



# Stemmarest

## Dokumentation des PSE2 Projekt

Jakob Schaerer, Severin Zumbrunn, Ido Gershoni, Joel Niklaus, Ramona Imhof



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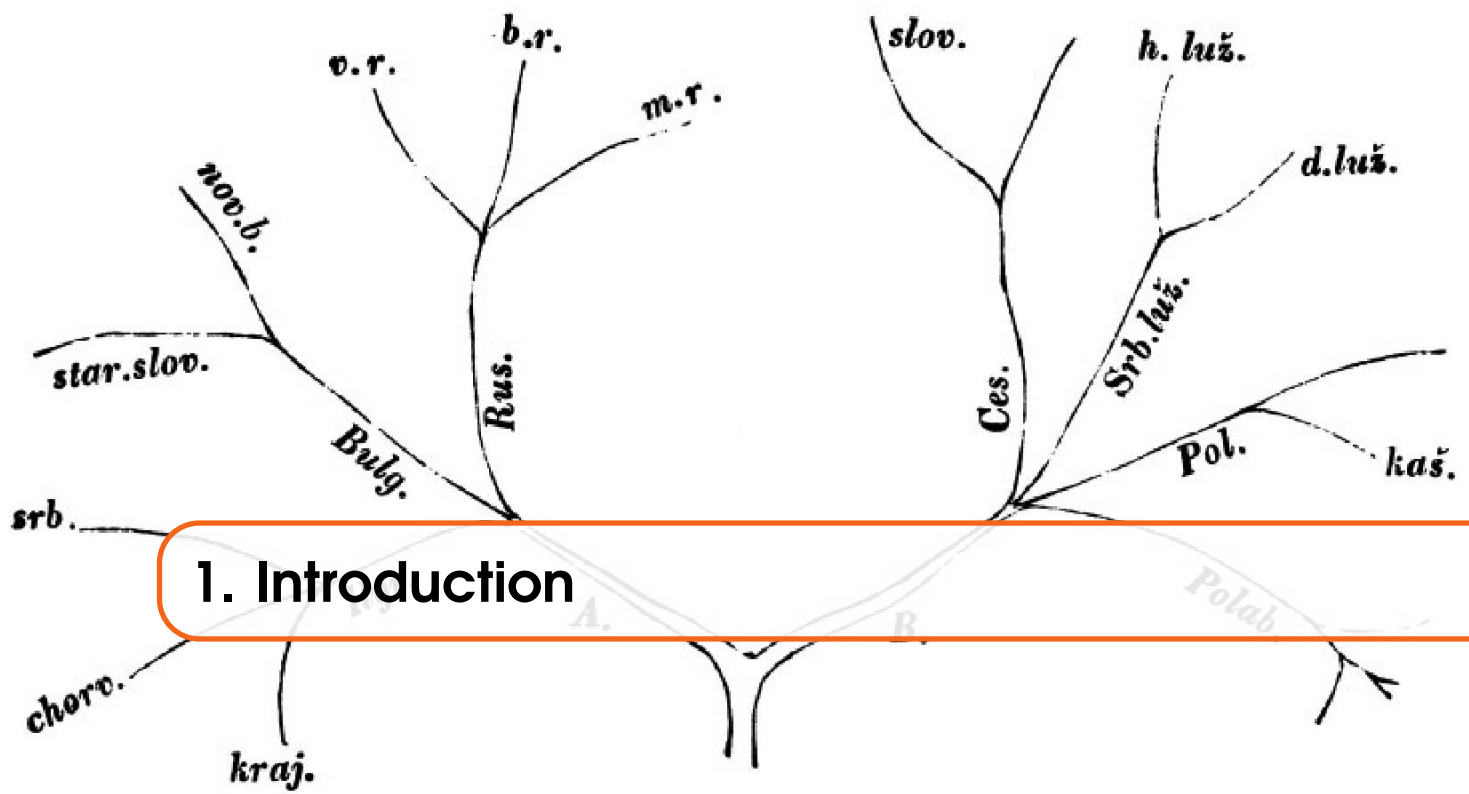


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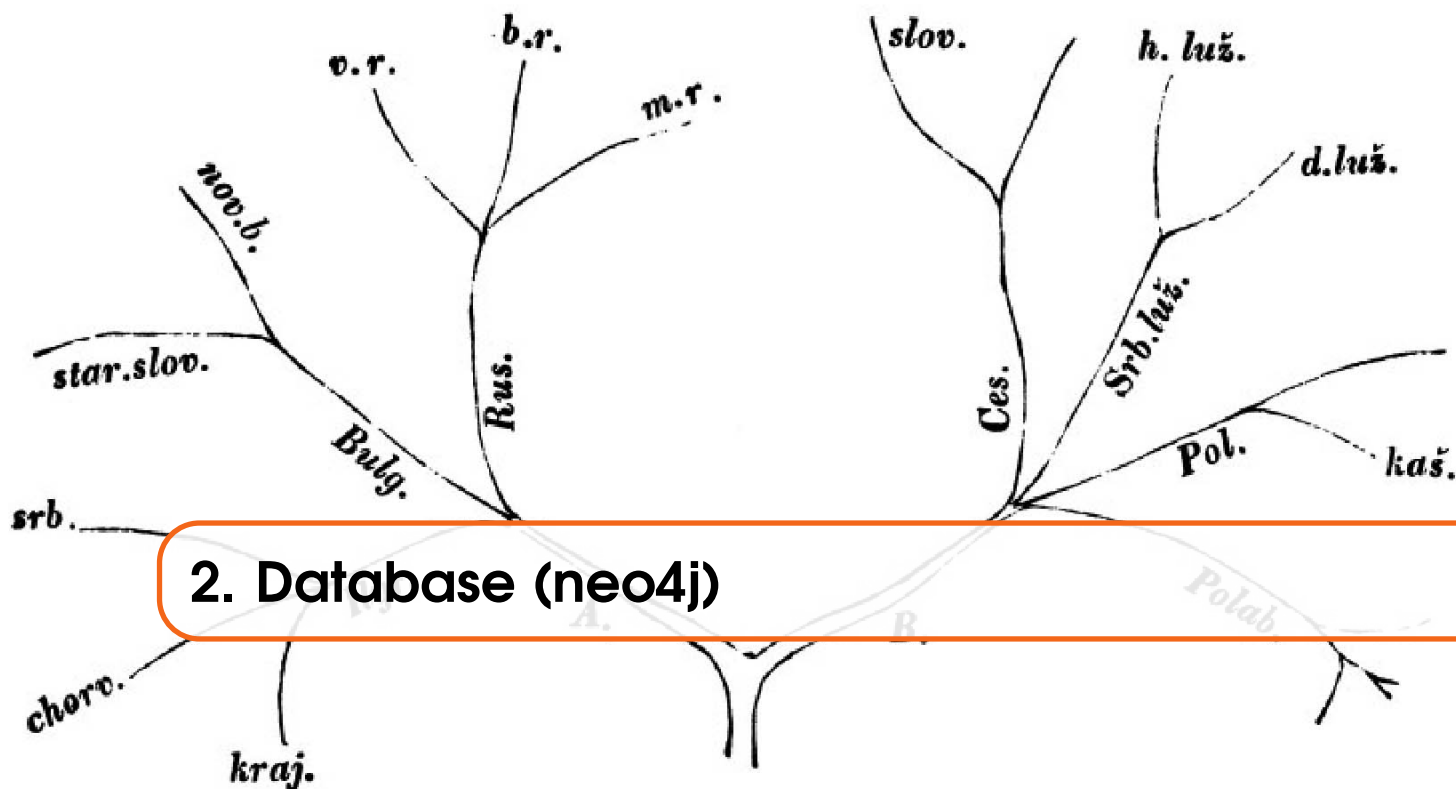
# Project

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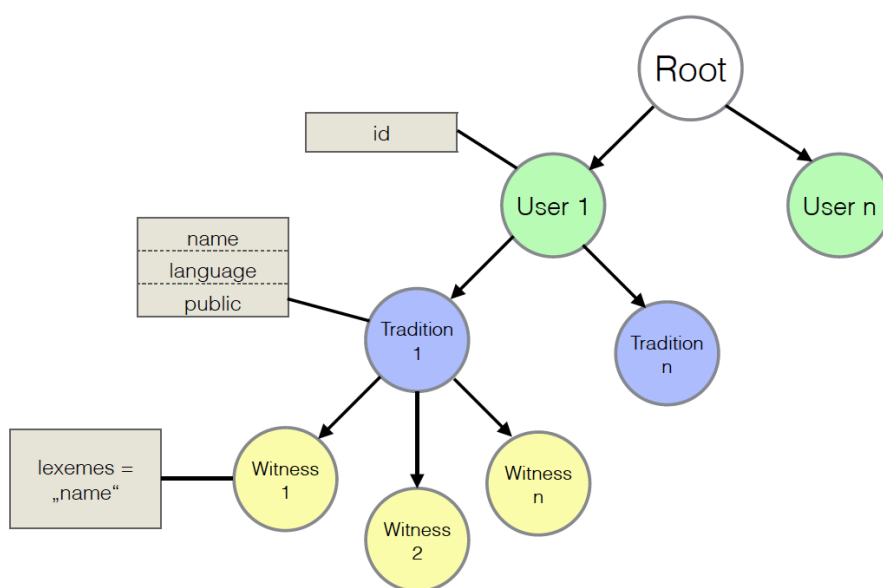
## 1. Introduction

