NLP as a Service – Technical Documentation

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1. Introduction

This document provides additional information regarding the technical details of the P2T and T2P webservices described in the BPM 2021 resource paper [1]. This documentation is for both domain users who only want to access the publicly deployed webservices and developers who want to integrate the P2T and T2P webservices into their own application, adapt the source code and/or deploy a tailored, on-premises version of the webservices.

2. Infrastructure

The source code for both webservices is hosted on GitHub under https://github.com/tfreytag/P2T and https://github.com/tfreytag/T2P, respectively. Both applications require at least Java version 11, the Springboot framework [2], and Maven [3] as build tool. The Jenkins-based pipelines for both services build an associated Docker image and push the image to DockerHub.

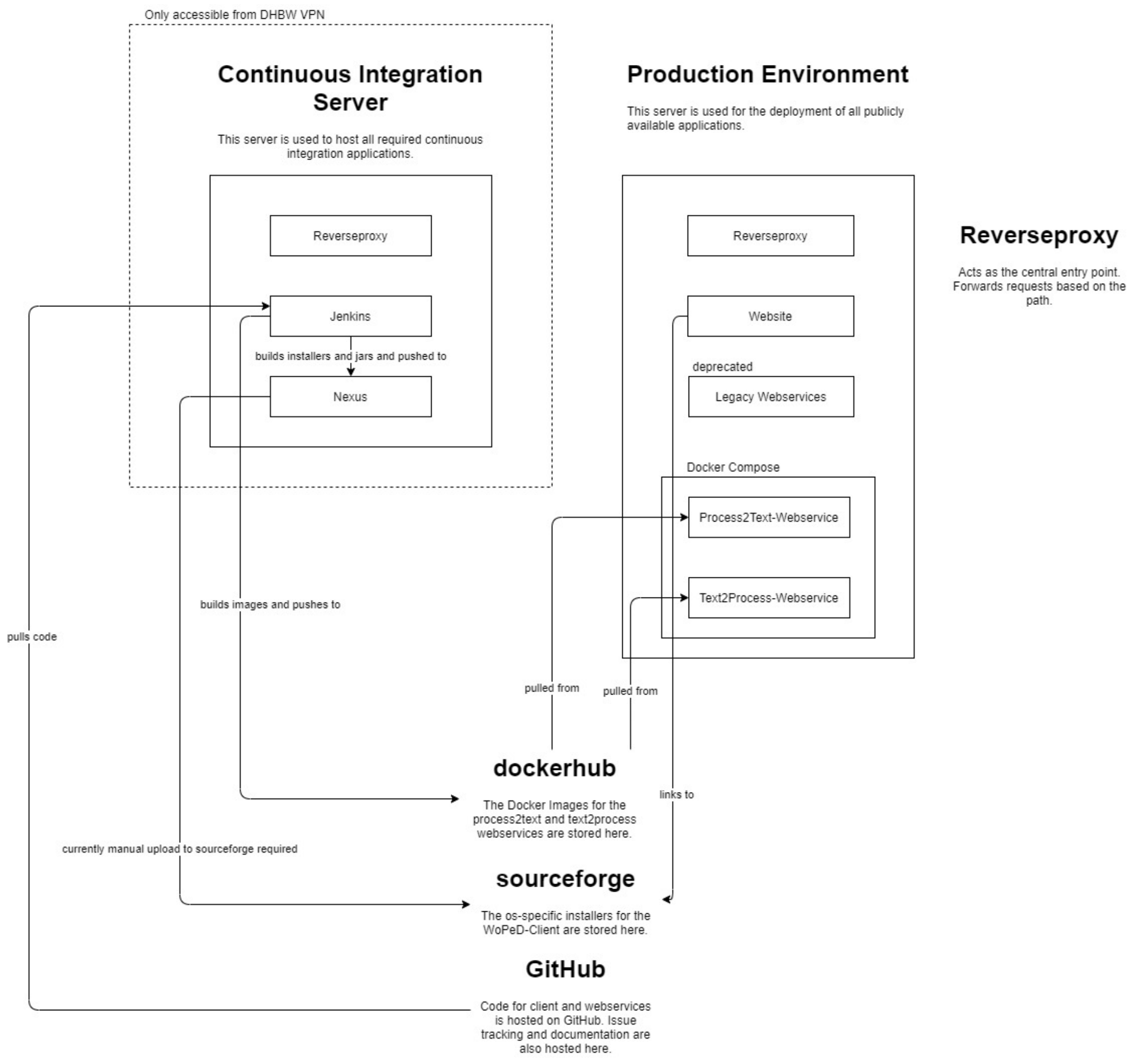
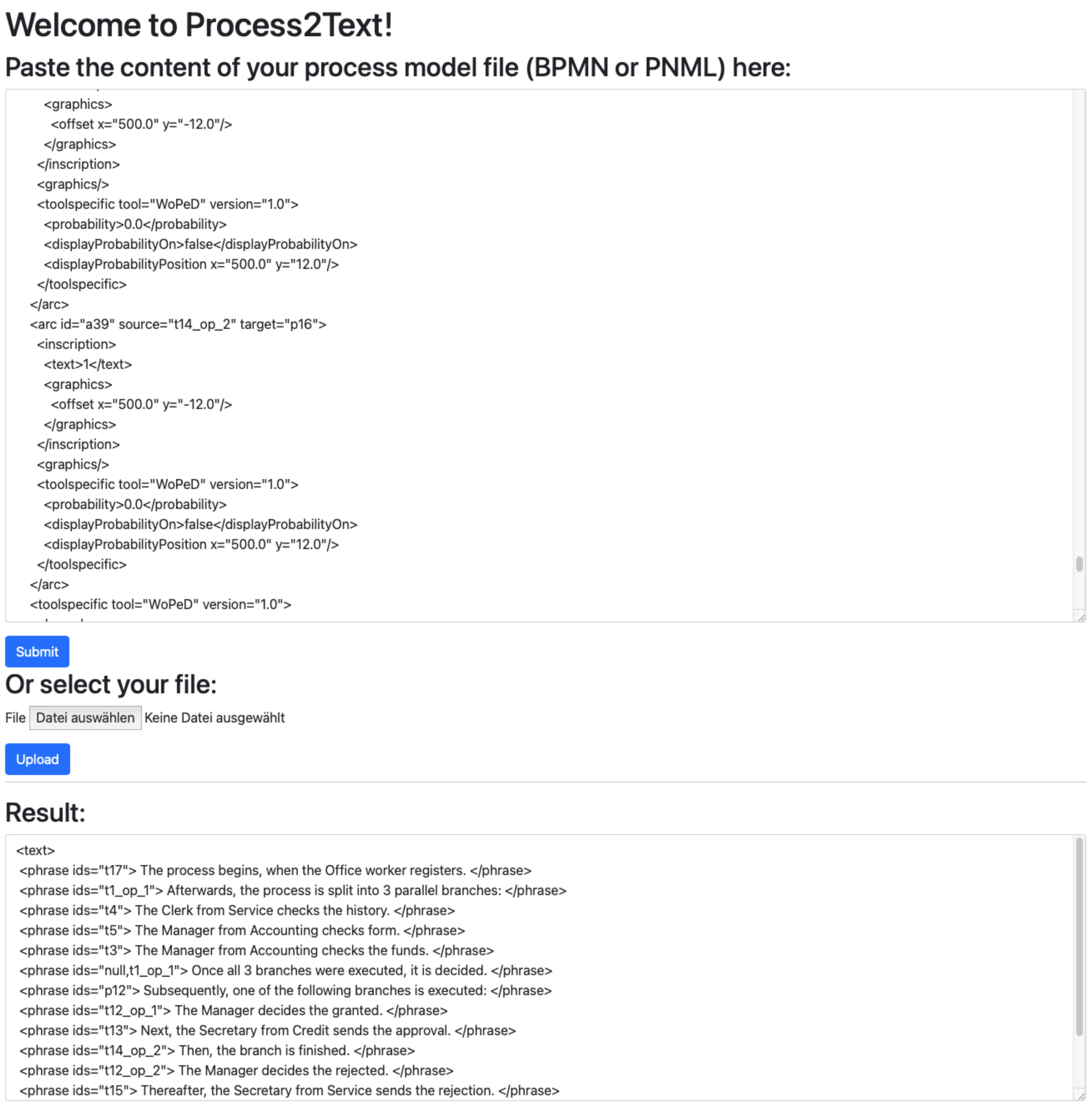

