CM4330

Semantic Web and Ontology Modelling

Assignment 2

Ontology on Political System of Sri Lanka

Faculty of Information Technology

University of Moratuwa

2019

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1. Introduction

Ontology is a formal knowledge representation which is defined in a machine readable way. The knowledge represented may belong to a certain domain. The ontology describes the concepts and the relationships among those concepts in a particular domain. An ontology is formal because its understanding is unambiguous in both semantics and syntax.

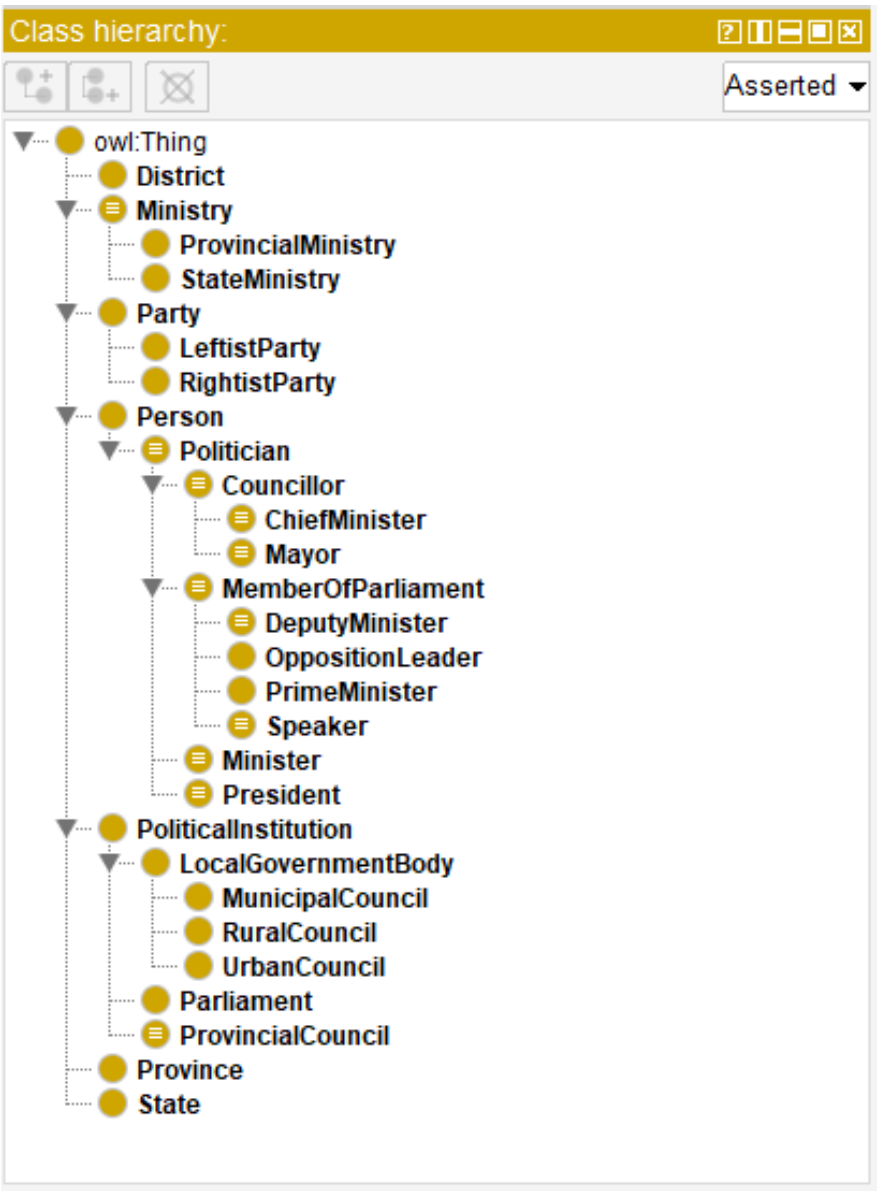
Web Ontology Language (OWL) is a standard language used to develop ontologies. The knowledge represented in OWL can be read by machines. There are classes and properties to describe a resource.

The topic of our ontology is the political system of Sri Lanka. This ontology can be used by voters to find the information about their representatives. It has classes to describe the political system of Sri Lanka.

