

How to secure Linux server with fail2ban

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Security

If your computer accepts new connection requests, such as Secure Shell connections or operates a website or email browser, you need to protect it from outside attacks.

To do this, you need to control faulty connection requests to your account. If not authenticated for a short time, they will be banned from taking further actions.

The simplest way to do this is to automate the entire process. With a simple configuration, fail2ban will control, ban or unblock all connections for you.

fail2ban integrates with the iptables of the Linux firewall. It will enforce a ban on suspicious IP addresses by adding rules to the firewall. To explain it more closely, the following iptables will appear with a blank set of rules.

Of course, if you are concerned about security, you are probably using a firewall equipped with a common set of rules. fail2ban only adds or deletes the program's own rules, so the firewall functions on your computer will remain intact.

Empty rule set will use this command:

```
sudo iptables -L
```



```
dave@ubuntu20-04:~$ sudo iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
dave@ubuntu20-04:~$
```

Typing the above command will result as a picture

Install fail2ban

Installing fail2ban is very simple. On Ubuntu 20.04, follow these steps:

```
sudo apt-get install fail2ban
```

On Fedora 32, enter:

```
sudo dnf install fail2ban
```

On Manjaro 20.0.1, we use:

```
sudo pacman -Sy fail2ban
```

Configure fail2ban

The installation of fail2ban includes the default jail.conf configuration file. This file is overwritten when fail2ban is upgraded, so the chance to edit this file is almost zero.

Instead, we change the file jail.conf instead of jail.local. When configuration changes in jail.local, they will stay the same during the upgrade. Both files are automatically read by fail2ban.

Ways to copy files:

```
sudo cp /etc/fail2ban/jail.conf /etc/fail2ban/jail.local
```

You can open the file with gedit:

```
sudo gedit /etc/fail2ban/jail.local
```

Find the two sections [DEFAULT] and [sshd] in the file. You can find [DEFAULT] around the 40th line. This is an extremely informative and commented section.

```
1 #
2 # WARNING: heavily refactored in 0.9.0 release. Please review and
3 # customize settings for your setup.
4 #
5 # Changes: in most of the cases you should not modify this
6 # file, but provide customizations in jail.local file,
7 # or separate .conf files under jail.d/ directory, e.g.:
8 #
9 # HOW TO ACTIVATE JAILS:
10 #
11 # YOU SHOULD NOT MODIFY THIS FILE.
12 #
13 # It will probably be overwritten or improved in a distribution update
14 #
15 # Provide customizations in a jail.local file or a jail.d/customisations
16 # For example to change the default bantime for all jails and to enable
17 # ssh-iptables jail the following (uncommented) would appear in the
18 # See man 5 jail.conf for details.
19 #
20 # [DEFAULT]
21 # bantime = 1h
22 #
23 # [sshd]
24 # enabled = true
25 #
26 # See jail.conf(5) man page for more information
27
28
```

Two sections [DEFAULT] and [sshd]

Scroll down to about 90th, you will see 4 settings should know:

1. **ignoreip** : This is a list of IP addresses that have free needles, never banned. They are IP addresses (127.0.0.1) listed from the default, along with the equivalent IPv6 (:: 1). If you also know that other IP addresses cannot be banned, add to this list by leaving a blank line between each address.
2. **bantime** : The period in which each IP address is banned (the letter 'm' stands for minutes / minutes). If you enter a value without 'm' or 'h' (hours / hour), the system will automatically count in seconds. If the value is -1, the IP address will be permanently banned. Be careful with this.
3. **findtime** : The amount of IP time prohibited after too many connection failures.
4. **maxretry** : The value represents 'connection failed too many times'.

```
89 # "ignoreip" can be a list of IP addresses, CIDR masks or DNS hosts.
90 # will not ban a host which matches an address in this list. Several
91 # can be defined using space (and/or comma) separator.
92 ignoreip = 127.0.0.1/8 ::1
93
94 # External command that will take an tagged arguments to ignore, e.g.
95 # and return true if the IP is to be ignored. False otherwise.
96 #
97 # ignorecommand = /path/to/command <ip>
98 ignorecommand =
99
100 # "bantime" is the number of seconds that a host is banned.
101 bantime = 10m
102
103 # A host is banned if it has generated "maxretry" during the last "findtime"
104 # seconds
105 findtime = 10m
106
107 # "maxretry" is the number of failures before a host get banned.
108 maxretry = 5
109
110 # "maxmatches" is the number of matches stored in ticket (resolvable)
111 maxmatches = %(maxretry)s
112
```

