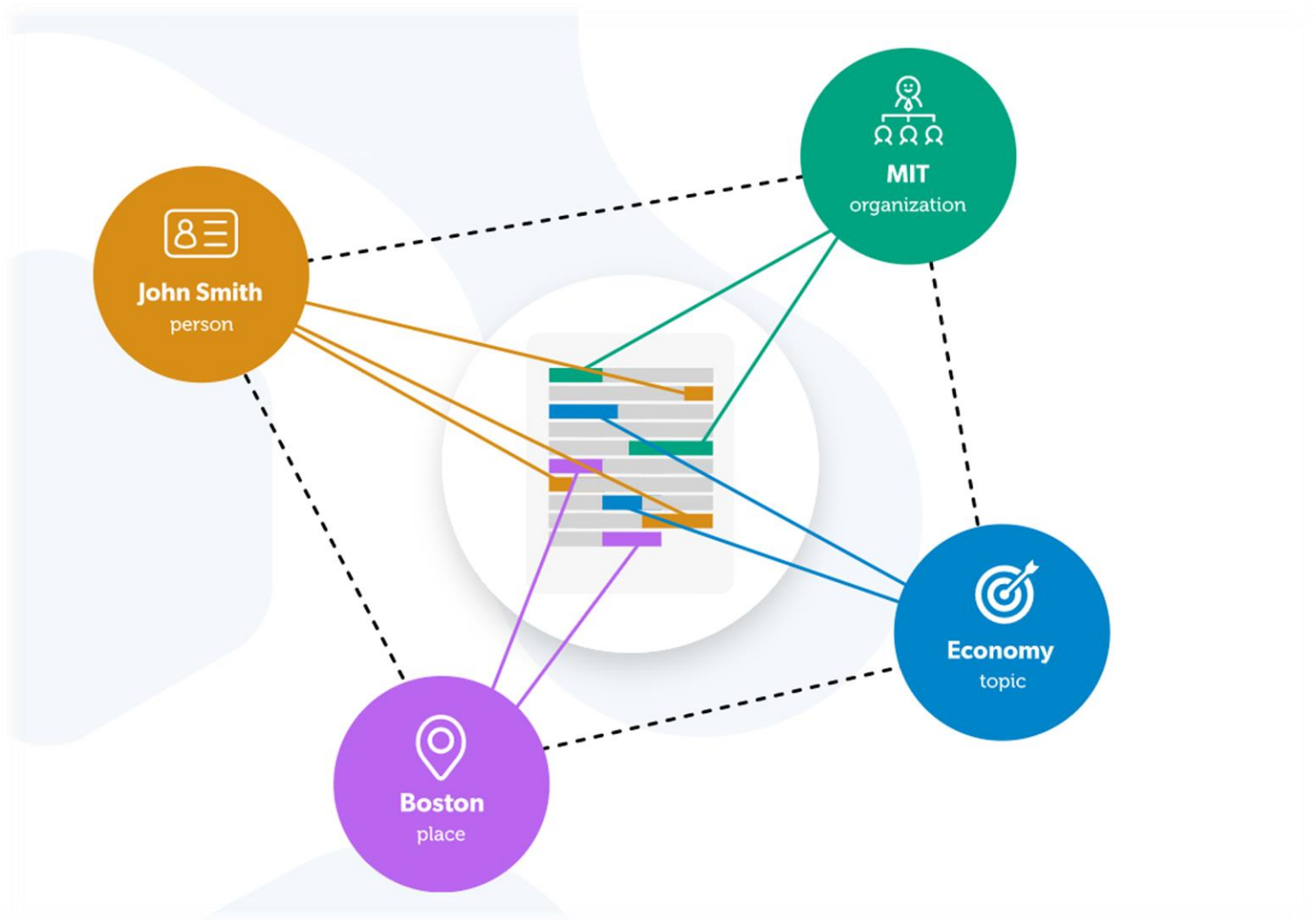


Expert.ai Integration Assessment



Version

Version	Date	Changes
1.0	04/10/2020	Creation

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1 INTRODUCTION

The main objective of the assessment is evaluating the ability of building an easy MVC to interact with expert.ai NL API.

You are asked to build simple application which communicates with the API and shows the results of the document analysis in a thin stand-alone application.