2. Ontology on Political System of Sri Lanka

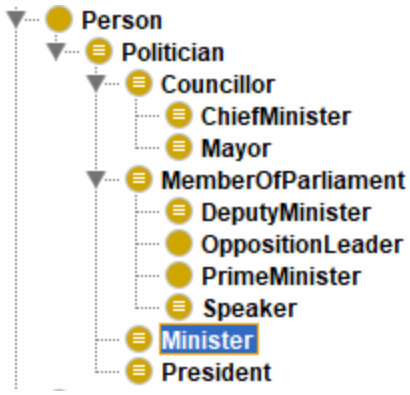
2.1 Classes

A class is set of individuals that have common characteristics which have been precisely defined. A class description describes a class using subclasses, property restriction etc.



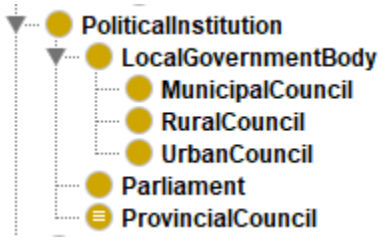
Person Class

All the persons are under this class. This class has a subclass Politician. Under Politician class there are subclasses Councillor, MemberOfParliament, Minister and President. Councillor has two classes ChiefMinister, Mayor classes. MemberOfParliament has subclasses DeputyMinister, OppositionLeader, PrimeMinister, Speaker. Minister is also a subclass of MemberOfParliament.



PoliticalInstitution Class

PoliticalInstitution is another class in the ontology. There are three subclasses as LocalGovernmentBody, Parliament and ProvincialCouncil. LocalGovernmentBody has three subclasses as MunicipalCouncil, RuralCouncil and UrbanCouncil.



Ministry Class

Ministry class has two subclasses. They are ProvincialMinistry and StateMinistry. ProvincialMinistry is for the ministries of provincial councils while the StateMinistry is for the ministries of central government.

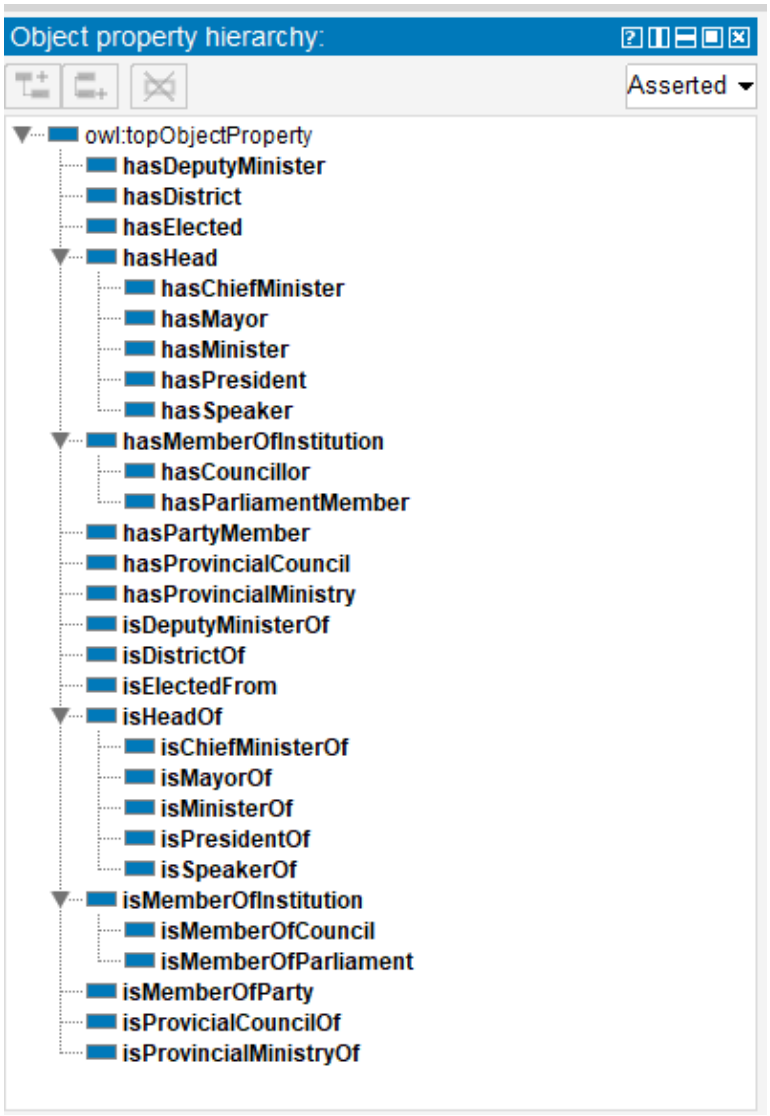
Party Class

Party Class represents the political parties. The Party class has two subclasses as LeftistParty and RightistParty. The LeftistParty is for the parties with leftist ideologies. The RightistParty represents political parties with rightist ideologies.

