온톨로지 시각화 도구

In [1]:
```
from pyvis.network import Network
import networkx as nx
from SPARQLWrapper import SPARQLWrapper, JSON
from rdflib import Graph
from rdflib.plugins.sparql.results.jsonresults import JSONResultSer
ializer
import json

from enum import Enum

class ShowLiteral(Enum):
    Yes = 0
    No = 1
    InNode = 2

class Vis(object):
    """
    SPARQL Endpoint 과 연동하여 특정 트리플들을 시각화하는 도구,
    파일을 읽어 파일의 내용을 시각화할 수도 있다.
    """

    def __init__(self, endpoint=None, filepath=None, ignore_propert
y=[]):
        self.__endpoint = endpoint
        self.__filepath = filepath
        self.__ignore_property = ignore_property if ignore_property
!= None else []
        self.__sparql = SPARQLWrapper(endpoint)



    def __getLocalName(self, node):
        if node.find('/') > 0 and node.find('#') > 0:
            return node[node.rindex('/')+1:] if node.rindex('/') >
node.rindex('#') else node[node.rindex('#')+1:]
        elif node.find('/') > 0:
            return node[node.rindex('/')+1:]
        elif node.find('#') > 0:
            return node[node.rindex('#')+1:]
        else:
            return node


    def __make_short_name(self, name):
        if len(name) > 20 :
            name = name[0:20]
        return name


    def setIgnoreProperty(self, ignore_property):
        self.__ignore_property = ignore_property


    def __show_graph(self, results, show_literal):
        nw = Network(height='800px', width='100%', notebook=True)
```

```
        node = {}
        groups = {}
        node_num = 0;
        group_num = 0;
        edge_list = []

        if show_literal:
            groups['literal'] = group_num
            group_num += 1

        for result in results["results"]["bindings"]:
#             print(result["s"]["value"], "\t", result["p"]["value"
], "\t", result["o"]["value"])
#             print(result)
            if not result["p"]["value"] in self.__ignore_property:
                # 존재하지 않는 경우 디폴트로 처리
                if 'slabel' not in result:
                    result['slabel'] = {'type': 'literal', 'value':
self.__getLocalName(result['s']['value'])}
                if 'olabel' not in result:
                    result['olabel'] = {'type': 'literal', 'value':
self.__getLocalName(result['o']['value'])}
                if 'stype' not in result:
                    result['stype'] = {'type': 'literal', 'value':
''}
                if 'otype' not in result:
                    result['otype'] = {'type': 'literal', 'value':
''}

                # 노드
                if result['s']['type'] == 'uri' and not result['s']
['value'] in node:
                    node[result['s']['value']] = {'id':node_num}
                    node_num += 1

                if result['o']['type'] == 'uri' and not result['o']
['value'] in node:
                    node[result['o']['value']] = {'id':node_num}
                    node_num += 1


                if 'stype'  in result and not result['stype']['valu
e'] in groups:
                    groups[result['stype']['value']] = group_num
                    group_num += 1
                if 'otype'  in result and not result['otype']['valu
e'] in groups:
                    groups[result['otype']['value']] = group_num
                    group_num += 1

                node[result['s']['value']].update({'label':result['
slabel']['value'], 'type':result['stype']['value']})
                if result['o']['type'] == 'uri':
                    node[result['o']['value']].update({'label':resu
lt['olabel']['value'], 'type':result['otype']['value']})
                    edge_list.append((result['s']['value'], result[
'o']['value'], result['p']['value']))

                # 리터널도 표시하는 경우
                if show_literal == ShowLiteral.Yes:
                    if result['o']['type'] == 'literal':
                        node[result['o']['value']+str(node_num)] =
{'id':node_num}
                        node[result['o']['value']+str(node_num)].up
```

```
                        node[result['o']['value']].update({'label':result['o']['value'], 'type':'literal'})
                        edge_list.append((result['s']['value'], result['o']['value'], result['p']['value'], result['o']['value']+str(node_num)))
                        node_num += 1

                # 노드 안에 넣는 경우
                if show_literal == ShowLiteral.InNode:
                    if result['o']['type'] == 'literal':
                        if 'datatype' in node[result['s']['value']]:
                            dt = node[result['s']['value']]['datatype'] + '<br>' + self.__getLocalName(result['p']['value']) + ":" + result['o']['value']
                            node[result['s']['value']].update({'datatype': dt})
                        else:
                            node[result['s']['value']]['datatype'] = self.__getLocalName(result['p']['value']) + ":" + result['o']['value']
                            node[result['s']['value']].update({'datatype': node[result['s']['value']]['datatype']})

        for n in node:
            if node[n]['type'] == 'literal':
                nw.add_node(n, shape='box',label=self.__make_short_name(node[n]['label']), title=node[n]['label'], group=groups[node[n]['type']])
