정(osm) 생성**

**# sudo adduser osm**

**6. 지도 스타일 시트 및 지도 데이터 다운로드**

**지도 데이터 조회 : https://download.geofabrik.de/**

**# su - osm**

**$ wget https://github.com/gravitystorm/openstreetmap-carto/archive/v4.20.0.tar.gz**

**$ tar xvfz v4.20.0.tar.gz -C /home/osm/**

**$ mkdir Map**

**$ cd Map/**

**$ wget -c https://download.geofabrik.de/asia/south-korea-latest.osm.pbf**

**$ du -sh south-korea-latest.osm.pbf**

110M    south-korea-latest.osm.pbf

**7. SSH KeppAlive(접속 유지 시간) 추가**

**# vi /etc/ssh/ssh\_config**

ServerAliveInterval 60

**8. PostgreSQL로 맵 데이터 가져오기**

**osm2pgsql Option 설명**

-a : 기존 데이터를 삭제하지 않고 OSM 파일을 데이터베이스에 추가

--slim : OSM(OSM 변경 파일)을 사용하여 맵 데이터를 업데이트하려는 경우에 필요

-c : 데이터베이스에서 기존 데이터 제거(기본값)

-d : 데이터베이스 선택

--hstore : 열이 없는 태그를 추가 hstore(키/값) 열에 PostgreSQL 테이블 추가

--multi-geometry : postgresql 테이블에서 다중 지오메트리 기능 생성

--style : 스타일 파일 위치 지정

--number-processes : 서버의 CPU 코어 수

-C : 서버의 사용 가능한 전체 RAM 사이즈 약 80% 정도로 설정(캐시 크기가 클수록 가져오기 속도가 빨라짐)

마지막 : 지도 데이터 파일 위치

**# apt install osm2pgsql**

**# su - osm**

**$ osm2pgsql --slim -d gis --hstore --multi-geometry --number-processes 12 --tag-transform-script /home/osm/openstreetmap-carto-4.20.0/openstreetmap-carto.lua --style /home/osm/openstreetmap-carto-4.20.0/openstreetmap-carto.style -C 50000 /home/osm/Map/south-korea-latest.osm.pbf**

osm2pgsql version 0.94.0 (64 bit id space)

Using lua based tag processing pipeline with script /home/osm/openstreetmap-carto-4.20.0/openstreetmap-carto.lua

Using projection SRS 3857 (Spherical Mercator)

Setting up table: planet\_osm\_point

Setting up table: planet\_osm\_line

Setting up table: planet\_osm\_polygon

Setting up table: planet\_osm\_roads

Allocating memory for dense node cache

Allocating dense node cache in one big chunk

Allocating memory for sparse node cache

Sharing dense sparse

Node-cache: cache=50000MB, maxblocks=800000\*65536, allocation method=11

Mid: pgsql, cache=50000

Setting up table: planet\_osm\_nodes

Setting up table: planet\_osm\_ways

Setting up table: planet\_osm\_rels

Reading in file: /home/osm/Map/south-korea-latest.osm.pbf

Using PBF parser.

Processing: Node(15336k 187.0k/s) Way(1344k 19.48k/s) Relation(24390 1742.14/s)  parse time: 165s

Node stats: total(15336025), max(7300322185) in 82s

Way stats: total(1344401), max(781826706) in 69s

Relation stats: total(24481), max(10841293) in 14s

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Setting up table: planet\_osm\_nodes

Setting up table: planet\_osm\_ways

Setting up table: planet\_osm\_rels

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Setting up table: planet\_osm\_rels

Using lua based tag processing pipeline with script /home/osm/openstreetmap-carto-4.20.0/openstreetmap-carto.lua

Going over pending ways...

        559875 ways are pending

Using 12 helper-processes

Finished processing 559875 ways in 9 s

559875 Pending ways took 9s at a rate of 62208.33/s

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Committing transaction for planet\_osm\_point

Committing transaction for planet\_osm\_line

Committing transaction for planet\_osm\_polygon

Committing transaction for planet\_osm\_roads

Going over pending relations...

