

ODE README

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1 About

ODE (Output DEsigner) is a system for rapid development of large-scale rule bases for template-based natural language generation for conversational agents.

It was developed in the context of ALIZ-E, a project that was carried out jointly by the German Research Center for Artificial Intelligence (DFKI) and a number of European partners.

2 Setting up

2.1 Dependencies

ODE requires:

- **Java SDK 7** (Oracle JDK 7 or OpenJDK 7). It has not been tested with Java 8, although newer versions of play! (the MVC framework on which ODE is built) seem to be Java 8-ready.
- **play-2.2.1**
- **neo4j-community-2.1.2** (bundled with this distribution of ODE).
- **Twitter Bootstrap v3.0.2** (minified version bundled with this distribution of ODE).
- **jQuery v1.11.0** (minified version bundled with this distribution of ODE).
- **jQuery UI v1.10.4** (minified version bundled with this distribution of ODE).
- **Underscore.js v1.5.2** (minified version bundled with this distribution of ODE).
- **Backbone.js v1.1.0** (minified version bundled with this distribution of ODE).

Dependency	Version	Bundled	Setup required
Java SDK	7	no	yes
play!	2.2.1	no	yes
Neo4j	2.1.2	yes	yes
Twitter Bootstrap	3.0.2	yes (minified)	no
jQuery	1.11.0	yes (minified)	no
jQuery UI	1.10.4	yes (minified)	no
Underscore.js	1.5.2	yes (minified)	no
Backbone.js	1.1.0	yes (minified)	no

2.2 Initial setup

Follow these steps to prepare your environment for working on ODE:

1. Install **Java SDK 7**.
2. If you haven't done so already, clone the ODE repository from GitHub:

```
git clone https://github.com/itsjeyd/ODE
```

3. Extract `deps/neo4j-community-2.1.2-unix.tar.gz`.
4. Load initial data:

```
cd /path/to/neo4j-community-2.1.2/  
bin/neo4j-shell -path data/graph.db/ -file /path/to/this/repo/initial-data.cql
```

The output of the second command should look like this:

```
+-----+  
| n                                           |  
+-----+  
| Node[0]{username:"dev@ode.com",password:"password"} |  
+-----+  
1 row  
Nodes created: 1  
Properties set: 2  
Labels added: 1  
1880 ms  
  
+-----+  
| n                                           |  
+-----+  
| Node[1]{name:"underspecified"} |  
+-----+  
1 row  
Nodes created: 1  
Properties set: 1  
Labels added: 1  
36 ms
```

5. Download play! (Version 2.2.1) from [here](#) and extract it. Make sure you choose a location to which you have both read and write access.
6. Make sure that the `play` script is executable:

```
cd /path/to/play-2.2.1/  
chmod a+x play  
chmod a+x framework/build
```

7. Add directory of `play` executable to your `PATH`:

```
export PATH=$PATH:/path/to/play-2.2.1/
```

Add this code to your `.bashrc`, `.zshrc`, etc. to make the modification permanent.

2.3 Daily workflow

2.3.1 Before

1. Start Neo4j:

```
cd /path/to/neo4j-community-2.1.2/  
bin/neo4j start-no-wait
```

2. Start `play`!:

```
cd /path/to/this/repo/ode/  
play
```

3. Run application (from `play` console):

```
run
```

4. Access application by navigating to `http://localhost:9000/` in your browser.

When you do this for the first time you will also need to perform the following steps:

- (a) Click the “Login” button in the top-right corner
- (b) Enter credentials:
 - Email: `dev@ode.com`
 - Password: `password`

As you make changes to the code, refreshing the current page in the browser will cause `play` to recompile the project. Note that compilation will only be triggered after changes to (server-side) code that actually *needs* to be compiled. Modifying client-side code will not trigger compilation.

2.3.2 After

1. Stop application (from play console): `Ctrl-D`
2. Stop Neo4j:

```
cd /path/to/neo4j-community-2.1.2/  
bin/neo4j stop
```

2.3.3 Accessing Neo4j directly

You can access the graph database directly by navigating to `http://localhost:7474/browser/` in your browser. This gives you a graphical interface for entering Cypher commands to interact with the database.

Neo4j also comes with a command line interface (“Neo4j Shell”) for interacting with databases. After stopping the database as described above you can issue the following command to start the shell:

```
bin/neo4j-shell -path data/graph.db/
```

More information about how to work with the Neo4j Shell can be found [here](#).

