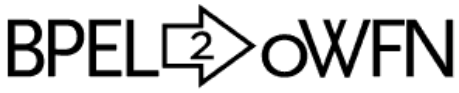

Translating BPEL Processes into Open Workflow Nets

GNU BPEL2oWFN Version 2.0.0, 20 April 2007

User's Manual

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About this document:

This manual is for GNU BPEL2oWFN, version 2.0.0, a tool translating a BPEL process into an open workflow net (oWFN), last updated 20 April 2007.

This manual does not explain how to setup or install GNU BPEL2oWFN. For this information please read the *Installation Manual* which is part of the distribution, or can be downloaded from the website of GNU BPEL2oWFN, http://www.gnu.org/software/bpel2owfn.

GNU BPEL2oWFN was developed during the Tools4BPEL project funded by the German Federal Ministry for Education and Research (BMBF), see http://www.informatik.hu-berlin.de/top/tools4bpel for details.

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1 Invoking BPEL2oWFN

The standard invocation of BPEL2oWFN is:

```
bpel2owfn -i service.bpel -f owfn -o
```

where '`service.bpel`' is a BPEL process. The option '`-f owfn`' causes BPEL2oWFN to generate an open workflow net. This net is written to a file named '`service.owfn`', because of the option '`-o`'.

BPEL2oWFN can be called without any parameter. In this case, it acts as a simple parser for BPEL processes that reads its input from the standard input (`stdin`).

1.1 Options

BPEL2oWFN supports the following command-line options:

'`--help`'
'`-h`' Print an overview of the command-line options and exit.

'`--version`'
'`-v`' Print version information and exit.

'`--input=`*`filename`*`.bpel`'
'`-i` *`filename`*`.bpel`'
Read a BPEL process from file '*`filename`*`.bpel`'. If this parameter is omitted, input is read from standard input (`stdin`).

'`--output[=`*`filename`*`]`'
'`-o`' The generated output is written to a file called *filename*. If the short form is used or the *filename* is omitted, the input file name is taken and extended by the suffix of the chosen file format(s). If this parameter is omitted, the output is passed to the standard output (`stdout`).

'`--log[=`*`filename`*`]`'
'`-l`' All additional information like warnings and processing information are written to a file called *filename*. If the short form is used or the *filename* is omitted, the output file name is taken and extended by the suffix '`.log`'. If this parameter is omitted, the information is passed to the standard error output (`stderr`).

'`--debug=1-4 | flex | bison`'
'`-d 1-4 | flex | bison`'
This option triggers different debug levels, and can enable additional information from Flex and Bison about how the input is lexed and parsed.

Debug level:

- '`0`' When errors are found, only display the error code and skip additional information.
- '`1`' No debug information, but display warning and error messages.
- '`2`' All messages from '`-d1`'. Additionally, information about the current steps is displayed.
- '`3`' All messages from '`-d2`'. Additionally, the structure of the process is shown, i.e. when a Petri net is generated...
- '`4`' All messages from '`-d3`'. Additionally, a message is displayed each time a function is entered or left.
- '`flex`' Displays messages from Flex. Can be combined with any other debug level.
- '`bison`' Displays messages from Bison. Can be combined with any other debug level.

1.1.1 Modes

When invoking BPEL2oWFN several modes are possible.

‘`--mode=`*`modus`*’
‘`-m` *`modus`*’

BPEL2oWFN supports different modes for handling input BPEL files: ‘*`modus`*’ can be one of the following:

‘`ast`’

Outputs the AST (abstract syntax tree) generated while parsing the input file to standard output. This option is mostly used for debugging reasons since it shows the implicit transformations and the phylum names used when generating the Petri net.

‘`cfg`’

For control flow analysis (a form of static analysis) a CFG (Control Flow Graph) is generated. It can be printed in graphical (dot) representation. With the CFG, several design flaws of BPEL processes such as cyclic control links or read access to uninitialized variables can be detected statically. Furthermore, faulty constellations such as conflicting receiving activities can be found using the ‘`cfg`’ mode.

