Before starting with REST we will first take a overview on JSON

**JSON**

JSON (JavaScript Object Notation) is a popular data format used for representing structured data. It's commonly used in transmitting and receive data between a server and web application in JSON format

**NOTE:**

* JSON data looks like python dictionary data types, JSON data are always kept in double quote but dictionary can be in single or double quote.
* We can check if data is a valid JSON data using loads()

**Json data types:**

In JSON, values must be one of the following data types

1. String
2. Number
3. Object (JSON object)
4. Array Boolean
5. null

**Json String**

Strings in JSON must be written in double quotes.

{ "name":"John" }

**Number**

Numbers in JSON must be an integer or a floating point.

{ "age":30 }

**JSON Object**

A JSON object contains data in the form of key/value pair. The keys are strings and the values are the JSON types. Keys and values are separated by colon. Each entry (key/value pair) is separated by comma.

*The { (curly brace) represents the JSON object*

*{*

*"employee": {*

*"name": "sonoo",*

*"salary": 56000,*

*"married": true*

*}*

*}*

**Json Array**

The data enclosed into '[',']' (square bracket) represents the JSON array.

*A JSON array can have values and objects.*

e.g—

1. Simple JSON array

["Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"]

2. Json array of json objects

[

{"name":"Ram", "email":"Ram@gmail.com"},

{"name":"Bob", "email":"bob32@gmail.com"}

]

**Boolean**

Booleans in JSON are either true or false

**Python data to JSON data types conversion tables.**



**Json data to python data conversion table**



**Parse JSON into Python**

The json module makes it easy to parse JSON strings and files containing JSON object

We have two methods to part it

1. json.loads(json\_data) ------ from JSON to python dictionary
2. json.load(file\_object) -------- from JSON file to python

**json.loads()**

using this method, we can convert JSON string into python data type or python data in a variable

We can parse a JSON string using json.loads() method.

*The method returns a dictionary if input data is validate json data else will get ValueError exception*.

Using load() method we can check if input data is a valid input data.

import json

person = '{"name": "Bob", "languages": ["English", "Fench"]}'

person\_dict = json.loads(person)

# Output: {'name': 'Bob', 'languages': ['English', 'Fench']}

print( person\_dict)

NOTE:

Here person is json string that is converted into python dictionary

**json.load(file\_object)**

We can use this method to convert JSON data stored in file to python variable

We can use json.load() method to read a file containing JSON object.

import json

with open('path\_to\_file’) as f:

  data = json.load(f)

print(data)

**Converting Python to JSON string**

**Python(dict,list,tuple etc) Convert to JSON string**

We can convert any of python data types into equivalent data types, for this we have below two methods

1. json.dumps(python\_var) ---------- from python variable to JSON string
2. json.dump(file\_path) ------------

**json.dumps(python\_var)**

using dumps(pyth\_variable) we can convert any python vraibale into it’s equivalent json data types

mport json

person\_dict = {'name': 'Bob',

'age': 12,

'children': None

}

person\_json = json.dumps(person\_dict)

# Output: {"name": "Bob", "age": 12, "children": null}

print(person\_json)

More about the dumps() can be check on next page

**json.dump(python\_data,file\_object)**

this method is used to write python data into JSON file or converting from python JSON variable to JSON file

import json

person\_dict = {"name": "Bob",

"languages": ["English", "Fench"],

"married": True,

"age": 32

}

with open('person.txt', 'w') as json\_file:

  json.dump(person\_dict, json\_file)

Above program will convert python data of variable person\_dict into person.txt file in which data will be in JSON format.

More j about json.dump() can be checked below

**json.dump(obj, skipkeys=False, allow\_nan=True, cls=None, indent=None, separators=None, default=None, sort\_keys=False, \*\*kw)**

1. If skipkeys is true (default: False), then dict keys that are not of a basic type (str, int, float, bool, None) will be skipped instead of raising a TypeError.
2. If indent is a non-negative integer or string, then JSON array elements and object members will be pretty-printed with that indent level. An indent level of 0, negative, or "" will only insert newlines.
3. Separators are used to specify how key and value will be separated for custom separation

separators=("separator\_for\_key", "separation\_for\_value ")

1. sort\_keys parameter to specify if the result should be sorted or not, if TRUE then the output of dictionaries will be sorted by key

**json.dumps(obj, skipkeys=False, allow\_nan=True, cls=None, indent=None, separators=None, default=None, sort\_keys=False, \*\*kw)**

Serialize obj to a JSON formatted str using this conversion table. *The arguments have the same meaning as in dump().*

**Converting Python class objects into JSON**

We can use \_\_dict\_\_ attribute of python to convert into dictionary and then use dumps() to convert into JSON.

Obj--- python object for any class

Obj.\_\_dict\_\_ ------- this will convert into python dictiaory

dumps(Obj.\_\_dict\_\_) --------- JSON format

**Encoders and Decoders**

**Encoders**

**class json.JSONEncoder(\*, skipkeys=False, ensure\_ascii=True, check\_circular=True, allow\_nan=True, sort\_keys=False, indent=None, separators=None, default=None)**

If we do conversion from Python to JSON data types they are converted to their equivalent data types as listed below



**Decoders**

Supports the following objects and types by default

**class json.JSONDecoder(\*, object\_hook=None, parse\_float=None, parse\_int=None, parse\_constant=None, strict=True, object\_pairs\_hook=None)**



**requests**

Requests is a Python module that you can use to send all kinds of HTTP requests. It is an easy-to-use library with a lot of features ranging from passing parameters in URLs to sending custom headers and SSL Verification

It has below methods-

|  |  |
| --- | --- |
| [delete(url, args)](https://www.w3schools.com/python/ref_requests_delete.asp) | Sends a DELETE request to the specified url |
| [get(url, params, args)](https://www.w3schools.com/python/ref_requests_get.asp) | Sends a GET request to the specified url  It returns response object |
| [head(url, args)](https://www.w3schools.com/python/ref_requests_head.asp) | Sends a HEAD request to the specified url |
| patch(url, data, args) | Sends a PATCH request to the specified url |
| [post(url, data, json, args)](https://www.w3schools.com/python/ref_requests_post.asp)  *requests.post(*url*, data={*key*:* value*}, json={*key*:* value*},* args*) --- syntax*  arguments means zero or more named arguments | Sends a POST request to the specified url |
| put(url, data, args) | Sends a PUT request to the specified url |
| request(method, url, args) | Sends a request of the specified method to the specified url |

**Methods of attributes of response**

Response is obtained when ever we send request using get() to server. It has below methods/attributes

json() ----- returns json object of result(if result is in JSON format else error)

status\_code ---- returns status that indicates status

url --- returns url of response

close() ---- close connection to server

**How to send HttpResponse using CLI**

We can send using command line http clients, we can send. There are many but few are:-

1. HttPie ------ we will work with HttPie
2. Curl
3. Wget

**Sending HttpRequest using HttPie**

http <url\_for\_request>

Note:

For sending request using cmd/CLI, as usual server need to be running

Views.py file

def home(request):

    print("tis is home view method")

    d={1:"hello",2:"Shyam",3:"Hare Hare"}

    json\_data=json.dumps(d)

    return HttpResponse(json\_data, content\_type='application/json')

urls.py

app\_name='no\_rest'

urlpatterns = [

    path('home/',views.home, name='no\_rest-home'),

]

sending httprequest

http http://127.0.0.1:8000/no\_rest/home/

output is below



**How to send dictionary object as Json type**

In json module there is one methos JsonResponse() which converts python dictionary data into json data and returns as HttpResponse.

**Note:**

We can use **JsonResponse()** method from json module to send dict object as json object, method will itself convert from dictionary to Json

def home(request):

    print("tis is home view method")

    d={1:"hello",2:"Shyam",3:"Hare Hare"}

    json\_data=json.dumps(d)

    print('data type of d is: ', type(d))

    print('data type of json\_data  is: ', type(json\_data))

    #return HttpResponse(json\_data, content\_type='application/json')

    return JsonResponse(d)

**How to send httprequest from python application**

Using 'requests' module we can send httprequest on a specified url.

In requests library we have **'get()'** using which we can call url which will fetch response

The returned response we can convert into dictionary object using json() as – response.json()

response =requests.get(url) #Getting response from url

dict\_data=response.json() # getting data back into json format (if returns json data)

test.py file

import requests

import json as js

base\_url='http://127.0.0.1:8000/no\_rest/'

end\_point='home'

response=requests.get(base\_url+end\_point)

print('this is test application')

print(type(response))

test.py file can be created/placed in any path(in this case I have created into rest\_api folder which is in project folder)



Common language b/t two app--- Http(java, Django etc)

Common message format --- JSON, XML(old technology)

**How to disable csrf\_token verification /middleware**

We can disable csrf\_token verification in three ways

1. **Method level or function lelvel.**

To disable at function label import decorator '@csrf\_exempt' on the where for which we want to disable csrf token validation.

@csrf\_exempt

def myview(request,\*args):

#

1. **Class label**

For class label we need to use below two decorators with class name.

from django.views.decorators.csrf import csrf\_exempt

from django.utils.decorators import method\_decorator

@method\_decorator(csrf\_exempt, name='dispatch’)

Class myClassBasedview(View):

#

*name= ‘dispatch’* -------- then it disables csrf validation for all methods related to class.

1. **Project label**

Disable it from setting.py file

**What is Mixin**

Mixin in class in Django which acts as parent class to provide functionality to child class, it supports only to child class.

Mixin class always extends object class not any other class

It always provides support to child class

Let’s take an example of mixin, here we are going to deal with same above example.

Mixin.py file

import json

from django.http import JsonResponse

class JsonMininx:

    def json\_data(self,data):

        return JsonResponse(data)

views.py file

class JsonCBV(JsonMininx,View):

    def get(self,request):

        d={1:"hello",2:"Shyam",0:"Hare Hare"}

        return self.json\_data(d)

**NOTE**:

Now here we can notice that where ever is required to run json response we can call json\_data from JsonMininx class.(we can modify that for any number of argument using variable argument)

**Multiple inheritance vs Mixin**

|  |  |
| --- | --- |
| **Mixin** | **Multiple inheritance** |
| >Parent class instantiation not possible or of no use  >Parent class contain only instance method not instance variable.  >Methods are useful only for Child class.  >Parent class should be direct child class of object class. | >We can instantiate.  >It may contain both instance variable and method and static methods and variable.  >Methods are useful for parent and child class.  >Parent class can inherit any other class also |

**What is difference between makemigrations and migrate command**

Makemigrations ---- create SQL query to create DB table

Migrate ------ creates table and inserts data into DB

**http Status code in Django**

1XX ----- this is for informational, it’s range is from 100 to 199

2XX ----- this is for success, it range is from 200 to 299

3XX ----- this is re-directional, it range from 300 to 399

4XX ----- Client Error, ranges from 400 to 499 (e.g --- page not found)

5XX ----- Server error

**Create a REST api to get data from database**

Here we will Employee model.

models.py file

class Employee(models.Model):

    ename=models.CharField(max\_length=100)

    esal=models.IntegerField()

    eadd=models.CharField(max\_length=100)

views.py file

class EmployeeCBV(View):

    def get(self,request,\*args):

        data=Employee.objects.get(id=1)

        print(data)

        emp\_data={'ename':data.ename,'esal':data.esal,'eadd':data.esal}

        json\_data=json.dumps(emp\_data)

        return HttpResponse(json\_data,content\_type='application/json')

urls.py file

urlpatterns = [

    #path('home/',views.home, name='no\_rest-home'),

    path('cbv/',views.JsonCBV.as\_view(),name="no\_rest\_cbv"),

    path('emp/',views.EmployeeCBV.as\_view(),name="no\_rest\_emp-cbv"),

]

Now from based on urls mapping and views we can get data from database using requests library

test.py file for getting json data

import requests

import json as js

#http://127.0.0.1:8000/no\_rest/cbv/

#http://127.0.0.1:8000/no\_rest/cbv/

base\_url='http://127.0.0.1:8000/no\_rest/'

end\_point='cbv'

response=requests.get(base\_url+end\_point)

**Customise above code in such way that it will accept employee id from requestor/url and then it will display detail of that employee.**

Hint- Modify urls.py file and class based view

urls.py file

urlpatterns = [

    #path('home/',views.home, name='no\_rest-home'),

    path('emp/<int:pk>',views.EmployeeCBV.as\_view(),name="no\_rest\_emp-cbv"),

]

Views.py file

class EmployeeCBV(View):

    pk=None

    def get(self,request,pk,\*args):

        data=Employee.objects.get(id=pk)

        print(data)

        emp\_data={'ename':data.ename,'esal':data.esal,'eadd':data.esal}

        json\_data=json.dumps(emp\_data)

        print(type(json\_data))

        return HttpResponse(json\_data,content\_type='application/json')

output

**What is Serialization**

Converting python dict object to json object is called serialization.

Serialization is a mechanism of converting the state of an object into a byte stream

(In general terminology converting from one object to another is called serialization)

Now suppose in case we used Entry.object.all() then there are chances that we may get thousands of data then converting them in json is big problem. To overcome this burden djanog have module called **serializer**

**Serializers**

Serializer is available in django.core import serializers

from django.core import serializers

Django’s serialization framework provides a mechanism for “translating” Django models into other formats. Usually these other formats will be text-based and used for sending Django data over a wire, but it’s possible for a serializer to handle any format (text-based or not).

**Serializing data**

We can use **serialize()** function to serialize data from queryset to json format

**serialize(data\_format,[data])**

**serialize(data\_format,[data], fields=[files\_that\_want\_to\_show])**

this is function in django.core.serializers

This methods creates json data as json array**.**

data\_format----- data format in which you want to serialize, this is string. E.g—xml,json

data ---- data that want to serialize, it’s iterable data , e.g--- queryset

fields---- data fields that want to serialize or give as out in specified format

**Note:**

If data is iterable(e.g- queryset) then we can some use that if not iterable then give in list form

CASE1:

data=Employee.objects.all()

json\_data=serializers.serialize('json',data,fields=['ename','eadd'])

here data is queryset (an iterable data)

CASE 2:

data=Employee.objects.get(id=pk)

json\_data=serializers.serialize('json',[data])

here data is not iterable data so giving in list

e.g---

data = serializers.serialize('xml', Restaurant.objects.all())

serialize(data\_format,[data], fields=[files\_that\_want\_to\_show])

This method creates json data as **json array.**

fields--- files that you want to show or give to requestor, these are nothing but column of DB table

e.g.-

json\_data=serializers.serialize('json',[data],fields=['ename','eadd'])

Showing all files of model class

class EmployeeCBV(View):

    pk=None

    def get(self,request,pk,\*args):

        print('id is: ',pk)

        data=Employee.objects.get(id=pk)

        json\_data=serializers.serialize('json',[data,])

        print("data typed of serialized data is: ",type(json\_data))

        return HttpResponse(json\_data,content\_type='application/json')

Showing only required fields

class EmployeeCBV(View):

    pk=None

    def get(self,request,pk,\*args):

        print('id is: ',pk)

        data=Employee.objects.get(id=pk)

        json\_data=serializers.serialize('json',[data],fields=['ename','eadd'])

        print("data typed of serialized data is: ",type(json\_data))

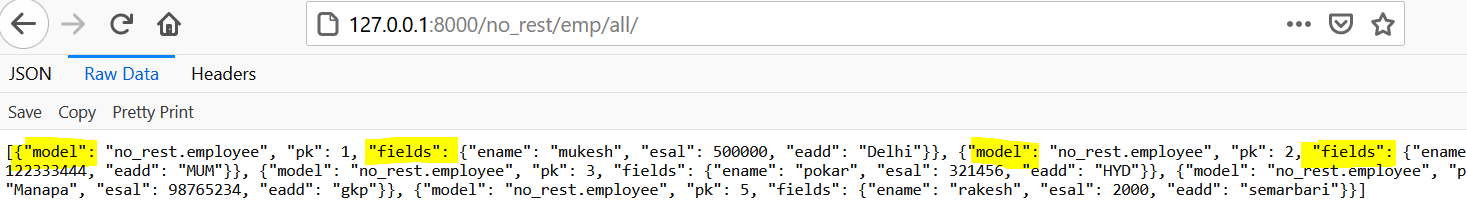
        return HttpResponse(json\_data,content\_type='application/json')

NOTE:

When we used above two methods for fetching data then the fetched data will be list of dictonary.

Key of dictionary will be – model(model class name), fields(fields of model class), primary key of id.

**Output:**



**WAP a view to get data only, don’t want keys**

final\_list=[]

for each in json\_data:

final\_list.append(each[‘fields’])

json\_data=json.dumps(final\_list)

class EmployeeListCBV(View):

    def get(self,request,\*args):

        print('this is EmployeeListCBV class ')

        qs=Employee.objects.all()

        json\_data=serializers.serialize('json',qs)#convert into json(list of dict will be)

        d=json.loads(json\_data) #get back in python data format

        fina\_list=[]

        for each in d:

            fina\_list.append(each['fields'])

        json\_data=json.dumps(fina\_list)#now convert into JSON data format

        return HttpResponse(json\_data,content\_type='application/json')

Let’s try to use here mixins to separate some code for getting required data only.

Views.py file

class EmployeeListCBV(View,EmployeeMixins):

    def get(self,request,\*args):

        print('this is EmployeeListCBV class ')

        qs=Employee.objects.all()

        data=self.json\_data(qs)

        return HttpResponse(data, content\_type='application/json')

mixins.py file

class EmployeeMixins(object):

    def json\_data(self,qs):

        json\_data=srz.serialize('json',qs) #converting query set into json

        d=json.loads(json\_data) #converted back to python

        fina\_list=[]

        for each in d:

            fina\_list.append(each['fields'])

        json\_data=json.dumps(fina\_list)

        return json\_data #retunred json data

Now here we will not get some details like – model name, fields etc.