Other Classes

Other than the above mentioned classes there are three classes. They are Province, District and State. The state class represents a country.

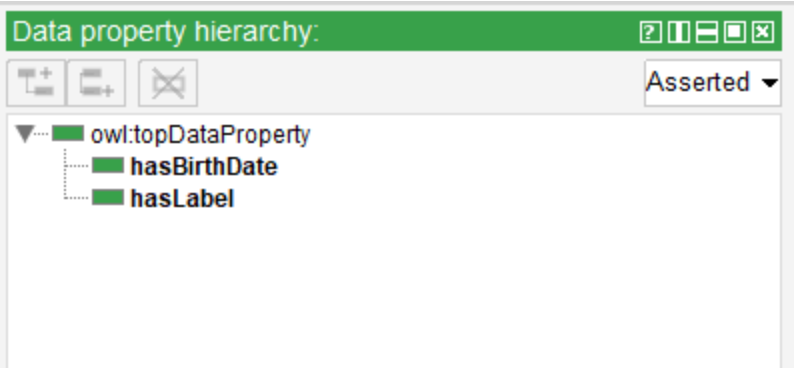
2.2 Object Properties



The above diagram shows the object properties defined for this ontology. The domain, range and inverse property of each of the above properties are shown in the below table. All the object properties are asymmetric and irreflexive.

Property	Domain	Range	Inverse Property
hasDeputyMinister	Ministry	DeputyMinister	isDeputyMinsterOf
isDeputyMinsterOf	DeputyMinister	Ministry	hasDeputyMinister
hasDistrict	Province	District	isDistrictOf
isDistrictOf	District	Province	hasDistrict
hasChiefMinister	ProvincialCouncil	ChiefMinister	isChiefMinsterOf
isChiefMinsterOf	ChiefMinister	ProvincialCouncil	ProvincialCouncil
hasMayor	MunicipalCouncil	Mayor	isMayorOf
isMayorOf	Mayor	MunicipalCouncil	hasMayor
hasMinister	Ministry	Minister	isMinsterOf
isMinsterOf	Minister	Ministry	hasMinister
hasPresident	State	President	isPresdentOf
isPresdentOf	President	State	hasPresdient
hasSpeaker	Parliament	Seaker	isSpeakerOf
isSpeakerOf	Speaker	Parliament	HasSpeaker
hasCoucillor	LocalGovernmentBody or ProvincialCouncil	Councillor	isMemberOfCouncil
isMemberOfCouncil	Councillor	LocalGovernmentBody or ProvincialCouncil	hasCoucillor
hasParliamentMember	Paliament	MemberOfParliament	isMemberOfParliament
isMemberOfParliament	MemberOfParliament	Paliament	hasParliamentMember
hasMemberOfInstitution	PoliticalInstitution	Politician	isMemberOfInstitution
isMemberOfInstitution	Politician	PoliticalInstitution	hasMemberOfInstitution
hasPartyMember	Party	Politician	isMemberOfParty
isMemberOfParty	Politician	Party	hasPartyMember
hasProvincialCouncil	Provice	ProvincialCouncil	isProvicialCouncilOf
isProvicialCouncilOf	ProvincialCouncil	Provice	hasProvincialCouncil
hasProvincialMinistry	ProvincialCouncil	ProvincialMinistry	isProvincialMinistryOf
isProvincialMinistryOf	ProvincialMinistry	ProvincialCouncil	hasProvincialMinistry