‘`consistency`’

The ‘`consistency`’ mode is an extension of the ‘`petrinet`’ mode. In the consistency mode, several BPEL processes can be parsed, and a Petri net model of their composition is generated.

The ‘`consistency`’ mode is in beta stage. It is not fully tested. For examples, check the ‘`test5`’ test script in the ‘`tests`’ directory. When combined with LoLA file output, an additional ‘`.task`’ file is generated. With the help of this file LoLA can check for weak termination of the composition.

‘`petrinet`’

Generates a Petri net representing the semantics of the given process. Other options can be added to simplify or modify that generated Petri net (see below).

‘`pretty`’

Outputs the parsed BPEL file in XML representation. This option is mostly used for debugging reasons as it shows the implicit transformations and the identifiers of the BPEL constructs.

At most one mode can be selected. If no mode is given, BPEL2oWFN acts like a plain BPEL parser; that is, the input file is read, but no output is generated.

1.1.2 Additional parameters

These options control some Petri net-related options.

‘`--parameter=`*`par`*’
‘`-p` *`par`*’

‘`communicationonly`’

Only the communicational behavior of the input BPEL process is modeled. That is, the negative control flow (fault, termination, or compensation handlers, as well as `<exit>`, `<throw>`, `<compensate>`, `<compensateScope>` activities) is not translated to the Petri net model.

When combined with '`reduce`', this parameter yields the most compact Petri net model.

'`fhfaults`'
: Confines the '`standardfaults`' parameter: in the negative control flow (in activities in fault handlers), no further BPEL standard faults can occur.

'`reduce`'
: Apply several structural reduction rules to the generated Petri net model. The rules preserve deadlocks, livelocks and all deadlock-free communicating partners. In addition, structurally dead nodes of the Petri net, for example, unmarked places without ingoing arcs are removed.

'`standardfaults`'
: Model the occurrence of standard faults. When this parameter is ommited, only user-defined faults, that is, faults thrown with `<throw>` activities, and join failures can occur. With the '`standardfaults`' parameter, also the occurrence of other BPEL standard faults is modeled. This parameter yields the most-detailled, and thus biggest Petri net model.

'`variables`'
: Add places for the variables of the input BPEL process to the Petri net model. As the generated model abstracts from data, that is, a low-level Petri net is generated, the '`variables`' parameter also does not introduce data aspects. Thus, this mode is experimental.

If you want to enable more than one parameter you have to add '`-p`'/ '`--parameter`' to each parameter.

1.1.3 Output formats

Especially for the Petri net mode, a variaty of output formats are supported. There are invoked by the following option:

'`--format=`*`fileformat`*'
'`-f` *`fileformat`*'
: Creates a file in a given ouput file format. Each file format is only available in certain modes. If you want to use more than one output file format you have to add '`-f`'/ '`--format`' to each file format. Please note that the underlying modes of the given file formats are the same. You cannot, for example, create XML and LoLA files together since XML requires the mode '`pretty`', whereas LoLA requires the mode '`petrinet`'.

  Petri net file formats (imply mode '`petrinet`' or '`consistency`'):

  '`apnn`' Outputs the inner of the generated open workflow net in APNN (Abstract Petri Net Notation). When the parameter '`-o`' is used, a file with the suffix '`.apnn`' is created.

  '`ina`' Outputs the inner of the generated open workflow net as untimed low-level Petri net in INA (Integrated Net Analyzer) format. When the parameter '`-o`' is used, a file with the suffix '`.pnt`' is created.

'`lola`' Outputs the inner of the generated open workflow net as low-level Petri net in LoLA (Low-Level Analyzer) file format. When the parameter '`-o`' is used, a file with the suffix '`.lola`' is created.

'`owfn`' Outputs the generated open workflow net in Fiona file format. Note that the Fiona file format is — together with the PNML file format — the only Petri net output format that outputs the complete open workflow net, that is, also the interface is exported. When the parameter '`-o`' is used, a file with the suffix '`.owfn`' is created.

'`pep`' Outputs the inner of the generated open workflow net as low-level Petri net in low-level PEP notation. When the parameter '`-o`' is used, a file with the suffix '`.llnet`' is created.

