
Finite Documentation

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1.1 Installation

```
$ composer require yohang/finite
```

1.1.1 Register the bundle

Register the bundle in your AppKernel:

```
<?php
// app/AppKernel.php

public function registerBundles()
{
    $bundles = array(
        // ...
        new \Finite\Bundle\FiniteBundle\FiniteFiniteBundle(),
        // ...
    );
}
```

1.2 Defining your stateful class

As we want to track the state of an object (or the multiples states, but this example will focus on object with single state-graph), create your class if it doesn't already exists. This class has simply to implements `Finite\StatefulInterface`.

This part is covered in *Define your object*.

1.3 Configuration

```
finite_finite:

    document_workflow:
        class: MyDocument # You class FQCN
        states:

            draft: { type: initial, properties: { visible: false } }
            proposed: { type: normal, properties: { visible: false } }
            accepted: { type: final, properties: { visible: true } }
            refused: { type: final, properties: { visible: false } }

        transitions:
            propose: { from: draft, to: proposed }
            accept: { from: proposed, to: accepted }
            refuse: { from: proposed, to: refused }
```

At this point, your graph is ready and you can start using your workflow on your object.

1.4 Controller / Service usage

Finite define several services into the Symfony DIC. The easier to use is `finite.context`.

1.4.1 Example

```
<?php

$context = $this->get('finite.context');
$context->getState($document); // return "draft", or... the current state if different
$context->getProperties($document); // array:1 [ 'visible' => false ]
$context->getTransitions($document); // array:2 [ 0 => "propose", 1 => "refuse" ]
$context->hasProperty($document, 'visible'); // true
$context->getFactory(); // Return an instance of FiniteFactory, used to instantiate_
↳the state machine
$context->getStateMachine($document); // Returns a initialized StateMachine instance_
↳for $document

// Throw a 404 if document isn't visible
if (!$this->get('finite.context')->getProperties($document)['visible']) {
    throw $this->createNotFoundException(
        sprintf('The document "%s" is not in a visible state.', $document->getName())
    );
}
```

1.5 Twig usage

Although the Twig Extension is not Symfony-specific at all, when using the Symfony Bundle, Finite functions are automatically accessible in your templates.

```

{{ dump(finite_state(document)) }} {# "draft" #}
{{ dump(finite_transitions(document)) }} {# array:2 [ 0 => "propose", 1 => "refuse" ]
→#}
{{ dump(finite_properties(document)) }} {# array:1 [ 'visible' => false ] #}
{{ dump(finite_has(document, 'visible')) }} {# true #}
{{ dump(finite_can(document, 'accept')) }} {# true #}

{# Display reachable transitions #}
{% for transition in finite_transitions(document) %}
  <a href="{{ path('document_apply_transition', {transition: transition}) }}">
    {{ transition }}
  </a>
{% endfor %}

{# Display an action if available #}
{% if finite_can(document, 'accept') %}
  <button type="submit" name="accept">
    Accept this document
  </button>
{% endif %}

```

1.5.1 Example

1.6 Using callbacks

The state machine is built around a very flexible and powerful events / callbacks system. Events dispatched with the `EventDispatcher` and works as the Symfony kernel events.

1.6.1 Events

finite.set_initial_state: This event is fired when initializing a state machine with an object which does not have a defined state. It allows you to manage the default initial state of your object.

finite.initialize: Fired when the `StateMachine` is initialized for an object (event if the current object state is known)

finite.test_transition: Fired when testing if a transition can be applied, when you call `StateMachine#can` or `StateMachine#apply`. This event is an instance of `Finite\Event\TransitionEvent` and can be rejected, which leads to a non-appliable transition. This is one of the most useful event, as it allows you to introduce business code for allowing / rejecting transitions

finite.test_transition.[transition_name]: Same as `finite.test_transition` but with the concerned transition in the event name.

finite.test_transition.[graph].[transition_name]: Same as `finite.test_transition` but with the concerned graph and transition in the event name.

finite.pre_transition: Fired before applying a transition. You can use it to prepare your object for a transition.

finite.pre_transition.[transition_name]: Same as `finite.pre_transition` but with the concerned transition in the event name.

finite.pre_transition.[graph].[transition_name]: Same as `finite.pre_transition` but with the concerned graph and transition in the event name.

finite.post_transition: Fired after applying a transition. You can use it to execute the business code you have to execute when a transition is applied.

finite.post_transition.[post_transition]: Same as `finite.post_transition` but with the concerned transition in the event name.

finite.post_transition.[graph].[transition_name]: Same as `finite.post_transition` but with the concerned graph and transition in the event name.

