

Computer Networks

Assignment 1

Part 1:

1)

Capturing packets on interface enp0s3 for 120 seconds...

Total data captured: 20,334,857 bytes

Total packets captured: 29,557

Smallest packet: 42 bytes

Largest packet: 7,354 bytes

Average packet size: 687.99 bytes

2)

Total unique source-destination pairs: 1066

3)

Source-Destination Pair with Most Data Transferred:

Source: 180.149.61.76:443 -> Destination: 10.7.11.235:53185

Part 2:

1. The absolute difference of the Source port and Destination port value is given as 54286, The ACK flag is set, and the last 4 digits of the Acknowledgement number is '1203'. Find the Source IP and Destination IP.

Ans) Matching IPs for port difference & ACK flag: [('10.7.11.235', '180.149.59.137'), ('10.7.11.235', '180.149.59.137')]

2. The first two digits of the checksum is 'b5' (it is of the form 0xb5____, hexadecimal notation), the urgent data pointer is set to 0 and the 4 four digits of Raw Sequence Number is '6183'. Find the source IP, destination IP and the complete checksum of this packet.

Ans) Matching IPs for checksum & sequence number: [('23.54.155.211', '10.7.11.235', '0xb55a')]

3. Tell the number of packets where the sum of source and destination ports is between 10,000 and 20,000.

Ans) Count of packets with sum of ports in range: 0

4. Find all such packets whose acknowledgement number (raw) is in between 1678999000 <= ack_number <= 1700000000.

Ans) Packets with ACK number in range: [('10.7.11.235', '104.18.32.47', 1691529412), ('10.7.11.235', '104.18.32.47', 1691529412), ('10.7.11.235', '104.18.32.47', 1691529412), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691530787), ('10.7.11.235', '104.18.32.47', 1691531324), ('10.7.11.235', '104.18.32.47', 1691532353), ('10.7.11.235', '104.18.32.47', 1691532353), ('10.7.11.235', '104.18.32.47', 1691532354), ('10.7.11.235', '142.250.66.10', 1693862525), ('10.7.11.235', '142.250.66.10', 1693862525), ('10.7.11.235', '142.250.66.10', 1693868173), ('10.7.11.235', '142.250.66.10', 1693873440), ('10.7.11.235', '142.250.66.10', 1693873440), ('10.7.11.235', '142.250.66.10', 1693874466), ('10.7.11.235', '142.250.66.10', 1693874466), ('10.7.11.235', '142.250.66.10', 1693874467), ('10.7.11.235', '23.54.155.206', 1684480870), ('10.7.11.235', '23.54.155.206', 1684480870), ('10.7.11.235', '23.54.155.206', 1684480870), ('10.7.11.235', '23.54.155.206', 1684481134), ('10.7.11.235', '23.54.155.206', 1684481134), ('10.7.11.235', '23.54.155.206', 1684481134), ('10.7.11.235', '23.54.155.206', 1684481482), ('10.7.11.235', '23.54.155.206', 1684481513), ('10.7.11.235', '23.54.155.206', 1684485019), ('10.7.11.235', '23.54.155.206', 1684487939), ('10.7.11.235', '23.54.155.206', 1684490859), ('10.7.11.235', '23.54.155.206', 1684493779), ('10.7.11.235', '23.54.155.206', 1684496699), ('10.7.11.235', '23.54.155.206', 1684499619), ('10.7.11.235', '23.54.155.206', 1684502539), ('10.7.11.235', '23.54.155.206', 1684503676), ('10.7.11.235', '23.54.155.206', 1684503676), ('10.7.11.235', '23.54.155.206', 1684507182), ('10.7.11.235', '23.54.155.206', 1684513022), ('10.7.11.235', '23.54.155.206', 1684515942), ('10.7.11.235', '23.54.155.206', 1684525489), ('10.7.11.235', '23.54.155.206', 1684525489), ('10.7.11.235', '23.54.155.206', 1684526110), ('10.7.11.235', '23.54.155.206', 1684530490), ('10.7.11.235', '23.54.155.206', 1684531950), ('10.7.11.235', '23.54.155.206', 1684534870), ('10.7.11.235', '23.54.155.206', 1684537790), ('10.7.11.235', '23.54.155.206', 1684542170), ('10.7.11.235', '23.54.155.206', 1684543630), ('10.7.11.235', '23.54.155.206', 1684546550), ('10.7.11.235', '23.54.155.206', 1684547719), ('10.7.11.235', '23.54.155.206', 1684547719), ('10.7.11.235', '23.54.155.206', 1684551226), ('10.7.11.235', '23.54.155.206', 1684555606), ('10.7.11.235', '23.54.155.206', 1684559986), ('10.7.11.235', '23.54.155.206', 1684565826), ('10.7.11.235', '23.54.155.206', 1684568746), ('10.7.11.235', '23.54.155.206', 1684569543), ('10.7.11.235', '23.54.155.206', 1684569543), ('10.7.11.235', '23.54.155.206', 1684573049), ('10.7.11.235', '23.54.155.206', 1684575969), ('10.7.11.235', '23.54.155.206', 1684581809), ('10.7.11.235', '23.54.155.206', 1684584729), ('10.7.11.235',