Only accessible from DHBW VPN
Continuous Integration Server
This server is used to host all required continuous integration applications.
Reverseproxy
Jenkins
builds installers and jars and pushed to
Nexus
Production Environment
This server is used for the deployment of all publicly available applications.
Reverseproxy
Website
deprecated
Legacy Webservices
Docker Compose
Process2Text-Webservice
Text2Process-Webservice
Reverseproxy
Acts as the central entry point. Forwards requests based on the path.
builds images and pushes to
pulls code
pulled from
pulled from
links to
dockerhub
The Docker Images for the process2text and text2process webservices are stored here.
currently manual upload to sourceforge required
sourceforge
The os-specific installers for the WoPeD-Client are stored here.
GitHub
Code for client and webservices is hosted on GitHub. Issue tracking and documentation are also hosted here.

Figure 1: Architectural Overview

After completion, they can be found online under https://hub.docker.com/r/woped/process2text and https://hub.docker.com/r/woped/text2process, respectively. The docker images are tagged according to the version of the underlying Maven build file pom.xml. Information on how to use those pre-built images is provided in the following sections. Figure 1 shows an architectural overview of the build and deployment process.

3. Practical Usage and Web Frontend

Both webservices contain an simple embedded UI which can be directly accessed via the URLs and https://woped.dhbw-karlsruhe.de/p2t/ and https://woped.dhbw-karlsruhe.de/t2p/ respectively. Users can perform a transformation there without having to implement a client software. The P2T webservice provides a simple, still very basic UI with a text field where the content of the native process model language (currently BPMN or PNML) can be pasted. Clicking the "Submit" button will generate the text representation of the process model, which will be displayed in the box at the bottom (see Figure 2). Note that the output is not in plain text format but XML-tagged in order to allow re-associating text phrases with model elements on client side.



