CS790 Assignment 3

Onions: Are they always tasty?

Report

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Task 1

- Coded in Python using the `stem` library in `make_4-hop_circuit.py`.
- Accessed `tor` easily (with suitable configurations) with `stem.process`. Used `pycurl` to send a web request (I did for `https://check.torproject.org`).
- Randomly selected 1 entry, 1 exit and 2 middle nodes and built the circuit with the library.
- From the above url, I got a response that we are indeed connecting via `Tor` but not via `Tor Browser`, showing success of the connection.
- Used the `nyx` program to confirm the circuit ID with the destination IP address, both of which matched.
    1. Circuit and its ID (which is 9 as shown in Figure 1) printed by my Python script matched with those in `nyx`.
    2. The destination IP (which is `204.137.14.106` as shown in Figure 2) shown in `nyx` for that circuit ID matched with the IP returned by the above url (which claimed it to be *my* IP from its perspective).

```
[*] Connected to Tor ControlPort.
[*] Selecting 4 relays for custom circuit...
[+] Built 4-hop circuit 9
  Hop 1: 000D11C0BF30C48FD81644ED2AA3D3733A5149D1
  Hop 2: 000A10D43011EA4928A35F610405F92B4433B4DC
  Hop 3: 0017A4738B6FFC5E3D0FC7EE380C10FC2160328A
  Hop 4: 000F3EB75342BE371F1D8D3FAE90890AEB5664EE
[*] Circuit built successfully.

[*] Waiting for request/stream to go through circuit... (Press Ctrl+C to quit)

[+] Attaching stream 7 to circuit 9
Time taken: 2.2678685188293457
[+] Tor connection recognized.
[+] But not via Tor Browser.
[+] Your IP address appears to be: <strong>204.137.14.106</strong></p>
[*] Press Ctrl+C to quit.
```

Figure 1: Output of the Python Script

Figure 2: Output of the Nyx program

Task 2

- Coded in `circuit_selector.py` but used as `python3 make_4-hop_circuit.py --task 2`.
- Made a function `get_path(num_hops)` that returns a valid "`num_hops`"-hops TOR relay path.
- Fetches the latest consensus and server descriptor files and parses them using `parse_file()`.
- Followed the rules mentioned in section 2.2 of `https://github.com/torproject/torspec/blob/main/path-spec.txt`:-
  1. Unique nodes
  2. Picked in the order of first Exit, then Guard and finally middle node(s)
  3. Not two nodes in the same family (found in `FAMILY` attribute of the server descriptors)
  4. Not two nodes in the same `/16` network
  5. Among the viable candidates, the winner was picked randomly with probability proportional to their `BANDWIDTH` attribute
- As can be seen in Figure 3, the circuit ID and destination IP matches for the Python script and `nyx`, hence proving the correctness.

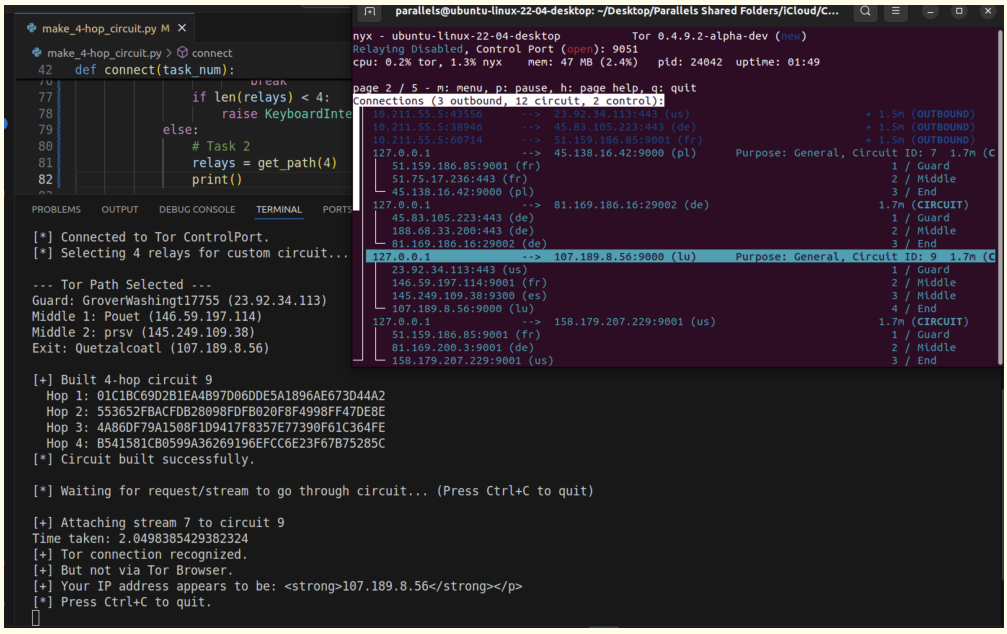

Figure 3: Outputs of the Python script and Nyx program side-by-side