1.1 WHAT WILL BE EVALUATED

The assessment will evaluate your ability to:

1. Fast developing a small WS app to integrate with an API
2. Develop the backend to support the required functionalities
3. Develop a thin frontend to support the required functionalities
4. Adapt using a given development environment and code skeleton

1.2 RULES OF THE ASSESSMENT

- 1) You will have 7 calendar days to complete the assessment, starting from the moment you receive the email with this document attached (email timestamp), to the moment you begin the technical interview.
- 2) At the time of your first technical interview, you will have to deliver:
 - a. Source code of the app, it should be a project created by Eclipse, Netbeans or IntelliJ.
 - b. A war file to be deployed on a Tomcat server and the config instructions to use it.
 - c. The structure of the database, to create it and make the application up and running by replicating the environment
- 3) During the assessment you will not be allowed to ask questions or support. Should you have any doubts about the requirements, the environment, or the application, make your own choice and implement it. During the interview, you will have the chance to explain your doubts and choices as part of the assessment itself.

1.3 WHAT ARE YOU GETTING INTO?

Expert.ai technology is a platform based on artificial intelligence algorithms that mimics the human ability to understand language and complex textual information at scale and with the accuracy required by today's business world.

Based on a rich, domain-independent representation of knowledge (knowledge graph), expert.ai technology integrates the best of natural language understanding (NLU) and machine learning (ML) to intelligently automate business processes and harvest relevant knowledge and critical insights from all the information available in your organization.

The expert.ai Natural Language API is a cloud-based software service that provides a comprehensive set of natural language understanding capabilities based on expert.ai technology.



You can find further information here: <https://www.expert.ai/products/technology/>

And here you will be able to access to a webinar done by our head of R&D explaining the functionalities of the API:

https://www.youtube.com/watch?v=kDSYurPFDWA&feature=youtu.be&ab_channel=expertai

1.4 HOW TO USE THE API

The Natural Language API is a cloud-based service with a [REST](#) interface. This means that the program must be able to access the Web and carry out an HTTP conversation with the API interface.

Whenever the program must analyze or classify a document, it must request the most suitable API resource, similarly to what you do when you request the page of a site with a Web browser.

If you use one of the SDKs available on the [developer portal](#), the details of the conversation are hidden, otherwise the program must use an HTTP client to request the API resources. In both cases what happens is the same: the program, via the—explicit or hidden—HTTP client, transmits a request to the API server.

The request contains the address of the resource of interest—its URL, or *endpoint*—and the text of the document to be analyzed or classified. For this type of request the [POST method](#) is used.

Faced with this request, the server responds synchronously (after an amount of time depending on the type of processing requested and the complexity/length of the text) with the results of the processing.

If the program uses an SDK, the interpretation of the result is simple because it involves examining the properties of an object. Otherwise it must be considered that the result is a JSON object that should be "de-serialized" to parse it.

In this manual you will find all the information on the format of the [request](#) and on the [JSON objects](#) that the API resources return, so you can easily create your own parser.

2 REQUIREMENTS

In a Github repository you can find the skeleton project to connect to the API and be familiar with the calls and the responses.

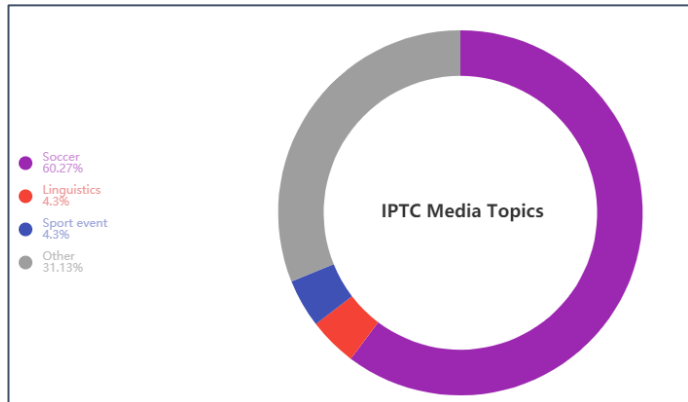
It can be found also the following classes to support the development:

- AbstractDao.java
- AbstractDaoImpl.java
- BaseController.java
- DaoAccessor.java
- DateUtils.java
- JsonUtils.java

Skeleton code: <https://github.com/oriolserret/expert.ai.assessment.git>

2.1 REQUIREMENTS SPECIFICATIONS

The following chapter explains the requirements of the application you must design and build, as a candidate for the position.

