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Mobility Vocabulary Development & Showcase

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Outline

- MobiVoc - Introduction
- Goal
- Vocabulary Development
- Vocabulary Testing
- End-user Application
- Demo
- Poster
- Future Work

MobiVoc - Introduction

What is MobiVoc?

- Open vocabulary for future-oriented mobility solutions.

Goal is to significantly improve the data mobility between all stakeholders by providing a standardized vocabulary using Semantic Web technologies and ontologies.

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Goal

- Offer a standardized vocabulary for fuel data and for electrical vehicles. (MobiVoc)
- Implement an application that uses the vocabulary that we created to test our vocabulary.

Vocabulary

- ***Fuel.ttl***
  List of fuels for vehicles and their properties.

- ***FillingStation.ttl***
  Facility for motor vehicles or electric motor vehicle.

Vocabulary

Fuel Types:

- ➔ Adblue
- ➔ Autogas
- ➔ Biodiesel
- ➔ CompressedNaturalGas
- ➔ DieselFuel
- ➔ E85
- ➔ Ethanol
- ➔ ExcelliumDiesel
- ➔ ExcelliumSuperPlus
- ➔ Hydrogen
- ➔ LiquidGas
- ➔ LiquidPetroleumGas
- ➔ LKWDiesel
- ➔ MaxxMotionDiesel
- ➔ MaxxMotionSuper100
- ➔ Methane
- ➔ Petrol
- ➔ SuperE5
- ➔ SuperE10
- ➔ SuperDiesel
- ➔ SuperPlus
- ➔ UltimateDiesel
- ➔ UltimateSuper
- ➔ VPowerDiesel
- ➔ VPowerRacing

Vocabulary

Fuel Properties:

- ➔ AutoignitionTemperature
- ➔ ChemicalStructure
- ➔ Cost
- ➔ Currency
- ➔ EnergyContent
- ➔ FlashPoint
- ➔ FuelMaterial
- ➔ GasolineGallonEquivalent
- ➔ MethaneNumber
- ➔ Payment
- ➔ PhysicalState
- ➔ Viscosity

Vocabulary

Adblue Properties:

- ➔ Aldehyde
- ➔ Alkalinity
- ➔ Aluminium
- ➔ Biuret
- ➔ Calcium
- ➔ Chromium
- ➔ Copper
- ➔ Currency
- ➔ Density
- ➔ Iron
- ➔ Insolubles
- ➔ Magnesium
- ➔ Nickel
- ➔ Phosphate
- ➔ Potassium
- ➔ Sodium
- ➔ Zinc

Vocabulary

Filling Station;

- ➔ Fuel Station
- ➔ Charging Station

Fuel Station Properties:

- ➔ fillingStationHeight
- ➔ hasOffer
- ➔ hasParkingFacility
- ➔ hasPrice
- ➔ hasShoppingFacility
- ➔ hasWashingFacility
- ➔ hasWCFacility

Vocabulary

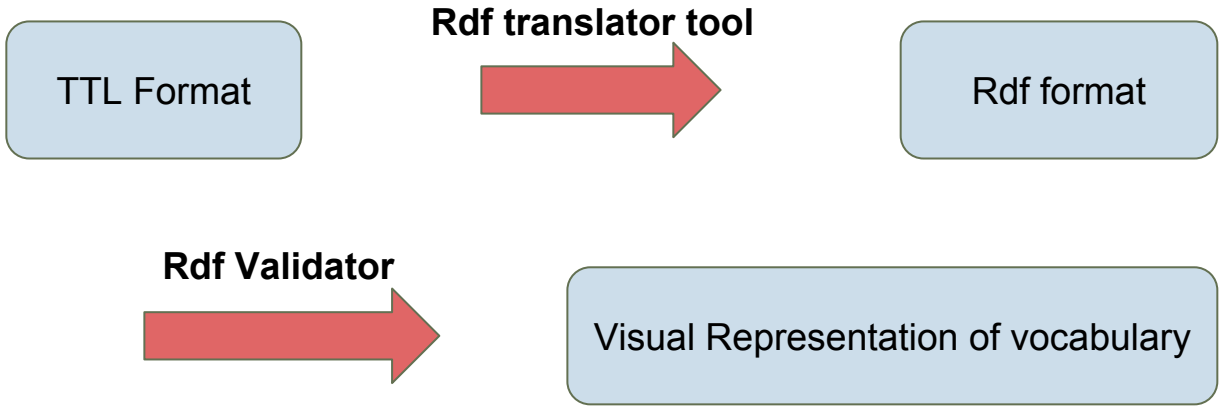
- ***ChargingPoint.ttl***
  List of charging points/stations for electric vehicles and their properties,
  based on the www.chargemap.com