            else:
                if 'datatype' in node[n]:
                    nw.add_node(n, label=self.__make_short_name(node[n]['label']), title=n+"<br>"+node[n]['datatype'], group=groups[node[n]['type']])
                else:
                    nw.add_node(n, label=self.__make_short_name(node[n]['label']), title=n, group=groups[node[n]['type']])
        for e in edge_list:
            if len(e)==4:
                nw.add_edge(e[0], e[3], arrows='to', label=self.__getLocalName(e[2]), title=e[2])
            else:
                if e[2]=='http://www.w3.org/1999/02/22-rdf-syntax-ns#type':
                    nw.add_edge(e[0], e[1], width=4, color='black', arrows='to', label=self.__getLocalName(e[2]), title=e[2])
                else:
                    nw.add_edge(e[0], e[1], arrows='to', label=self.__getLocalName(e[2]), title=e[2])

        nw.set_edge_smooth('dynamic')
        nw.show_buttons(filter_=['physics'])

        return nw


    def __run_query(self, query_string, show_literal):
        self.__sparql.setQuery(query_string)
        self.__sparql.setReturnFormat(JSON)
        results = self.__sparql.query().convert()
        nw = self.__show_graph(results, show_literal)
        return nw
```

```
    def vis(self, search_keyword : str='', uri: str='', limit: int=
500, show_literal: ShowLiteral=ShowLiteral.No):
        if limit > 1000:
            limit = 1000

        if uri != '':
            query_string = """
                prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#
>
                SELECT ?s ?p ?o ?slabel ?olabel ?stype ?totype
                WHERE {
                    {
                        filter(?s=<%s>)
                        ?s ?p ?o.
                        optional{?s rdfs:label ?slabel .}
                        optional{?s a ?stype}
                        optional{?o rdfs:label ?olabel .}
                        optional{?o a ?otype}
                      } UNION {
                        filter(?o=<%s>)
                        ?s ?p ?o.
                        optional{?s rdfs:label ?slabel .}
                        optional{?s a ?stype}
                        optional{?o rdfs:label ?olabel .}
                        optional{?o a ?otype}
                      }
                } LIMIT %i
            """  % (uri, uri, limit)
        elif search_keyword != '':
            query_string = """
                prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#
>
                SELECT ?s ?p ?o ?slabel ?olabel ?stype ?totype
                WHERE {
                    ?s ?pp ?oo.
                    filter(regex(?oo, '%s'))
                    ?s ?p ?o.
                    optional{?s rdfs:label ?slabel .}
                    optional{?s a ?stype}
                    optional{?o rdfs:label ?olabel .}
                    optional{?o a ?otype}
                } LIMIT %i
            """ % (search_keyword, limit)
        else:
            query_string = """
                    prefix rdfs: <http://www.w3.org/2000/01/rdf-sch
ema#>
                    SELECT *
                    WHERE {
                        ?s ?p ?o.
                        optional{?s rdfs:label ?slabel .}
                        optional{?s a ?stype}
                        optional{?o rdfs:label ?olabel .}
                        optional{?o a ?otype}
                    } LIMIT %i
                """ % limit

        return self.__run_query(query_string, show_literal)

    def vis_file(self, uri: str='', show_literal: ShowLiteral=ShowL
iteral.Yes):
        g = Graph()
        g.parse(self.__filepath, format='turtle')
```

```
        if uri != '':
            qres = g.query("""
                prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#
>
                SELECT ?s ?p ?o ?slabel ?olabel ?stype ?totype
                WHERE {
                    {
                        filter(?s=<%s>)
                        ?s ?p ?o.
                        optional{?s rdfs:label ?slabel .}
                        optional{?s a ?stype}
                        optional{?o rdfs:label ?olabel .}
                        optional{?o a ?otype}
                      } UNION {
                        filter(?o=<%s>)
                        ?s ?p ?o.
                        optional{?s rdfs:label ?slabel .}
                        optional{?s a ?stype}
                        optional{?o rdfs:label ?olabel .}
                        optional{?o a ?otype}
                      }
                }
            """  % (uri, uri))
        else:
            qres = g.query("""
                prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#
>
                SELECT *
                WHERE {
                    ?s ?p ?o.
                    optional{?s rdfs:label ?slabel .}

                    optional{?s a ?stype}
                    optional{?o rdfs:label ?olabel .}
                    optional{?o a ?otype}
                }
            """)
        f = open('json_result', 'w')
        JSONResultSerializer(qres).serialize(f)
        with open('json_result') as f:
            read_data = json.load(f)

        nw = self.__show_graph(read_data, show_literal)
        return nw
```

