



# Nurse Rostering Web Installation & Demonstration User Guide

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## Prepared for NUS-ISS Master of Technology in Intelligent Systems ISY5001 Reasoning System Group Project

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## 1.0 System Overview

Hospitals face planning problems: providing products or services with a limited set of constrained resources (employees, assets, time and money). One such planning problem is nurse shift rostering: assigning shifts to nurses. Nurse Rostering Web is a web application and REST service that solves nurse shift rostering problems using the OptaPlanner engine.

### 1.1 User Interface

The front-end system is built with Google Web Toolkit(GWT).

## 2.0 Requirements

### 2.1 Recommended Browsers

Nurse Rostering Web demonstration supports the following web browsers:

- Internet Explorer 11
- Microsoft Edge 39 and above
- Firefox 53 and 52 ESR and above
- Google Chrome Version 59 and above
- Safari Version 10 and above

## 3.0 Deployment

Our system is capable of running on both Windows or Linux Systems. To demonstrate, we will only deploy in ISS Virtual Machine.

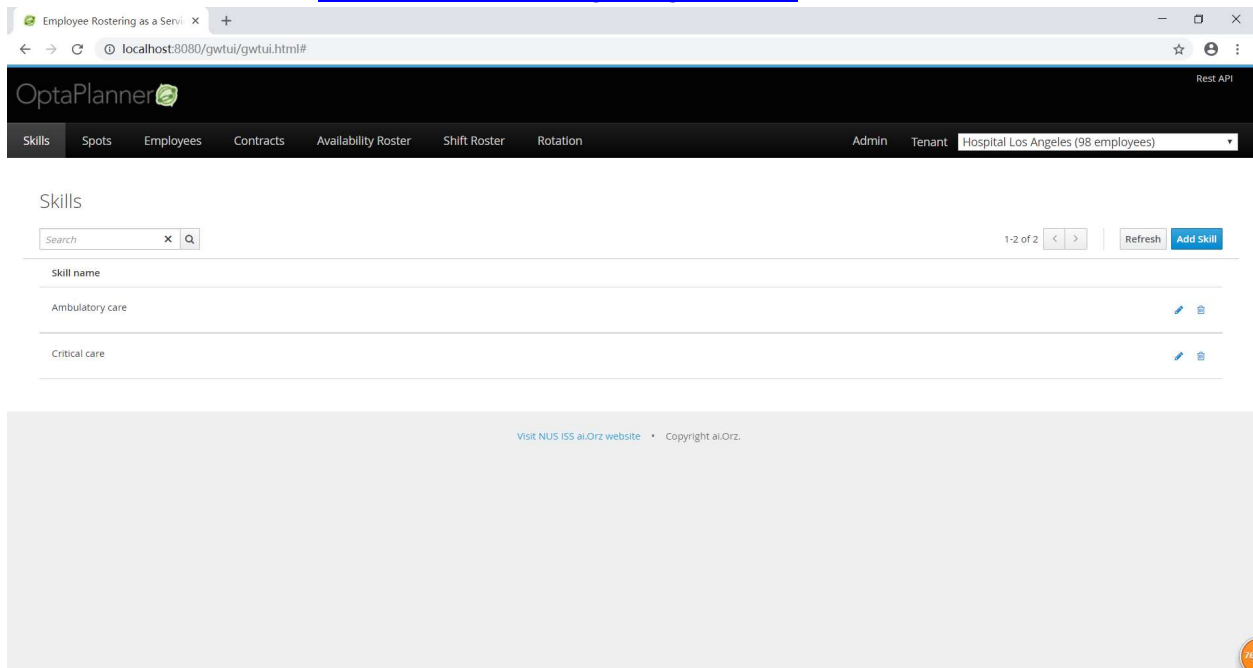
### 3.1 Setup the Nurse Rostering Web project in IntelliJ