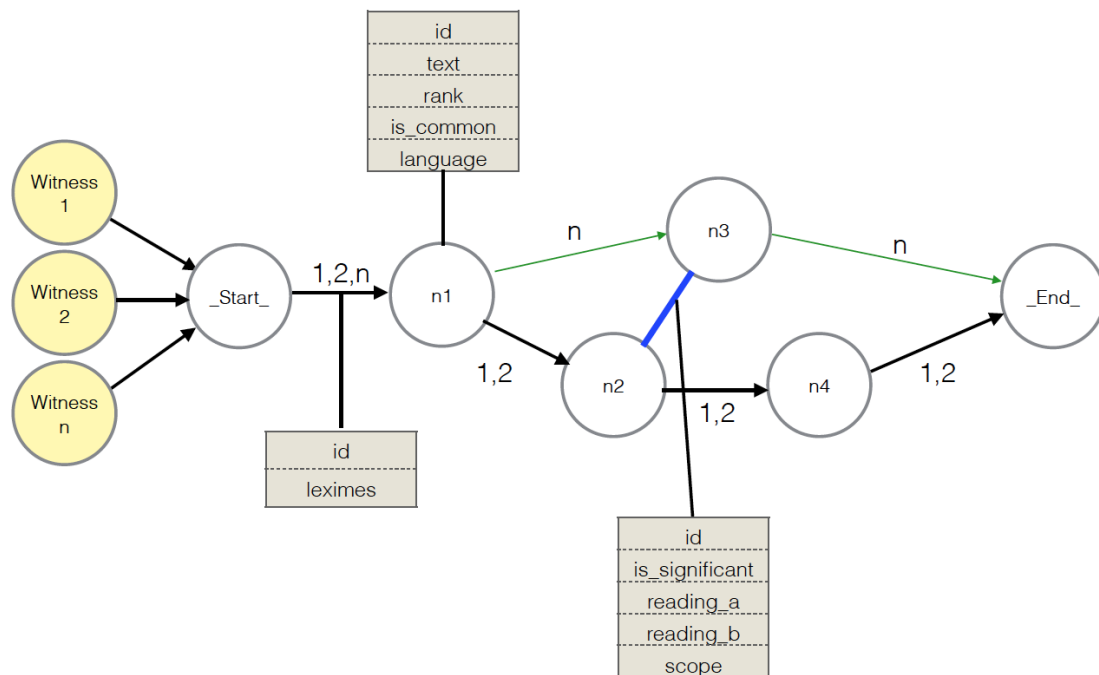
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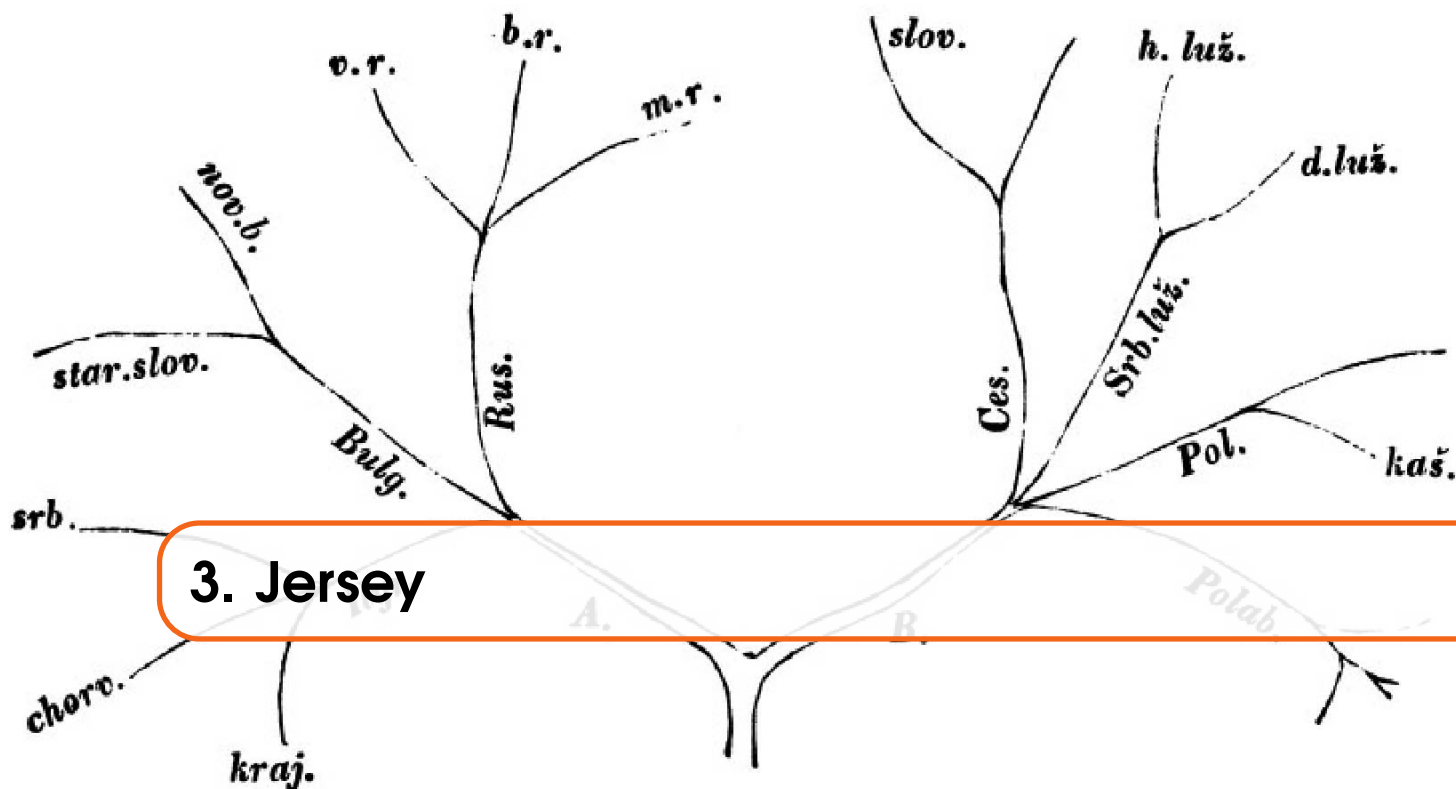
## 2. Database (neo4j)