'`pnml`' Outputs the generated open workflow net in PNML (Petri Net Markup Language). Note that the PNML file format is — together with the Fiona file format — the only Petri net output format that outputs the complete open workflow net, that is, also the interface is exported. Currently, the interface places are annotated using a `<type>` tag which is only supported by Yasper[1]. When the parameter '`-o`' is used, a file with the suffix '`.pnml`' is created.

'`spin`' Outputs the inner of the generated open workflow net as low-level Petri net in Promela (Process Meta Language) for the model checker SPIN. When the parameter '`-o`' is used, a file with the suffix '`.spin`' is created.

Other file formats (note the required mode):

'`dot`' When mode '`petrinet`' is used, the generated open workflow net is printed in Graphviz dot representation. When mode '`ast`' is used, the AST (abstract syntax tree) is printed in Graphviz dot representation. When mode '`cfg`' is used, the CFG (control flow graph) is printed in Graphviz dot representation.

In any case, when the tool `dot` is found in the search path during configuration of BPEL2oWFN and the parameter '`-o`' is used, `dot` is used to generate a PNG (Portable Network Image) file. In this case, two files with the suffixes '`.dot`' and '`.png`' are created. Note that when the '`ast`' mode is used with the '`dot`' file format, the '`-o`' parameter has to be used.

'`info`' When mode '`petrinet`' is used, information about the places and transitions of the generated net in a proprietary ASCII-based format. For each place and transition, all roles, that is, inscriptions of the Petri net patterns, are listed. The information can be used to correlate the generated Petri net model with the input BPEL process. When the parameter '`-o`' is used, a file with the suffix '`.info`' is created.

[1] Yasper is available at http://www.yasper.org.

'`xml`' When the mode '`pretty`' is used, the pretty-printed input BPEL process — with the implicit transformation rules applied – exported in XML (Extensible Markup Lanuage). When the parameter '`-o`' is used, a file with the suffix '`.xml`' is created.

1.2 Examples

In this section we show some examples how BPEL2oWFN can be invoked.

'`bpel2owfn -i sample.bpel -flola -finfo -o -p reduce`'
Reads the file '`sample.bpel`', generates a structural reduced low-level Petri net and saves it in a LoLA file '`sample.lola`'. For further information a file '`sample.info`' is generated.

'`bpel2owfn -i sample.bpel -fowfn -d3 -o`'
Reads the file '`sample.bpel`', generates a low-level open workflow net and saves it in an oWFN file '`sample.owfn`'. For further information a file '`sample.info`' is generated. During the conversion several debug messages are printed to standard output.

'*prog* `| bpel2owfn -fdot -m petrinet | dot -Tps -osample.ps`'
Runs the program *prog* and reads its output as BPEL process, generates a Petri net and outputs its Graphviz dot representation. This stream is read by `dot` which layouts the Petri net and creates an output PostScript file '`sample.ps`'.

'`bpel2owfn -i sample.bpel -m ast`'
Reads the file '`sample.bpel`' and prints the abstract syntax tree (AST) to standard output.

'`bpel2owfn -m consistency -i service1.bpel -i service2.bpel -f lola -o`'
Reads the files '`service1.bpel`' and '`service2.bpel`' and creates a Petri net model of their composition. The result is written to the LoLA file '`service1_service2.lola`'. Furthermore, an analysis file '`service1_service2.task`' is written that can be processed by LoLA.

1.3 Warnings and Error Messages

BPEL2oWFN performs several analysis steps on the input BPEL process. These messages are displayed during parsing and postprocessing of the process, and can be classified as follows:

- **Notices** do not report errors, but just give information about the translation process.
- **Syntax error messages** report problems during the lexical or syntactical analysis of the process. See Chapter 3 [FAQ and Known Bugs], page 12 for information about handling syntax errors.
- **Static analysis messages** occur when a test described in the WS-BPEL specification detects an error in the process. When such an error is found, a WS-BPEL processor must reject the process. If the process is an abstract process, the static analysis errors can be considered as warnings as abstract processes are not meant to be executed.
- **Warnings** report potential problems in the input process. The warned problem should be corrected to assure executability of the input process.
- **Errors** report problems that are explicitly mentioned in the WS-BPEL specification. They should be corrected to avoid runtime errors. Furthermore, problems can arise during the generation of a Petri net model.
- **Critical errors** make a further processing of the input process impossible and terminate GNU BPEL2oWFN immediately.