        0 relations are pending

Using 12 helper-processes

Finished processing 0 relations in 0 s

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

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Committing transaction for planet\_osm\_line

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Committing transaction for planet\_osm\_roads

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WARNING:  there is no transaction in progress

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Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

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Committing transaction for planet\_osm\_line

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Committing transaction for planet\_osm\_polygon

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Committing transaction for planet\_osm\_roads

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Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_point

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_line

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_polygon

WARNING:  there is no transaction in progress

Committing transaction for planet\_osm\_roads

WARNING:  there is no transaction in progress

Sorting data and creating indexes for planet\_osm\_point

Sorting data and creating indexes for planet\_osm\_line

Stopping table: planet\_osm\_nodes

Sorting data and creating indexes for planet\_osm\_polygon

Sorting data and creating indexes for planet\_osm\_roads

Stopping table: planet\_osm\_ways

Building index on table: planet\_osm\_ways

Stopped table: planet\_osm\_nodes in 0s

Stopping table: planet\_osm\_rels

Building index on table: planet\_osm\_rels

Stopped table: planet\_osm\_rels in 1s

NOTICE:  Self-intersection at or near point 14146816.115549183 4525943.9306361834

Copying planet\_osm\_point to cluster by geometry finished

Creating geometry index on planet\_osm\_point

Copying planet\_osm\_roads to cluster by geometry finished

Creating geometry index on planet\_osm\_roads

Creating osm\_id index on planet\_osm\_roads

Creating indexes on planet\_osm\_roads finished

All indexes on planet\_osm\_roads created in 39s

Completed planet\_osm\_roads

Creating osm\_id index on planet\_osm\_point

Creating indexes on planet\_osm\_point finished

All indexes on planet\_osm\_point created in 43s

Completed planet\_osm\_point

Copying planet\_osm\_line to cluster by geometry finished

Creating geometry index on planet\_osm\_line

Copying planet\_osm\_polygon to cluster by geometry finished

Creating geometry index on planet\_osm\_polygon

Creating osm\_id index on planet\_osm\_line

Creating indexes on planet\_osm\_line finished

All indexes on planet\_osm\_line created in 119s

Completed planet\_osm\_line

Creating osm\_id index on planet\_osm\_polygon

Creating indexes on planet\_osm\_polygon finished

All indexes on planet\_osm\_polygon created in 122s

Completed planet\_osm\_polygon

Stopped table: planet\_osm\_ways in 264s

node cache: stored: 15336025(100.00%), storage efficiency: 50.36% (dense blocks: 109, sparse nodes: 14780653), hit rate: 99.99%