- ***Battery.ttl***
  List of different types of batteries used for electric vehicles and their properties

- ***Vehicle.ttl***
  List of different types of vehicles and their properties

- ***Country.ttl***
  Information about the fuel/charging stations in each country

Vocabulary


TTL Format
Rdf translator tool
Rdf format
Rdf Validator
Visual Representation of vocabulary

Vocabulary

Example:

TTL Format

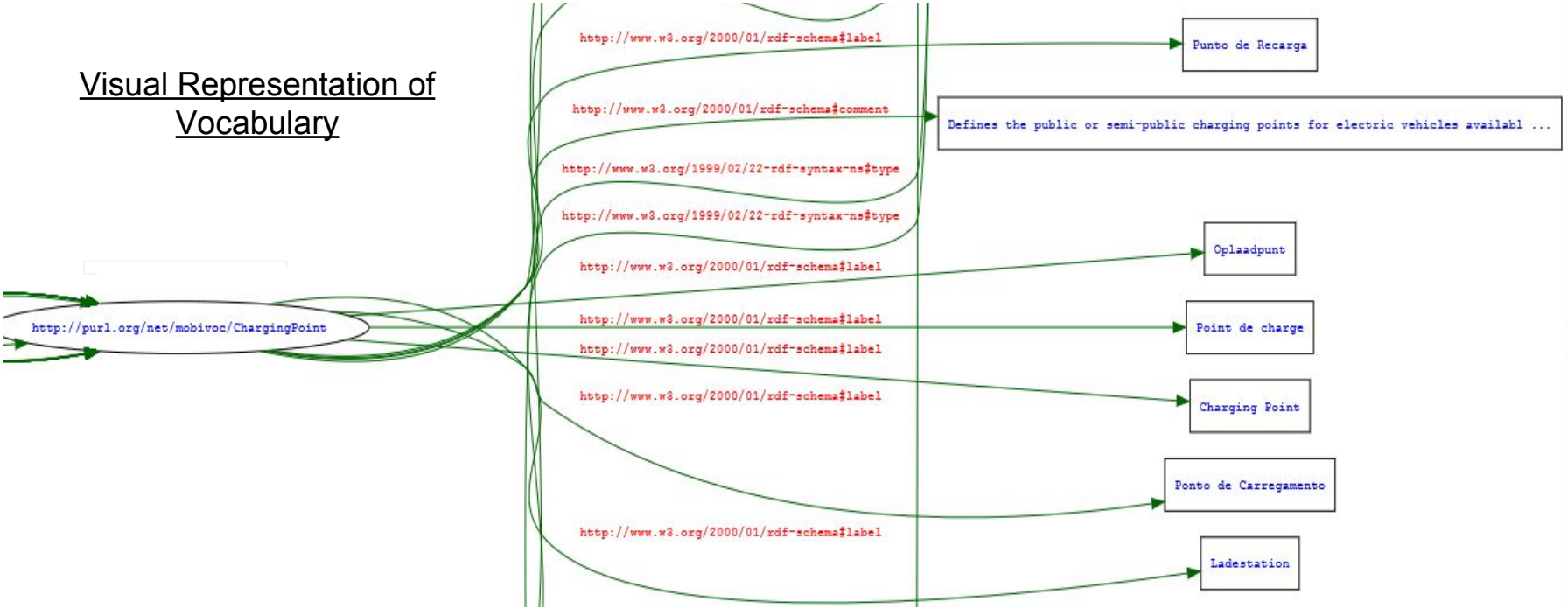
```
mv:ChargingPoint
    a rdfs:Class, owl:Class ;
    rdfs:comment    "Defines the public or semi-public charging points for electric vehicles available worldwide. " ;
    rdfs:label "Ladestation"@de ;
    rdfs:label "Charging Point"@en ;
    rdfs:label "Point de charge"@fr ;
    rdfs:label "Punto de Recarga"@es ;
    rdfs:label "Oplaadpunt"@nl ;
    rdfs:label "Ponto de Carregamento"@pt .

mv:ChargingPointFees
    a rdfs:Class, owl:Class ;
    rdfs:comment    "Captures information about the charging point fees." ;
    rdfs:label "Charging Point Fees"@en .
```