An example for a message is this:

```
CubeManagement.bpel:566 - [W00114]
variable 'waitResponse' used as 'variable' in <from> might be uninitialized
```

The first line contains the filename of the input process '`CubeManagement.bpel`' and the line number '`566`' of the displayed issue. The line number might be imprecise; that is, it might deviate up or down a few lines. After the line number, the error code is displayed. '`W00114`' stands for a warning with code 114. Further details can be taken from the table below.

Code	**Type**	**Description**
1–94	static analysis	A check for a static analysis goal defined in the WS-BPEL specification detected an error. Currently, 44 of the 94 described static analysis goals are checked.
100	notice	Either a non-standard element[2] was parsed or a BPEL activity was considered as misplaced. In the first case, a non-standard element was parsed when the parser expected a BPEL standard activity. Then, a syntax error is printed and the whole element is ignored. The parse error and this message can usually be ignored, as non-standard elements would neither we translated to a Petri net model nor are constrained by the WS-BPEL specification. In the second case, a syntactically correct BPEL was skipped, because it was misplaced. As an example, consider two activities embedded in a `<while>` activity without an enclosing `<sequence>` activity. In this case, the second activity triggers this message.
101	notice	The `<partners>` construct (only supported by BPEL4WS 1.1) is skipped due to a syntax error.
102	notice	The `<to>` or `<from>` construct is skipped due to a syntax error.
103	notice	The `<condition>` construct is skipped due to a syntax error.
104	critical	When a syntax error occurs, BPEL2oWFN tries to recover and continues parsing the input file after skipping the faulty or unknown element. Sometimes, however, the skipping of activities yields to situations where a further analysis of the BPEL process is impossible. In this case, the syntax of the process has to be fixed or non-standard elements have to be removed or out-commented.
105	notice	When a syntax error occurs, BPEL2oWFN tries to recover and continues parsing the input file after skipping the faulty or unknown element. If it is possible to continue, the analysis results might be faulty. In this case, the syntax of the process has to be fixed or non-standard elements have to be removed or out-commented.

[2] All elements that are not explicitly defined in the WS-BPEL specification (e.g., elements from other namespaces) are considered as "non-standard".

106	warning	CFG analysis detected two receiving activities (i.e., `<receive>`, `<onEvent>`, `<onMessage>`, synchronous `<invoke>`) that might be activated concurrently and share the same partner link, port type, operation, and correlation set. When a message is sent to the process, these activities are in *conflict*; that is, it is not defined which activity will receive an inbound message. At runtime, the standard fault '`bpel:conflictingReceive`' would be thrown.
107	warning	A mandatory attribute of an activity was not defined. Especially for communicating activities, the absence of `partnerLink` and `operation` might hamper the subsequent analysis and Petri net generation.
108	syntax	An attribute was set to a value that violates the attribute's given type. Only the types `tBoolean`, `tInitiate`, `tRoles`, and `tPattern` are checked.
109	warning	A variable referenced in an activity was not defined before; that is, no matching `<variable>` definition was found in a parent scope.
110	warning	A partner link referenced in an activity was not defined before; that is, no matching `<partnerLink>` definition was found in the process.
111	warning	A correlation set referenced in an activity was not defined before; that is, no matching `<correlationSet>` definition was found in a parent scope.
112	notice	The `<literal>` construct is skipped due to a syntax error.
113	syntax	A UTF-8 character was read in the input file. As BPEL2oWFN's scanner does not support Unicode, all UTF-8 characters are ignored. This message is only displayed when the first UTF-8 character is read.
114	warning	CFG analysis detected a read access to a variable that was not initialized before. At runtime, the standard fault '`bpel:uninitializedVariable`' would be thrown.
115	notice	The process definition defines an abstract process profile, and thus allows several "opaque" constructs. When processing and analyzing an abstract process, BPEL2oWFN might report error messages that where designed for executable processes, for example missing attributes. Static analysis errors detected in an abstract process are reported as warnings.
116	notice	An `<opaqueActivity>` of an abstract process was replaced by an `<empty>` activity.

