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Web Semântica Projeto 2

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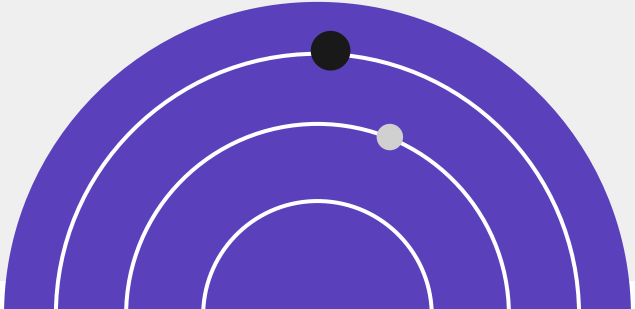
01

Introdução

Breve Introdução ao tema do trabalho



Introdução

Website com estrutura de dados em N3, que mostra dados acerca de anime, usando a framework Django, com a estrutura template-model-view.

Nesta iteração, criamos uma ontologia para os nossos dados, complementando-os com os dados provenientes da Wikidata e da DBpedia, com regras de inferição, para relacionarmos todas as nossas entidades, e com a publicação dos dados usando RDFa Light.

02

Ontologia

Criação e gestão da ontologia

Entidades - Trabalho 1

Anime

Rank, Score, Link, Music, Characters, ...

Character

Name, Role

Voice Actor

Name, Character Played

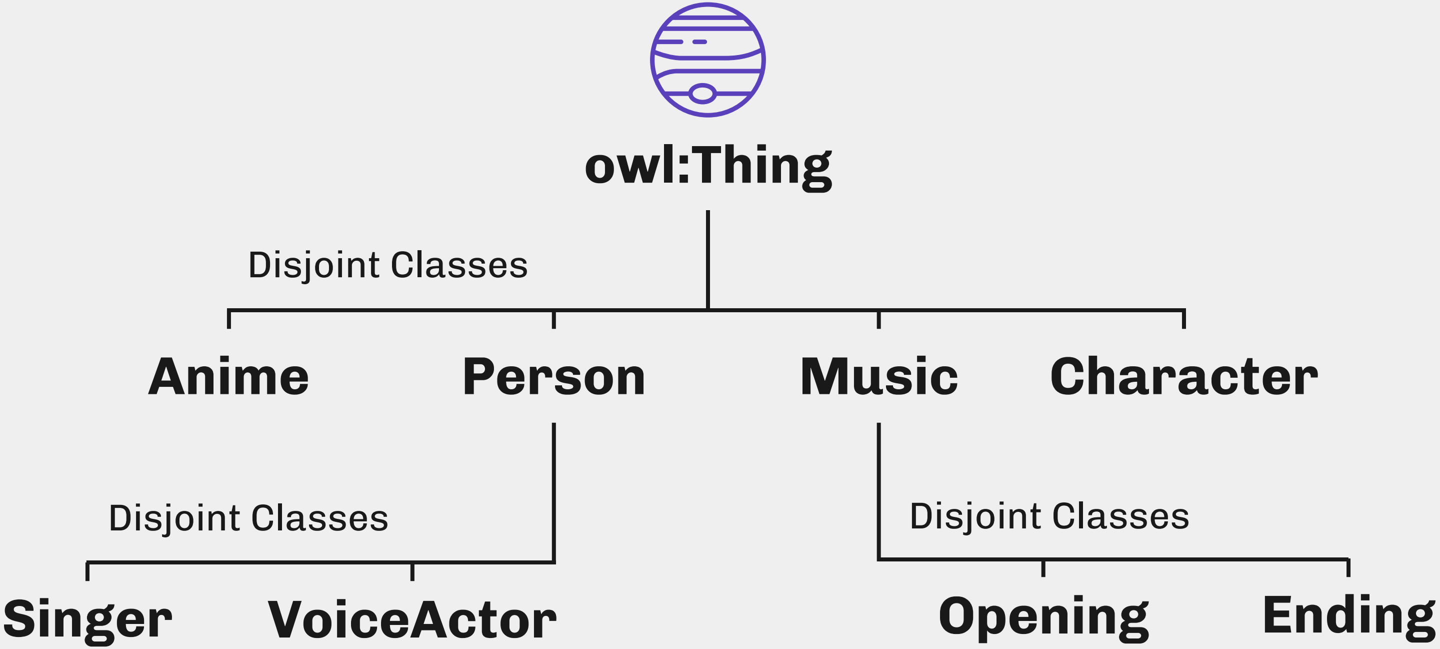
Singer

Name, Music Played

Music

Name

Entidades - Final



owl:Thing

Disjoint Classes

Anime

Person

Music

Character

Disjoint Classes

Singer

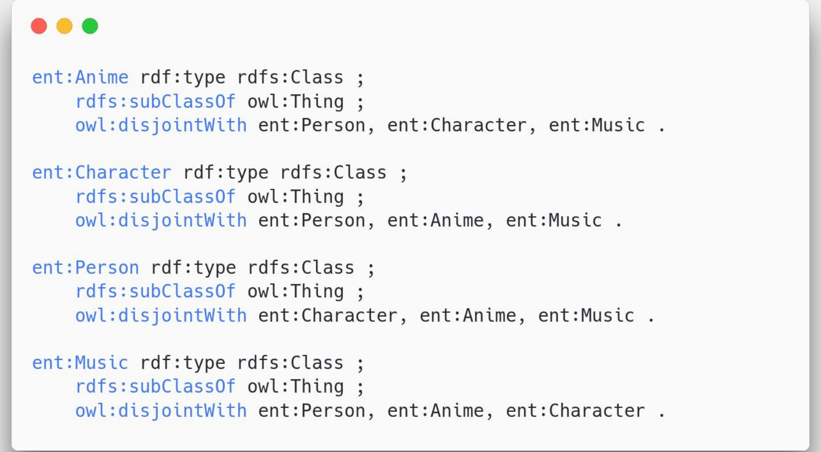
VoiceActor

Disjoint Classes

Opening

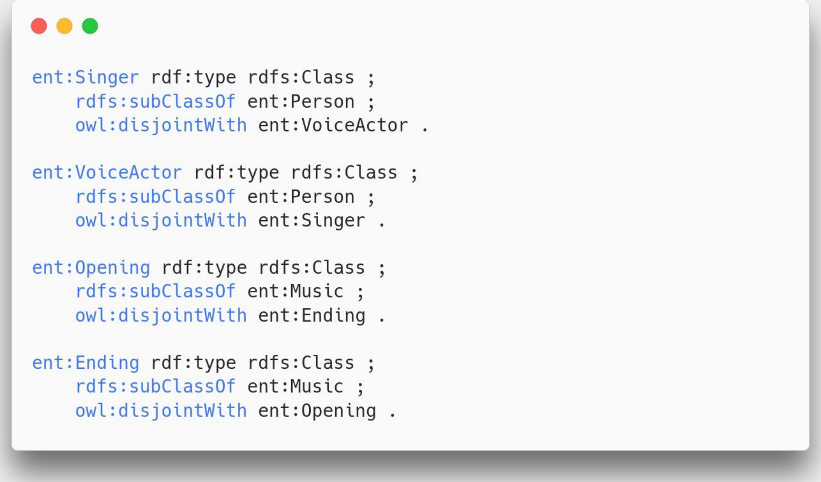
Ending

Entidades



```
ent:Anime rdf:type rdfs:Class ;
    rdfs:subClassOf owl:Thing ;
    owl:disjointWith ent:Person, ent:Character, ent:Music .

ent:Character rdf:type rdfs:Class ;
    rdfs:subClassOf owl:Thing ;
    owl:disjointWith ent:Person, ent:Anime, ent:Music .

ent:Person rdf:type rdfs:Class ;
    rdfs:subClassOf owl:Thing ;
    owl:disjointWith ent:Character, ent:Anime, ent:Music .

ent:Music rdf:type rdfs:Class ;
    rdfs:subClassOf owl:Thing ;
    owl:disjointWith ent:Person, ent:Anime, ent:Character .
```