Rdf Format

```
<rdf:Description rdf:about="http://purl.org/net/mobivoc/ChargingPoint">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  <rdfs:label xml:lang="en">Charging Point</rdfs:label>
  <rdfs:label xml:lang="pt">Ponto de Carregamento</rdfs:label>
  <rdfs:label xml:lang="de">Ladestation</rdfs:label>
  <rdfs:label xml:lang="es">Punto de Recarga</rdfs:label>
  <rdfs:comment>Defines the public or semi-public charging points for electric vehicles available worldwide. </rdfs:comment>
  <rdfs:label xml:lang="nl">Oplaadpunt</rdfs:label>
  <rdfs:label xml:lang="fr">Point de charge</rdfs:label>
</rdf:Description>
<rdf:Description rdf:about="http://purl.org/net/mobivoc/ChargingPointFees">
  <rdfs:label xml:lang="en">Charging Point Fees</rdfs:label>
  <rdf:type rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
  <rdfs:comment>Captures information about the charging point fees.</rdfs:comment>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
</rdf:Description>
```

Vocabulary

Visual Representation of Vocabulary



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Vocabulary Testing

- Syntax Testing
  - ➔ RDF Translator Tool
- Semantic Testing
  - ➔ OOPS (OntOlogy Pitfall Scanner) tool

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End-user Application Outline

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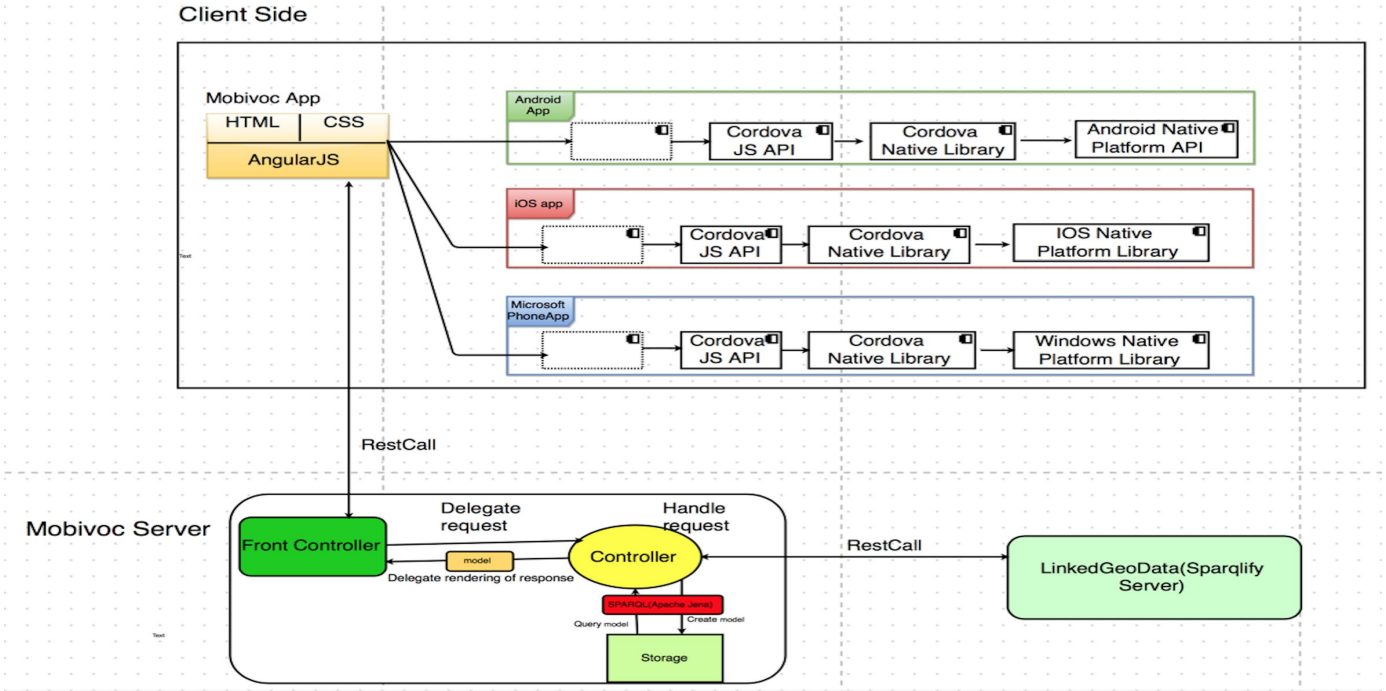
- Application Technology
- Application Architecture
  - ➔ Server-Side
  - ➔ Client-Side
- Testing
- Application Demo

