

Package ‘petrinetR’

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Type Package

Title Building, Visualizing, Exporting and Replaying Petri Nets

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Description Functions for the construction of Petri Nets. Petri Nets can be replayed by firing enabled transitions.
Silent transitions will be hidden by the execution handler. Also includes functionalities for the visualization of Petri Nets and export of Petri Nets to PNML (Petri Net Markup Language) files.

License GPL-3

Depends R(>= 3.0.0)

Imports dplyr, visNetwork, DiagrammeR, xml2, purrr, lifecycle

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BugReports <https://github.com/bupaverse/petrinetR/issues>

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create_marked_PN	<i>Create marked Petri Net</i>
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Description

Function to create a [marked_petrinet](#), consisting of a [petrinet](#), an initial marking, and a final marking.

Usage

```
create_marked_PN(PN, initial_marking, final_marking)
```

Arguments

PN [petrinet](#): Object of class [petrinet](#).
initial_marking [character](#): A vector with place ids representing the initial marking.
final_marking [character](#): A vector with place ids representing the final marking.

Value

A [marked_petrinet](#)

create_PN	<i>Create Petri Net</i>
-----------	-------------------------

Description

Function to create a [petrinet](#) by specifying places, transitions and flows.

Usage

```
create_PN(places, transitions, flows)
```

Arguments

places	data.frame or tibble of places, with columns id and label. Both columns should be characters.
transitions	data.frame or tibble of transitions, with columns id and label. Both columns should be characters.
flows	data.frame or tibble of flows, with columns named "from" and "to", referring to ids of places and transitions. Both columns should be characters.

Value

A [petrinet](#)

Examples

```
library(dplyr)
create_PN(tibble(id = "p1", label = "place_1"),
tibble(id = "t1", label = "transition_1"),
tibble(from = "t1", to = "p1"))
```

enabled	<i>Enabled transitions</i>
---------	----------------------------

Description

List the enabled transitions in a marked Petri Net. Silent transitions, i.e. starting with "inv_" or "tau" are assumed to be able to fire silently, thereby possible enabling other transitions.

Usage

```
enabled(PN)
```

Arguments

PN	A Petri Net
----	-------------

enabled_transition	<i>Enabled Transition</i>
--------------------	---------------------------

Description

Check if a transition is currently enabled

Usage

```
enabled_transition(PN, transition)
```

Arguments

PN	A Petri Net
transition	A Transition

execute	<i>Execute</i>
---------	----------------

Description

Executes (fire) an enabled transition and returns the Petri Net with the New marking. If the transition is enabled via the firing of silent transition (i.e. starting with "inv_" of "tau"), it will fire these first. If the transition is not enabled, it will return FALSE.

Usage

```
execute(PN, transition)
```

Arguments

PN	A Petri Net
transition	The transition to be fired

final_marking	<i>Final Marking</i>
---------------	----------------------

Description

Get the final marking of a [marked_petrinet](#)

Usage

```
final_marking(PN)
```

Arguments

PN A [marked_petrinet](#)

flows	<i>Flows</i>
-------	--------------

Description

Extracts the flows from a (marked) Petri Net

Usage

```
flows(PN)
```

```
## S3 method for class 'petrinet'
```

```
flows(PN)
```

```
## S3 method for class 'marked_petrinet'
```

```
flows(PN)
```

Arguments

PN [petrinet](#) or [marked_petrinet](#)

Value

A data.frame containing the flows of the petri net.

Methods (by class)

- `flows(petrinet)`: Flow of petrinet
- `flows(marked_petrinet)`: Flow of marked petrinet

initial_marking	<i>Initial Marking</i>
-----------------	------------------------

Description

Get the initial marking of a [marked_petrinet](#)

Usage

initial_marking(PN)

Arguments

PN A [marked_petrinet](#)

is_node	<i>Is node</i>
---------	----------------

Description

Check if a node is part of a petri net

Usage

is_node(node, PN)

Arguments

node [character](#) of length one: the node id to check.
PN [petrinet](#) or [marked_petrinet](#)

Value

logical that indicates whether node is a node in PN

is_place	<i>Is place</i>
----------	-----------------

Description

Check if a place is part of a petri net.

Usage

```
is_place(place, PN)
```

Arguments

place	character of length one: the place id to check.
PN	petrinet or marked_petrinet

Value

logical that indicates whether place is a place in PN

is_transition	<i>Is transition</i>
---------------	----------------------

Description

Check if a transition is part of a petri net.

Usage

```
is_transition(transition, PN)
```

Arguments

transition	character of length one: the transition id to check.
PN	petrinet or marked_petrinet

Value

logical that indicates whether transition is a transition in PN

marked_petrinet	<i>Marked petrinet</i>
-----------------	------------------------

Description

Object consisting of a petrinet, initial marking, and final marking

marking	<i>Marking</i>
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Description

Get the current marking of a Petri Net

Usage

marking(PN)

Arguments

PN A Petri Net

nodes	<i>Get nodes from (marked) petrinet</i>
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Description

Get nodes from (marked) petrinet

Usage

nodes(PN)

Arguments

PN [petrinet](#) or [marked_petrinet](#)

`n_places`*Utils*

Description

Several auxilliary functions for Petri Net objects.

