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# **fantastico Documentation**

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## INTRODUCTION

### 1.1 Why another python framework?

The main reason for developing a new framework is simple: I want to use it for teaching purposes. I have seen many projects which fail either because of poor coding or because they become legacy very fast. I will not get into details why and what could have been done. It defeats the purpose.

Each piece of code that is being added to fantastico will follow these simple rules:

1. *The code is written because is needed and there is no clean way to achieve the requirement with existing fantastico features.*
2. The code is developed using TDD (Test Driven Development).
3. The code quality is 9+ (reported by pylint).
4. The code coverage is 90%+ (reported by nose coverage).
5. The code is fully documented and included into documentation.

#### 1.1.1 What do you want to teach who?

I am a big fan of Agile practices and currently I own a domain called [scrum-expert.ro](http://scrum-expert.ro). This is meant to become a collection of hands on resource of how to develop good software with high quality and in a reasonable amount of time. Resources will cover topics like

1. Incremental development always ready for rollout.
2. TDD (Test Driven Development)
3. XP (eXtreme programming)
4. Scrum
5. Projects setup for Continuous Delivery

and many other topics that are required for delivering high quality software but apparently so many companies are ignoring nowadays.

### 1.2 Fantastico's initial ideas

- Very fast and pluggable routing engine.
- Easily creation of REST apis.
- Easily publishing of content (dynamic content).

- Easily composition of available content.
- Easily deployment on non expensive infrastructures (AWS, RackSpace).

Once the features above are developed there should be extremely easy to create the following sample applications:

1. Blog development
2. Web Forms development.
3. Personal web sites.

## GETTING STARTED

### 2.1 Installation manual

In this section you can find out how to configure fantastico framework for different purposes.

#### 2.1.1 Developing a new fantastico project

Currently fantastico is in early stages so we did not really use it to create new projects. The desired way we want to provide this is presented below:

pip-3.2 install fantastico

Done, now you are ready to follow our tutorials about creating new projects.

#### 2.1.2 Contributing to fantastico framework

Fantastico is an open source MIT licensed project to which any contribution is welcomed. If you like this framework idea and you want to contribute do the following (I assume you are on an ubuntu machine):

```
#. Create a github account.
#. Ask for permissions to contribute to this project (send an email to radu.cosnita@gmail.com) - I w
#. Create a folder where you want to hold fantastico framework files. (e.g worspace_fantastico)
#. cd ~/workspace_fantastico
#. git clone git@github.com:rcosnita/fantastico
#. sudo apt-get install python3-setuptools
#. sh virtual_env/setup_dev_env.sh
#. cd ~/workspace_fantastico
#. git clone git@github.com:rcosnita/fantastico fantastico-doc
#. git checkout gh-pages
```

Now you have a fully functional fantastico workspace. I personally use PyDev and spring toolsuite but you are free to use whatever editor you want. The only rule we follow is *always keep the code stable*. To check the stability of your contribution before committing the code follow the steps below:

```
#. cd ~/workspace_fantastico/fantastico/fantastico
#. sh run_tests.sh (we expect no failure in here)
#. sh run_pylint.sh (we expect 9+ rated code otherwise the build will fail).
#. cd ~/workspace_fantastico/fantastico
#. export BUILD_NUMBER=1
#. ./build_docs.sh (this will autogenerate documentation).
#. Look into ~/workspace_fantastico/fantastico-doc
#. Here you can see the autogenerated documentation (do not commit this as Jenkins will do this for y
#. Be brave and push your newly awesome contribution.
```

## 2.2 Fantastico settings

Fantastico is configured using a plain settings file. This file is located in the root of fantastic framework or in the root folder of your project. Before we dig further into configuration options lets see a very simple settings file:

```
class BasicSettings(object):
    @property
    def installed_middleware(self):
        return ["fantastico.middleware.request_middleware.RequestMiddleware",
               "fantastico.middleware.routing_middleware.RoutingMiddleware"]

    @property
    def supported_languages(self):
        return ["en_us"]
```

The above code sample represent the minimum required configuration for fantastic framework to run. The order in which middlewares are listed is the order in which they are executed when an http request is made.

### 2.2.1 Settings API

Below you can find technical information about settings.

class `fantastico.settings.BasicSettings`

This is the core class that describes all available settings of fantastic framework. For convenience all options have default values that ensure minimum functionality of the framework. Below you can find an example of three possible configuration: Dev / Stage / Production.



As you can see, if you want to overwrite basic configuration you simply have to extend the class and set new values for the attributes you want to overwrite.

#### database\_config

This property holds the configuration of database. It is recommended to have all environment configured the same. An exception can be done for host but the rest must remain the same. Below you can find an example of functional configuration:

```
config = {"drivername": "mysql+mysqlconnector",
          "username": "fantastico",
          "password": "12345",
          "port": 3306,
          "host": "localhost",
          "database": "fantastico",
          "additional_params": {"charset": "utf8"},
          "show_sql": True}
```



As you can see, in your configuration you can influence many attributes used when configuring the driver / database. **show\_sql** key tells orm engine from **Fantastico** to display all generated queries.

#### **dev\_server\_host**

This property holds development server hostname. By default this is localhost.

#### **dev\_server\_port**

This property holds development server port. By default this is 12000.

#### **installed\_middleware**

Property that holds all installed middlewares.

#### **routes\_loaders**

This property holds all routes loaders available.

#### **supported\_languages**

Property that holds all supported languages by this fantastico instance.

#### **templates\_config**

This property holds configuration of templates rendering engine. For the moment this influence how [Jinja2](#) acts.

## 2.2.2 Create Dev configuration

Let's imagine you want to create a custom dev configuration for your project. Below you can find the code for this:

```
class DevSettings(BasicSettings):
    @property
    def supported_languages(self):
        return ["en_us", "ro_ro"]
```

The above configuration actually overwrites supported languages. This mean that only en\_us is relevant for **Dev** environment. You can do the same for **Stage**, **Prod** or any other custom configuration.

## 2.2.3 Using a specific configuration

```
class fantastico.settings.SettingsFacade(environ=None)
```

For using a specific fantastico configuration you need to do two simple steps:

- Set **FANTASTICO\_ACTIVE\_CONFIG** environment variable to the fully python qualified class name you want to use. E.g: `fantastico.settings.BasicSettings`
- In your code, you can use the following snippet to access a specific setting:

```
from fantastico.settings import SettingsFacade

print(SettingsFacade().get("installed_middleware"))
```

If no active configuration is set in the `fantastico.settings.BasicSettings` will be used.

#### **get** (*name*)

Method used to retrieve a setting value.

##### **Parameters**

- **name** – Setting name.
- **type** – string

**Returns** The setting value.

**Return type** object

**get\_config()**

Method used to return the active configuration which is used by this facade.

**Return type** `fantastico.settings.BasicSettings`

**Returns** Active configuration currently used.

**get\_root\_folder()**

Method used to return the root folder of the current fantastico project (detected starting from settings) profile used.

## 2.3 Contribute

Fantastico framework is open source so every contribution is welcome. For the moment we are looking for more developers willing to contribute.

### 2.3.1 Code contribution

If you want to contribute with code to fantastico framework there are a simple set of rules that you must follow:

- Write unit tests (for the code / feature you are contributing).
- Write integration tests (for the code / feature you are contributing).
- Make sure your code is rated above 9.5 by pylint tool.
- In addition integration tests and unit tests must cover 95% of your code.

In order for each build to remain stable the following hard limits are imposed:

1. Unit tests must cover  $\geq 95\%$  of the code.
2. Integration tests must cover  $\geq 95\%$  of the code.
3. Code must be rated above 9.5 by pylint.
4. Everything must pass.

When you push on master a set of jobs are cascaded executed:

1. Run all unit tests job.
2. Run all integration tests job (only if unit tests succeeds).
3. Generate documentation and publish it (only if integration tests job succeeds).

You can follow the above build process by visiting [Jenkins build](#). Login with your github account and everything should work smoothly.

In the end do not forget that in Fantastico framework we love to develop against a **stable** base. We really think code will have high quality and zero bugs.

### Writing unit tests

For better understanding how to write unit tests see the documentation below:

```
class fantastico.tests.base_case.FantasticoUnitTestsCase (methodName='runTest')
```

This is the base class that must be inherited by each unit test written for fantastico.

```
class SimpleUnitTest (FantasticoUnitTestCase):
    def init(self):
        self._msg = "Hello world"

    def test_simple_flow_ok(self):
        self.assertEqual("Hello world", self._msg)
```

**\_\_get\_class\_root\_folder()**

This methods determines the root folder under which the test is executed.

**\_\_get\_root\_folder()**

This method determines the root folder under which core is executed.

**check\_original\_methods (cls\_obj)**

This method ensures that for a given class only original non decorated methods will be invoked. Extremely useful when you want to make sure @Controller decorator does not break your tests. It is strongly recommended to invoke this method on all classes which might contain @Controller decorator. It ease your when committing on CI environment.

**classmethod setup\_once ()**

This method is overridden in order to correctly mock some dependencies:

- `fantastico.mvc.controller_decorators.Controller`

## Writing integration tests

For better understanding how to write integration tests see the documentation below:

**class** `fantastico.tests.base_case.FantasticoIntegrationTestCase` (*methodName='runTest'*)  
This is the base class that must be inherited by each integration test written for fantastico.

```
class SimpleIntegration (FantasticoIntegrationTestCase):
    def init(self):
        self.simple_class = {}

    def cleanup(self):
        self.simple_class = None

    def test_simple_ok(self):
        def do_stuff(env, env_cls):
            self.assertEqual(simple_class[env], env_cls)

        self._run_test_all_envs(do_stuff)
```

If you used this class you don't have to mind about restoring call methods from each middleware once they are wrapped by fantastico app. This is a must because otherwise you will crash other tests.

**\_\_envs**

Private property that holds the environments against which we run the integration tests.

**\_\_restore\_call\_methods ()**

This method restore original call methods to all affected middlewares.

**\_\_run\_test\_all\_envs (callable\_obj)**

This method is used to execute a callable block of code on all environments. This is extremely useful for avoid boiler plate code duplication and executing test logic against all environments.

**\_\_save\_call\_methods (middlewares)**

This method save all call methods for each listed middleware so that later on they can be restored.

**fantastico\_cfg\_os\_key**

This property holds the name of os environment variable used for setting up active fantastico configuration.