### 2.1 Structure

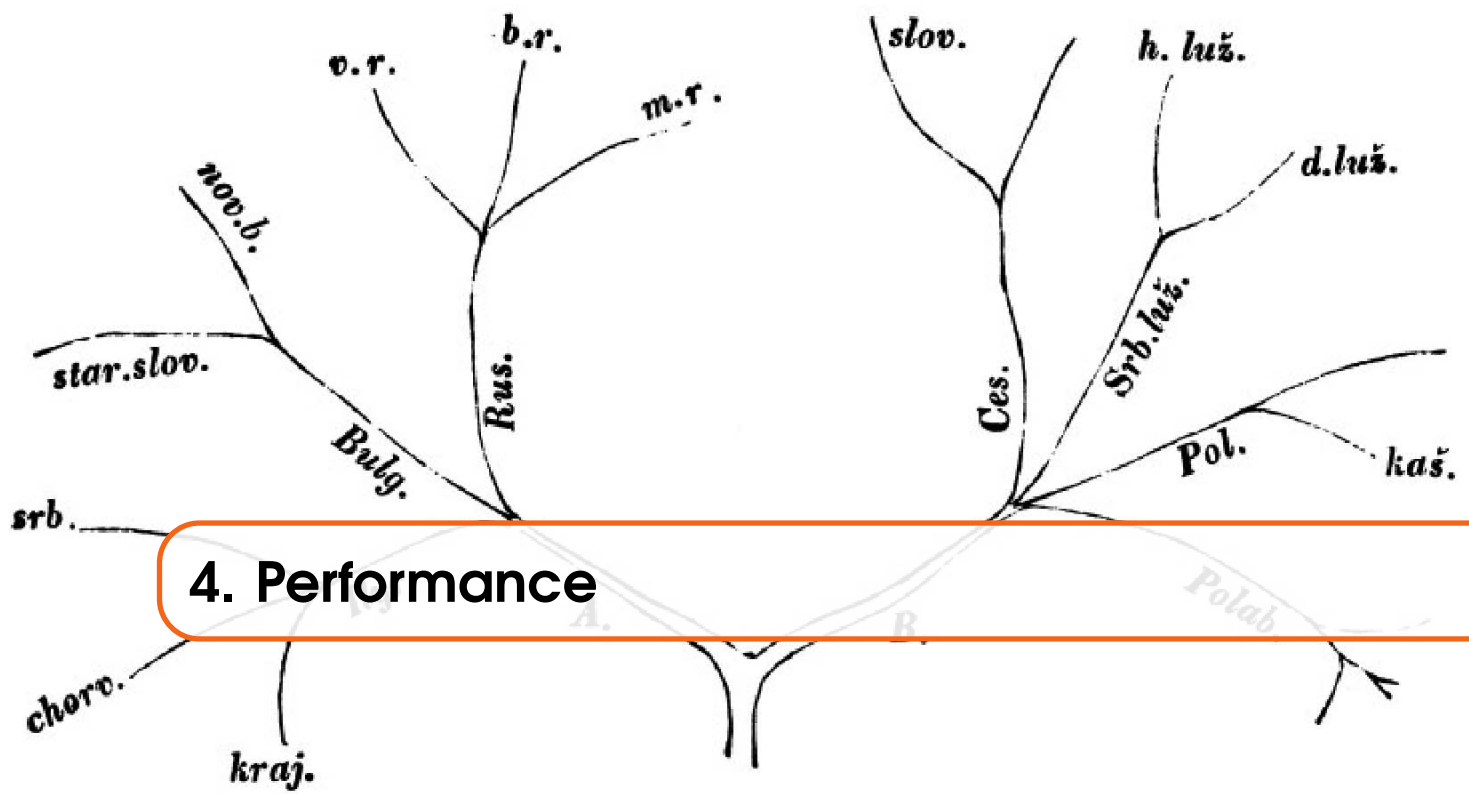






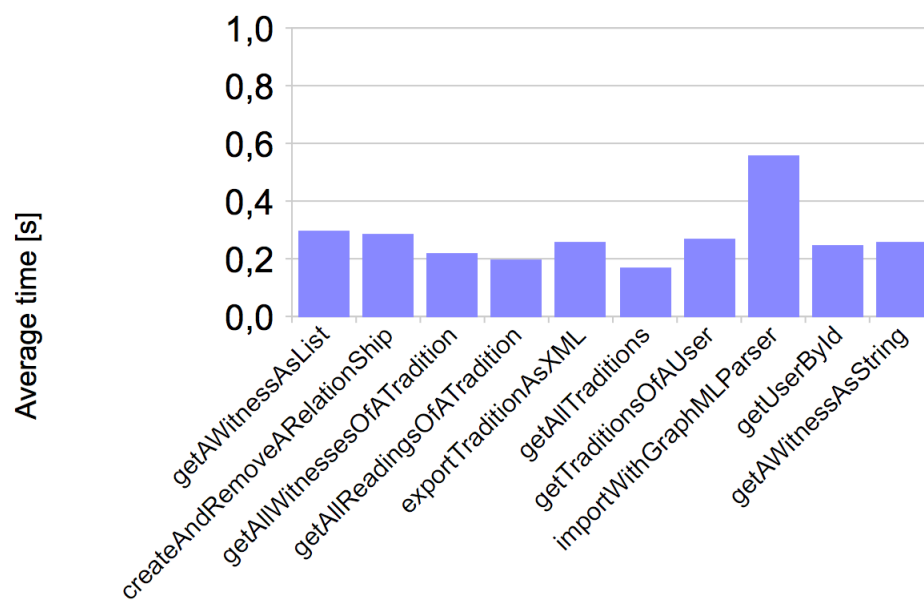


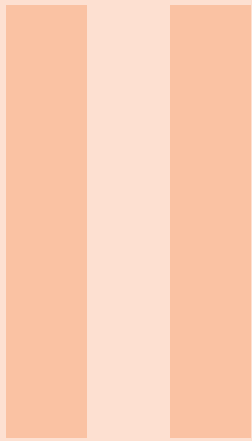
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The performance is tested by benchmark tests. Please consult the chapter Benchmark Tests in the part Testing of this documentation for further technical information.

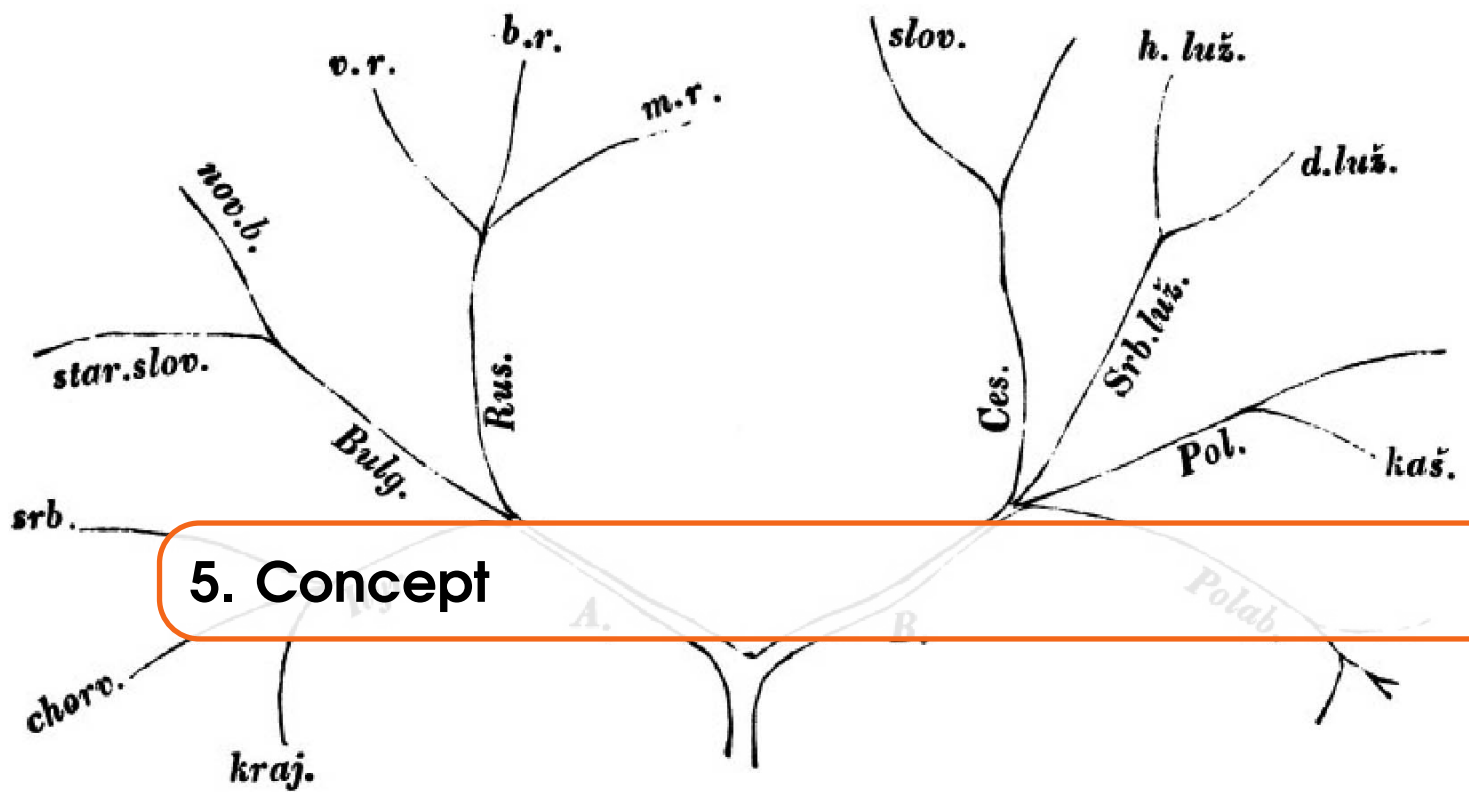
Figure 4.1: An example to show what will come here.





# Testing

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This chapter describes the test-concept of the Digital Humanities PSE2 Project. The testing is used to assure the quality of the project and for test driven development. All tests are written in a manner they don't have any impact on the architecture of the project. To achieve this object mocking and injection by mockito is used.