3 Project Structure

```
.  
├── .git  
├── deps  
├── doxygen  
├── ode  
├── training-materials  
├── initial-data.cql  
├── README.org  
├── README.pdf  
└── README.tex
```

3.1 deps

```
deps/  
└── neo4j-community-2.1.2-unix.tar.gz
```

This folder contains third-party software that ODE depends on.

3.2 doxygen

```
doxygen/  
├── Doxyfile  
└── html.tar.gz
```

This folder contains documentation for server-side code in HTML format. After extracting `html.tar.gz`, the entry point for viewing the documentation is `html/index.html`. A graphical representation of the class hierarchy is available under `html/inherits.html`.

To regenerate the documentation after modifying the source code, run the following commands:

```
cd /path/to/this/repo/doxygen
doxygen Doxyfile
```

Note that this will overwrite the contents of the `html` folder that contains the documentation extracted from `html.tar.gz`.

On many Linux distributions, Doxygen can be installed from official package repositories. It can also be built from source on Unix and Windows as described here. The documentation bundled with this distribution of ODE was generated using Doxygen 1.8.9.

3.3 ode

```
ode/
├── app
├── conf
├── logs
├── project
├── public
├── test
├── build.sbt
└── README
```

This folder contains the complete source code of ODE. While extending ODE you will mostly be working with files located in the `app`, `public`, and `test` directories.

3.3.1 app

```
ode/app/
├── constants
├── controllers
├── managers
├── models
├── neo4play
├── utils
├── views
└── Global.java
```

constants: Enums that define **node and relationship types**.

controllers: Classes that implement **methods for handling user requests**. Each controller method is associated with a specific type of HTTP request (GET, POST, PUT, DELETE) and URL (cf. Section 3.3.2 below).

managers: Classes that **handle communication with the database access layer**.

Each model class has a static **nodes** field or a static **relationships** field that stores a reference to an appropriate Manager object. Managers **implement appropriate CRUD (Create, Read, Update, Delete) methods** for obtaining and operating on model data. When handling user requests, controllers call these methods via the **nodes** and **relationships** fields of relevant model classes.

models: **Classes representing domain entities** (such as rules, features, and values) **and relationships** between them.

neo4play: Classes that implement a custom **database access layer** for communicating with Neo4j.

utils: **Utility classes** for manipulating strings and generating Version 3 and Version 4 UUIDs. Any additional utility classes that you implement should be added to this folder.

views: **Server-side templates** for rendering different user interfaces. Controllers will inject relevant data into these templates when users request corresponding interfaces. Note that most rendering operations actually happen on the client; the templates in this folder only provide basic scaffolding for the different interfaces that are part of the current implementation.

Global.java: Defines **custom global settings** for ODE. Currently, the **Global** class defines how ODE should behave for different types of errors.

3.3.2 conf

```
ode/conf/
├── application.conf
└── routes
```

This folder contains configuration files for ODE.

application.conf is the main configuration file; it contains standard configuration parameters. You should not have to touch this file very often during day-to-day development.

routes defines mappings between pairs of the form **<HTTP-verb> <URL>** and controller methods:

```
# Home page
GET      /                               controllers.Application.home()

# Authentication
POST     /register                       controllers.Auth.register()
GET      /login                         controllers.Application.login()
POST     /login                         controllers.Auth.authenticate()
GET      /logout                        controllers.Application.logout()
```

```
# Browsing
GET      /rules                controllers.Rules.browse()
GET      /rules/:name          controllers.Rules.details(name: String)

...
```

Every time you add a new controller method that renders an additional interface or serves as an endpoint for AJAX requests, you have to define a URL for it in this file.

3.3.3 logs

```
ode/logs/
└─ application.log
```

This folder contains log files produced by ODE. By default, all logging output is written to `application.log`.

3.3.4 project

```
ode/project/
├─ build.properties
└─ plugins.sbt
```

play! applications are built using `sbt` (Scala Build Tool). This folder contains the `sbt` build definitions; `plugins.sbt` defines `sbt` plugins used by ODE, and `build.properties` contains the `sbt` version to use for building the application.

You should not have to touch the files in this folder very often during day-to-day development.