Osm2pgsql took 440s overall

**$ exit**

**9. mod\_tile 설치 및 렌더링**

**# add-apt-repository ppa:osmadmins/ppa**

**# apt install libapache2-mod-tile renderd**

**# systemctl status renderd**

**10. Mapnik 스타일 시트 생성**

**# apt install curl unzip gdal-bin mapnik-utils libmapnik-dev nodejs**

**# apt install libssl1.0-dev**

**# apt install nodejs-dev**

**# apt install node-gyp**

**# apt install npm**

**# npm install -g carto**

/usr/local/bin/carto -> /usr/local/lib/node\_modules/carto/bin/carto

/usr/local/lib

└─┬ carto@1.2.0

  ├── chroma-js@1.3.7

  ├── hsluv@0.0.3

  ├─┬ js-yaml@3.12.2

  │ ├─┬ argparse@1.0.10

  │ │ └── sprintf-js@1.0.3

  │ └── esprima@4.0.1

  ├── lodash@4.17.15

  ├── mapnik-reference@8.10.0

  ├── semver@5.6.0

  └─┬ yargs@12.0.5

    ├─┬ cliui@4.1.0

    │ ├─┬ strip-ansi@4.0.0

    │ │ └── ansi-regex@3.0.0

    │ └─┬ wrap-ansi@2.1.0

    │   ├─┬ string-width@1.0.2

    │   │ ├── code-point-at@1.1.0

    │   │ └─┬ is-fullwidth-code-point@1.0.0

    │   │   └── number-is-nan@1.0.1

    │   └─┬ strip-ansi@3.0.1

    │     └── ansi-regex@2.1.1

    ├── decamelize@1.2.0

    ├─┬ find-up@3.0.0

    │ └─┬ locate-path@3.0.0

    │   ├─┬ p-locate@3.0.0

    │   │ └─┬ p-limit@2.2.2

    │   │   └── p-try@2.2.0

    │   └── path-exists@3.0.0

    ├── get-caller-file@1.0.3

    ├─┬ os-locale@3.1.0

    │ ├─┬ execa@1.0.0

    │ │ ├─┬ cross-spawn@6.0.5

    │ │ │ ├── nice-try@1.0.5

    │ │ │ ├── path-key@2.0.1

    │ │ │ ├─┬ shebang-command@1.2.0

    │ │ │ │ └── shebang-regex@1.0.0

    │ │ │ └─┬ which@1.3.1

    │ │ │   └── isexe@2.0.0

    │ │ ├─┬ get-stream@4.1.0

    │ │ │ └─┬ pump@3.0.0

    │ │ │   ├── end-of-stream@1.4.4

    │ │ │   └─┬ once@1.4.0

    │ │ │     └── wrappy@1.0.2

    │ │ ├── is-stream@1.1.0

    │ │ ├── npm-run-path@2.0.2

    │ │ ├── p-finally@1.0.0

    │ │ ├── signal-exit@3.0.2

    │ │ └── strip-eof@1.0.0

    │ ├─┬ lcid@2.0.0

    │ │ └── invert-kv@2.0.0

    │ └─┬ mem@4.3.0

    │   ├─┬ map-age-cleaner@0.1.3

    │   │ └── p-defer@1.0.0

    │   ├── mimic-fn@2.1.0

    │   └── p-is-promise@2.1.0

    ├── require-directory@2.1.1

    ├── require-main-filename@1.0.1

    ├── set-blocking@2.0.0

    ├─┬ string-width@2.1.1

    │ └── is-fullwidth-code-point@2.0.0

    ├── which-module@2.0.0

    ├── y18n@4.0.0

    └─┬ yargs-parser@11.1.1

      └── camelcase@5.3.1

**# su - osm**

**$ cd /home/osm/openstreetmap-carto-4.20.0/**

**$ nano scripts/get-shapefiles.py**

#!/usr/bin/env python

# This script generates and populates the 'data' directory with all needed

# shapefiles.

from \_\_future\_\_ import (

    division,

    absolute\_import,

    print\_function,

    unicode\_literals)

import os

import errno

import tarfile

import zipfile

import subprocess

import distutils.spawn

import argparse

import sys

import tempfile

import logging

import time

import email.utils

import atexit

import time

if sys.version\_info >= (3,):

    import urllib.request as urllib2

    import urllib.parse as urlparse

else:

    import urllib2

    import urlparse

start = time.time()

data\_dir = 'data'

settings = {

    # Keys 1, 2, 3, ... set the arg short-options and the related process

    # ordering. Use > 0 to allow processing.

    1: {

        'directory': 'world\_boundaries',

        'url': 'https://planet.openstreetmap.org/historical-shapefiles/world\_boundaries-spherical.tgz',  # noqa

        'type': 'tgz',

        'shp\_basename': [

            'world\_bnd\_m',

            'places',

            'world\_boundaries\_m'],

        'long\_opt': '--world-boundaries'

    },

    2: {

        'directory': 'simplified-land-polygons-complete-3857',

        'url': 'https://osmdata.openstreetmap.de/download/simplified-land-polygons-complete-3857.zip',  # noqa

        'type': 'zip',

        'shp\_basename': ['simplified\_land\_polygons'],

        'long\_opt': '--simplified-land'

    },

    3: {

        'directory': 'ne\_110m\_admin\_0\_boundary\_lines\_land',

        'url': 'http://www.naturalearthdata.com/http//www.naturalearthdata.com/download/110m/cultural/ne\_110m\_admin\_0\_boundary\_lines\_land.zip',  # noqa

        'type': 'zip\_dir',

        'shp\_basename': ['ne\_110m\_admin\_0\_boundary\_lines\_land'],

        'long\_opt': '--ne-admin'

    },

    4: {

        'directory': 'land-polygons-split-3857',

        'url': 'https://osmdata.openstreetmap.de/download/land-polygons-split-3857.zip',  # noqa

        'type': 'zip',

        'shp\_basename': ['land\_polygons'],

        'long\_opt': '--land-polygons'

    },

    5: {

        'directory': 'antarctica-icesheet-polygons-3857',

        'url': 'https://osmdata.openstreetmap.de/download/antarctica-icesheet-polygons-3857.zip',  # noqa

        'type': 'zip',

        'shp\_basename': ['icesheet\_polygons'],

        'long\_opt': '--icesheet-polygons'

    },

    6: {

        'directory': 'antarctica-icesheet-outlines-3857',

        'url': 'https://osmdata.openstreetmap.de/download/antarctica-icesheet-outlines-3857.zip',  # noqa