**Exception handling in API**

Let say we have below code in view.py file-

class EmployeeCBV(View,EmployeeMixins):

    pk=None

    def get(self,request,pk,\*args):

        print('i am working wih JSON data')

        print('id is: ',pk)

        qs=Employee.objects.get(id=pk)

        data=self.json\_data([qs,])

        return HttpResponse(data, content\_type='application/json')

when user tries to access any data by using id then it’s going to give exception/error, that we need to handle that need to be handled as below-

*Method 1: More suggustable*

Modify the views.py file to handle exception as shown below-

view.py file

class EmployeeCBV(View,):

    pk=None

    def get(self,request,pk,\*args):

        print('i am working wih JSON data')

        print('id is: ',pk)

        try:

            qs=Employee.objects.get(id=pk)

        except Employee.DoesNotExist:

            data=json.dumps({'msg':"no such employee"})

            return HttpResponse(data, content\_type='application/json')

        else:

            data=self.json\_data([qs,])

            return HttpResponse(data, content\_type='application/json')

*Method 2:* handle in partner application

If Django application doesn’t handles exception then we can handle in our partner application.

Python application(test.py file)

data=requests.get('http://127.0.0.1:8000/no\_rest/emp/200/')

if data.status\_code in range(200,300):

    data=data.json() #get the json data obtained in response

    print(data)

else:

    print('something goes worng')

views.py file

class EmployeeCBV(View,EmployeeMixins):

    pk=None

    def get(self,request,pk,\*args):

        print('i am working wih JSON data')

        print('id is: ',pk)

        qs=Employee.objects.get(id=pk)

        data=self.json\_data([qs,])

        return HttpResponse(data, content\_type='application/json')

mixin.py file

class EmployeeMixins(object):

    def json\_data(self,qs):

        json\_data=srz.serialize('json',qs) #converting query set into json

        d=json.loads(json\_data) #converted back to python

        fina\_list=[]

        for each in d:

            fina\_list.append(each['fields'])

        json\_data=json.dumps(fina\_list)

        return json\_data #retunred json data

**How to add status code manually in response**

We can add status code while returning response. The same status code will be retuned to partner application or in response

HttpResponse(data, content\_type='application/json', status=status\_code)

**Create operation**

For create operation we will be using POST() in our view(if class based view else class based view then we have to check method name for which data is coming and then work accordingly) or from requests.

**How to dump data from database**

In Django we can dump data using manage.py file as below

python manage.py dumpdata <app\_name>.<model\_name> --format format\_value --indent int –output filename

Using above command, we can dump data to console for given app and model name.

--fomrat ----------> this is optional, default to JSON format

-- indent -----optional, specify the indent label you want to keep while displaying data

-- output ----- optional, specify the file where you want to write data, default is console

**How to disable csrf\_token verification**

We can disable csrf\_token verification in three ways

1. **Method level or function lelvel.**

To disable at function label import decorator '@csrf\_exempt' on the where for which we want to disable csrf token validation.

@csrf\_exempt

def myview(request,\*args):

#

1. **Class label**

For class label we need to use below two decorators with class name.

from django.views.decorators.csrf import csrf\_exempta

from django.utils.decorators import method\_decorator

@method\_decorator(csrf\_exempt, name='dispatcha)

Class myClassBasedview(View):

#

*name= ‘dispatch’* -------- then it disables csrf validation for all methods related to class.

1. **Project label**

Disable it from setting.py file

Now here we will try to send a create operation for our model Employee from python application (test.py file)

test.py file

def create\_resource():

    emp={'ename':"rakesh",'esal':2000,'eadd':"semarbari"}

    json\_data=json.dumps(emp)

    resp=requests.post('http://127.0.0.1:8000/no\_rest/emp/',data=json\_data)

    print('retundes statuse code is: ',resp.status\_code)

create\_resource()

views.py file

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeListCBV(View,EmployeeMixins):

    def get(self,request,\*args):

        print('this is EmployeeListCBV class ')

        qs=Employee.objects.all()

        data=self.json\_data(qs)

        return HttpResponse(data, content\_type='application/json')

    def post(self,request, \*args, \*\*kwargs):

        print('processing post request')

        data={'msg':'this is retunred message'}

        json\_resp=json.dumps(data)

        return HttpResponse(json\_resp,content\_type='application/json')

Output will be :-

retundes statuse code is: 200 # 200 means we are able to send a post request,

**Adding data validation(data type) in view**

Now in my view we have not added validation to check if data sent by consumer is validation json data or not, we will check if and accordingly will sent a message to consumer.

Steps:

1. While receiving data try to convert into python data, is completed without any error then requestor have sent a valid input data.

Views.py file

    def post(self,request, \*args, \*\*kwargs):

        input\_data=request.body #retriving data from request

        try:

            json.loads(input\_data)

        except ValueError as e:

            print(e)

            data={'msg':'invalid data'}

            json\_resp=json.dumps(data)

            return HttpResponse(json\_resp,content\_type='application/json')

        else:

            data={'msg':'we have got your data'}

#we will also add logic data validation with our model and will add in DB

            return HttpResponse(json.dumps(data),content\_type='application/json')

request.body ---- this is way to retrieve data from request. Check HttpRequest in djano

tesy.py file

def create\_resource():

    emp={'ename':"rakesh",'esal':2000,'eadd':"semarbari"}

    json\_data=json.dumps(emp)

    resp=requests.post('http://127.0.0.1:8000/no\_rest/emp/',data=json\_data)

    print('retundes statuse code is: ',resp.status\_code)

    print(resp.json())

create\_resource()

Output:

Now if we sent other than json data from client end then we will get ‘Invalid data’ as response at client end. (instead of data=json\_data try use data=emp in test.py file and see response/output)

**Now our requirement is to do data validation(data type, data related to model) and add data to DB**

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeListCBV(View,EmployeeMixins):

    def get(self,request,\*args):

        print('this is EmployeeListCBV class ')

        qs=Employee.objects.all()

        data=self.json\_data(qs)

        return HttpResponse(data, content\_type='application/json')

    def post(self,request, \*args, \*\*kwargs):

        input\_data=request.body

        try:

            py\_data=json.loads(input\_data)

            fm=forms.AddDataForm(py\_data)

            if fm.is\_valid():

                print('data was a valid data')

                fm.save()

                return HttpResponse(json.dumps({"msg":"data added to DB"}),content\_type='application/json')

        except ValueError as e:

            print(e)

            data={'msg':'invalid data'}

            json\_resp=json.dumps(data)

            return HttpResponse(json\_resp,content\_type='application/json')

        else:

            data={'msg':'we have got your data'}

            return HttpResponse(json.dumps(data),content\_type='application/json')

**Create API to update details of a Employee**

For updating we need to use put() in views.py file and in python applications.

Consider a case where we can to update employee address and salary from our python applications for given eomployee, employee id is paswd in url

def update\_resource():

    url='http://127.0.0.1:8000/no\_rest/emp/1/' #here I at end is emp id to update

    emp={'ename':"mukesh",'esal':10,'eadd':"Delhi"}

    json\_emp=json.dumps(emp)

    resp=requests.put(url,data=json\_emp)

    print('retundes statuse code is: ',resp.status\_code)

    print(resp.json())

update\_resource()

Here from python application we are sending data in json form to update in database.

Utils.py file in app

import json

from .models import \*

from .forms import \*

#this method is for checking if data provided was in json format

def is\_valid\_json(data): #this is for checking it input data is valid json

    try:

        json\_data=json.loads(data)

        return True

    except ValueError as e:

        return False

    finally:

        pass

def get\_object\_by\_id(id): #this is just to check if employee exists with given id

    try:

        emp=Employee.objects.get(id=id)

        return True

    except Employee.DoesNotExist as e:

        return False

    finally:

        pass

forms.py file

from django import forms

from . import models

class AddDataForm(forms.ModelForm):

    class Meta:

        model=models.Employee

        fields='\_\_all\_\_'

views.py file

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeCBV(View,EmployeeMixins):

    pk=None

    def put(self,request,pk,\*args,\*\*kwargs):

        print('employee id is: ',pk)

        print('input data is: ',request.body)

        if is\_valid\_json(request.body):

            if get\_object\_by\_id(pk):

                emp=Employee.objects.get(id=pk)

                input\_data=request.body

                provided\_data=json.loads(input\_data)

                print(emp.id,emp.ename,emp.esal,emp.eadd)

                emp\_dict={'ename':emp.ename,'esal':emp.esal,"eadd":emp.esal}

                emp\_dict.update(provided\_data)

                print('updated employee  dictinary is: ',emp\_dict)

                form=AddDataForm(emp\_dict,instance=emp) #creating new emp obj to update

                if form.is\_valid():

                    msg={'msg':'form is valid'}

                    form.save()

                    emp=Employee.objects.get(id=pk)

                    print(emp.id)

                    print(emp.ename)

                    print(emp.esal)

                    return HttpResponse(json.dumps(msg),content\_type='application/json', status=200)

                if form.errors:

                    msg={'msg':'Error is form creations'}

                    return HttpResponse(json.dumps(msg),content\_type='application/json', status=200)

            else:

                msg={'msg':"object does not exists"}

                return HttpResponse(json.dumps(msg),content\_type='application/json', status=404)

        else:

            return HttpResponse(json.dumps({"msg":"invalid data format"}),content\_type='application/json', status=200)

**Note:**

1. emp\_dict.update(provided\_data)

I have used this to ceate new dicntionary which I will use while creating the employee object for updating the details, irrespective of any parameter that want to update.

1. form=AddDataForm(emp\_dict,instance=emp)

Here I havecreated new form object , I am using instance=emp so that while calling save() on this object it doesn’t create new rows instead that it update the old object(emp)

1. form.errors and form.is\_valid() these two methods are from forms class which are being used to get the error and validate the form(form=AddDataForm(emp\_dict,instance=emp)
2. Employee.DoesNotExist this coming from Employee model of model.py file to handle the exception when employee is not existing with given id.

**Create API to delete details or delete a Employee**

Try by you own

**Thumb Rule:**

1. *We should have only one endpoint for out api to all operations.*

Note:

1. In rest api there must be only one end point but here we have used two end points that should not be case.

Django Rest FrameWork

There are many frame work available in Django as—

DRF

Testify

Features of DRF

1. It provides inbuilt security features (TokenAuthentication, OAuth authentication, JWAuth etc)
2. It provides browsable api(by using browser we can check if API is working properly or not)
3. Serializers both ORM and non ORM
4. Extensive documentations and library
5. Trusted by big companies (Mozilla, amazon)

*pip freeze >file\_name.txt ------- this is will dump all installed library/software in file\_name.*

To use DRF we must install/add rest\_framework in out setting.py file.

INSTALLED\_APPS = [

    'django.contrib.admin',

    'django.contrib.auth',

    'django.contrib.contenttypes',

    'django.contrib.sessions',

    'django.contrib.messages',

    'django.contrib.staticfiles',

    'rest\_framework',

]

If we are intending to use browsable api then we need to use path('api-auth/', include('rest\_framework.urls')) in out project’s url.py file.

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api-auth/', include('rest\_framework.urls')),

]

**DRF serializers**

Below are three main roles of drf serializers.

1. Serialization
2. Deserialization
3. Validaitions

**Hint for future:**

Our DRF serializers concept simply access forms and model forms only. It will exacly work and forms and model forms.

Django forms

class Employee(forms.Form):

    ename=models.CharField(max\_length=100)

    esal=models.IntegerField()

    eadd=models.CharField(max\_length=100)

Using DRF serailizers

class Employee(serializers.Serialozers):

    ename=models.CharField(max\_length=100)

    esal=models.IntegerField()

    eadd=models.CharField(max\_length=100)

Django model forms

class AddDataForm(forms.ModelForm):

    class Meta:

        model=models.Employee

        fields='\_\_all\_\_'

Using DRF serailizers(Model Serializers)

class AddDataForm(serializers.ModelSerializers):

    class Meta:

        model=models.Employee

        fields='\_\_all\_\_'

**Serializations**

Process of converting from complex types (model instance or queryset OR JSON) to python native data types(dict) is called serializations

(Converting from JSON to python data types also)

Let’s take an example for discussing serializations. Here we have one Employee model and for which we want to define rest\_framework serializers class.

**Note:**

It’s always best practice to create serializers in a separate file.

Employee model in models.py file

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=100)

esal=models.floatfiled()

Now above Employee model we will create on serializer. I have used serialisers.py file



Seliralizer.py file

from rest\_framework import serializers

class EmployeeSerializer(serializers.):

    enp=serializers.IntegerField()

    ename=serializers.CharField(max\_length=100)

    esal=serializers.FloatField()

Here what ever variable we are using eno, ename, seal only those variable will be serialized, if trying to serialized anyother variable then will get error. Check in serializer of APIView.

Here models is changed to serializers while defining the data types.

**Steps for converting into python data types from complex data types**

1. Get the model object instance
2. Get the instance of Serializer defined for that model on that model object(say—eser)
3. Instance\_of\_serializer.data --- this will have all data in python dict types(eser.data)

**Questions:**

**Get employee object and then convert that into python native(dict) datatypes using rest\_framework serializers.**

>>> from testapp.models import Employee

>>> from testapp.myser import EmployeeSer

>>>emp=Employee.objects.get(id=1)

>>> eser=EmployeeSer(emp)

>>> eser.data # data will in in python dict format, data is bultin attribute

**How to convert from python dict /native to json data types.**

In rest\_framework.renderer there is module by name JSONRenderer, using this the object of this module we can use render method of this module.

>>>from rest\_framework.renderers import JSONRenderer #import rendered

>>> json\_data=JSONRenderer().render(eser.data) #

**How to perform serialization of queryset**

1. Get the querset
2. Get the serialization instance using that query set, you must use many=True for queryset.
3. Rest all are same

>>> eser=EmployeeSer(qs,many=True)

>>> eser.data

**How to convert from python dict /native to json data types(when we got serialize data from qs)**

In rest\_framework.renderer there is module by name JSONRenderer, using this the object of this module we can use render method of this module.

This is same as previous.

>>>from rest\_framework.renderers import JSONRenderer #import rendered

>>> json\_data=JSONRenderer().render(eser.data) #

**Deserializations**

The process of converting python native data types into database supported complex types is called deserializations.

**Converting JSON into python native types**

In rest framework we have JSONParser() class in rest\_frameowrk.parser. Class JSONParser have method parse() which can convert to python data types.(data is parse() should be in io stream format)

from rest\_framework.parser import JSONParser

stream=io.ByteIO(json\_data)

py\_data=JSONParser().parse(stream)

**Converting python data to Database supported data (Deserialization)**

Create serializer object from defined serializer class

Validate the deserialized object

From deserialized object get data into db supported format

eser=EmployeeSer(data=python\_data) #creating serializer object

eser.is\_valid() #validate that it’s in db supported format

eser.validated\_data #data in db supported format

**Example 1:** Getting data from db using rest\_framwork

Views.py file

from django.shortcuts import render

from django.views.generic import View

import io

from rest\_framework.parsers import JSONParser

from .models import Employee

from .myser import EmployeeSer

from rest\_framework.renderers import JSONRenderer

from django.http import HttpResponse

from django.views.decorators.csrf import csrf\_exempt

from django.utils.decorators import method\_decorator

# Create your views here.

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeCRUDCBV(View):

    print('this is EmployeeCRUDCBV view')

    def get(self,request,\*args,\*\*kwards):

        print('this is get view')

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream) #data is in python format

        id=py\_data.get('id',None)

        if id is not None:

            emp=Employee.objects.get(id=id)#this is employee object

            print(emp)

            #converting emp object into JSON types

            eser=EmployeeSer(emp)

            json\_data=JSONRenderer().render(eser.data)

            return HttpResponse(json\_data,content\_type='application/json')

            #send id specific record

        #send all record

        qs=Employee.objects.all()

        eser=EmployeeSer(qs,many=True)

#py\_data=eser.data #now this data is in python native(list of dict) format

        json\_data=JSONRenderer().render(eser.data)

        return HttpResponse(json\_data,content\_type='application/json')

myser.py (serializer that I created)

from rest\_framework import serializers

class EmployeeSer(serializers.Serializer):

    eno=serializers.IntegerField()

    ename=serializers.CharField(max\_length=100)

    esal=serializers.FloatField()

tests.py file (python applications)

def get\_resource(id=None):

    BASE\_URL='http://127.0.0.1:8000/'

    end\_points='api/'

    data={}

    if id is not None:

        data={'id':id}

        json\_data=json.dumps(py\_data)

        resp=requests.get(BASE\_URL+end\_points,data=json\_data)

        print('fectched id specific data')

        print(resp.json())

        # print('status code is: ',resp.status\_code)

    else:

        resp=requests.get(BASE\_URL+end\_points,data=json.dumps(data))

        print('fetched all data')

        print(resp.json())

        pass

get\_resource()

**Example 2: Post request using rest**

We need to define create() in our serializer class which will be invoked by save() for creating object in DB.

Views.pu file

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeCRUDCBV(View):

    def post(self,request,\*args,\*\*kwargs):

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream)

        eser=EmployeeSer(data=py\_data)

        if eser.is\_valid():

            eser.save()#internally it will call create method of EmployeeSer class

            msg={'msg':"resource created successfully"}

            json\_data=JSONRenderer().render(msg)

            return HttpResponse(json\_data,content\_type='application/json')

        else:

            json\_data=JSONRenderer().render(eser.errors)

            return HttpResponse(json\_data,content\_type='application/json',status=400)

myser.py file (serializer created for employee class)

from rest\_framework import serializers

from .models import Employee

class EmployeeSer(serializers.Serializer):

    eno=serializers.IntegerField()

    ename=serializers.CharField(max\_length=100)

    esal=serializers.FloatField()

    def create(self,validate\_data):

        return Employee.objects.create(\*\*validate\_data)

tests.py file (python applications)

def create\_resource(id=None):

    BASE\_URL='http://127.0.0.1:8000/'

    end\_points='api/'

    data={'eno':510,'ename':'Vinod','esal':10000}

    resp=requests.post(BASE\_URL+end\_points,data=json.dumps(data))

    print(resp.status\_code)

    print(resp.json())

create\_resource()

**Update employee data using rest**

For doing any update we need to override update() in our serializer class and create a serializer object accordingly. Example is below

serializer\_class(model\_instance,data=python\_data,partial=True) ------ genral informations

* model\_instance --- model instance name obtained from DB for which we want to update data
* data ------- data in python dict form which need to be update in db for model\_intance obtained from DB
* partial=True--- to support for partial and full update

overriding update() in serializer class

def update(slef,model\_instance,validate\_data):

#code for change/update value of column

instance.ename=validated\_data.get('ename',instance.ename)

General hint/steps:

1. Override update method for details update and write save() on instance of model name that want to update.
2. Create a serializer instance from provided data , instance for which want to update and partial=True
3. Call save() from views that will call update() of serialzer class.

