

Unicorn

version

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Contents

Unicorn	1
Installation	1
FAQ	1
Do I need to learn a new frontend framework for Unicorn?	1
Do I need to build an entire API to use Unicorn?	1
Do I need to need to install GraphQL to use Unicorn?	1
Do I need to run an annoying separate node.js process or learn any tedious Webpack configuration incantations to use Unicorn?	1
Does this replace Vue.js or React?	1
Isn't calling an AJAX endpoint on every input slow?	2
But, what about security?	2
What browsers does Unicorn support?	2
How to make sure that the new JavaScript is served when a new version of Unicorn is released?	2
Changelog	2
v0.14.0	2
v0.13.0	2
v0.12.0	2
v0.11.2	2
v0.11.0	3
v0.10.1	3
v0.10.0	3
v0.9.4	3
v0.9.3	3
v0.9.1	3
v0.9.0	3
v0.8.0	4
v0.7.1	4
v0.7.0	4
v0.6.5	4
v0.6.4	4
v0.6.3	4
v0.6.2	5
v0.6.1	5
v0.6.0	5
v0.5.0	5
v0.4.0	5
v0.3.0	5
v0.2.3	5
v0.2.2	6
v0.2.1	6

v0.2.0	6
v0.1.1	6
v0.1.0	6
Components	6
Component key	6
Component arguments	7
Example component	7
Unicorn attributes	8
Supported property types	8
Accessing nested fields	8
Django QuerySet	8
Custom class	9
Templates	9
Model modifiers	10
Lazy	10
Debounce	10
Defer	10
Chaining modifiers	10
Key	10
Smooth updates	10
DOM merging	11
Django Models	11
Class Model	11
Instance Model	11
DbModel	12
Queryset	12
Actions	13
Events	14
Passing arguments	14
Argument types	14
Set shortcut	15
Modifiers	15
prevent	15
stop	15
Special arguments	15
\$event	15
\$model	16
\$returnValue	16
Special methods	16
\$refresh	16
\$reset	17
\$toggle	17

\$validate	17
Calling methods	17
Return values	17
Validation	18
Showing validation errors	18
Highlighting the invalid form	18
Showing a specific error message	19
Showing all the error messages	19
Validate the entire component	19
Redirecting	20
Redirect	20
HashUpdate	21
LocationUpdate	21
Loading States	22
Toggling Elements	22
Toggling Attributes	23
attr	23
class	23
class.remove	23
Polling	23
Advanced	24
Class properties	24
template_name	24
Instance properties	24
request	24
Custom methods	24
Instance methods	25
__init__()	25
mount()	25
hydrate()	25
updating(name, value)	26
updated(name, value)	26
updating_{property_name}(value)	26
updated_{property_name}(value)	26
calling(name, args)	26
called(name, args)	26
Meta	26
exclude	26
Settings	27
MINIMIZE	27
APPS	27
CLI	27

Unicorn

Installation

Install `Unicorn` the same as any other Python package (preferably into a virtual environment).

```
pip install django-unicorn
```

OR

```
poetry add django-unicorn
```

Next, install `Unicorn` into the Django project.

- Add `"django_unicorn"`, to the `INSTALLED_APPS` array in the Django settings file (normally `settings.py`)
- Add `path("unicorn/", include("django_unicorn.urls"))`, into the project's `urls.py`
- Add `{% load unicorn %}` to the top of the Django HTML template
- Add `{% unicorn_scripts %}` into the Django HTML template

Then, create a component.

FAQ

Do I need to learn a new frontend framework for Unicorn?

Nope! `Unicorn` gives you some magical template tags and HTML attributes to sprinkle in normal Django HTML templates. The backend code is a simple class that ultimately derives from `TemplateView`. Keep using the same Django HTML templates, template tags, filters, etc and the best-in-class Django ORM without learning another new framework of the week.

Do I need to build an entire API to use Unicorn?

Nope! Django REST framework is pretty magical on its own, and if you will need a mobile app or other use for a REST API, it's a great set of abstractions to follow REST best practices. But, it can be challenging implementing a robust API even with Django REST framework. And I wouldn't even attempt to build an API up from scratch unless it was extremely limited.

Do I need to need to install GraphQL to use Unicorn?

Nope! GraphQL looks like an awesome technology for specific use-cases and solves some pain points around creating a RESTful API. But, it is another peiece of technology to wrestle with.

Do I need to run an annoying separate node.js process or learn any tedious Webpack configuration incantations to use Unicorn?

Nope! `Unicorn` installs just like any normal Django package and is seamless to implement. There `are` a few "magic" attributes to sprinkle into a Django HTML template, but other than that it's just like building a regular server-side application.

Does this replace Vue.js or React?

Nope! In some cases, you might need to actually build an SPA in which case `Unicorn` really isn't that helpful. In that case you might have to invest the time to learn a more involved frontend framework. Read [Using VueJS alongside Django](#) for one approach, or check out [other articles](#) about this.

Isn't calling an AJAX endpoint on every input slow?

Not really! `Unicorn` is ideal for when an AJAX call would already be required (such as hitting an API for typeahead search or update data in a database). If that isn't required, the `lazy` and `debounce` modifiers can also be used to prevent an AJAX call on every change.

But, what about security?

`Unicorn` follows the best practices of Django and requires a `CSRF token` to be set on any page that has a component. This ensures that no nefarious AJAX POSTs can be executed. `Unicorn` also creates a unique component checksum with the Django `secret key` on every data change which also ensures that all updates are valid.

What browsers does Unicorn support?