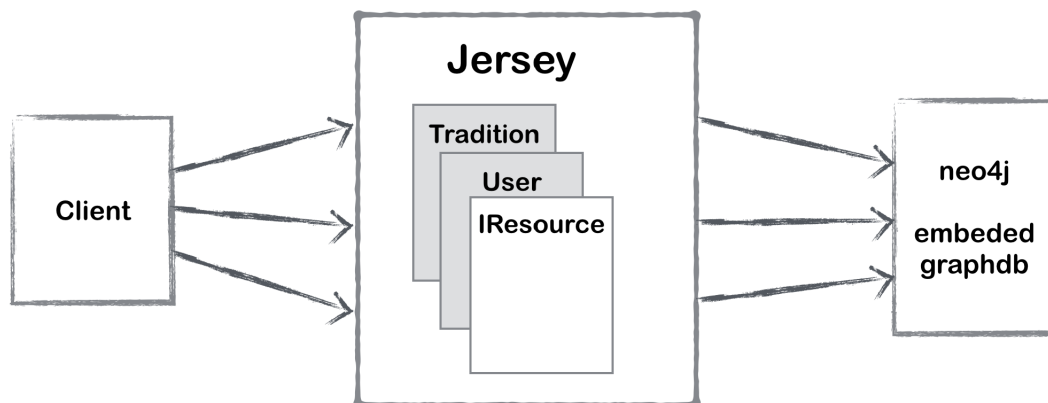
### Integration Tests

Every user story is tested by an integration Test. The integration tests assures the quality of the project. The technique of integration tests is described in the Integration test chapter.

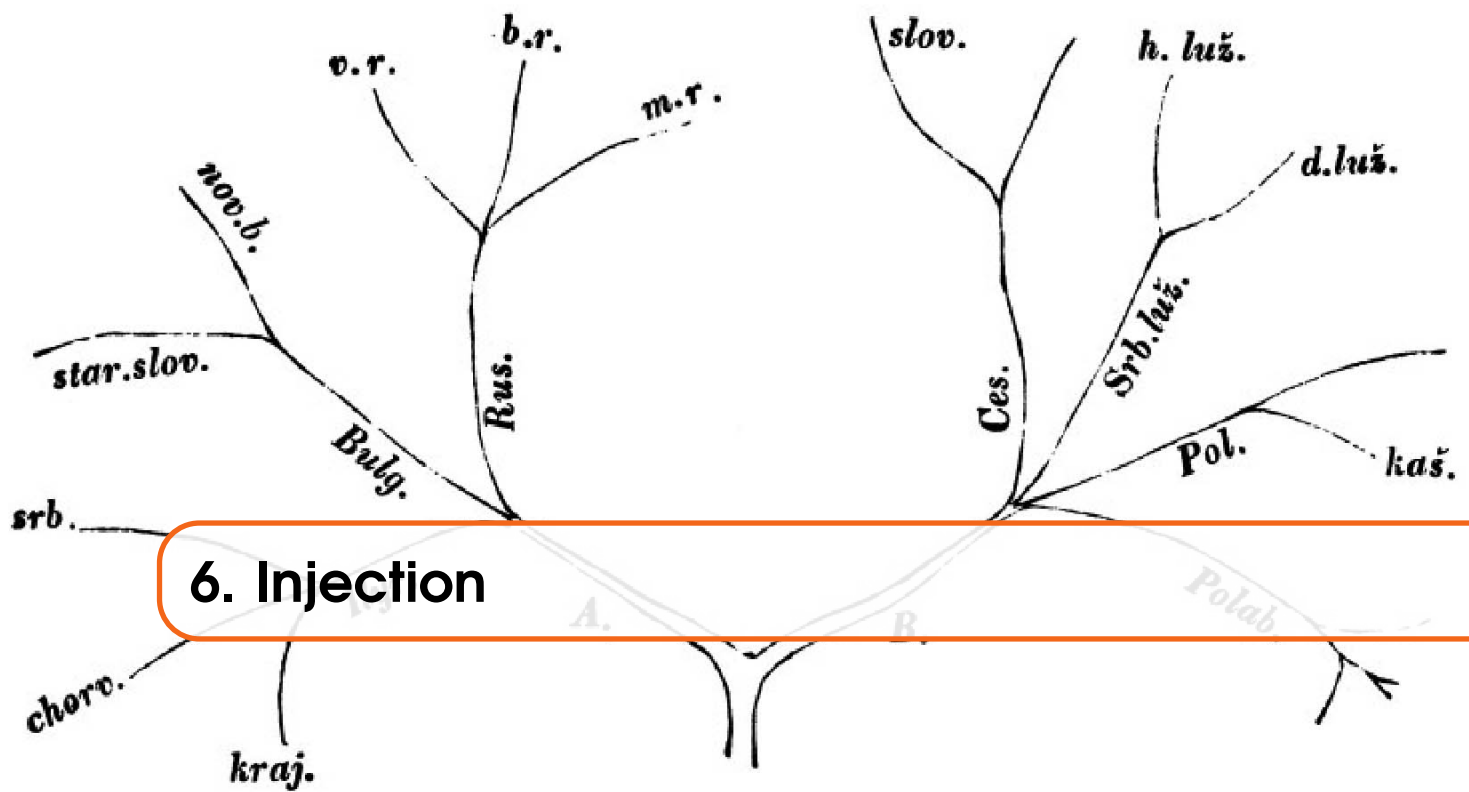
### Unit Tests

Unit tests are used for test driven development and are defined by the developer. They are only for the development process and are not referenced in quality audits.

## Jersey Overview



In the productive system for every REST call jersey is instantiating the requested resource and providing the service. Each resource object has its own database service, which is closed after each call. In production a embedded neo4j GraphDatabase is used. To achieve a minimal invasive test system the productive database needs to be replaced with a test database. To change the database without test related code in the project, object injection is used.



## 6. Injection

Mockito is used to mock, spy and inject objects in the tests. To use Mockito with junit the following annotation has to be done directly above the class header.

```
@RunWith( MockitoJUnitRunner . class )
```

With the MockitoJUnitRunner the annotations @Mock, @Spy and @InjectMocks can be used. To inject an GraphDatabaseService, the GraphDatabaseFactory is mocked and the newEmbeddedDatabase method overwritten that it returns an impermanent database.

```
@Mock
```

```
protected GraphDatabaseFactory mockDbFactory =
    new GraphDatabaseFactory ();
```

The Mock annotation creates a Mock object. This is needed to overwrite the newEmbeddedDatabase method.

```
Mockito . when( mockDbFactory . newEmbeddedDatabase( Matchers . anyString ( ) ) )
        . thenReturn( mockDbService );
```

Where mockDbService is a spy object. This is needed to suppress each shutdown call of this object. This is necessary because the resource is not new created for every restcall and so the database should not be closed. See more in the Integrationtest chapter.

```
@Spy
```

