University of Aveiro
Master in Computer Engineering
Semantic Web

Second Practical Work

F1 App

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Ontology:

Classes

```
f1:Driver rdf:type rdfs:Class ;
    rdfs:label "Driver" .

f1:Race rdf:type rdfs:Class ;
    rdfs:label "Race" .

f1:Contract rdf:type rdfs:Class ;
    rdfs:label "Contract" .

f1:Team rdf:type rdfs:Class ;
    rdfs:label "Team" .

f1:Standing rdf:type rdfs:Class ;
    rdfs:label "Standing" .
```


Sub classes

```
f1:Driver_standing rdf:type rdfs:Class ;
    rdfs:label "Driver Standing" ;
    rdfs:subClassOf f1:Standing .

f1:Driver_final_standing rdf:type rdfs:Class ;
    rdfs:label "Driver Final Standings" ;
    rdfs:subClassOf f1:Standing .

f1:Team_final_standing rdf:type rdfs:Class ;
    rdfs:label "Team Final Standings" ;
    rdfs:subClassOf f1:Standing .
```

Ontology:

Properties

```
driver_pred:signed_for rdf:type rdf:Property ;
    rdfs:domain f1:Driver ;
    rdfs:range f1:Contract ;
    rdfs:label "Signed for" .
```

```
driver_pred:teammate rdf:type owl:SymmetricProperty ;
    rdfs:domain f1:Driver ;
    rdfs:range f1:Driver ;
    rdfs:comment "Symetric teammate property" .
```

```
contract_pred:is_signed_by rdf:type owl:ObjectProperty ;
    owl:inverseOf driver_pred:signed_for ;
    rdfs:range f1:Driver ;
    rdf:comment "Inverse of Driver's signed_for" .
```

Ontology:

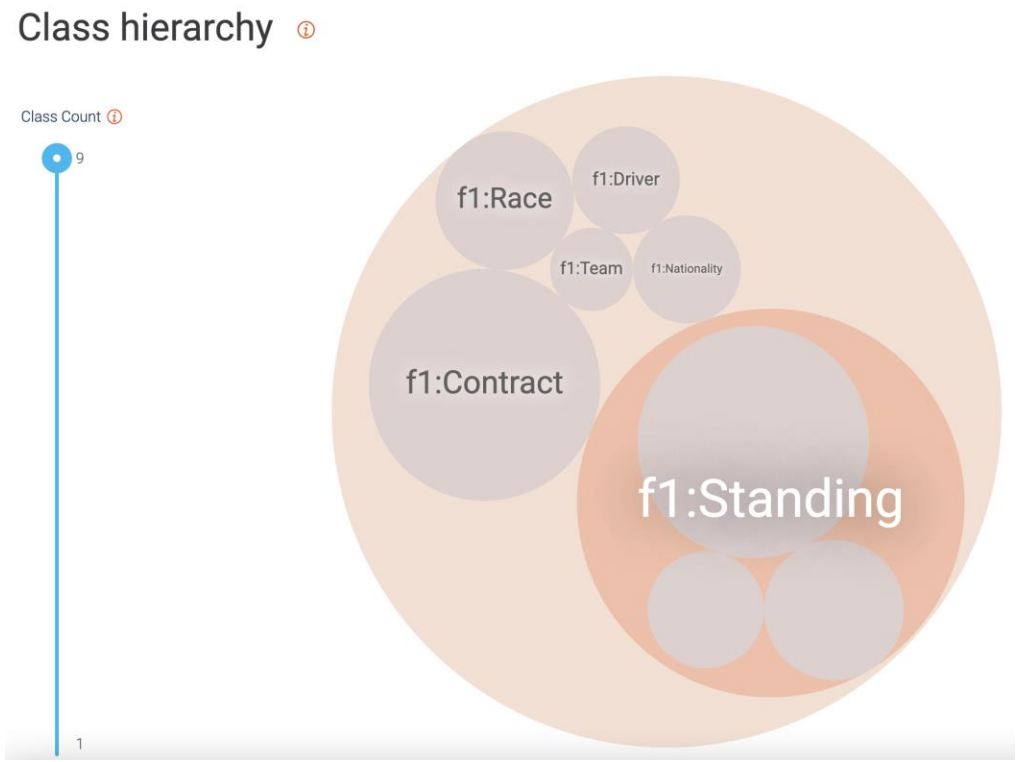
Manual inferences

```
f1:Champion a owl:Class ;
    rdfs:label "Champion" ;
    rdfs:subClassOf [ a owl:Restriction ;
    owl:intersectionOf (f1:Driver
            [ a owl:Restriction ;
            owl:minCardinality "1"^^<http://www.w3.org/2001/XMLSchema#int>;
            owl:onProperty driver_pred:champs ;
        ])
    ] .
```

