M - Attack and defend your web applications

Project Report

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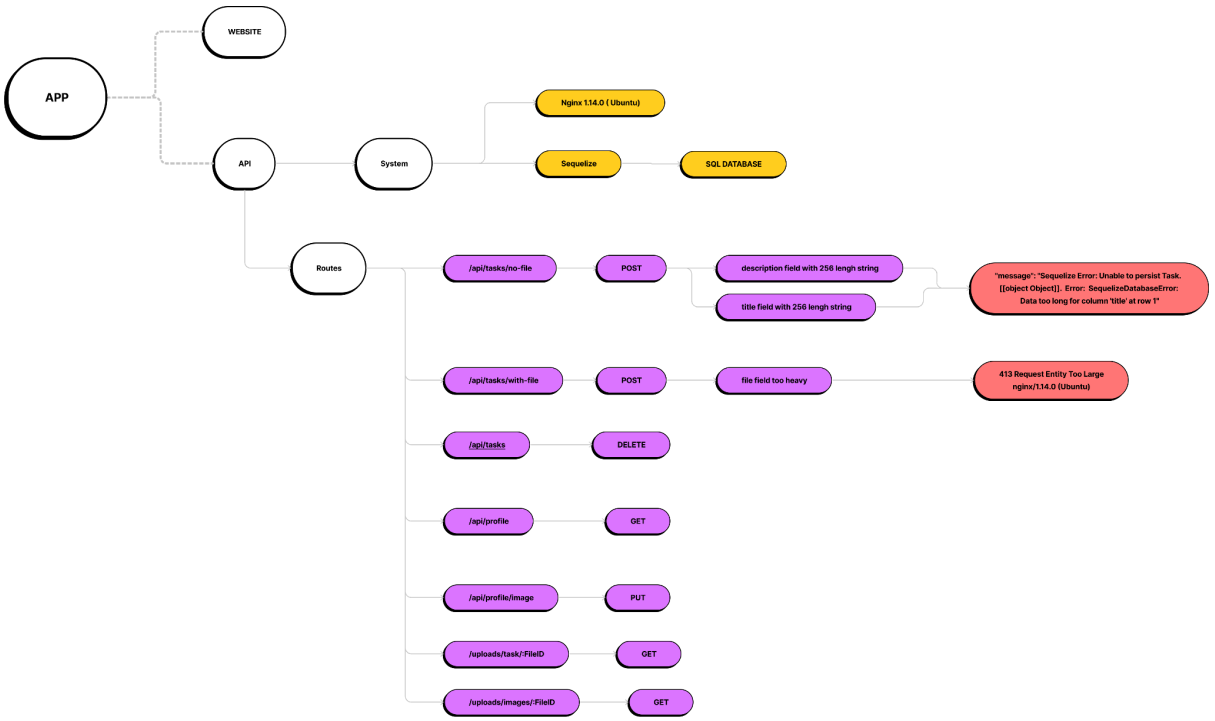
ABOUT THE TARGET PROJECT



- **Svelte**
- **Nginx 1.14.0 ubuntu**
- **server nodejs ?**
- **orm sequelize**
- **sql database**

PAGE ACCESS

With nothing to do these pages are accessible:

- http://51.178.36.94:3000/login
- http://51.178.36.94:3000/profile
- http://51.178.36.94:3000/login.json

SECURITY ISSUES

TYPE	A03:2021-Injection
VULNERABILITY	The Front End only verifies if the token is stored, so we can write anything inside the local storage to bypass the verification.
EXPLOIT	See **LOCAL STORAGE EXPLOIT**
FIX	Create an API endpoint to verify the token and use it in the front router.

TYPE	A07:2021-Identification and Authentication Failures
VULNERABILITY	We can write a one character password
EXPLOIT	A lot of password will be enough weak to allow attacker to brute force the acces
FIX	Add a regex to verify the password before to create an account

TYPE	A09:2021-Security Logging and Monitoring Failures
VULNERABILITY	When you create a account with a email which has already been used we have a a http error from their api with this error message: Email is already in use
EXPLOIT	We can know if someone does have an account So we can create a list of users and brute force attack
FIX	Change the API result message to a less explicit message like “an error occured”

TYPE	A09:2021: Security Logging and Monitoring Failures
VULNERABILITY	In the upload file route when the title is up to 255 characters the backend route gives more information.
EXPLOIT	See **SEND LONG TITLE INPUT**
FIX	We need to catch this error from the database and not respond to the user.