**class** `fantastico.server.tests.itest_dev_server.DevServerIntegration` (*methodName='runTest'*)

This class provides the foundation for writing integration tests that do http requests against a fantastico server.

```
class DummyLoaderIntegration(DevServerIntegration):
    def init(self):
        self._exception = None

    def test_server_runs_ok(self):
        def request_logic(server):
            request = Request(self._get_server_base_url(server, DummyRouteLoader.DUMMY_ROUTE))
            with self.assertRaises(HTTPError) as cm:
                urllib.request.urlopen(request)

            self._exception = cm.exception

        def assert_logic(server):
            self.assertEqual(400, self._exception.code)
            self.assertEqual("Hello world.", self._exception.read().decode())

        self._run_test_all_envs(lambda env, settings_cls: self._run_test_against_dev_server(request_logic,
                                                                                          assert_logic=assert_logic))

        # you can also pass only request logic without assert logic
        # self._run_test_all_envs(lambda env, settings_cls: self._run_test_against_dev_server(request_logic))
```

As you can see from above listed code, when you write a new integration test against Fantastico server you only need to provide the request logic and assert logic functions. Request logic is executed while the server is up and running. Assert logic is executed after the server has stopped.

**\_\_check\_server\_started** (*server*)

This method holds the sanity checks to ensure a server is started correctly.

**\_\_get\_server\_base\_url** (*server, route*)

This method returns the absolute url for a given relative url (route).

**\_\_run\_test\_against\_dev\_server** (*request\_logic, assert\_logic=None*)

This method provides a template for writing integration tests that requires a development server being active. It accepts a request logic (code that actually do the http request) and an assert logic for making sure code is correct.

## 2.4 Development mode

**Fantastico** framework is a web framework designed to be developers friendly. In order to simplify setup sequence, fantastico provides a standalone WSGI compatible server that can be started from command line. This server is fully compliant with WSGI standard. Below you can find some easy steps to achieve this:

1. Goto fantastico framework or project location
2. `sh run_dev_server.sh`

This is it. Now you have a running fantastico server on which you can test your work.

By default, **Fantastico** dev server starts on port 12000, but you can customize it from `fantastico.settings.BasicSettings`.

### 2.4.1 Hot deploy

Currently, this is not implemented, but it is on todo list on short term.

### 2.4.2 API

For more information about Fantastico development server see the API below.

```
class fantastico.server.dev_server.DevServer (settings_facade=<class          'fantastico.settings.SettingsFacade'>)
```

This class provides a very simple wsgi http server that embeds Fantastico framework into it. As developer you can use it to simply test your new components.

```
start (build_server=<function    make_server    at    0x5a831e8>,    app=<class    'fantastico.middleware.fantastico_app.FantasticoApp'>)
```

This method starts a WSGI development server. All attributes like port, hostname and protocol are read from configuration file.

**started**

Property used to tell if development server is started or not.

**stop()**

This method stops the current running server (if any available).

### 2.4.3 Database config

Usually you will use **Fantastico** framework together with a database. When we develop new core features of **Fantastico** we use a sample database for integration. You can easily use it as well to play around:

1. Goto fantastico framework location
2. export MYSQL\_PASSWD=\*\*\*\*\* (your mysql password)
3. export MYSQL\_HOST=<hostname> (your mysql hostname: e.g localhost)
4. sh run\_setup\_db.sh

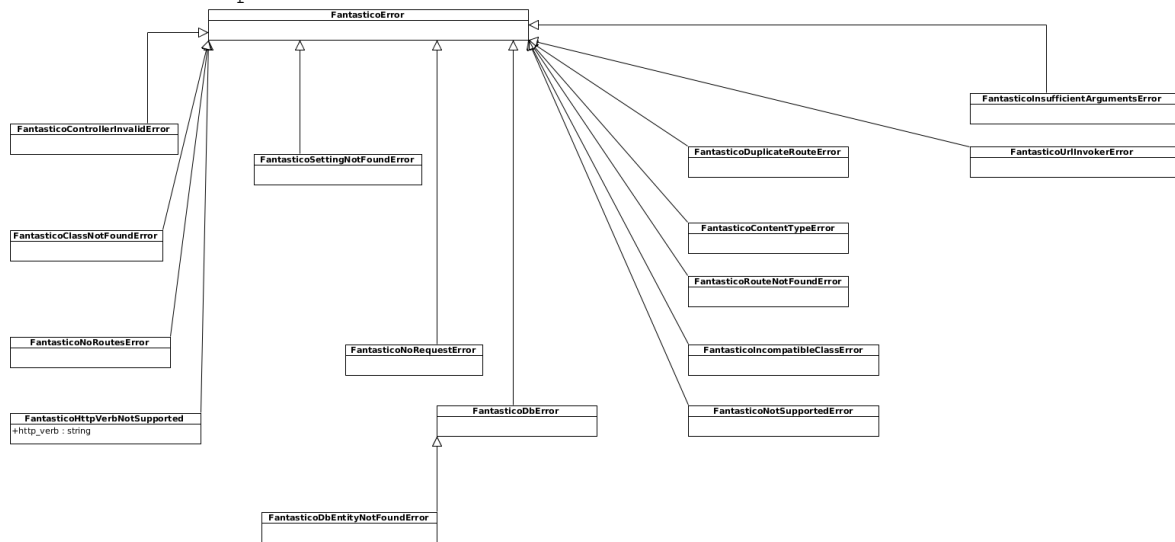
**run\_setup\_db.sh** create an initial fantastico database and a user called fantastico identified by **12345** password. After database is successfully created, it scans for all available **module\_setup.sql** files and execute them against newly created database.



## FANTASTICO FEATURES

### 3.1 Exceptions hierarchy

class `fantastico.exceptions.FantasticoError`



**FantasticoError** is the base of all exceptions raised within fantastico framework. It describe common attributes that each concrete fantastico exception must provide. By default all fantastico exceptions inherit FantasticoError exception. We do this because each raised unhandled FantasticoError is map to a specific exception response. This strategy guarantees that at no moment errors will cause fantastico framework wsgi container to crash.

class `fantastico.exceptions.FantasticoControllerInvalidError`

This exception is raised whenever a method is decorated with `fantastico.mvc.controller_decorators.ControllerDecorator` and the number of arguments is not correct. Usually developer forgot to add request as argument to the controller.

class `fantastico.exceptions.FantasticoClassNotFoundError`

This exception is raised whenever code tries to dynamically import and instantiate a class which can not be resolved.

class `fantastico.exceptions.FantasticoNotSupportedError`

This exception is raised whenever code tries to do an operation that is not supported.

class `fantastico.exceptions.FantasticoSettingNotFoundError`

This exception is raised whenever code tries to obtain a setting that is not available in the current fantastico configuration.

**class** `fantastico.exceptions.FantasticoDuplicateRouteError`

This exception is usually raised by routing engine when it detects duplicate routes.

**class** `fantastico.exceptions.FantasticoNoRoutesError`

This exception is usually raised by routing engine when no loaders are configured or no routes are registered.

**class** `fantastico.exceptions.FantasticoRouteNotFoundError`

This exception is usually raised by routing engine when a requested url is not registered.

**class** `fantastico.exceptions.FantasticoNoRequestError`

This exception is usually raised when some components try to use `fantastico.request` from WSGI environ before `fantastico.middleware.request_middleware.RequestMiddleware` was executed.

**class** `fantastico.exceptions.FantasticoContentTypeError`

This exception is usually thrown when a mismatch between request accept and response content type. In Fantastico we think it's mandatory to fulfill requests correctly and to take in consideration sent headers.

**class** `fantastico.exceptions.FantasticoHttpVerbNotSupported` (*http\_verb*)

This exception is usually thrown when a route is accessed with an http verb which does not support.

**http\_verb**

This property returns the http verb that caused the problems.

**class** `fantastico.exceptions.FantasticoTemplateNotFoundError`

This exception is usually thrown when a controller tries to load a template which it does not found.

**class** `fantastico.exceptions.FantasticoIncompatibleClassError`

This exception is usually thrown when we want to decorate / inject / mixin a class into another class that does not support it. For instance, we want to build a `fantastico.mvc.model_facade.ModelFacade` with a class that does not extend **BASEMODEL**.

**class** `fantastico.exceptions.FantasticoDbError`

This exception is usually thrown when a database exception occurs. For one good example where this is used see `fantastico.mvc.model_facade.ModelFacade`.

**class** `fantastico.exceptions.FantasticoDbNotFoundError`

This exception is usually thrown when an entity does not exist but we try to update it. For one good example where this is used see `fantastico.mvc.model_facade.ModelFacade`.

**class** `fantastico.exceptions.FantasticoInsufficientArgumentsError`

This exception is usually thrown when a component extension received wrong number of arguments. See `fantastico.rendering.component.Component`.

**class** `fantastico.exceptions.FantasticoUrlInvokerError`

This exception is usually thrown when an internal url invoker fails. For instance, if a component reuse rendering fails then this exception is raised.

## 3.2 Request lifecycle

In this document you can find how a request is processed by fantastico framework. By default WSGI applications use a dictionary that contains various useful keys:

- HTTP Headers
- HTTP Cookies
- Helper keys (e.g file wrapper).

In fantastico we want to hide the complexity of this dictionary and allow developers to use some standardized objects. Fantastico framework follows a Request / Response paradigm. This mean that for every single http request only



one single http response will be generated. Below, you can find a simple example of how requests are processed by fantastico framework:



In order to not reinvent the wheels fantastico relies on WebOb python framework in order to correctly generate request and response objects. For more information read [WebOB Doc](#).

### 3.2.1 Request middleware

To have very good control of how WSGI environ is wrapped into **WebOb request** object a middleware component is configured. This is the first middleware that is executed for every single http request.

```
class fantastico.middleware.request_middleware.RequestMiddleware (app)
```

This class provides the middleware responsible for converting wsgi environ dictionary into a request. The result is saved into current WSGI environ under key **fantastico.request**. In addition each new request receives an identifier. If subsequent requests are triggered from that request then they will also receive the same request id.

### 3.2.2 Request context

In comparison with WebOb **Fantastico** provides a nice improvement. For facilitating easy development of code, each fantastico request has a special attribute called context. Below you can find the attributes of a request context object:

- settings facade (*Fantastico settings*)
- session (not yet supported)
- **language** The current preferred by user. This is determined based on user lang header.
- user (not yet supported)

```
class fantastico.middleware.request_context.RequestContext (settings, language)
```

This class holds various attributes useful giving a context to an http request. Among other things we need to be able to access current language, current session and possible current user profile.