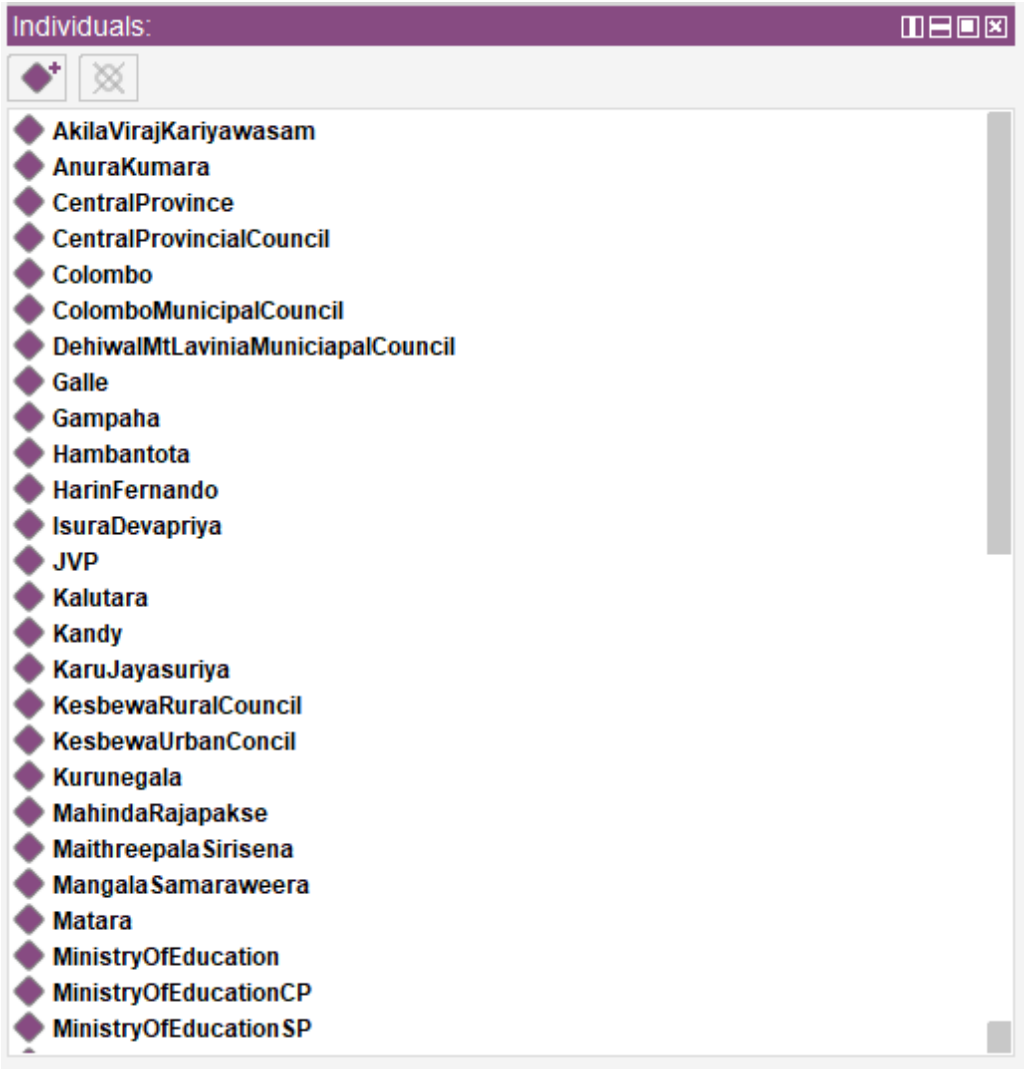
2.3 Data Properties

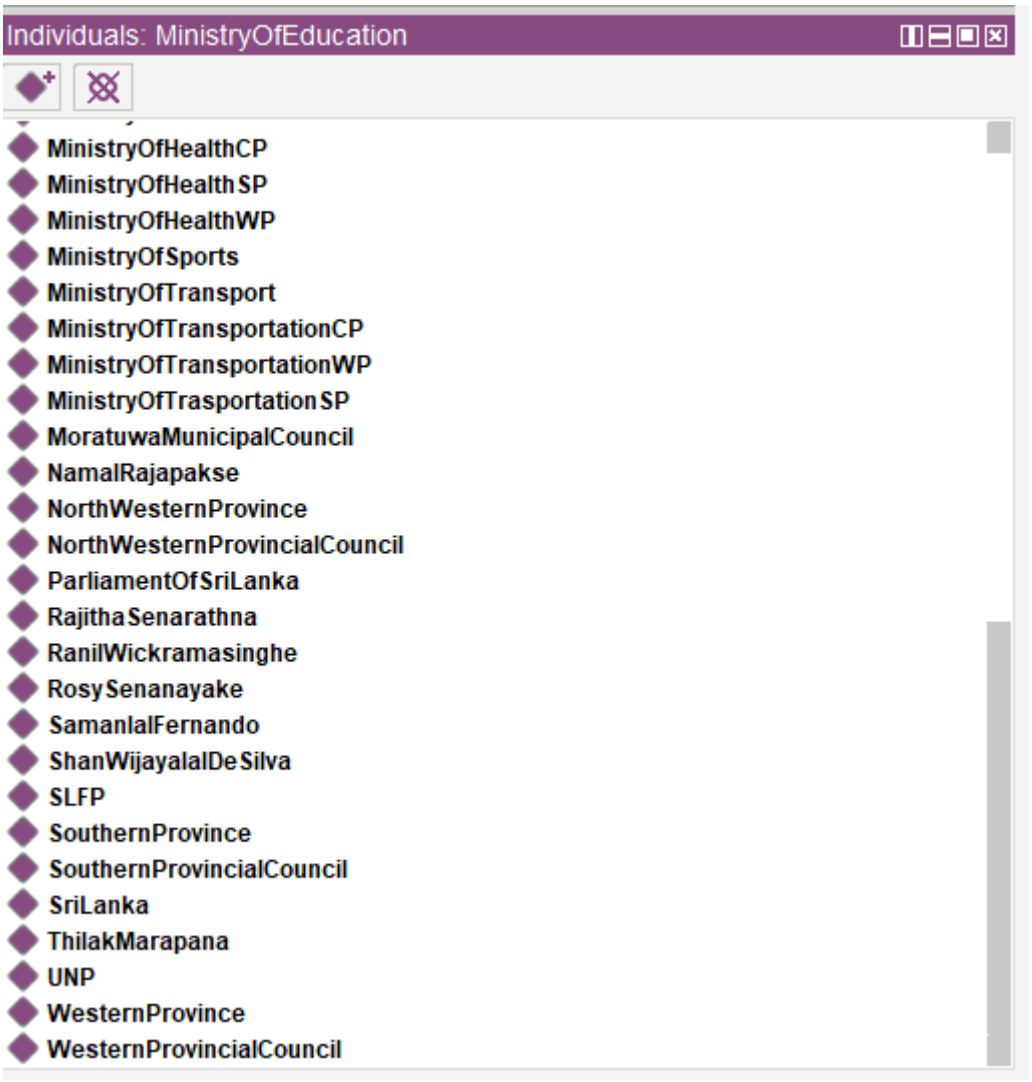


There are two data properties.

Property	**Domain**	**Range**
hasBirthDate	Person	xsd:dateTime
hasLabel	owl:Thing	xsd:string