1.6.2 Callbacks

Callbacks are a simplified mechanism allowing you to plug your domain services on the finite events. You can see it as a way to listen to events without defining a listener class that just redirects the events to your services.

Using YAML configuration

```
finite_finite:

  document_workflow:
    class: MyDocument
    states:
      # ...
    transitions:
      # ...

  callbacks:
    before:
      # Will call the `sendPublicationMail` method of `@app.mailer.
      ↪document` service
      # When the `accept` transition is applied
      send_publication_mail:
        disabled: false # default value
        on: accept
        do: [ @app.mailer.document, 'sendPublicationMail' ]

      # Will call the `sendNotAnymoreProposedEmail` method of `@app.mailer.
      ↪document` service
      # When any transition from the `proposed` state is applied.
      # This condition can be negated by prefixing a `~` before the state_
      ↪name
      # And the same exists for the destination transitions (with `to: `)
      send_publication_mail:
        disabled: false # default value
        from: ['proposed']
        do: [ @app.mailer.document, 'sendNotAnymoreProposedEmail' ]
```

1.7 Configuration reference

```
finite_finite:

  # Prototype
  name: # internal name of your graph, not used
  class: ~ # Required, FQCN of your class
```

```

graph:                default      # Name of your graph, keep default if using
↳a single graph
property_path:       finiteState # The property of your class used to store
↳the state

states:
  # Prototype
  name:               # Required, Name of your state
    type: normal # State type, in "initial", "normal", "final"
    properties: # Properties array.
      # Prototype
      name:           ~

transitions:
  # Prototype
  name:               # Required, Name of your transition
  from: []           # Required, states the transition can come from
  to: ~              # Required, state where the transition go
  properties: # Properties array.
    # Prototype
    name:             ~

callbacks:

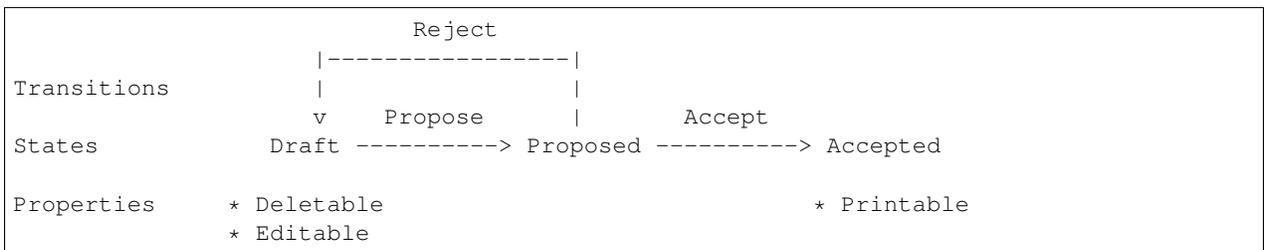
  before: # Pre-transition callbacks
    # Prototype
    name:
      do: ~ # Required. The callback.
      on: ~ # On which transition to trigger the callback.
↳Default null
      from: ~ # From which states are we triggering the callback.
↳Default null
      to: ~ # To which states are we triggering the callback.
↳Default null
      disabled: false

  after: # Post-transition callbacks
    # Prototype
    name:
      on: ~
      do: ~
      from: ~
      to: ~
      disabled: false

```


2.1 Goal

In this example, we'll see a basic Document workflow, following this graph :



2.2 Implement the document class

```
<?php
class Document implements Finite\StatefulInterface
{
    private $state;

    public function getFiniteState()
    {
        return $this->state;
    }

    public function setFiniteState($state)
    {
        $this->state = $state;
    }
}
```

2.3 Configure your graph

```
<?php
$loader = new Finite\Loader\ArrayLoader([
    'class' => 'Document',
    'states' => [
        'draft' => [
            'type' => Finite\State\StateInterface::TYPE_INITIAL,
            'properties' => ['deletable' => true, 'editable' => true],
        ],
        'proposed' => [
            'type' => Finite\State\StateInterface::TYPE_NORMAL,
            'properties' => [],
        ],
        'accepted' => [
            'type' => Finite\State\StateInterface::TYPE_FINAL,
            'properties' => ['printable' => true],
        ]
    ],
    'transitions' => [
        'propose' => ['from' => ['draft'], 'to' => 'proposed'],
        'accept' => ['from' => ['proposed'], 'to' => 'accepted'],
        'reject' => ['from' => ['proposed'], 'to' => 'draft'],
    ],
]);

$document = new Document;
$stateMachine = new Finite\StateMachine\StateMachine($document);
$loader->load($stateMachine);
$stateMachine->initialize();
```

At this point, your Workflow / State graph is fully accessible to the state machine, and you can start to work with your workflow.

