

IIT Madras

ONLINE DEGREE

Modern Application Development – I
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Rest APIs – Examples-II

(Refer Slide Time: 01:16)

Example: CoWin public APIs

- For Co-Win app: vaccine registration and information
- Unauthenticated APIs:
 - statewise search, districts etc.
- Authenticated APIs:
 - Book appointment

<https://apisetu.gov.in/public/marketplace/api/cowin#/>



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Hello everyone, and welcome to this course on Modern Application Development. So, all of that was for Wikipedia, I am just going to bring up one more sort of public API that, you know especially nowadays is something that is interesting to know that this is also implemented using a public API, this is for the CO-Win app which all of us are familiar with in 2021, it is basically used for vaccine registration and information.

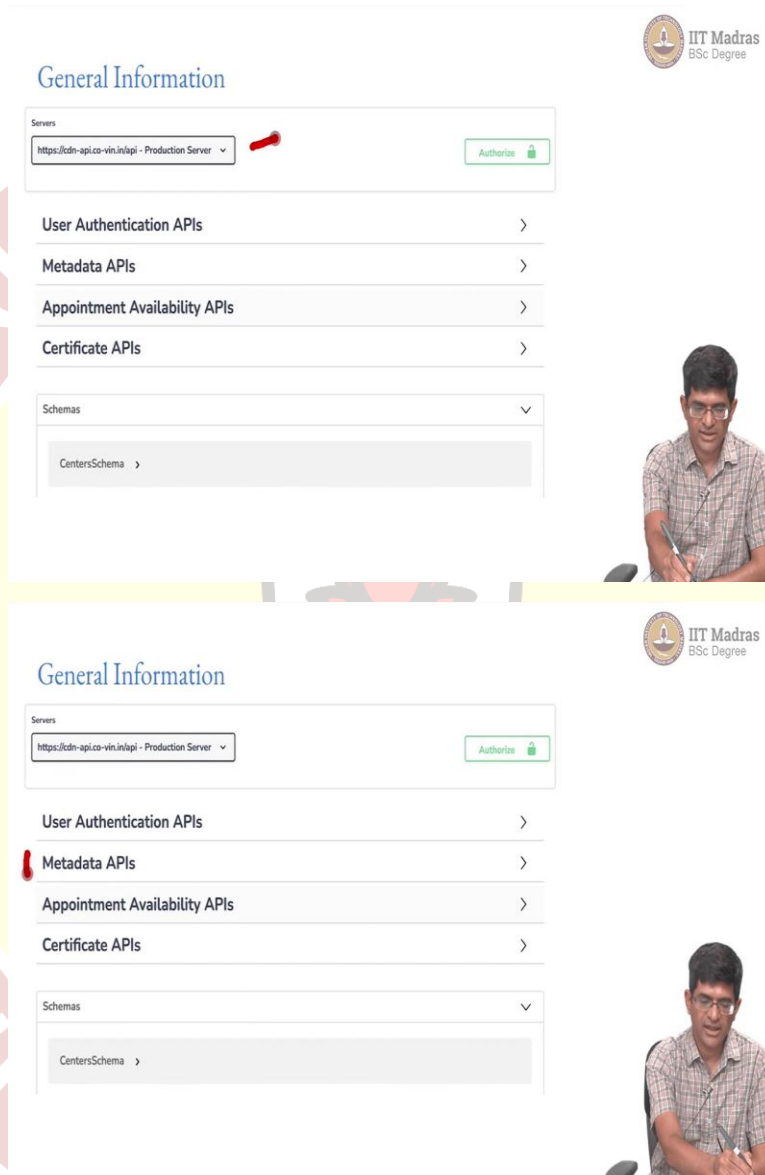
So, as all of you know, you can basically go to the cowin.gov.in website and get information about the vaccine availability, and book a slot for an appointment and so on. The thing is that entire app has also been built nicely, around this notion of restful API's. And why need an API? Because there is a lot of information that needs to be retrieved from there and also other things which it makes sense to do that separation, you could have an app which does it separately from what the back end itself is doing.

And by having that separation, it makes it cleaner to sort of design the way that the data is stored and also handle it. And the numbers that we are talking about they are of course are huge, because you pretty much have to assume that at some point, all of India's population is going to be in this database, or at least we are talking about like 60, 70 percent minimum, we want to get to that point.

So, what are the kinds of API's that it has? There are some unauthenticated API's largely for searching and some authenticated API's for booking appointments, I will get to that in a little bit

later. The exact API of course if you google around for CoWin API, it will eventually take you to this, but this is the link that you need to get there right now.

(Refer Slide Time: 02:01)



The screenshot displays the 'General Information' page of the IIT Madras BSc Degree portal. The page features a 'Servers' dropdown menu with the selected option 'https://cdn-api.co-vin.in/api - Production Server'. An 'Authorize' button is located next to the dropdown. Below this, there is a list of APIs: 'User Authentication APIs', 'Metadata APIs', 'Appointment Availability APIs', and 'Certificate APIs'. A 'Schemas' dropdown menu is also present, showing 'CentersSchema'. A small video inset in the bottom right corner shows a man speaking.