2 File Formats

In this chapter, we show how a BPEL process can be translated to a Petri net model an then exported to several output file formats. Consider the following simple BPEL process '`example.bpel`':

```
<process name="exampleprocess" targetNamespace="www.gnu.org/software/bpel2owfn">
  <partnerLinks>
    <partnerLink name="PL" partnerLinkType="PLT"
      myrole="exampleprocess" partnerRole="exampleuser" />
  </partnerLinks>

  <sequence>
    <receive partnerLink="PL" operation="req" createInstance="yes" />
    <reply partnerLink="PL" operation="ack" />
  </sequence>
</process>
```

This process just waits for a message '`req`' on partner link '`PL`' and replies to this message with '`ack`' on the same partner link. To parse this BPEL process, BPEL2oWFN has to be invoked with

```
bpel2owfn -i example.bpel
```

which responds with the output:

```
================================================================================
GNU BPEL2oWFN 2.0.0 reading from file 'example.bpel'
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
3 activities (2 basic, 1 structured, 0 scopes) + 3 implicit activities
0 handlers (0 FH, 0 TH, 0 CH, 0 EH) + 1 implicit handlers
0 links, 0 variables

[SYNTAX ANALYSIS] No syntax errors found.
[STATIC ANALYSIS] No errors found checking 44 statics analysis requirements.
[OTHER ANALYSIS]  No other errors found.
--------------------------------------------------------------------------------
```

This means, the process consists of three activities (two basic activities and one structured activities), no handlers, no links and no variables. On the bottom the analysis results are summarized: no syntactic, static, or other error was found.

Furthermore, three "implicit" activities are counted: The WS-BPEL specification describes several implicit transformations of the input process, as well as standard fault, termination and compensation handlers. In the considered BPEL process, no fault handlers are specified. Thus, a standard fault handler is added by BPEL2oWFN:

```
<faultHandlers>
  <catchAll>
    <sequence>
      <compensate />
      <rethrow />
    </sequence>
  </catchAll>
</faultHandlers>
```

To see how the BPEL process looks like after applying the transformation rules and adding the standard handlers, BPEL2oWFN output the manipulated process using its pretty-printer:

```
bpel2owfn -i example.bpel -m pretty
```

The manipulated process looks like this:

```
<process id="1" abstractProcess="no" exitOnStandardFault="no" name="exampleprocess"
 suppressJoinFailure="no" targetNamespace="www.gnu.org/software/bpel2owfn">
  <partnerLinks>
    <partnerLink id="3" myrole="exampleprocess"
       name="PL" partnerLinkType="PLT" partnerRole="exampleuser" />
  </partnerLinks>
  <faultHandlers id="4">
    <catchAll id="13">
      <sequence id="12" suppressJoinFailure="no">
        <compensate id="11" suppressJoinFailure="no">
        </compensate>
        <rethrow id="10">
        </rethrow>
      </sequence>
    </catchAll>
  </faultHandlers>
  <sequence id="7" suppressJoinFailure="no">
    <receive id="8" createInstance="yes" operation="req"
       partnerLink="PL" suppressJoinFailure="no">
    </receive>
    <reply id="9" operation="ack" partnerLink="PL" suppressJoinFailure="no">
    </reply>
  </sequence>
</process>
```

Each activity is printed together with its attributes. Note that the standard values of several attributes (e.g., '`abstractProcess`' or '`suppressJoinFailure`') are added. Furthermore, an identifier (attribute '`id`') was added to every activity.