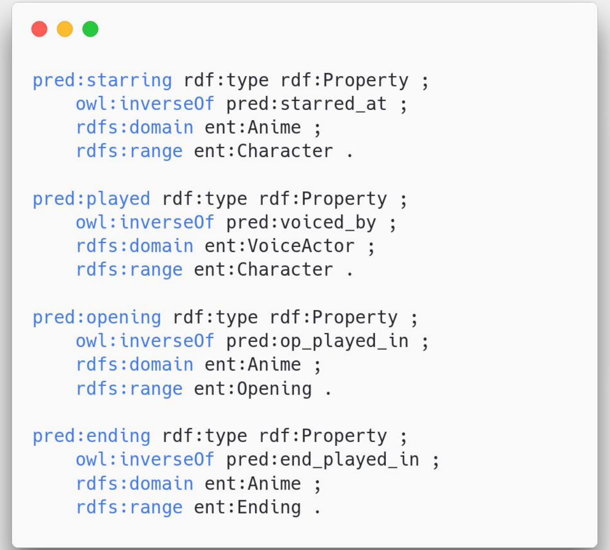
Subclasses diretas de owl:Thing



```
ent:Singer rdf:type rdfs:Class ;
    rdfs:subClassOf ent:Person ;
    owl:disjointWith ent:VoiceActor .

ent:VoiceActor rdf:type rdfs:Class ;
    rdfs:subClassOf ent:Person ;
    owl:disjointWith ent:Singer .

ent:Opening rdf:type rdfs:Class ;
    rdfs:subClassOf ent:Music ;
    owl:disjointWith ent:Ending .

ent:Ending rdf:type rdfs:Class ;
    rdfs:subClassOf ent:Music ;
    owl:disjointWith ent:Opening .
```

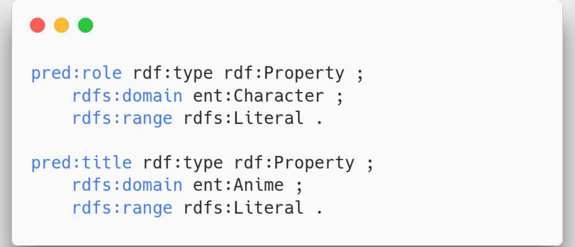
Subclasses de entidades

Propriedades



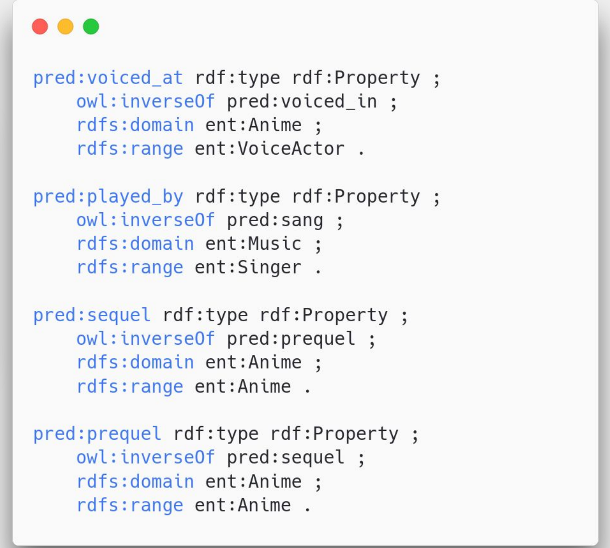
```
pred:starring rdf:type rdf:Property ;
    owl:inverseOf pred:starred_at ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:Character .

pred:played rdf:type rdf:Property ;
    owl:inverseOf pred:voiced_by ;
    rdfs:domain ent:VoiceActor ;
    rdfs:range ent:Character .

pred:opening rdf:type rdf:Property ;
    owl:inverseOf pred:op_played_in ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:Opening .

pred:ending rdf:type rdf:Property ;
    owl:inverseOf pred:end_played_in ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:Ending .
```

Propriedades de Objetos



```
pred:role rdf:type rdf:Property ;
    rdfs:domain ent:Character ;
    rdfs:range rdfs:Literal .

pred:title rdf:type rdf:Property ;
    rdfs:domain ent:Anime ;
    rdfs:range rdfs:Literal .
```

Propriedades de Dados



```
pred:voiced_at rdf:type rdf:Property ;
    owl:inverseOf pred:voiced_in ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:VoiceActor .

pred:played_by rdf:type rdf:Property ;
    owl:inverseOf pred:sang ;
    rdfs:domain ent:Music ;
    rdfs:range ent:Singer .

pred:sequel rdf:type rdf:Property ;
    owl:inverseOf pred:prequel ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:Anime .

pred:prequel rdf:type rdf:Property ;
    owl:inverseOf pred:sequel ;
    rdfs:domain ent:Anime ;
    rdfs:range ent:Anime .
```