Example:

From a python application we want to update any of employee data, create a API

Serialiser class

class EmployeeSer(serializers.Serializer):

    eno=serializers.IntegerField()

    ename=serializers.CharField(max\_length=100)

    esal=serializers.FloatField()

    def create(self,validate\_data):

        return Employee.objects.create(\*\*validate\_data)

    def update(self,instance,validate\_data):

        instance.eno=validate\_data.get('eno',instance.eno)

        instance.ename=validate\_data.get('ename',instance.ename)

        instance.esal=validate\_data.get('esal',instance.esal)

        instance.save()

        return instance

instance.eno=validate\_data.get('eno',instance.eno) ------- these lines are just to update value with provide data if not provided then update with existing data(i.e no update in rfact)

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeCRUDCBV(View):

    def put(self,request,\*args,\*\*kwargs):

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream)#now data is in dict format

        print(py\_data)

        id=py\_data.get('id')

        emp=Employee.objects.get(id=id)

        eser=EmployeeSer(emp,data=py\_data,partial=True)

        if eser.is\_valid():

            eser.save() # this will internally call update() of serializer class

            msg={'msg':'data updated successfully'}

            json\_data=JSONRenderer().render(msg)

            return HttpResponse(json\_data,content\_type='application/json')

        json\_data=JSONRenderer().render(eser.errors)

        return HttpResponse(json\_data,content\_type='application/json')

**Deleting record using serializer**

Serializer is not required here

emp=employee.objects.get(id=id)

Emp.delete()

**Validation using Serializer**

There are three types of validation if we do use serailizer validations

1. Field level validations ----- one filed, e.g --- validating salary of employee
2. Object level validations ----- multiple filed together, e.g --- name and salary
3. By using validators

**Field Level Validations**

We can write validation method for any filed which we want to validate in below fashion—

*The Below method will be invoked by python whenever we call is\_valid() on serialized object.*

def validate\_variable\_or\_filed\_to\_validate(self,value):

#validation logic

return value

**Example**

**Write a validation method in such a way that it will validate for salary to be greater than 5000.**

serializer.py file, remaining all file will be same

def validate\_esal(self,value):

        if value<5000:

            raise serializers.ValidationError('Salary must be more than 4999')

        return value

Now when ever we call is\_valid() on serialiser object that will call above validation method.

**Object level validations**

This is used for validating many filed together, e.g – validating ename, esal, eadd fileds

of employee data.

To do object level validate() method in our serializer class.

def validate(self,value):

#validation logic for fileds

**Example:**

**Update salary of employee whose id is 1 but for employee of name Sunny salary must not be less than 5555. Salary will be provided by python applications.**

serializer.py file, remaining all file will be same

class EmployeeSer(serializers.Serializer):

    eno=serializers.IntegerField()

    ename=serializers.CharField(max\_length=100)

    esal=serializers.FloatField()

    def validate(self,value):

        ename=value.get('ename')

        esal=value.get('esal')

        if ename.lower()=='sunny' and esal<55555:

            raise serializers.ValidationError('Sunny salary must be greater than 55554')

        return value

**Note:**

When we call is\_valid() on serialzer object then python does field level and object level validation both if it is defined.

**By Using validators**

This is done by default from python based on fields defined in serializers and field options or any other functions defined for validations. Validation will happen at is\_valid() call

If doing from function then declare that function at global level in you serializer file

Serialisers.filed\_name(validators=[function\_name\_for\_validatio])

Serializer.file\_name(field\_options)

**Example:**

**Before updating any salary make sure that salary is multiple of 1000 and max\_length of ename field is 5.**

serializer.py file, remaining all file will be same

def multiple\_1000(value):

    if value%1000!=0:

        raise serializers.ValidationError('salary must be multiple of 1000')

    return value

class EmployeeSer(serializers.Serializer):

    eno=serializers.IntegerField()

    ename=serializers.CharField(max\_length=5)

    esal=serializers.FloatField(validators=[multiple\_1000])

Let say we tried to update details of employee with data={'ename':'Shukla','esal':55555,'id':1} from our python application.

Output

{'ename': ['Ensure this field has no more than 5 characters.'], 'esal': ['salary must be multiple of 1000']}

Note:

1. Internally validation will happen for all type of validation(field , object, validators) if defined or asked to do on call of is\_valid().
2. Priority/Order of validations

Validators----->Field validations----->object validations

**Drawback of serializers**

1. Need to define fields explicitly
2. Need to define create(), update() methods.

################################################################################

**# MODEL SERIALIZERS #**

################################################################################

For creating model serializers we need to inherit ModelSerializer in our serializer class and use class Meta option for the fields that you want to include in this serializer class.

Once we have created model serializer class then we don’t need to define create() or update() methods.

class EmployeeSer(serializers.ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

**Specifying Fields that need to be serialized**

fields='\_\_all\_\_' ---- serialize all fields of model class

fields= ['field1','filed2'....] --- serialize specified fields

exclude=['field1','field2',...] --- don't serialize specified fields of model/Meta class

Now we have model serializer then we can do all previous operation(get,update,delete,create) on previous class based view nothing else is required to change.

Model serializer provides default implementation for post and create so no need to override update() and create() in model serializer class.

**Validation using ModelSerializers.**

* If we want to do validation of any file then declare that field in serializer class how we do in serializer.
* Method creations for validation in modelserializers is same as for normal serializers for field validation, object validation or validators.

**Example 1:**

**Write a validator for salary to check salary is multiple of 1000.**

Serializers.py file, remaining all will be same

def multiple\_1000(value):

    if value%1000!=0:

        raise serializers.ValidationError('salary must be multiple of 1000')

    return value

class EmployeeSer(serializers.ModelSerializer):

    esal=serializers.FloatField(validators=[multiple\_1000])

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

views.py file (this is same as for normal serializer nothing is changed)

@method\_decorator(csrf\_exempt,name='dispatch')

class EmployeeCRUDCBV(View):

    def put(self,request,\*args,\*\*kwargs):

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream)#now data is in dict format

        print(py\_data)

        id=py\_data.get('id')

        emp=Employee.objects.get(id=id)

        eser=EmployeeSer(emp,data=py\_data,partial=True)

        if eser.is\_valid():

            eser.save()

            msg={'msg':'data updated successfully'}

            json\_data=JSONRenderer().render(msg)

            return HttpResponse(json\_data,content\_type='application/json')

        json\_data=JSONRenderer().render(eser.errors)

        return HttpResponse(json\_data,content\_type='application/json')

    def post(self,request,\*args,\*\*kwargs):

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream)

        eser=EmployeeSer(data=py\_data)

        if eser.is\_valid():

            eser.save()#internally it will call create method of EmployeeSer class

            msg={'msg':"resource created successfully"}

            json\_data=JSONRenderer().render(msg)

            return HttpResponse(json\_data,content\_type='application/json')

        else:

            json\_data=JSONRenderer().render(eser.errors)

            return HttpResponse(json\_data,content\_type='application/json',status=400)

    def get(self,request,\*args,\*\*kwards):

        print('this is get view')

        json\_data=request.body

        stream=io.BytesIO(json\_data)

        py\_data=JSONParser().parse(stream)

        id=py\_data.get('id',None)

        if id is not None:

            emp=Employee.objects.get(id=id)#this is employee object

            print(emp)

            #converting emp object into JSON types

            eser=EmployeeSer(emp)

            json\_data=JSONRenderer().render(eser.data)

            return HttpResponse(json\_data,content\_type='application/json')

        qs=Employee.objects.all()

        eser=EmployeeSer(qs,many=True)

        json\_data=JSONRenderer().render(eser.data)

        return HttpResponse(json\_data,content\_type='application/json')

**Field validations**

This is same as how we do in normal serializer validations

Serializer.py file

from rest\_framework import serializers

from .models import Employee

def multiple\_1000(value): #this is for validator validations not required for field val.

    print('validator validations')

    if value%1000!=0:

        raise serializers.ValidationError('salary must be multiple of 1000')

    return value

class EmployeeSer(serializers.ModelSerializer):

    esal=serializers.FloatField(validators=[multiple\_1000])

    def validate\_esal(self,value):

        print('file level valiations')

        if value<10000:

            raise serializers.ValidationError('Salary must be more than 4999')

        return value

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

**Model validations**

This is exactly copy paste of normal validations.

Try to do it.

**Order/priority of validations**

Validator ------> Filed validation -----------> Object validations (same as normal serializer)

################################################################################

# Request in rest\_framework #

################################################################################

REST framework's Request class extends the standard HttpRequest, adding support for REST framework's flexible request parsing and request authentication.

As REST framework's Request extends Django's HttpRequest, all the other standard attributes and methods are also available.

For example the request.META and request.session dictionaries are available as normal.

**Request parsing**

REST framework's Request objects provide flexible request parsing that allows you to treat requests with JSON data or other media types in the same way that you would normally deal with form data.

**.data**

request.data returns the parsed content of the request body. This is similar to the standard request.POST and request.FILES attributes

################################################################################ **# Response in rest\_framework #**

**################################################################################**

It takes python native data and convert that into JSON types as for HttpResponse.

REST framework supports HTTP content negotiation by providing a Response class which allows you to return content that can be rendered into multiple content types, depending on the client request.

Unlike regular HttpResponse objects, you do not instantiate Response objects with rendered content. Instead you pass in unrendered data, which may consist of any Python primitives.

The renderers used by the Response class cannot natively handle complex datatypes such as Django model instances, so you need to serialize the data into primitive datatypes before creating the Response object.

Response(data, status=None, template\_name=None, headers=None, content\_type=None)

--------- Signature

* **data:** The serialized data for the response.
* **status:** A status code for the response. Defaults to 200. See also status codes
* **template\_name:** A template name to use if HTMLRenderer is selected
* **headers:** A dictionary of HTTP headers to use in the response.
* **content\_type:** The content type of the response. Typically, this will be set automatically by the renderer as determined by content negotiation, but there may be some cases where you need to specify the content type explicitly.

**Attributes**

* **.data** ----------- The unrendered, serialized data of the response.
* **.status\_code** ---------- The numeric status code of the HTTP response.
* **.content** --------------- The rendered content of the response. The .render() method must have been called before .content can be accessed.
* **.template\_name** ------The template\_name, if supplied. Only required if HTMLRenderer or some other custom template renderer is the accepted renderer for the response.
* **.accepted\_renderer**-------The renderer instance that will be used to render the response.
* **.accepted\_media\_type** -----The media type that was selected by the content negotiation stage.
* **.renderer\_context** -------- A dictionary of additional context information that will be passed to the renderer's .render() method.

################################################################################

**# DRF VIEWS #**

################################################################################

DRF provides two class for views

1. APIView
2. ViewSet

APIView is smething like function based view of Django

ViewSet is something like class based view of django

**APIView vs ViewSet**

|  |  |
| --- | --- |
| APIView | ViewSet |
| >Present in rest\_framework.view module  >Method names reflect HTTP methods --- get(), put(), post(), update(), patch()  >We have to map views to urls  >Most of business logic we have to write  >Length of code is less  >API development time is more  >Developer has complete control over flow and execution  >Best for complex operation using multiple sources | >Present in rest\_framework.viewset module  >Methods names DB model class operations/names--- list(), retrive(), create(), update(), partial\_update(), destroy()  >We don’t need to map views to urls, done by routers  >Most business logic will be generated automatically  >Length of code is less  >API development time is less  >Developer won’t have complete control over flow and execution  >Best for standard operations |

**APIView**

REST framework provides an APIView class, which subclasses Django's View class.

APIView classes are different from regular View classes in the following ways:

1. Requests passed to the handler methods will be REST framework's Request instances, not Django's HttpRequest instances.
2. Handler methods may return REST framework's Response, instead of Django's HttpResponse. The view will manage content negotiation and setting the correct renderer on the response.
3. Any APIException exceptions will be caught and mediated into appropriate responses.
4. Incoming requests will be authenticated and appropriate permission and/or throttle checks will be run before dispatching the request to the handler method.

Most basic class to design API view

Child class of View.

We have to write code explicitly so we have complete control of execution.

It has clear execution flow.

Best suitable for complex operations (multiple DB operations, third party API use)

We have to map view to url manually.

Used when we are using third part APIs.

get(), put(), delete() , post().

**ViewSet**

A ViewSet class is simply a type of class-based View, that does not provide any method handlers such as .get() or .post(), and instead provides actions such as .list() and .create().

The method handlers for a ViewSet are only bound to the corresponding actions at the point of finalizing the view, using the .as\_view() method.

In ViewSet we use routers instead of url configurations.

list(), create(), details, update(), partial\_update(), destroy() --- methods we will be using

Most of execute will be already ready done so no complete control of execution , control

Good to developing simple APIs.

No need to map views to url (it will be done by Router concept).

**Testing of APIs**

Till now we were using python application/script to test our API but now we will be using now Browsable API given by DRF.

**APIView**

This is like function based view of Django. Let’s take an example to understand. We will be creating one API for get, post request from browsable API.

If we are using APIView then we need to implement http methods ( get, post, put etc) to handle incoming request/reponse.

If using child classes(ListAPIVew, CreateAPIView etc) of ALIView then we don’t need to write this much.

Serializer.py file

from rest\_framework import serializers

class NameSerializer(serializers.Serializer):

    name=serializers.CharField(max\_length=20)

Now for serializing or converting from JSON to python data types it will check for variable name to be name if no then serialization error will be raised.

Here we are not using any model class that’ why using normal serializer.

views.py file

from django.shortcuts import render

from rest\_framework.views import APIView

from rest\_framework.response import Response

from testapp.serializer import NameSerializer

# Create your views here.

class TestAPIView(APIView):

    def get(self,request,\*args,\*\*kwargs):

        colors=['Red','Green']

        msg={'msg':'Happy pongal'}

        return Response({'msg':'happy pongal','col':colors})

    def post(self,request,\*args,\*\*kwargs):

        print('data is: ',request.data)

        ser=NameSerializer(data=request.data)

        if ser.is\_valid():

            print('serialization completed')

            msg={'msg':'Operation completed'}

            return Response(msg)

        else:

            print('error in validations')

            return Response({'msg':ser.errors})

**Note:**

Here we don’t need to disable csrf token that being sent by browsable API.

**Response** is the class from rest\_framework.response module will will take care of deserialization(python to JSON)

Outputs:

<http://127.0.0.1:8000/api/>



Sending JSON data





Sending data with wrong variable name





It’s raising validation/serialization error and variable name “name” is expected b/c we have declared name variable in our serializer class.

Here we are written put(), delete(), patch() just for handling incoming requests.

from django.shortcuts import render

from rest\_framework.views import APIView

from rest\_framework.response import Response

from testapp.serializer import NameSerializer

# Create your views here.

class TestAPIView(APIView):

    def get(self,request,\*args,\*\*kwargs):

        colors=['Red','Green']

        msg={'msg':'Happy pongal'}

        return Response({'msg':'happy pongal','col':colors})

    def post(self,request,\*args,\*\*kwargs):

        print('data is: ',request.data)

        ser=NameSerializer(data=request.data)

        if ser.is\_valid():

            print('serialization completed')

            msg={'msg':'Operation completed'}

            return Response(msg)

        else:

            print('error in validations')

            return Response({'msg':ser.errors})

    def put(self,request,\*args,\*\*kwargs):

        return Response({'msg':"this response is from PUT method"})

    def delete(self,request,\*args,\*\*kwargs):

        return Response({'msg':"this response is from delete method"})

    def patch(self,request,\*args,\*\*kwargs):

        return Response({'msg':"this response is from PATCH method"})

**ViewSet**

This is like class based view in Django. It has below methods. This requires less code to develop API as most of codes will be generated automatically.

When using ViewSet then url mapping is not required, it is done by routers.

**Best to use ViewSet**

If we want to develop a simple CRUD interface for our DB then go for VewiSet.

If we want to develop API then ViewSet is best choice

If not performing standard operations then ViewSet is best choice

list() ------- to get all resources or records

retrive() ---- to get specific esource

create() ------ to create a new resource

update() ----- tp perform updation

partial\_update() ---- to perform update

distroy() ------ to delete a resource

get() ---- list(), retrive()

post() ---- create()

put() ----- update()

patch() ----- partial\_update()

delete() ----- destroy()

**Using routers**

Rest\_frame work provide DesfaultRouters from rest\_framework.rputres using which we can register a router.

**Register router**

Creaate a intanc eof DefaultRouter() class

On this instance call register() with endpoint url(test-view as you can see below), views class name and a basename.

router=DefaultRouter()

router.register('test-view',views.TestViewSet,basename='test-view-set')

'test-view' this will be appended with base url while showing this url

**Example of Viewset**

urls.py file

from django.contrib import admin

from django.urls import path, include

from testapp import views

from rest\_framework.routers import DefaultRouter

router=DefaultRouter()

router.register('test-view',views.TestViewSet,basename='test-view-set')

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api-auth/', include('rest\_framework.urls')),

    path('',include(router.urls)),

]

Views.py file

class TestViewSet(ViewSet):

    def list(self,request,\*args,\*\*kwargs):

        colors=['Red','Green']

        msg={'msg':'Happy pongal'}

        return Response({'msg':'happy pongal','col':colors})

    def retrive(self,request,pk=None,\*args,\*\*kwargs):

        colors=['Red','Green']

        msg={'msg':'Happy pongal'}

        return Response({'msg':'responce from retrive methods'})

    def create(self,request,\*args,\*\*kwargs):

        print('data is: ',request.data)

        ser=NameSerializer(data=request.data)

        if ser.is\_valid():

            print('serialization completed')

            msg={'msg':'Operation completed'}

            return Response(msg)

        else:

            print('error in validations')

            return Response({'msg':ser.errors})

    def update(self,request,\*args,\*\*kwargs):

        return Response({'msg':"this response is from PUT method"})



**################################################################################**

# Function based view in rest\_framework #

################################################################################

REST framework also allows you to work with regular function based views. It provides a set of simple decorators that wrap your function based views to ensure they receive an instance of Request (rather than the usual Django HttpRequest) and allows them to return a Response (instead of a Django HttpResponse), and allow you to configure how the request is processed.