We now want to create a compact Petri net model of the BPEL process, using the '`petrinet`' mode and the '`communicationonly`' parameter:

```
bpel2owfn -i example.bpel -m petrinet -p communicationonly
```

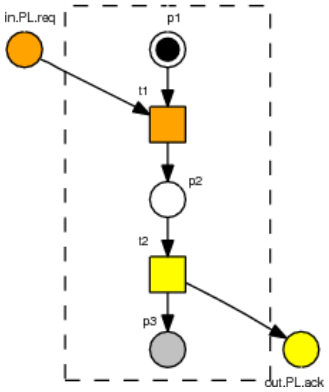
BPEL2oWFN now also displays statistics of the generated Petri net model:

```
|P|=5, |P_in|= 1, |P_out|= 1, |T|=2, |F|=6
```

The generated Petri net model consists of five places, including one input and one output place, two transitions and six arcs. To create a graphical representation, invoke BPEL2oWFN with the following options:

```
bpel2owfn -i example.bpel -m petrinet -p communicationonly -f dot -o
```

This command creates a file '`example.dot`', containing a Graphviz dot representation of the Petri net, and—if the `dot` tool was found in the search path—a PNG (Portable Network Graphics) an image file '`example.png`'. The latter looks like this:



The graphic depicts the generated open workflow net. The inner of the net, that is, all nodes except the interface places, are depicted inside the dashed box, whereas the interface is depicted outside the frame. Input places and all connected transitions are colored orange. Similarly, output places and connected transitions are colored yellow. Gray places belong to the final marking, that is, the marking [**p3**] is the final marking of the oWFN.

To reach this final marking, the environment has to send a message **in.PL.req**, followed by receiving a message **out.PL.ack**. The name of the communication places is composed by the communication direction ("in" or "out"), the partner link's name ('`PL`') and the operations name ('`req`' or '`ack`').

For this very small process, it is easy to validate the generated Petri net model, that is, to compare the intended semantics by the actually modeled semantics. Especially the correlation between the nodes of the Petri net and the activities of the input BPEL process is not obvious for larger processes. To this end,

```
bpel2owfn -i example.bpel -m petrinet -p communicationonly -f info
```

displays an information file, consisting of all the Petri net nodes' roles.

```
PLACES:
ID      TYPE            ROLES
p1      internal        1.internal.initial
                        7.initial
                        7.internal.initial
                        8.initial
                        8.internal.initial
p2      internal        8.final
                        8.internal.final
                        9.initial
                        9.internal.initial
p3      internal        1.internal.final
                        7.final
                        7.internal.final
                        9.final
                        9.internal.final
in.PL.req       input           in.PL.req
out.PL.ack      output          out.PL.ack

TRANSITIONS:
ID      ROLES
t1      8.internal.receive
t2      9.internal.reply
```

This file has to be read as follows: the place '`p1`' has the type internal (i.e., is not connected with an interface place) and has the roles '`1.internal.initial`', '`7.initial`', '`7.internal.initial`', '`8.initial`', and '`8.internal.initial`'. While the prefix of each role is the identifier of an activity ('`1`' for the `<process>`, '`7`' for the `<sequence>`, and '`8`' for the `<receive>`), the suffix specifies the role inside the respective pattern. Without going

too much into details, '`1.internal.initial`' is the role of the initial place of the pattern for the `<process>`, whereas, for example '`7.internal.final`' is the final place of the `<sequence>`'s pattern. Similarly, roles of transitions are specified. Multiple roles of a single place arise due to the merging of distinct places during the composition of the several patterns.

Now that we have convinced ourselves that the generated net reflects the intended behavior of the BPEL process, we can export the Petri net model to an output file to process it by analysis tools. In this case, we want to create a Fiona open workflow net executing

```
bpel2owfn -i example.bpel -m petrinet -p communicationonly -f ownf -o
```

which creates a file '`example.owfn`':

```
{
  generated by: BPEL2oWFN 2.0.0
  input file:   'example.bpel' (process 'exampleprocess')
  invocation:   'bpel2owfn -i example.bpel -m petrinet -p communicationonly -f owfn'
  net size:     |P|=5, |P_in|= 1, |P_out|= 1, |T|=2, |F|=6
}

PLACE
  INTERNAL
    p1, p2, p3;

  INPUT
    in.PL.req {$ MAX_OCCURRENCES = 1 $};

  OUTPUT
    out.PL.ack {$ MAX_OCCURRENCES = 1 $};


INITIALMARKING
  p1:    1 {initial place};

FINALMARKING
  p3 {final place};


TRANSITION t1 { input }
  CONSUME in.PL.req, p1;
  PRODUCE p2;

TRANSITION t2 { output }
  CONSUME p2;
  PRODUCE out.PL.ack, p3;


{ END OF FILE 'example.owfn' }
```

This is finally the oWFN model of the BPEL process that can be analyzed by Fiona[1].