        'type': 'zip',

        'shp\_basename': ['icesheet\_outlines'],

        'long\_opt': '--icesheet-outlines'

    }

}

u\_prompt = True

def exit\_handler(dir\_path):

    # Removing empty directory

    try:

        os.rmdir(dir\_path)

    except Exception:

        pass

def download\_file(

    url,

    desc=None,

    option\_force\_update=False,

        option\_no\_curl=False):

    global u\_prompt

    try:

        scheme, netloc, path, query, fragment = urlparse.urlsplit(url)

        file\_name = os.path.basename(path)

        if not file\_name:

            file\_name = 'downloaded.file'

        if desc:

            file\_name = os.path.join(desc, file\_name)

        org\_file\_modified = None

        org\_file\_size = None

        if os.path.exists(file\_name):

            org\_file\_modified = time.localtime((os.path.getmtime(file\_name)))

            org\_file\_size = int(os.path.getsize(file\_name))

        curl\_used = 0

        if not option\_no\_curl and distutils.spawn.find\_executable("curl"):

            curl\_used = 1

            sys.stdout.flush()

            if os.path.exists(file\_name) and not option\_force\_update:

                if subprocess.call(

                    ["curl", "-R", "-z", file\_name, "-L", "-o", file\_name, url],

                        stderr=subprocess.STDOUT) != 0:

                    sys.exit("\n\n   'curl' error: download failed.\n")

                curl\_used = 2

            else:

                if subprocess.call(

                    ["curl", "-R", "-L", "-o", file\_name, url],

                        stderr=subprocess.STDOUT) != 0:

                    sys.exit("\n\n   'curl' error: download failed.\n")

            sys.stdout.flush()

        u = urllib2.urlopen(url)

        meta = u.info()

        # Compare dates and sizes

        local\_file\_modified = None

        local\_file\_size = None

        if os.path.exists(file\_name):

            local\_file\_modified = time.localtime((os.path.getmtime(file\_name)))

            local\_file\_size = int(os.path.getsize(file\_name))

        meta\_func = meta.getheaders if hasattr(

            meta, 'getheaders') else meta.get\_all

        host\_file\_modified = email.utils.parsedate(

            meta\_func("last-modified")[0])

        meta\_length = meta\_func("Content-Length")

        host\_file\_size = None

        if meta\_length:

            host\_file\_size = int(meta\_length[0])

        # Do a file check control after using curl (which looks like not

        # including it internally)

        if curl\_used == 2 and (host\_file\_size != local\_file\_size):

            print(

                "     Warning: file size differs. Downloading the file again.")

            curl\_used = 0

        if curl\_used > 0:

            u.close()

            if (not option\_force\_update and local\_file\_size is not None and

                    (org\_file\_modified == local\_file\_modified) and

                    (org\_file\_size == local\_file\_size)):

                print("     No newer file to download.")

                return file\_name, 0

            else:

                return file\_name, 1

        if (not option\_force\_update and os.path.exists(file\_name) and

                (host\_file\_modified <= local\_file\_modified) and

                (host\_file\_size == local\_file\_size)):

            print("     No newer file to download.", end="")

            if u\_prompt:

                print(" (Use -u to force downloading file)", end="")

                u\_prompt = False

            print()

            u.close()

            return file\_name, 0

        with open(file\_name, 'wb') as f:

            print(" Bytes: {0:10}".format(host\_file\_size))

            file\_size\_dl = 0

            block\_sz = 65536

            while True:

                buffer = u.read(block\_sz)

                if not buffer:

                    if file\_size\_dl != host\_file\_size:

                        sys.exit("\n\n   Error: download with invalid size.\n")

                    break

                file\_size\_dl += len(buffer)

                f.write(buffer)

                status = "{0:18}".format(file\_size\_dl)

                if host\_file\_size:

                    status += "   [{0:3.0f}%]".format(

                        file\_size\_dl \*

                        100 /

                        host\_file\_size)

                status += chr(13)

                print(status, end="")

            f.close()

            u.close()

            os.utime(

                file\_name,

                (time.mktime(host\_file\_modified),

                    time.mktime(host\_file\_modified)))

            print()

        return file\_name, 2

    except urllib2.HTTPError as e:

        sys.exit(

            "\n\n   Error: download failed. (error code: " +

            str(e.code) +

            ", error reason: " + e.reason + ")\n")

    except Exception as e:

        sys.exit("\n\n   Error: download failed.\n" + str(e) + "\n")

def main():