**language**

Property that holds the current language that must be used during this request.

**settings**

Property that holds the current settings facade used for accessing fantastico configuration.

**wsgi\_app**

Property that holds the WSGI application instance under which the request is handled.

### 3.2.3 Obtain request language

**class** `fantastico.locale.language.Language` (*code*)

Class used to define how does language object looks like. There are various use cases for using language but the simplest one is in request context object:

```
language = request.context.language
```

```
if language.code == "en_us":
    print("English (US) language").
else:
    raise Exception("Language %s is not supported." % language.code)
```

**code**

Property that holds the language code. This is readonly because once instantiated we mustn't be able to change it.

### 3.2.4 Obtain settings using request

It is recommended to use `request.context` object to obtain fantastico settings. This hides the complexity of choosing the right configuration and accessing attributes from it.

```
installed_middleware = request.context.settings.get("installed_middleware")

print(installed_middleware)
```

For more information about how to configure **Fantastico** please read *Fantastico settings*.

### 3.2.5 Redirect using request

In Fantastico is fairly simply to redirect client to a given location.

**class** `fantastico.routing_engine.custom_responses.RedirectResponse` (*destination,*  
*query\_params=None*)

This class encapsulates the logic for programmatically redirecting client from a fantastico controller.

```
@Controller(url="/redirect/example")
def redirect_to_google(self, request):
    return request.redirect("http://www.google.ro/")
```

There are some special cases when you would like to pass some query parameters to redirect destination. This is also easily achievable in Fantastico:

```
@Controller(url="/redirect/example")
def redirect_to_google(self, request):
    return request.redirect("http://www.google.ro/search",
                           query_params=[("q", "hello world")])
```

The above example will redirect client browser to <http://www.google.ro/search?q=hello world>

### 3.3 Routing engine



Fantastico routing engine is design by having extensibility in mind. Below you can find the list of concerns for routing engine:

1. Support multiple sources for routes.
2. Load all available routes.
3. Select the controller that can handle the request route (if any available).

**class** `fantastico.routing_engine.router.Router` (`settings_facade=<class 'fantastico.settings.SettingsFacade'>`)

This class is used for registering all available routes by using all registered loaders.

**get\_loaders()**

Method used to retrieve all available loaders. If loaders are not currently instantiated they are by these method. This method also supports multi threaded workers mode of wsgi with really small memory footprint. It uses an internal lock so that it makes sure available loaders are instantiated only once per wsgi worker.

**handle\_route** (`url, environ`)

Method used to identify the given url method handler. It enrich the environ dictionary with a new entry that holds a controller instance and a function to be executed from that controller.

**register\_routes()**

Method used to register all routes from all loaders. If the loaders are not yet initialized this method will

first load all available loaders and then it will register all available routes. Also, this method initialize available routes only once when it is first invoked.

### 3.3.1 Routes loaders

Fantastico routing engine is designed so that routes can be loaded from multiple sources (database, disk locations, and others). This give huge extensibility so that developers can use Fantastico in various scenarios:

- Create a CMS that allows people to create new pages (mapping between page url / controller) is hold in database. Just by adding a simple loader in which the business logic is encapsulated allows routing engine extension.
- Create a blog that loads articles from disk.

I am sure you can find other use cases in which you benefit from this extension point.

### 3.3.2 How to write a new route loader

Before digging in further details see the `RouteLoader` class documentation below:

**class** `fantastico.routing_engine.routing_loaders.RouteLoader` (*settings\_facade*)

This class provides the contract that must be provided by each concrete implementation. Each route loader is responsible for implementing its own business logic for loading routes.

```
class DummyRouteLoader (RouteLoader):  
    def __init__ (self, settings_facade):  
        self.settings_facade = settings_facade  
  
    def load_routes (self):  
        return {"/index.html": {"method": "fantastico.plugins.static_assets.StaticAssetsControll  
                                "http_verbs": ["GET"]},  
                "/images/image.png": {"method": "fantastico.plugins.static_assets.StaticAssetsCo  
                                         "http_verbs": ["GET"]}}
```

`load_routes` ()

This method must be overridden by each concrete implementation so that all loaded routes can be handled by fantastico routing engine middleware.

As you can, each concrete route loader receives in the constructor settings facade that can be used to access fantastico settings. In the code example above, `DummyRouteLoader` maps a list of urls to a controller method that can be used to render it. Keep in mind that a route loader is a stateless component and it can't in anyway determine the wsgi environment in which it is used. In addition this design decision also make sure clear separation of concerned is followed.

Once your **RouteLoader** implementation is ready you must register it into settings profile. The safest bet is to add it into `BaseSettings` provider. For more information read [Fantastico settings](#).

### 3.3.3 Configuring available loaders

You can find all available loaders for the framework configured in your settings profile. You can find below a sample configuration of available loaders:

```
class CustomSettings (BasicSettings):  
    @property  
    def routes_loaders (self):  
        return ["fantastico.routing_engine.custom_loader.CustomLoader"]
```

The above configuration tells **Fantastico routing engine** that only CustomLoader is a source of routes. If you want to learn more about multiple configurations please read [Fantastico settings](#).

### 3.3.4 DummyRouteLoader

**class** `fantastico.routing_engine.dummy_routeloader.DummyRouteLoader` (*settings\_facade*)

This class represents an example of how to write a route loader. **DummyRouteLoader** is available in all configurations and it provides a single route to the routing engine: `/dummy/route/loader/test`. Integration tests rely on this loader to be configured in each available profile.

**display\_test** (*request*)

This method handles `/dummy/route/loader/test` route. It is expected to receive a response with status code 400. We do this for being able to test rendering and also avoid false positive security scans messages.

### 3.3.5 Routing middleware

**Fantastico** routing engine is designed as a standalone component. In order to be able to integrate it into Fantastico request lifecycle (:doc:/features/request\_response.) we need an adapter component.

**class** `fantastico.middleware.routing_middleware.RoutingMiddleware` (*app*,  
*router\_cls=<class*  
*'fantastico.routing\_engine.router.Router'>*)

Class used to integrate routing engine fantastico component into request / response lifecycle. This middleware is responsible for:

- 1.instantiating the router component and make it available to other components / middlewares through WSGI environment.
- 2.register all configured fantastico loaders (`fantastico.routing_engine.router.Router.get_loaders()`).
- 3.register all available routes (`fantastico.routing_engine.router.Router.register_routes()`).
- 4.handle route requests (`fantastico.routing_engine.router.Router.handle_route()`).

It is important to understand that routing middleware assume a **WebOb request** available into WSGI environ. Otherwise, `fantastico.exceptions.FantasticoNoRequestError` will be thrown. You can read more about request middleware at [Request lifecycle](#).

## 3.4 Model View Controller

**Fantastico** framework provides quite a powerful model - view - controller implementation. Here you can find details about design decisions and how to benefit from it.

### 3.4.1 Classic approach

Usually when you want to work with models as understood by MVC pattern you have in many cases boiler plate code:

1. Write your model class (or entity)
2. Write a repository that provides various methods for this model class.
3. Write a facade that works with the repository.
4. Write a web service / page that relies on the facade.

### 5. Write one or multiple views.

As this is usually a good in theory, in practice you will see that many methods from facade are converting a data transfer object to an entity and pass it down to repository.

## 3.4.2 Fantastico approach

**Fantastico** framework provides an alternative to this classic approach (you can still work in the old way if you really really want).

**class** `fantastico.mvc.controller_decorators.Controller` (*url*, *method='GET'*, *models=None*, *\*\*kwargs*)

This class provides a decorator for magically registering methods as route handlers. This is an extremely important piece of Fantastico framework because it simplifies the way you as developer can define mapping between a method that must be executed when an http request to an url is made:

```
@ControllerProvider()
class BlogsController(BaseController):
    @Controller(url="/blogs/", method="GET",
                models={"Blog": "fantastico.plugins.blog.models.blog.Blog"})
    def list_blogs(self, request):
        Blog = request.models.Blog

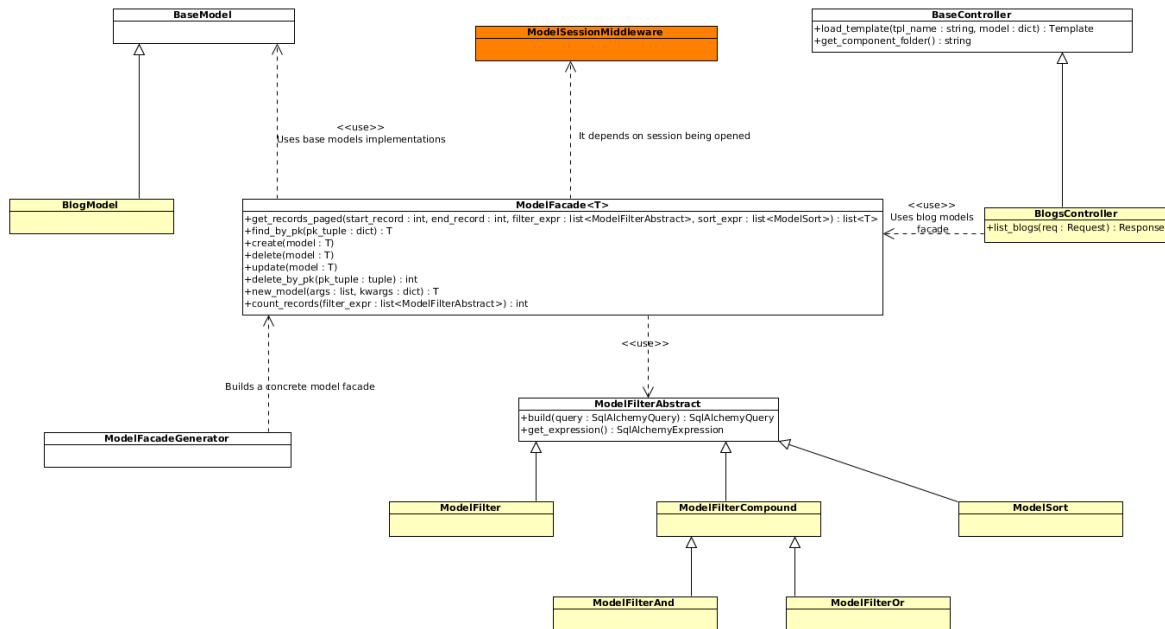
        blogs = Blog.get_records_paged(start_record=0, end_record=5,
                                       sort_expr=[ModelSort(Blog.model_cls.create_date, ModelSort.ASC,
                                                             ModelSort(Blog.model_cls.title, ModelSort.DESC)],
                                       filter_expr=ModelFilterAnd(
                                           ModelFilter(Blog.model_cls.id, 1, ModelFilter.GT),
                                           ModelFilter(Blog.model_cls.id, 5, ModelFilter.LT)

        return Response(blogs)
```

The above code assume the following:

- 1.As developer you created a model called blog (this is already mapped to some sort of storage).
- 2.Fantastico framework generate the facade automatically (and you never have to know anything about underlining repository).
- 3.Fantastico framework takes care of data conversion.
- 4.As developer you create the method that knows how to handle **/blog/** url.
- 5.Write your view.