2.4 Working with workflow

2.4.1 Current state

```
<?php
// Get the name of the current state
$stateMachine->getCurrentState()->getName();
// string(5) "draft"

// List the currently accessible properties, and their values
$stateMachine->getCurrentState()->getProperties();
// array(2) {
//     'deletable' => bool(true)
//     'editable' => bool(true)
// }

// Checks if "deletable" property is defined
$stateMachine->getCurrentState()->has('deletable');
// bool(true)
```

```
// Checks if "printable" property is defined
$stateMachine->getCurrentState()->has('printable');
// bool(false)
```

2.4.2 Available transitions

```
<?php

// Retrieve available transitions
var_dump($stateMachine->getCurrentState()->getTransitions());
// array(1) {
//     [0] => string(7) "propose"
// }

// Check if we can apply the "propose" transition
var_dump($stateMachine->getCurrentState()->can('propose'));
// bool(true)

// Check if we can apply the "accept" transition
var_dump($stateMachine->getCurrentState()->can('accept'));
// bool(false)
```

2.4.3 Apply transition

```
<?php

// Trying to apply a not accessible transition
try {
    $stateMachine->apply('accept');
} catch (\Finite\Exception\StateException $e) {
    echo $e->getMessage();
}
// The "accept" transition can not be applied to the "draft" state.

// Applying a transition
$stateMachine->apply('propose');
$stateMachine->getCurrentState()->getName();
// string(7) "proposed"
$document->getFiniteState();
// string(7) "proposed"
```


3.1 Overview

Finite use the Symfony EventDispatcher component to notify each actions done by the State Machine.

You can use the event system directly with callbacks in your configuration, or by attaching listeners to the event dispatcher.

3.2 Implement your document class and define your workflow

See *Basic graph*.

3.3 Use callbacks

Callbacks can be defined directly in your State Machine configuration. The can be called before or after the transition apply, and their definition use the following pattern :

```
<?php
$definition = [
    'from' => [], // a string or an array of string that represent the initial_
    ↳states that trigger the callback. Empty for All.
    'to'   => [], // a string or an array of string that represent the target states_
    ↳that trigger the callback. Empty for All.
    'on'   => [], // a string or an array of string that represent the transition_
    ↳names that trigger the callback. Empty for All.
    'do'   => function($object, Finite\Event\TransitionEvent $e) {
        // The callback
    }
];
```

from and *to* parameters can be any state names. Prefix by - to process an exclusion. By default, callbacks matches all the events.

3.3.1 Example :

```
<?php

[
    'from' => ['all', '-proposed'],
    'do'   => function($object, Finite\Event\TransitionEvent $e) {
        // callback code
    }
];
```

Will match any transition that don't begin on the *proposed* state.

3.3.2 Full example :

```
<?php

$loader      = new Finite\Loader\ArrayLoader([
    'class'    => 'Document',
    'states'   => [
        'draft' => [
            'type'      => Finite\State\StateInterface::TYPE_INITIAL,
            'properties' => ['deletable' => true, 'editable' => true],
        ],
        'proposed' => [
            'type'      => Finite\State\StateInterface::TYPE_NORMAL,
            'properties' => [],
        ],
        'accepted' => [
            'type'      => Finite\State\StateInterface::TYPE_FINAL,
            'properties' => ['printable' => true],
        ]
    ],
    'transitions' => [
        'propose' => ['from' => ['draft'], 'to' => 'proposed', 'properties' => ['foo' ↵
↪=> 'bar']],
        'accept'  => ['from' => ['proposed'], 'to' => 'accepted'],
        'reject'  => ['from' => ['proposed'], 'to' => 'draft'],
    ],
    'callbacks' => [
        'before' => [
            [
                'from' => '-proposed',
                'do'   => function(\Finite\Event\TransitionEvent $e) {
                    echo 'Applying transition '.$e->getTransition()->getName(), "\n";
                    if ($e->has('foo')) {
                        echo "Parameter \"foo\" is defined\n";
                    }
                }
            ],
            [
                'from' => 'proposed',
```

```

        'do' => function() {
            echo 'Applying transition from proposed state', "\n";
        }
    ],
    'after' => [
        [
            'to' => ['accepted'], 'do' => [$document, 'display']
        ]
    ]
];
});

$stateMachine->apply('propose');
// => "Applying transition propose"
// => "Parameter "foo" is defined"

$stateMachine->apply('reject');
// => "Applying transition from proposed state"

$stateMachine->apply('propose');
// => "Applying transition propose"
// => "Parameter "foo" is defined"

$stateMachine->apply('accept');
// => "Applying transition from proposed state"
// => "Hello, I'm a document and I'm currently at the accepted state."