SPARQL Endpoint에 대한 사용법

In [2]:
```
# 객체 생성

v = Vis('http://localhost:3030/publicdata/query')
```

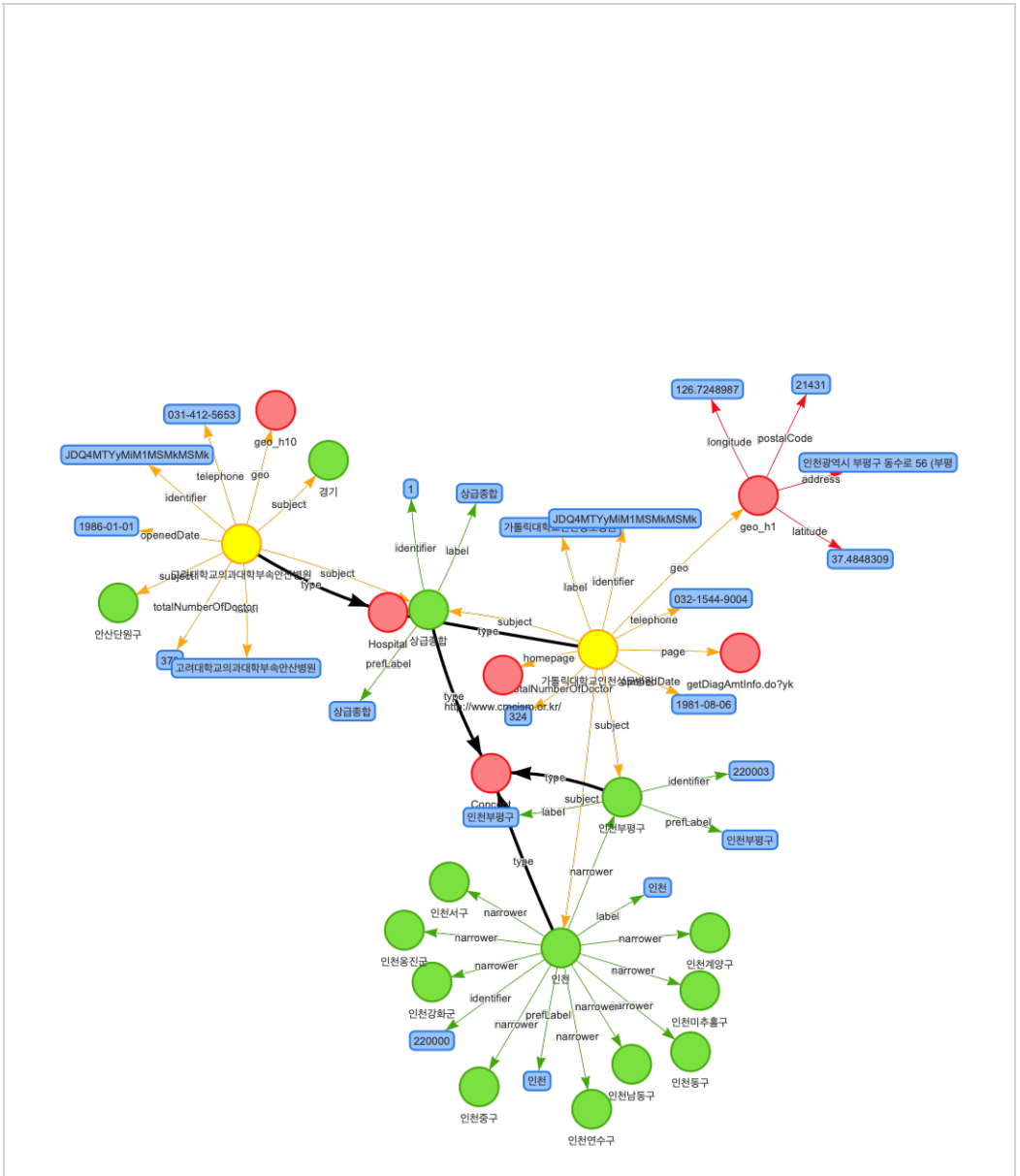
리터널값을 보여주는 방식을 3가지로 정의함

1. ShowLiteral.Yes -> 개별 노드로 구성하여 보여준다.
2. ShowLiteral.No -> 보여주지 않는다.(Resource 인 노드들만 시각화 한다.)(default)
3. ShowLiteral.InNode -> 리터널값을 가지는 주어 노드의 툴팁으로 보여준다.

기본 사용

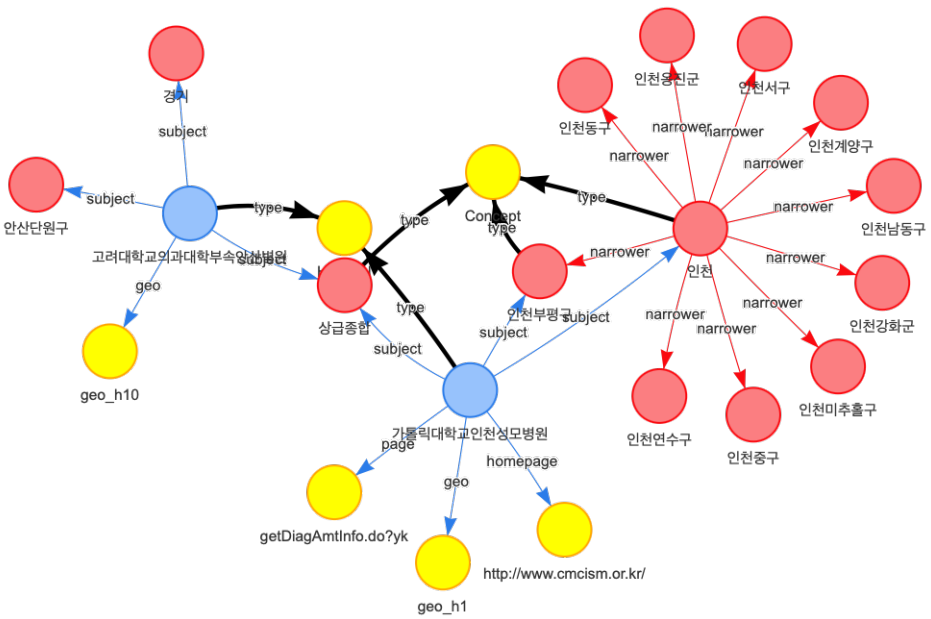
In [3]:
```
nw = v.vis(limit=50, show_literal=ShowLiteral.Yes)
nw.show('default1.html')
```

Out[3]:



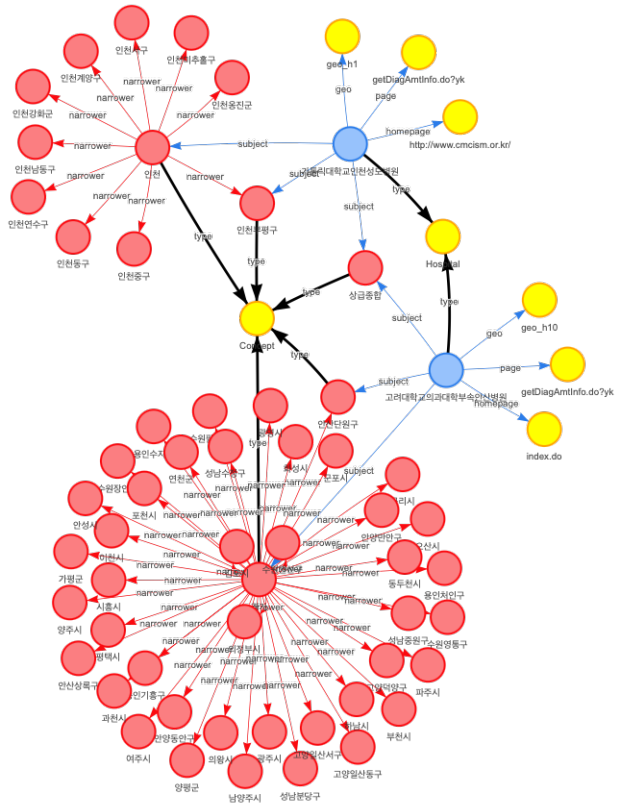
In [4]:
```
nw = v.vis(limit=50, show_literal=ShowLiteral.InNode)
nw.show('default2.html')
```