`Unicorn` mostly targets modern browsers, but the project would appreciate any PRs to help support legacy browsers.

How to make sure that the new JavaScript is served when a new version of Unicorn is released?

`Unicorn` works great with the `whitenoise` ability to serve static assets with a filename based on a hash of the file. `CompressedManifestStaticFilesStorage` works great for this purpose and is used by django-unicorn.com for this very purpose. Example code can be found at <https://github.com/adamghill/django-unicorn.com/>.

Changelog

v0.14.0

- Dynamically disable polling
- Basic support for `pydantic` models

All changes since 0.13.0.

v0.13.0

- Component key to allow disambiguation of components of the same name
- `$returnValue` special argument
- Get the last action method's return value

All changes since 0.12.0.

v0.12.0

- Redirect from action method in component

All changes since 0.11.2.

v0.11.2

- Fix encoding issue with default component template on Windows (#91)
- Fix circular import when creating the component (#92)

All changes since 0.11.0.

v0.11.0

- `$model` special argument and decorator.
- `$toggle` special method.
- Support nested properties when using the set shortcut.
- Fix action string arguments that would get spaces removed inadvertently.

Breaking changes

- All existing special methods now start with a `$` to signify they are magical. Therefore, `refresh` is now `$refresh`, `reset` is now `$reset`, and `validate` is now `$validate`.

[All changes since 0.10.1.](#)

v0.10.1

- Use LRU cache for constructed components to prevent ever-expanding memory.
- Loosen `beautifulsoup4` version requirement.
- Fix bug to handle floats so that they don't lose precision when serialized to JSON.
- Fix bug to handle related models (ForeignKeys, OneToOne, etc) fields in Django models.

[All changes since 0.10.0.](#)

v0.10.0

- Add support for passing kwargs into the component on the template
- Provide access to the current request in the component's methods

[All changes since 0.9.4.](#)

v0.9.4

- Fix: Prevent Django `CharField` form field from stripping whitespaces when used for validation.
- Fix: Handle edge case that would generate a null exception.
- Fix: Only change loading state when an action method gets called, not on every event fire.

[All changes since 0.9.1.](#)

v0.9.3

- Handle child elements triggering an event which should be handled by a parent unicorn element.

[All changes since 0.9.1.](#)

v0.9.1

- Fix: certain actions weren't triggering model values to get set correctly

[All changes since 0.9.0.](#)

v0.9.0

- Loading states for improved UX.
- `$event` special argument for actions.

Changelog

- `u` unicorn attribute.
- `APPS` setting for determining where to look for components.
- Add support for parent elements for non-db models.
- Fix: Handle if `Meta` doesn't exist for db models.

[All changes since 0.8.0.](#)

v0.8.0

- Add much more elaborate support for dealing with Django models.

[All changes since 0.7.1.](#)

v0.7.1

- Fix bug where multiple actions would trigger multiple payloads.
- Handle lazy models that are children of an action model better.

[All changes since 0.7.0.](#)

v0.7.0

- Parse action method arguments as basic Python objects
- Stop and prevent modifiers on actions
- Defer modifier on model
- Support for multiple actions on the same element
- Django setting to minimize the JavaScript

Breaking changes

- Remove unused `unicorn_styles` template tag
- Use dash for poll timing instead of dot

[All changes since 0.6.5.](#)

v0.6.5

- Attempt to get the CSRF token from the cookie first before looking at the CSRF token.

[All changes since 0.6.4.](#)

v0.6.4

- Fix bug where lazy models weren't sending values before an action was called
- Add `is_valid` method to component to more easily check if a component has validation errors.
- Better error message if the CSRF token is not available.

[All changes since 0.6.3.](#)

v0.6.3

- Fix bug where model elements weren't getting updated values when an action was being called during the same component update.
- Fix bug where some action event listeners were duplicated.

[All changes since 0.6.2.](#)

v0.6.2

- More robust fix for de-duping multiple actions.
- Fix bug where conditionally added actions didn't get an event listener.

[All changes since 0.6.1.](#)

v0.6.1

- Fix model sync getting lost when there is an action ([issue 39](#)).
- Small fix for validations.

[All changes since 0.6.0.](#)

v0.6.0

- Realtime validation of a Unicorn model.
- Polling for component updates.
- More component hooks

[All changes since 0.5.0.](#)

v0.5.0

- Call component method from JavaScript.
- Support classes, dictionaries, Django Models, (read-only) Django QuerySets properties on a component.
- Debounce modifier to change how fast changes are sent to the backend from `unicorn:model`.
- Lazy modifier to listen for `blur` instead of `input` on `unicorn:model`.
- Better support for `textarea` HTML element.

[All changes since 0.4.0.](#)

v0.4.0

- Set shortcut for setting properties.
- Listen for any valid event, not just `click`.
- Better handling for model updates when element ids aren't unique.

[All changes since 0.3.0.](#)

v0.3.0

- Add mount hook.
- Add reset action.
- Remove lag when typing fast in a text input and overall improved performance.
- Better error handling for exceptional cases.

[All changes since 0.2.3.](#)

v0.2.3

Components

- Fix for creating default folders when running `startunicorn`.

[All changes since 0.2.2.](#)

v0.2.2

- Set default `template_name` if it's missing in component.

[All changes since 0.2.1.](#)

v0.2.1

- Fix `startunicorn` Django management command.

[All changes since 0.2.0.](#)

v0.2.0

- Switch from `Component` class to `UnicornView` to follow the conventions of class-based views.
- Investigate using class-based view instead of the custom `Component` class

[All changes since 0.1.1.](#)

v0.1.1

- Fix package readme and repository link.