2.4 Individuals





3. SPARQL Queries

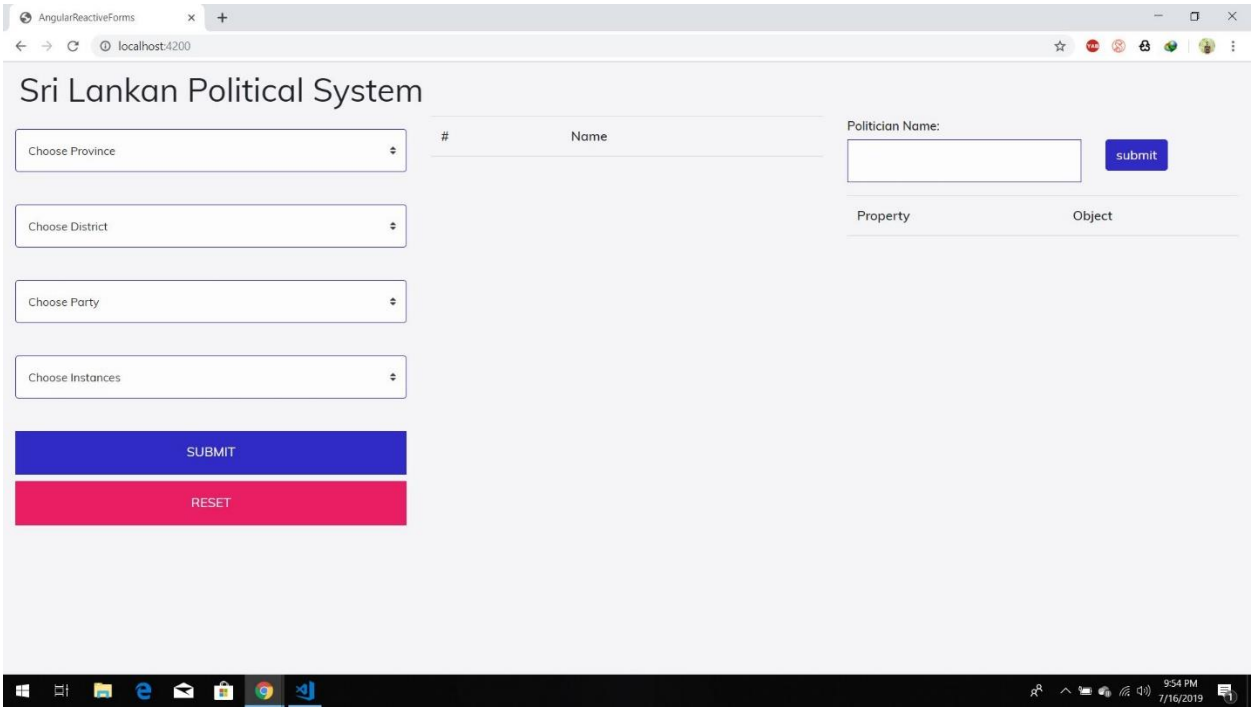
We used SPARQL queries for retrieving the data from the ontology. Some queries used are mentioned below. We have used PREFIX to simplify the queries.

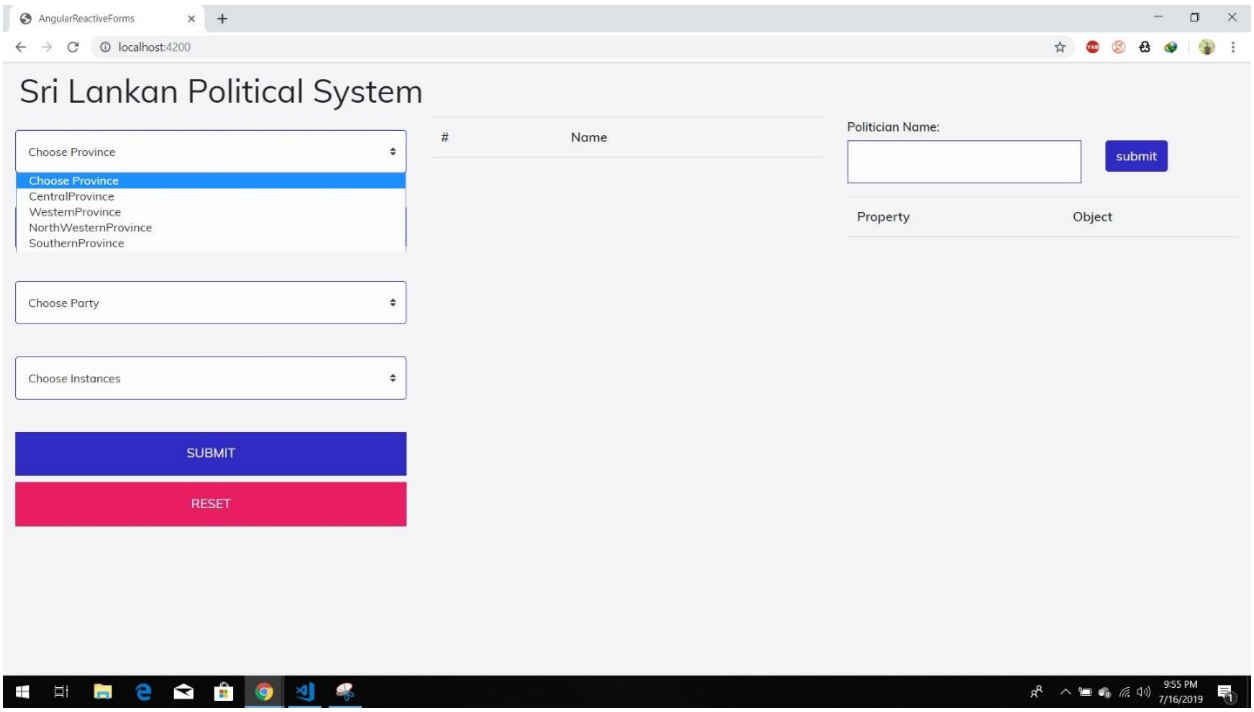
```
PREFIX pol: <http://www.semanticweb.org/viva/ontologies/2019/6/politicians#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
```