Out[4]:



In [5]:
```
nw = v.vis(limit=100)
nw.show('default3.html')
```

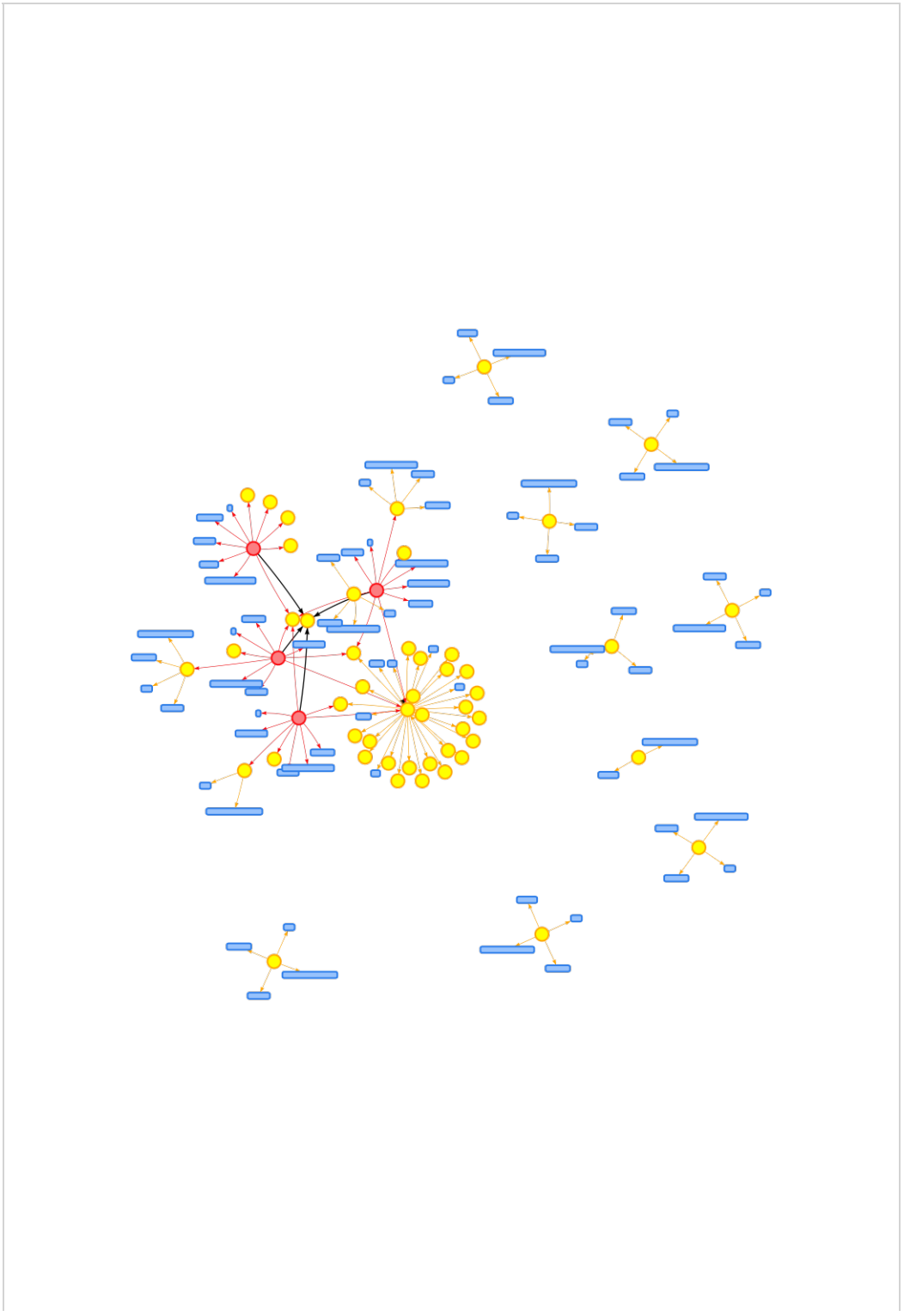
Out[5]:



검색어 입력

In [6]:
```
nw = v.vis(search_keyword='서울',limit=150, show_literal=ShowLiteral
.Yes)
nw.show('default4.html')
```