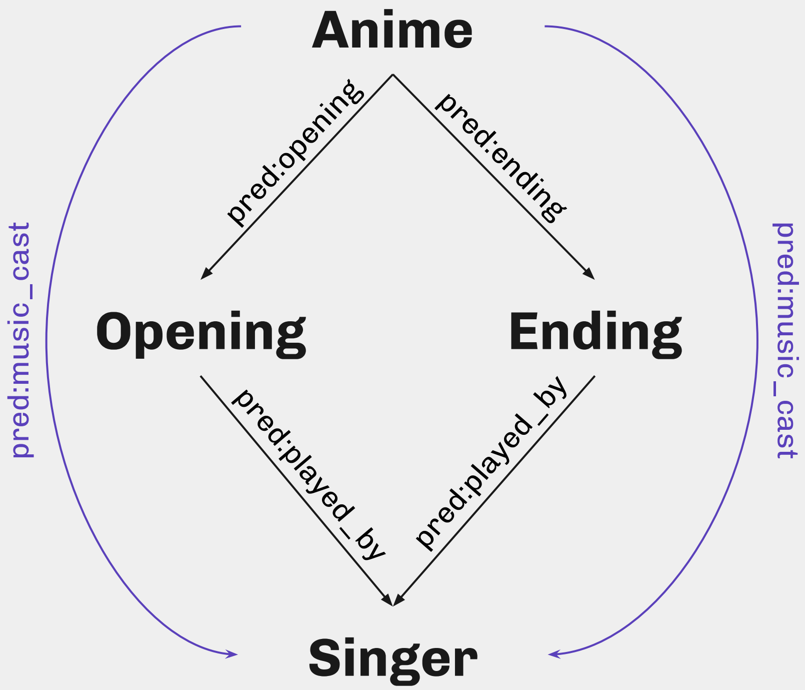
Propriedades de Objetos

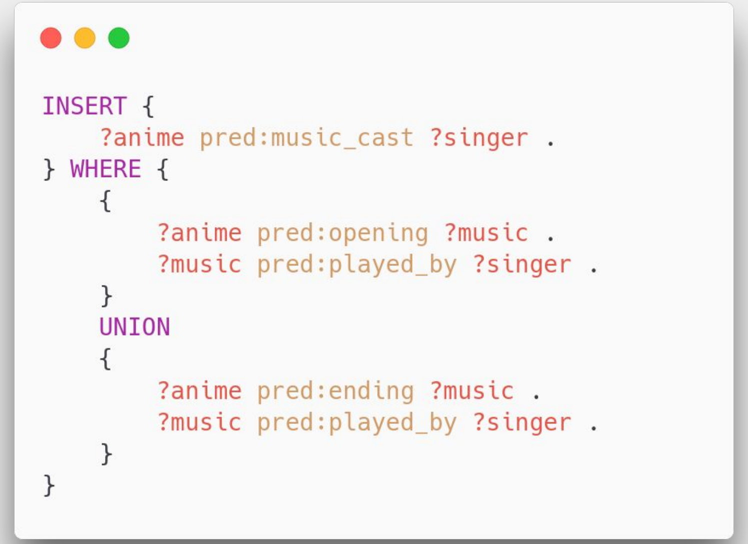
03

SPIN

Construção de regras de inferência

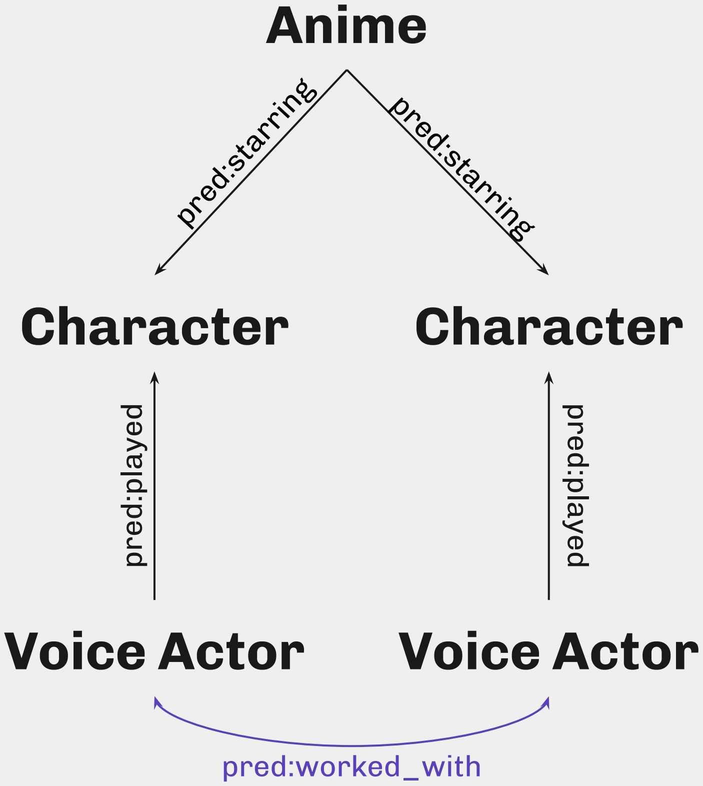
Novas Regras de Inferência

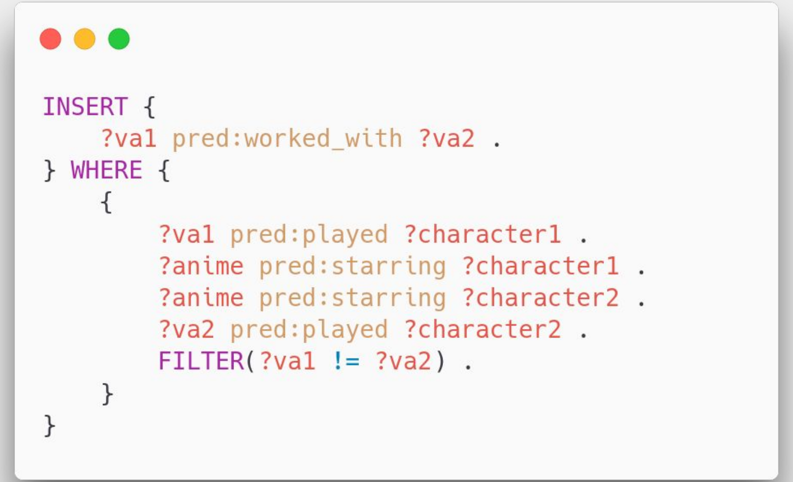




```
INSERT {
    ?anime pred:music_cast ?singer .
} WHERE {
    {
        ?anime pred:opening ?music .
        ?music pred:played_by ?singer .
    }
    UNION
    {
        ?anime pred:ending ?music .
        ?music pred:played_by ?singer .
    }
}
```

Novas Regras de Inferência





```
INSERT {
    ?va1 pred:worked_with ?va2 .
} WHERE {
    {
        ?va1 pred:played ?character1 .
        ?anime pred:starring ?character1 .
        ?anime pred:starring ?character2 .
        ?va2 pred:played ?character2 .
        FILTER(?va1 != ?va2) .
    }
}
```

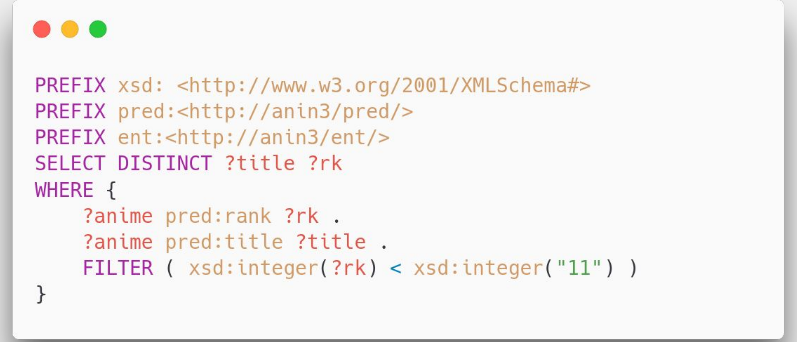
04

SPARQL

Queries novas e alteração das antigas

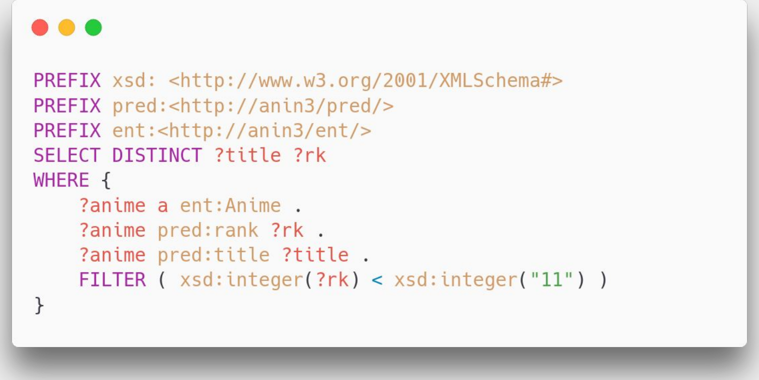
Alterações Simples - I

Antes



```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX pred:<http://anin3/pred/>
PREFIX ent:<http://anin3/ent/>
SELECT DISTINCT ?title ?rk
WHERE {
    ?anime pred:rank ?rk .
    ?anime pred:title ?title .
    FILTER ( xsd:integer(?rk) < xsd:integer("11") )
}
```