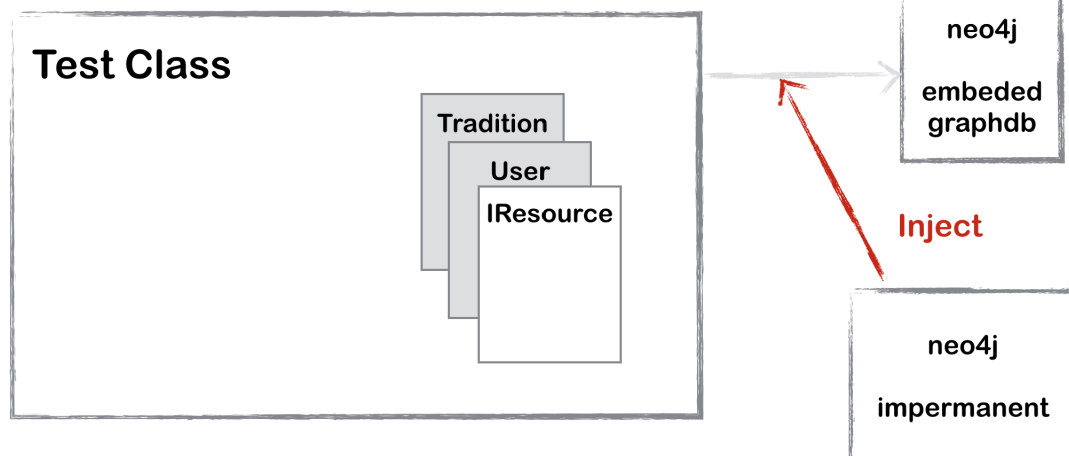
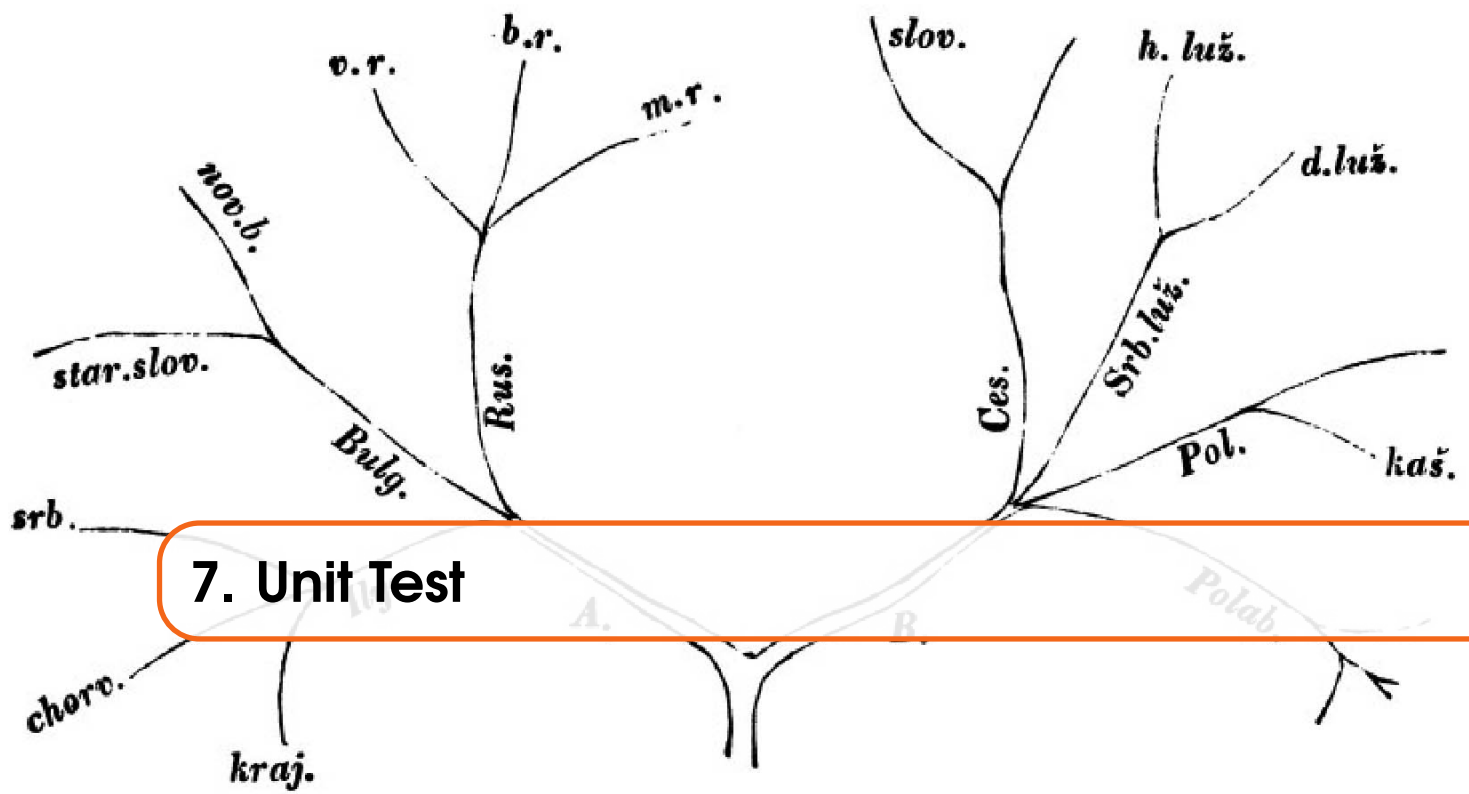
```
protected GraphDatabaseService mockDbService =
    new TestGraphDatabaseFactory ( ) . newImpermanentDatabase ( );
```

```
Mockito . doNothing ( ) . when( mockDbService ) . shutdown ( );
```

And the injection of the Mockobjects into a resource

```
@InjectMocks
```

```
private User userResource ;
```

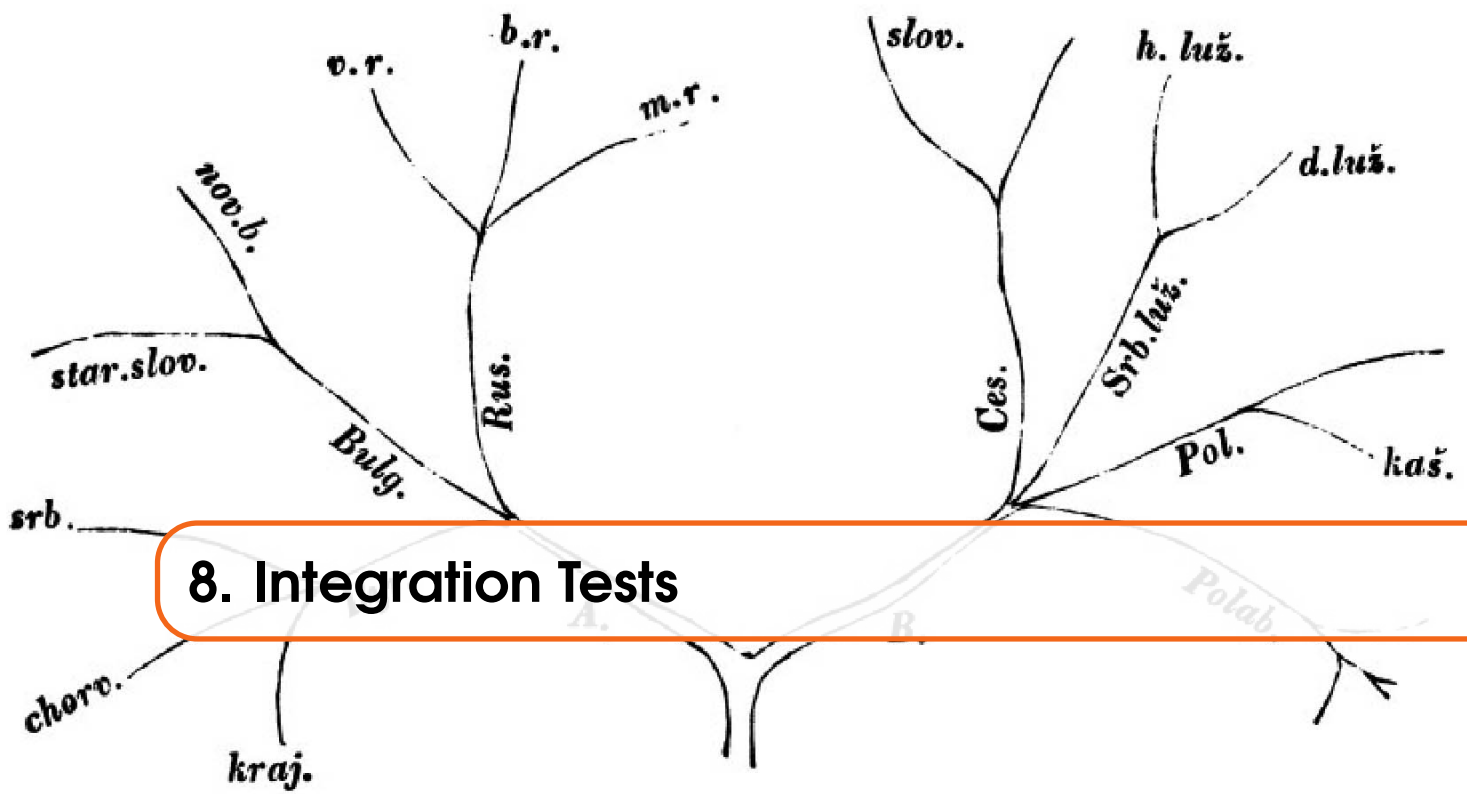


For Unit Tests the methods of the resource are called directly.