    # Option handling

    parser = argparse.ArgumentParser(

        epilog="This script generates and populates the '" + data\_dir +

        "' directory with all needed shapefiles, including indexing " +

        " them through shapeindex.")

    parser.add\_argument(

        '-c', "--check", dest='option\_check\_mode', action='store\_true',

        help="check whether the '" + data\_dir + "' directory already exists")

    parser.add\_argument(

        "-d", "--directory", dest="data\_dir",

        help="set the name of the data directory (default: '" +

        data\_dir + "')",

        default=data\_dir, metavar="<directory name>")

    parser.add\_argument(

        '-e', "--no-extract", dest='option\_no\_extract', action='store\_true',

        help="do not populate target directories with the expansion " +

        "of downloaded data")

    parser.add\_argument(

        '-f', "--force", dest='option\_force', action='store\_true',

        help="force continuing even if project.mml does not exist")

    parser.add\_argument(

        '-l', "--no-curl", dest='option\_no\_curl', action='store\_true',

        help="do not use 'curl' even if available")

    parser.add\_argument(

        '-n', "--no-download", dest='option\_no\_download', action='store\_true',

        help="do not download archive if already existing locally")

    parser.add\_argument(

        '-p', "--pause", dest='option\_pause\_mode', action='store\_true',

        help="pause before starting")

    parser.add\_argument(

        '-r', "--remove", dest='option\_remove', action='store\_true',

        help="remove each downloaded archive after its expansion")

    parser.add\_argument(

        '-s', "--no-shape", dest='option\_no\_shape', action='store\_true',

        help="do not run shapeindex")

    parser.add\_argument(

        '-u', "--update", dest='option\_force\_update', action='store\_true',

        help="force performing an update operation even if not needed " +

        "(e.g., downloading, expanding, indexing)")

    for element in sorted(settings):

        parser.add\_argument(

            settings[element]['long\_opt'],

            dest='option\_filter', action='append\_const', const=element,

            help="only process " + settings[element]['directory'])

    args = parser.parse\_args()

    # Initial checks

    if not args.option\_no\_shape and (

            not distutils.spawn.find\_executable("shapeindex")):

        sys.exit(

            """\n   Error: you need shapeindex (or shapeindex is not in the

   PATH). Otherwise, use '-s' option to skip shapeindex

   (indexing shapes is suggested for performance improvement).\n""")

    if args.option\_force:

        os.chdir(os.path.join(os.path.dirname(\_\_file\_\_)))

    else:

        os.chdir(os.path.join(os.path.dirname(\_\_file\_\_), '..'))

        if not os.path.isfile("project.mml"):

            sys.exit(

                """\n   Error: project.mml not found.

   Are you sure you are in the correct folder?

   Otherwise, use '-f' option to go on creating or updating the '""" +

                args.data\_dir + """' directory

   placed in the same path of this script.\n""")

    if os.path.isfile(args.data\_dir):

        sys.exit(

            """\n   Error: existing file named '""" +

            args.data\_dir +

            """'\n""")

    if args.option\_check\_mode:

        if os.path.isdir(args.data\_dir):

            sys.exit(

                """\n   A directory named '""" + args.data\_dir +

                """' already exists.

   Please consider renaming it.

   Otherwise, remove '-c' option to allow updating.\n""")

    if args.option\_pause\_mode:

        print(

            "\nThis script generates and populates the '" + args.data\_dir +

            "' directory with all needed shapefiles.\n")

        try:

            input(

                "Press Enter to continue " +

                "(remove '-p' option to avoid this message)...")

        except Exception:

            pass

    print("\nStarting " + os.path.basename(\_\_file\_\_) + "...")

    # Processing

    for element in sorted(settings):

        if (not args.option\_filter or

                (args.option\_filter and

                 element in args.option\_filter)) and element > 0:

            dir\_name = settings[element]['directory']

            dir\_path = os.path.join(args.data\_dir, dir\_name)

            path\_name = os.path.join(

                args.data\_dir,

                settings[element]['url'].rsplit('/', 1)[-1])

            # Creating directory

            try:

                os.makedirs(dir\_path)

                atexit.register(exit\_handler, dir\_path)

            except Exception:

                pass

            # Downloading

            download\_type = -1

            if not args.option\_no\_download or not os.path.isfile(path\_name):

                print(str(element) + "-1. Downloading '" + dir\_name + "'...")