```

3.4 Use event dispatcher

If you prefer, you can use directly the event dispatcher.

Here is the available events :

```

finite.initialize      => Dispatched at State Machine initialization
finite.test_transition => Dispatched when testing if a transition can be applied
finite.pre_transition  => Dispatched before a transition
finite.post_transition => Dispatched after a transition

finite.test_transition.{transitionName} => Dispatched when testing if a specific_
↳ transition can be applied
finite.pre_transition.{transitionName} => Dispatched before a specific transition
finite.post_transition.{transitionName} => Dispatched after a specific transition

finite.test_transition.{graph}.{transitionName} => Dispatched when testing if a_
↳ specific transition in a specific graph can be applied
finite.pre_transition.{graph}.{transitionName} => Dispatched before a specific_
↳ transition in a specific graph
finite.post_transition.{graph}.{transitionName} => Dispatched after a specific_
↳ transition in a specific graph

```

3.4.1 Example :

```
<?php
$stateMachine->getDispatcher()->addListener('finite.pre_transition',
↳function(\Finite\Event\TransitionEvent $e) {
    echo 'This is a pre transition', "\n";
});
$stateMachine->apply('propose');
// => "This is a pre transition"
```

3.4.2 Example testing transitions:

```
<?php
$stateMachine->getDispatcher()->addListener('finite.test_transition',
↳function(\Finite\Event\TransitionEvent $e) {
    $e->reject();
});

try {
    $stateMachine->apply('propose');
}
catch (Finite\StateMachine\Exception\StateException $e) {
    echo 'The transition did not apply', "\n";
}

// => "The transition did not apply"
```

Transitions properties

As the second argument, *StateMachine#apply* and *StateMachine#test* will accept an array of properties to be passed to the dispatched event, and accessible by the listeners.

Default properties can be defined with your state graph.

```
$stateManager->apply('some_event', array('something' => $value));
```

In your listeners you just have to call ``$event->getProperties()`` to access the passed data.

```
<?php
namespace My\AwesomeBundle\EventListener;

use Finite\Event\TransitionEvent;

class TransitionListener
{
    /**
     * @param TransitionEvent $event
     */
    public function someEvent(TransitionEvent $event)
    {
        $entity = $event->getStateMachine()->getObject();
        $params = $event->getProperties();

        $entity->setSomething($params['something']);
    }
}
```

4.1 Default properties

```
'transitions' => array(
    'finish'    => array(
        'from' => array('middle'),
        'to'   => 'end',
        'properties' => array('foo' => 'bar'),
        'configure_properties' => function (OptionsResolver $resolver) {
            $resolver->setRequired('baz');
        }
    )
)
```

CHAPTER 5

A PHP Finite State Machine

Finite is a state machine library that gives you ability to manage the state of a PHP object through a graph of states and transitions.

6.1 Define your workflow / state graph

```
<?php

$document      = new MyDocument;
$stateMachine  = new Finite\StateMachine\StateMachine;
$loader        = new Finite\Loader\ArrayLoader([
    'class' => 'MyDocument',
    'states' => [
        'draft'    => ['type' => 'initial', 'properties' => []],
        'proposed' => ['type' => 'normal',  'properties' => []],
        'accepted' => ['type' => 'final',   'properties' => []],
        'refused'  => ['type' => 'final',   'properties' => []],
    ],
    'transitions' => [
        'propose' => ['from' => ['draft'],    'to' => 'proposed'],
        'accept'  => ['from' => ['proposed'], 'to' => 'accepted'],
        'refuse'  => ['from' => ['proposed'], 'to' => 'refused'],
    ]
]);

$loader->load($stateMachine);
$stateMachine->setObject($document);
$stateMachine->initialize();
```

6.2 Define your object

```
<?php

class MyDocument implements Finite\StatefulInterface
{
```

```
private $state;
public function getFiniteState()
{
    return $this->state;
}
public function setFiniteState($state)
{
    $this->state = $state;
}
}
```

6.3 Work with states & transitions

```
<?php
echo $stateMachine->getCurrentState();
// => "draft"

var_dump($stateMachine->can('accept'));
// => bool(false)

var_dump($stateMachine->can('propose'));
// => bool(true)

$stateMachine->apply('propose');
echo $stateMachine->getCurrentState();
// => "proposed"
```

CHAPTER 7

Contribute

Contributions are welcome !

Finite follows PSR-2 code, and accept pull-requests on the [GitHub repository](#).

If you're a beginner, you will find some guidelines about code contributions at [Symfony](#).