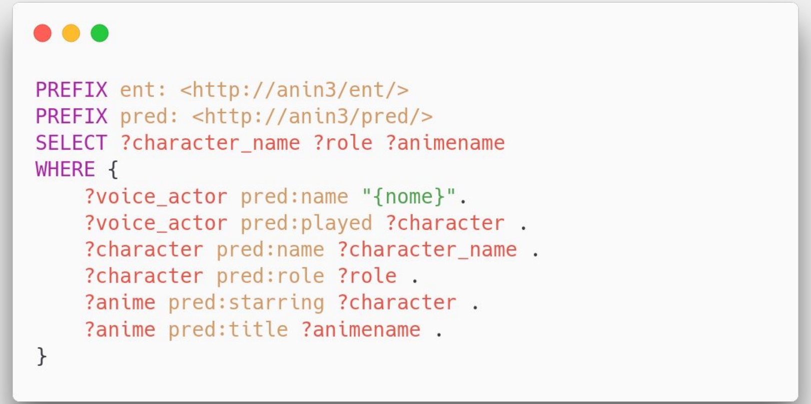
Agora



```
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX pred:<http://anin3/pred/>
PREFIX ent:<http://anin3/ent/>
SELECT DISTINCT ?title ?rk
WHERE {
    ?anime a ent:Anime .
    ?anime pred:rank ?rk .
    ?anime pred:title ?title .
    FILTER ( xsd:integer(?rk) < xsd:integer("11") )
}
```

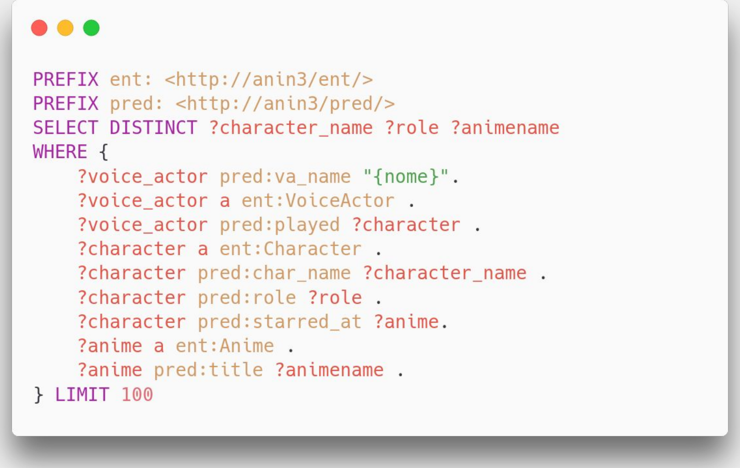
Alterações Simples - II

Antes



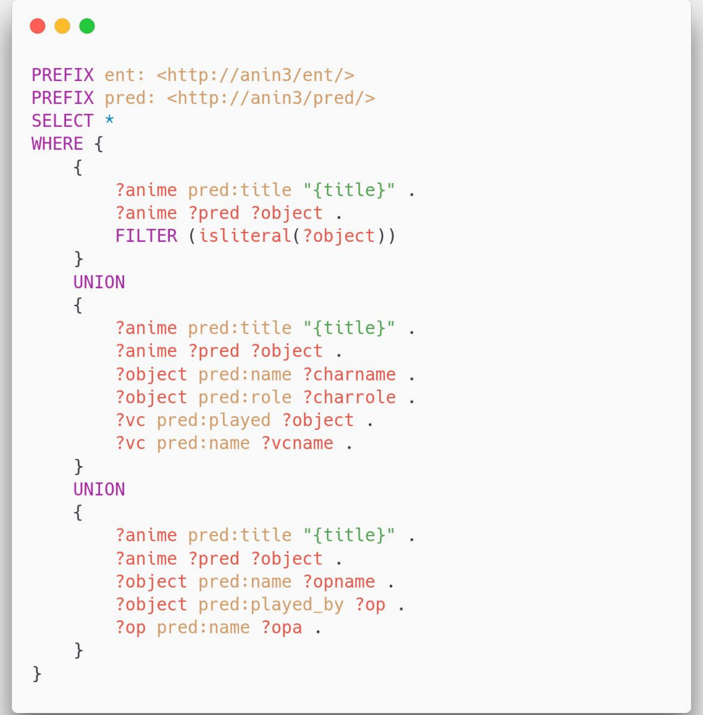
```
PREFIX ent: <http://anin3/ent/>
PREFIX pred: <http://anin3/pred/>
SELECT ?character_name ?role ?animename
WHERE {
    ?voice_actor pred:name "{nome}".
    ?voice_actor pred:played ?character .
    ?character pred:name ?character_name .
    ?character pred:role ?role .
    ?anime pred:starring ?character .
    ?anime pred:title ?animename .
}
```

Agora



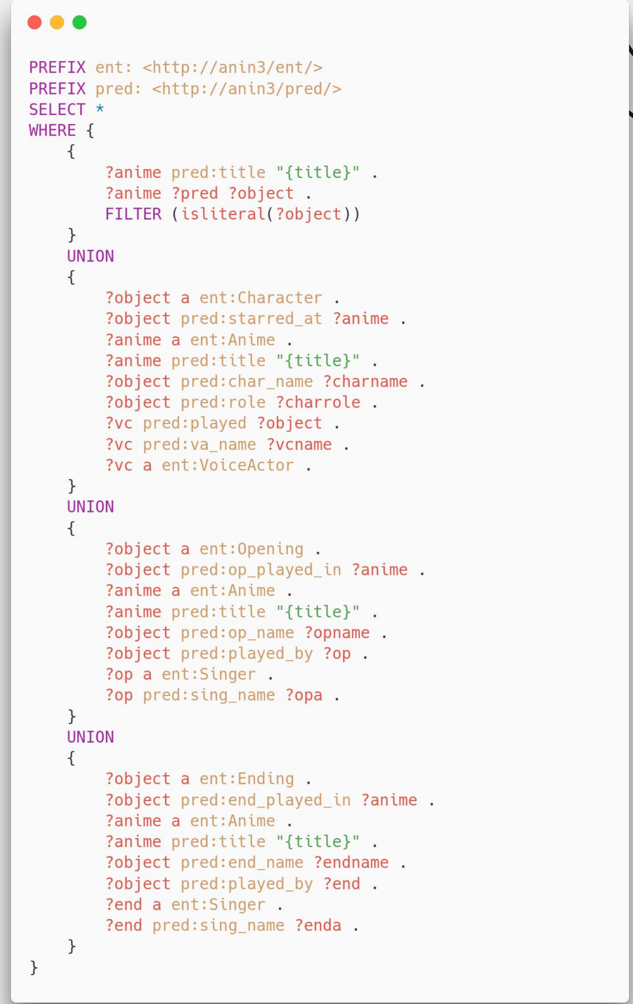
```
PREFIX ent: <http://anin3/ent/>
PREFIX pred: <http://anin3/pred/>
SELECT DISTINCT ?character_name ?role ?animename
WHERE {
    ?voice_actor pred:va_name "{nome}".
    ?voice_actor a ent:VoiceActor .
    ?voice_actor pred:played ?character .
    ?character a ent:Character .
    ?character pred:char_name ?character_name .
    ?character pred:role ?role .
    ?character pred:starred_at ?anime.
    ?anime a ent:Anime .
    ?anime pred:title ?animename .
} LIMIT 100
```