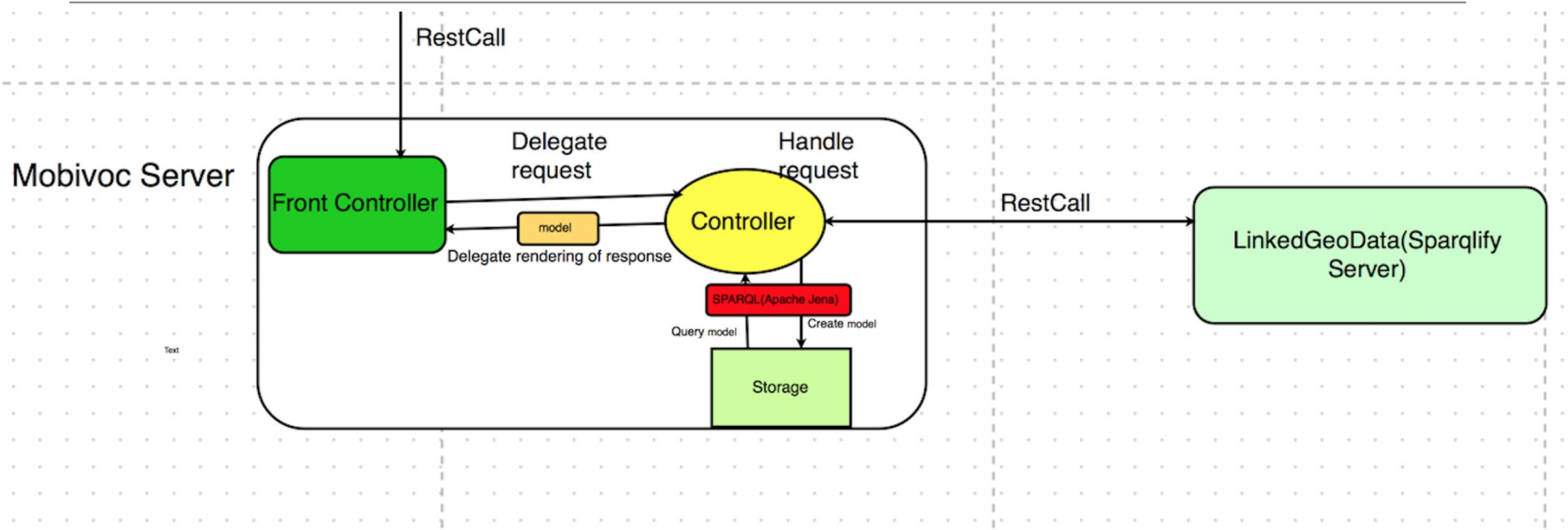
Application Technology

- Server Side Development:
  - ➔ Spring Framework for MVC Architecture
  - ➔ Apache Jena for SPARQL API
  - ➔ Apache Tomcat 8 for Web Server
  - ➔ Rest for communication protocol
- Client-Side Development:
  - ➔ Apache Cordova for build app for mobile platform
  - ➔ AngularJS for MVC Architecture