Welcome to Process2Text!

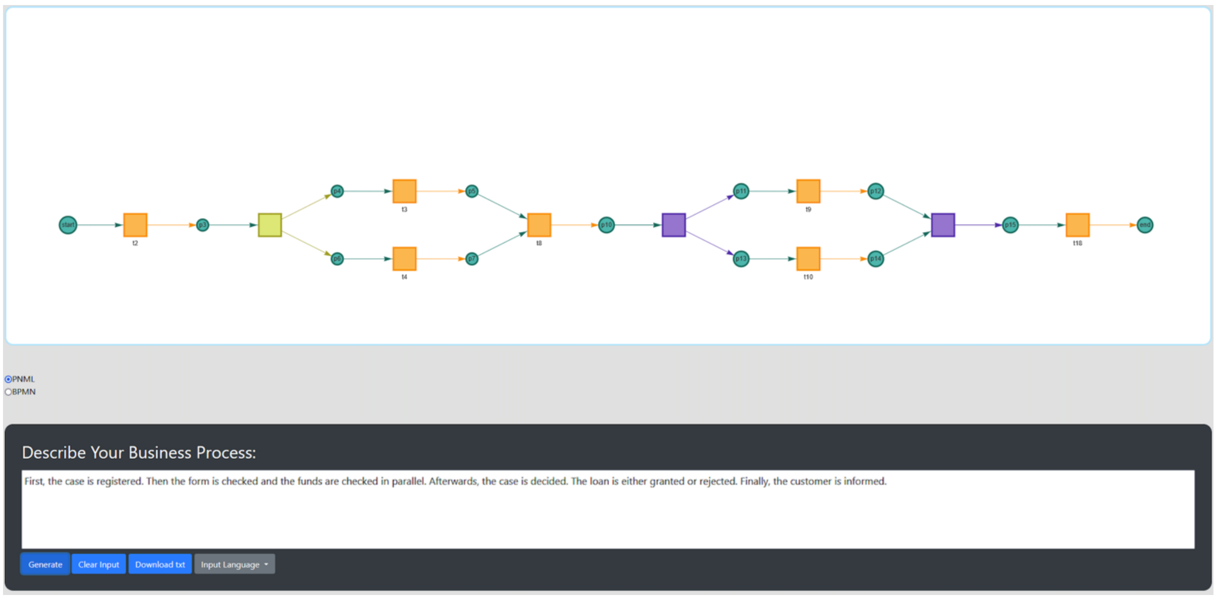
Paste the content of your process model file (BPMN or PNML) here:

```
      <graphics>
        <offset x="500.0" y="-12.0"/>
      </graphics>
    </inscription>
    <graphics/>
    <toolspecific tool="WoPeD" version="1.0">
      <probability>0.0</probability>
      <displayProbabilityOn>false</displayProbabilityOn>
      <displayProbabilityPosition x="500.0" y="12.0"/>
    </toolspecific>
  </arc>
  <arc id="a39" source="t14_op_2" target="p16">
    <inscription>
      <text>1</text>
      <graphics>
        <offset x="500.0" y="-12.0"/>
      </graphics>
    </inscription>
    <graphics/>
    <toolspecific tool="WoPeD" version="1.0">
      <probability>0.0</probability>
      <displayProbabilityOn>false</displayProbabilityOn>
      <displayProbabilityPosition x="500.0" y="12.0"/>
    </toolspecific>
  </arc>
  <toolspecific tool="WoPeD" version="1.0">
```

```
<text>
 <phrase ids="t17"> The process begins, when the Office worker registers. </phrase>
 <phrase ids="t1_op_1"> Afterwards, the process is split into 3 parallel branches: </phrase>
 <phrase ids="t4"> The Clerk from Service checks the history. </phrase>
 <phrase ids="t5"> The Manager from Accounting checks form. </phrase>
 <phrase ids="t3"> The Manager from Accounting checks the funds. </phrase>
 <phrase ids="null,t1_op_1"> Once all 3 branches were executed, it is decided. </phrase>
 <phrase ids="p12"> Subsequently, one of the following branches is executed: </phrase>
 <phrase ids="t12_op_1"> The Manager decides the granted. </phrase>
 <phrase ids="t13"> Next, the Secretary from Credit sends the approval. </phrase>
 <phrase ids="t14_op_2"> Then, the branch is finished. </phrase>
 <phrase ids="t12_op_2"> The Manager decides the rejected. </phrase>
 <phrase ids="t15"> Thereafter, the Secretary from Service sends the rejection. </phrase>
```