1. **@api\_view**

The core of this functionality is the api\_view decorator, which takes a list of HTTP methods that your view should respond to.

@api\_view(http\_method\_names=[http\_methods]) ---------signature

Example –

@api\_view(http\_method\_names= ['GET', 'POST'])

def hello\_world(request):

if request.method == 'POST':

return Response({"message": "Got some data!", "data": request.data})

return Response({"message": "Hello, world!"})

**Questions**

WAP to return the response in JSON format using rest\_framework. Response will contain employee model data

Views.py file

@api\_view(http\_method\_names=['GET'])

def get\_fucntion(request):

    qs=Employee.objects.all()

    eser=EmployeeSer(qs,many=True)

    return Response(eser.data)

models.py class

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=100)

    esal=models.FloatField(null=True)

    eadd=models.CharField(max\_length=100)

serializer file

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api-auth/', include('rest\_framework.urls')),

    #path('api/',EmployeeCreateAPIView.as\_view()),

    path('api-func/',get\_fucntion,name='getting-data-using-fincaton-based-view'),

]

Output

It will have all employee object data on hitting url <http://127.0.0.1:8000/api-func/>

**API policy decorators**

To override the default settings, REST framework provides a set of additional decorators which can be added to your views. These must come after (below) the @api\_view decorator

@renderer\_classes(...)

@parser\_classes(...)

@authentication\_classes(...)

@throttle\_classes(...)

@permission\_classes(...) ------------ Used in authentication and authorizations

**View schema decorator**

To override the default schema generation for function based views you may use the @schema decorator. This must come after (below) the @api\_view decorator

**Routers**

It provides functionality for automatically determining how the URLs for an application should be mapped to the logic that deals with handling incoming requests.

It automatically generates url based on how we are registerting Routers.

Rest framework provides below router classes-

1. SimpleRouter
2. DefaultRouter
3. Custom Routers

**Advantages for Routers**

* Routers generate automatic URL patterns and maps every URL to its respective method based on a type of the request.
* We can avoid configuring the URL's with views.
* Router generates standardized url patterns.
* We can expect consistent behaviour from viewsets and routers

**Registering Routers**

For registering any router we need to use register() on that router instance.

router\_instance.register(prefix,viewset\_class,basename=?)

prefix and viewset\_name are mandatory

* **prefix** - The URL prefix to use for this set of routes ----------- mandatory
* **viewset\_class** - The viewset class -------- mandatory
* **basename** - The base to use for the URL names that are created ---- optional

**SimpleRouter**

This router includes routes for the standard set of list, create, retrieve, update, partial\_update and destroy actions. The viewset can also mark additional methods to be routed, using the @action decorator.

By default the URLs created by SimpleRouter are appended with a trailing slash. This behavior can be modified by setting the trailing\_slash argument to False when instantiating the router.



**DefaultRouter**

This router is similar to SimpleRouter as above, but additionally includes a default API root view, that returns a response containing hyperlinks to all the list views. It also generates routes for optional .json style format suffixes.

As with SimpleRouter the trailing slashes on the URL routes can be removed by setting the trailing\_slash argument to False when instantiating the router



**APIView, ListAPIView, CreateAPIView**

ListAPIView and CreateAPIViews are views are the bulitin classes to list,create etc. , methods.

There are available in rest\_framework.genericviews module

**Using APIView**

Fetch all data from using APIViews

Views.py file

class EmployeeView(ListAPIView):

    #queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    def get\_queryset(self):

        name=self.request.GET.get('ename')

        qs=Employee.objects.all()

        if name is not None:

            qs=qs.filter(ename\_\_icontains=name)

        return qs

myser.py file

from rest\_framework.serializers import Serializer, ModelSerializer

from testapp.models import Employee

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api-auth/', include('rest\_framework.urls')),

    #path('api/',EmployeeView.as\_view()),

    path('api/',EmployeeCreateAPIView.as\_view()),

]

Now we will get all data of Employee model class(as fetching data from Employee model class) in below format---



**Using LISTAPIView**

ListAPIView extends APIView class. This is bultin class in rest\_framwork for getting data.

If using LISTAPIView then don’t need to write any return statement or so any serializations.

View.py

class EmployeeView(ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

just by adding above line we will get even the same result as what we got from API view.

* queryset ----- this is builtin variable, which hold queryset type data
* serializer\_class ---- this is building variable which is name of serializer class to be used to serialization.

**Getting data by some name/id using LISTAPIView**

We can do it using the query string and overriding the get\_queryset().

query string ---- this is the string added in url to fetch any specific data. E.g ---

127.0.0.1:8000/api/?name=’rakesh’

name=’rakesh’ ----- this us query string. Here I am trying to fetch data for variable name.

views.py file

class EmployeeView(ListAPIView):

    #queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    def get\_queryset(self):

        name=self.request.GET.get('ename')

        qs=Employee.objects.all()

        if name is not None:

            qs=qs.filter(ename\_\_icontains=name)

        return qs

* get\_queryset() ---- this method is used for getting queryset data/data from database. That could be all or some filtered data. If overriding this method then using queryset inbuilt variable(queryset=Employee.objects.all() ) is of no use.

**CreateAPIView**

This is used for creating objects in database.

If we are not using CreateAPIView then we will have to provide implementation of post() to create object in database.

Views.py file

class EmployeeCreateAPIView(CreateAPIView):

    # add some validation login if you want

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

Change urls.py file accordingly.

This much is enough for ceating any resource in Database. When we send data from browasable API, it will be itself created and saved in to databse.

If we can we can add some data validation logic.



Once we send data from above form(gererated by rest browasable API) it will be saved to DB

################################################################################# Generic View #

################################################################################

The generic views provided by REST framework allow you to quickly build API views that map closely to your database models.

If the generic views don't suit the needs of your API, you can drop down to using the regular APIView class, or reuse the mixins and base classes used by the generic views to compose your own set of reusable generic views.

The following classes are the concrete generic views. If you're using generic views this is normally the level you'll be working at unless you need heavily customized behavior.

**1.)CreateAPIView**

Used for create-only endpoints.

Provides a post method handler.

Extends: GenericAPIView, CreateModelMixin

**2.)ListAPIView**

Used for read-only endpoints to represent a collection of model instances.

Provides a get method handler.

Extends: GenericAPIView, ListModelMixin

**3.)RetrieveAPIView**

Used for read-only endpoints to represent a single model instance.(based on primary key, in url)

Provides a get method handler.

Extends: GenericAPIView, RetrieveModelMixin

**4.)DestroyAPIView**

Used for delete-only endpoints for a single model instance.(based on primary key, passed in url)

Provides a delete method handler.

Extends: GenericAPIView, DestroyModelMixin

**5.)UpdateAPIView**

Used for update-only endpoints for a single model instance. (based on primary key, passed in url)

Provides put and patch method handlers.

Extends: GenericAPIView, UpdateModelMixin

**6.)ListCreateAPIView**

Used for read-write endpoints to represent a collection of model instances.(for list and create op.)

Provides get and post method handlers.

Extends: GenericAPIView, ListModelMixin, CreateModelMixin

**7.)RetrieveUpdateAPIView**

Used for read or update endpoints to represent a single model instance.(for retriever and update)

Provides get, put and patch method handlers.

Extends: GenericAPIView, RetrieveModelMixin, UpdateModelMixin

**8.)RetrieveDestroyAPIView**

Used for read or delete endpoints to represent a single model instance.(for retrieve and destroy)

Provides get and delete method handlers.

Extends: GenericAPIView, RetrieveModelMixin, DestroyModelMixin

**9.)RetrieveUpdateDestroyAPIView**

Used for read-write-delete endpoints to represent a single model instance.

Provides get, put, patch and delete method handlers.

Extends: GenericAPIView, RetrieveModelMixin, UpdateModelMixin, DestroyModelMixin

**Methods in rest\_framework.generics module class**

1. **get\_queryset(self)**

* Returns the queryset that should be used for list views, and that should be used as the base for lookups in detail views. Defaults to returning the queryset specified by the queryset attribute.
* This method should always be used rather than accessing self.queryset directly, as self.queryset gets evaluated only once, and those results are cached for all subsequent requests.
* Can be overridden to provide dynamic behavior, such as returning a queryset, that is specific to the user making the request.

def get\_queryset(self):

qs=#get query on same filerting or something

return qs

1. **get\_serializer\_class(self)**

* Returns the class that should be used for the serializer. Defaults to returning the serializer\_class attribute.
* Can be overridden to provide dynamic behavior, such as using different serializers for read and write operations, or providing different serializers to different types of requrement.

def get\_serializer\_class(self):

if self.request.user.is\_staff:

return FullAccountSerializer

return BasicAccountSerializer

There are below some more methods which can be used while we are writing custom views using GenericAPIView.

1. **get\_serializer\_context(self)** - Returns a dictionary containing any extra context that should be supplied to the serializer. Defaults to including 'request', 'view' and 'format' keys.
2. **get\_serializer(self, instance=None, data=None, many=False, partial=False)** - Returns a serializer instance.
3. **get\_paginated\_response(self, data)** - Returns a paginated style Response object.
4. **paginate\_queryset(self, queryset)** - Paginate a queryset if required, either returning a page object, or None if pagination is not configured for this view.
5. **filter\_queryset(self, queryset)** - Given a queryset, filter it with whichever filter backends are in use, returning a new queryset.

**Some attributes**

rest\_framework.generics module provide below attributes-

1. **serializer\_class**--The serializer class that should be used for validating and deserializing input, and for serializing output. Typically, you must either set this attribute, or override the get\_serializer\_class() method.
2. **queryset**--The queryset that should be used for returning objects from this view. Typically, you must either set this attribute, or override the get\_queryset() method

**.user**

request.user typically returns an instance of django.contrib.auth.models.User, although the behavior depends on the authentication policy being used.

If user not authenticated then retuns Anonymous user

**.content\_type**

request.content\_type, returns a string object representing the media type of the HTTP request's body, or an empty string if no media type was provided.

**.stream**

request.stream returns a stream representing the content of the request body.

**Lec-17**

**RetrieveAPIView**

This is used for retrieve operations, based on some primary key(by default)

**Questions**

Fetch data from database of employee based on some id

Views.py file

class EMployeeAPIRetrieve(RetrieveAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api/<int:pk>',EMployeeAPIRetrieve.as\_view()),

]

Serializer class and other stuff will same as previous

Note:

<int:pk> here pk is default and butiltin variable. If want to use other variable then override it using variable lookup\_field in views class.

Views.py file

class EMployeeAPIRetrieve(RetrieveAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    lookup\_field='id'

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api/<int:id>',EMployeeAPIRetrieve.as\_view()),

]

**UpdateView**

This view is used for updating data in databse using primary key, which will be passed in url

Here once we specified the queryset and serializer then remaining work(updating) will be done by rest itself.

Views.py file

class EmployeeUpdateView(UpdateAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api/<int:pk>',EmployeeUpdateView.as\_view()),

]

Here pk is builtin variable, if we want to change this variable then we need to sue field\_lookup variable in views.py file.



Now when we try to access url with primary key then we will get above form for updating the url data.

**DestroyAPIView**

This is used to deleting any row from DB using primary key.( will be passed in url as previous)

class EmployeeUpdateView(DestroyAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

remaining all will be same

**Note:**

* Below three view takes pk in url to do operations

RetrieveAPIView

DeleteAPIView

DestroyAPIView

* Below two view don’t need any primary key for working.

ListAPIView

CreateAPIView

**ListCreateAPIView**

This is used for list and create operations.

We need to just inherit the class in our class nothing else need to change in views.py file and map the url.

class EmployeeListCreate(ListCreateAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

Same we can do for all hybrid classes.

Note:

Here we have create many end point but we can reduce that to two end points If we use below two hybrid classes --- ListCreateAPIView and RetriveUpdateDeleteAPIView

**Doing all operations using two end points**

Views.py file

class EmployeeRetrieveUpdateDestroyAPIView(RetrieveUpdateDestroyAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    lookup\_field='id'

class EmployeeListCreate(ListCreateAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

Urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api/<int:id>/',EmployeeRetrieveUpdateDestroyAPIView.as\_view()),

    path('api/',EmployeeListCreate.as\_view()),

]

################################################################################# Mixins in rest\_framework #

################################################################################

The mixin classes provide the actions that are used to provide the basic view behavior. Note that the mixin classes provide action methods rather than defining the handler methods, such as .get() and .post(), put() ,patch() etc. We need to defined them if required

We have below types of mixins

1. ListModelMixin
2. CreateModelMixin
3. RetrieveModelMixin
4. DestroyModelMixin

All hybrid APIVew are developed using mixins only, use either mixins or APIViews

We can use above mixin classes to implement retrive, update, list, delete etc operations by implementing their methods

Even if you are using above mixin classes still we need to use http methods (get, put , post..) to handle the request and then in these methods we will use mixin class method for required oper.

**ListModelMixin**

Provides a list(request, \*args, \*\*kwargs) method, that implements listing a queryset.

**CreateModelMixin**

Provides a create(request, \*args, \*\*kwargs) method, that implements creating and saving a new model instance.

**RetrieveModelMixin**

Provides a update(request, \*args, \*\*kwargs) method, that implements updating and saving an existing model instance.

Also provides a partial\_update(request, \*args, \*\*kwargs) method, which is similar to the update method, except that all fields for the update will be optional. This allows support for HTTP PATCH requests.

**DestroyModelMixin**

Provides a .destroy(request, \*args, \*\*kwargs) method, that implements deletion of an existing model instance.

**Example:**

**Use mixin for retrieve operations**

class EMployeeListCreateModelMixins(ListAPIView,CreateModelMixin):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    def get(self,request,\*args,\*\*kwargs):

        return self.list(request,\*args,\*\*kwargs)

Using Mixins for create,retrieve,update operations

class EmployeeRetrieveUpdateDestroy(RetrieveAPIView,UpdateModelMixin, DestroyModelMixin):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    def put(self,request,\*args,\*\*kwargs):

        return self.update(request,\*args,\*\*kwargs)

    def patch(self,request,\*args,\*\*kwargs):

        return self.partial\_update(request,\*args,\*\*kwargs)

    def delete(self,request,\*args,\*\*kwargs):

        return self.delete(request,\*args,\*\*kwargs)

urlpatterns = [

    path('admin/', admin.site.urls),

    path('api/<int:pk>/',EmployeeRetrieveUpdateDestroy.as\_view()),

    path('api/',EMployeeListCreateModelMixins.as\_view()),

]

**Note:**

* Here you can see we are using mixin methods inside http method(put, delete) for respective suitable mixin methods. E.g --- create() of mixin in post http methods and so on.
* We are using APIView classes (RetrieveAPIView, ListAPIview etc) so that we can see suitable data also on the browsable API. If not used these classes then it will not show data from DB but will allow operations(delete, put, post ..)

################################################################################# ViewSet #

################################################################################

**ViewSet**

The ViewSet class inherits from APIView.

The ViewSet class does not provide any implementations of actions. In order to use a ViewSet class you'll override the class and define the action implementations explicitly.

**GenericViewSet**

The GenericViewSet class inherits from GenericAPIView, and provides the default set of get\_object, get\_queryset methods and other generic view base behavior, but does not include any actions by default.

In order to use a GenericViewSet class you'll override the class and either mixin the required mixin classes, or define the action implementations explicitly.

**ModelViewSet**

The ModelViewSet class inherits from GenericAPIView and includes implementations for various actions, by mixing in the behavior of the various mixin classes.

The actions provided by the ModelViewSet class are .list(), .retrieve(), .create(), .update(), .partial\_update(), and .destroy().

Example

Let’s try to create a viewset for Employee model

(Will be using ModelViewSet), here giving just a step for hint

* Create Employee Model
* Create serializer (EmployeeSer) for Employee object, will be using modelSerializer to save effort
* Create view a class EmployeeViewSet for views and use DefaultRouters and register it.

Serializer class

from rest\_framework.serializers import ModelSerializer

from testapp.models import Employee

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

Models.py file

from django.db import models

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=20)

    esal=models.FloatField()

    eadd=models.CharField(max\_length=20)

views.py file

from rest\_framework.viewsets import ModelViewSet

from testapp.models import Employee

from testapp.myser import EmployeeSer

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

urls.py file of project

from rest\_framework.routers import DefaultRouter

from testapp import views

router=DefaultRouter()

router.register('api',views.EmployeeViewSet) #inherting ModelViewSet so basename not req.

urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include(router.urls)),

]

Note:

* We are using ModelViewSet as base class for our view class so basename parameter is not required while registering url.
* Based on registered url we can use <http://127.0.0.1:8000/api> or [http://127.0.0.1:8000/api/<int>/](http://127.0.0.1:8000/api/%3cint%3e/) for accessing data.

The biggest advantage is that we can do llist/retrieve , destroy or update operation using one url no need to write any methods or class to handle retieve/list/update/delete etc operations unlike APIViews where we have to inherit AVPIView classes(ListAPIView, DestroyAPIView, UpdateAPIView etc) for reach operation in our view class.

Using the same reouter we can filter data using primary key also, no need to define anything or create primary key based urls, router will take care of that but for APIView we used to defined urls for primary key based get, update.. etc operations.

<http://127.0.0.1:8000/api>

[http://127.0.0.1:8000/api/<int>/](http://127.0.0.1:8000/api/%3cint%3e/)

No primary key use



Primary key based



################################################################################# Authentication and Authorization in rest frame work #

################################################################################

If we don’t have authentication and authorization then any one can access our API and do any action (e.g--- someone deleted some data) that may create a big issue.