1. Download source code from URL: <https://github.com/gu-lijian/IRS-RS-2019-03-09-IS1PT-GRP-ai.Orz-NurseRosteringWeb.git>
2. Download Jboss Wildfly 14.0.1.Final from: <https://wildfly.org/downloads/>
3. Import from optaweb-employee-rostering-master/pom.xml into IntelliJ as project
4. Do a clean build (mvn clean install) on both employee-rostering-webapp and optaweb-employee-rostering-master
5. CodeServer run configuration: In IntelliJ(Run -> Edit Configurations -> Add New Configuration -> Maven) and set following parameters
  - a. Working directory: /absolute/path/optaweb-employee-rostering
  - b. Command line: gwt:codeserver
6. AppServer run configuration: In IntelliJ(Run -> Edit Configurations -> Add New Configuration -> Jboss Local)

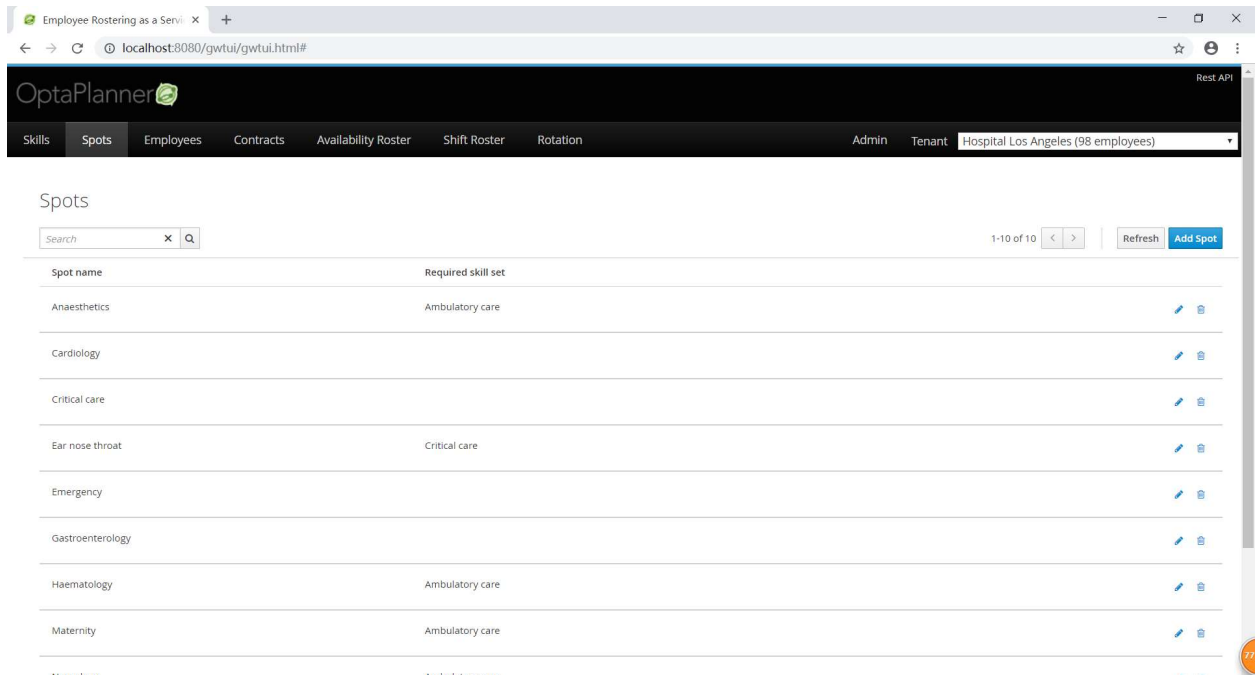
- a. Configure the Application server field to point to a local WildFly 14 installation downloaded in step2
  - b. Click Fix button at the bottom of the dialogue and select optaweb-employee-rostering-webbab:war exploded
  - c. Remove any steps that were automatically added to the Before launch phase.
  - d. Configure JavaScript debugger:
    - i. Check After launch and select Chrome browser.
    - ii. Check with JavaScript debugger.
    - iii. Set start page to <http://localhost:8080/gwtui/gwtui.html>.
    - iv. Set both On Update action and On frame deactivation to Update classes and resources.
  7. Run the CodeServer configuration in normal mode
  8. Run the AppServer configuration in normal mode.
- If something goes wrong, do a clean build and click Maven Projects > Reimport All Maven Projects.