Below you can find the design for MVC provided by **Fantastico** framework:

**fn\_handler**

This property retrieves the method which is executed by this controller.

**classmethod get\_registered\_routes ()**

This class methods retrieve all registered routes through Controller decorator.

**method**

This property retrieves the method(s) for which this controller can be invoked. Most of the time only one value is retrieved.

**models**

This property retrieves all the models required by this controller in order to work correctly.

**url**

This property retrieves the url used when registering this controller.

If you want to find more details and use cases for controller read [Controller](#) section.

### 3.4.3 Model

A model is a very simple object that inherits `fantastico.mvc.models.BaseModel`.

In order for models to work correctly and to be injected correctly into controller you must make sure you have a valid database configuration in your settings file. By default, `fantastico.settings.BasicSettings` provides a usable database configuration.

```
# fantastic.settings.BasicSettings
@property
def database_config(self):
    return {"drivername": "mysql+mysqldb",
            "username": "fantastico",
            "password": "12345",
            "host": "localhost",
            "port": 3306,
            "database": "fantastico",
            "show_sql": True}
```

By default, each time a new build is generated for fantastico each environment is validated to ensure connectivity to configured database works.

There are multiple ways in how a model is used but the easiest way is to use an autogenerated model facade:

**class** `fantastico.mvc.model_facade.ModelFacade(model_cls, session)`

This class provides a generic model facade factory. In order to work **Fantastico** base model it is recommended to use autogenerated facade objects. A facade object is binded to a given model and given database session.

**count\_records** (*filter\_expr=None*)

This method is used for counting the number of records from underlining facade. In addition it applies the filter expressions specified (if any).

```
records = facade.count_records(
    filter_expr=ModelFilterAnd(
        ModelFilter(Blog.id, 1, ModelFilter.GT),
        ModelFilter(Blog.id, 5, ModelFilter.LT)))
```

**Parameters** `filter_expr` (*list*) – A list of `fantastico.mvc.models.model_filter.ModelFilterAbstract` which are applied in order.

**Raises** `fantastico.exceptions.FantasticoDbError` This exception is raised whenever an exception occurs in retrieving desired dataset. The underlining session used is automatically rolled-back in order to guarantee data integrity.

**create** (*model*)

This method add the given model in the database.

```
class PersonModel(BASEMODEL):
    __tablename__ = "persons"

    id = Column("id", Integer, autoincrement=True, primary_key=True)
    first_name = Column("first_name", String(50))
    last_name = Column("last_name", String(50))

    def __init__(self, first_name, last_name):
        self.first_name = first_name
        self.last_name = last_name

facade = ModelFacade(PersonModel, fantastico.mvc.SESSION)

model = facade.new_model("John", last_name="Doe")
facade.create(model)
```

**Returns** The newly generated primary key or the specified primary key (it might be a scalar value or a tuple).

**Raises** `fantastico.exceptions.FantasticoDbError` Raised when an unhandled exception occurs. By default, session is rollback automatically so that other consumers can still work as expected.

**delete** (*model*)

This method deletes a given model from database. Below you can find a simple example of how to use this:

```
class PersonModel(BASEMODEL):
    __tablename__ = "persons"

    id = Column("id", Integer, autoincrement=True, primary_key=True)
```



```

first_name = Column("first_name", String(50))
last_name = Column("last_name", String(50))

def __init__(self, first_name, last_name):
    self.first_name = first_name
    self.last_name = last_name

facade = ModelFacade(PersonModel, fantastico.mvc.SESSION)
model = facade.find_by_pk({PersonModel.id: 1})
facade.delete(model)

```

**Raises `fantastico.exceptions.FantasticoDbError`** Raised when an unhandled exception occurs.

By default, session is rollback automatically so that other consumers can still work as expected.

#### **find\_by\_pk** (*pk\_values*)

This method returns the entity which matches the given primary key values.

```

class PersonModel(BASEMODEL):
    __tablename__ = "persons"

    id = Column("id", Integer, autoincrement=True, primary_key=True)
    first_name = Column("first_name", String(50))
    last_name = Column("last_name", String(50))

    def __init__(self, first_name, last_name):
        self.first_name = first_name
        self.last_name = last_name

facade = ModelFacade(PersonModel, fantastico.mvc.SESSION)
model = facade.find_by_pk({PersonModel.id: 1})

```

#### **get\_records\_paged** (*start\_record*, *end\_record*, *filter\_expr=None*, *sort\_expr=None*)

This method retrieves all records matching the given filters sorted by the given expression.

```

records = facade.get_records_paged(start_record=0, end_record=5,
                                   sort_expr=[ModelSort(Blog.create_date, ModelSort.ASC,
                                                           ModelSort(Blog.title, ModelSort.DESC)],
                                   filter_expr=ModelFilterAnd(
                                                           ModelFilter(Blog.id, 1, ModelFilter.GT),
                                                           ModelFilter(Blog.id, 5, ModelFilter.LT)))

```

#### **Parameters**

- **start\_record** (*int*) – A zero indexed integer that specifies the first record number.
- **end\_record** (*int*) – A zero indexed integer that specifies the last record number.
- **filter\_expr** (*list*) – A list of `fantastico.mvc.models.model_filter.ModelFilterAbstract` which are applied in order.
- **sort\_expr** (*list*) – A list of `fantastico.mvc.models.model_sort.ModelSort` which are applied in order.

**Returns** A list of matching records strongly converted to underlining model.

**Raises `fantastico.exceptions.FantasticoDbError`** This exception is raised whenever an exception occurs in retrieving desired dataset. The underlining session used is automatically rolled-back in order to guarantee data integrity.

**model\_cls**

This property holds the model based on which this facade is built.

**new\_model** (\*args, \*\*kwargs)

This method is used to obtain an instance of the underlining model. Below you can find a very simple example:

```
class PersonModel(BASEMODEL):
    __tablename__ = "persons"

    id = Column("id", Integer, autoincrement=True, primary_key=True)
    first_name = Column("first_name", String(50))
    last_name = Column("last_name", String(50))

    def __init__(self, first_name, last_name):
        self.first_name = first_name
        self.last_name = last_name

facade = ModelFacade(PersonModel, fantastico.mvc.SESSION)

model = facade.new_model("John", last_name="Doe")
```

**Parameters**

- **args** (*list*) – A list of positional arguments we want to pass to underlining model constructor.
- **kwargs** (*dict*) – A dictionary containing named parameters we want to pass to underlining model constructor.

**Returns** A BASEMODEL instance if everything is ok.

**update** (model)

This method updates an existing model from the database based on primary key.

```
class PersonModel(BASEMODEL):
    __tablename__ = "persons"

    id = Column("id", Integer, autoincrement=True, primary_key=True)
    first_name = Column("first_name", String(50))
    last_name = Column("last_name", String(50))

    def __init__(self, first_name, last_name):
        self.first_name = first_name
        self.last_name = last_name

facade = ModelFacade(PersonModel, fantastico.mvc.SESSION)

model = facade.new_model("John", last_name="Doe")
model.id = 5
facade.update(model)
```

**Raises**

- **fantastico.exceptions.FantasticoDbNotFoundError** – Raised when the given model does not exist in database. By default, session is rollback automatically so that other consumers can still work as expected.

- **fantastico.exceptions.FantasticoDbError** – Raised when an unhandled exception occurs. By default, session is rollback automatically so that other consumers can still work as expected.

If you are using the **Fantastico MVC** support you don't need to manually create a model facade instance because `fantastico.mvc.controller_decorators.Controller` injects defined models automatically.

### 3.4.4 View

A view can be a simple html plain file or html + jinja2 enriched support. You can read more about **Jinja2** [here](#). Usually, if you need some logical block statements in your view (if, for, ...) it is easier to use jinja 2 template engine. The good news is that you can easily embed jinja 2 markup in your views and it will be rendered automatically.

### 3.4.5 Controller

A controller is the *brain*; it actually combines a model execute some business logic and pass data to the desired view that needs to be rendered. In some cases you don't really need view in order to provide the logic you want:

- A REST Web service.
- A RSS feed provider.
- A file download service

Though writing REST services does not require a view, you can load external text templates that might be useful for assembling the response:

- An invoice generator service
- An xml file that must be filled with product data
- A **vCard**. export service.

If you want to read a small tutorial and to start coding very fast on Fantastico MVC read [MVC How to](#). Controller API is documented `fantastico.mvc.controller_decorator.Controller`.

```
class fantastico.mvc.controller_registrator.ControllerRouteLoader(settings_facade=<class
    'fantastico.settings.SettingsFacade'>,
    scanned_folder=None,
    ignore_prefix=None)
```

This class provides a route loader that is capable of scanning the disk and registering only the routes that contain a controller decorator in them. This happens when **Fantastico** servers starts. In standard configuration it ignores tests subfolder as well as `test_*` / `itest_*` modules.

**load\_routes()**

This method is used for loading all routes that are mapped through `fantastico.mvc.controller_decorators.Controller` decorator.

**scanned\_folder**

This property returns the currently scanned folder from where mvc routes are collected.

```
class fantastico.mvc.base_controller.BaseController(settings_facade)
```

This class provides common methods useful for every concrete controller. Even if no type checking is done in Fantastico it is recommended that every controller implementation inherits this class.

**curr\_request**

This property returns the current http request being processed.

**get\_component\_folder()**

This method is used to retrieve the component folder name under which this controller is defined.

**load\_template**(*tpl\_name*, *model\_data=None*, *get\_template=<function get\_template at 0x2bf5408>*)

This method is responsible for loading a template from disk and render it using the given model data.