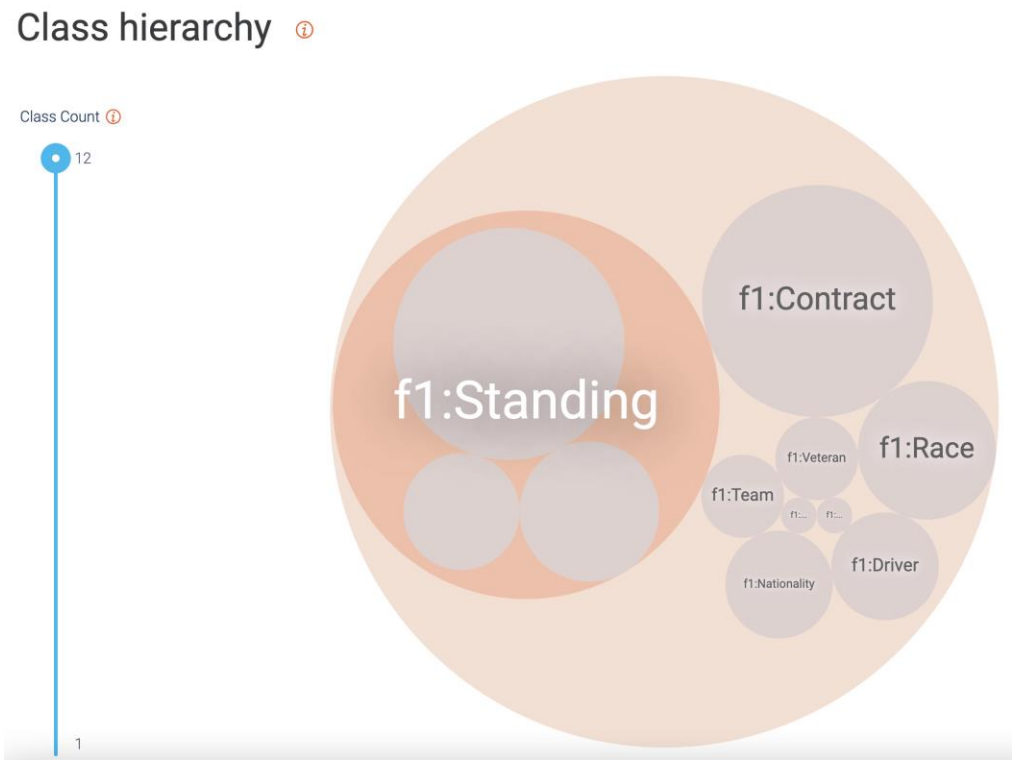


```
PREFIX driver: <http://f1/driver/pred/>
PREFIX driver_final_standings: <http://f1/driver_final_standing/pred/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX f1: <http://f1/>
PREFIX champion: <http://f1/champion/>

INSERT {
    GRAPH champion:graph_temp { ?driver driver:champs ?count }
}
WHERE {
    SELECT ?driver (COUNT(DISTINCT ?season) as ?count) WHERE
    {
        ?driver driver:finished_in ?dfs.
        ?dfs driver_final_standings:season ?season.
        ?dfs driver_final_standings:position ?position.

        FILTER (?position = '1')
    }
    GROUP BY ?driver
};

INSERT { ?driver driver:champs ?count }
WHERE {
    GRAPH champion:graph_temp { ?driver driver:champs ?count }.
};

DROP GRAPH champion:graph_temp;
```