Alterações Complexas



```
PREFIX ent: <http://anin3/ent/>
PREFIX pred: <http://anin3/pred/>
SELECT *
WHERE {
    {
        ?anime pred:title "{title}" .
        ?anime ?pred ?object .
        FILTER (isliteral(?object))
    }
    UNION
    {
        ?anime pred:title "{title}" .
        ?anime ?pred ?object .
        ?object pred:name ?charname .
        ?object pred:role ?charrole .
        ?vc pred:played ?object .
        ?vc pred:name ?vcname .
    }
    UNION
    {
        ?anime pred:title "{title}" .
        ?anime ?pred ?object .
        ?object pred:name ?opname .
        ?object pred:played_by ?op .
        ?op pred:name ?opa .
    }
}
```

Antes Agora



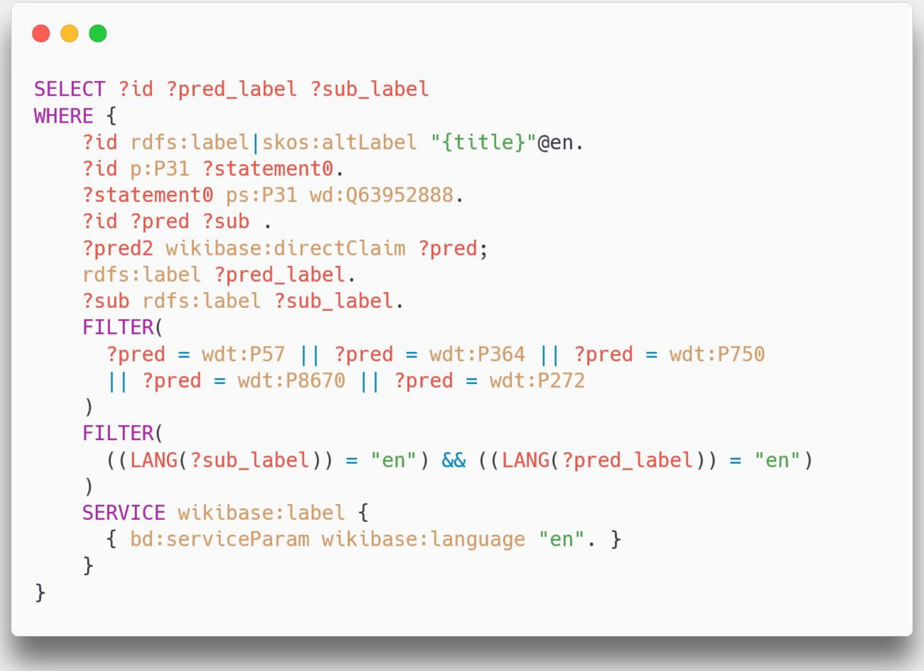
```
PREFIX ent: <http://anin3/ent/>
PREFIX pred: <http://anin3/pred/>
SELECT *
WHERE {
    {
        ?anime pred:title "{title}" .
        ?anime ?pred ?object .
        FILTER (isliteral(?object))
    }
    UNION
    {
        ?object a ent:Character .
        ?object pred:starred_at ?anime .
        ?anime a ent:Anime .
        ?anime pred:title "{title}" .
        ?object pred:char_name ?charname .
        ?object pred:role ?charrole .
        ?vc pred:played ?object .
        ?vc pred:va_name ?vcname .
        ?vc a ent:VoiceActor .
    }
    UNION
    {
        ?object a ent:Opening .
        ?object pred:op_played_in ?anime .
        ?anime a ent:Anime .
        ?anime pred:title "{title}" .
        ?object pred:op_name ?opname .
        ?object pred:played_by ?op .
        ?op a ent:Singer .
        ?op pred:sing_name ?opa .
    }
    UNION
    {
        ?object a ent:Ending .
        ?object pred:end_played_in ?anime .
        ?anime a ent:Anime .
        ?anime pred:title "{title}" .
        ?object pred:end_name ?endname .
        ?object pred:played_by ?end .
        ?end a ent:Singer .
        ?end pred:sing_name ?enda .
    }
}
```

05

WikiData e DBpedia

Dados retirados da Wikidata e da DBpedia

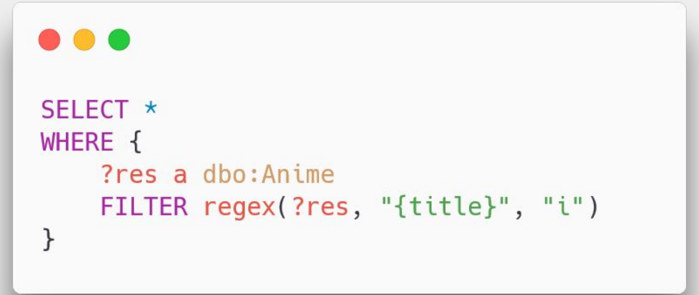
Wikidata



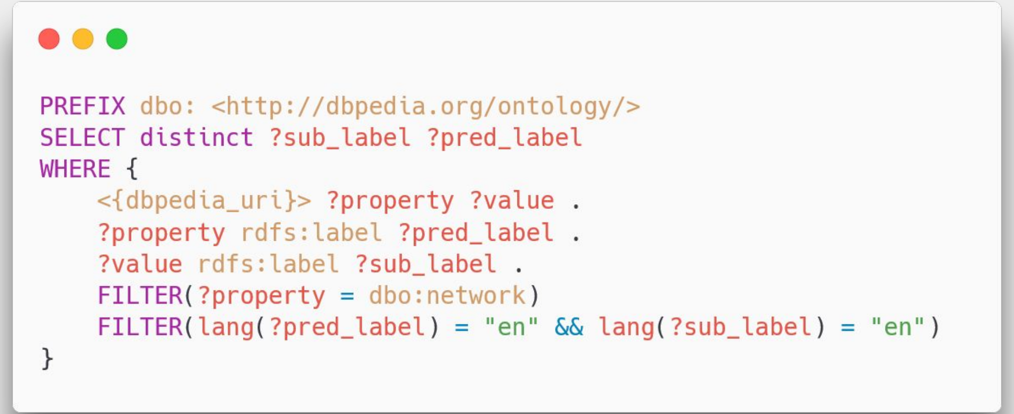
```
SELECT ?id ?pred_label ?sub_label
WHERE {
    ?id rdfs:label|skos:altLabel "{title}"@en.
    ?id p:P31 ?statement0.
    ?statement0 ps:P31 wd:Q63952888.
    ?id ?pred ?sub .
    ?pred2 wikibase:directClaim ?pred;
    rdfs:label ?pred_label.
    ?sub rdfs:label ?sub_label.
    FILTER(
      ?pred = wdt:P57 || ?pred = wdt:P364 || ?pred = wdt:P750
      || ?pred = wdt:P8670 || ?pred = wdt:P272
    )
    FILTER(
      ((LANG(?sub_label)) = "en") && ((LANG(?pred_label)) = "en")
    )
    SERVICE wikibase:label {
      { bd:serviceParam wikibase:language "en". }
    }
}
```