[All changes since 0.1.0.](#)

v0.1.0

- Initial version with basic functionality.

Components

Unicorn uses the term “component” to refer to a set of interactive functionality that can be put into templates. A component consists of a Django HTML template with specific tags and a Python class which provides the backend code for the template.

The easiest way to create your first component is to run the following Django management command after Unicorn is installed.

```
python manage.py startunicorn hello-world
```

Tip

If this is the first component you create, you will also need to add `"unicorn"`, to `INSTALLED_APPS` in your Django settings file (normally [settings.py](#)) to make sure that Django can find the component templates you create.

Add `{% unicorn 'hello-world' %}` into the template where you want to load the new component.

Component key

If there are multiple of the same components on the page, a `key` kwarg can be passed into the template. For example, `{% unicorn 'hello-world' key='helloWorldKey' %}`.

Component arguments

kwargs can be passed into the `unicorn` templatetag from the template. The kwargs will be available in the component `__init__` method.

Warning

When overriding `__init__` calling `super().__init__(**kwargs)` is required for the component to initialize properly.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    name = "World"

    def __init__(self, *args, **kwargs):
        super().__init__(**kwargs) # calling super is required
        self.name = kwargs.get("name")
```

```
<!-- index.html -->
{% unicorn 'hello-world' name="Universe" %}
```

Regular Django template variables can also be passed in as an argument as long as it is available in the template context.

```
# views.py
from django.shortcuts import render

def index(request):
    context = {"hello": {"world": {"name": "Galaxy"}}}
    return render(request, "index.html", context)
```

```
<!-- index.html -->
{% unicorn 'hello-world' name=hello.world.name %}
```

Example component

A basic example component could consist of the following template and class.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    name = "World"
```

```
<!-- hello-world.html -->
<div>
  <input unicorn:model="name" type="text" id="text" /><br />
  Hello {{ name|title }}
</div>
```

`unicorn:model` is the magic that ties the input to the backend component. The Django template variable can use any property or method on the component as if they were context variables passed in from a view. The attribute passed into `unicorn:model` refers to the property in the component class and binds them together.

Note

By default `unicorn:model` updates are triggered by listening to `input` events on the element. To listen for the `blur` event instead, use the `lazy` modifier.

When a user types into the text input, the information is passed to the backend and populates the component class, which is then used to generate the output of the template HTML. The template can use any normal Django `templatetags` or filters (e.g. the `title` filter above).

Unicorn attributes

Attributes used in component templates usually start with `unicorn:`, however the shortcut `u:` is also supported. So, for example, `unicorn:model` could also be written as `u:model`.

Supported property types

Properties of the component can be of many different types, including `str`, `int`, `list`, `dictionary`, Django `Model`, Django `QuerySet`, or custom classes.

Accessing nested fields

Fields in a dictionary or Django model can be accessed similarly to the Django template language with “dot-notation”.

```
# hello_world.py
from django_unicorn.components import UnicornView
from book.models import Book

class HelloWorldView(UnicornView):
    book = Book.objects.get(title='American Gods')
    book_ratings = {'excellent': {'title': 'American Gods'}}
```

```
<!-- hello-world.html -->
<div>
  <input unicorn:model="book.title" type="text" id="model" />
  <input
    unicorn:model="book_ratings.excellent.title"
    type="text"
    id="dictionary"
  />
</div>
```

Note

Django models has many more details about using Django models in Unicorn.

Django QuerySet

Django `QuerySet` can be referenced similarly to the Django template language in a `unicorn:model`.

```
# hello_world.py
from django_unicorn.components import UnicornView
from book.models import Book

class HelloWorldView(UnicornView):
    books = Book.objects.all()
```

```
<!-- hello-world.html -->
<div>
  <input unicorn:model="books.0.title" type="text" id="text" />
</div>
```

Note

Django models has many more details about using Django QuerySets in Unicorn.

Custom class

Custom classes need to define how they are serialized. If you have access to the object to serialize, you can define a `to_json` method on the object to return a dictionary that can be used to serialize. Inheriting from `unicorn.components.UnicornField` is a quick way to serialize a custom class, but note that it just calls `self.__dict__` under the hood, so it is not doing anything particularly smart.

Another option is to set the `form_class` on the component and utilize Django's built-in forms and widgets to handle how the class should be deserialized. More details are provided in validation.

```
# hello_world.py
from django_unicorn.components import UnicornView, UnicornField

class Author(UnicornField):
    def __init__(self):
        self.name = 'Neil Gaiman'

    # Not needed because inherited from `UnicornField`
    # def to_json(self):
    #     return {'name': self.name}

class HelloWorldView(UnicornView):
    author = Author()
```

```
<!-- hello-world.html -->
<div>
  <input unicorn:model="author.name" type="text" id="author_name" />
</div>
```

!DANGER!

Never put sensitive data into a public property because that information will publicly available in the HTML source code.

Templates

Templates are just normal Django HTML templates, so anything you could normally do in a Django template will still work, including template tags, filters, loops, if statements, etc.

Warning

Unicorn requires there to be a root `div` element surrounding the component template.