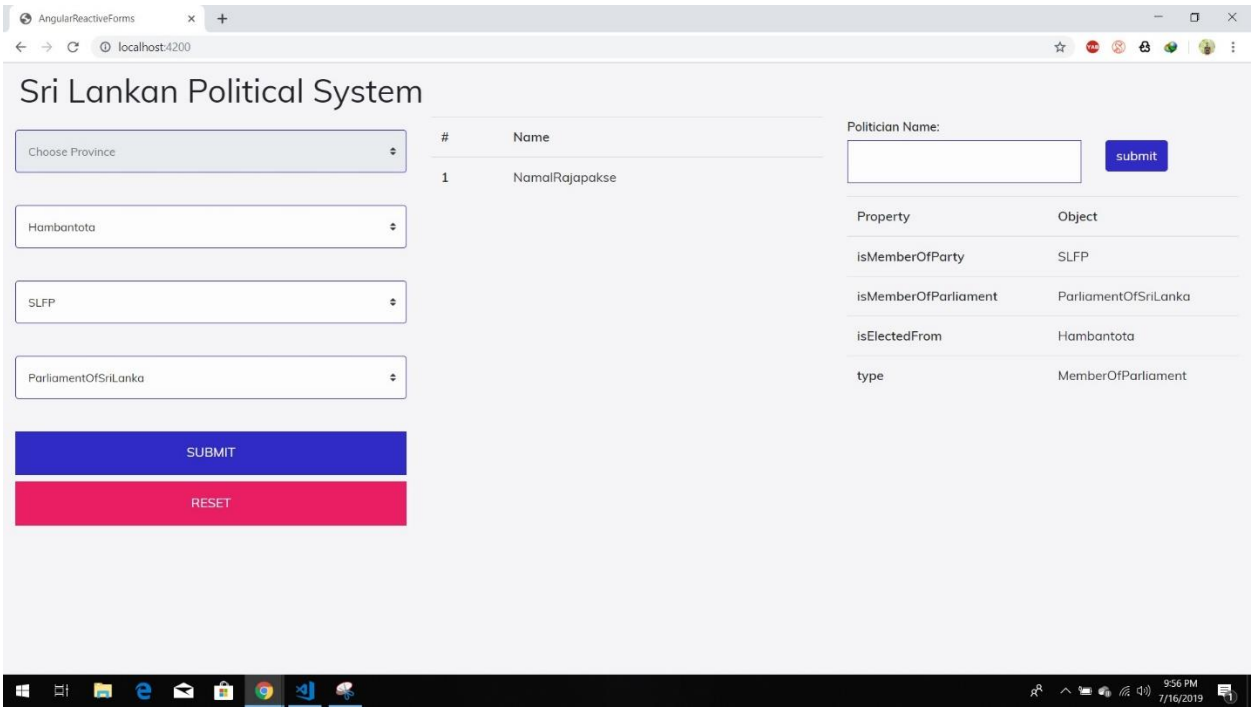
```
//To filter and get politicians by different provinces, different parties or
by different political Institutions
SELECT ?Y
WHERE {
      ?Z pol:isDistrictOf pol:WesternProvince.
      ?Y pol:isElectedFrom ?Z .
      ?Y pol:isMemberOfParty pol:UNP.
      ?A rdfs:subPropertyOf pol:isMemberOfInstitution.
      ?Y ?A pol:ParliamentOfSriLanka.
}

//To get information about a specific politician
SELECT ?Y ?Z
WHERE {
      pol:RajithaSenarathna ?Y ?Z .
}

//To get all the parties in the ontology for displaying in dropdown filter
SELECT ?X
WHERE {
      ?Y rdfs:subClassOf pol:Party .
      ?X rdf:type ?Y
}

//To get all the provinces in the ontology for displaying in dropdown filter
SELECT ?X
WHERE {
      ?Y rdfs:subClassOf* pol:PoliticalInstitution .
      ?X rdf:type ?Y
}

//To get all the districts in the ontology for displaying in dropdown filter
SELECT ?X
WHERE {
      ?X rdf:type pol:District .
}
```