TYPE	A01:2021-Broken Access Control
VULNERABILITY	We can’t make files private
EXPLOIT	Anyone can access to all the file uploaded
FIX	Add a private feature to block access to other peoples

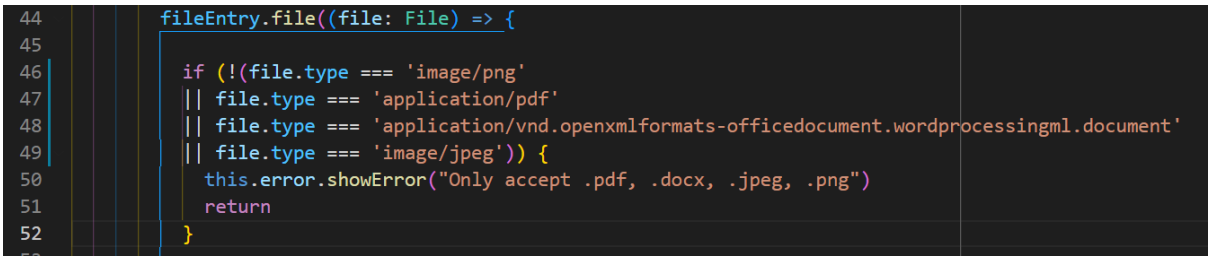
TYPE	A03:2021-Injection A04:2021-Insecure Design
VULNERABILITY	We can upload empty file with *":;base64,"* inside The API won’t check the integrity of the file
EXPLOIT	We can upload anything we want
FIX	Check the file integrity in the API

TYPE	A03:2021-Injection A04:2021-Insecure Design
VULNERABILITY	We can upload any files
EXPLOIT	We can potentially upload script / binary , etc
FIX	Check the files integrity in the API

HOW WE SECURED OUR APP

1 - File check

For the front part, we check the type of file thanks to the File interface of the typescript library which contains a type attribute. Which is created thanks to the ngx-file-drop lib which allows to upload files.



```
44          fileEntry.file((file: File) => {
45
46            if (!(file.type === 'image/png'
47            || file.type === 'application/pdf'
48            || file.type === 'application/vnd.openxmlformats-officedocument.wordprocessingml.document'
49            || file.type === 'image/jpeg')) {
50              this.error.showError("Only accept .pdf, .docx, .jpeg, .png")
51              return
52            }
```

2 - Jwt check for auth

We check the jwt token for all the auth routes

```python
@file_upload.route('/upload', methods=['POST'])
@jwt_required()
@token_valid
@request_form
def upload(form, user):
    try:
        if not request.files.getlist("files"):
            return jsonify({'msg': 'File required'}), 404
        file = File(owner=user.id)
        if form.get('public').lower() == 'true':
            file.public = True
        file.name = request.files["files"].filename
        file.fs.put(request.files["files"])
        file.save()
        return jsonify({'msg': 'File successfully created'}), 201
    except ValidationError as error:
        return jsonify(error.to_dict()), 403
```

3 - We check the force of the user password

For prevent brute force attacks we force the user to have a strong password with Uppercase and special character.

```python
@staticmethod
def password_strength():
    return r"^(?=.*[a-z])(?=.*[A-Z])(?=.*\d)(?=.*[@$!%*#?&])[A-Za-z\d@$!#%*?&]"
```

4 - Using middlewares to verify user permissions

We make some middleware for check the permissions of user when i try to access to protected routes.

```python

def admin_required(func):
    @wraps(func)
    def decorator(*args, **kwargs):
        identity = get_jwt_identity()

        user = Users.objects(id=identity).first()
        if not user.account.is_admin:
            return admin_access_refused(), 401

        return func(*args, **kwargs)
    return decorator


def ban_checking(func):
    @wraps(func)
    def decorator(*args, **kwargs):
        identity = get_jwt_identity()

        user = Users.objects(id=identity).first()
        if user.account.is_banned:
            return user_banned(), 401

        return func(*args, **kwargs)
    return decorator
```

5 - Handle error outputs (using try / except)

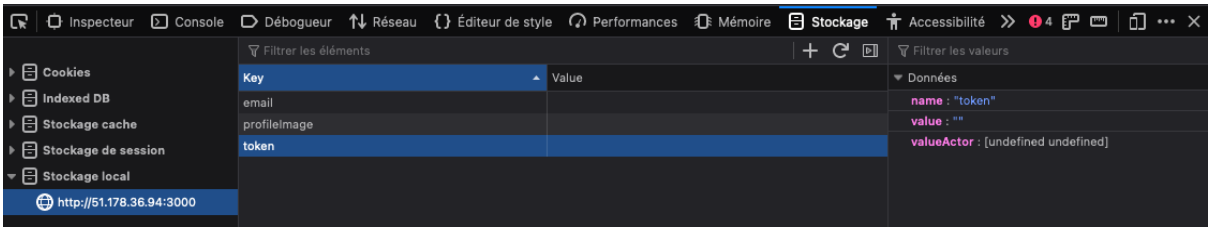
For prevent Security Logging and Monitoring Failures we add try catch to not share sensitive information with the user.

