

IDOR in Insecure APIs

So far, we have only been using IDOR vulnerabilities to access files and resources that are out of our user's access. However, IDOR vulnerabilities may also exist in function calls and APIs, and exploiting them would allow us to perform various actions as other users.

While **IDOR Information Disclosure Vulnerabilities** allow us to read various types of resources, **IDOR Insecure Function Calls** enable us to call APIs or execute functions as another user. Such functions and APIs can be used to change another user's private information, reset another user's password, or even buy items using another user's payment information. In many cases, we may be obtaining certain information through an information disclosure IDOR vulnerability and then using this information with IDOR insecure function call vulnerabilities, as we will see later in the module.

Identifying Insecure APIs

Going back to our **Employee Manager** web application, we can start testing the **Edit Profile** page for IDOR vulnerabilities:

The screenshot shows a browser window with the URL `http://SERVER_IP:PORT/`. The page title is "Employee Manager". Below the title, there is a blue button labeled "Edit Profile". Underneath the button, there are three menu items: "Personal Records", "Documents", and "Contracts".

When we click on the **Edit Profile** button, we are taken to a page to edit information of our user profile, namely **Full Name**, **Email**, and **About Me**, which is a common feature in many web applications:

The screenshot shows a browser window with the URL `http://SERVER_IP:PORT/profile/index.php`. The page title is "Edit Profile". The form has three input fields: "Full name" (containing "Amy Lindon"), "Email" (containing "a.lindon@employees.htb"), and "About Me" (containing "A Release is like a boat. 80% of the holes plugged is not good enough."). Below the form is a blue "Update profile" button.

We can change any of the details in our profile and click **Update profile**, and we'll see that they get updated and persist through refreshes, which means they get updated in a database somewhere. Let's intercept the **Update** request in Burp and look at it:

The screenshot shows the Burp Suite interface with the "Intercept" tab selected. A request is captured: `PUT /profile/api.php/profile/1 HTTP/1.1`. The request body contains JSON data: `{"uid":1, "uuid":"40f588b67c748df7efba008e7c2f9d2", "role":"employee", "full_name":"Amy Lindon", "email":"a.lindon@employees.htb", "about":"A Release is like a boat. 80% of the holes plugged is not good enough."}`.

We see that the page is sending a **PUT** request to the `/profile/api.php/profile/1` API endpoint. **PUT** requests

The sidebar includes links for "Cheat Sheet", "Go to Questions", and a "Table of Contents". The "Table of Contents" section lists several modules with checkboxes, including "Introduction to Web Attacks", "HTTP Verb Tampering", "Insecure Direct Object References (IDOR)", "XML External Entity (XXE) Injection", "Skills Assessment", and "My Workstation".

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My Workstation

The workstation status is shown as "OFFLINE".

Start Instance

/ 1 spawns left

are usually used in APIs to update item details, while `POST` is used to create new items, `DELETE` to delete items, and `GET` to retrieve item details. So, a `PUT` request for the `Update profile` function is expected. The interesting bit is the JSON parameters it is sending:

```
Code: json
{
    "uid": 1,
    "uuid": "40f5888b67c748df7efba008e7c2f9d2",
    "role": "employee",
    "full_name": "Amy Lindon",
    "email": "a_lindon@employees.htb",
    "about": "A Release is like a boat. 80% of the holes plugged is not good enough."
}
```

We see that the `PUT` request includes a few hidden parameters, like `uid`, `uuid`, and most interestingly `role`, which is set to `employee`. The web application also appears to be setting the user access privileges (e.g. `role`) on the client-side, in the form of our `Cookie: role=employee` cookie, which appears to reflect the `role` specified for our user. This is a common security issue. The access control privileges are sent as part of the client's HTTP request, either as a cookie or as part of the JSON request, leaving it under the client's control, which could be manipulated to gain more privileges.

So, unless the web application has a solid access control system on the back-end, we should be able to set an arbitrary role for our user, which may grant us more privileges. However, how would we know what other roles exist?

Exploiting Insecure APIs

We know that we can change the `full_name`, `email`, and `about` parameters, as these are the ones under our control in the HTML form in the `/profile` web page. So, let's try to manipulate the other parameters.