**Authentication**

Process of validating user is called authentications. To provide authentication DRF provides several mechanism as-

1. Basic authentications
2. Session authentications
3. Token authentications
4. Custom authentication
5. JWT (Json Window Toekn) authentications ------- third party

**Authorizations**

The process of validating access permissions of user is called authorizations. DRF provides several permission classes to support authorizations as –

1. AllowAny
2. IsAuthenticated
3. IsAdminUser
4. IsAuthenticatedOrReadOnly
5. DjangoModelPermissions
6. DjangoModelPermissionsOrAnonReadOnly

READ operations --- GET,OPTIONS,HEAD ----> SAFE methods

Write operations -- POST, PUT,PATCH, DELETE

**TokenAuthentication**

Authentication is performed by some token, best suitable for – mobile applications, desktop client.

Whenever a request comes a valid token must also come in request.

DRF provides inbuilt application 'authtoken' which is used for token management available in rest\_framework package.

* authtoken application take cares of generating and validating token.
* Token can be generated for each user that is unique for each user.
* Token can be generated by using admin console or by sending a request with user and password but for that we must create url pattern to handle request
* In authtoken application there is built-in function based views 'obtain\_auth\_token' which we can use to obtain token based on user id and password.

**Example**

**Get the token for user ‘Sunny’**

Assume that this user was already added.

Solution

We will import views file from authtoken application from reast\_framework and will use obtain\_auth\_token function based view to obtain the token using postman.

Views.py file

from rest\_framework.authtoken import views

# router=DefaultRouter()

# router.register('api',views.EmployeeViewSet)

urlpatterns = [

    path('admin/', admin.site.urls),

    #path('', include(router.urls)),

    path('get',views.obtain\_auth\_token,name='obtain\_auth\_token'),

]

Sending request using postman.



Note:

* If token was not created then it will create a token for that user and will store it in token table and will return token when asked for token when requested.

**Securing our view classes by implementing tokens**

We can implement token authentication for any class based view using below two variable—

1. authentication\_classes ----- class used for authentication (ToeknAuth, JWAuth etc)
2. permission\_classes ---- class used for authorization(AllowAny, IsAuthenticated etc)

When we add these two lines on any view it asks for a valid token before sending any response

**Passing Token while send get request:**

We can do it in multiple ways based on how we are sending request-

1. **Sending get request using cmd**

We can send it by adding below data with url

"authorization:Token token\_number"

e.g---

http://127.0.0.1:8000/api/ "authorization:Token 79d1578dfde5e8038cfed76653265206702926a0"

1. **Using postman**

We can send it by selecting from option. In headers user ‘Authorization’ as key and ‘token’ <token\_data> in headers.s

Questions:

################################################################################

# Implement a Token based authentication for a CBV #

################################################################################

Note: We are using our last application we had built

Views.py file

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[TokenAuthentication,]

    permission\_classes=[IsAuthenticated,]

Note:

The last two line of EmployeeViewSet clas will ask for token whien this is called for getting some data.

urls.py file

from testapp import views

from rest\_framework.authtoken import views as view

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include(router.urls)),

    #path('get',view.obtain\_auth\_token,name='obtain\_auth\_token'),#in case for obtaining token

]

**Sending request**

**Method 1----- Using cmd**



**Method 2: Using postman**



**Enabling authentication**

We can enable authentication in two ways

1. Locally --- Using authentication\_class , permission\_class variable in you CBV or create a mixin class using authentication and authorization you want and inherit it in you CBV
2. Globally --- In settings.py file, This will enabled authentication for all CBV. If used this then no need to add authentication and authorization variable in CBV.

REST\_FRAMEWORK={

'DEFAULT\_AUTHENTICATION\_CLASSES’:('rest\_framework.authentications.TokenAuthentication’,),

'DEFAULT\_PERMISSION\_CLASSES’:('rest\_framework.permissions.IsAuthenticated’,),

}

Note:

Value for each of above two variables will be in tupple form, we can specify more than one permissions and authentication classes in tuple form.

**Enabling Authentication and Authorization globally**

Here we have removed variable or authentication from views.py file and added in setting.py file

Views.py file

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    # authentication\_classes=[TokenAuthentication,]

    # permission\_classes=[IsAuthenticated,]

Settings.py file --- added below lines

REST\_FRAMEWORK={

'DEFAULT\_AUTHENTICATION\_CLASSES':('rest\_framework.authentication.TokenAuthentication',),

'DEFAULT\_PERMISSION\_CLASSES':('rest\_framework.permissions.IsAuthenticated',),

}

**Output**:

Output while trying to access data without using token



Using token



**Note:**

* We can use enabling authentication globally or locally both but local will have high priority than local.

##############################################################################

# Authentication in function based views #

##############################################################################

We can implement authentication and authorization for function based view like class based views using below tow decorators-

1. @authentication\_classes -----@authentication\_classes[auth\_classes]
2. @permission\_classes -----------@permission\_classes[permission\_or\_authorization\_calses]

Views.py file

@api\_view(http\_method\_names=['GET'])

@authentication\_classes([TokenAuthentication])

@permission\_classes([IsAuthenticated])

def fbv(request):

    return HttpResponse('this is fbv')

urls.py file

urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include(router.urls)),

    path('fbv/',views.fbv,name='fbv')

    #path('get',view.obtain\_auth\_token,name='obtain\_auth\_token'),

]

Setting.py file

REST\_FRAMEWORK={

'DEFAULT\_AUTHENTICATION\_CLASSES':('rest\_framework.authentication.TokenAuthentication',),

'DEFAULT\_PERMISSION\_CLASSES':('rest\_framework.permissions.IsAuthenticated',),

}

################################################################################

# Authorization/Permission classes #

################################################################################

**IsAuthenticated**

This class allows only autheticated/registered user to access endpoints

This permission is suitable if you want your API to be accessible to registered users only.

Example—we were doing above example using this permission class.

**AllowAny**

This permission class allows all users to access endpoints

**IsAdminUser**

The IsAdminUser permission class will deny permission to any registered user, unless user.is\_staff is True in this case permission will be allowed, accessible to only admin users(user.is\_staff=True)

This permission is suitable if you want your API to only be accessible to a subset of trusted administrators.

Views.py file

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[TokenAuthentication,]

    permission\_classes=[IsAdminUser,]

settings.py file – here we are setting IsAuthenticated permission globaly but local have high choice

REST\_FRAMEWORK={

'DEFAULT\_AUTHENTICATION\_CLASSES':('rest\_framework.authentication.TokenAuthentication',),

'DEFAULT\_PERMISSION\_CLASSES':('rest\_framework.permissions.IsAuthenticated',),

}

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include(router.urls)),

]

Now Let’s send the request using postman.

**For non admin user**



**For admin user**



**IsAuthenticatedOrReadOnly**

Unauthenticated user can also do read operations,For Write/Modify operation users need to be authenticated/registered.

The IsAuthenticatedOrReadOnly will allow authenticated users to perform any request.

Requests for unauthorised users will only be permitted if the request method is one of the "safe" methods; GET, HEAD or OPTIONS.(i.e without passing token we can use GET,HEAD or OPTIONS)

This permission is suitable if you want to your API to allow read permissions to anonymous users, and only allow write permissions to authenticated users.

Views.py file

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[TokenAuthentication,]

    permission\_classes=[IsAuthenticatedOrReadOnly,]

**Sending get request (Noe that we are not passing authorization and token but still able to get resp.)**



**Sending post/patch etc request (Noe that we are not passing authorization and token so we will get error)**

Try yourself

**DjangoModelPermissions**

This permission class ties into Django's standard django.contrib.auth model permissions. This permission must only be applied to views that have a .queryset property or get\_queryset() method. Authorization will only be granted if the user is authenticated and has the relevant model permissions assigned.

* POST requests require the user to have the add permission on the model.
* PUT and PATCH requests require the user to have the change permission on the model.
* DELETE requests require the user to have the delete permission on the model
* GET ---- authentication is enough, model permission not requried

*Summary*

To access endpoint , authentication is required(token need to pass)

GET --- authentication is enough, model permission not requried

POST,PUT,PATCH,DELETE --- authenitcation+model permission required

Model permissions are created/selected for given user and model from admin console.

By default Django create 4 permissions(add, view, delete, change)

**Updating a value (salary data) using DjangoModelPermission class(I have used authenticated user which have change permission)**



**DjangoModelPermissionsOrAnonReadOnly**

Similar to DjangoModelPermissions, but also allows unauthenticated users to have read-only access to the API.

Normal user ------ can’t access admin console

Admin user ----- can access admin console but no permission to modify anything

Superuser ---- can access admin console and can modify anything

################################################################################

# Custom authorization classes or Permission class #

################################################################################

If defining custom permission then define a class and inherit the BasePermission class and override has\_permission(self,request,view) method in your permission class.

Return true for those methods for which you want to give access or authorizations.

We should define our custom class in a separate file.

**Example.**

**Create a custom permission class for read and patch operations**.

Steps:

Create a custom permission class and return True for ‘GET’,PATCH methods while overriding it.

customper.py file(custom permission class file in testapp)

from rest\_framework.permissions import BasePermission

class ReadOrPatch(BasePermission):

    def has\_permission(self,request,view):

        allowed\_merhods=['GET','PATCH']

        if request.method in allowed\_merhods: #allow GET and PATCH operations

            return True

views.py file (enabled TokenAuthentcation by using authentication\_class variable)

from testapp.customperm import ReadOrPatch

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[TokenAuthentication]

    permission\_classes=[ReadOrPatch] #ReadOrPatch is custom permission class

urls.py file

from rest\_framework.routers import DefaultRouter

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

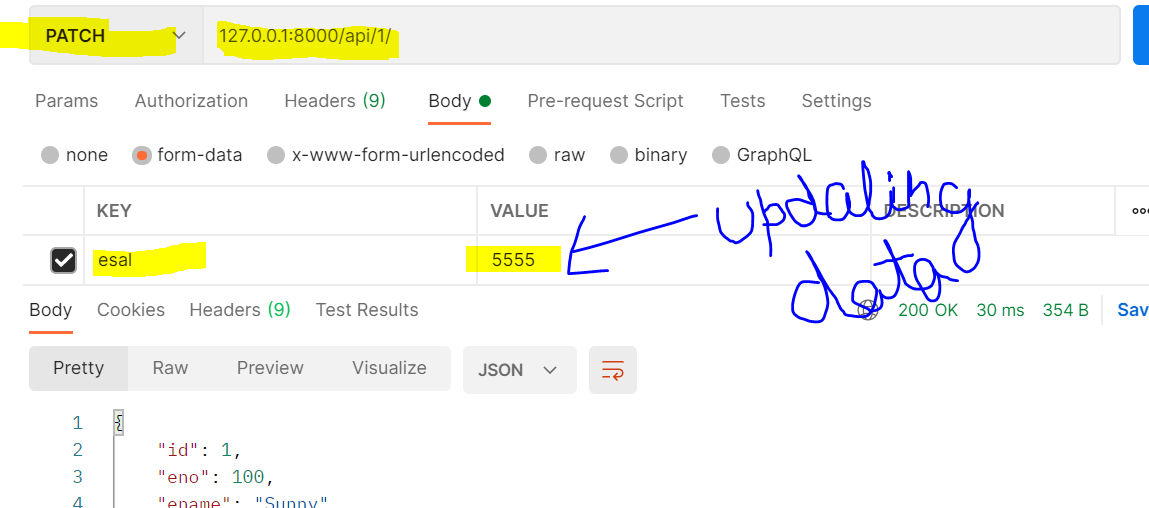
urlpatterns = [

    path('admin/', admin.site.urls),

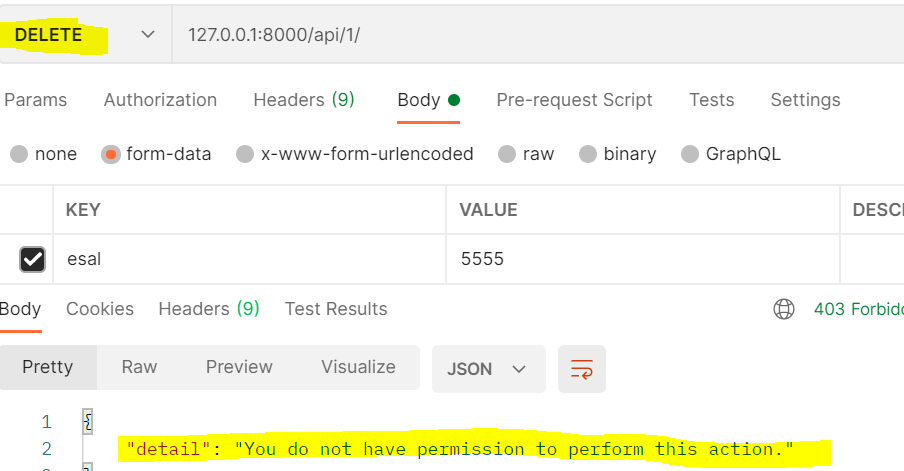
    path('', include(router.urls)),

]

**Sending PATCH request (no error ar PATCH and GET operations allowed)**



**Sending DELETE request(it will give error because only PATCH and GET operations allowed from custom permission class)**



**Example 2:**

**Allow all operation if name is user name is of even character length and GET for odd length of characters.**

Customeper.py file(created new class that we will use in views.py file for authorization)s

class EvenAllOddGET(BasePermission):

    def has\_permission(self,request,view):

        username=request.user.username

        print('user name is: ',username)

        if len(username)%2==0 and username!="": #if user not authenticate then will get ''

            return True

        else:

            if request.method in ['GET']:

                return True

views.py file

from testapp.customperm import ReadOrPatch,EvenAllOddGET

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[TokenAuthentication]

    permission\_classes=[EvenAllOddGET]

urls.py file ------- nothing need to change, just make sure it’s mapped to correct viewset clas

from rest\_framework.routers import DefaultRouter

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

urlpatterns = [

    path('admin/', admin.site.urls),

    path('', include(router.urls)),

]

This will allow all operation for any user whose user name is of even characters and GET operations for odd number of username characters.

**Drawback of DRF token authentications**

Scalablity and performance issue in there are more users registered/request is coming

Let’s take one scenario---

There are 1 lacs user reqgistered and each one is sending request.

When ever a request come with token system does on DB query and find out the user name for that token, if 1 lacs request are coming then system will have to 1 lacs DB query that will cause performance issue.

################################################################################# JWT Authentication(JSON Web Toekn) #

################################################################################

This is third party authentication mechanism not part of DRF.

djangorestframework-jwt --------- no need to install in setting.py file( in installed\_app section)

Django-rest-framework-simplejwt ---- pip install django-rest-framework-simplejwt

Access token

* valid for 5 minutes, customizable, obtain\_jwt\_token()

Refresh token

* Non expired token can be refreshed token to obtain brand new token with renewed expiration time, refreshed token is valid only for 7 days, refresh\_jwt\_token()

Verify token

* Checking if token is expired. If token is valid then will get status code 200 and and same token will be returned. verify\_jwt\_token()

To generate token---- user name and password + dabatase connection required

To refresh token ----non expired token required, DB connection not required if token is not expired

**Obtaining, refreshing, verifying token**

In rest\_framework\_jwt.views we have below methods for their respective use in views.py file of rest\_framework\_jwt app.

obtain\_jwt\_token -------- To obtain new the token, we should send post request for getting token

refresh\_jwt\_token ------- To refresh non expired token, request will be POST

verify\_jwt\_token ------- To verify token, request will be POST

urls.py file

from rest\_framework\_jwt.views import obtain\_jwt\_token, refresh\_jwt\_token, verify\_jwt\_token

urlpatterns = [

    path('admin/', admin.site.urls),

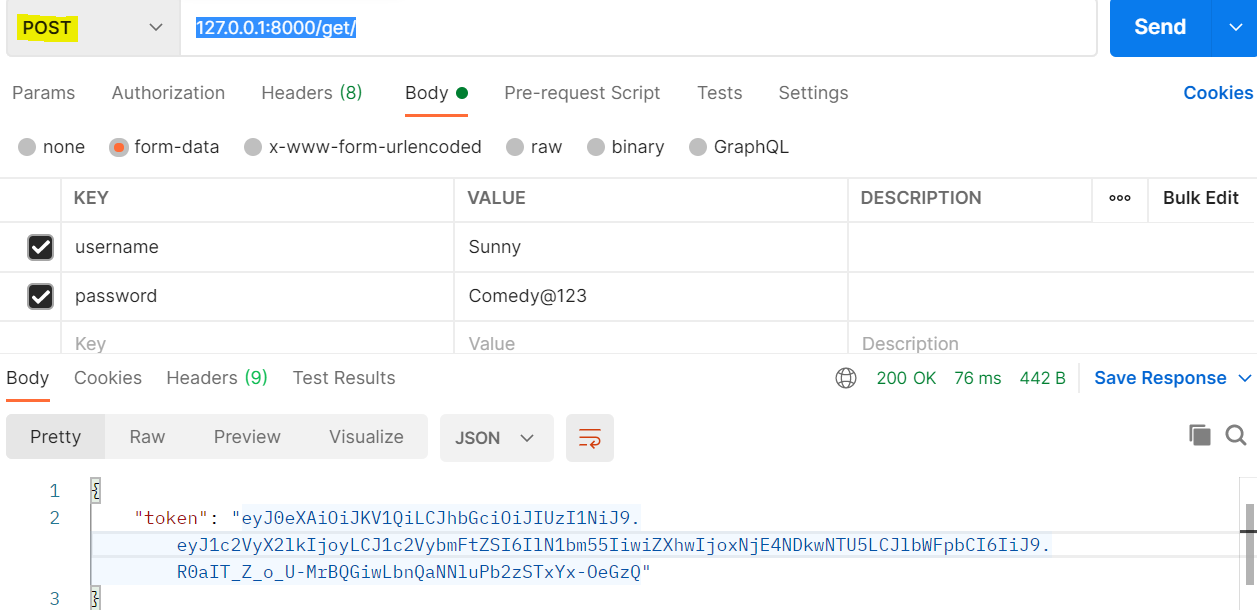
    path('get/',obtain\_jwt\_token),

    path('refresh',refresh\_jwt\_token),

    path('verify',verify\_jwt\_token),

]

