Our project is written in Python 3 and runs on Linux platform.

You can get our code from Github with:

```
git clone https://github.com/tianchuan2017/NetworkSec.git
```

Dependencies

You will need the following python packages to run the code. Most of them are usually already installed. But in case you are missing some packages, they can be installed with pip or other python package management tools:

```
=====================================
import sys
import socket
import base64
import os
import random
import struct
import json
import cryptography
=====================================
```

Server Setup

To set up the network, you need to run server.py first, example:

```
chuantian$ python server.py
```

You will be able to add a pattern to IDS, view existing patterns, or simply press <enter> to proceed. The patterns are written in hex, you can at maximum have 50 patterns, each pattern is up to 32 bytes in size.

```
Starting Intrusion Detection System:
Type 'a' to add a new pattern, 'v' to view the current patterns, or press <enter> to
proceed:
```

When you proceed, you will be asked to enter an port number for the FTP server, here we use 2000 as example:

```
FTP Server Starting…
Please enter the port number of this FTP Server: 2000
```

If the server set up successfully, you will see a message like:

Awaiting connections on: ('129.236.232.104', 2000)

The first string in the pathesses is your IP address, the second is the port number. Now we can use them to set up the client side.

Client Setup

After you have the server running, you can set up the client with:

chuantian$ python client.py

You will be asked to enter the IP address and port number of the server

Please enter the IP address of the FTP Server: 129.236.232.104
Please enter the port number of the FTP Server: 2000

If the client successfully connects to the server, you will see message like:

Connected to server at: ('129.236.232.104', 2000)
ftp>

And now you can send commands to the FTP server.

FTP Usage

We support basic FTP commands, commands currently available are:

put, get, ls, exit

Examples:

Client side:
ftp> put test.txt
Server side will see:
Plaintext written to: test.txt
Hash written to: test.txt.hash

Client side:
ftp>get test.txt
Server side will see:
Sent file: test.txt
Sent hash: test.txt.hash

Client side:

ftp>ls

Server side send a list of files in the current directory:

test.txt.hash
test.txt
server.log

Client side:

ftp>exit

Server will close the connection with client.

IDS Usage

When starting a server, you will be able to add patterns to the IDS and view existing patterns:

For example:

```
chuantian$ python server.py
    Starting Intrusion Detection System
    Type 'a' to add a new pattern, 'v' to view the current patterns, or press <enter> to
    proceed: a

    Enter pattern id (int or str): new pattern
    Enter pattern in hex: (ex. efa7e779...): 68656C6C6F20776F726C64
    Added pattern.

    Type 'a' to add a new pattern, 'v' to view the current patterns, or press <enter> to
    proceed: v
    id      pattern
    new pattern     b'hello world'
```

Intrusion Detection

Once the client side tries to put a file with illegal content (configured by the prefixed patterns) to the FTP server, the server will detect the transfer, send a warning, log the intrusion, and refuse to accept the file.

For example:

```
    Starting Intrusion Detection System
```

```
Type 'a' to add a new pattern, 'v' to view the current patterns, or press <enter> to
proceed: v
id        pattern
new pattern     b'hello world'
```

We see above that files containing ‘hello world’ will be flagged as intrusion.

```
Connected to server at: ('129.236.232.104', 2000)
ftp>put test.txt
```

Now we try to send a file test.txt containing ‘hello world’ to the server.

```
Awaiting connections on: ('129.236.232.104', 2000)
Connection from: ('129.236.232.104', 54081)
!!!INTRUSION DETECTED!!!
Intrusion!
```

We see above that the server has detected the intrusion, and refused to accept the file.