## 4.0 Walkthrough

After you run both CodeServer and AppServer chrome will automatically open, if not please open chrome and access url: <http://localhost:8080/gwtui/gwtui.html>



Maintain skill sets for nurses



Employee Rostering as a Service

localhost:8080/gwtui/gwtui.html#

OptaPlanner

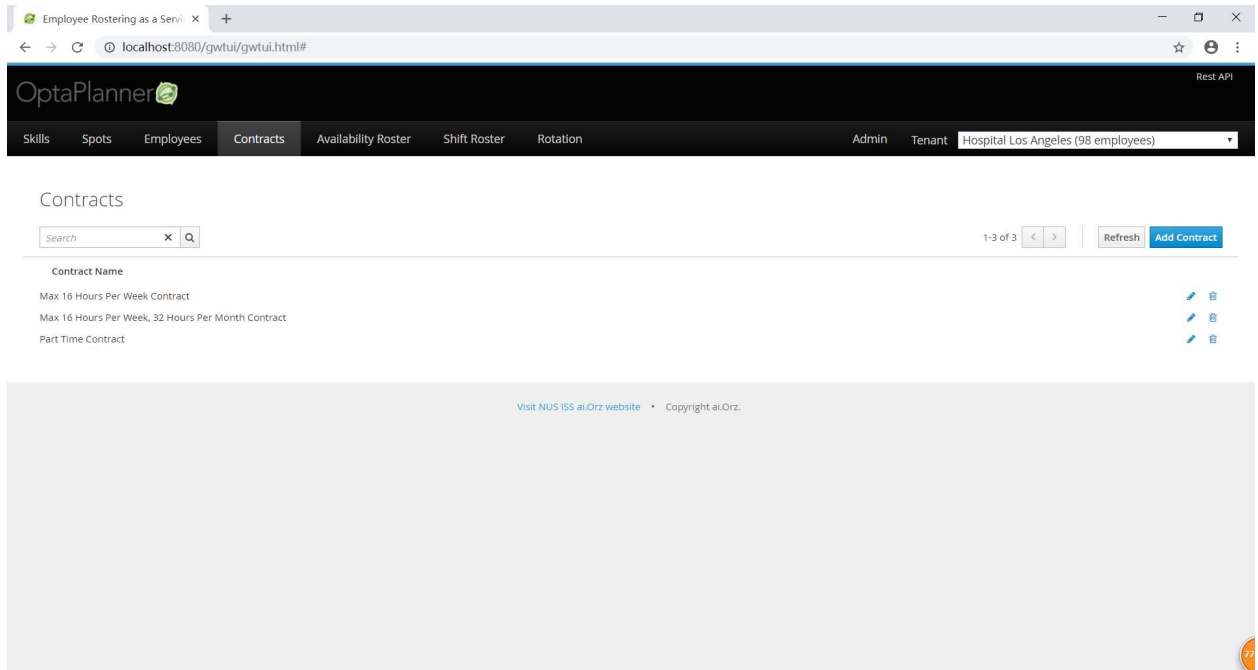
Skills Spots Employees Contracts Availability Roster Shift Roster Rotation Admin Tenant Hospital Los Angeles (98 employees)

Spots

Search 1-10 of 10 Refresh Add Spot

| Spot name        | Required skill set |
|------------------|--------------------|
| Anaesthetics     | Ambulatory care    |
| Cardiology       |                    |
| Critical care    |                    |
| Ear nose throat  | Critical care      |
| Emergency        |                    |
| Gastroenterology |                    |
| Haematology      | Ambulatory care    |
| Maternity        | Ambulatory care    |