Código Wikidata	Significado
P31	Instância de
Q63952888	anime
P57	Diretor
P364	Lingua oficial
P750	Distribuido por
P8670	Designer de personagens
P272	Produtora

DBpedia



```
SELECT *
WHERE {
    ?res a dbo:Anime
    FILTER regex(?res, "{title}", "i")
}
```



```
PREFIX dbo: <http://dbpedia.org/ontology/>
SELECT distinct ?sub_label ?pred_label
WHERE {
    <{dbpedia_uri}> ?property ?value .
    ?property rdfs:label ?pred_label .
    ?value rdfs:label ?sub_label .
    FILTER(?property = dbo:network)
    FILTER(lang(?pred_label) = "en" && lang(?sub_label) = "en")
}
```

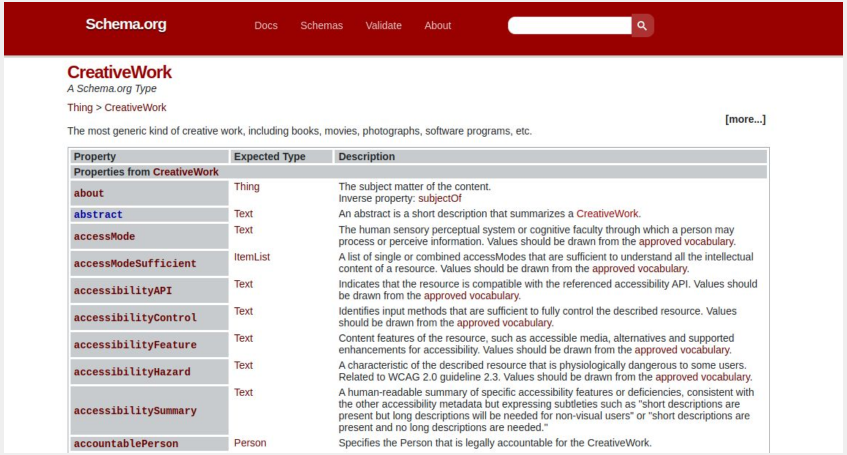
http://dbpedia.org/resource/Naruto__tv_series__1
http://dbpedia.org/resource/Fullmetal_Alchemist:_Brotherhood

06

RDFa e UI

Publicação dos dados e mudança na UI

Implementação de RDFa



CreativeWork

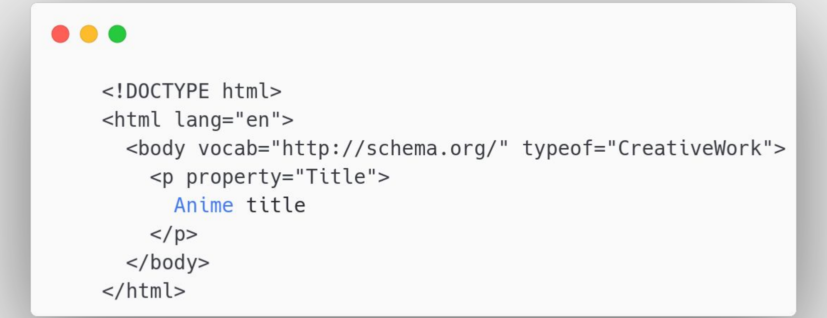
A Schema.org Type

Thing > CreativeWork

[more...]

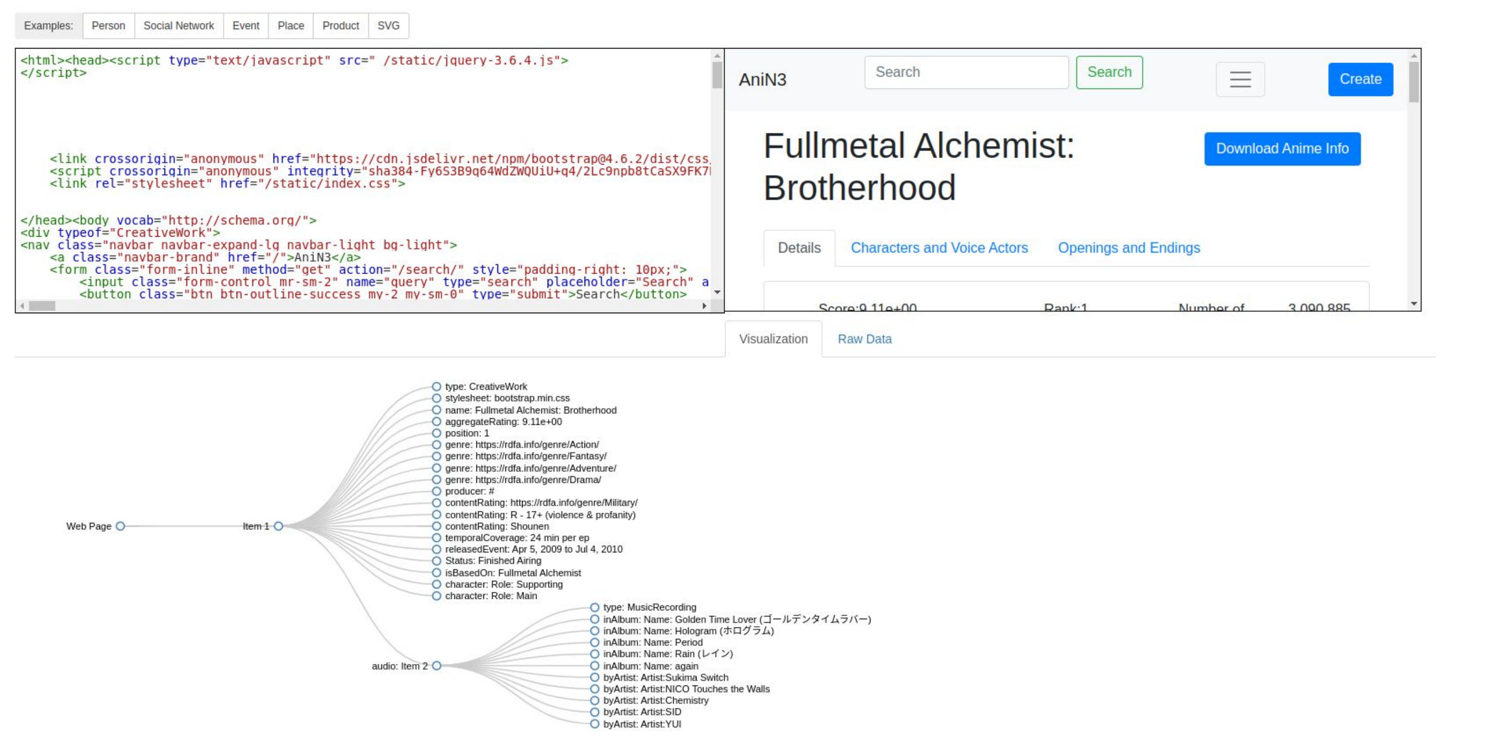
The most generic kind of creative work, including books, movies, photographs, software programs, etc.