@ControllerProvider()

```
class TestController(BaseController):
    @Controller(url="/simple/test/hello", method="GET")
    def say_hello(self, request):
        return Response(self.load_template("/hello.html"))
```

The above snippet will search for **hello.html** into component folder/views/.

## Available filters

class `fantastico.mvc.models.model_filter.ModelFilterAbstract`

This is the base class that defines the contract a model filter must follow. A model filter is a class that decouples sqlalchemy framework from Fantastico MVC. This is required because in the future we might want to change the ORM that powers Fantastico without breaking all existing code.



For seeing how to implement filters (probably you won't need to do this) see some existing filters:

- `fantastico.mvc.models.model_filter.ModelFilter`
- `fantastico.mvc.models.model_filter_compound.ModelFilterCompound`
- `fantastico.mvc.models.model_filter_compound.ModelFilterAnd`
- `fantastico.mvc.models.model_filter_compound.ModelFilterOr`

**build**(*query*)

This method is used for appending the current filter to the query using sqlalchemy specific language.

**get\_expression**()

This method is used for retrieving native sqlalchemy expression held by this filter.

class `fantastico.mvc.models.model_filter_compound.ModelFilterCompound`(*operation*, *\*args*)

This class provides the api for compounding ModelFilter objects into a specified sql alchemy operation.

**build**(*query*)

This method transform the current compound statement into an sql alchemy filter.

**get\_expression**()

This method transforms calculates sqlalchemy expression held by this filter.

**class** `fantastico.mvc.models.model_filter.ModelFilter` (*column, ref\_value, operation*)

This class provides a model filter wrapper used to dynamically transform an operation to sql alchemy filter statements. You can see below how to use it:

```
id_gt_filter = ModelFilter(PersonModel.id, 1, ModelFilter.GT)
```

**build** (*query*)

This method appends the current filter to a query object.

**column**

This property holds the column used in the current filter.

**get\_expression** ()

Method used to return the underlining sqlalchemy exception held by this filter.

**static get\_supported\_operations** ()

This method returns all supported operations for model filter. For now only the following operations are supported:

- GT - greater than comparison
- GE - greater or equals than comparison
- EQ - equals comparison
- LE - less or equals than comparison
- LT - less than comparison
- LIKE - like comparison
- IN - in comparison.

**operation**

This property holds the operation used in the current filter.

**ref\_value**

This property holds the reference value used in the current filter.

**class** `fantastico.mvc.models.model_filter_compound.ModelFilterAnd` (*\*args*)

This class provides a compound filter that allows **and** conditions against models. Below you can find a simple example:

```
id_gt_filter = ModelFilter(PersonModel.id, 1, ModelFilter.GT)
id_lt_filter = ModelFilter(PersonModel.id, 5, ModelFilter.LT)
name_like_filter = ModelFilter(PersonModel.name, '%%john%%', ModelFilter.LIKE)

complex_condition = ModelFilterAnd(id_gt_filter, id_lt_filter, name_like_filter)
```

**class** `fantastico.mvc.models.model_filter_compound.ModelFilterOr` (*\*args*)

This class provides a compound filter that allows **or** conditions against models. Below you can find a simple example:

```
id_gt_filter = ModelFilter(PersonModel.id, 1, ModelFilter.GT)
id_lt_filter = ModelFilter(PersonModel.id, 5, ModelFilter.LT)
name_like_filter = ModelFilter(PersonModel.name, '%%john%%', ModelFilter.LIKE)

complex_condition = ModelFilterOr(id_gt_filter, id_lt_filter, name_like_filter)
```

**class** `fantastico.mvc.models.model_sort.ModelSort` (*column, sort\_dir=None*)

This class provides a filter that knows how to sort rows from a query result set. It is extremely easy to use:

```
id_sort_asc = ModelSort(PersonModel.id, ModelSort.ASC)
```

**build**(*query*)

This method appends `sort_by` clause to the given query.

**column**

This property holds the column we are currently sorting.

**get\_expression**()

This method returns the sqlalchemy expression held by this filter.

**get\_supported\_sort\_dirs**()

This method returns all supported sort directions. Currently only ASC / DESC directions are supported.

**sort\_dir**

This property holds the sort direction we are currently using.

### 3.4.6 Database session management

We all know database session management is painful and adds a lot of boiler plate code. In fantastico you don't need to manage database session by yourself. There is a dedicated middleware which automatically ensures there is an active session ready to be used:

```
class fantastico.middleware.model_session_middleware.ModelSessionMiddleware(app,
                                                                              set-
                                                                              tings_facade=<class
                                                                              'fan-
                                                                              tas-
                                                                              tico.settings.SettingsFacade>)
```

This class is responsible for managing database connections across requests. It also takes care of connection data pools. By default, the middleware is automatically configured to open a connection. If you don't need mvc (really improbable but still) you simply need to change your project active settings profile. You can read more on [fantastico.settings.BasicSettings](#)

## 3.5 SDK

Starting with version **0.3.0** of Fantastico framework all dispersed shell scripts are unified under Fantastico Software Development Kit. In addition, the sdk is complemented by autogenerated documentation.

### 3.5.1 Intro

Fantastico sdk was developed with the following requirements in my mind:

- Allow developers to manage Fantastico projects easily (using a single uniform command line). This is similar to many other frameworks (e.g **android sdk**).
- Allow easily extension of sdk through plugins (e.g: activate off the shelf components into my project).
- Create a uniform way to provide feedback to developers (prompt user for data, show help messages, support parameters).
- Make the sdk compliant with linux way of developing command lines.

### 3.5.2 Usage

In this section you can find samples of how to use the sdk and how to make it available in older projects.

```
# For versions prior to **0.3.0**
pip install fantastico -U
```

```
fantastico --help
```

When you invoke `fantastico sdk` with **-help** argument it will list all available commands. Similar to other linux command lines you can obtain help hierarchical:

```
# Show help screen for fantastico <command>
fantastico.py <command> --help
```

### 3.5.3 Supported commands

#### Activate extension command

This Fantastico command helps developers integrate existing components into their project very easy. One use case is to activate in your projects contrib components (e.g: *Dynamic menu*). It is strongly recommended to use this sdk command because it works on every supported operating system.

```
class fantastico.sdk.commands.command_activate_extension.SdkCommandActivateExtension (argv, cmd_factory)
```

This class provides the functionality for activating off the shelf fantastico extensions. As developer, it is extremely easy to integrate provided functionality into fantastico. For now, it supports only local extensions provided into `fantastico.contrib` package. In the future, we plan to support activation of remote components into projects.

```
# replace <project_root_path> with your fantastico project location.
cd <project_root_path>
```

```
# replace <component_root_path> with your actual folder.
fantastico activate-extension --name dynamic_menu --comp-root <component_root_path>
```

```
exec (os_lib=<module 'os' from '/mnt/jenkins_ebs/continous_integration/fantastico_doc_workspace/pip-
deps/lib/python3.2/os.py'>)
```

This method is executed to activate the given extension name.

```
get_arguments ()
```

This method returns support arguments of activate-extension command.

#### Version command

This command tells you what is the current installed version of **Fantastico SDK**.

```
class fantastico.sdk.commands.command_version.SdkCommandVersion (argv, cmd_factory, version_reader=<module
'fantastico' from
'/mnt/jenkins_ebs/continous_integration/fa
```

This class provides the command for finding out installed version of Fantastico SDK. The value is defined in `fantastico` root module code.

```
# display help information for version command in sdk context
fantastico version --help
```

```
# display the current sdk version
fantastico version
```

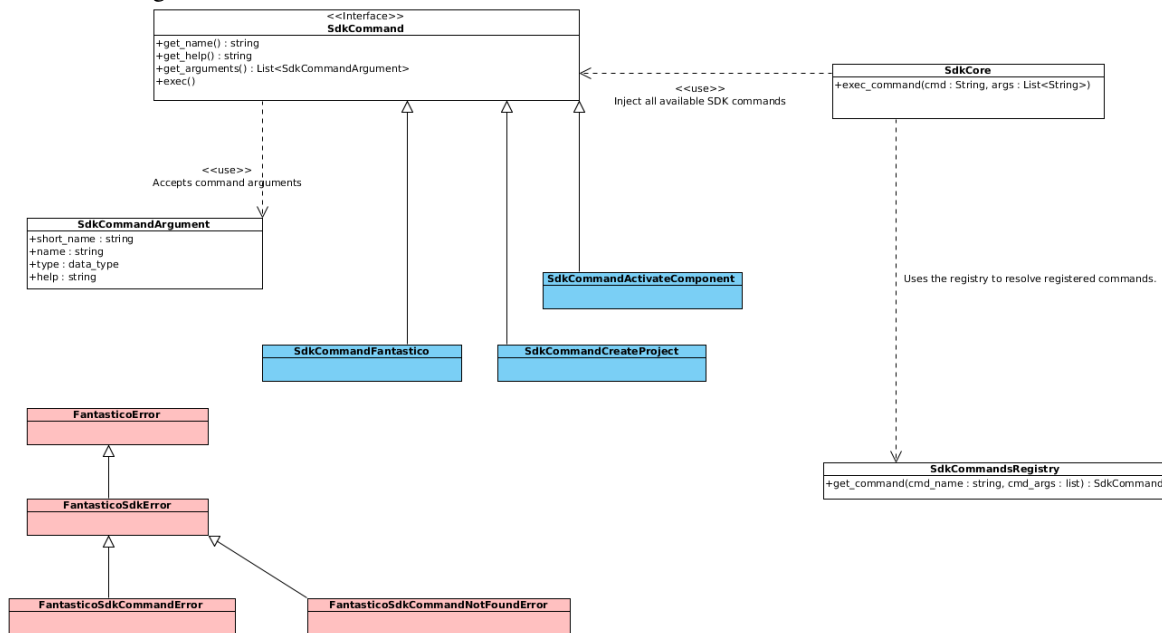
**exec** (*print\_fn=<built-in function print>*)

This method prints the current fantastico framework version.

### 3.5.4 Technical summary

```
class fantastico.sdk.fantastico.SdkCore (argv, cmd_factory=<class 'fantastico.sdk.sdk_core.SdkCommandsRegistry'>, supported_prefixes=None, settings_facade_cls=<class 'fantastico.settings.SettingsFacade'>)
```

This class provides the core functionality of Fantastico Software Development Kit. It wires all available commands together and handles requests accordingly. To better understand how sdk is designed see the following class diagram:



As you can see in above diagram, sdk core is just the main entry point of Fantastico Software Development Kit. It wires all available sdk commands together and it adds support for uniformly executes them and pass them arguments..