Maintain spots which require different skill sets



Employee Rostering as a Service

localhost:8080/gwtui/gwtui.html#

OptaPlanner

Skills Spots Employees Contracts Availability Roster Shift Roster Rotation Admin Tenant Hospital Los Angeles (98 employees)

Contracts

Search 1-3 of 3 Refresh Add Contract

| Contract Name                                      |
|--|
| Max 16 Hours Per Week Contract                     |
| Max 16 Hours Per Week, 32 Hours Per Month Contract |
| Part Time Contract                                 |

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Maintain contracts

Employee Rostering as a Servi x +

localhost:8080/gwtui/gwtui.html#

OptaPlanner Rest API

Skills Spots Employees Contracts Availability Roster Shift Roster Rotation Admin Tenant Hospital Los Angeles (98 employees)

Employees

Search x Q

1-10 of 98 Refresh Add Employee

| Employee name | Skill set                      | Contract           |
|---------------|--------------------------------|--------------------|
| Amy Cole      | Ambulatory care, Critical care | Part Time Contract |
| Amy Fox       |                                | Part Time Contract |
| Amy Green     | Ambulatory care, Critical care | Part Time Contract |
| Amy Jones     | Ambulatory care, Critical care | Part Time Contract |
| Amy King      | Critical care                  | Part Time Contract |
| Amy Li        | Ambulatory care, Critical care | Part Time Contract |
| Amy Poe       | Ambulatory care, Critical care | Part Time Contract |
| Amy Rye       | Ambulatory care, Critical care | Part Time Contract |

Maintain nurse employees with different skills and contracts

Once user clicks “Process To Assess” button, the system will prompt 7 fields for user to key in. Shown below:

Employee Rostering as a Servi x +

localhost:8080/gwtui/gwtui.html#

OptaPlanner Rest API

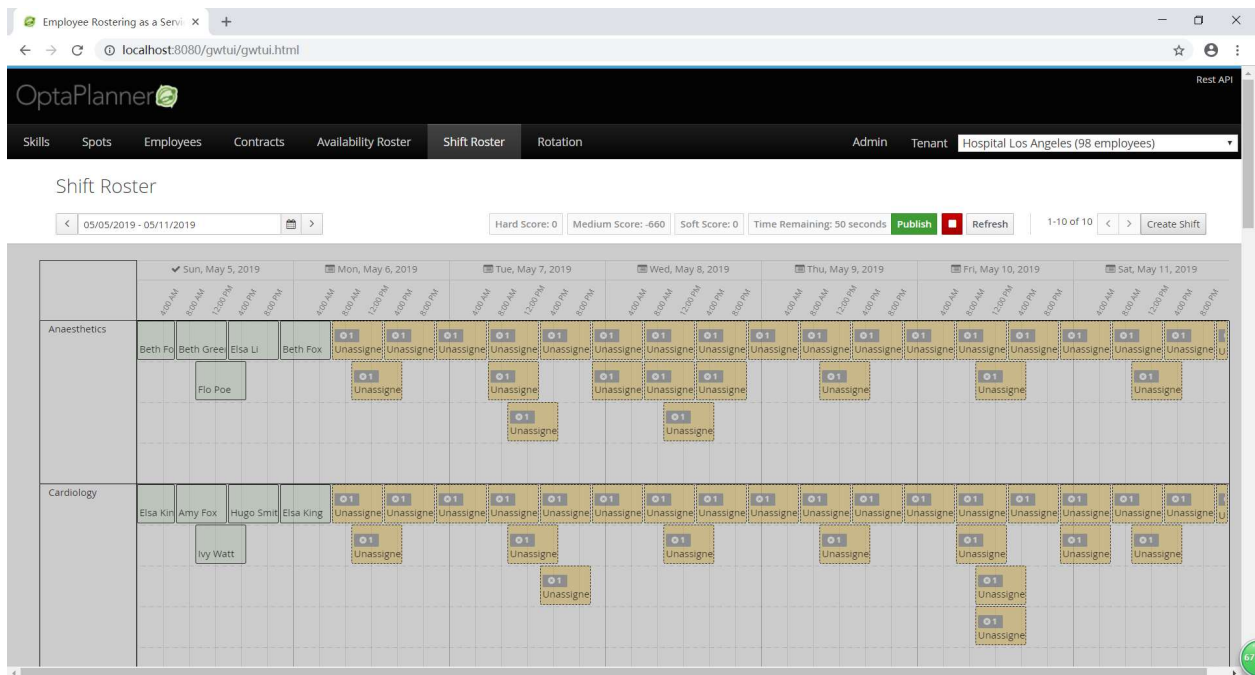
Skills Spots Employees Contracts Availability Roster Shift Roster Rotation Admin Tenant Hospital Los Angeles (98 employees)