ID	Description	Mandatory / Optional	Priority										
1	Create a WS app with a basic frontend.	Mandatory	High										
2	The app must be able to upload all documents available in the folder https://github.com/oriolserret/expert.ai.assessment/tree/main/inputFolder to be processed by expert.ai API, so it must include an upload option to upload the text files for its analysis. Keep in mind that the API has 10000-character limit per file.	Mandatory	High										
3	Each document processed by the application must be sent to the expert.ai NL API and use the categorization service and the full analysis service	Mandatory	High										
4	The application stores the response into a database and allows the responses to be displayed by the front end to see the output of the document annotation	Mandatory	High										
5	The frontend displays aggregated data regarding document categorization in a graphic chart (pie, bars, treemap). <div><table><caption>IPTC Media Topics</caption><thead><tr><th>Topic</th><th>Percentage</th></tr></thead><tbody><tr><td>Soccer</td><td>60.27%</td></tr><tr><td>Other</td><td>31.13%</td></tr><tr><td>Sport event</td><td>4.3%</td></tr><tr><td>Linguistics</td><td>4.3%</td></tr></tbody></table></div>	Topic	Percentage	Soccer	60.27%	Other	31.13%	Sport event	4.3%	Linguistics	4.3%	Optional	High
Topic	Percentage												
Soccer	60.27%												
Other	31.13%												
Sport event	4.3%												
Linguistics	4.3%												

The charts must be browsable working as a facet to drill-down into data. For instance, by clicking on a slice of the pie chart, or on a bar of the bar chart, that represent the percentage of document belonging to a specific category, the frontend shows a list of all the documents that belong to that same category.

Documents

Showing 10 of 14 results

<input type="checkbox"/>	#	Title	Mod. date	Size	Actions
<input type="checkbox"/>	242	Sales Agreement13.docx		53.65 Kb	
<input type="checkbox"/>	236	Sales Agreement10.docx		53.67 Kb	
<input type="checkbox"/>	235	Sales Agreement11.docx		53.62 Kb	
<input type="checkbox"/>	234	Sales Agreement12.docx		53.73 Kb	
<input type="checkbox"/>	233	Sales Agreement14.docx		53.65 Kb	
<input type="checkbox"/>	232	Sales Agreement9.docx		53.65 Kb	
<input type="checkbox"/>	229	Sales Agreement2.docx		47.53 Kb	
<input type="checkbox"/>	226	Sales Agreement5.docx		53.65 Kb	
<input type="checkbox"/>	225	Sales Agreement4.docx		53.65 Kb	
<input type="checkbox"/>	224	Sales Agreement3.docx		47.7 Kb	

<<
<
1
>
>>

6

The frontend must allow a drill-down at the single document level to access and consult the information of the annotation done by the expert.ai NL API (categories, extractions, main lemmas, main domains, main phrases)

Main Lemmas
minimize

element	type	score
Leo Messi	Lemma	14.69
Barcelona	Lemma	12.19
Manchester City F.C.	Lemma	9.69
Josep Maria Bartomeu	Lemma	6.8
Ronald Koeman	Lemma	5.09
Bayern Munich	Lemma	4.09
Jorge Messi	Lemma	3.2

Main Sentences
expand

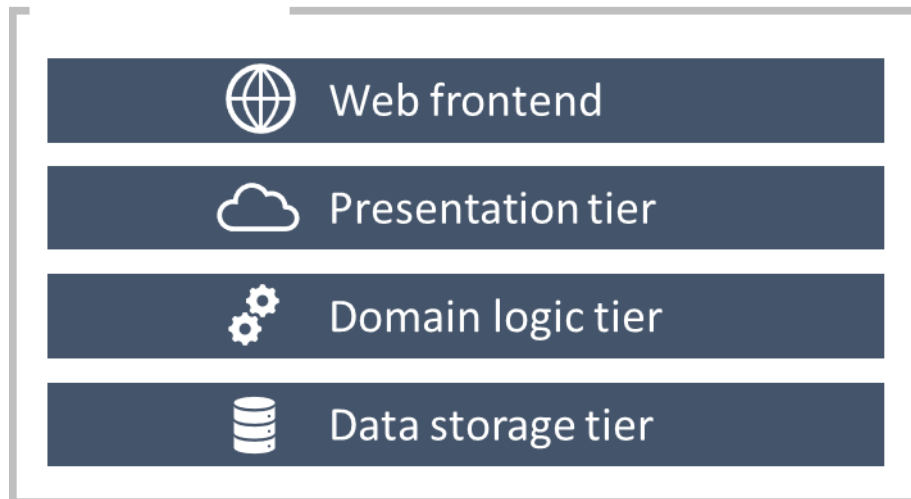
Main Phrases
expand

Optional

medium

3 ARCHITECTURE

This assessment must be implemented according to the widely used three-tier architecture with an additional web frontend:



3.1 FRAMEWORKS

For each framework will be an example of a class to be developed on every layer.

