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

**JSON**

SON (JavaScript Object Notation) is a popular data format used for representing structured data. It's commonly used in transmit 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 differentiate JSON data python dictionary using type()

**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**

Boolean 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().*

**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() ----- retuns 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, 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**

**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 middleware**

In Settings.py file go to middleware section and comment it.

**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 will contain both instance variable and method.  >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

(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])

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

**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, fields, primary key of id

**fields**--- it denotes all data from model class , doesn’t matter it we have used fields attribute while converting to json data using serialize function

**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 of not 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')

**Starts with lesson 8**