[1] Fiona is available at http://www.informatik.hu-berlin.de/top/tools4bpel.

3 FAQ and Known Bugs

3.1 Frequently Asked Questions

- **Why does the parser reject my BPEL file?**

  BPEL2oWFN uses Flex and Bison to implement the parser. We decided do not use an off-the-shelf XML parser generator as we did not found a suitable platform-independent parser generator whose license was "compatible" to the GNU GPL (General Public License). Furthermore, we use the term generator Kimwitu++ to describe and process the AST (abstract syntax tree), and the trio Flex/Bison/Kimwitu++ integrates seamlessly. Though the grammar has to be defined manually, the generated parser is very flexible as it allows to process BPEL4WS 1.1, WS-BPEL 2.0, and to some extend BPEL4WS 1.0 processes.

  However, the parser does not support XML namspaces. To this end, BPEL constructs are only recognized if the are either unprefixed or using the prefix '`bpws:`'. Any other elements are skipped by the parser of BPEL2oWFN. Nevertheless, processes that use such elements might be rejected with a syntax error message (cf. warning message [W00104]).

  As a solution, try removing or commenting non-standard elements, and remove any namespace prefixed from BPEL elements.

- **I validated my process using an XML validator. Why does BPEL2oWFN still reports syntax errors?**

  Well, because there *are* such errors. Many BPEL editors generate invalid BPEL. Even the WS-BPEL specification contained processes with syntax errors for a long time. Furthermore, a lot of syntax errors cannot be covered with XSD (XML Schema Definition) validation. Even if the considered process run on existing engines, BPEL2oWFN might reject it, as it stubbornly follows the WS-BPEL specification.

- **Why LoLA does not accept the generated files and reports parse errors in the first line?**

  This problem occurs using a pre-compiled windows version of BPEL2oWFN. The generated files are in Windows format, yet LoLA only supports files in Unix format. To overcome this limitation of LoLA, use a tool like '`dos2unix`' or change the file format in an editor like '`vi`'.

3.2 Known Bugs

Though this is the second major release version of BPEL2oWFN, it might still contain poorly tested, inefficient code.

- **Problem:** BPEL2oWFN crashes during the translation of an abstract BPEL process.

  Diagnosis: The implemented semantics of was mainly created to support executable BPEL processes. Therefore, the translation of abstract BPEL processes (formerly called *business protocols*) might be buggy. In particular, the allowed absence of implementation details hampers the analysis of the process and the generation of a formal model.

  Solution: To avoid errors, at least each communicating activity should be defined with `partnerLink` and `operation` attribute, and `<invoke>` activities should be defined with `inputVariable` and/or `outputVariable` to distinguish the respective asynchronous and synchronous occurrence.

3.3 Reporting Bugs

If you find a bug in BPEL2oWFN or have a question, please first check that it is not a known bug or a frequently asked question listed in above. Otherwise, please send us an email to bug-bpel2owfn@gnu.org. Include the version number which you can find by running '`bpel2owfn --version`'. Also include in your message the input BPEL process and the output that the program produced. We will try to answer your mail within a week.

If you have other questions, comments or suggestions about BPEL2oWFN, contact us via electronic mail to nlohmann@informatik.hu-berlin.de.

3.4 Contact Person

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3.5 Help BPEL2oWFN

BPEL2oWFN is now developed for one and a half year, and grown to a quite big program. Since November 2006, BPEL2oWFN is a GNU package, and the development is organized at Savannah (https://savannah.gnu.org/projects/bpel2owfn). We are always looking for developers and testers that can help us improving BPEL2oWFN.

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Version 1.2, November 2002

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