Model modifiers

Lazy

To prevent updates from happening on every input, you can append a `lazy` modifier to the end of `unicorn:model`. That will only update the component when a `blur` event happens.

```
<!-- waits-for-blur.html -->
<div>
  <input unicorn:model.lazy="name" type="text" id="name" />
  Hello {{ name|title }}
</div>
```

Debounce

The `debounce` modifier configures how long to wait to fire an event. The time is always specified in milliseconds, for example: `unicorn:model.debounce-1000` would wait for 1000 milliseconds (1 second) before firing the message.

```
<!-- waits-1-second.html -->
<div>
  <input unicorn:model.debounce-1000="name" type="text" id="name" />
  Hello {{ name|title }}
</div>
```

Defer

The `defer` modifier will store and save model changes until the next action gets triggered. This is useful to prevent additional network requests until an action is triggered.

```
<!-- defer.html -->
<div>
  <input unicorn:model.defer="task" type="text" id="task" />
  <button unicorn:click="add">Add task</button>
  <ul>
    {% for task in tasks %}
    <li>{{ task }}</li>
    {% endfor %}
  </ul>
</div>
```

Chaining modifiers

Lazy and debounce modifiers can even be chained together.

```
<!-- waits-for-blur-and-then-5-seconds.html -->
<div>
  <input unicorn:model.lazy.debounce-5000="name" type="text" id="text" />
  Hello {{ name|title }}
</div>
```

Key

Smooth updates

Setting a unique `id` on elements with `unicorn:model` will prevent changes to an input from being choppy when there are lots of updates in quick succession.

```
<!-- choppy-updates.html -->
<input type="text" unicorn:model="name"></input>
```



```
!-- smooth-updates.html -->
<input type="text" id="someFancyId" unicorn:model="name"></input>
```

However, setting the same `id` on two elements with the same `unicorn:model` won't work. The `unicorn:key` attribute can be used to make sure that the elements can be synced as expected.

```
<!-- missing-updates.html -->
<input type="text" id="someFancyId" unicorn:model="name"></input>
<input type="text" id="someFancyId" unicorn:model="name"></input>
```

```
<!-- this-should-work.html -->
<input type="text" id="someFancyId" unicorn:model="name"></input>
<input type="text" id="someFancyId" unicorn:model="name" unicorn:key="someFancyKey"></input>
```

DOM merging

The JavaScript library used to merge changes in the DOM, `morphdom`, uses an element's `id` to intelligently update DOM elements. If it isn't possible to have an `id` attribute on the element, `unicorn:key` will be used if it is available.

Django Models

Unicorn provides tight integration with Django Models and Querysets to handle typical Django workflows. There are multiple ways to integrate a Django model with a component. They all work a little differently and which option you choose to do depends on the situation.

Class Model

Django models can be initialized similar to how basic Python objects (i.e. strings, integers, dictionaries) can be set on a component.

```
<!-- class-model.html -->
<div>
  <input unicorn:model=defer="book.title" type="text" id="book" />
  {{ book.title }}
  <button unicorn:click="save">Save</button>
</div>
```

```
# class_model.py
from django_unicorn.components import UnicornView
from books.models import Book

class ClassModelView(UnicornView):
    book = Book()

    def save(self):
        self.book.save()
```

Instance Model

Django models can be initialized in the component's `__init__` method similar to how a "normal" class would initialize an instance variable.

!DANGER!

`super().__init__(**kwargs)` **has** to be called at the end of the overridden `__init__` method.

```
<!-- instance-model.html -->
<div>
```

```

<input unicorn:model,defer="book.title" type="text" id="book" />
{{ book.title }}
<button unicorn:click="save">Save</button>
</div>

```

```

# instance_model.py
from django_unicorn.components import UnicornView
from books.models import Book

class InstanceModelView(UnicornView):
    def __init__(self, **kwargs):
        self.book = Book()

        # super() has to be called at the end
        super().__init__(**kwargs)

    def save(self):
        self.book.save()

```

DbModel

If there is no reason to have a class or instance attribute, then Unicorn also provides a `DbModel` class that ties a simple name used in the front-end to a Django model defined in the component.

`unicorn:db` can also live in a parent element and surround a group of inputs. The `unicorn:field` attribute is used for the model's fields.

```

<!-- db-model.html -->
<div>
  <div unicorn:db="book">
    <div>
      <input unicorn:field,defer="title" type="text" id="title" />
      {{ book.title }}
    </div>
    <div>
      <input unicorn:field,defer="description" type="text" id="description" />
      {{ book.description }}
    </div>
  </div>

  <button unicorn:click="save">Save</button>

</div>

```

```

# db_model.py
from django_unicorn.components import UnicornView
from django_unicorn.db import DbModel
from books.models import Book

class DbModelView(UnicornView):
    class Meta:
        db_models = [DbModel("book", Book)]

    def save(self):
        pass

```

Queryset

Binding models to a Django Queryset is done by setting an `unicorn:pk` attribute with the model's pk (normally an integer in an `id` field, but could be a custom `primary_key`).

Warning

A blank value for an `unicorn:pk` attribute signals to Unicorn to create a new instance of the underlying Django model of the queryset.

```
<!-- queryset.html -->
<div>
  <div unicorn:model="books">
    <div unicorn:pk="">
      <!-- A blank pk will create a new model when it is saved -->
      <div>
        <input unicorn:field.defer="title" type="text" id="title" />
      </div>
      <div>
        <input unicorn:field.defer="description" type="text" id="description" />
      </div>
    </div>

    {% for book in books %}
    <div unicorn:pk="{{ book.pk }}">
      <!-- Using the model's pk will save the model -->
      <div>
        <input unicorn:field.defer="title" type="text" id="title" />
        {{ book.title }}
      </div>
      <div>
        <input unicorn:field.defer="description" type="text" id="description" />
        {{ book.description }}
      </div>
    </div>
    {% endfor %}

  </div>

  <button unicorn:click="save">Save</button>
</div>
```

```
# queryset.py
from django_unicorn.components import UnicornView
from books.models import Book

class QuerysetView(UnicornView):
    books = Book.objects.none()

    def hydrate(self):
        # Using `hydrate` is the best way to make sure that QuerySets
        # are re-queried every time the component is loaded
        self.books = Book.objects.all().order_by("-id")[:5]

    def save(self):
        pass
```

Actions

Components can also trigger methods from the templates by listening to any valid event type. The most common events would be `click`, `input`, `keydown`, `keyup`, and `mouseenter`, but [MDN has a list of all of the browser event types available](#).