Availability Roster

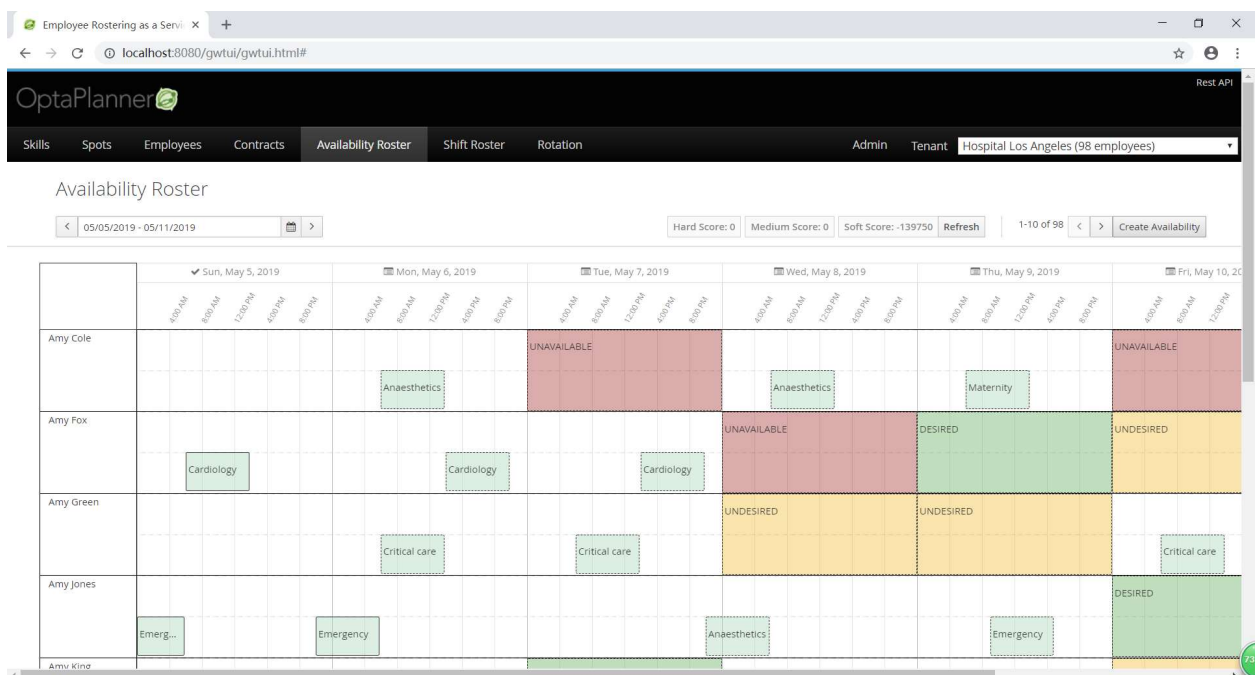
05/05/2019 - 05/11/2019 Hard Score: 0 Medium Score: -660 Soft Score: 0 Refresh 1-10 of 98 Create Availability