**exec** ()

This method does nothing because fantastico is designed to accept only registered subcommands.

**get\_arguments** ()

This property retrieves support fantastico arguments.

```
class fantastico.sdk.sdk_core.SdkCommandsRegistry
```

This class holds all registered commands available to use in the sdk. It is important to understand that commands and subcommands are registered by name and must be unique. This is because, by design, each command can easily become a subcommand for another command. It facilitates very flexible extension of sdk and reuse of existing commands.



**static** `add_command(cmd_name, cmd_cls)`

This method registers a new command using the given name.

**Parameters**

- **cmd\_name** (*str*) – Command name used to uniquely identify the command.
- **cmd\_class** (`fantastico.sdk.sdk_core.SdkCommand`) – A subclass of sdk command.

**Raises** `fantastico.sdk.sdk_exceptions.FantasticoSdkError` If the given name is not unique or cmd class is wrong.

**static** `get_command(cmd_name, cmd_args)`

This method retrieve a concrete sdk command by name with the give args passed.

**Parameters**

- **cmd\_name** (*str*) – The registered command name we want to instantiate.
- **cmd\_args** (*list*) – a list of arguments received from command line.

**Returns** Command instance.

**Return type** `fantastico.sdk.sdk_core.SdkCommand`

**Raises** `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandNotFoundError` if command is not registered.

**class** `fantastico.sdk.sdk_core.SdkCommandArgument(arg_short_name, arg_name, arg_type, arg_help)`

This class describe the attributes supported by a command argument. For a simple example of how arguments are used read `fantastico.sdk.sdk_core.SdkCommand`

**help**

This read only property holds the argument help message.

**name**

This read only property holds the argument name. Name property will represent the long name argument available for sdk commands. E.g: **-name**.

**short\_name**

This read only property holds the argument short name. Short name property will represent the short name argument available for sdk commands. E.g: **-n**.

**type**

This read only property holds the argument type.

**class** `fantastico.sdk.sdk_core.SdkCommand(argv, cmd_factory)`

This class provides the contract which must be provided by each concrete command. A command of sdk is just and extension which can provide custom actions being executed by Fantastico in a uniform manner.

Below you can find a simple example of how to implement a concrete command:

In the previous example, we have shown that all received arguments from command line are magically provided into **self.arguments** attribute of the command.

When a sdk command is instantiated with a list of command line arguments the first element from the list must be the command name. This happens because all arguments passed after a command name belongs only to that command.

**exec()**

This method must be overridden by each concrete command and must provide the command execution logic.

Raises `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandError` if an exception occurs while executing the command.

**exec\_command** (\*args, \*\*kwargs)

This method provides a template for executing the current command if subcommands are present. Internally it invokes overridden exec method.

**Raises**

- `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandError` – if an exception occurs while executing the command.
- `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandNotFoundError` – if a subcommand does not exist.

**get\_arguments** ()

This method must be overridden by each concrete command and must return the command supported arguments.

**class** `fantastico.sdk.sdk_decorators.SdkCommand` (name, help, target=None)

This decorator describe the sdk commands metadata:

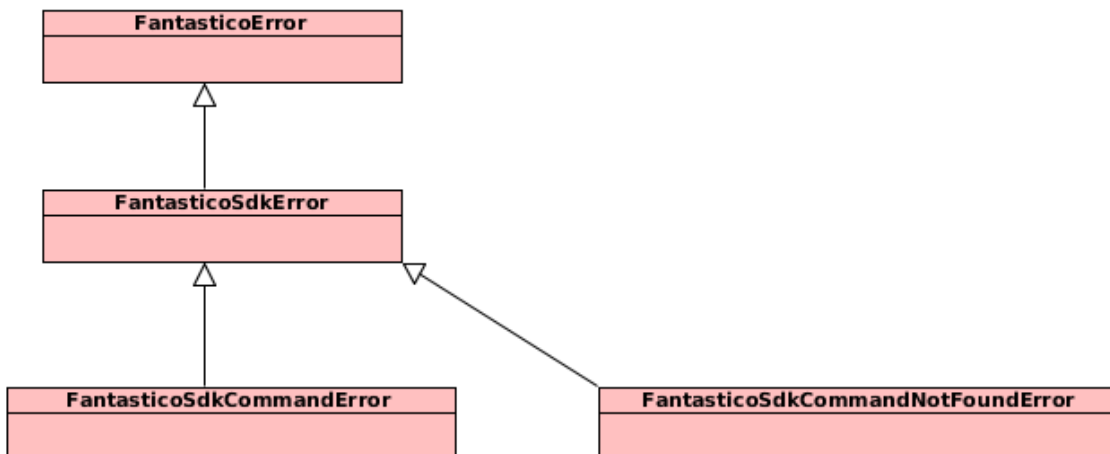
1.name

2.target (which is the main purpose of the command. E.g: fantastico - this mean command is designed to work as a subcommand for fantastico cmd).

It is used in conjunction with `fantastico.sdk.sdk_core.SdkCommand`. Each sdk command decorated with this decorator automatically receives `get_name` and `get_target` methods.

**class** `fantastico.sdk.sdk_exceptions.FantasticoSdkError`

This is the base exception used to describe unexpected situations occurring into fantastico sdk. Below you can see the sdk hierarchy of concrete exceptions.



**class** `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandError`

This class describe an exception which occurred into one of fantastico sdk commands.

**class** `fantastico.sdk.sdk_exceptions.FantasticoSdkCommandNotFoundError`

This class describe an exception which occurs when we try to execute an inexistent command.

## 3.6 Component model

In Fantastico there is no enforced component model for your code but there are a set of recommendations that will make your life a lot easier when organizing projects. A typical **component** structure looks like:

- **<your project folder>**
  - **component\_1**
    - \* models (sql alchemy models)
    - \* static (static files holder)
    - \* views (all views used by this component controllers')
    - \* sql (sql scripts required to setup the component)
    - \* \_\_init\_\_.py
    - \* \*.py (controller module files)

You can usually structure your code as you want, but Fantastico default *Model View Controller* registrators are assuming component name is the parent folder of the controller module. This is why is best to follow the above mentioned structure. None of the above folders are mandatory which gives you, developer, plenty of flexibility but also responsibility. For more information about **models**, **views** and **controllers** read *MVC How to* section.

### 3.6.1 Static folder

By default, static folder holds all static assets belonging to a component. You can find more information about this in *Static assets* section.

### 3.6.2 Sql folder

Sql folder is used to hold all sql scripts required for a component to work correctly. In our continuous delivery process we scan all available sql folders and execute **module\_setup.sql** scripts. By default, we want to give developers the chance to provide a setup script for each component in order to easily install the component database dependencies.

#### Sql folder example

Assume you want to create a blog module that requires a storage for **Authors** and **Posts**. `module_setup.sql` script is the perfect place to provide the code. We recommend to make this code idempotent, meaning that once dependencies are created they should not be altered anymore by this script.

An example of such a script we use in integration tests can be found under: **<fantastico\_framework>/samples/mvc/sql/module\_setup.sql**.

```
#####
# Copyright 2013 Cosnita Radu Viorel
#
# Permission is hereby granted, free of charge, to any person obtaining a copy of this software
# and associated documentation files (the "Software"), to deal in the Software without
# restriction, including without limitation the rights to use, copy, modify, merge, publish,
# distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom
# the Software is furnished to do so, subject to the following conditions:
#
# The above copyright notice and this permission notice shall be included in all copies or
# substantial portions of the Software.
```

```
#
# THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED,
# INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR
# PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR
# ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE,
# ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS
# IN THE SOFTWARE.
#####

DROP TABLE IF EXISTS mvc_friendly_messages;
CREATE TABLE mvc_friendly_messages(
  Id INT AUTO_INCREMENT,
  Message TEXT,
  PRIMARY KEY(id));
```

## 3.7 Component reuse

```
class fantastico.rendering.component.Component (environment,
                                                url_invoker_cls=<class
                                                'fantastico.rendering.url_invoker.FantasticoUrlInternalInvoker'>)
```

In fantastico, components are defined as a collection of classes and scripts grouped together as described in [Component model](#). Each fantastico component provides one or more public routes that can be accessed from a browser or from other components. This class provides the mechanism for internal component referencing.

In order to gain a better understanding about internal / in process component referencing we assume **Blog** component provides the following public routes:

- /blog/articles/<article\_id>** - Retrieves information about an article.
- /blog/ui/articles/<article\_id>** - Displays an article within a html container.

The first url is a simple json endpoint while the second url is a simple html dynamic page. When we want to reuse a datasource or an dynamic html page in fantastico is extremely easy to achieve. Lets first see possible responses from the above mentioned endpoints:

```
/* /blog/articles/<article_id> response */
{"id": 1,
 "title": "Simple blog article",
 "content": "This is a simple and easy to read blog article."}

<!-- /blog/ui/articles/<article_id> response-->

<div class="blog-article">
  <p class="title">Simple blog article</p>

  <p class="content">This is a simple and easy to read blog article.</p>
</div>
```

A very common scenario is to create multiple views for a given endpoint.

```
<!-- web service server side reuse -->
{% component url="/blog/articles/1", template="/show_blog_formatted.html", runtime="server" %}{%

<!-- show_blog_formatted.html -->
<p class="blog-title">{{model.title}}</p>
<p class="blog-content">{{model.content}}</p>
```

As you can see, json response is plugged into a given template name. It is mandatory that the given template exists on the component root path.

Also a very common scenario is to include an endpoint that renders partial html into a page:

```
<!-- html server side reusage -->
{% component url="/blog/ui/articles/1",runtime="server" %}{% endcomponent %}
```

Runtime attribute is used for telling Fantastico if the rendering needs to take place on server side or on client. Currently, only server side rendering is supported which actually means a page will be completed rendered on server and then the markup is sent to the browser.

In order to reduce required attributes for component tag, runtime attribute is optional with server as default value.

#### **parse** (*parser*)

This method is used to parse the component extension from template, identify named parameters and render it.

**Parameters** *parser* (*Jinja 2 parser*) – The Jinja 2 expression parser.

**Returns** A callblock able to render the component.

**Raises** **FantasticoInsufficientArgumentsError** when no / not enough arguments are provided to component.

**render** (*template*='/raw\_dump.html', *url*=None, *runtime*='server', *caller*=<function <lambda> at 0x44396b0>)

This method is used to render the specified url using the given parameters.