Events

An example action to call the `clear_name` method on the component.

```
<!-- clear-name.html -->
<div>
  <input unicorn:model="name" type="text" id="text" />
  Hello {{ name|title }}
  <button unicorn:click="clear_name">Clear Name</button>
</div>
```

```
# clear_name.py
from django_unicorn.components import UnicornView

class ClearNameView(UnicornView):
    name = "World"

    def clear_name(self):
        self.name = ""
```

When the button is clicked, the `name` property will get set to an empty string. Then, the component will intelligently re-render itself and the text input will update to match the property on the component.

Tip

Instance methods without arguments can be called from the template with or without parenthesis.

Passing arguments

Actions can also pass basic Python types to the backend component.

```
<!-- passing-args.html -->
<div>
  <input unicorn:model="name" type="text" id="text" />
  Hello {{ name|title }} ■
  <button unicorn:click="set('Bob')">Set as Bob</button>
  <button unicorn:click="set()">Set default value of name argument</button>
</div>
```

```
# passing_args.py
from django_unicorn.components import UnicornView

class PassingArgsView(UnicornView):
    name = "World"

    def set(self, name="Universe"):
        self.name = name
```

Argument types

Arguments can be most basic Python types, including string, int, float, list, tuple, dictionary, set, datetime, and UUID4.

```
<!-- argument-types.html -->
<div>
  <button unicorn:click="update(99)">Pass int</button>
  <button unicorn:click="update(1.234)">Pass float</button>
  <button unicorn:click="update({'key': 'value'})">Pass dictionary</button>
  <button unicorn:click="update([1, 2, 3])">Pass list</button>
```

```

<button unicorn:click="update((1, 2, 3))">Pass tuple</button>
<button unicorn:click="update({1, 2, 3})">Pass set</button>
<button unicorn:click="update(2020-09-12T01:01:01)">Pass datetime</button>
<button unicorn:click="update(90144cb9-fc47-476d-b124-d543b0cff091)">
    Pass UUID
</button>
</div>

```

Note

Strings will be converted to datetime if they are successfully parsed by Django's `parse_datetime` method.

Set shortcut

Actions can also set properties without requiring an explicit method.

```

<!-- set-shortcut.html -->
<div>
  <input unicorn:model="name" type="text" id="text" />
  Hello {{ name|title }} ■
  <button unicorn:click="name='Bob'">Set name as Bob</button>
</div>

```

```

# set_shortcut.py
from django_unicorn.components import UnicornView

class SetShortcutView(UnicornView):
    name = "World"

```

Modifiers

Similar to models, actions also have modifiers which change how the method gets called.

prevent

Prevents the default action the browser would use for that element. The same as calling `preventDefault`.

```

<!-- prevent-modifier.html -->
<div>
  <button unicorn:click.prevent="name='Bob'">Set name as Bob</button>
</div>

```

stop

Stops the event from bubbling up the event chain. The same as calling `stopPropagation`.

```

<!-- stop-modifier.html -->
<div>
  <button unicorn:click.stop="name='Bob'">Set name as Bob</button>
</div>

```

Special arguments

\$event

A reference to the event that triggered the action.

```
<!-- event.html -->
<div>
  <input type="text" unicorn:change="update($event.target.value.trim())">Update</input>
</div>
```

\$model

Sends the current `db_model` to an action.

Note

`$model` requires `db_models` to be defined in the component's `Meta` class. The component method must also be decorated with `django_unicorn.decorators.db_model` and must have at least one argument (which will be converted into the specified Django model from the frontend).

```
# model.py
from django_unicorn.components import UnicornView
from django_unicorn.db import DbModel
from django_unicorn.decorators import db_model
from .models import Book

class ModelView(UnicornView):
    books = Book.objects.all()

    @db_model
    def delete(self, book):
        book.delete()

    class Meta:
        db_models = [DbModel("book", Book)]
```

```
<!-- model.html -->
<div>
  <div unicorn:db="book">
    {% for book in books %}
      <div unicorn:pk="{{ book.pk }}">
        <input type="text" unicorn:change="delete($model)">Delete the current book</input>
      </div>
    {% endfor %}
  </div>
</div>
```

\$returnValue

A reference to the last return value from an action method.

```
<!-- returnValue.html -->
<div>
  <input type="text" unicorn:change="update($returnValue.trim())">Update</input>
</div>
```

Special methods

\$refresh

Refresh and re-render the component from its current state.

```
<!-- refresh-method.html -->
<div>
  <button unicorn:click="$refresh">Refresh the component</button>
</div>
```

\$reset

Revert the component to its original state.

```
<!-- reset-method.html -->
<div>
  <button unicorn:click="$reset">Reset the component</button>
</div>
```

\$toggle

Toggle a field on the component. Can only be used for fields that are booleans.

```
<!-- toggle-method.html -->
<div>
  <button unicorn:click="$toggle('check')">Toggle the check field</button>
</div>
```

Tip

Multiple fields can be toggled at the same time by passing in multiple fields at a time: `unicorn:click="$toggle('check', 'another_check', 'a_third_check')"`. Nested properties are also supported: `unicorn:click="$toggle('nested.check')"`.