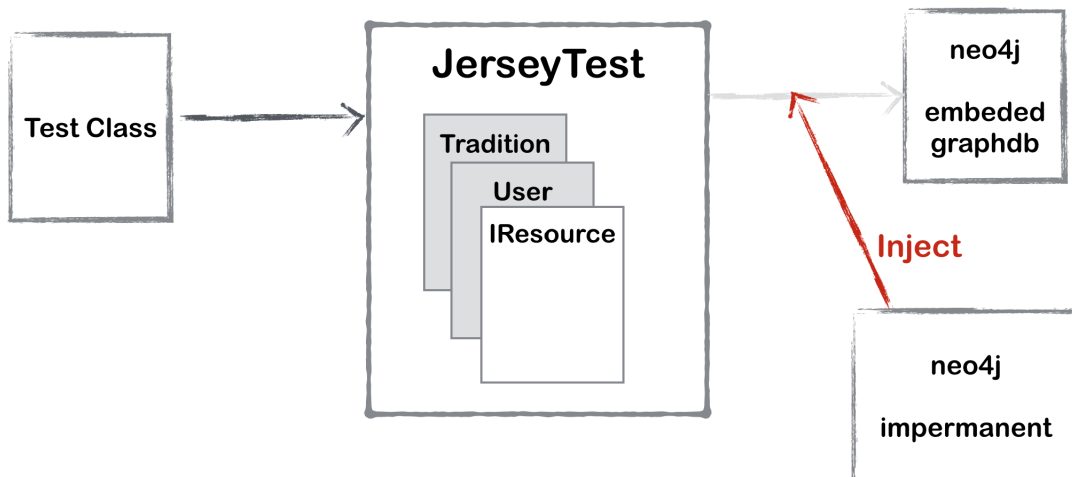
```
@Test
public void SimpleTest(){
    String actualResponse = userResource.getIt();
    assertEquals(actualResponse, "User!");
}
```

### Example

[https://github.com/tohotforice/PSE2\\_DH/blob/e364fcb0c164981281c5799a6bf9f9f9ea5eb503/stemmarest/src/test/java/net/stemmaweb/stemmaserver/UserUnitTest.java](https://github.com/tohotforice/PSE2_DH/blob/e364fcb0c164981281c5799a6bf9f9f9ea5eb503/stemmarest/src/test/java/net/stemmaweb/stemmaserver/UserUnitTest.java)



## 8. Integration Tests



To inject objects into a resource it is mandatory that the resource is created statically at the place the injection is done. This is not possible when the resources are instantiated when a REST call occurs. To solve this JerseyTestServerFactory creates a server where already instantiated resources can be registered. To start a JerseyTestServer a global JerseyTest has to be created.

```
private JerseyTest jerseyTest;
```

The JerseyTestServerFactory creates a JerseyTest with already instantiated resources. This is necessary to inject the mock objects. Multiple resources can be added by chaining .addResource(..).addResource()

```
jerseyTest = JerseyTestServerFactory.newJerseyTestServer()  
    .addResource(userResource).create();  
jerseyTest.setUp();
```

The test is done by calling a webresource of jerseyTest

```
@Test
```

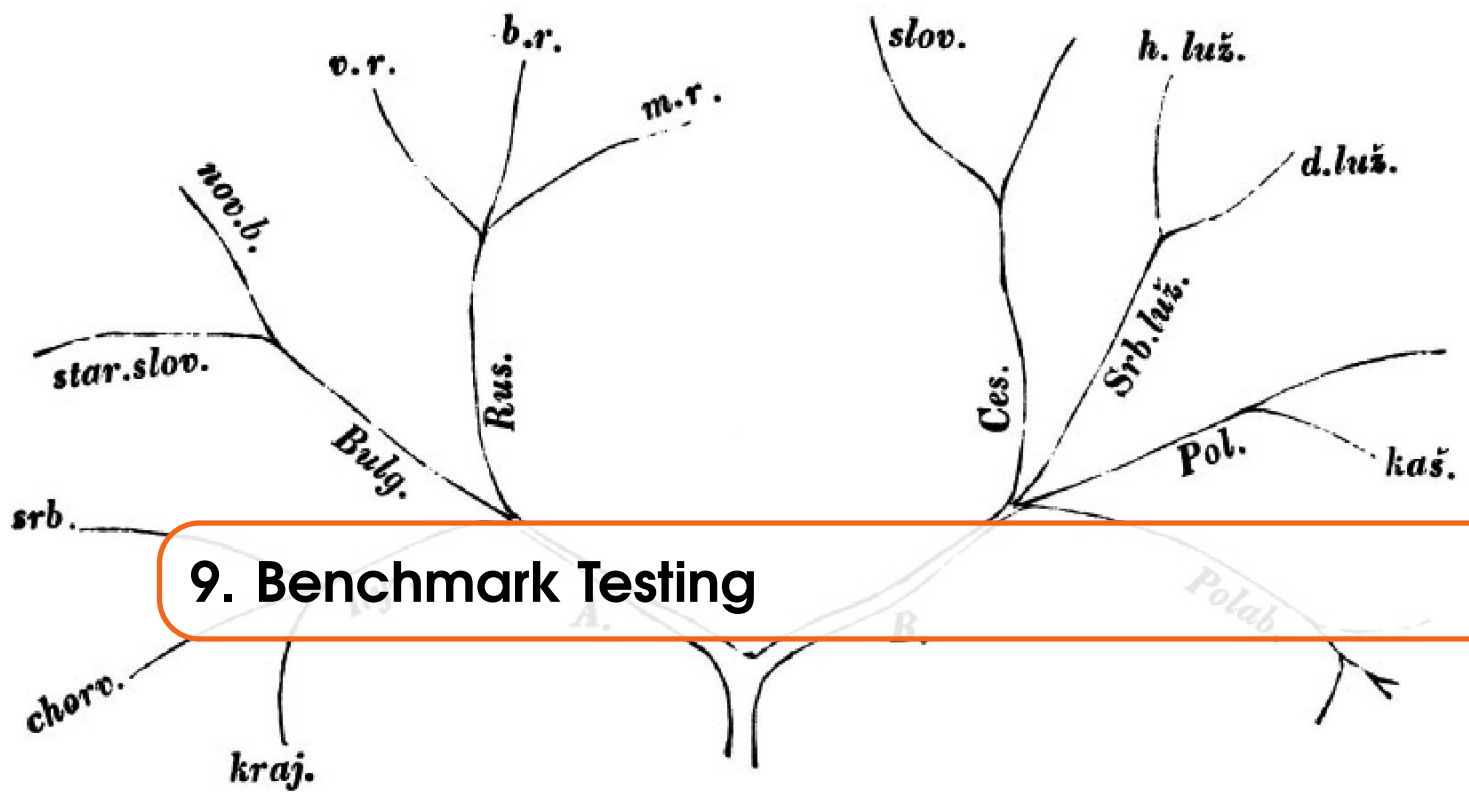


```
public void SimpleTest(){
    String actualResponse = jerseyTest.resource()
        .path("/user").get(String.class);
    assertEquals(actualResponse, "User!");
}
```

**Example**

[https://github.com/tohotforice/PSE2\\_DH/blob/e364fcb0c164981281c5799a6bf9f9f9ea5eb503/stemmarest/src/test/java/net/stemmaweb/stemmaserver/UserTest.java](https://github.com/tohotforice/PSE2_DH/blob/e364fcb0c164981281c5799a6bf9f9f9ea5eb503/stemmarest/src/test/java/net/stemmaweb/stemmaserver/UserTest.java)

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## 9. Benchmark Testing

A main goal of the PSE2 stemmarest project is a good performance compared to the previous RESTful service. To measure the performance benchmark testing is needed. A benchmark test basically calls the RESTful service multiple times and measure the response time. To achieve this *com.carrotsearch.junitbenchmarks* a handy JUnit benchmark test suite is used. This JUnitbenchmarks measure the time which is used to execute a test and can generate visual representations of the measurement.

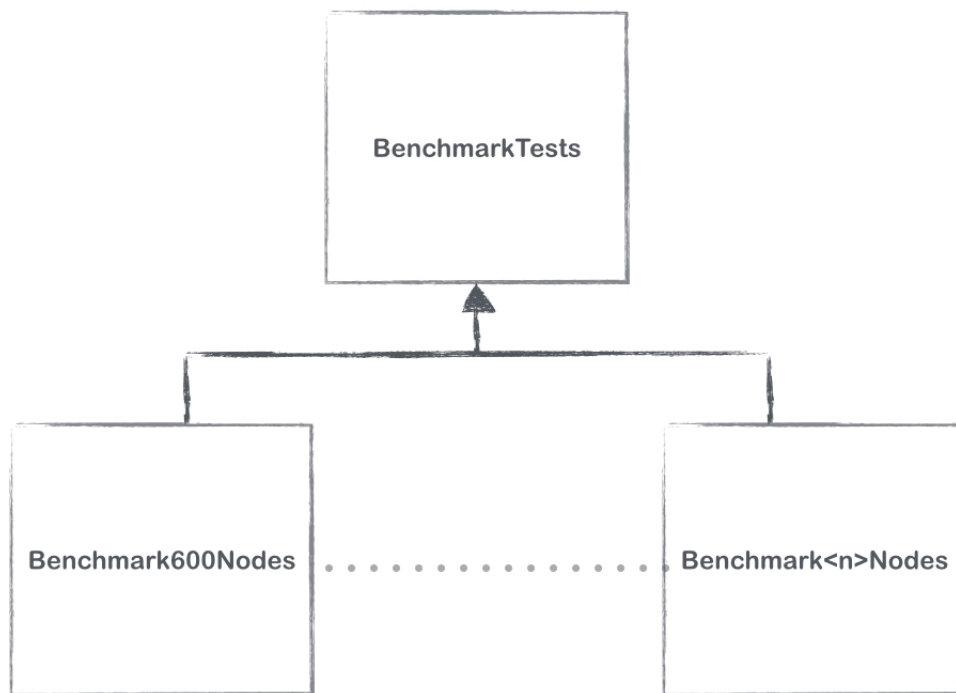
For the benchmark testing it is of interest to have a variety of different databases. Those databases should differ in their size from small to very huge. This allows to measure the algorithms in extreme situations. To generate valid graphs only limited by disk space the class *RandomGraphGenerator* can be used. By calling the static method *role* a graph is generated according to the parameters.