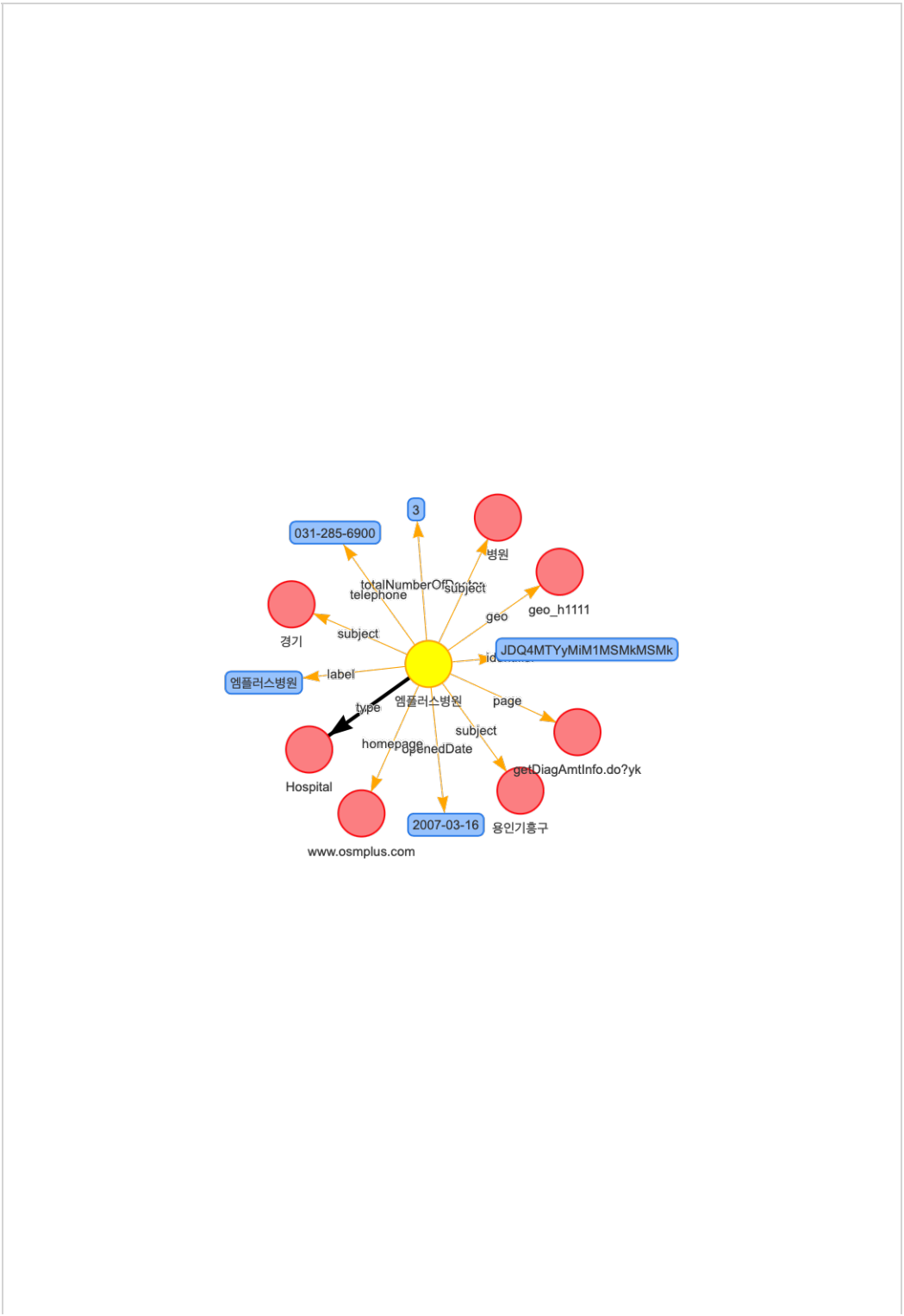
Out[6]:



URI 입력

In [7]:
```
nw = v.vis(uri='http://joyhong.tistory.com/resource/h_1111',limit=150, show_literal=ShowLiteral.Yes)
nw.show('default5.html')
```

Out[7]:



ignore property 설정

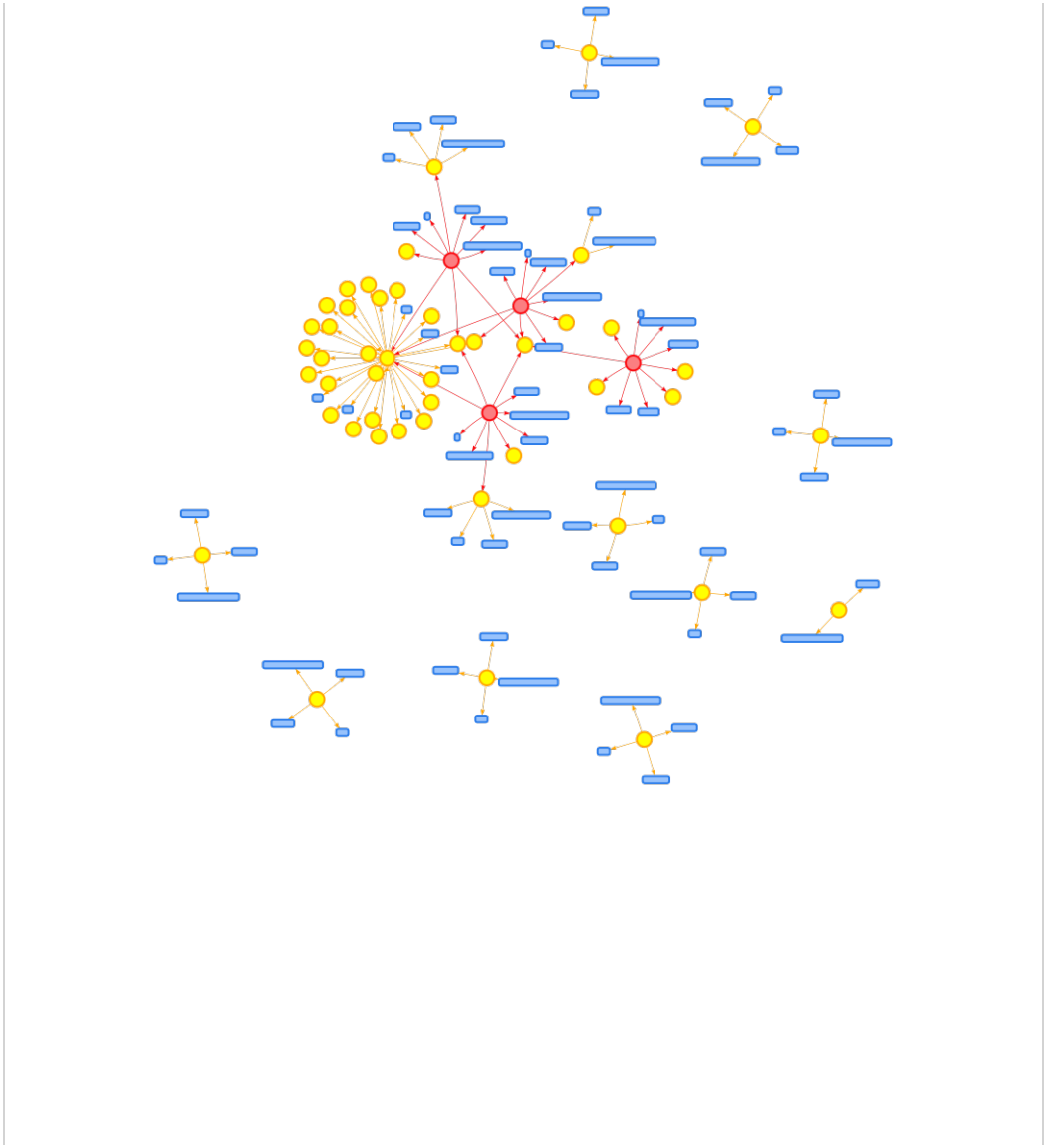
시각화하는 내용 중에 삭제하고자 하는 관계를 ignore property 로 설정하여 사용한다.