\$validate

Validates the component.

```
<!-- validate-method.html -->
<div>
  <button unicorn:click="$validate">Validate the component</button>
</div>
```

Calling methods

Sometimes you need to trigger a method on a component from regular JavaScript. That is possible with `Unicorn.call()`. It can be called from anywhere on the page.

```
<!-- index.html -->
{% unicorn 'hello-world' %}

<button onclick="Unicorn.call('hello-world', 'set_name');">
  Set the name from outside the component
</button>
```

Return values

To retrieve the last action method's return value, use `Unicorn.getReturnValue()`.

```
<!-- index.html -->
{% unicorn 'hello-world' %}

<button onclick="alert(Unicorn.getReturnValue('hello-world'));">
```

```
Get the last return value
</button>
```

Validation

Unicorn uses Django forms infrastructure for all validation. This means that a form could be re-used between any other Django views and a Unicorn.

Using the Django forms system provides a way to serialize/deserialize certain classes (for example, datetime and uuid) and a way to validate properties of a class.

Note

There are many [built-in fields available for Django form fields](#) which can be used to validate text inputs.

```
# book.py
from django_unicorn.components import UnicornView
from django import forms

class BookForm(forms.Form):
    title = forms.CharField(max_length=100, required=True)
    publish_date = forms.DateField(required=True)

class BookView(UnicornView):
    form_class = BookForm

    title = ""
    publish_date = ""
```

```
<!-- book.html -->
<div>
  <input unicorn:model="title" type="text" id="title" /><br />
  <input unicorn:model="publish_date" type="text" id="publish-date" /><br />
  <button unicorn:click="$validate">Validate</button>
</div>
```

Because of the `form_class = BookForm` defined on the UnicornView above, Unicorn will automatically validate that the title has a value and is less than 100 characters. The `publish_date` will also be converted into a datetime from the string representation in the text input.

Showing validation errors

As the form is filled out the appropriate inputs will be validated. There are a few ways to show the validation messages.

Highlighting the invalid form

When a model form is invalid, a special `unicorn:error` attribute is added to the element. Depending on whether it is an invalid or required error code, the attribute will be `unicorn:error:invalid` or `unicorn:error:required`. The value of the attribute will be the validation message.

```
<!-- highlight-input-errors.html -->
<div>
  <style>
    [unicorn:error:invalid] {
      border: 1px solid red !important;
    }
    [unicorn:error:required] {
```



```

        border: 1px solid red !important;
    }
</style>

<input
    unicorn:model="publish_date"
    type="text"
    id="publish-date"
    unicorn:error:invalid="Enter a valid date/time."
/><br />
</div>

```

Showing a specific error message

```

<!-- show-error-message.html -->
<div>
    <input unicorn:model="publish_date" type="text" id="publish-date" /><br />
    <span class="error">{{ unicorn.errors.publish_date.0.message }}</span>
</div>

```

Showing all the error messages

There is a `unicorn_errors` template tag that shows all errors for the component. It should provide an example of how to display component errors in a more specific way if needed.

```

<!-- show-all-error-messages.html -->
{% load unicorn %}

<div>
    {% unicorn_errors %}

    <input unicorn:model="publish_date" type="text" id="publish-date" /><br />
</div>

```

Validate the entire component

The magic action method `$validate` can be used to validate the whole component by the front-end.

```

<!-- validate.html -->
<div>
    <input unicorn:model="publish_date" type="text" id="publish-date" /><br />
    <button unicorn:click="$validate">Validate</button>
</div>

```

The `validate` method can also be used inside of the component.

```

# validate.py
from django_unicorn.components import UnicornView
from django import forms

class BookForm(forms.Form):
    title = forms.CharField(max_length=6, required=True)

class BookView(UnicornView):
    form_class = BookForm

    text = "hello"

    def set_text(self):

```

```
self.text = "hello world"
self.validate()
```

The `is_valid` can also be used inside of the component to check if a component is valid.

```
# validate.py
from django_unicorn.components import UnicornView
from django import forms

class BookForm(forms.Form):
    title = forms.CharField(max_length=6, required=True)

class BookView(UnicornView):
    form_class = BookForm

    text = "hello"

    def set_text(self):
        if self.is_valid():
            self.text = "hello world"
```

Redirecting

Unicorn has a few different ways to redirect from an action method.

Redirect

To redirect the user, return a `HttpResponseRedirect` from an action method. Using the Django shortcut `redirect` method is one way to do that in a typical Django manner.

Note

`django.shortcuts.redirect` can take a Django model, Django view name, an absolute url, or a relative url. However, the `permanent` kwarg for `redirect` has no bearing in this context.

Tip

It is not required to use `django.shortcuts.redirect`. Anything that returns a `HttpResponseRedirect` will behave the same in Unicorn.

```
# redirect.py
from django.shortcuts import redirect
from django_unicorn.components import UnicornView
from .models import Book

class BookView(UnicornView):
    title = ""

    def save_book(self):
        book = Book(title=self.title)
        book.save()
        self.reset()

        return redirect(f"/book/{book.id}")
```

```
<!-- redirect.html -->
<div>
  <input unicorn:model="title" type="text" id="title" /><br />
  <button unicorn:click="save_book()">Save book</button>
</div>
```

HashUpdate

To avoid a server-side page refresh and just update the hash at the end of the url, return `HashUpdate` from the action method.

```
# hash_update.py
from django_unicorn.components import HashUpdate, UnicornView
from .models import Book

class BookView(UnicornView):
    title = ""

    def save_book(self):
        book = Book(title=self.title)
        book.save()
        self.reset()

        return HashUpdate(f"#{book.id}")
```

```
<!-- hash-update.html -->
<div>
  <input unicorn:model="title" type="text" id="title" /><br />
  <button unicorn:click="save_book()">Save book</button>
</div>
```

LocationUpdate

To avoid a server-side page refresh and update the whole url, return a `LocationUpdate` from the action method. `LocationUpdate` is instantiated with a `HttpResponseRedirect` arg and an optional `title` kwarg.