Ontology: Classes



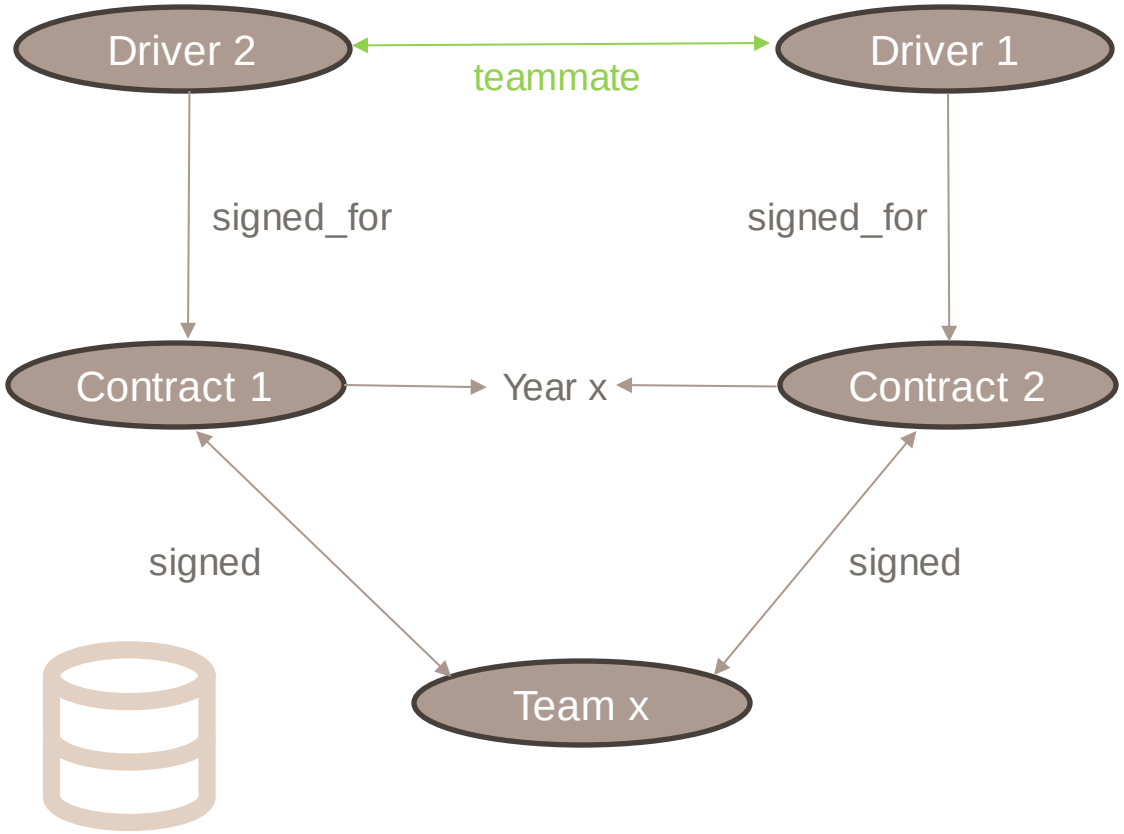
Before inferences



After inferences

Ontology:

Property inferences with SPIN




```
PREFIX driver: <http://f1/driver/pred/>
PREFIX contract: <http://f1/contract/pred/>
PREFIX team: <http://f1/team/pred/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX f1: <http://f1/>

INSERT {
    ?d1 driver:teammate ?d2 .
}
WHERE {
    ?d1 rdf:type f1:Driver .
    ?d2 rdf:type f1:Driver .

    ?d1 driver:code ?d1_code .
    ?d2 driver:code ?d2_code .

    ?d1 driver:signed_for ?contract1 .
    ?contract1 rdf:type f1:Contract .
    ?d2 driver:signed_for ?contract2 .
    ?contract2 rdf:type f1:Contract .

    ?contract1 contract:year ?year .
    ?contract2 contract:year ?year .

    ?team rdf:type f1:Team .
    ?team team:signed ?contract1 .
    ?team team:signed ?contract2 .

    FILTER(?d1_code != ?d2_code)
}
```