Architecture Design

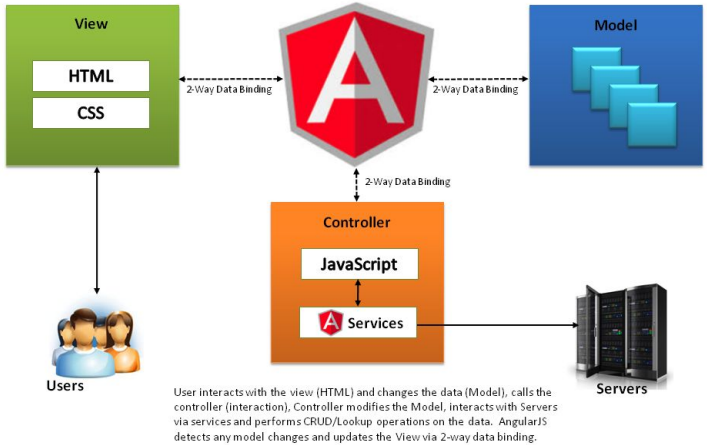


Mobivoc Server-Side



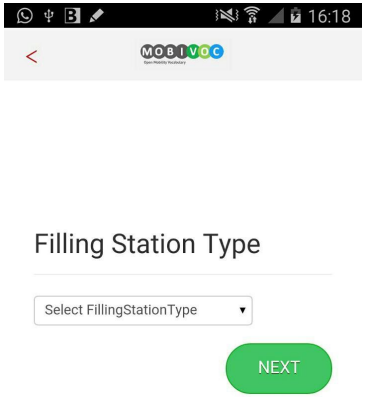
Mobivoc App

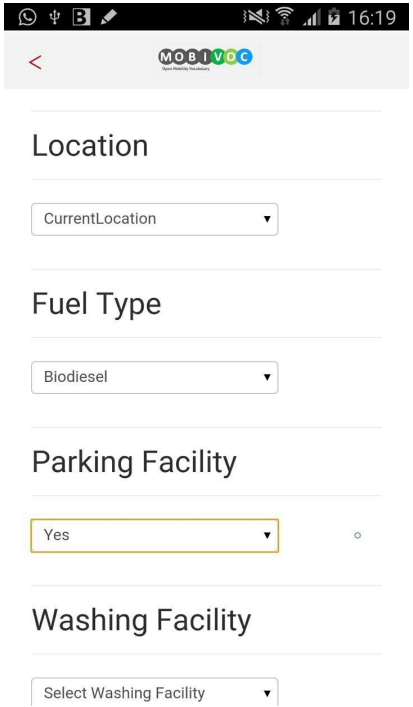
- Build Single-Page Application(SPA)
  - ➔ all necessary code – HTML, JavaScript, and CSS – is retrieved with a single page load
- MVC Architecture with using AngularJS