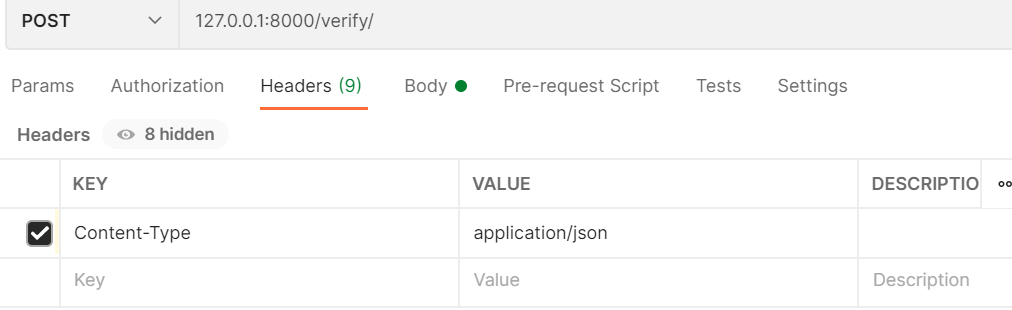
**Getting token**

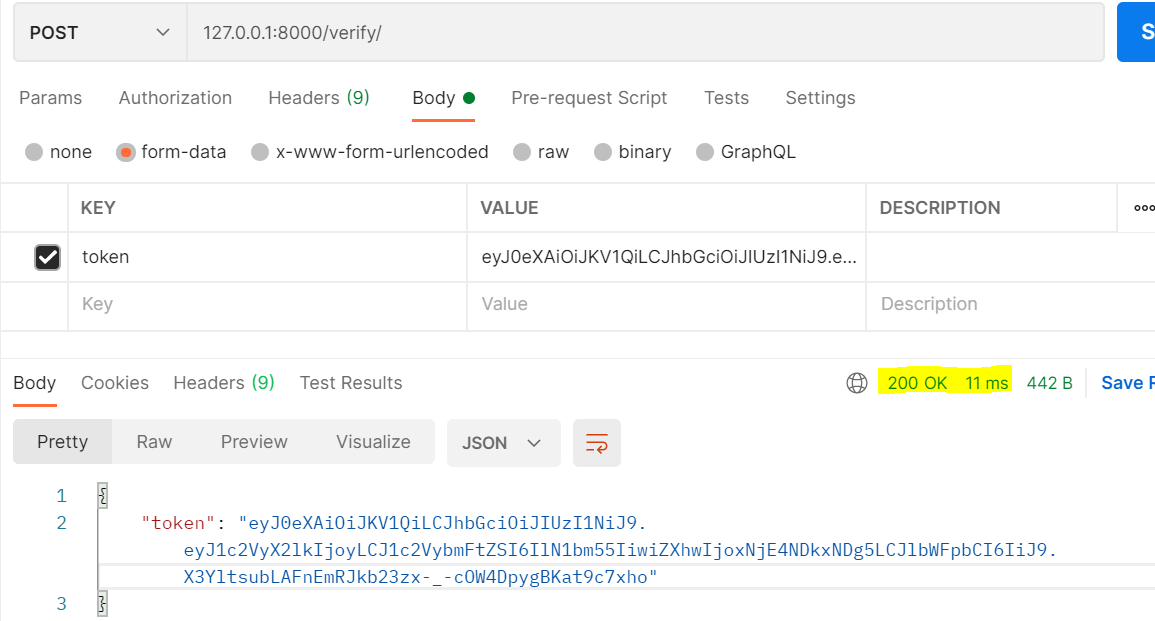


In header section we need to give key as Contenttype and value as application/JSON.

**Validating token**

Send token in body section and in header section content-type will be key and application/json as value.





Here we have got 200 status code and same token which we are trying to validate because token is valid token.

**Refreshing token**

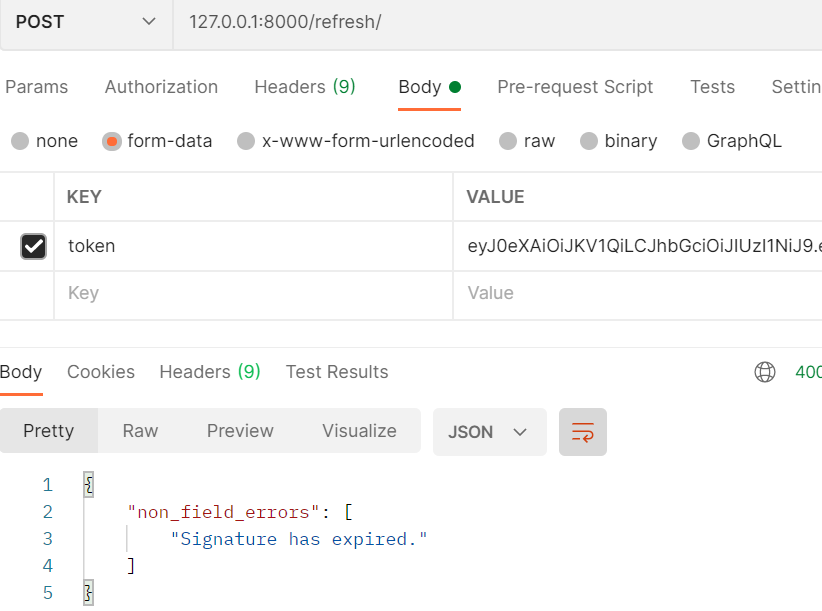
Add below lines in settings.py file for refreshing token.

JWT\_AUTH={

    'JWT\_ALLOW\_REFRESH':True,

}

Refreshing token when it was expired ( will get Signature expired as output/message)



If token is expired then we get error as Signature is Expired else it will generated a new token for corresponding user (for which we are refreshing the token)

**Note:**

* JWT token will be always in form of XXX.YYYY.ZZZ

XXX---- header part

YYYY ---- payload part

ZZZ ---- Signature part

##################################

#Using JWTAuthentication in ViewSets #

##################################

We need to just JSONWebTokenAuthentication class from rest\_framework-jwt.authentication as value of authentication\_class variable.

Views.py file

from rest\_framework\_jwt.views import obtain\_jwt\_token, refresh\_jwt\_token, verify\_jwt\_token

from rest\_framework\_jwt.authentication import JSONWebTokenAuthentication

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[JSONWebTokenAuthentication]

    permission\_classes=[IsAuthenticated]

urls.py file

from rest\_framework.routers import DefaultRouter

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

from rest\_framework\_jwt.views import obtain\_jwt\_token, refresh\_jwt\_token, verify\_jwt\_token

urlpatterns = [

    path('admin/', admin.site.urls),

    path('get/',obtain\_jwt\_token),

    path('refresh/',refresh\_jwt\_token),

    path('verify/',verify\_jwt\_token),

    path('', include(router.urls)),

]

**How to send get request:**

We should send JWT token in header section.

Key--- Authorization

Value---- JWT <JWT token> (we can change prefix JWT in setting.py file 'JWT\_AUTH\_HEADER\_PREFIX': 'prefix\_name')

Settings.py file

JWT\_AUTH={

    'JWT\_ALLOW\_REFRESH':True,

}

Views.py file

from rest\_framework\_jwt.views import obtain\_jwt\_token, refresh\_jwt\_token, verify\_jwt\_token

from rest\_framework\_jwt.authentication import JSONWebTokenAuthentication

class EmployeeViewSet(ModelViewSet):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[JSONWebTokenAuthentication]

    permission\_classes=[IsAuthenticated]

urls.py file

from rest\_framework.routers import DefaultRouter

router=DefaultRouter()

router.register('api',views.EmployeeViewSet)

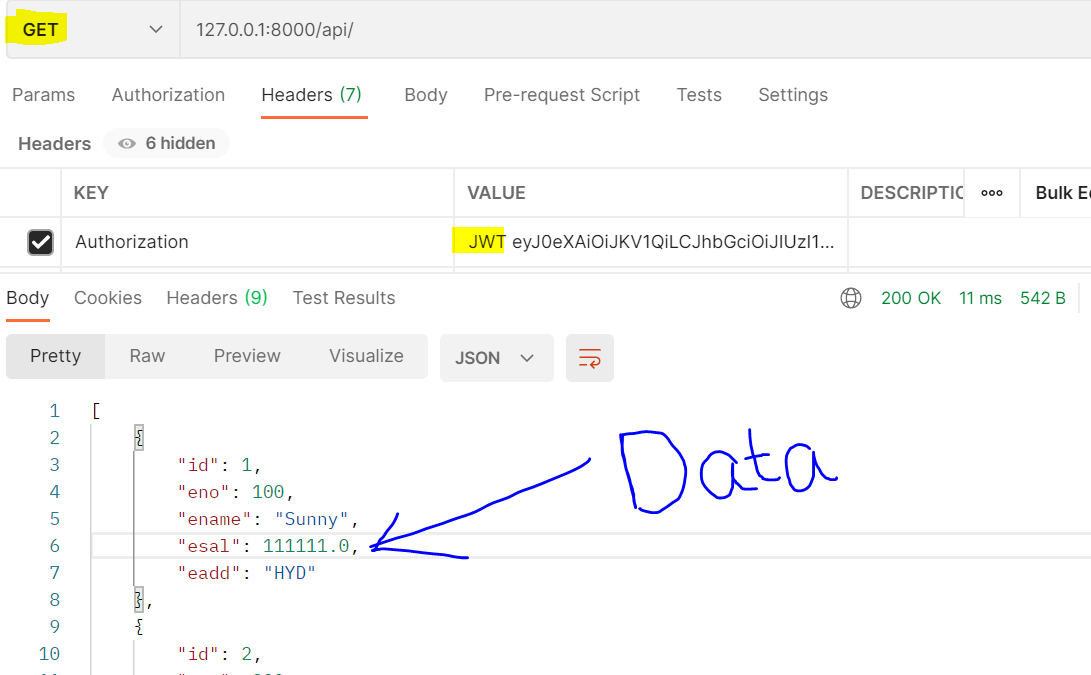
from rest\_framework\_jwt.views import obtain\_jwt\_token, refresh\_jwt\_token, verify\_jwt\_token

urlpatterns = [

    path('admin/', admin.site.urls),

]

**( JWT token need to pass in header section, nothing in body section)**



**Changing default prefix of token**

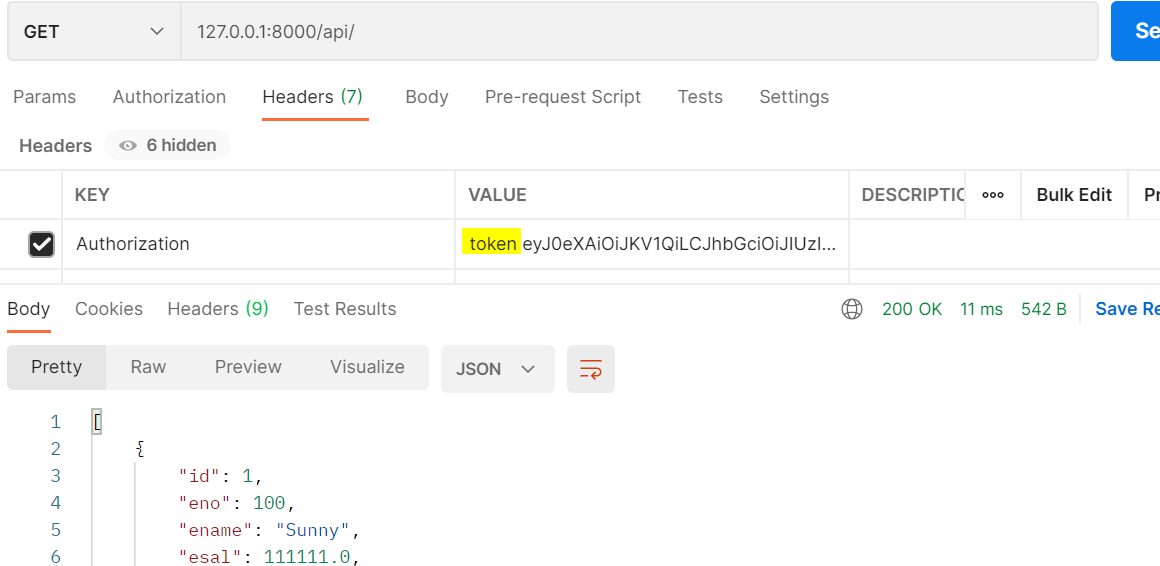
Settings.py file(urls,views file will be same as previous)

JWT\_AUTH={

    'JWT\_ALLOW\_REFRESH':True,

    'JWT\_AUTH\_HEADER\_PREFIX': 'token' #defaul prefix JWT is changed to token

}



**Note:**

* We can send any request (POST, DELETE, PATCH, PUT) nothing extra need to do.
* We can use all authorization classes (IsAuthenticated, AllowAny etc)

**Changing expiration, refresh time**

We can change it by using below two variables in settings.py file

'JWT\_EXPIRATION\_DELTA': datetime.timedelta(seconds=num\_of\_sec) --- expiry of token

'JWT\_REFRESH\_EXPIRATION\_DELTA': datetime.timedelta(days=num\_of\_days) – expiry of refresh token

e.g

JWT\_AUTH={

    'JWT\_ALLOW\_REFRESH':True,

    'JWT\_AUTH\_HEADER\_PREFIX': 'token'

    'JWT\_EXPIRATION\_DELTA': datetime.timedelta(seconds=600),

    'JWT\_REFRESH\_EXPIRATION\_DELTA': datetime.timedelta(days=10),

}

################################################################################# Custom Authentication classes #

################################################################################

If we are creating custom authentication classes then we need to extend 'BaseAuthentication' class and overwrite 'autheticate(selg,request)' methods.

If authentication is successful then return a tupe of (user,None) else return AuthenticationFailed Exception.

If writing own authentication class then better that we write in new file.

**Create a custom authentication class which will take username(from query string) as a token or validating if user is valid.**

Myauthen.py

from rest\_framework.authentication import BaseAuthentication

from django.contrib.auth.models import User

from rest\_framework.exceptions import AuthenticationFailed

class CustomAuth(BaseAuthentication):

    def authenticate(self,request):

        username=request.GET.get('username') #username will obtain from query string

        print('name of user we found is: ',username)

        if username is None:

            return None

        try:

            user=User.objects.get(username=username)

            pass

        except User.DoesNotExists as e:

            raise AuthenticationFailed('Invalid credentials')

        return (user,None)

views.py file

from testapp.myauthen import CustomAuth

class EmployeeViewSet(ModelViewSet):

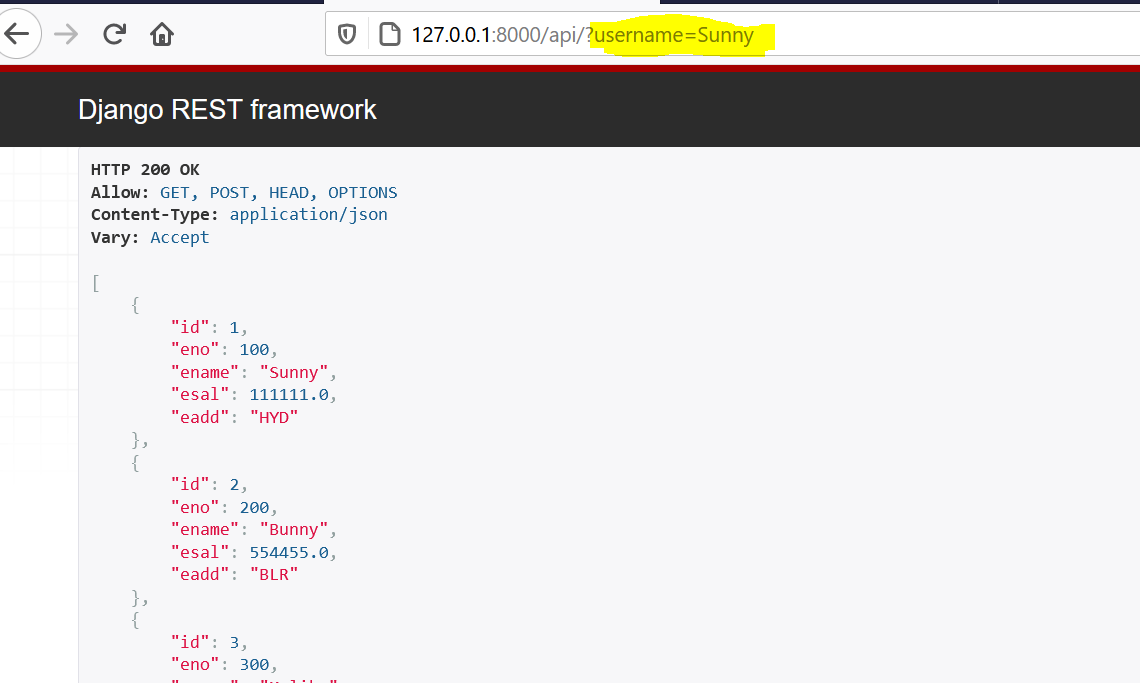
    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    authentication\_classes=[CustomAuth]

    permission\_classes=[IsAuthenticated]

**Sending request and getting data**



Here we are using querystring but we can do custom validation using header or body section also.