Property	Expected Type	Description
Properties from CreativeWork		
about	Thing	The subject matter of the content. Inverse property: subjectOf
abstract	Text	An abstract is a short description that summarizes a CreativeWork.
accessMode	Text	The human sensory perceptual system or cognitive faculty through which a person may process or perceive information. Values should be drawn from the approved vocabulary.
accessModeSufficient	ItemList	A list of single or combined accessModes that are sufficient to understand all the intellectual content of a resource. Values should be drawn from the approved vocabulary.
accessibilityAPI	Text	Indicates that the resource is compatible with the referenced accessibility API. Values should be drawn from the approved vocabulary.
accessibilityControl	Text	Identifies input methods that are sufficient to fully control the described resource. Values should be drawn from the approved vocabulary.
accessibilityFeature	Text	Content features of the resource, such as accessible media, alternatives and supported enhancements for accessibility. Values should be drawn from the approved vocabulary.
accessibilityHazard	Text	A characteristic of the described resource that is physiologically dangerous to some users. Related to WCAG 2.0 guideline 2.3. Values should be drawn from the approved vocabulary.
accessibilitySummary	Text	A human-readable summary of specific accessibility features or deficiencies, consistent with the other accessibility metadata but expressing subtleties such as "short descriptions are present but long descriptions will be needed for non-visual users" or "short descriptions are present and no long descriptions are needed."
accountablePerson	Person	Specifies the Person that is legally accountable for the CreativeWork.



```
<!DOCTYPE html>
<html lang="en">
  <body vocab="http://schema.org/" typeof="CreativeWork">
    <p property="Title">
      Anime title
    </p>
  </body>
</html>
```

Verificação de Implementação



```
<html><head><script type="text/javascript" src=" /static/jquery-3.6.4.js">
</script>





    <link crossorigin="anonymous" href="https://cdn.jsdelivr.net/npm/bootstrap@4.6.2/dist/css
    <script crossorigin="anonymous" integrity="sha384-Fy6S3B9q64WdZWQUiU+q4/2Lc9npb8tCaSX9FK7
    <link rel="stylesheet" href="/static/index.css">


</head><body vocab="http://schema.org/">
<div typeof="CreativeWork">
<nav class="navbar navbar-expand-lg navbar-light bg-light">
    <a class="navbar-brand" href="/">AniN3</a>
    <form class="form-inline" method="get" action="/search/" style="padding-right: 10px;">
        <input class="form-control mr-sm-2" name="query" type="search" placeholder="Search" a
        <button class="btn btn-outline-success my-2 my-sm-0" type="submit">Search</button>
```

Fullmetal Alchemist: Brotherhood

Score:9.11e+00 Rank:1 Number of 3,090,885

Web Page

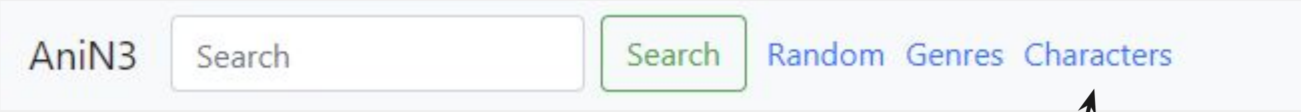
Item 1

type: CreativeWork
stylesheet: bootstrap.min.css
name: Fullmetal Alchemist: Brotherhood
aggregateRating: 9.11e+00
position: 1
genre: https://rdfa.info/genre/Action/
genre: https://rdfa.info/genre/Fantasy/
genre: https://rdfa.info/genre/Adventure/
genre: https://rdfa.info/genre/Drama/
producer: #
contentRating: https://rdfa.info/genre/Military/
contentRating: R - 17+ (violence & profanity)
contentRating: Shounen
temporalCoverage: 24 min per ep
releasedEvent: Apr 5, 2009 to Jul 4, 2010
Status: Finished Airing
isBasedOn: Fullmetal Alchemist
character: Role: Supporting
character: Role: Main

audio: Item 2

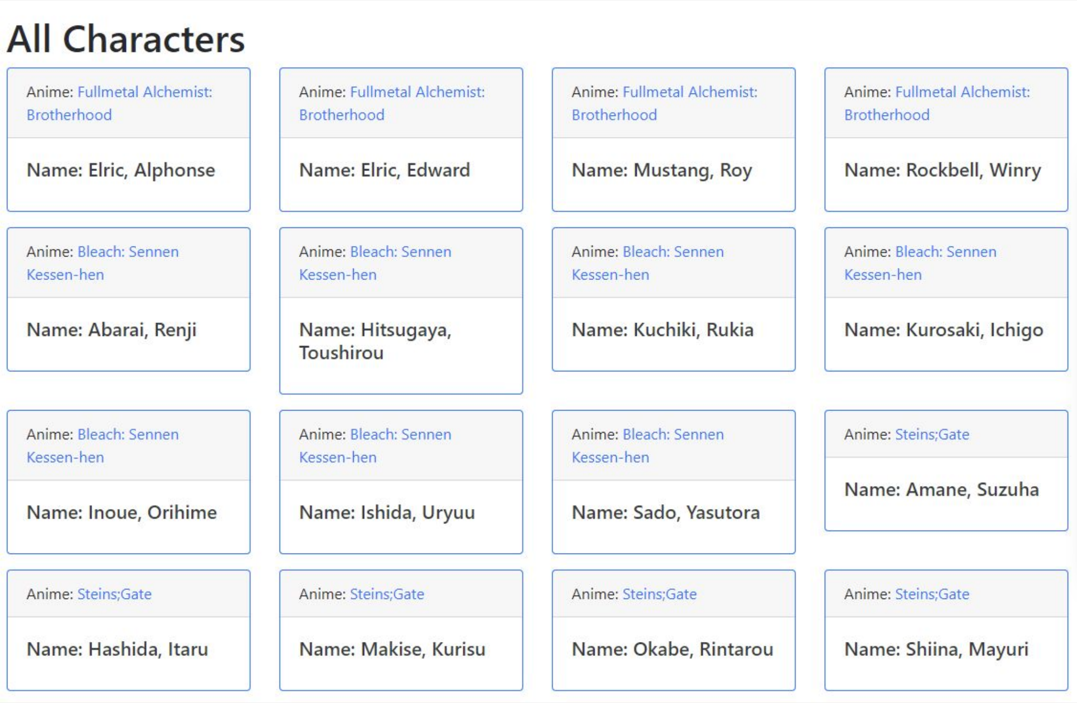
type: MusicRecording
inAlbum: Name: Golden Time Lover (ゴールデンタイムラバー)
inAlbum: Name: Hologram (ホログラム)
inAlbum: Name: Period
inAlbum: Name: Rain (レイン)
inAlbum: Name: again
byArtist: Artist:Sukima Switch
byArtist: Artist:NICO Touches the Walls
byArtist: Artist:Chemistry
byArtist: Artist:SID
byArtist: Artist:YUI