4 values ??should know

If connections from the same IP address encounter a maxretry failure connection within a certain findtime, they will be blocked for a period of time in bantime. The only exception is that this IP is present in the ignoreip list.

fail2ban only put the IP address into jail for a certain period of time. fail2ban supports many different types of jail, and each represents the settings that are applied to a specific type of connection. This allows you to have various adjustments for connection types. Or fail2ban is only used to control a set of different connection types.

You will have to guess the word in the section [DEFAULT], but the settings we see are the default. Now for the settings for SSH jail.

Create a Jail profile

Jail allows connections to and from the dashboard of fail2ban. If the default settings do not match what you want to jailbreak, you can set individual values ??like bantime, findtime and maxretry.

Down to about line 280, you will see the section [sshd].

```
275 #
276 # SSH servers
277 #
278
279 [sshd]
280
281 # To use more aggressive sshd modes set filter parameter "mode" in j
282 # normal (default), ddos, extra or aggressive (combines all).
283 # See "tests/files/logs/sshd" or "filter.d/sshd.conf" for usage exam
284 #mode = normal
285 port = ssh
286 logpath = %(sshd_log)s
287 backend = %(sshd_backend)s
288 maxretry = 3
289 enable = true
290
291
```

In the section [sshd]

This is where you can set the jailbreak values ??for SSH connections. To include this jailbreak in your dashboard and ban, type the following:

```
enabled = true
```

Type next:

```
maxretry = 3
```

The default setting is 5, but be extra careful with SSH connections. Reduce to 3, then save and close the file.

A jailbreak can use both the default and specific jail settings.

Activate fail2ban

fail2ban has been installed, must now activate auto-start service.

To enable fail2ban, use the systemctl command:

```
sudo systemctl enable fail2ban
```

They are also used to start the service:

```
sudo systemctl start fail2ban
```

We can also check the status of the service using systemctl:

```
sudo systemctl status fail2ban.service
```

When the green light came on, everything was in perfect condition.

```
dave@ubuntu20-04:~$ sudo systemctl status fail2ban.service
● fail2ban.service - Fail2Ban Service
   Loaded: loaded (/lib/systemd/system/fail2ban.service; enabled; vendor preset: enabled)
   Active: active (running) since Tue 2020-05-26 16:40:23 BST; 10min ago
     Docs: man:fail2ban(1)
  Main PID: 3988 (f2b/server)
    Tasks: 5 (limit: 4657)
   Memory: 13.9M
    CGroup: /system.slice/fail2ban.service
            └─3988 /usr/bin/python3 /usr/bin/fail2ban-server -xf sta

May 26 16:40:23 ubuntu20-04 systemd[1]: Starting Fail2Ban Service...
May 26 16:40:23 ubuntu20-04 systemd[1]: Started Fail2Ban Service.
May 26 16:40:23 ubuntu20-04 fail2ban-server[3988]: Server ready
lines 1-13/13 (END)
```

The blue line has been turned on

Now let's see how fail2ban works:

```
sudo fail2ban-client status
```

```
dave@ubuntu20-04:~$ sudo fail2ban-client status
Status
|- Number of jail:      1
  `-- Jail list:      sshd
dave@ubuntu20-04:~$
```

Bad fail2ban operation

This reflects what was installed above. Activate a single jail, named [sshd]. If we include the name of the jail in the previous command, we can see:

```
sudo fail2ban-client status sshd
```

```
dave@ubuntu20-04:~$ sudo fail2ban-client status sshd
Status for the jail: sshd
|- Filter
|  |- Currently failed: 0
|  |- Total failed:    0
|  `-- File list:      /var/log/auth.log
  `-- Actions
     |- Currently banned: 0
     |- Total banned:    0
     `-- Banned IP list:
dave@ubuntu20-04:~$
```

List of broken IP connections

A list of broken connections and banned IP addresses will appear. Of course all the indicators are equal to 0 now.

Jail Testing.