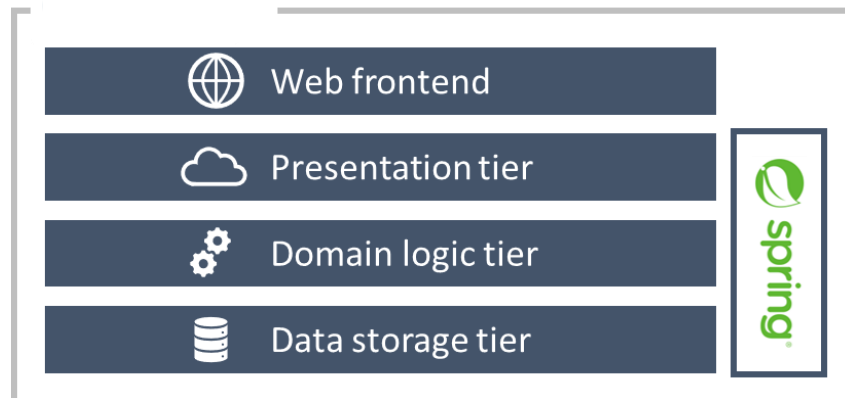
In the Github repository you will find the support documents referenced on each class described in this section.

This service is an example and the functionality that must be done is the one specified on the requirements.

3.1.1 Spring

- Map URLs to Java classes in the presentation tier
- Define beans:
 - As "Controllers" in the presentation tier
 - As "Services" and "Components" in the domain logic tier
 - As "Repositories" in the data storage tier
- Inject defined beans into other existing Spring beans
- Configure Hibernate

All the above by using Spring standard annotations.



DAO (com.expertsystem.persistence.dao)

Interface

```
package com.expertsystem.persistence.dao;

import com.expertsystem.persistence.model.PersistenceEntity;

public interface PersistenceEntityDao extends AbstractDao<PersistenceEntity>
{
    public Long getCustomCount();
}
```

Implementation

```
package com.expertsystem.persistence.dao.impl;

import org.springframework.stereotype.Repository;

import com.expertsystem.persistence.dao.PersistenceEntityDao;
import com.expertsystem.persistence.model.PersistenceEntity;

@Repository("persistenceEntityDao")
public class PersistenceEntityDaoImpl extends
AbstractDaoImpl<PersistenceEntity> implements PersistenceEntityDao
{
    @Override
    public Long getCustomCount()
    {
        super.getSession();
        return null;
    }
}
```

Manager (com.expertsystem.core.manager)

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```
package com.expertsystem.core.manager;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Component;

import com.expertsystem.persistence.dao.DaoAccessor;

@Component
public class PersistenceEntityManager
{
    @Autowired
    private DaoAccessor daoAccessor;

    public Double getCustomRatio()
    {
        this.daoAccessor.persistenceEntityDao.getCustomCount();
        return null;
    }
}
```

Service (com.expertsystem.core.service)

Interface

```
package com.expertsystem.core.service;

public interface PersistenceEntityService
{
    public Double getCustomRatio();
}
```

Implementation

```
package com.expertsystem.core.service.impl;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Service;
import org.springframework.transaction.annotation.Transactional;

import com.expertsystem.core.manager.PersistenceEntityManager;
import com.expertsystem.core.service.PersistenceEntityService;

@Service
@Transactional(rollbackFor = Throwable.class)
public class PersistenceEntityServiceImpl implements PersistenceEntityService
{
    @Autowired
    private PersistenceEntityManager persistenceEntityManager;

    @Override
```

```
public Double getCustomRatio()
{
    return this.persistenceEntityManager.getCustomRatio();
}
```

Controller (com.expertsystem.ws.controller)

```
package com.expertsystem.ws.controller;

import javax.servlet.http.HttpServletRequest;

import org.springframework.beans.factory.annotation.Autowired;
import org.springframework.stereotype.Controller;
import org.springframework.web.bind.annotation.RequestMapping;
import org.springframework.web.bind.annotation.RequestMethod;
import org.springframework.web.bind.annotation.ResponseBody;

import com.expertsystem.core.exception.UserMessageException;
import com.expertsystem.core.service.PersistenceEntityService;
import com.expertsystem.commons.json.Json;