General Information

Servers

<https://cdn-api.co-vin.in/api> - Production Server

Authorize

User Authentication APIs >

Metadata APIs >

Appointment Availability APIs >

Certificate APIs >

Schemas

CentersSchema >



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When you go there, you see that there is some general information about API's itself, so for example, it tells you there is a production server this is where you can actually the API and get information. And what are the kinds of API's that are available there? There is user authentication, mostly the one-time password on SMS that it sends, information about that and how to use it.

There are some metadata API's, there are things for these are mostly for searching and getting information about vaccination possibilities, and so on. There are things for appointment availability, and for downloading certificates. Now, this last part is actually sort of an authenticated one, it requires that I will talk about that a little bit later.

It also has, like I said, schemas, which tells you that these API's may return information that follows some of these schemas. So, for example, it tells you what the schema corresponding to a vaccination center is, it will probably have information like the address or the center, the name of the hospital, the pin code of the place, and things of that sort, so all of that is also described out here.

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Example: Availability API

GET `/v2/appointment/sessions/public/findByPin` Get vaccination sessions by PIN

API to get planned vaccination sessions on a specific date in a given pin.

Parameters Try it out

Name	Description
Accept-Language string (header)	The locale code of the preferred language such as en_US. The text data will be returned in the preferred language along with default English text. Example: hi_IN <input type="text" value="hi_IN"/>
pincode * string (query)	<input type="text" value="110001"/>
date * string (query)	<input type="text" value="31-03-2021"/>



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pincode * required string (query)	<input type="text" value="110001"/>
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One of the API's is for example, the availability API, and what it says is, again, look at this, this is V2, so this is version 2 of the API, there was probably some initial version 1, and you know at some point, they had to break make some breaking changes which is probably what they moved to version 2. It says that we are looking at appointment, objects and you are looking for a new session, this is the public part and you want to find by pin code.

So, this is the route used for accessing this part of the API. And it gives you all the information, the parameters that it uses, it requires the pin code, and it requires the date on which you want to search. And it also gives you the option to try it out right there on the page itself. What I did instead is to, as before, tried using curl.

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Testing public API: WARNING - do not overdo this!



```
curl -X GET  
"https://cdn-api.co-vin.in/api/v2/appointment/sessions/public/findByPin" -H  
"accept: application/json" -H "Accept-Language: en_US"
```



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```



Testing public API: WARNING - do not overdo this!

```
curl -X GET  
"https://cdn-api.co-vin.in/api/v2/appointment/sessions/public/findByPin?pincode=600028&date=04-08-2021" -H "accept: application/json" -H "Accept-Language: en_US"
```



Testing public API: WARNING - do not overdo this!

```
curl -X GET
"https://cdn-api.co-vin.in/api/v2/appointment/sessions/public/findByPin?pincode=600020&date=04-08-2021" -H "accept: application/json" -H "Accept-Language: en_US"
```

```
{
  "sessions": [
    {
      "center_id": 604384,
      "name": "Fortis Malar Hospital",
      "address": "Fortis Malar HospitalChennai TN.",
      "state_name": "Tamil Nadu",
      "district_name": "Chennai",
      "block_name": "Adyar",
      "pincode": 600020,
      "from": "13:30:00", "to": "15:30:00", "lat": 12, "long": 80, "fee_type": "Paid",
      "session_id": "d40bd2c9-0f42-4948-b794-e3c31fa7c3cc",
      "date": "04-08-2021",
      "available_capacity": 85,
      "available_capacity_dose1": 40,
      "available_capacity_dose2": 45,
      "fee": 1250, ...
    }
  ]
}
```



So, one very important warning I need to state over here, please remember that this API has a very specific public function, it is one of those things which even as you know a joke please do not overload it, do not overdo this, be careful of when you are accessing API's, even Wikipedia and other places like that are not going to enjoy being hit by too many things, but at the end of the day if Wikipedia, you know something happens to it, yes, it is a problem.

But if something like a health related app is affected, that has much deeper implications that you do not really want to get into. So, please do not overdo this, any testing that you are doing, think carefully about what you want to do, see if there or non, you can hit the non production servers instead of the production server. And in general, make sure that you do not put this into a script that is just going to run automatically and has the potential to just hit this page a large number of times.

Anyway, so coming back to the API, just like I said earlier, it is going to make a request to this URL, which is exactly what we saw earlier. One thing you notice over here is I am explicitly using the -X GET to indicate that the request should be a get request, that is the default, so even if we did not have this, it should probably have worked.

The difference is you could also do a post over here, by changing this -X to post, you will also see that there are some -H values out here. And these -H values are essentially adding header information to the request that you send, so curl basically takes everything that you add in this

minus H, you can have as many of them as you want, and makes each one of them a small line, a header line that goes back to the server.