################################################################################# Pagination in DRF #

################################################################################

DRF provides below three classes for pagincations

1. PageNumberPagination
2. LimitOffsetPagination
3. CursorPagination

**Enabling pagination**

For implementing pagination we need to enable paginations. We can enable in two ways

1.) Enabling pagination globally

2.) Enabling pagincation locally

**Enabling pagination globally**

For enabling pagination globally we need to enable it from settings.py file. Add below lines in settings.py file

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':pagination\_class\_name

'PAGE\_SIZE':<int> --------- default to all records

}

**Enabling pagination locally (for each view class/function)**

For enabling localy for any view/function we need to use a variable pagination\_class like permission\_class, authentication\_class etc variables.

pagination\_class=<paginatoin\_class\_name>

##############################################################

# PageNumberPagination #

##############################################################

############################

#Pagination with Global Settings#

############################

Here we have taken Employee class as model class. It has 4 fields—eno, ename, esal, eadd

Models.py file

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=20)

    esal=models.FloatField()

    eadd=models.CharField(max\_length=20)

myser.py file(serializer class)

from rest\_framework.serializers import ModelSerializer

from testapp.models import Employee

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

settings.py file (enabling paginations and page size)

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':10, #if not given then it will show all records on a page

}

Views.py file

class EmployeeListAPIView(generics.ListAPIView):

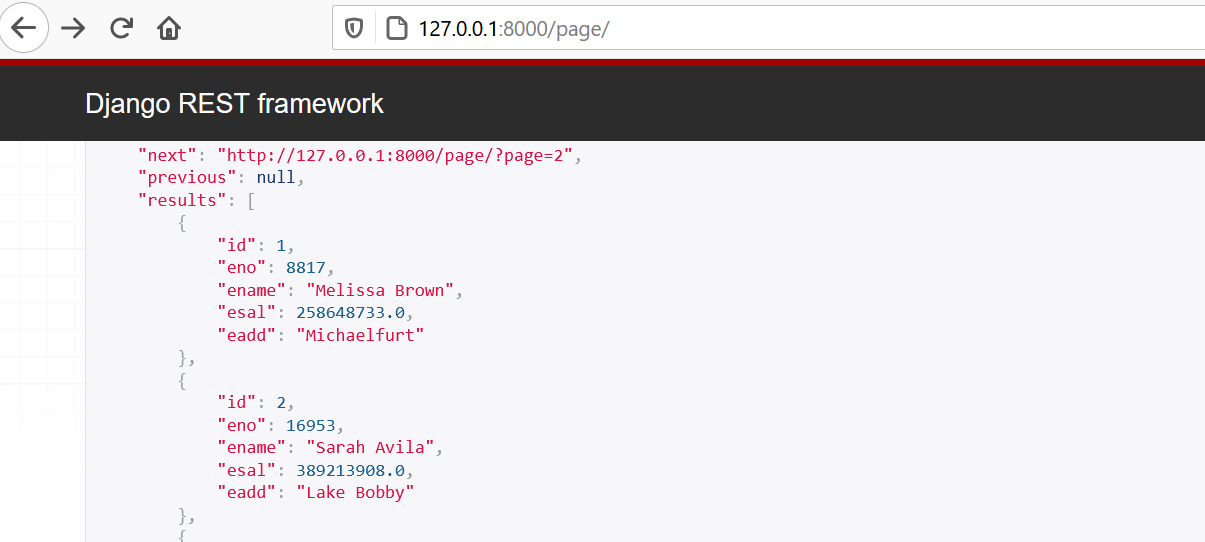
    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    pagination\_class=MyPaginations

**Output**

when we send get request on <http://127.0.0.1:8000/page/> will get all record



#####################

#Using Local paginations#

#####################

If we are using local pagination then we should define out own pagination class inherit builtin pagination classes and define the page\_size for each page.

Best practice is to define custom pagincation class in separate file

We can define pagination for any using any rest\_framework views (APIView or ViewSet) that we should select on our requirement.

**Preference of pagination propery:**

Local property have higher preference over global propery

Views.py file

class MyPaginations(PageNumberPagination): #custom pagination class

    page\_size=20

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

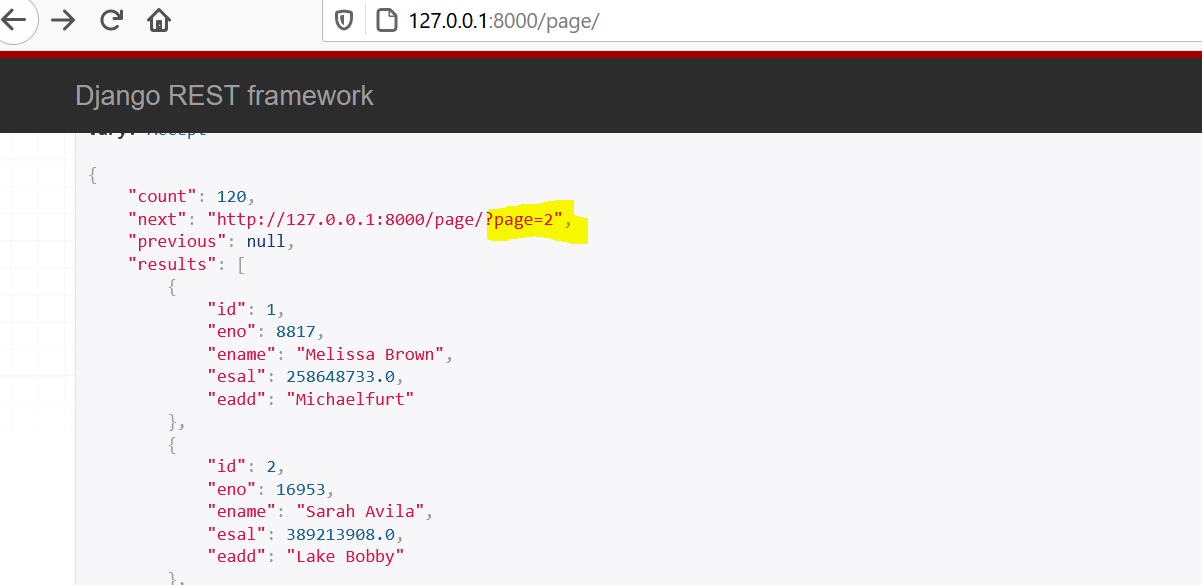
    serializer\_class=EmployeeSer

    pagination\_class=MyPaginations

settings.py, urls.py, serializers, models class --- all same as above

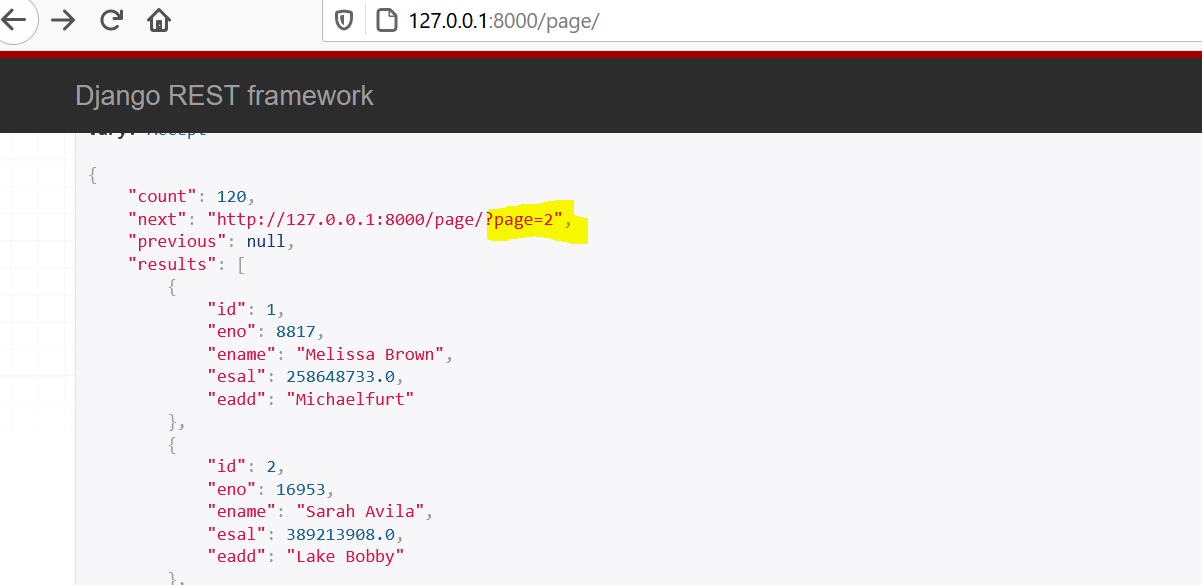
Output:

Now we will get result with 20 result(as defined on our pagination class) on each page



Note:

While using pagincation default query string in page, we can change it in our pagincation class as below



Views.py file

class MyPaginations(PageNumberPagination):

    page\_size=20

    page\_query\_param='mypage'

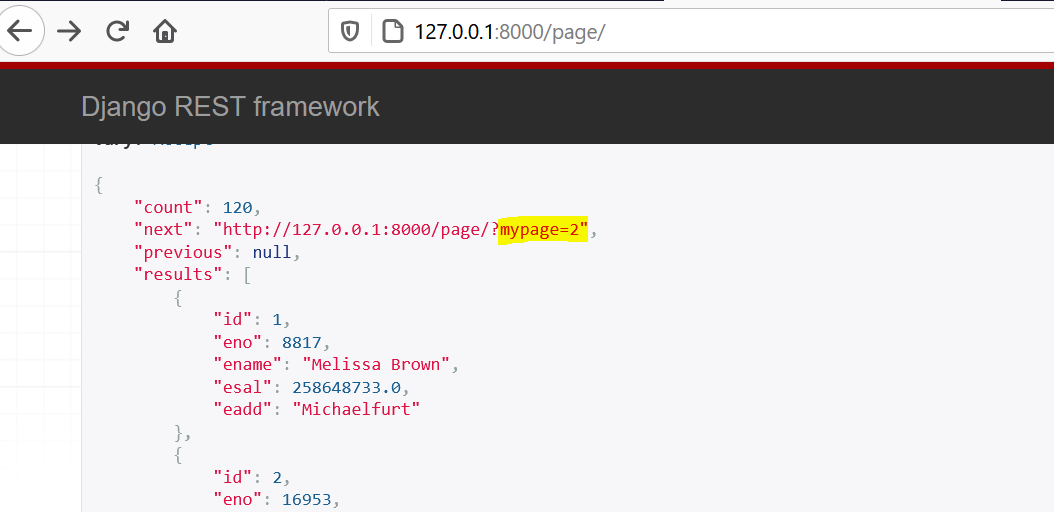
class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    pagination\_class=MyPaginations

Output after hitting same url (query string is changed)



Note:

We can change the page\_size parmater value to be dynamic also i.e we can obtain page\_size from query string and display that many of records.

#################

#Dyanmic Page size#

#################

If we can page size to be dynamic then we need to use page\_size\_query\_param in our custom pagination class.

Views.py file

class MyPaginations(PageNumberPagination):

    page\_size=20

    page\_query\_param='mypage'

    page\_size\_query\_param='size'

class EmployeeListAPIView(generics.ListAPIView):

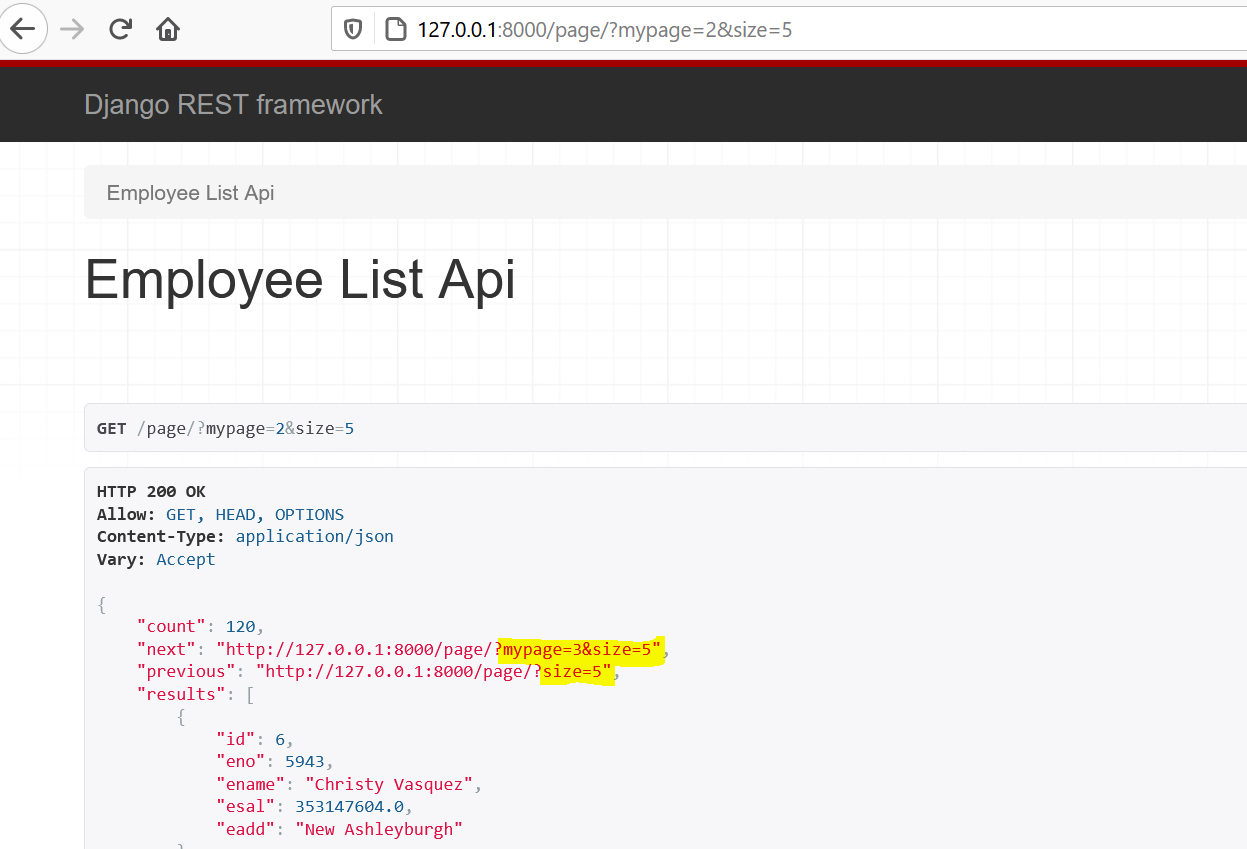
    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    pagination\_class=MyPaginations

Here we will have to pass two variable in query string (mypage and size) as these two are defined in custom pagincation class.

**Output** ( on hitting http://127.0.0.1:8000/page/?mypage=2&size=5)



Note:

* We can set the maximum number of records to be displayed on page using parameter max\_page\_size. We ned to define it same as hoe we defined page\_size or page\_query\_param.

max\_page\_size=<int>

###############################################################################

# LimitOffsetPagination #

###############################################################################

The client includes both a "limit" and an "offset" query parameter. The limit indicates the maximum number of items to return, and is equivalent to the page\_size in other styles

e.g

We want records from index 43 and ownwards and on each page 20 records (page\_size) should be displayed. This requirement needs a bit property of PageNumberPagination with some offset.

If we don’t define page\_size etc property then it fetched from settings.py file

Local propery have high preference over global

Custom pagination class (custompage.py)

from rest\_framework.pagination import \*

class CustomPage(LimitOffsetPagination):

    pass

views.py file

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    pagination\_class=CursorPagination

settings.py file

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

}

Here these propery will not come in role with it will be overridden by local and LimitOffsetPagination don’t have any parameter (PAGE\_SIZE)

Output (on hitting url http://127.0.0.1:8000/page/)



It has taken default value of limit and offset to 10.

Here there is no page\_size variable

**Available propery for customization**

* limit\_query\_param - A string value indicating the name of the "limit" query parameter. Defaults to 'limit'.
* offset\_query\_param - A string value indicating the name of the "offset" query parameter. Defaults to 'offset'.
* max\_limit - If set this is a numeric value indicating the maximum allowable limit that may be requested by the client. Defaults to None.
* template - The name of a template to use when rendering pagination controls in the browsable API. May be overridden to modify the rendering style, or set to None to disable HTML pagination controls completely. Defaults to "rest\_framework/pagination/numbers.html".

**We can use these properties to customize the our pagination in exactly same manner as we did in PanuNumberPagination (define these in out custom pagination class)**

**CursorPaginations**

The cursor-based pagination presents an opaque "cursor" indicator that the client may use to page through the result set. This pagination style only presents forward and reverse controls, and does not allow the client to navigate to arbitrary positions.

Cursor based pagination requires that there is a unique, unchanging ordering of items in the result set.

Cursor based pagination is more complex than other schemes. It also requires that the result set presents a fixed ordering, and does not allow the client to arbitrarily index into the result set

**This pagination doesn’t talks about offset**

e.g--- want records to be present in the acending/decending order of salary

**Parameters of Cursorpagination**

* ordering =<variable\_name\_to\_sort>, This should be a string, or list of strings, indicating the field against which the cursor based pagination will be applied. For example: ordering = <variable\_name\_to\_sort>. Defaults to -created. This value may also be overridden by using OrderingFilter on the view.
* page\_size=same as previous
* template = The name of a template to use when rendering pagination controls in the browsable API. May be overridden to modify the rendering style, or set to None to disable HTML pagination controls completely. Defaults to "rest\_framework/pagination/previous\_and\_next.html".

ordering =<variable\_name\_to\_sort> ----------- Ascending order

ordering = -<variable\_name\_to\_sort> --------- Descending order

###############################################################################

# Filtering #

###############################################################################

The default behavior of REST framework's generic list views is to return the entire queryset for a model manager i.e. it gives all result/record for that model.

There may be requirement that we need to get some specific records there we need to use filtering (we can do this by writing queryset variable value on some filtering)

We can implement filtering in DRF in two ways-

1. Plain Vanilla filtering --------- Writing filtering methods by own, overriding get\_requryset
2. By using DRF API

By filtering of queryset variable value

class EmployeeViewset(ModelViewSet):

    queryset=Employee.objects.all().filter(eno=2227)

    serializer\_class=EmployeeSer

**Plain Vanilla filtering**

In this filtering the parmeter against which filtering will be done is received from query string.

Filtering against given query string is done y overriding the get\_queryset(self) function.

Example

Get all employee object from employee model whose name contains ‘John’

Models.py class

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=20)

    esal=models.FloatField()

    eadd=models.CharField(max\_length=20)

myser.py file

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

views.py file

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    def get\_queryset(self):

        queryset=Employee.objects.all()

        name=self.request.GET.get('ename')

        if name is not None:

            return queryset.filter(ename\_\_icontains=name)

        return queryset

Views.py file (if implementing using ViewSet)

class EmployeeViewset(ModelViewSet):

    queryset=Employee.objects.all().filter(eno=2227)

    serializer\_class=EmployeeSer

    def get\_queryset(self):

        queryset=Employee.objects.all()

        name=self.request.GET.get('ename')

        if name is not None:

            return queryset.filter(ename\_\_icontains=name)

        return queryset

urls.py file

from rest\_framework.routers import DefaultRouter

from testapp import views

router=DefaultRouter()

router.register('api',views.EmployeeViewset)

urlpatterns = [

    path('admin/', admin.site.urls),

    path('page/',EmployeeListAPIView.as\_view()),

    path('', include(router.urls)),

]

**By using DRF API**

There are many filters available for filtering using rest\_frmework.

