Microsec Programming Test

Please provide solutions to these questions within **48 hours**. The solutions should be provided in either .sh format, .py format or other relevant formats. Files with extension with .sh should be executable over bash shell, while files with extension .py should be executable on Python3 or Python2. Always provide a test program (client) for testing a server.

If any confusion, make your own assumption. If anything else, email me within 10 minutes of receiving this email. If you need more time to solve these questions, please do let me know.

Shell Programming Questions:

1. Create a script that recursively downloads a given webpage and finds all hyperlink in that webpage. It should then explore all the hyperlinks and carry doing that in a recursive way. In each of this recursive crawling, it finds all the appearance of the given search word and displays them.
   Create the script that takes in parameters while execution in the format:
   Format: ./script.sh "website_address" "search_word"
   Example: ./script.sh www.usec.io Security

2. Create a script that blocks a connection from a given range of IP address for a particular duration. You are allowed to use either IPTables or/and network interfaces.
   Create the script that takes a file with the list of IP addresses as input and another parameter as duration (in minutes).
   Example: ./script.sh "file" 60
   Where file contains the IP addresses separated by newline as shown below and 60 minutes is the duration for which these IP addresses won't be able to connect to any port on the given system.
   Example content of "file":
   10.21.11.14
   202.14.56.22

Python Programming Question:

1. Write a python socket server program that listens on port 2999. Through this socket program you are able to execute the script that you wrote in Problem 1 of Shell Programming Question above. Make this socket server program a system service which can be controlled by systemctl (like start, stop and restart this socket server). Also write a client socket program for testing it. (In other words, by using a test client program in running on one computer, a user is able to connect to another computer socket and execute the script on it.) Please also provide a test program to test it.

2. Write a program that displays all the data packet that flows through the given network interface. For example, if network interface eth0 is selected, it displays all the incoming and outgoing packets through this network interface. While displaying a packet, showing incoming IP address, port, destination IP address and port is enough. You CANNOT use tools like netncat, nc or any other network tools.

Django/Flask Programming Question:

1. Write a program in Django/Flask which shows real-time data on a browser, i.e. whenever there is any change/addition reflected on the database, it should reflect on the browser. This program should not use any update/refresh call from browser side. You can use packages like Celery or Websockets to implement it. You can assume the data in the database is a temperature data of a sensor which receives value every 10 seconds from a source. The data could be displayed over a table or graph (whichever is easier for you)

Architecture Proposal for Application Scale Out

1. Please find the attached problem on scalability (Architecture Proposal for Application Scale Out.PDF). Please propose how the scalability and availability of the given application stack could be improved.