Note

`LocationUpdate` uses `window.history.pushState` so the new url must be relative or the same origin as the original url.

```
# location_update.py
from django.shortcuts import redirect
from django_unicorn.components import LocationUpdate, UnicornView
from .models import Book

class BookView(UnicornView):
    title = ""

    def save_book(self):
        book = Book(title=self.title)
        book.save()
        self.reset()

        return LocationUpdate(redirect(f"/book/{book.id}"), title=f"{book.title}")
```

```
<!-- location-update.html -->
<div>
  <input unicorn:model="title" type="text" id="title" /><br />
  <button unicorn:click="save_book()">Save book</button>
</div>
```

Loading States

Because Unicorn requires an AJAX request for any component updates, it is helpful to provide some context to the user that an action is happening.

Toggling Elements

Elements with the `unicorn:loading` attribute are only visible when an action is in process.

```
<!-- loading.html -->
<div>
  <button unicorn:click="update">Update</button>

  <div unicorn:loading>Updating!</div>
</div>
```

When the *Update* button is clicked, the “Updating!” message will show until the action is complete, and then it will re-hide itself.

Warning

Loading elements get shown or removed with the `hidden` attribute. One drawback to this approach is that setting the `style display` property overrides this functionality.

You can also hide an element while an action is processed by adding a `remove` modifier.

```
<!-- loading-remove.html -->
<div>
  <button unicorn:click="update">Update</button>

  <div unicorn:loading remove>Not currently updating!</div>
</div>
```

If there are multiple actions that happen in the component, you can show or hide a loading element for a specific action by targeting another element's `id` with `unicorn:target`.

```
<!-- loading-target-id.html -->
<div>
  <button unicorn:click="update" id="updateId">Update</button>
  <button unicorn:click="delete" id="deleteId">Delete</button>

  <div unicorn:loading unicorn:target="updateId">Updating!</div>
  <div unicorn:loading unicorn:target="deleteId">Deleting!</div>
</div>
```

An element's `unicorn:key` can also be targeted.

```
<!-- loading-target-key.html -->
<div>
  <button unicorn:click="update" unicorn:key="updateKey">Update</button>
  <button unicorn:click="delete" unicorn:key="deleteKey">Delete</button>

  <div unicorn:loading unicorn:target="updateKey">Updating!</div>
```

```
<div unicorn:loading unicorn:target="deleteKey">Deleting!</div>
</div>
```

Toggling Attributes

Elements with an action event can also include an `unicorn:loading` attribute with either an `attr` or `class` modifier.

attr

Set the specified attribute on the element that is triggering the action.

This example will disable the *Update* button when it is clicked and remove the attribute once the action is completed.

```
<!-- loading-attr.html -->
<div>
  <button unicorn:click="update" unicorn:loading.attr="disabled">Update</button>
</div>
```

class

Add the specified class to the element that is triggering the action.

This example will add a loading class to the *Update* button when it is clicked and remove the class once the action is completed.

```
<!-- loading-class.html -->
<div>
  <button unicorn:click="update" unicorn:loading.class="loading">Update</button>
</div>
```

class.remove

Remove the specified class from the element that is triggering the action.

This example will remove a `active` class from the *Update* button when it is clicked and add the class back once the action is completed.

```
<!-- loading-class-remove.html -->
<div>
  <button unicorn:click="update" unicorn:loading.class.remove="active">
    Update
  </button>
</div>
```

Polling

`unicorn:poll` can be added to the root `div` element of a component to have it refresh the component automatically every 2 seconds. The polling is smart enough that it won't poll when the page is inactive.

```
# polling.py
from django.utils.timezone import now
from django_unicorn.components import UnicornView

class PollingView(UnicornView):
    current_time = now()
```

```
<!-- polling.html -->
<div unicorn:poll>{{ current_time }}</div>
```

A method can also be specified if there is a specific method on the component that should be called every time the polling fires. For example, `unicorn:poll="get_updates"` would call the `get_updates` method instead of the built-in refresh method.

To define a different refresh time in milliseconds, a modifier can be added as well. `unicorn:poll-1000` would fire the `refresh` method every 1 second, instead of the default 2 seconds.

```
<!-- polling_every_five_seconds.html -->
<div unicorn:poll-5000="get_updates">
  <input unicorn:model="update" type="text" id="text" />
  {{ update }}
</div>
```

Advanced

Class properties

template_name

By default, the component name is used to determine what template should be used. For example, `hello_world.HelloWorldView` would by default use `unicorn/hello-world.html`. However, you can specify a particular template by setting `template_name` in the component.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    template_name = "unicorn/hello-world.html"
```

Instance properties

request

The current request is available on `self` in the component's methods.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    def __init__(self, *args, **kwargs):
        super().__init__(**kwargs)
        print("Initial request that rendered the component", self.request)

    def test(self):
        print("callMethod request to re-render the component", self.request)
```