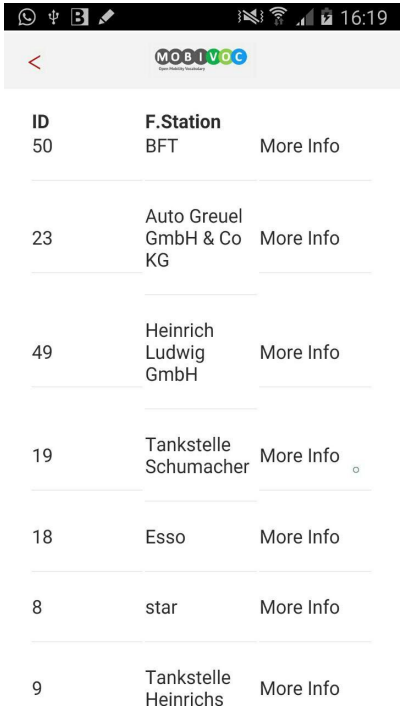


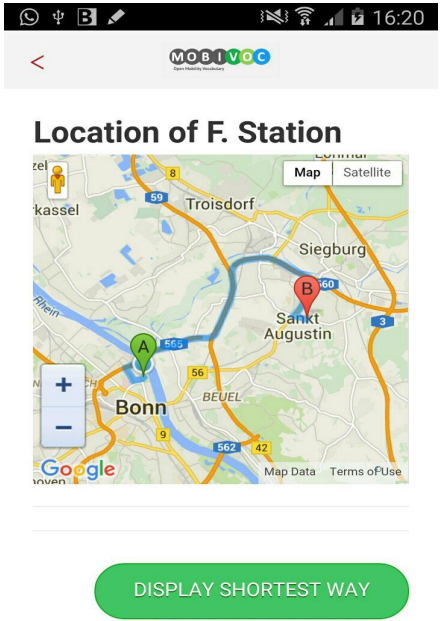
Ref: http://avaldes.com/wp-content/uploads/2014/09/angularJS_MVC1.png?47a727

Mobivoc App(ScreenShots)









Testing

- End-User Application Testing / Test Case:
  - ➔ Define relationships based on use cases and requirements
  - ➔ Create test cases with SPARQL

Testing

- Test Cases;
  - ➔ “Fuel Stations that have washing and shopping facility with giving location”

    “http://localhost:8080/Mobivoc/testwashingshopping?location=Leipzig&washingChoice=Yes&shoppingChoice=Yes”
  - ➔ “Fuel Stations that have parking facility all over the germany”

    “htpp://localhost:8080/Mobivoc/testparking?parkingChoice=Yes”
  - ➔ “Fuel Stations that have WC facility with giving location”

    “localhost:8080/Mobivoc/testwc?location=Bonn&wcChoice=Yes”

Testing

- ➔ “Fuel Stations that have washing and WC facility with giving location”

  “http://localhost:8080/Mobivoc/testwashingwc?location=Bonn&parkingChoice=Yes&wcChoice=Yes”

- ➔ “Fuel Stations that have shopping facility all over the Germany”

  “http://localhost:8080/Mobivoc/testshopping?shoppingChoice=Yes”

- ➔ “Fuel Stations that are wheelchair friendly all over the Germany ”

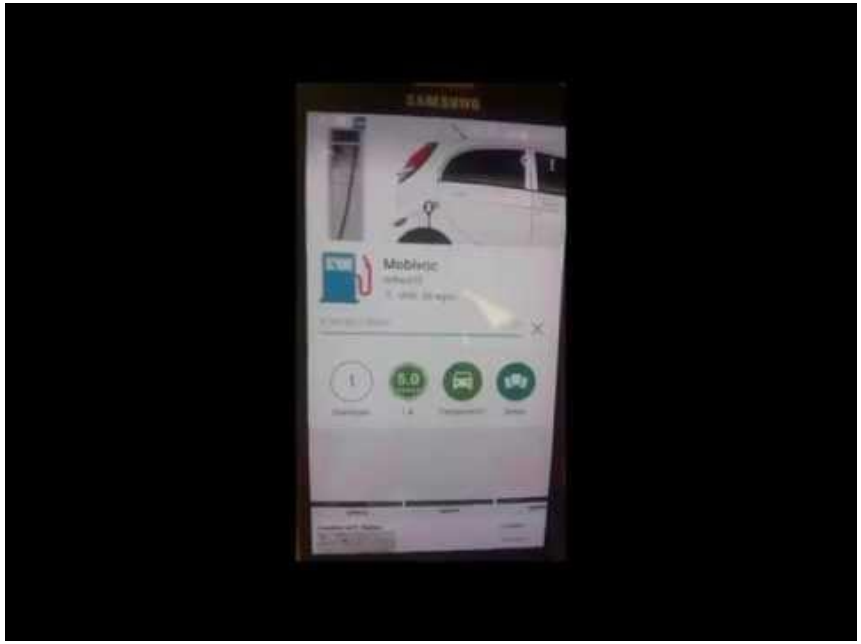
  “http://localhost:8080/Mobivoc/testwheelChair?wheelChair=Yes”