Barra de Navegação



Adicionamos uma nova Tab

Characters Page



All Characters

Anime: Fullmetal Alchemist: Brotherhood

Name: Elric, Alphonse

Anime: Fullmetal Alchemist: Brotherhood

Name: Elric, Edward

Anime: Fullmetal Alchemist: Brotherhood

Name: Mustang, Roy

Anime: Fullmetal Alchemist: Brotherhood

Name: Rockbell, Winry

Anime: Bleach: Sennen Kessen-hen

Name: Abarai, Renji

Anime: Bleach: Sennen Kessen-hen

Name: Hitsugaya, Toushirou

Anime: Bleach: Sennen Kessen-hen

Name: Kuchiki, Rukia

Anime: Bleach: Sennen Kessen-hen

Name: Kurosaki, Ichigo

Anime: Bleach: Sennen Kessen-hen

Name: Inoue, Orihime

Anime: Bleach: Sennen Kessen-hen

Name: Ishida, Uryuu

Anime: Bleach: Sennen Kessen-hen

Name: Sado, Yasutora

Anime: Steins;Gate

Name: Amane, Suzuha

Anime: Steins;Gate

Name: Hashida, Itaru

Anime: Steins;Gate

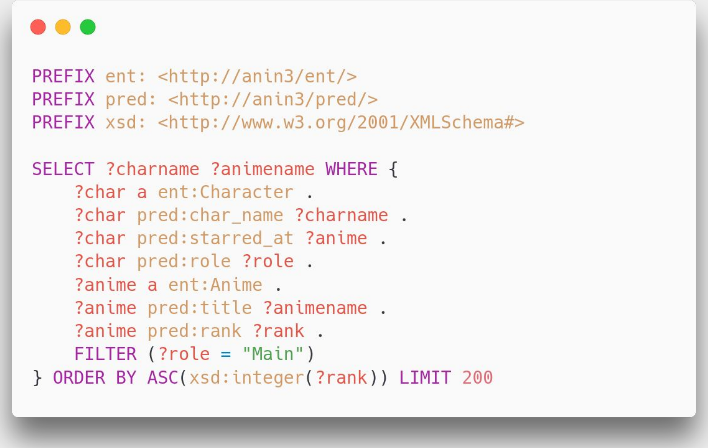
Name: Makise, Kurisu

Anime: Steins;Gate

Name: Okabe, Rintarou

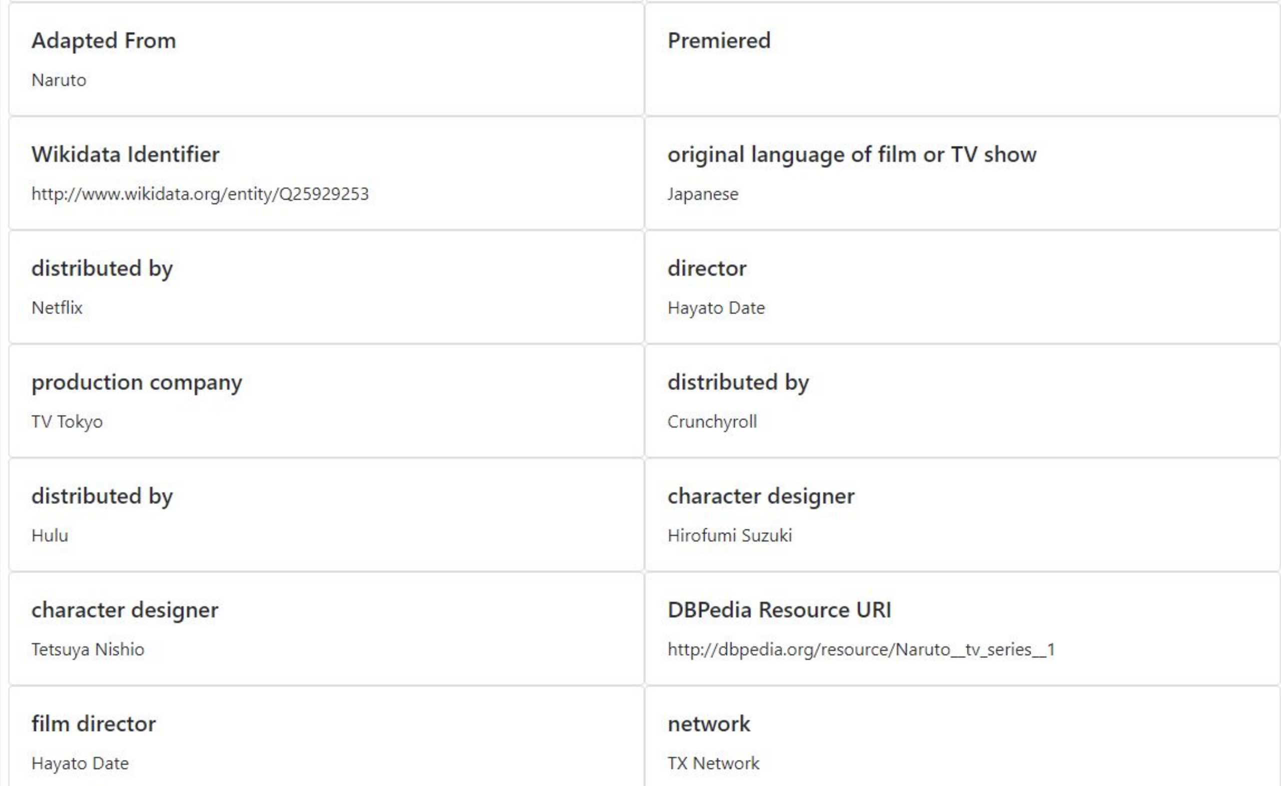
Anime: Steins;Gate

Name: Shiina, Mayuri



```
PREFIX ent: <http://anin3/ent/>
PREFIX pred: <http://anin3/pred/>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

SELECT ?charname ?animename WHERE {
    ?char a ent:Character .
    ?char pred:char_name ?charname .
    ?char pred:starred_at ?anime .
    ?char pred:role ?role .
    ?anime a ent:Anime .
    ?anime pred:title ?animename .
    ?anime pred:rank ?rank .
    FILTER (?role = "Main")
} ORDER BY ASC(xsd:integer(?rank)) LIMIT 200
```

Anime Page



Adapted From Naruto	Premiered
Wikidata Identifier http://www.wikidata.org/entity/Q25929253	original language of film or TV show Japanese
distributed by Netflix	director Hayato Date
production company TV Tokyo	distributed by Crunchyroll
distributed by Hulu	character designer Hirofumi Suzuki
character designer Tetsuya Nishio	DBPedia Resource URI http://dbpedia.org/resource/Naruto__tv_series__1
film director Hayato Date	network TX Network

Conclusão

Conclusão

- Criamos uma ontologia, e regras de inferência
- Enriquecemos os dados usando SPIN
- Aumentamos a robustez das queries SPARQL
- Complementamos os dados com a Wikidata e a DBpedia
- Publicamos os dados com RDFa

DEMO