                archive\_file\_name, download\_type = download\_file(

                    settings[element]['url'], args.data\_dir,

                    args.option\_force\_update, args.option\_no\_curl)

            # Expanding

            if ((not args.option\_no\_extract and download\_type > 0) or

                    args.option\_force\_update):

                sys.stdout.flush()

                print()

                print(

                    str(element) + "-2. Expanding '" + dir\_name + "'...",

                    end="")

                sys.stdout.flush()

                if settings[element]['type'] == 'tgz':

                    tar = tarfile.open(path\_name)

                    try:

                        tar.extractall(args.data\_dir)

                    except Exception:

                        sys.exit(" Failed (try with -u option).\n")

                    tar.close()

                elif settings[element]['type'] == 'zip':

                    zip = zipfile.ZipFile(path\_name)

                    try:

                        zip.extractall(args.data\_dir)

                    except Exception:

                        sys.exit(" Failed (try with -u option).\n")

                    zip.close()

                elif settings[element]['type'] == 'zip\_dir':

                    zip = zipfile.ZipFile(path\_name)

                    try:

                        zip.extractall(dir\_path)

                    except Exception:

                        sys.exit(" Failed (try with -u option).\n")

                    zip.close()

                else:

                    sys.exit(

                        "\n\nInternal error: unmanaged 'type'='" +

                        settings[element]['type'] + "'.\n")

                sys.stdout.flush()

                print(" Done.\n")

            # Removing archive

            if args.option\_remove:

                try:

                    os.remove(path\_name)

                except OSError:

                    sys.exit("\n\n\nCannot remove '" + path\_name + "'\n")

            # Indexing

            for item, shp\_basename in enumerate(

                    settings[element]['shp\_basename']):

                shp\_file\_name = os.path.join(dir\_path, shp\_basename + ".shp")

                index\_file\_name = os.path.join(

                    dir\_path, shp\_basename + ".index")

                shp\_file\_modified = None

                if os.path.exists(shp\_file\_name):

                    shp\_file\_modified = time.localtime(

                        (os.path.getmtime(shp\_file\_name)))

                index\_file\_modified = None

                if os.path.exists(index\_file\_name):

                    index\_file\_modified = time.localtime(

                        (os.path.getmtime(index\_file\_name)))

                if (not args.option\_no\_shape and shp\_file\_modified is None

                        and index\_file\_modified is not None):

                    try:

                        os.remove(index\_file\_name)

                    except OSError:

                        sys.exit(

                            "\n\n\nCannot remove '" +

                            index\_file\_name +

                            "'\n")

                if shp\_file\_modified is None:

                    sys.exit("\n\n\nMissing '" + shp\_file\_name + "'\n")

                if (args.option\_force\_update or index\_file\_modified is None or

                        (shp\_file\_modified is not None and index\_file\_modified is not None and

                         (shp\_file\_modified > index\_file\_modified))):

                    if args.option\_no\_shape and index\_file\_modified is not None:

                        if len(settings[element]['shp\_basename']) == 1:

                            print(

                                str(element) +

                                "-3" +

                                ". Removing old index '" +

                                index\_file\_name +

                                "'...")

                        else:

                            print(str(element) + "-3-" + str(item + 1) +

                                  ". Removing old index '" + index\_file\_name + "'...")

                        sys.stdout.flush()

                        try:

                            os.remove(index\_file\_name)

                        except OSError:

                            sys.exit(

                                "\n\n\nCannot remove old index '" +

                                index\_file\_name +

                                "'\n")

                            pass

                        print()

                    if not args.option\_no\_shape:

                        if len(settings[element]['shp\_basename']) == 1:

                            print(str(element) + "-3" + ". Indexing '" +

                                  shp\_file\_name + "'...")

                        else:

                            print(str(element) + "-3-" + str(item + 1) +

                                  ". Indexing '" + shp\_file\_name + "'...")

                        sys.stdout.flush()

                        if (subprocess.call(["shapeindex", "--shape\_files",

                                             shp\_file\_name],

                                            stderr=subprocess.STDOUT) != 0):

                            sys.exit(

                                "\n   Indexing error: shapeindex failed.\n")

                        sys.stdout.flush()

                        print()

    # Finishing

    if time.time()-start < 2:

        print ("...script completed.\n")

    else:

        print ("...script completed in %.1f seconds.\n" % (time.time()-start))

if \_\_name\_\_ == '\_\_main\_\_':

    try:

        main()

    except KeyboardInterrupt:

        sys.exit("\n\n\nInterrupted: you pressed Ctrl+C!\n")

    except Exception as e:

        sys.exit("\n   Error. " + str(e) + "\n")

**$ scripts/get-shapefiles.py**

Starting get-shapefiles.py...