@Controller
@RequestMapping("management/entities/persistenceController")
public class PersistenceEntityController extends BaseController
{
    @Autowired
    private PersistenceEntityService persistenceEntityService;

    @RequestMapping(value = "getCustomRatio", method = RequestMethod.GET,
produces = "application/json;charset=UTF-8")
    @ResponseBody
    public String getCustomRatio(HttpServletRequest httpServletRequest)
    {
        try
        {
            if (this.log.isInfoEnabled())
                this.log.info("list requested");

            return doGetCustomRatio(httpServletRequest);
        }
        catch (UserMessageException userMessageException)
        {
            this.log.error(userMessageException.toString());
            return Json.throwableToJson(userMessageException);
        }
        catch (Throwable throwable)
        {
            this.log.error(throwable.toString(), throwable);
            return Json.throwableToJson(throwable);
        }
    }
}
```

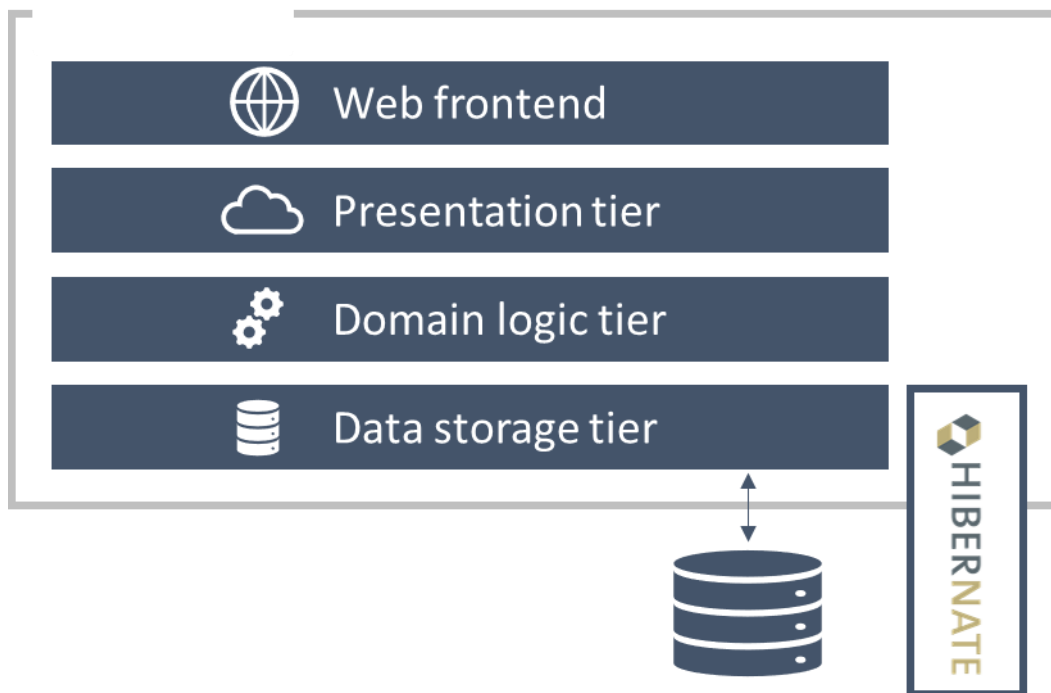
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```
}  
  
    public String doGetCustomRatio(HttpServletRequest httpRequest)  
    throws Exception  
    {  
        return  
        Json.toJson(this.persistenceEntityService.getCustomRatio());  
    }  
}
```

3.1.2 Hibernate

Provides persistence regardless of the underlying specific database.