**R** Please note that the response time highly depends on the hardware the tests are running on and the actual state of Java's virtual machine.

To reduce the influence of the virtual machine before the measurements 5 warm-up calls are done to bring the virtual machine to live. The hardware which was used for testing is represented in the report.

### Setup

All the classes related to the Benchmark Tests can be found in the package *net.stemmaweb.stemmaserver.benchmarktests*. The class *BenchmarkTests* contains all Tests. The classes *Benchmark<n>Nodes* contain the database generation. Here is configured how many nodes the database has. These are also the classes which are run with JUnit test. *BenchmarkTests* can't be run as a JUnit test as it is an abstract class. s



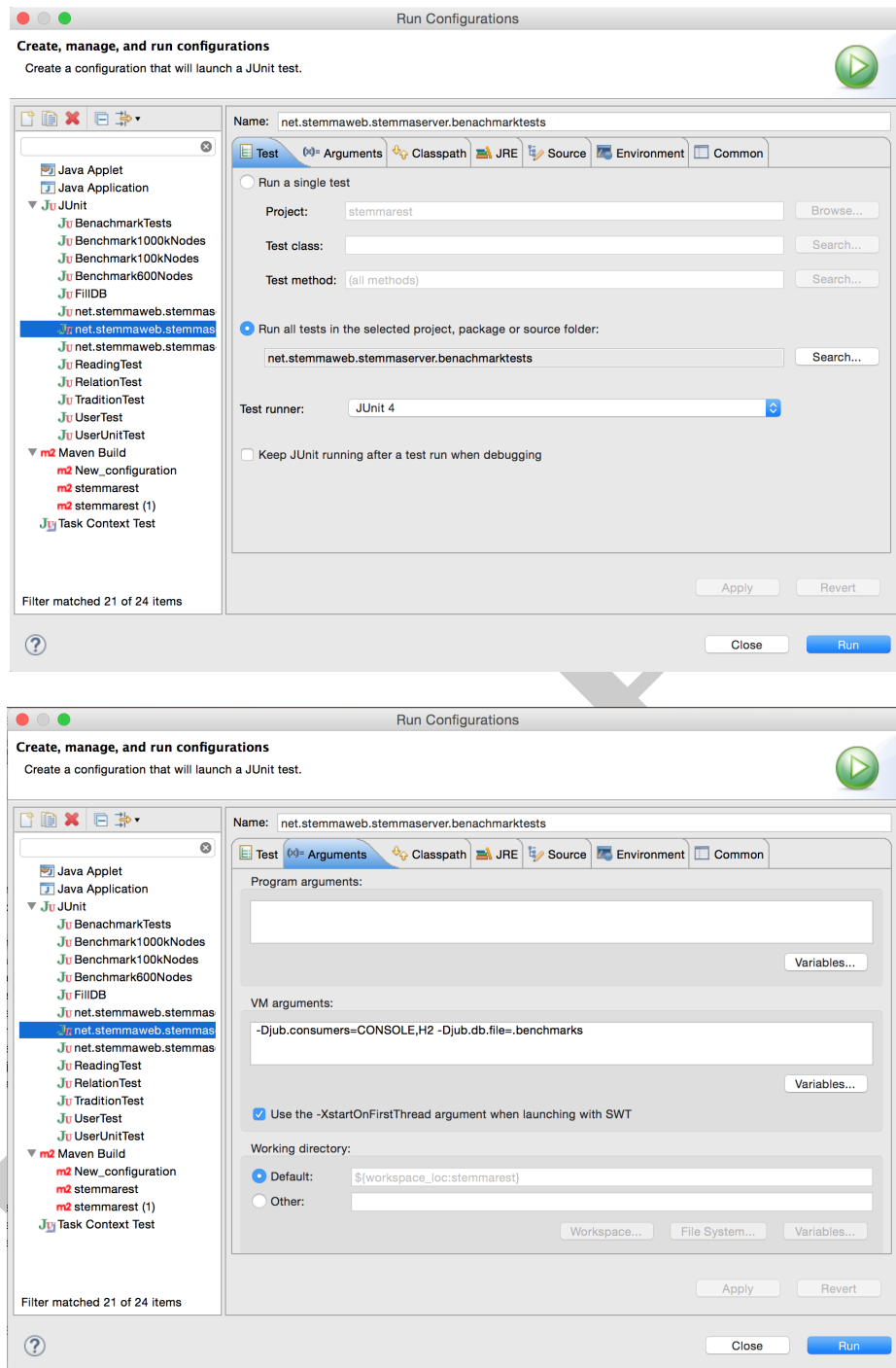
Tests are simply implemented in the `BenchmarkTests` class with the `@Test` annotation. It is best practice only to implement the restcall in this method and only test if `Response.Status` is OK. This assures that as less as possible overhead time is measured. And the integration- and JUnit tests should be done on a other place.

**R** JUnitBenchmarks measures the time to execute (`@Before`, `@Test`, `@After`). Heavy operations which should not be measured can be done in `@BeforeClass` and `@AfterClass`.

To create a new database test-environment copy the class `Benchmark600Nodes` and rename it to the count of Nodes that should be inserted. In the class itself only two small adjustments need to be done. First change the name of the report file `@BenchmarkMethodChart(filePrefix = "benchmark/benchmark-600Nodes")`. Second adjust the properties of the database which should be generated `rgg.role(db, 2, 1, 3, 100);. role(databaseService, cardinalityOfUsers, cardinalityOfTraditionsPerUser, cardinalityOfWitnessesPerTradition, degreeOfTheTraditionGraphs)`

## Run Benchmarktests

The Benchmarktests can be run as every JUnit test. But to generate the report an argument needs to be passed by. Create a JUnit Test as follows:



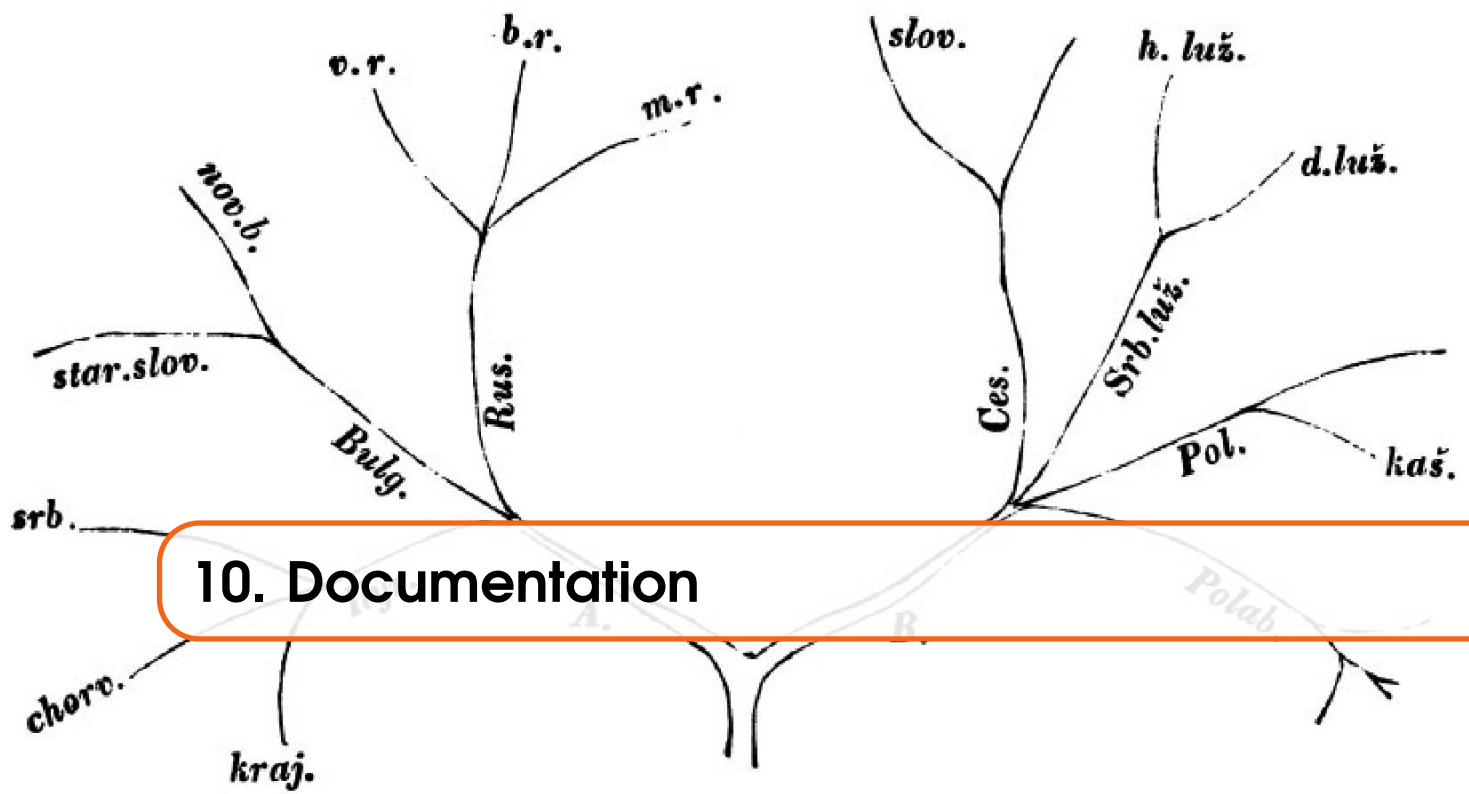
On the tab Arguments `-Djub.consumers=CONSOLE,H2 -Djub.db.file=.benchmarks` has to be inserted into the VM Arguments input. After the test can be run as usual. After the test execution the reports are stored under *benchmark/*.