|           | Sun, May 5, 2019 | Mon, May 6, 2019 | Tue, May 7, 2019 | Wed, May 8, 2019 | Thu, May 9, 2019 | Fri, May 10, 2019 | Sat, May 11, 2019 |
|-----------|------------------|------------------|------------------|------------------|------------------|-------------------|-------------------|
| Amy Cole  |                  |                  | UNAVAILABLE      |                  |                  | UNAVAILABLE       |                   |
| Amy Fox   | Cardiol...       | UNAVAILABLE      |                  | UNAVAILABLE      | DESIRED          | UNDESIRE          | UNAVAILABLE       |
| Amy Green |                  |                  |                  | UNDESIRE         | UNDESIRE         |                   |                   |
| Amy Jones | Emer...          | Emerge...        |                  |                  |                  | DESIRED           |                   |
| Amy King  | Ear n...         | Ear nos...       | DESIRED          |                  |                  | UNDESIRE          |                   |
| Amy Li    |                  |                  |                  |                  |                  |                   |                   |

Maintain nurse employees DayDesired, DayUndesired, DayUnavailable, ShiftDesired, ShiftUndesired, ShiftUnavailable(click block to specify start and end time for shift)

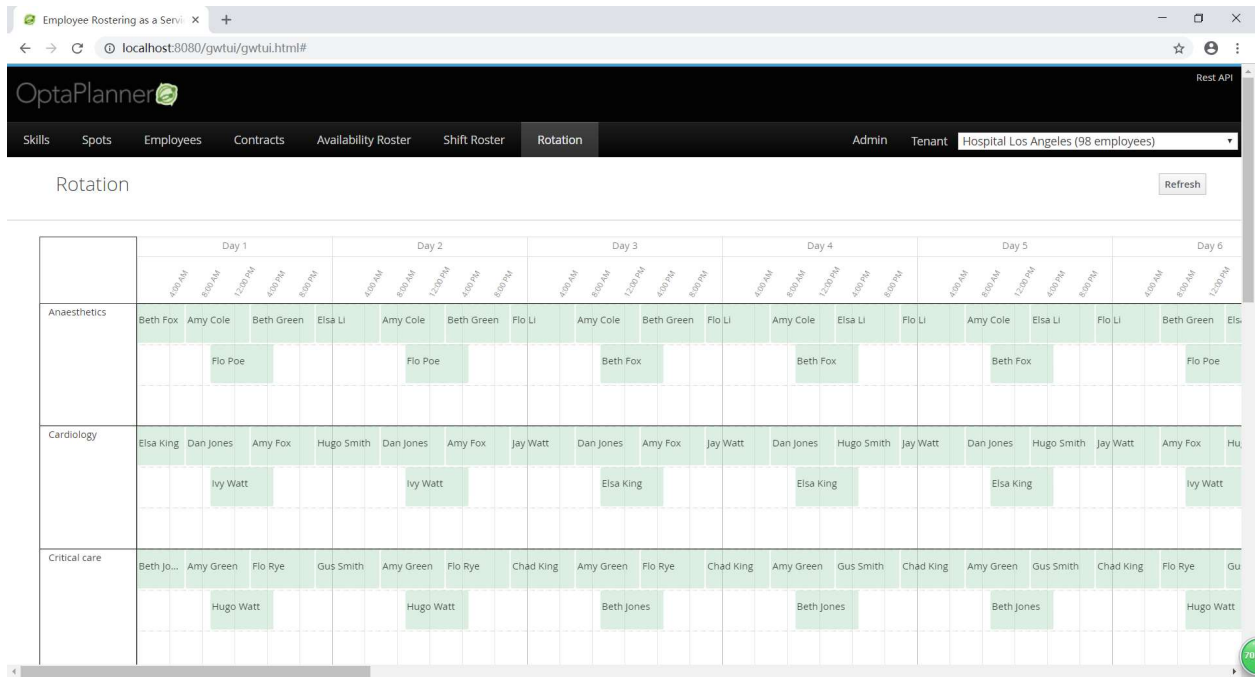


Click Schedule to calculate the new shift roster based after updated with employ Day and Shift desired info, by default optaplanner solver will calculate for 60 seconds