- Object-relational mapping
- 1st level cache



Table

```
create table persistence_entity  
(  
    id bigint(24) not null auto_increment,  
    name char(100) not null,  
    constraint persistenceentity_pk primary key (id)
```

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```
) engine=InnoDB default charset=UTF8;
```

Model (com.expertsystem.persistence.model)

```
package com.expertsystem.persistence.model;

import javax.persistence.Column;
import javax.persistence.Entity;
import javax.persistence.GeneratedValue;
import javax.persistence.GenerationType;
import javax.persistence.Id;
import javax.persistence.Table;

@Entity
@Table(name = "persistence_entity")
public class PersistenceEntity
{
    private Long id;
    private String name;

    @Id
    @GeneratedValue(strategy = GenerationType.AUTO)
    public Long getId()
    {
        return id;
    }

    public void setId(Long id)
    {
        this.id = id;
    }

    @Column(name = "name")
    public String getName()
    {
        return name;
    }

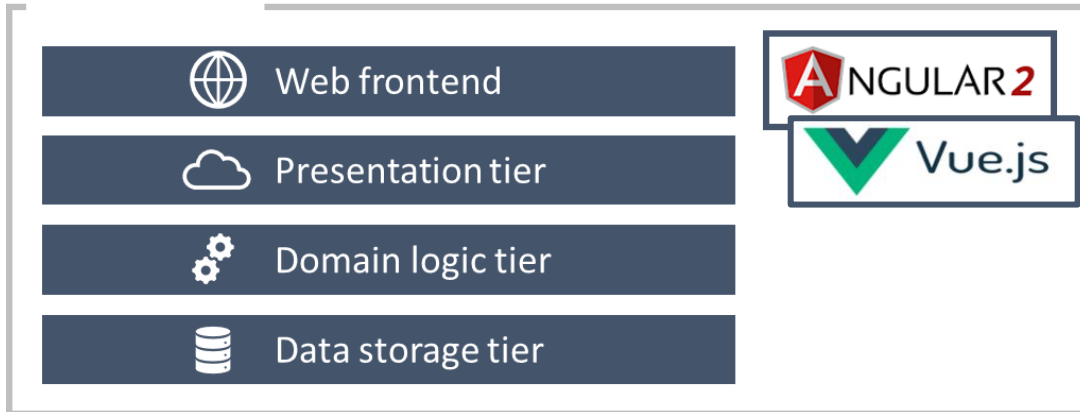
    public void setName(String name)
    {
        this.name = name;
    }
}
```

Angular2 or Vue.js

- SCSS → Makes easier to manage the application CSS styles

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- MVC → Independence of HTML pages from the underlying used model makes it easier to build a scalable web application
- Built-in AJAX feature



3.2 SOFTWARE

The assessment must be a solution composed of the following components:

- Assessment WS
- Assessment frontend
- Expert.ai
- Database → MySQL / Oracle

4 EXPERT.AI OUTPUT

Example of output returned by the expert.ai service

4.1 CATEGORIZATION

```
{
  categories:[
    {
      frequency:92.37
      hierarchy:[
        "Sport"
        "Competition discipline"
        "Soccer"
      ]
      id:"20001065"
      label:"Soccer"
      namespace:"iptc_en_1.0"
      positions:[
        {
          end:69
          start:57
        }
        {
          end:144
          start:139
        }
        {
          end:152
          start:145
        }
      ]
      score:4005
      winner:true
    }
  ]
  content:"It's been a week to forget after the season to forget at FC Barcelona after Lionel Messi informed the club he wanted to leave. The current Barça captain is ready to break his silence on the subject but will wait for the right time and moment to explain the reasons behind the desire to move."
  language:"en"
  version:"sensei: 3.1.0; disambiguator: 14.5-QNTX-2016"
}
```

4.2 ANALYSIS (NOT FULL)

```
{
  content:"It's been a week to forget after the season to forget at FC Barcelona after Lionel Messi informed the club he wanted to leave. The current Barça captain is ready to break his silence on the subject but will wait for the right time and moment to explain the reasons behind the desire to move."
}
```

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```
knowledge:[...]
language:"en"
mainLemmas:[
{
  positions:[
    {
      end:69
      start:57
    }
    {
      end:144
      start:139
    }
  ]
  score:25.7
  value:"Barcelona"
}
{
  positions:[
    {
      end:88
      start:76
    }
    {
      end:109
      start:107
    }
  ]
  score:17.89
  value:"Lionel Messi"
}
{
  positions:[
    {
      end:152
      start:145
    }
  ]
  score:16.2
  value:"captain"
}
{...}
{...}
{...}
{...}
]
mainPhrases:[...]
mainSentences:[...]
mainSyncons:[...]
topics:[
{
  id:64
  label:"soccer (US)"
}
```




```
    score:9.69
    winner:false
  }
  {
    id:219
    label:"watercraft and nautical navigation"
    score:0.3
    winner:false
  }
]
version:"sensei: 3.1.0; disambiguator: 15.0-QNTX-2016"
}
```