On another computer, an SSH connection request was sent to the device under test and the password was deliberately mistakenly entered. You will have three times to retype the password for each connection.

The maxretry value will pop out right after the connection fails 3 times, not 3 times the wrong password. This means 3 incorrect password attempts with one failed connection.

Try another connection and type the wrong password 3 times. The first time after the third connection, fail2ban will be turned on.

```
[dave@Nostromo ~]$ ssh dave@ubuntu20-04.local
dave@ubuntu20-04.local's password:
Permission denied, please try again.
dave@ubuntu20-04.local's password:
Permission denied, please try again.
dave@ubuntu20-04.local's password:
dave@ubuntu20-04.local: Permission denied (publickey,password).
[dave@Nostromo ~]$ ssh dave@ubuntu20-04.local
dave@ubuntu20-04.local's password:
Permission denied, please try again.
dave@ubuntu20-04.local's password:
Permission denied, please try again.
dave@ubuntu20-04.local's password:
dave@ubuntu20-04.local: Permission denied (publickey,password).
[dave@Nostromo ~]$ ssh dave@ubuntu20-04.local
dave@ubuntu20-04.local's password:
Permission denied, please try again.
dave@ubuntu20-04.local's password:
```

fail2ban will be enabled

After the next time, we will receive no response from the server, no explanation, no further notice.

You must press Ctrl + C to return to the command prompt. If you try again, another response pops up:

```
ssh dave@ubuntu20-04.local
```

```
[dave@Nostromo ~]$ ssh dave@ubuntu20-04.local
ssh: connect to host ubuntu20-04.local port 22: Connection refused
[dave@Nostromo ~]$
```

Notice of connection refusal

Earlier, the error message was 'Permission denied'. This time, the connection was denied.

Take a look at the details of [sshd] jail again:

```
sudo fail2ban-client status sshd
```

```
dave@ubuntu20-04:~$ sudo fail2ban-client status sshd
Status for the jail: sshd
|- Filter
| |- Currently failed: 0
| |- Total failed:    3
| `-- File list:      /var/log/auth.log
`- Actions
   |- Currently banned: 1
   |- Total banned:    1
   `-- Banned IP list: 192.168.4.25
dave@ubuntu20-04:~$
```

There are three failed connections, and an IP address (192.168.4.25) is banned

As mentioned above, fail2ban ban IPs by adding new rules to the firewall's rule set. Let's take a look at that set of rules now (the first is blank):

```
sudo iptables -L
```

```
dave@ubuntu20-04:~$ sudo iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source                destination
f2b-sshd   tcp  --  anywhere              anywhere
t dports ssh

Chain FORWARD (policy ACCEPT)
target     prot opt source                destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source                destination

Chain f2b-sshd (1 references)
target     prot opt source                destination
REJECT     all  --  192.168.4.25          anywhere
           reject-w
t icmp-port-unreachable

Chain RETURN
target     prot opt source                destination
RETURN    all  --  anywhere              anywhere
dave@ubuntu20-04:~$
```

New rules are added to the firewall

A rule has been added to the INPUT policy, sending SSH traffic to the f2b-ssh string. The rule in the f2b-sshd string denies SSH connections from the address 192.168.4.25. The default bantime settings have not been replaced, so after 10 minutes, these IP addresses will be unblocked and may require resuming from the beginning.

If you set a long bantime (like a few hours) but suddenly want to revisit that IP address sooner, you can adjust the time.

Type the following:

```
sudo fail2ban-client set sshd unbanip 192.168.5.25
```

On the server, if you require another SSH connection and type the correct password, we will be connected:

```
ssh dave@ubuntu20-04.local
```

```
[dave@Nostromo ~]$ ssh dave@ubuntu20-04.local
dave@ubuntu20-04.local's password:
Welcome to Ubuntu 20.04 LTS (GNU/Linux 5.4.0-31-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:    https://landscape.canonical.com
 * Support:       https://ubuntu.com/advantage

0 updates can be installed immediately.
0 of these updates are security updates.

Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Sun Apr 26 22:38:42 2020 from 192.168.4.24
dave@ubuntu20-04:~$ █
```

When connection is allowed

Simple and effective

Simple is always effective and fail2ban is a quick solution to the problem. It only takes a little time to install and then all operations on the computer are automatic.

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