In [8]:
```
from rdflib.namespace import RDF
```

```
ignore = [str(RDF.type)]
v.setIgnoreProperty(ignore)

nw = v.vis(search_keyword='서울',limit=150, show_literal=ShowLiteral
.Yes)
nw.show('default6.html')
```

Out[8]:



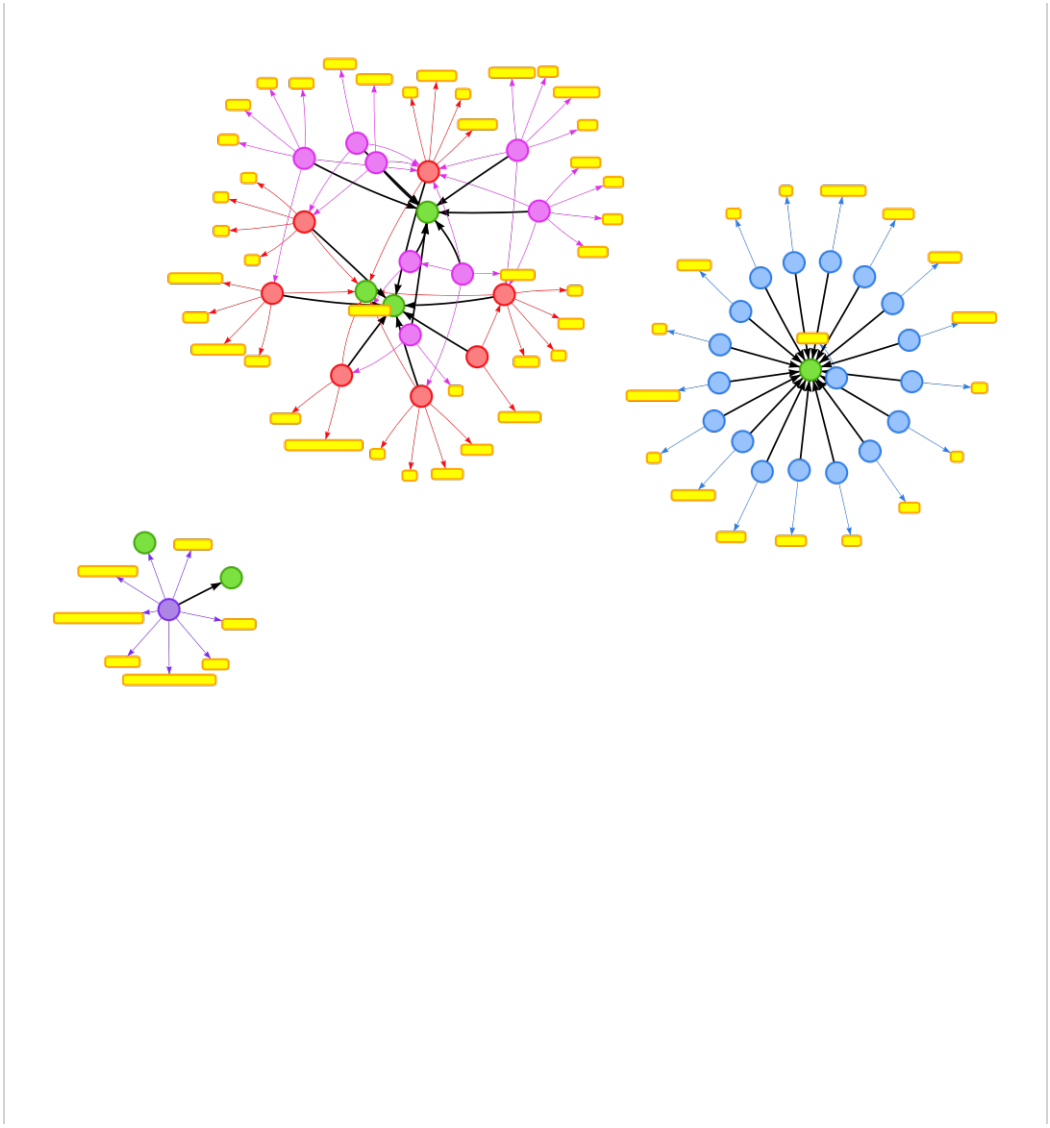
파일에 대한 사용법

기본 사용

In [9]:
```