Employee view of rotation info

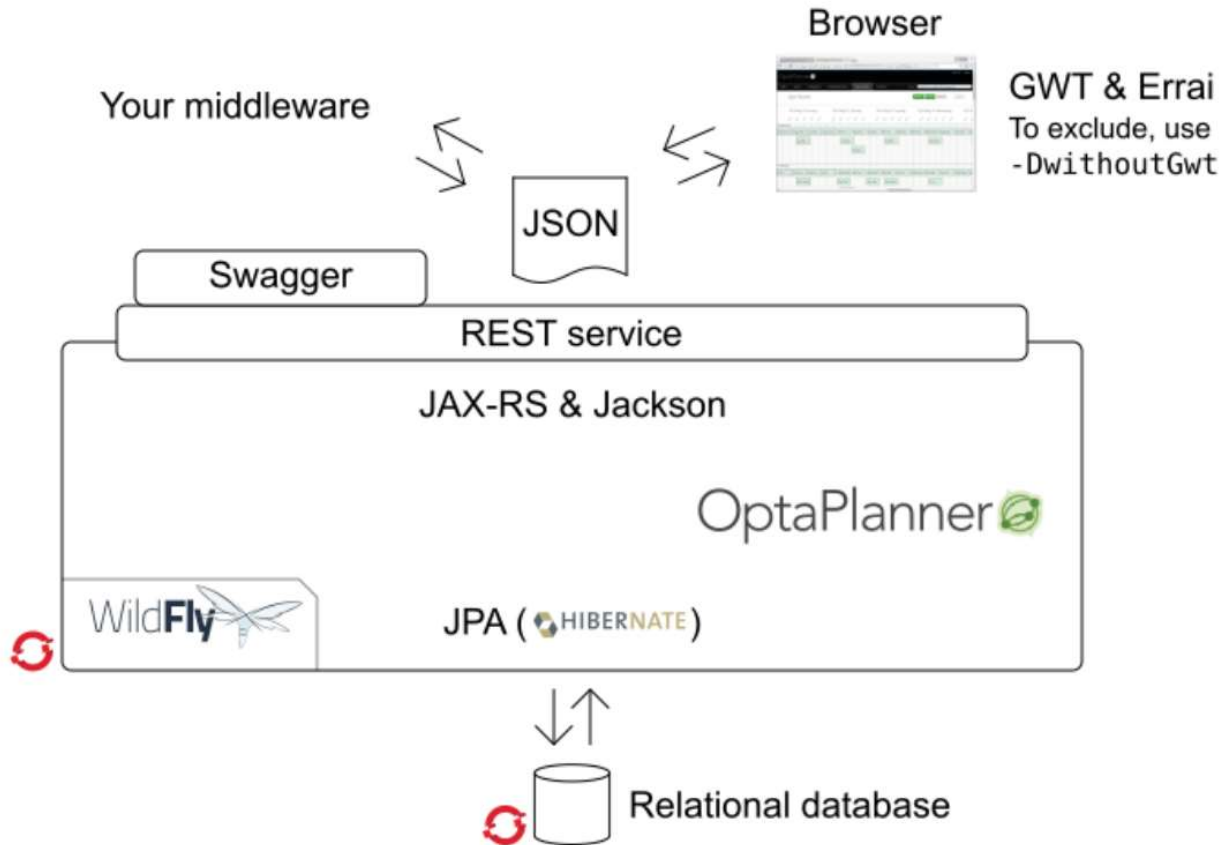




Spot view of rotation info

## 5.0 Architecture

Use the powerful REST interface or the user friendly web interface.



## 6.0 Class Diagram