#### **Parameters**

- **template** (*string*) – The template we want to render into the result of the url.
- **url** (*string*) – The url we want to invoke.
- **runtime** (*string*) – The runtime we execute the rendering into. Only **server** is supported for now.
- **caller** (*macro*) – The caller macro that can retrieve the body of the tag when invoked.

**Returns** The rendered component result.

#### **Raises**

- **fantastico.exceptions.FantasticoTemplateNotFoundError** – Whenever we try to render a template which does not exist.
- **fantastico.exceptions.FantasticoUrlInvokerError** – Whenever an exception occurs invoking a url within the container.

## 3.8 Built in components

Fantastico framework is really young and continuously improving. As of version **0.2.0** it is extremely easy to reuse components provided urls in other context. This feature opens the possibility to provide common day by day used components in new projects in order to accelerate development. In this document you can find a detailed list of built in components as well as sample of how to use them:

### 3.8.1 Dynamic menu

Menus are a core part of every web site / application as well as mobile applications. More over, again and again developers will want a quick way to define menu items without actually redefining menu data structure again and again. This component which we generic named dynamic menu simply provides the controller and the model for easy development of menus.

#### Integration

In order to use dynamic menu component within your project follow the steps below:

#### Component files activation deprecated

1. Create a symbolic link under your root components folder to dynamic\_menu.

```
mkdir <components root>/dynamic_menu
cd <components root>/dynamic_menu
ln -s ../../pip-deps/lib/python[version]/site-packages/fantastico/contrib/dynamic_menu/sql .
ln -s ../../pip-deps/lib/python[version]/site-packages/fantastico/contrib/dynamic_menu/tests .
ln -s ../../pip-deps/lib/python[version]/site-packages/fantastico/contrib/dynamic_menu/*.py .
```

#### Component files activation (SDK)

```
fantastico activate-extension --name dynamic_menu
```

#### Component sample + db data

1. Create a template in one of your components in which you define the menu view:

```
<!-- *sample_menu.html* - simple snippet for creating a left / right side dockable menu. -->
{% for menu_item in model["items"] %}
    <a href="{{menu_item.url}}" title="{{menu_item.title}}" target="{{menu_item.target}}">{{menu_
{% endfor %}
```

2. In all views where you want to reuse the component you can paste the following snippet:

```
{% component template="sample_menu.html", url="/dynamic-menu/menus/1/items/" %}{% endcomponent %}
```

3. Make sure you run **dynamic\_menu/sql/module\_setup.sql** against your configured database.
4. This script will create **menus** and **menu\_items** tables into your database. Below you can find a sample script for creating a menu:

```
INSERT INTO menus(name) VALUES('My First Menu');
INSERT INTO menu_items(target, url, title, label)
VALUES ('_blank', '/homepage', 'Simple and friendly description', 'Home', <menu_id from previous
       ('_blank', '/page2', 'Simple and friendly description', 'Page 2', <menu_id from previous
       ('_blank', '/page3', 'Simple and friendly description', 'Page 3', <menu_id from previous
```

By default, when this component is first setup into an application, the sample menu mentioned above is created in database. You can test to see that dynamic menu works by accessing dev server url: <http://localhost:12000/dynamic-menu/menus/1/items/>.

## Current limitations

Because **Fantastico** framework is developed using an Agile mindset, only the minimum valuable scope was delivered for **Dynamic Menu** component. This mean is not currently possible to:

- Localize your menu items.
- Display the menu items in the request language dynamically.
- Only first 100 menu items can be currently retrieved.

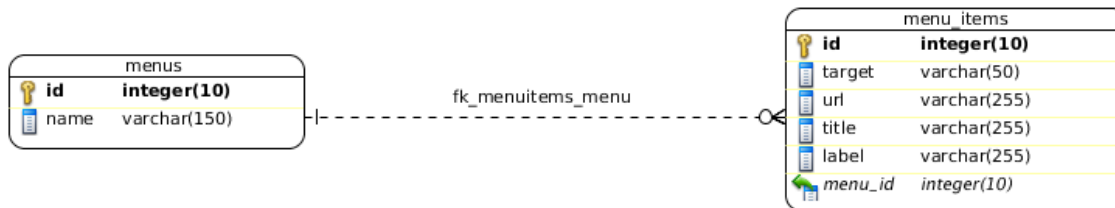
## Technical summary

**class** `fantastico.contrib.dynamic_menu.menu_controller.DynamicMenuController` (*settings\_facade*)

This class provides the controller for dynamic menus. The following routes are automatically made available when dynamic menu component is deployed:

**/dynamic-menu/menus/<menu\_id>/items/** – This route loads menu items from database and retrieve them in json format.

Below you can see a diagram describing relation model of the menu:



### **max\_items**

This property retrieves the maximum number of items allowed for a menu.

### **retrieve\_menu\_items** (*\*args, \*\*kwargs*)

This method is used to retrieve all items associated with a specified menu.

#### **Parameters**

- **request** (*HTTP request*) – Http request being processed.
- **menu\_id** (*int*) – Menu unique identifier we want to retrieve information for.

**Returns** A JSON array containing all available menu items.

**Raises** `fantastico.contrib.dynamic_menu.menu_exceptions.FantasticoMenuNotFoundException`

Whenever the requested menu does not exist.

**class** `fantastico.contrib.dynamic_menu.menu_exceptions.FantasticoMenuNotFoundException`

This class defines a concrete fantastic menu not found exception raised whenever someone tries to access an inexistent menu attributes.





## HOW TO ARTICLES

### 4.1 MVC How to

In this article you can see how to assemble various pieces together in order to create a feature for a virtual blog application. If you follow this step by step guide in the end you will have a running blog which can list all posts.

#### 4.1.1 Code the model

Below you can find how to easily create **post** model.

1. Create a new package called **blog**
2. Create a new package called **blog.models**
3. Create a new module called **posts** and paste the following code into it:

```
class Post(BaseModel):
    __tablename__ = "posts"

    id = Column("id", Integer, primary_key=True)
    blog_id =
    title = Column("title", String(150))
    tags = Column("tags", String(150))
    created_date = Column("registered_date", DateTime(), default=datetime.now)
    content = Column("content", Text(100))
```

Now you have a fully functional post model mapped over **posts** table.

#### 4.1.2 Code the controller

1. Create a new package called **blog.controllers**
2. Create a new module called **blog\_controller** and paste the following code into it:

```
@ControllerProvider()
class BlogsController(BaseController):
    @Controller(url="/blogs/(?P<blog_id>\\d{1,})/posts/$", method="GET",
                models={"Post": "fantastico.plugins.blog.models.posts.Post"})
    def list_blog_posts(self, request, blog_id):
        Post = request.models.Post

        blog_id = int(blog_id)

        posts = Post.get_records_paged(start_record=1, end_record=100,
```

```
sort_expr=[ModelSort(Post.model_cls.created_date, ModelSort.ASC),
           ModelSort(Post.title, ModelSort.DESC)],
filter_expr=[ModelFilter(Post.model_cls.blog_id, blog_id, ModelFilter.EQ)]

response = Response()
response.text = self.load_template("/posts_listing.html",
                                  {"posts": posts,
                                   "blog_id": blog_id})

return response
```

Now you have a fully functional controller that will list first 100 posts.

### 4.1.3 Code the view

1. Create a new folder called **blog.views**
2. Create a new view under **blog.views** called *posts\_listing.html* and paste the following code into it:

```
<html>
  <head>
    <title>List all available posts from blog {{blog_id}}</title>
  </head>

  <body>
    <ul>
      {% for post in posts %}
        <li>{{post.title}} | {{post.created_date}}</li>
      {% endfor %}
    </ul>
  </body>
</html>
```

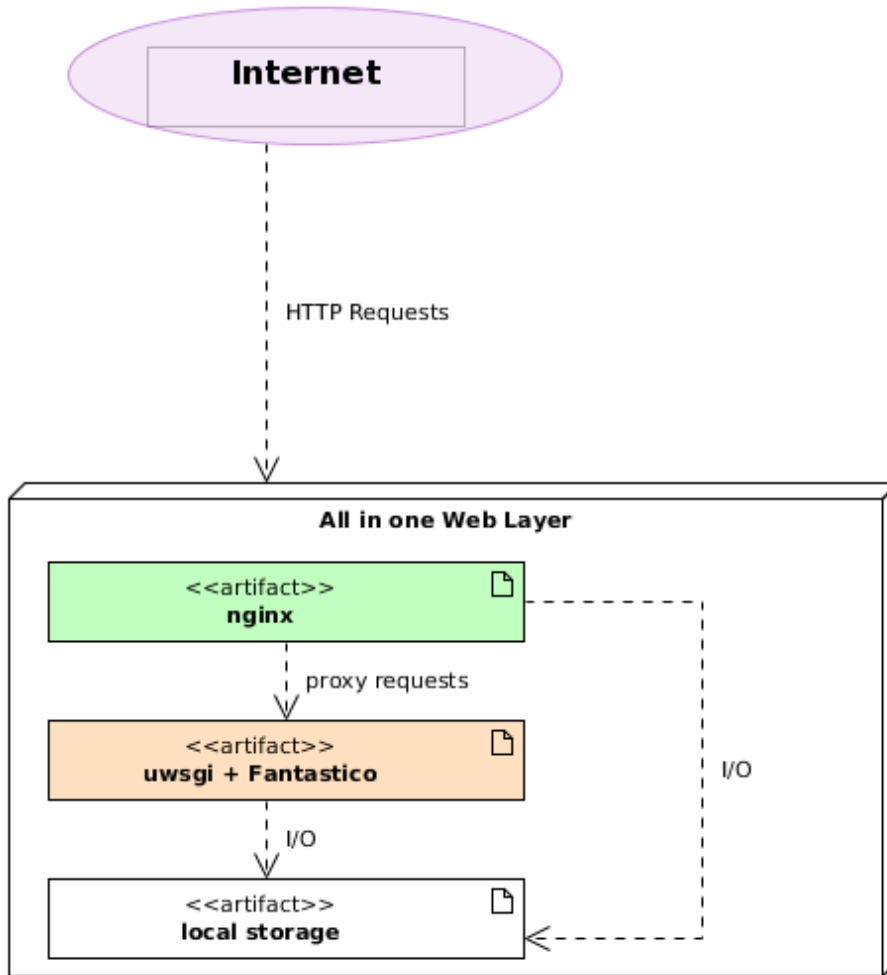
### 4.1.4 Test your application

1. Start fantastico dev server by executing script **run\_dev\_server.sh** (*Development mode*)
2. Open a browser and visit <http://localhost:12000/blogs/1/posts>.