DBpedia:

Charles Leclerc

Age: 25

Nationality: Monegasque

Championships won: 0

Bio | Teams History

Driver's Biography ×

Charles Leclerc

Charles Marc Hervé Perceval Leclerc (French pronunciation: \u200b[ʃaʁl ləklɛʁ]; born 16 October 1997) is a Monégasque racing driver, currently racing in Formula One for Scuderia Ferrari. He won the GP3 Series championship in 2016 and the FIA Formula 2 Championship in 2017. Leclerc made his Formula One debut in 2018 for Sauber, a team affiliated with Ferrari, for which he was part of the Ferrari Driver Academy. With Sauber having finished last the year before, Leclerc led the charge to improve its finishing position in the constructors' championship to eighth, and was the higher ranked of the two Sauber drivers. He joined Ferrari the next season and became the second-youngest driver to qualify on pole position in Formula One at the 2019 Bahrain Grand Prix. The 2019 season also saw Leclerc take his first career win in Belgium. He won the FIA Pole Trophy for most pole positions in the 2019 season, becoming the youngest driver to win it, before winning it again in 2022. As of the 2022 Abu Dhabi Grand Prix, Leclerc has achieved 5 race wins and 18 pole positions in Formula One. He scored the first grand slam of his career at the 2022 Australian Grand Prix. Leclerc is set to remain at Ferrari until at least the end of the 2024 season.

Close

Saudi Arabian Grand Prix

Jeddah, Saudi Arabia

Round: 2

Race distance (km): 308448.0

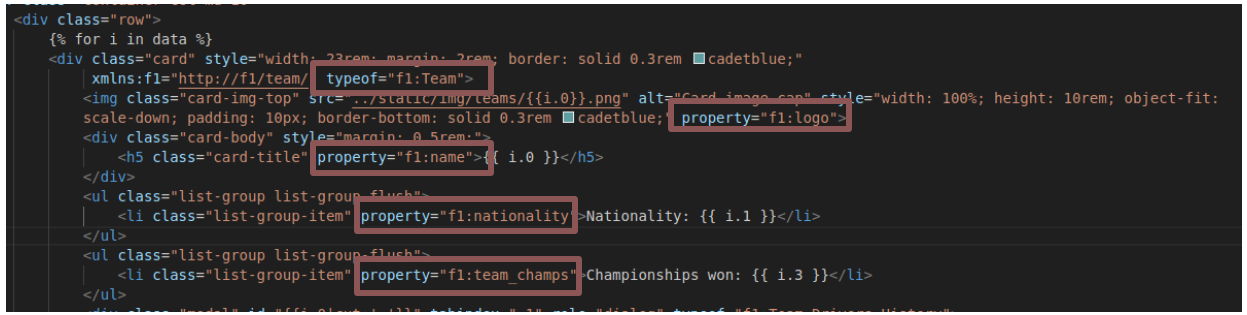
Race laps: 50

Info | Results

Ontology Publication:

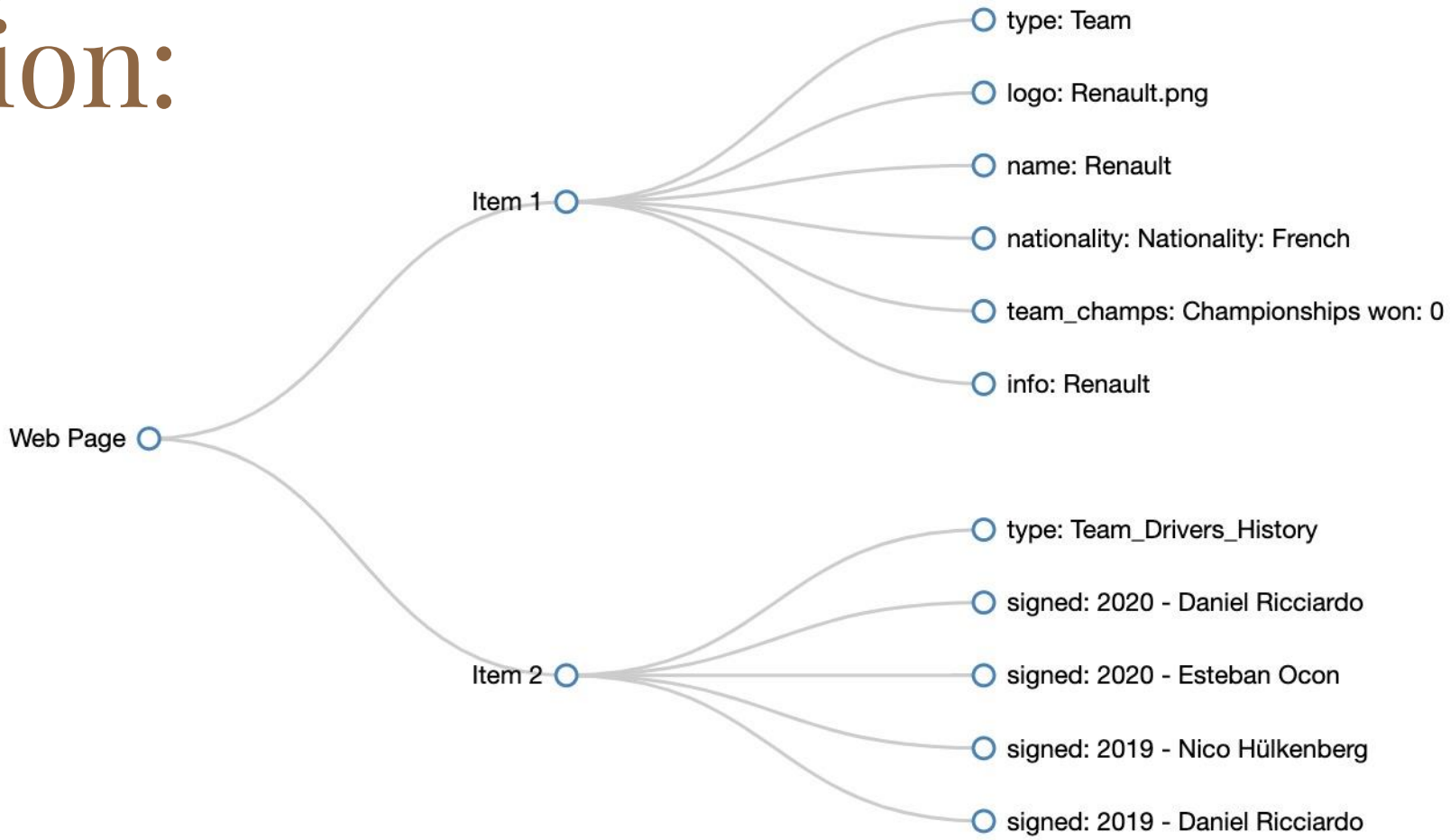
Annotations in HTML templates using RDFa:

- drivers.html
- teams.html
- results.html
- race-modal.html
- curiosities.html



This way search engines and other tools can easily understand the meaning of the data present on the page, promoting semantic interoperability.

Ontology Publication:



Demo:

Conclusion:

- Ontology, with inferences, allows greater knowledge within the system;
- GraphDB's Reasoner is limited, needing extra code for more complex inferences;
- Data obtained from external sources, such as DBpedia, allows complementing information, although sometimes it is much slower;
- Publishing data with RDFa allows the extraction of more information from the pages.

Thank you