- R The execution of the tests will take some time because of the generation of huge graphs. Its recommended not to use the computer during this tests.



# RESTful API

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## 10. Documentation

### 10.1 /user

**GET** /user

#### Summary

Returns a welcome message

#### Parameter

**Return** — SUCCESS. text/plain

"User!"

### 10.2 /user/create

**POST** /user/create

#### Summary

Creates a user.

#### Parameter application/json

{ "userId":<userId>, "isPublic":<isAdmin> }

**Return** — CREATED. application/json

{ "userId":<userId>, "isPublic":<isAdmin> }

**Return** — CONFLICT. application/json

Error: A user with this id already exists

### 10.3 /user/{id}

**GET** /user/{id}

### Summary

Returns the user as JSON Object

**Parameter URL**

Id: the user id

**Return — OK. application/json**

```
{ 'userId': <userId>, 'isAdmin': <isAdmin> }
```

*The information about the user*

**Return — NOT\_FOUND. application/json**

*The information about the user*

## 10.4 /user/traditions/{userId}

**GET** /user/traditions/{userId}

### Summary

List all Traditions of a user

**Parameter URL**

userId: the id of the user

**Return — OK. application/json**

```
{ "traditions": [ { "name": <traditionName> } ] }
```

**Return — NOT\_FOUND. application/json**

Error: A user with this id does not exist!

## 10.5 /textinfo/{textId}

**POST** /textinfo/{textId}

### Summary

Update the textInfo of a tradition.

**Parameter URL**

textId: the id of the tradition

**Parameter application/json**

```
{ 'name': <new_name>, 'language': <new_language>, 'isPublic': <is_public>, 'ownerId':  
<new_ownerId> }
```

**Return — SUCCESS. application/json**

```
{ 'name': <new_name>, 'language': <new_language>, 'isPublic': <is_public>, 'ownerId':  
<new_ownerId> }
```

*The new information of the tradition.*

**Return — CONFLICT. application/json**  
 "Error: A user with this id does not exist"  
*If the user does not exist.*

**Return — NOT\_FOUND. application/json**  
*If the tradition was not found.*

## 10.6 /tradition/witness/{tradId}

**GET** /tradition/witness/{tradId}

### Summary

List all Witness of a tradition

**Parameter URL**  
 tradId: the id of the tradition

**Return — OK. application/json**

**Return — NOT\_FOUND. application/json**  
 Error: A tradition with this id does not exist!

## 10.7 /tradition/new

**POST** /tradition/new

### Summary

Create a new tradition.

**Parameter text/plain**  
 name: The name of the tradition

**Parameter multipart/form-data**  
 language: The language of the tradition  
 public: 0 if the tradition is not public 1 if the tradition is public  
 name: The name of the tradition  
 file: multipart file input stream

**Return — CONFLICT. application/json**  
 "Error: No user with this id exists"

**Return — INTERNAL\_SERVER\_ERROR. application/json**  
 "Error: Tradition could not be imported!" *If the server was not able to parse the input file*

**Return — OK. application/json**  
 "Tradition imported successfully"

## 10.8 /tradition/get/{tradId}

**GET** /tradition/get/{tradId}



### Summary

Get a graphml of a tradition

**Parameter URL**

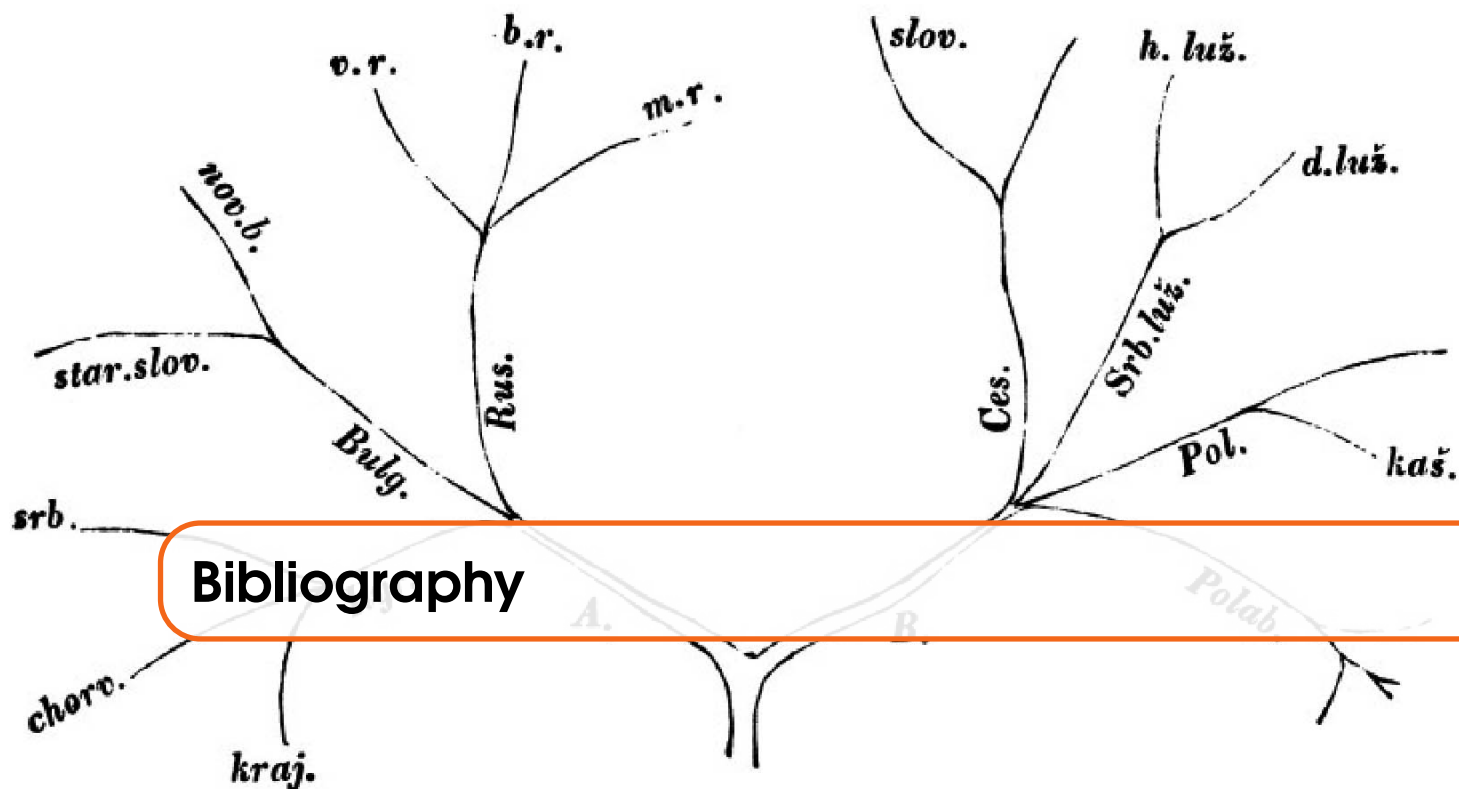
tradId: the id of the tradition

**Return — OK.** application/xml

**Return — NOT\_FOUND.** application/json

Error: A tradition with this id does not exist!

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## Bibliography

Books  
Articles