1. OrderingFilter
2. SearchFilter
3. Cutoms filter

If using DRF filters then we need to define filters in out settings.py file

REST\_FRAMEWORK = {

'DEFAULT\_FILTER\_BACKENDS': (filter\_want\_to\_use,) ------- this must be in tuple form

}

**Search Filter**

We need to add search filter in settings.py file and filter variable name (search\_fields) in views.py file.

search\_fields --- the search\_fields attribute should be a list/tuple of names of text type fields on the model on which filtering will be done. E.g—

search\_fields = [‘username’, ‘email’]

**Apply search filter on Employee model**.

setting.py file

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

'DEFAULT\_FILTER\_BACKENDS': ('rest\_framework.filters.SearchFilter',)

}

Myser.py file (serialization class)

class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

views.py file

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    search\_fields=('ename', 'eno')

    def get\_queryset(self):

        queryset=Employee.objects.all()

        name=self.request.GET.get('ename')

        if name is not None:

            return queryset.filter(ename\_\_icontains=name)

        return queryset

models.py file

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=20)

    esal=models.FloatField()

    eadd=models.CharField(max\_length=20)

urls.py file

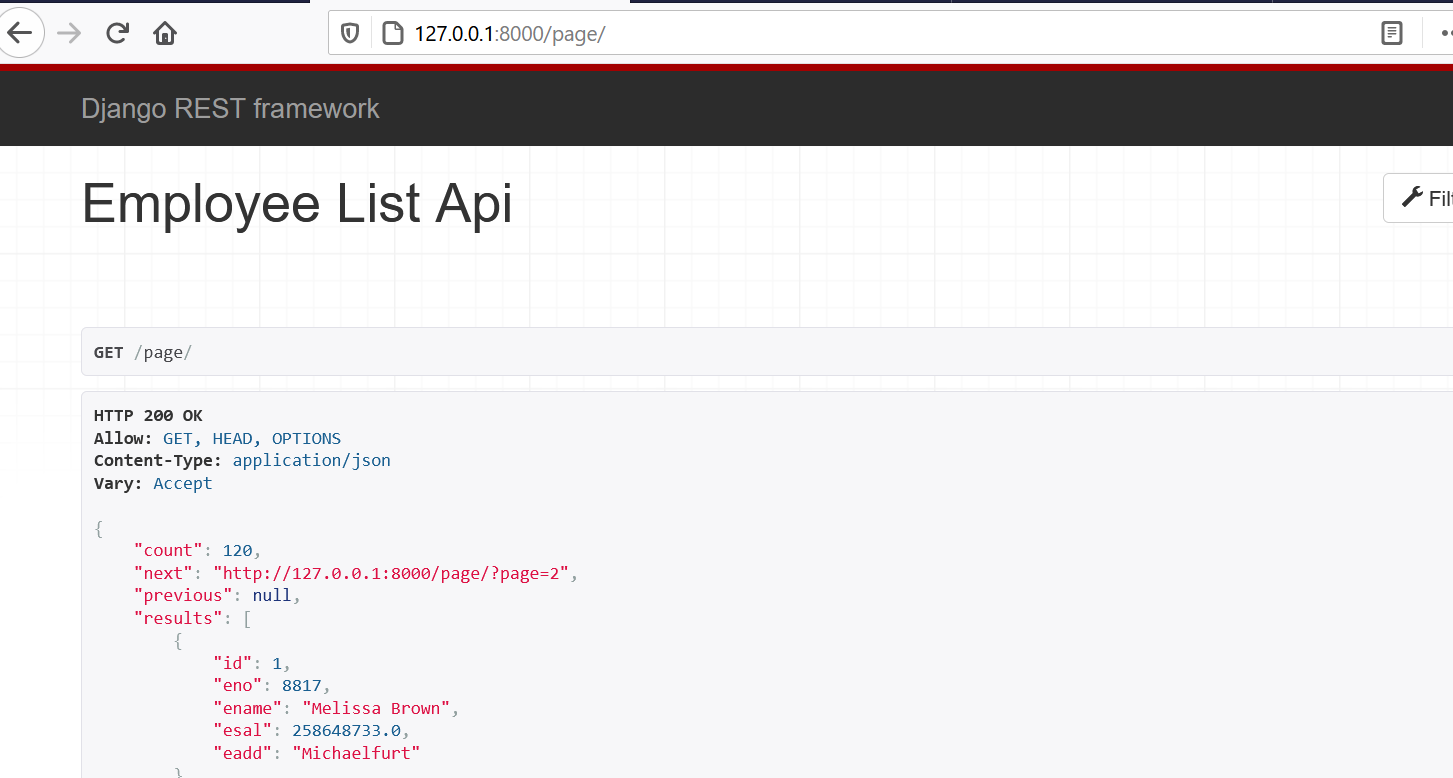
urlpatterns = [

    path('admin/', admin.site.urls),

    path('page/',EmployeeListAPIView.as\_view()),

]

Output on (<http://127.0.0.1:8000/page/> , will get filter for searching based on ename)



**Changing search querystring**

By default search query string is 'search'. We can change by using SEARCH\_PARAM in settings.py file

SEARCH\_PARAM:<search\_parameter\_string>

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

'DEFAULT\_FILTER\_BACKENDS': ('rest\_framework.filters.SearchFilter',)

'SEARCH\_PARAM':'mysearch'

}

The search behavior may be restricted by prepending various characters to the search\_fields.

* '^' Starts-with search.
* '=' Exact matches.
* '@' Full-text search. (Currently only supported Django's PostgreSQL backend.)
* '$' Regex search.

Example:

search\_fields=('^ename') ---- starts with given name

search\_fields=('=ename') ---- exact search with given name

**Dynamically changing the search fields**

To dynamically change search fields based on request content, it's possible to subclass the SearchFilter and override the get\_search\_fields(self, view, request) function.

##########

# Ordergin #

##########

By default ordering is not provided if we want ordering then we need to add ordering in our settins.py file

'DEFAULT\_FILTER\_BACKENDS': (ordering\_filter) -------- this is tuple

Setting.py file

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

'DEFAULT\_FILTER\_BACKENDS': ('rest\_framework.filters.SearchFilter','rest\_framework.filters.OrderingFilter',),

}

Views.py, urls.py, models.py, serializer file --- literally nothing will be changed, same as previous

If ordering fileds not specified in views then it provides all fields for ordering while selecting filter

Views.py file

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    search\_fields=('ename',)

    def get\_queryset(self):

        queryset=Employee.objects.all()

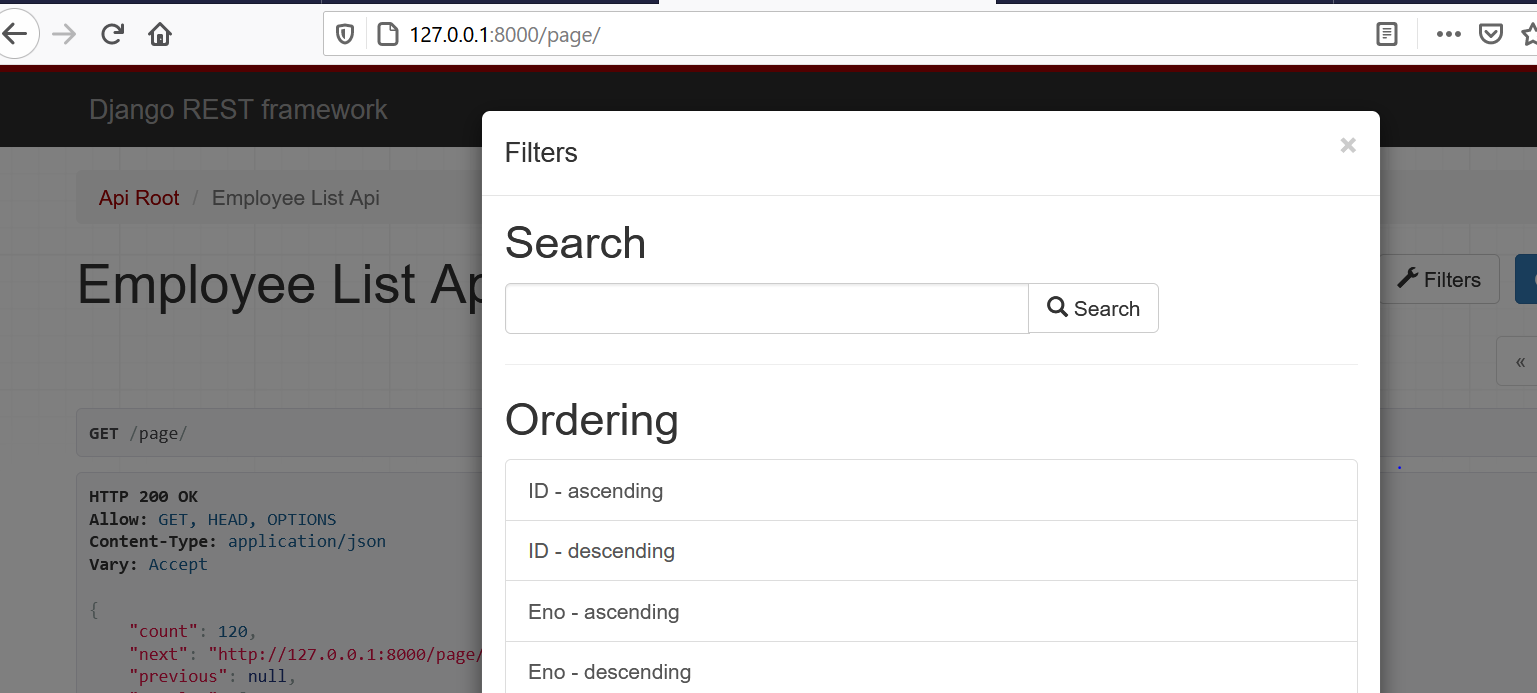
        name=self.request.GET.get('ename')

        if name is not None:

            return queryset.filter(ename\_\_icontains=name)

        return queryset

**Output** (we will get ordering option for all fields(eno, ename, esal ..)



**Specifying the ordering vraible**

By default DRF provides ordering for all variables of models class

If we want to specify the ordering then we need to customise using ordering\_fields in our view class

ordering\_fields=(field1, field2….) -------- this will be in tuple form, fields are fields of model class

Example

Implement ordering for ename and eno fields

Views.py file

class EmployeeListAPIView(generics.ListAPIView):

    queryset=Employee.objects.all()

    serializer\_class=EmployeeSer

    search\_fields=('ename',)

**ordering\_fields=('ename','eno')**

    def get\_queryset(self):

        queryset=Employee.objects.all()

        name=self.request.GET.get('ename')

        if name is not None:

            return queryset.filter(ename\_\_icontains=name)

        return queryset

Now we will get only ename and eno for ordering purpose in our filter section while clicking

Models.py, urls.py , setting, serialiser file ------- no change

settings.py file

REST\_FRAMEWORK={

'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

'DEFAULT\_FILTER\_BACKENDS': ('rest\_framework.filters.SearchFilter','rest\_framework.filters.OrderingFilter',),

}

Models file

class Employee(models.Model):

    eno=models.IntegerField()

    ename=models.CharField(max\_length=20)

    esal=models.FloatField()

    eadd=models.CharField(max\_length=20)

myser,py file

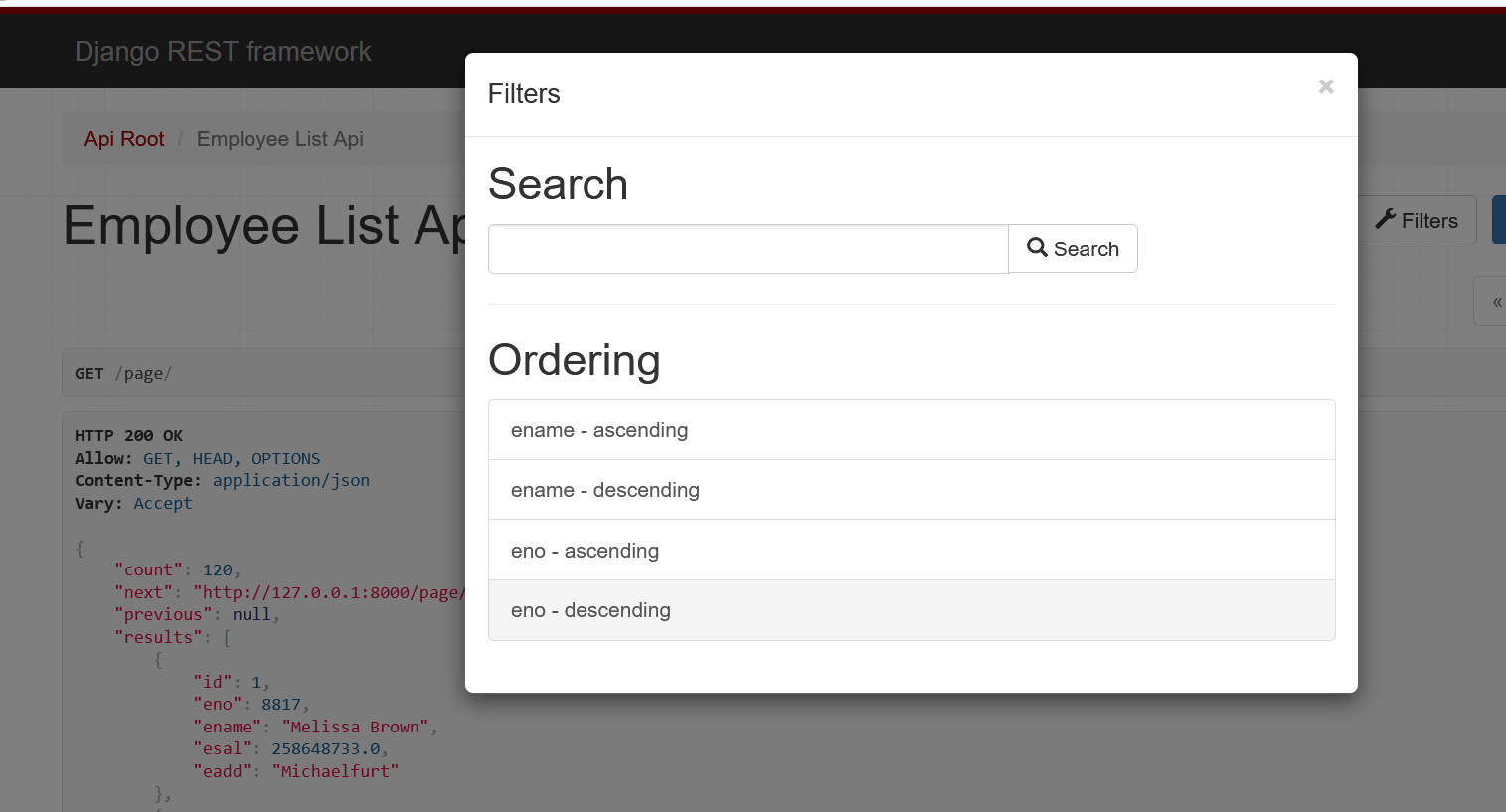
class EmployeeSer(ModelSerializer):

    class Meta:

        model=Employee

        fields='\_\_all\_\_'

Output (Now we have only ename and eno for ordering in filter)



**Changing the Query string/parameter for ordering**

We can change it y using ORDERING\_PARAM in settingpy file.

ORDERING\_PARAM:<ordering\_parameter\_name>

Settings.py file

REST\_FRAMEWORK={

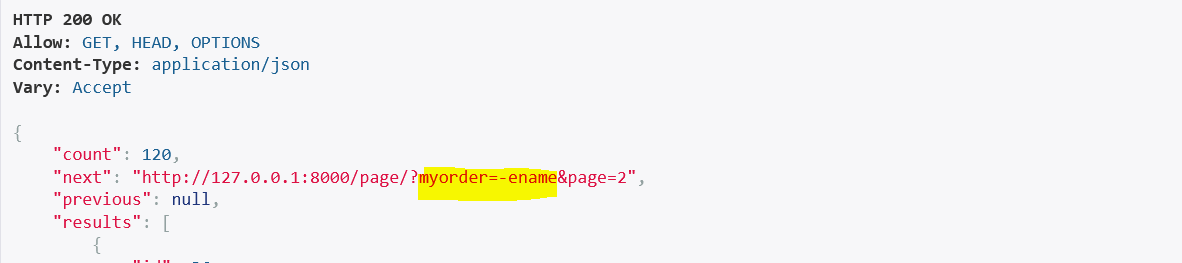
'DEFAULT\_PAGINATION\_CLASS':'rest\_framework.pagination.PageNumberPagination',

'PAGE\_SIZE':30,

'DEFAULT\_FILTER\_BACKENDS': ('rest\_framework.filters.SearchFilter','rest\_framework.filters.OrderingFilter',),

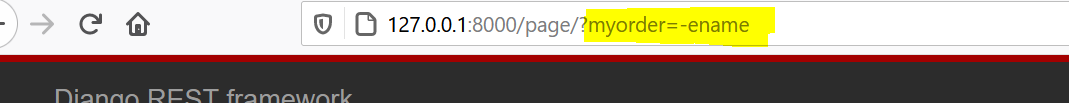
'ORDERING\_PARAM':'myorder',

}



**Note:**

* For search\_fileds there is not default value
* For ordering default value is all fields
* For descending order it takes – (-ve sign) for that fields so we can order data directly by adding appropriate sign for ordering for that filed(s).



Questions:

What will be output for below urls

**1.) http://127.0.0.1:8000/page/?ename=R&myorder=-ename**

Output will contain data in which employee name is containing character “R” in descending order.