## 4.2 Deployment how to

In this how to we guide you to Fantastico deployment to production. Below you can find various deployment scenarios that can be used for various needs.

### 4.2.1 Low usage (simplest scenario)



Above diagram described the simplest scenario for rolling out Fantastico to production. You can use this scenario for minimalistic web applications like:

- Presentation website
- Personal website
- Blog

We usually recommend to start with this deployment scenario and the migrate to more complex scenarios when you application requires it.

Advantages	Disadvantages
Extremely easy to deploy	Does not scale well for more than couple of requests / second
Minimal os configuration	All components are bundled on one node without any failover.
Automatic scripts for configuring the os	Does not support vertical scaling out of the box.
Easy to achieve horizontal scaling for all components at once.	Static files are not served from a cdn.

## Setup

1. Install Fantastico framework on the production machine (*Installation manual*).
2. Goto \$FANTASTICO\_ROOT
3. export ROOT\_PASSWD=<your root password>
4. `fantastico_setup_low_usage_<os_distribution> -ipaddress <desired_ip> -vhost-name <desired_vhost> -uwsgi-port <uwsgi port> -root-folder <desired root folder> -modules-folder <desired modules folder>` (e.g `fantastico_setup_low_usage_ubuntu.sh -ipaddress 127.0.0.1 -vhost-name fantastico-framework.com -uwsgi-port 12090 -root-folder 'pwd' -modules-folder /fantastico/samples`)
5. Done.

It is usually a good idea to change the number of parallel connections supported by your linux kernel:

1. `sudo nano /etc/sysctl.conf`
2. Search for **net.core.somaxconn**.
3. If it does not exist you can add `net.core.somaxconn = 8192` to the bottom of the file.
4. Restart the os.

### 4.2.2 Low usage AWS



This scenario is a little bit more complex than *Low usage (simplest scenario)* but it provides some advantages:

Advantages	Disadvantages
Can be autoscaled.	Requires AWS EC2 instances
Easier crash recovery	Requires manual configuration
Very easy monitoring support (CloudWatch)	Requires AWS EBS.
	Requires some AWS know how.
	Static files are not served from a cdn.

This scenario is recommended if you want to rollout you application on AWS infrastructure. Usually it is non expensive to do this as it requires micro instances and low cost storage. For more information about AWS required components read:

1. [AWS Instance types](#).
2. [AWS EBS](#).

## Setup

1. Create an AWS account. ([AWS Getting Started](#)).
2. Create an EC2 instance from AWS Management Console ([EC2 setup](#)).
3. SSH on EC2 instance.
4. Install Fantastico framework on the production machine ([Installation manual](#)).
5. Goto \$FANTASTICO\_ROOT
6. `fantastico_setup_low_usage_<os_distribution>.sh` (e.g `fantastico_setup_low_usage_ubuntu.sh`)
7. Done.

## Optimization

This scenario can be easily optimized by using **AWS S3** buckets for static files. This ensures faileover for static files and very easy horizontal scaling for sites. Below you can find the new diagram:



You can read more about **AWS S3** storage on <http://aws.amazon.com/s3/>. In this version of fantastic there is no way to sync static module files with S3 buckets. This feature is going to be implemented in upcoming **Fantastico** features. As a workaround you can easily copy **static** folder content from each module on S3 using the tool provided from AWS Management Console.

You can see how to use AWS Management Console S3 tool on <http://www.youtube.com/watch?v=1qrjFb0ZTm8>

## Setup with S3

1. export ROOT\_PASSWD=<your root password>
2. Create an AWS account. ([AWS Getting Started](#)).
3. Create an EC2 instance from AWS Management Console ([EC2 setup](#)).
4. SSH on EC2 instance.
5. Install Fantastico framework on the production machine ([Installation manual](#)).
6. Goto \$FANTASTICO\_ROOT/deployment
7. `fantastico_setup_low_usage_s3<os_distribution>.sh -ipaddress <desired_ip> -vhost-name <desired_vhost> -uwsgi-port <uwsgi port> -root-folder <desired root folder> -modules-folder <desired modules folder>` (e.g `fantastico_setup_low_usage_s3_ubuntu.sh -ipaddress 127.0.0.1 -vhost-name fantastico-framework.com -uwsgi-port 12090 -root-folder 'pwd' -modules-folder /fantastico/samples`)
8. Done.

It is usually a good idea to change the number of parallel connections supported by your linux kernel:

1. `sudo nano /etc/sysctl.conf`
2. Search for **net.core.somaxconn**.
3. If it does not exist you can add `net.core.somaxconn = 8192` to the bottom of the file.
4. Restart the os.

## 4.3 Static assets

By default, static assets can be any file that is publicly available. Most of the time, here you can place:

- css files
- png, jpg, gif files
- downloadable pdf
- movie files
- any other file format you can think about

For Production environment, requests to these files are handled by the web server you are using. You only need to place them under **static** folder of your component ([Component model](#)).

There are several scenario in which Fantastico projects are deployed which influence where your component static files are stored. I recommend you read [Deployment how to](#) section.

### 4.3.1 Static assets on dev

Of course, on development environment you are not required to have a web server in front of your Fantastico dev server. For this purpose, fantastico framework provides a special controller which can easily serve static files. Even though it works as expected, please do not use it in production. It does not send headers required by browser for caching purposes.

Static assets routes are the same between **prod** and **dev** environments.

## Favicon

If you want your site to also have an icon which is automatically presented by browsers, in your project root folder do the following:

1. `mkdir static`
2. `cd static`
3. Copy your `favicon.ico` file in here.

### 4.3.2 Static assets on prod

There is no difference between static assets on dev and static assets on production from routes point of view. From handling requests point of view, nginx configuration for your project takes care of serving static assets and sending correct http caching headers.

## 4.4 Creating a new project

A new Fantastico based project can be easily setup by following this how to. In this how to we are going to create a project named **fantastico\_first**.

1. `cd ~/`
2. `mkdir fantastico_first`
3. `cd fantastico_first`
4. `virtualenv-3.2 --distribute pip-deps`
5. `. pip-deps/bin/activate`
6. `pip install fantastico`
7. `fantastico_setup_project.sh python3.2 my_project`

The last step might take a while because it will also install all fantastico dependencies (e.g sphinx, sqlalchemy, ...). Please make sure you replace `python3.2` with the correct python version. In order to test the current project do the following:

1. `fantastico_run_dev_server`
2. Access <http://localhost:12000/fantastico/samples/mvc/static/sample.jpg>
3. Access <http://localhost:12000/mvc/hello-world>

Your newly project is setup correctly and it runs fantastico default samples project.

### 4.4.1 Create first component

After the new project it's correctly setup we can create our first component.

1. `. pip-deps/bin/activate`
2. `export FANTASTICO_ACTIVE_CONFIG=my_project.settings.BaseProfile`
3. `cd my_project`
4. `mkdir component1`

5. cd component1
6. mkdir static
7. Paste an image into static folder (e.g first\_photo.jpg)
8. touch \_\_init\_\_.py
9. touch hello\_world.py
10. Paste the code listed below into hello\_world.py

```
from fantastico.mvc.base_controller import BaseController
from fantastico.mvc.controller_decorators import ControllerProvider, Controller
from webob.response import Response

@ControllerProvider()
class HelloWorldController(BaseController):
    '''This is a very simple controller provider.'''

    @Controller(url="/component1/hello")
    def say_hello(self, request):
        '''This method simply returns an html hello world text.'''

        msg = "Hello world from my project"

        return Response(content_type="text/html", text=msg)
```

11. fantastico\_dev\_server
12. Now you can access [Hello](#) route.
13. Now you can access [First photo](#) route.

## 4.4.2 Customize dev server

For understanding how to customize dev server please read [Development mode](#)

## 4.4.3 Customize uwsgi prod server

By design, each Fantastico project provides built in support for running it on [uWSGI server](#). If you want to customize uwsgi parameters for your server you can follow these steps:

1. cd \$FANTASTICO\_PROJECT\_FOLDER/deployment/conf/nginx
2. nano fantastico-uwsgi.ini
3. Change the options you want and save the file.
4. fantastico\_run\_prod\_server (for testing the production server).
5. Be aware that first you need an nginx configured and your project config file deployed (Read [Deployment how to](#)).



## CHANGES

- **v0.2.2**
  - Update dynamic menu activation documentation.
  - Fix a serious bug in engine management and too many sql connections opened.
  - Fix a bug in db session close when an unexpected error occurs when opening the connection.
  - Add extensive unit tests for db session management.
- **v0.2.1**
  - Fix packaging of pypi package. Now it is usable and contains rendering package as well as contrib package.
- **v0.2.0**
  - Framework documentation is tracked using Google Analytics
  - Component reuse is done using { % component % } tag.
  - Dynamic menu pluggable component can be used out of the box.
  - MVC documentation improvements.
  - Fix a bug in DB session management cache when configuration was changed at runtime.
- **v0.1.2**
  - Nginx config file now also maps www.<vhost\_name>
  - Redirect support from controllers
  - Setup fantastico framework script does not override deployment files anymore
- **v0.1.1**
  - Favicon route handling.
  - Deployment scripts error handling and root folder execution (rather than execution only for deployment subfolder).
  - MVC how to article was changed to use get\_records\_paged instead of all\_paged method (it used to be a bug in documentation).
  - DB Session manager was changed from one singleton connection to connection / request.
  - FantasticoIntegrationTestCase now has a property that holds os environment variable name for setting up Fantastico active config.
- **v0.1.0**
  - Built in router that can be easily extended.

- WebOb Request / Response architecture.
- Request context support for accessing various attributes (current language, current user and other attributes).
- Multiple project profiles support.
- Database simple configuration for multiple environments.
- Model - View - Controller support.
- Automatic model facade generator.
- Model facade injection into Controllers.
- Templating engine support for views (jinja2).
- Documentation generator for pdf / html / epub formats.
- Automatic framework packaging and deployment.
- Helper scripts for creating projects based on Fantastico.
- Easy rollout script for running Fantastico projects behind nginx.
- Rollout scenarios for deploying Fantastico projects on Amazon (AWS).
- How to sections for creating new projects and components using Fantastico.

## BUILD STATUS

If you want to see the current build status of the project visit [Build status](#).



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