There are a few things we could try in this case:

1. Change our `uid` to another user's `uid`, such that we can take over their accounts
2. Change another user's details, which may allow us to perform several web attacks
3. Create new users with arbitrary details, or delete existing users
4. Change our role to a more privileged role (e.g. `admin`) to be able to perform more actions

Let's start by changing our `uid` to another user's `uid` (e.g. `"uid": 2`). However, any number we set other than our own `uid` gets us a response of `uid mismatch`:

Request	Response
<pre>Pretty Raw Hex \n \n 1 PUT /profile/api.php/profile/1 HTTP/1.1 2 Host: 178.128.160.242:32504 3 Content-Length: 208 4 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4453.102 Safari/537.36 5 Content-Type: application/json 6 Accept: */* 7 Origin: http://178.128.160.242:32504 8 Referer: http://178.128.160.242:32504/profile/index.php 9 Accept-Encoding: gzip, deflate 10 Accept-Language: en-US,en;q=0.9 11 Cookie: role=employee 12 Connection: close 13 14 { "uid":2, "uuid": "40f5888b67c748df7efba008e7c2f9d2", "role": "employee", "full_name": "Amy Lindon", "email": "a_lindon@employees.htb", "about": "A Release is like a boat. 80% of the holes plugged is not good enough." }</pre>	<pre>Pretty Raw Hex Render \n \n 1 HTTP/1.1 200 OK 2 Date: Sat, 12 Jun 2021 14:44:11 GMT 3 Server: Apache/2.4.41 (Ubuntu) 4 Content-Length: 12 5 Connection: close 6 Content-Type: text/html; charset=UTF-8 7 8 uid mismatch 9 10 11 12 13 14</pre>

The web application appears to be comparing the request's `uid` to the API endpoint (`/1`). This means that a form of access control on the back-end prevents us from arbitrarily changing some JSON parameters, which might be necessary to prevent the web application from crashing or returning errors.

Perhaps we can try changing another user's details. We'll change the API endpoint to `/profile/api.php/profile/2`, and change `"uid": 2` to avoid the previous `uid mismatch`:

Request	Response
<pre>Pretty Raw Hex \n \n 1 PUT /profile/api.php/profile/2 HTTP/1.1 2 Host: 178.128.160.242:32504 3 Content-Length: 208 4 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/91.0.4453.102 Safari/537.36 5 Content-Type: application/json 6 Accept: */* 7 Origin: http://178.128.160.242:32504 8 Referer: http://178.128.160.242:32504/profile/index.php 9 Accept-Encoding: gzip, deflate 10 Accept-Language: en-US,en;q=0.9 11 Cookie: role=employee 12 Connection: close 13 14 { "uid":2, "uuid": "40f5888b67c748df7efba008e7c2f9d2", "role": "employee", "full_name": "Amy Lindon", "email": "a_lindon@employees.htb", "about": "A Release is like a boat. 80% of the holes plugged is not good enough." }</pre>	<pre>Pretty Raw Hex Render \n \n 1 HTTP/1.1 200 OK 2 Date: Sat, 12 Jun 2021 14:44:11 GMT 3 Server: Apache/2.4.41 (Ubuntu) 4 Content-Length: 12 5 Connection: close 6 Content-Type: text/html; charset=UTF-8 7 8 uid mismatch 9 10 11 12 13 14</pre>

As we can see, this time, we get an error message saying `uid mismatch`. The web application appears to be

ignoring the `Cookie: role=employee` header and instead using the value from the JSON parameter `role`.

Checking if the `uid` value we are sending matches the user's `uid`. Since we are sending our own `uid`, our request is failing. This appears to be another form of access control to prevent users from changing another user's details.