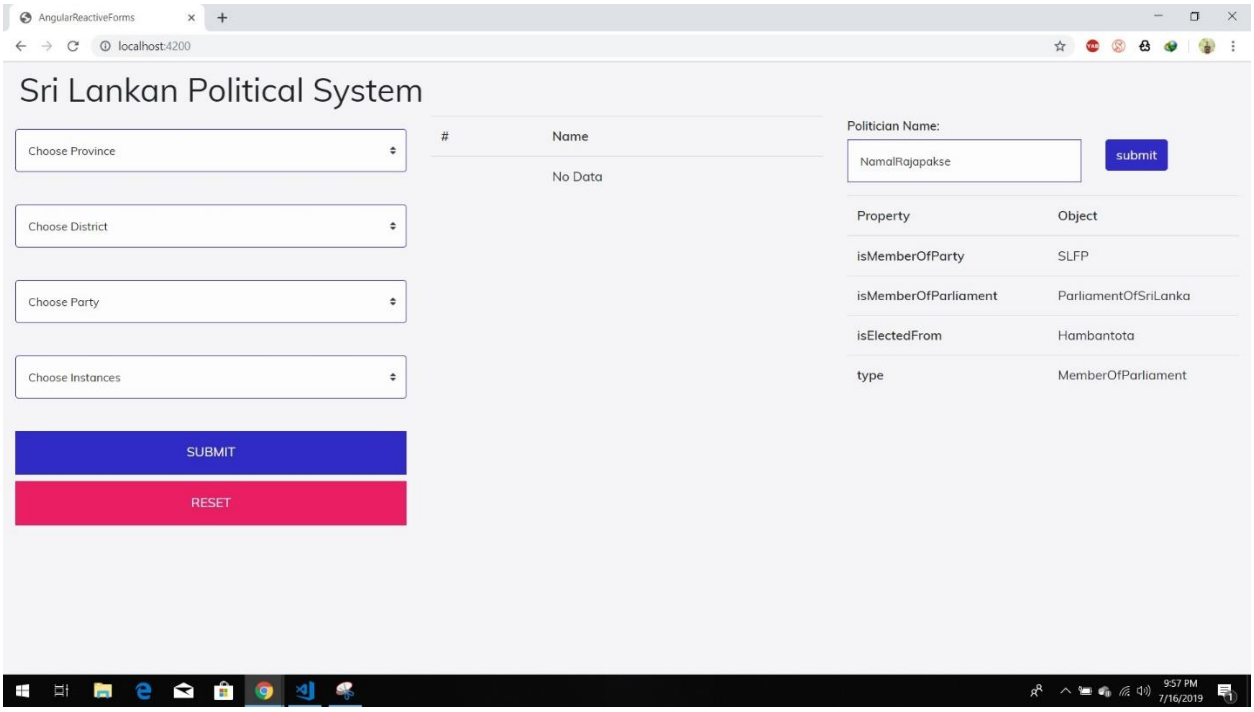
4. User Interface

We used Angular to develop the user interface. The data is provided from the back end which was developed using Jena and Spring boot.






AngularReactiveForms
localhost:4200
Sri Lankan Political System
Choose Province
Hambantota
SLFP
ParliamentOfSriLanka
SUBMIT
RESET
Name
1 NamalRajapakse
Politician Name:
submit
Property Object
isMemberOfParty SLFP
isMemberOfParliament ParliamentOfSriLanka
isElectedFrom Hambantota
type MemberOfParliament
9:56 PM
7/16/2019


AngularReactiveForms
localhost:4200
Sri Lankan Political System
Choose Province
Choose District
Choose Party
Choose Instances
SUBMIT
RESET
Name
No Data
Politician Name:
NamalRajapakse
submit
Property Object
isMemberOfParty SLFP
isMemberOfParliament ParliamentOfSriLanka
isElectedFrom Hambantota
type MemberOfParliament
9:57 PM
7/16/2019