1-1. Downloading 'world\_boundaries'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0

     Warning: file size differs. Downloading the file again.

Bytes:   52857349

          52857349   [100%]

1-2. Expanding 'world\_boundaries'... Done.

1-3-2. Indexing 'data/world\_boundaries/places.shp'...

max tree depth:8

split ratio:0.55

processing data/world\_boundaries/places.shp

9994

length=1054

version=1000

type=1

extent:box2d(-175.2365875244140625,-41.2103958129882812,179.2218933105468750,66.1441192626953125)

number shapes=251

number nodes=406

done!

2-1. Downloading 'simplified-land-polygons-complete-3857'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

100 23.3M  100 23.3M    0     0  3153k      0  0:00:07  0:00:07 --:--:-- 5061k

2-2. Expanding 'simplified-land-polygons-complete-3857'... Done.

2-3. Indexing 'data/simplified-land-polygons-complete-3857/simplified\_land\_polygons.shp'...

max tree depth:8

split ratio:0.55

processing data/simplified-land-polygons-complete-3857/simplified\_land\_polygons.shp

9994

length=250550

version=1000

type=5

extent:box2d(-20037508.3427892476320267,-20037508.3688470497727394,20037508.3427892476320267,18461504.1001019775867462)

number shapes=62625

number nodes=2295

done!

3-1. Downloading 'ne\_110m\_admin\_0\_boundary\_lines\_land'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0

100   295  100   295    0     0    189      0  0:00:01  0:00:01 --:--:--   189

100 45820  100 45820    0     0  15022      0  0:00:03  0:00:03 --:--:-- 36803

3-2. Expanding 'ne\_110m\_admin\_0\_boundary\_lines\_land'... Done.

3-3. Indexing 'data/ne\_110m\_admin\_0\_boundary\_lines\_land/ne\_110m\_admin\_0\_boundary\_lines\_land.shp'...

max tree depth:8

split ratio:0.55

processing data/ne\_110m\_admin\_0\_boundary\_lines\_land/ne\_110m\_admin\_0\_boundary\_lines\_land.shp

9994

length=794

version=1000

type=3

extent:box2d(-140.9977800000000059,-54.8968100000000021,141.0338517600138175,70.1641900000000049)

number shapes=186

number nodes=176

done!

4-1. Downloading 'land-polygons-split-3857'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

100  625M  100  625M    0     0  4674k      0  0:02:17  0:02:17 --:--:-- 6142k

4-2. Expanding 'land-polygons-split-3857'... Done.

4-3. Indexing 'data/land-polygons-split-3857/land\_polygons.shp'...

max tree depth:8

split ratio:0.55

processing data/land-polygons-split-3857/land\_polygons.shp

9994

length=2614002

version=1000

type=5

extent:box2d(-20037508.3399999998509884,-20037508.3399999998509884,20037508.3399999998509884,18461504.1001019775867462)

number shapes=653488

number nodes=6271

done!

5-1. Downloading 'antarctica-icesheet-polygons-3857'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

100 50.8M  100 50.8M    0     0  4417k      0  0:00:11  0:00:11 --:--:-- 5444k

5-2. Expanding 'antarctica-icesheet-polygons-3857'... Done.

5-3. Indexing 'data/antarctica-icesheet-polygons-3857/icesheet\_polygons.shp'...

max tree depth:8

split ratio:0.55

processing data/antarctica-icesheet-polygons-3857/icesheet\_polygons.shp

9994

length=67578

version=1000

type=5

extent:box2d(-20037508.3427892439067364,-20037508.3427892439067364,20037508.3427892439067364,-8479237.0339447762817144)

number shapes=16882

number nodes=1020

done!

6-1. Downloading 'antarctica-icesheet-outlines-3857'...

  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed

100 51.4M  100 51.4M    0     0  2118k      0  0:00:24  0:00:24 --:--:-- 5475k

6-2. Expanding 'antarctica-icesheet-outlines-3857'... Done.