Figure 2: Process2Text web interface

The T2P frontend provides a text input field for the process model description. Clicking the "Generate" button will call the T2P algorithms and display the generated process model in the process modelling language chosen (PNML or BPM) – see Figures 3 and 4.

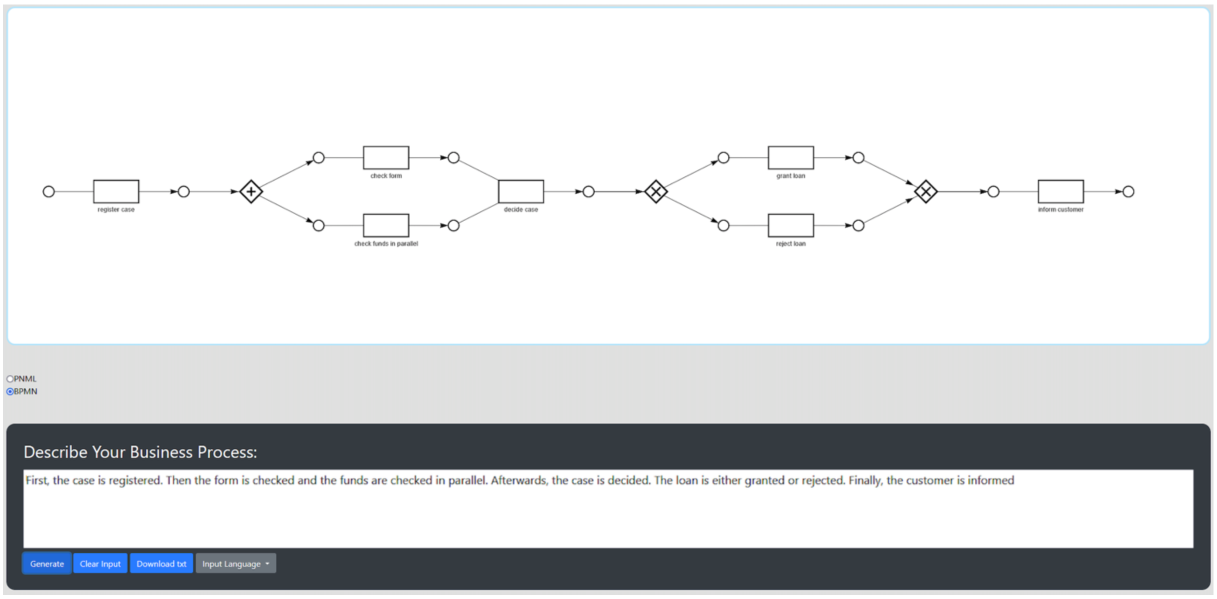


[✓ PNML] BPMN

Describe Your Business Process:

First, the case is registered. Then the form is checked and the funds are checked in parallel. Afterwards, the case is decided. The loan is either granted or rejected. Finally, the customer is informed.

Figure 3: Text2Process web interface (generated PNML)



PNML [✓ BPMN]

Describe Your Business Process:

First, the case is registered. Then the form is checked and the funds are checked in parallel. Afterwards, the case is decided. The loan is either granted or rejected. Finally, the customer is informed

Figure 4: Text2Process web inerface (generated BPMN)

4. Integration of P2T and T2P Webservices

Developers who want to call the webservices from their own code must go through an HTTP client to perform the according REST calls. There are multiple HTTP clients for various programming languages and the access to the webservices should work with any existing HTTP client. Possible HTTP software for Java can be found in [4] and [5]. Regarding the definition of the endpoints, both webservices provide an OpenAPI (former called Swagger) specification [6] that can be used to generate the client code for many programming languages available e.g. at [7]. For developers who want to write the client code themselves, the Swagger UI of the webservices can be used to gain insight into parameters, return types and other configuration properties. The Swagger UI for the P2T and T2P webservices can be found at the URLs https://woped.dhbw-karlsruhe.de/p2t/swagger-ui/ and https://woped.dhbw-karlsruhe.de/t2p/swagger-ui/ respectively.

5. Customizing the P2T and T2P Webservices

If users find bugs or require additional features, they can raise an issue on GitHub. The developing team at the institution of the authors of this paper will then be giving their best to fix the bug or implement the new feature in time. If, however, the desired change is too complex or must be implemented very quickly, the users can either simply apply the changes themselves and create a pull-request, or they can fork the git repository and implement the code change there. If they want to deploy this version of the webservice, they must build the docker image themselves. As a critical precondition, docker must be installed on the system that is used to build the docker image and the system that is used to deploy the webservice. Installation instructions for any operating system can be found on the docker website [8].

6. Building and Deploying the P2T and T2P Webservices

In the first step, the docker image must be built. The required Docker files are in the root folder of the associated webservice code. Navigating there on the command line and executing the command

```
docker build -t myWebservice:myWebserviceVersion .
```

will create the docker image. If the image should be pushed to a container registry later, the image must be tagged according to the username and repository name of the container registry as shown in [9]. Executing the command

```
docker push myUsername/myWebservice:myWebserviceVersion
```

will push the image to the container registry. Beforehand, `docker login` for the target container registry is required. Now, this image can be pulled from the system, where the webservice(s) should be hosted. Running the command

```
docker run myWebservice:myWebserviceVersion
```

will pull docker image and start the webservice. Regarding the base paths and ports of the webservices, the application.yml file in either of the webservice repositories can be used to adapt those values.

7. Conclusion

This document describes how to call the two NLP webservices P2T and T2P from your own software as well as how to customize, build and deploy the webservices on your own server. For questions regarding the described procedures, do not hesitate to contact the authors via the email addresses provided above.

References

[1] BPM 2021 resource demo submitted paper: “NLP as a Service: An API to Convert between Process Models and Natural Language Text”

[2] https://spring.io/projects/spring-boot

[3] https://maven.apache.org

[4] https://www.baeldung.com/java-9-http-client

[5] https://openjdk.java.net/groups/net/httpclient/recipes.html

[6|https://swagger.io/specification

[7] https://github.com/OpenAPITools/openapi-generator

[8] https://docs.docker.com/get-docker

[9] https://docs.docker.com/docker-hub/repos