vf = Vis(filepath='sample_model.ttl')
```

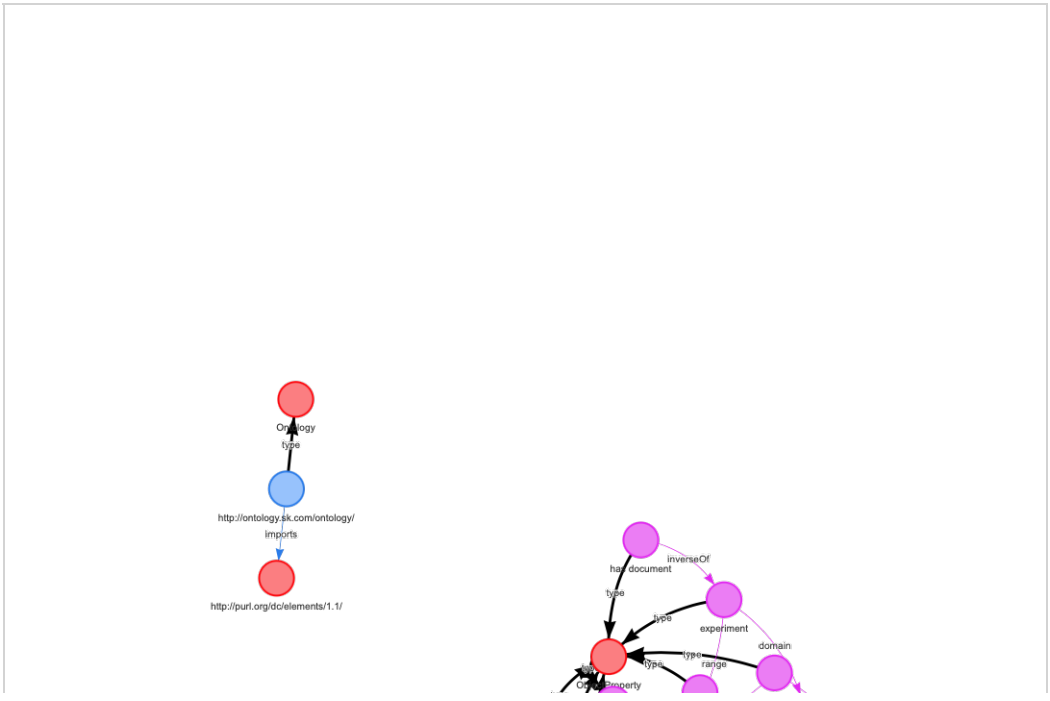
In [10]:
```
nw = vf.vis_file()
nw.show('default7.html')
```

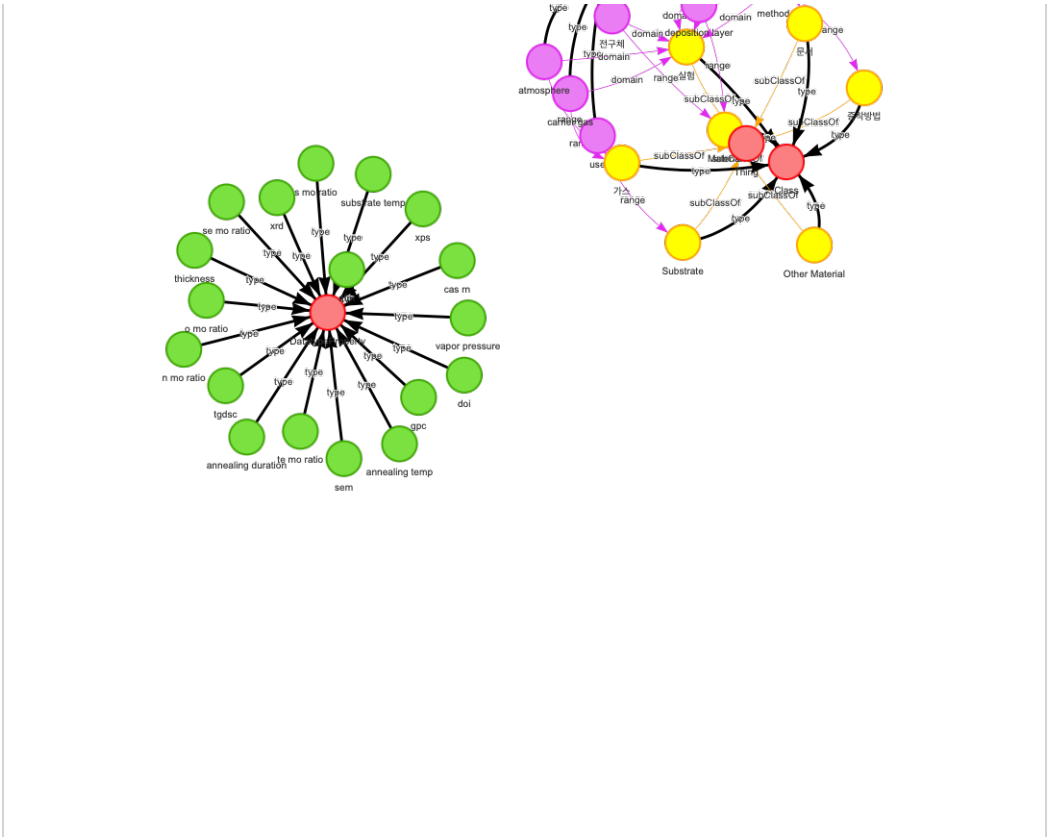
Out[10]:



In [11]:
```
nw = vf.vis_file(show_literal=ShowLiteral.InNode)
nw.show('default8.html')
```

Out[11]:

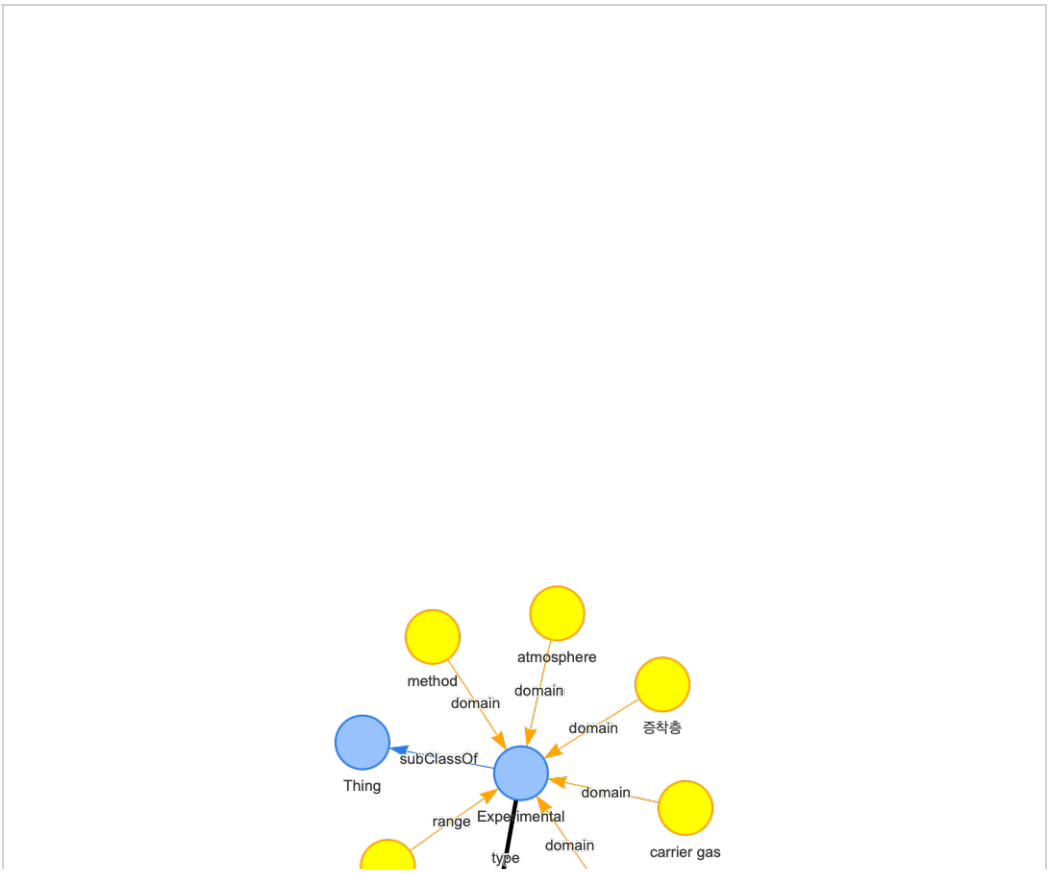


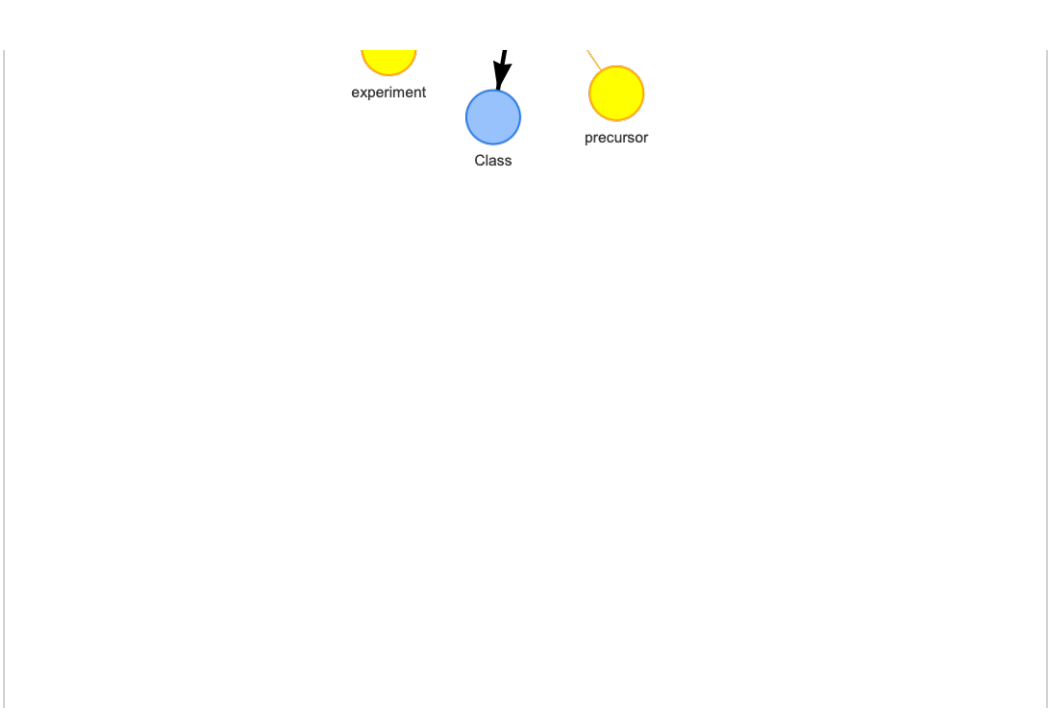


URI 입력

In [12]:
```
nw = vf.vis_file(uri='http://test.com/Experimental',show_literal=ShowLiteral.InNode)
nw.show('default9.html')
```

Out[12]:





Finish