Custom methods

Defined component instance methods with no arguments are made available to the Django template context and can be called like a property.

```
# states.py
from django_unicorn.components import UnicornView

class StateView(UnicornView):
    def all_states(self):
        return ["Alabama", "Alaska", "Arizona", ...]
```

```
<!-- states.html -->
<div>
  <ul>
    {% for state in all_states %}
    <li>{{ state }}</li>
```

```
{% endfor %}
</ul>
</div>
{% endverbatim %}
```

Tip

If the method is intensive and will be called multiple times, it can be cached with Django's [cached_property](https://docs.djangoproject.com/en/stable/ref/utils/#django.utils.functional.cached_property) to prevent duplicate API requests or database queries. The method will only be executed once per component rendering.

```
# states.py
from django.utils.functional import cached_property
from django_unicorn.components import UnicornView

class StateView(UnicornView):
    @cached_property
    def all_states(self):
        return ["Alabama", "Alaska", "Arizona", ...]
```

Instance methods

`__init__()`

Gets called when the component gets constructed for the very first time. Note that constructed components get cached to reduce the amount of time discovering and instantiating them, so `__init__` only gets called the very first time the component gets rendered.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    name = "original"

    def __init__(self, *args, **kwargs):
        super().__init__(**kwargs)
        self.name = "initialized"
```

`mount()`

Gets called when the component gets initialized or reset.

```
# hello_world.py
from django_unicorn.components import UnicornView

class HelloWorldView(UnicornView):
    name = "original"

    def mount(self):
        self.name = "mounted"
```

`hydrate()`

Gets called when the component data gets set.

```
# hello_world.py
from django_unicorn.components import UnicornView
```

```
class HelloWorldView(UnicornView):
    name = "original"

    def hydrate(self):
        self.name = "hydrated"
```

updating(name, value)

Gets called before each property that will get set.

updated(name, value)

Gets called after each property gets set.

updating_{property_name}(value)

Gets called before the specified property gets set.

updated_{property_name}(value)

Gets called after the specified property gets set.

calling(name, args)

Gets called before each method that gets called.

called(name, args)

Gets called after each method gets called.

Meta

Classes that derive from `UnicornView` can include a `Meta` class that provides some advanced options for the component.

exclude

By default, all properties of the component are included in the payload when hydrating the Django template. One way to prevent internal-only data from getting POSTed needlessly is to prefix the property name with `_` to indicate it should stay private.

```
# hello_state.py
from django_unicorn.components import UnicornView

class HelloStateView(UnicornView):
    state = ""

    _all_states = (
        "Alabama",
        "Alaska",
        "Arizona",
        "Arkansas",
        ...
        "Wisconsin",
        "Wyoming",
    )
```

Another way to prevent that data from going across the wire on every interaction is to add it to the `Meta` class's `exclude` tuple.


```
# hello_state.py
from django_unicorn.components import UnicornView

class HelloStateView(UnicornView):
    state = ""

    all_states = (
        "Alabama",
        "Alaska",
        "Arizona",
        "Arkansas",
        ...
        "Wisconsin",
        "Wyoming",
    )

    class Meta:
        exclude = ("all_states", )
```

Settings

Unicorn stores all settings in a dictionary under the `DJANGO_UNICORN` setting attribute in the Django settings file. All settings are optional.

```
# settings.py
DJANGO_UNICORN = {
    "MINIMIZE": True,
    "APPS": ["unicorn"]
}
```

MINIMIZE

Provides a way to control if the minimized version of `unicorn.min.js` is used. Defaults to `!DEBUG`.

APPS

Specify the modules to look for components. Defaults to `["unicorn",]`.

CLI

Unicorn provides a Django management command to create new components.

```
python manage.py startunicorn hello-world
```

The command will create a `unicorn` directory, and `templates` and `components` sub-directories if necessary. Underneath the `components` directory there will be a new module and subclass of `django_unicorn.components.UnicornView`. Underneath the `templates/unicorn` directory will be an example template.

The following is an example folder structure.

```
unicorn/
  components/
    hello_world.py
  templates/
    unicorn/
      hello-world.html
```

Unicorn is a reactive component framework that progressively enhances a normal Django view, makes AJAX calls in the background, and dynamically updates the DOM.

`Unicorn` seamlessly extends Django past its server-side framework roots without giving up all of its niceties or re-building your website.

Related projects

`Unicorn` stands on the shoulders of giants, in particular `morphdom` which is integral for merging DOM changes.

A few inspirational projects in other languages and frameworks.

- [Livewire](#), a full-stack framework for the PHP web framework, Laravel.
- [LiveView](#), a library for the Elixir web framework, Phoenix, that uses websockets.
- [StimulusReflex](#), a library for the Ruby web framework, Ruby on Rails, that uses websockets.
- [Hotwire](#), “is an alternative approach to building modern web applications without using much JavaScript by sending HTML instead of JSON over the wire”. Uses AJAX, but can also use websockets.

Some Python packages which aim to solve similar problems as `Unicorn`.

- [Reactor](#), a port of Elixir’s `LiveView` to Django. Especially interesting for more complicated use-cases like chat rooms, keeping multiple browsers in sync, etc. Uses Django channels and websockets to work its magic.
- [Flask-Meld](#), a port of `Unicorn` to Flask. Uses websockets.
- [Sockpuppet](#), a port of Ruby on Rail’s `StimulusReflex`. Requires Django channels and websockets.
- [Django inertia.js adapter](#) allows Django to use `inertia.js` to build an SPA without building an API.
- [django-components](#), which provides declarative and composable components for Django, inspired by JavaScript frameworks.
- [django-page-components](#), a minimalistic framework for creating page components and using them in your Django views and templates.