Testing

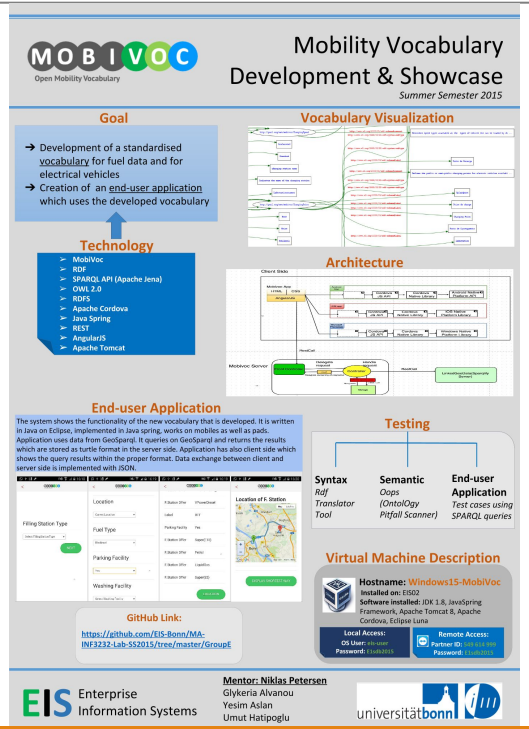
➔ “Fuel Stations that have WC facility with giving location”

localhost:8080/Mobivoc/testwc?location=Bonn&wcChoice=Yes

Application Demo



Poster


MOBIVOC
Open Mobility Vocabulary
Mobility Vocabulary Development & Showcase
Summer Semester 2015
Goal
➔ Development of a standardised vocabulary for fuel data and for electrical vehicles
➔ Creation of an end-user application which uses the developed vocabulary
Technology
MobiVoc
RDF
SPARQL API (Apache Jena)
OWL 2.0
RDFS
Apache Cordova
Java Spring
REST
AngularJS
Apache Tomcat
Vocabulary Visualization
Architecture
End-user Application
The system shows the functionality of the new vocabulary that is developed. It is written in Java on Eclipse, implemented in Java spring, works on mobiles as well as pads. Application uses data from GeoSparql. It queries on GeoSparql and returns the results which are stored as turtle format in the server side. Application has also client side which shows the query results within the proper format. Data exchange between client and server side is implemented with JSON.
Testing
Syntax
Rdf Translator Tool
Semantic
Oops (OntolOgy Pitfall Scanner)
End-user Application
Test cases using SPARQL queries
Virtual Machine Description
Hostname: Windows15-MobiVoc
Installed on: EIS02
Software installed: JDK 1.8, JavaSpring Framework, Apache Tomcat 8, Apache Cordova, Eclipse Luna
Local Access:
Remote Access:
GitHub Link:
https://github.com/EIS-Bonn/MA-INF3232-Lab-SS2015/tree/master/GroupE
EIS Enterprise Information Systems
Mentor: Niklas Petersen
Glykeria Alvanou
Yesim Aslan
Umut Hatipoglu
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Future Work

- Extension of the vocabulary
  - Extension for more means of transport like buses, trains etc..
  - Add more properties and facilities in the existing vocabulary

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Thank you!

Questions?