3.3.5 public

```
ode/public/
├─ css
│   ├── lib
│   │   └─ bootstrap.min.css
│   ├── browse.css
│   ├── details.css
│   ├── features.css
│   ├── input.css
│   ├── main.css
│   ├── output.css
│   └─ search.css
├─ fonts
│   └─ ...
├─ images
│   └─ ...
└─ js
```



```

├── lib
│   ├── backbone-min.js
│   ├── bootstrap.min.js
│   ├── jquery.min.js
│   ├── jquery-ui.min.js
│   └── underscore-min.js
├── browse.js
├── combinations.js
├── details.js
├── error.js
├── features.js
├── header.js
├── input.js
├── ode.js
├── output.js
└── search.js

```

This folder contains code that implements client-side functionality of ODE. The following table shows associations between routes, controller methods, server-side templates, and corresponding client-side code (CSS and JavaScript):

Route	Controller	Template	CSS	JS
GET /	Application.home	home.scala.html	-	-
GET /rules	Rules.browse	browse.scala.html	browse.css	browse.js
GET /rules/:name	Rules.details	details.scala.html	details.css	details.js
GET /features	Features.features	features.scala.html	features.css	features.js
GET /rules/:name/input	Rules.input	input.scala.html	input.css	input.js
GET /rules/:name/output	Rules.output	output.scala.html	output.css	output.js
GET /search	Search.search	search.scala.html	search.css	search.js

Each of the JS modules listed above makes use of a number of utility functions for

- operating on strings
- creating new DOM elements
- operating on existing DOM elements.

These functions are defined in the `ode.js` module.

3.3.6 test

```

ode/test/
├── controllers

```

```

├── managers
├── models
├── neo4play
├── utils
├── views
└── IntegrationTest.java

```

This folder contains tests for server-side functionality of ODE. Its structure parallels the structure of the **app** folder: Tests for controllers are located in the **controllers** folder, tests for utilities are located in the **utils** folder, etc.

To run the test suite:

```

cd /path/to/this/repo/ode/
play test

```

You can also run the tests from the **play** console. The sequence of commands then becomes:

```

cd /path/to/this/repo/ode/
play
test

```

3.3.7 build.sbt

This file contains the main build declarations for ODE.

3.4 training-materials

```

training-materials/
├── assignment
│   ├── assignment.html
│   ├── gold-standard
│   │   ├── input.org
│   │   └── output.org
│   ├── reference.pdf
│   └── reference.tex
├── css
│   └── ...
├── js
│   └── ...
├── questionnaire
│   ├── answers
│   │   └── data.json
│   ├── persist.php
│   └── questionnaire.html
├── sounds
│   └── ...

```

```

├── training
│   ├── 00-intro.html
│   ├── 01-create_rule.html
│   ├── 02-add_feature.html
│   ├── 03-set_value.html
│   ├── 04-remove_feature.html
│   ├── 05-rename_rule.html
│   ├── 06-change_description.html
│   ├── 07-switching.html
│   ├── 08-add_output_string.html
│   ├── 09-modify_output_string.html
│   ├── 10-remove_output_string.html
│   ├── 11-split_output_string.html
│   ├── 12-add_part.html
│   ├── 13-show_output.html
│   ├── 14-modify_part.html
│   ├── 15-remove_part.html
│   ├── 16-add_slot.html
│   ├── 17-remove_slot.html
│   ├── 18-parts_inventory.html
│   ├── 19-multiple_groups.html
│   └── 20-browse_rules.html
├── intermission.html
└── overview.html

```

This folder contains materials that can be used to train novice users to use ODE (and to gather feedback about the system). The entry point for starting the training process is `overview.html`.

Feedback submitted via the questionnaire will be stored in `data.json`. **Note** that in order for this to work,

1. a web server (such as Apache) has to serve the file `persist.php` at `http://localhost/persist.php`
2. the user under which the web server is running must have write access to `data.json`.

Additionally, as a preparatory step the string `/path/to/this/repo/` in line 8 of `persist.php` has to be replaced with the absolute path of this repository.

3.4.1 Data

In order to use the training materials *as is*, you'll need to prepopulate a fresh database instance (i.e., an instance that only contains nodes listed in `initial-data.sql`) with the data shown below.

If you need to add this data to many different Neo4j instances, you can create a `.cql` script (or simply extend `initial-data.sql`) and load it as described in Section 2.2 above.