Next, let's see if we can create a new user with a `POST` request to the API endpoint. We can change the request method to `POST`, change the `uid` to a new `uid`, and send the request to the API endpoint of the new `uid`:



```
Request
Pretty Raw Hex \n ▾
1 POST /profile/api.php/profile/50 HTTP/1.1
2 Host: 178.128.160.242:32504
3 Content-Length: 144
4 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) ...
5 Content-type: application/json
6 Accept: */*
7 Origin: http://178.128.160.242:32504
8 Referer: http://178.128.160.242:32504/profile/index.php
9 Accept-Encoding: gzip, deflate
10 Accept-Language: en-US,en;q=0.9
11 Cookie: role=employee
12 Connection: close
13
14 {
  "uid":50,
  "uid":40f588b67c748df7efba008e7c2f9d2",
  "role":"employee",
  "full_name":"test",
  "email":"test@employees.htm",
  "about":""
}

Response
Pretty Raw Hex Render \n ▾
1 HTTP/1.1 200 OK
2 Date: ...
3 Server: Apache/2.4.41 (Ubuntu)
4 Content-Length: 41
5 Connection: close
6 Content-Type: text/html; charset=UTF-8
8 Creating new employees is for admins only
```

We get an error message saying `Creating new employees is for admins only`. The same thing happens when we send a `Delete` request, as we get `Deleting employees is for admins only`. The web application might be checking our authorization through the `role=employee` cookie because this appears to be the only form of authorization in the HTTP request.

Finally, let's try to change our `role` to `admin/administrator` to gain higher privileges. Unfortunately, without knowing a valid `role` name, we get `Invalid role` in the HTTP response, and our `role` does not update:



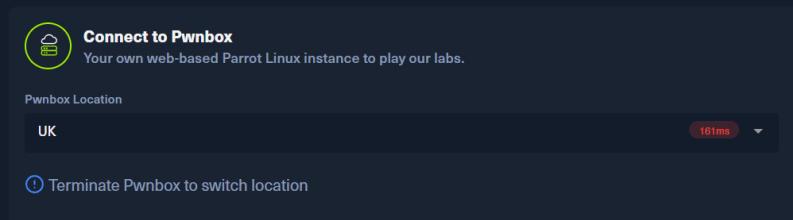
```
Request
Pretty Raw Hex \n ▾
1 PUT /profile/api.php/profile/1 HTTP/1.1
2 Host: 178.128.160.242:32504
3 Content-Length: 144
4 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) ...
5 Content-type: application/json
6 Accept: */*
7 Origin: http://178.128.160.242:32504
8 Referer: http://178.128.160.242:32504/profile/index.php
9 Accept-Encoding: gzip, deflate
10 Accept-Language: en-US,en;q=0.9
11 Cookie: role=employee
12 Connection: close
13
14 {
  "uid":1,
  "uid":40f588b67c748df7efba008e7c2f9d2",
  "role":"admin",
  "full_name":"Amy Lindon",
  "email":"a.lindon@employees.htm",
  "about":"A Release is like a boat. 80% of the holes plugged is not good enough."
}

Response
Pretty Raw Hex Render \n ▾
1 HTTP/1.1 200 OK
2 Date: ...
3 Server: Apache/2.4.41 (Ubuntu)
4 Content-Length: 12
5 Connection: close
6 Content-Type: text/html; charset=UTF-8
8 Invalid role
```

So, all of our attempts appear to have failed. We cannot create or delete users as we cannot change our `role`. We cannot change our own `uid`, as there are preventive measures on the back-end that we cannot control, nor can we change another user's details for the same reason. So, is the web application secure against IDOR attacks?

So far, we have only been testing the `IDOR Insecure Function Calls`. However, we have not tested the API's `GET` request for `IDOR Information Disclosure Vulnerabilities`. If there was no robust access control system in place, we might be able to read other users' details, which may help us with the previous attacks we attempted.

Try to test the API against IDOR Information Disclosure vulnerabilities by attempting to get other users' details with `GET` requests. If the API is vulnerable, we may be able to leak other users' details and then use this information to complete our IDOR attacks on the function calls.



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Enable step-by-step solutions for all questions i 

Questions

Answer the question(s) below to complete this Section and earn cubes!

 Cheat Sheet

Target(s): [Click here to spawn the target system!](#)

+ 1  Try to read the details of the user with 'uid=5'. What is their 'uuid' value?

`eb4fe264c10eb7a528b047aa983e4829`

 Submit

 Hint

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