Usage`n_places(PN)``n_transitions(PN)``n_flows(PN)``n_nodes(PN)``rename_transitions(PN, .f, ...)``rename_places(PN, .f, ...)``add_places(PN, places)``add_transitions(PN, transitions)``add_flows(PN, flows)`**Arguments**

<code>PN</code>	A petri net
<code>.f</code>	A function name to apply for renaming
<code>...</code>	Additional arguments
<code>places</code>	<code>data.frame</code> or <code>tibble</code> of places, with columns <code>id</code> and <code>label</code> . Both columns should be characters.
<code>transitions</code>	<code>data.frame</code> or <code>tibble</code> of transitions, with columns <code>id</code> and <code>label</code> . Both columns should be characters.
<code>flows</code>	<code>data.frame</code> or <code>tibble</code> of flows, with columns named "from" and "to", referring to ids of places and transitions. Both columns should be characters.

parse_trace	<i>Parse (logical)</i>
-------------	------------------------

Description

Tests whether a sequence of transitions can be fired by a Petri Net. If so returns TRUE, otherwise FALSE.

Usage

```
parse_trace(PN, trace)
```

Arguments

PN	A Petri Net
trace	A sequence of transitions, stored in a vector.

parse_trace	<i>Parse</i>
-------------	--------------

Description

Parses a sequence of transitions. If possible returns the Petri Net with the updated marking. Otherwise returns FALSE

Usage

```
parse_trace(PN, trace)
```

Arguments

PN	A Petri Net
trace	A sequence of transitions, stored in a vector.

part_of	<i>Part of</i>
---------	----------------

Description

Check if a node is part of a petri net

Usage

part_of(node, PN)

Arguments

node	A node
PN	A Petri Net

petrinet	<i>Ppetrinet</i>
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Description

Object consisting of places, transitions and flows that denote a petri net

petrinetR	<i>petrinetR - Building, visualizing, exporting and replaying Petri Nets</i>
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Description

Functions for the construction of Petri Nets. Petri Nets can be replayed by firing enabled transitions. Silent transitions will be hidden by the execution handler. Also includes functionalities for the visualization of Petri Nets and export of Petri Nets to PNML-files.

places	<i>Places</i>
--------	---------------

Description

Extracts the places from a Petri Net

Usage

```
places(PN)
```

```
## S3 method for class 'petrinet'
```

```
places(PN)
```

```
## S3 method for class 'marked_petrinet'
```

```
places(PN)
```

Arguments

PN [petrinet](#) or [marked_petrinet](#)

Methods (by class)

- `places(petrinet)`: Places of petrinet
- `places(marked_petrinet)`: Places of marked petrinet

post_set	<i>Postset</i>
----------	----------------

Description

Get the postset of a transition or place in a Petri Net

Usage

```
post_set(PN, node)
```

Arguments

PN [petrinet](#) or [marked_petrinet](#)

node [character](#) of length one: the node id for which to get the postset.

pre_set	<i>Preset</i>
---------	---------------

Description

Get the preset of a transition or place in a Petri Net

Usage

```
pre_set(PN, node)
```

Arguments

PN	petrinet or marked_petrinet
node	character of length one: the node id for which to get the postset.

read_PN	<i>Read .PNML file</i>
---------	------------------------

Description

Read .PNML file

Usage

```
read_PN(file, add_final_marking = TRUE)
```

Arguments

file	Path to .pnml file
add_final_marking	logical (default: TRUE): add final marking. If TRUE, all places without outgoing flows are considered part of a single final marking. Overwrite with set_final_marking() if needed. If FALSE, final_marking is set to NULL

Value

A [codemarked_petrinet](#)

`render_PN`*Render Petri Net*

Description

Visualize Petri Net with bipartite graph.

Usage

```
render_PN(PN)
```

Arguments

PN [petrinet](#) or [marked_petrinet](#)

`transitions`*Transitions*

Description

Extracts the transitions from a Petri Net

Usage

```
transitions(PN)
```

```
## S3 method for class 'petrinet'  
transitions(PN)
```

```
## S3 method for class 'marked_petrinet'  
transitions(PN)
```

Arguments

PN [petrinet](#) or [marked_petrinet](#)

Methods (by class)

- `transitions(petrinet)`: Transitions of `petrinet`
- `transitions(marked_petrinet)`: Transitions of `marked_petrinet`

`visNetwork_from_PN` *VisNetwork from PN*

Description

Visualize a Petri Net with an interactive network

Usage

`visNetwork_from_PN(PN)`

Arguments

PN `petrinet` or `marked_petrinet`

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