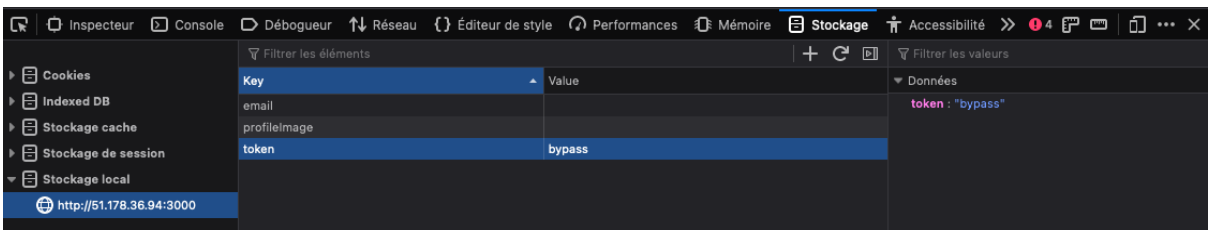
```python
@account_delete.route('/', methods=['POST'])
@jwt_required()
@ban_checking
def me_():
    identity = get_jwt_identity()

    try:
        user = Users.objects(id=identity)
        user.delete()
        return jsonify({"message": "Account successfully deleted"}), 200
    except:
        return try_except_error(), 500
```

```
78
79  RESOURCE_NOT_FOUND = 'Resource not found'
80  RESOURCE_ALREADY_EXISTS = 'Resource already exists'
81  FRIEND_REQUEST_FAILED = 'Invalid friend request'
82  FRIEND_ACCEPT_FAILED = 'Invalid friend request accept'
83  FRIEND_DENY_FAILED = 'Invalid friend request deny'
84  FRIEND_DELETE_FAILED = 'Invalid friend request delete'
85  LOGIN_FAILED = 'Invalid email or password'
86  LOGIN_INVALID = 'Invalid resources provided, expect: email, password'
87  REGISTER_INVALID = 'Invalid resources provided, expect: email, username, password'
88  PASSWORD_INVALID = 'At least 8 chars with 1 uppercase, 1 lowercase, 1 number, 1 special'
89  POST_ADD_INVALID = 'Invalid resources provided, expect: content'
90  POST_ADD_FAILED = 'Invalid request: probably wrong image file given'
91  REQUEST_FORM_INVALID = 'Invalid request: content-type multipart/form-data expected'
92  REQUEST_JSON_INVALID = 'Invalid request: content-type application/json expected'
93  ALREADY_ADMIN = 'User has already admin access'
94  ADMIN_FAILED = 'Invalid request you must be admin'
95  BAN_ARGUMENT_INVALID = 'Invalid parameter [duration] - must be [0-9]*[d-h]'
96  UNLIKE_FAILED = 'Invalid unlike request'
97  MESSAGE_INVALID = 'Invalid resources provided, expect: content'
98  MESSAGE_FAILED = 'Invalid message request'
99  CHAT_FAILED = 'Invalid chat request'
```

ANNEXES

LOCAL STORAGE EXPLOIT





Now we have access to the Home page.

We did not receive any patch from the other groups but for example we can improve the upload file part from our application.

```python
CONTENT_TYPE_ACCEPTED = ['image/jpeg', 'image/png', 'application/vnd.openxmlformats-officedocument.wordprocessingml.document', 'application/pdf']

@file_upload.route('/upload', methods=['POST'])
@jwt_required()
@token_valid
@request_form
def upload(form, user):
    try:
        if not request.files.getlist("files"):
            return jsonify({'msg': 'File required'}), 404
        file = File(owner=user.id)
        if form.get('public').lower() == 'true':
            file.public = True
        if not CONTENT_TYPE_ACCEPTED in request.files["files"].content_type:
            return jsonify({'msg': 'File type is not allowed'}), 404
        file.name = request.files["files"].filename
        file.fs.put(request.files["files"])
        file.save()
        return jsonify({'msg': 'File successfully created'}), 201
    except ValidationError as error:
        return jsonify(error.to_dict()), 403
```