Features

name	description	type
About	What is the current SpeechAct about?	atomic
ChildGender	Stores the gender of the current user.	atomic
ChildName	Stores the name of the current user.	atomic
CurrentGame	Stores the game that the agent and the user are currently playing.	atomic
Encounter	Is this the first encounter between the agent and the current user or have they met before?	atomic
Familiarity	Is the agent familiar with the current user?	atomic
GameQuiz	Is this the first time the agent and the current user are playing the quiz game or have they played it before?	atomic
SpeechAct	Type of utterance to perform (e.g. greeting, request)	atomic

Values

name
Emilia
Marco
answer
answerRetry
apologize
closing
dance
female
first
fun
greeting
imitation
male
no
notfirst
play
quiz
request
underspecified
unknown
yes

Note that if you use ODE to populate the DB manually, you do *not* need to create the **underspecified** value yourself: initial-data.sql already contains an appropriate Cypher query for

adding this node. Just make sure you load it as described in Section 2.2 above *before* creating any features.

Associations between features and values

Feature	Permitted values
About	underspecified, fun, play, answerRetry, answer
ChildGender	underspecified, unknown, female, male
ChildName	underspecified, unknown, Marco, Emilia
CurrentGame	underspecified, quiz, imitation, dance
Encounter	underspecified, notfirst, first
Familiarity	underspecified, no, yes
GameQuiz	underspecified, notfirst, first
SpeechAct	underspecified, closing, apologize, request, greeting

Note that if you use ODE to populate the DB manually, you do *not* need to add the **underspecified** value to the list of permitted values for each feature yourself: For each atomic feature you create, ODE automatically sets up a relationship between the feature in question and the **underspecified** value.

Rules

name	description	LHS	RHS
@firstEncounter	Agent meets someone for the first time.	(1)	(2)

(1) LHS

Feature	Value
SpeechAct	greeting
Encounter	first
Familiarity	no

(2) RHS

- Group 1:

Slot 1	Slot 2	Slot 3
Hi,	how are you?	I am Nao.
Hey,		My name is Nao.
Hello,		

- Group 2:

Slot 1	Slot 2
Hola!	What's up?
Hey there!	Nice to meet you.

4 Resources

4.1 play!

- Documentation for play-2.2.x: <https://playframework.com/documentation/2.2.x/Home>
- Deployment: <https://playframework.com/documentation/2.2.x/Production>
- Java API for play-2.2.x: <https://playframework.com/documentation/2.2.x/api/java/index.html>

4.2 Neo4j

- Manual for Neo4j v2.1.2: <http://neo4j.com/docs/2.1.2/>
- Cypher Query Language: <http://neo4j.com/docs/2.1.2/cypher-query-lang.html>

4.3 JS + CSS Frameworks

- Twitter Bootstrap: <http://getbootstrap.com/>
 - CSS: <http://getbootstrap.com/css/>
 - UI components: <http://getbootstrap.com/components/>
 - JavaScript: <http://getbootstrap.com/javascript/>
- jQuery: <https://api.jquery.com/>
- jQuery UI: <http://api.jqueryui.com/>
- Backbone.js: <http://backbonejs.org/>
- Underscore.js: <http://underscorejs.org/>

4.4 ODE

In addition to this README, you can consult the following resources for in-depth information about ODE:

- “A System for Rapid Development of Large-Scale Rule Bases for Template-Based NLG for Conversational Agents” (Krones 2014) (BibTeX, PDF)
 - Part III (chapters 6-7): System Architecture + Technologies
 - Part IV (chapters 9-10), Appendix A: Data Models

- Part V (chapters 11-15): User-Facing Functionality
- Part VII (chapter 21): Future Work
- Appendix B: Algorithms
- Documentation generated with Doxygen
 - Searchable lists of packages, classes, files
 - Alphabetical index of classes
 - Textual and graphical class hierarchy
 - Alphabetical index of class members (with links to classes to which they belong)
 - Collaboration diagrams for individual classes
 - Call and caller graphs for member functions
 - Ability to jump to definitions of class members
- `git` commit messages associated with this repository

4.5 Other

- Doxygen manual: <http://www.stack.nl/~dimitri/doxygen/manual/index.html>
- Git:
 - Pro Git
 - Git Reference
 - Git Quick Reference
 - Git Cheatsheet
 - tryGit

5 Contact Information

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