6-3. Indexing 'data/antarctica-icesheet-outlines-3857/icesheet\_outlines.shp'...

max tree depth:8

split ratio:0.55

processing data/antarctica-icesheet-outlines-3857/icesheet\_outlines.shp

9994

length=317942

version=1000

type=3

extent:box2d(-20037508.3427892439067364,-20037508.3427892439067364,20037508.3427892439067364,-8479237.0339447762817144)

number shapes=79473

number nodes=1920

done!

...script completed in 231.3 seconds.

**$ carto project.mml > style.xml**

**11. 글꼴 설치**

**# apt install ttf-dejavu**

**# apt install fonts-noto-cjk fonts-noto-hinted fonts-noto-unhinted ttf-unifont**

**12. 렌더링 설정**

**# apt install libmapnik-dev**

**# mapnik-config --input-plugins**

    /usr/lib/mapnik/3.0/input

**Renderd.conf 설명**

num\_threads : CPU 코어 스레드 수

plugins\_dir : 기본 입력 플러그인 디렉토리 경로(mapnik-config --input-plugins)

font\_dir : 글꼴 경로

font\_dir\_recurse : 글꼴 활성화(true)

XML : style.xml 경로

HOST : 도메인 또는 IP 저정

**# vi /etc/renderd.conf**

[renderd]

stats\_file=/var/run/renderd/renderd.stats

socketname=/var/run/renderd/renderd.sock

num\_threads=12

tile\_dir=/var/lib/mod\_tile

[mapnik]

plugins\_dir=/usr/lib/mapnik/3.0/input/

font\_dir=/usr/share/fonts/truetype

font\_dir\_recurse=true

[default]

;URI=/osm/

URI=/

XML=/home/osm/openstreetmap-carto-4.20.0/style.xml

DESCRIPTION=This is the standard osm mapnik style

;ATTRIBUTION=&copy;<a href=\"http://www.openstreetmap.org/\">OpenStreetMap</a> and <a href=\"http://wiki.openstreetmap.org/w\

iki/Contributors\">contributors</a>, <a href=\"http://creativecommons.org/licenses/by-sa/2.0/\">CC-BY-SA</a>

HOST=192.168.100.50

;SERVER\_ALIAS=http://a.tile.openstreetmap.org

;SERVER\_ALIAS=http://b.tile.openstreetmap.org

;HTCPHOST=proxy.openstreetmap.org

**# chown osm:osm /var/lib/mod\_tile -R**

**# vi /etc/init.d/renderd**

    RUNASUSER=osm(수정)

**# systemctl daemon-reload**

**# systemctl restart renderd**

**# journalctl -eu renderd**

**13. Apache 설정**

**# vi /etc/apache2/sites-available/tileserver\_site.conf**

    ServerName 192.168.100.50(수정)

**# systemctl restart apache2**

**14. OSM Tile URL 검증**

<http://192.168.100.50/0/0/0.png>



**15. Tiled Web Map(leaflet) 설치**

**# cd var/www/**

**# wget http://cdn.leafletjs.com/leaflet/v1.4.0/leaflet.zip**

**# unzip leaflet.zip**

**# nano index.html**

<html>

<head>

<meta charset="UTF-8">

<title>Mobigen Openstreet Map</title>

<link rel="stylesheet" type="text/css" href="leaflet.css"/>

<script type="text/javascript" src="leaflet.js"></script>

<style>

   #map{width:100%;height:100%}

</style>

</head>

<body>

  <div id="map"></div>

  <script>

    var map = L.map('map').setView([36.671,128.063],7);

    L.tileLayer('http://192.168.100.50/{z}/{x}/{y}.png',{maxZoom:18}).addTo(map);

</script>

</body>

</html>

**16. Web Map(leaflet) 확인 및 Cache 누적량 확인**

**Web 브라우저에서 Zoom In/Out 시도시 용량 변화가 반영됨**

**# ls -al /var/lib/mod\_tile/default/**

합계 32

drwxr-xr-x 8 osm osm 4096  3월 18 12:26 .

drwxr-xr-x 3 osm osm 4096  3월 18 12:20 ..

drwxr-xr-x 3 osm osm 4096  3월 18 12:20 0

drwxr-xr-x 3 osm osm 4096  3월 18 12:25 10

drwxr-xr-x 3 osm osm 4096  3월 18 12:26 12

drwxr-xr-x 3 osm osm 4096  3월 18 12:24 7

drwxr-xr-x 3 osm osm 4096  3월 18 12:25 8

drwxr-xr-x 3 osm osm 4096  3월 18 12:25 9

<http://192.168.100.50/>