So, for example, if you put in this line saying, I am willing to accept application/json as the output from your side. So, it is basically requesting a json output. Similarly, I am willing to accept English language output, you could change this to Hindi or other languages that CoWin supports. Now, what happens if you do this? Well, it gives an error. Now, why is that error?

If you think about it, let us go back here. These things, the pin code and the date have been marked as required. I did not have them over here, there is no query string after this. So, it says input parameter missing. Let us fix that, the way to do that is basically just add on this question mark, pin code equal to this basically corresponds to some place in Chennai.

And I put a date 4th of August 2021, nothing else changed, the accept et cetera exactly the same as before. When you run this, you get a lot more information, I have like cut out a large part of it and just put what is essential over there, it comes back with what are possible sessions, vaccination sessions. This is an array of possible sessions. In each element over there I have a center information.

And that center is basically it has a center_id, the name of the hospital, the address, the district, bla, bla, bla, lots of information, including what is the capacity, the dose 1 capacity, dose 2 capacity, and so on. So, all of this information basically is coming back from the API, I could use that in order to construct some kind of a script around it if necessary.

Once again, I repeat, please be careful, if you are thinking of writing such scripts, there is nothing wrong with it, in fact it is a good way of sort of making use of the API, but you have to be very clear not to abuse such things, you have to be clear that you respect the intention of the person who has created the website and the intention of what this is actually being used for, so that it does not get overloaded.

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Testing public API: WARNING - do not overdo this!



```
curl -X GET  
"https://cdn-api.co-vin.in/api/v2/registration/certificate/public/download?ben  
eficiary_reference_id=1234567890123" -H "accept: application/json" -H  
"Accept-Language: en_US" -H "User-Agent: Mozilla/5.0"
```



Testing public API: WARNING - do not overdo this!



```
curl -X GET  
"https://cdn-api.co-vin.in/api/v2/registration/certificate/public/download?ben  
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```



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Testing public API: WARNING - do not overdo this!


```
curl -X GET  
"https://cdn-api.co-vin.in/api/v2/registration/certificate/public/download?beneficiary_reference_id=1234567890123" -H "accept: application/json" -H  
"Accept-Language: en-us" -H "User-Agent: Mozilla/5.0"
```



Now, one thing that happens is sometimes you might have to explicitly put in a user agent, tag over here, and the reason for that is because in certain cases especially like I said, there is some automatic protection built into these things which sometimes says that you do not want to be you it will respond only to certain kinds of browsers. This is one possibility which may get you pass that, which you could add a note here.

Now, what I am trying is another API which is basically to download a vaccination certificate, and it basically gives a beneficiary reference ID. Now, clearly 12345678 is just a random number that I put in over there, but the important point is what you expect is going to happen, if I asked for a download of some random person certificate should it even be responding? It basically comes back with unauthenticated access. Now, this is interesting, it is basically telling you that the API says you should have authenticated in some way before you try to access this. Now, how do you authenticate? After all I am just doing an HTTP GET request.

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Authentication

- Many APIs must be protected:
 - only meant for specific users
 - avoid abuse by overloading servers

How?

Require a "token" that only a valid user can have

- Securely give token only when user logs in - Google OAuth, Facebook etc.
- API Key: one time token that user downloads - can be copied, so potentially less secure unless combined with other methods



There are many ways of doing this, many APIs need to be protected, either they are meant only for specific users, or it is to avoid abuse by overloading servers. In this case, I want only the beneficiary, the correct person who has authenticated maybe using an OTP or whatever to be able to download it. And the way that authentication is typically done is that you require a token that only a valid user can have.

So, along with every GET request or post request, there should be a token that only the correct user of the system will be able to provide. One way to do that is, when you try to access a page, you basically redirect them to another page, which then takes them to a Google authentication or it sends an OTP or whatever and after the OTP it gives back some unique string, which it is impossible to guess.

And they have to keep coming back to you with that string anytime they want to make a new request. You could also use something called an API key, which is sometimes used for things like Twitter, not sure about Twitter, but you know, GitHub and various other things that allow a person to have a key associated with their account, and use that in order to access various things on the website.

So, these are things that can be used in order to make requests in an authenticated manner. Right now, I am not getting into this, in one of the later lectures we will talk about authentication of

websites in general, and also of API's, at which point, we will look into this in a little bit more detail.

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Summary

- API examples: CoWin, Google cloud, Twitter, github, ...
- Authentication may be enforced or optional on some parts
- Allows third-party integrations
- Equivalent of a "remote procedure call" - call a function on a remote system



So, to summarize, there are many different API examples, like CoWin is there like I said, there is Twitter, GitHub, the Google Cloud, authentication may be either enforced in certain cases, or it could be optional on some parts. The main reason for having API's is that they allow various kinds of third party integrations, you can write your own app in some sense that is able to communicate using this API. And effectively, what it is doing is it is sort of triggering a remote function call, on another device, by targeting the appropriate endpoint, you are able to trigger some kind of behaviour at the other end.