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'10.7.11.235', 1685428634), ('142.250.192.197', '10.7.11.235', 1685428673), ('142.250.192.197', '10.7.11.235', 1685431593), ('142.250.192.197', '10.7.11.235', 1685431737), ('142.250.192.197', '10.7.11.235', 1685431737), ('142.250.192.197', '10.7.11.235', 1685431776), ('142.250.192.197', '10.7.11.235', 1685431777), ('52.10.219.207', '10.7.11.235', 1689806917), ('52.10.219.207', '10.7.11.235', 1689806917), ('52.10.219.207', '10.7.11.235', 1689808928), ('52.10.219.207', '10.7.11.235', 1689808928), ('52.10.219.207', '10.7.11.235', 1689808928), ('52.10.219.207', '10.7.11.235', 1689809084), ('52.10.219.207', '10.7.11.235', 1689811174), ('52.10.219.207', '10.7.11.235', 1689812930), ('52.10.219.207', '10.7.11.235', 1689812930), ('52.10.219.207', '10.7.11.235', 1689812930), ('52.10.219.207', '10.7.11.235', 1689812961), ('52.10.219.207', '10.7.11.235', 1689812961), ('52.10.219.207', '10.7.11.235', 1689814005), ('52.10.219.207', '10.7.11.235', 1689814005), ('52.10.219.207', '10.7.11.235', 1689814932), ('52.10.219.207', '10.7.11.235', 1689814932), ('52.10.219.207', '10.7.11.235', 1689815945), ('52.10.219.207', '10.7.11.235', 1689815945), ('52.10.219.207', '10.7.11.235', 1689816957), ('52.10.219.207', '10.7.11.235', 1689816957), ('52.10.219.207', '10.7.11.235', 1689818017), ('52.10.219.207', '10.7.11.235', 1689818017), ('52.10.219.207', '10.7.11.235', 1689819039), ('52.10.219.207', '10.7.11.235', 1689819039), ('52.10.219.207', '10.7.11.235', 1689820054), ('52.10.219.207', '10.7.11.235', 1689820054), ('52.10.219.207', '10.7.11.235', 1689821122), ('52.10.219.207', '10.7.11.235', 1689821122), ('52.10.219.207', '10.7.11.235', 1689822151), ('52.10.219.207', '10.7.11.235', 1689822151), ('52.10.219.207', '10.7.11.235', 1689823172), ('52.10.219.207', '10.7.11.235', 1689823172), ('52.10.219.207', '10.7.11.235', 1689824194), ('52.10.219.207', '10.7.11.235', 1689824194), ('52.10.219.207', '10.7.11.235', 1689825138), ('52.10.219.207', '10.7.11.235', 1689825138), ('52.10.219.207', '10.7.11.235', 1689826601), ('52.10.219.207', '10.7.11.235', 1689826601), ('52.10.219.207', '10.7.11.235', 1689826602)]

Part 3:

a)

SMTP (Simple Mail Transfer Protocol)

Layer: Application Layer

Operation: SMTP is used to transmit emails from a client to a mail server or between mail servers, and it communicates via TCP port 25.

RFC: RFC 5321

SNMP (Simple Network Management Protocol)

Layer: Application Layer

Operation: SNMP is used to monitor and manage network devices (such as routers and switches), allowing network managers to collect and alter device data.

RFC: RFC 1157

NTP (Network Time Protocol)

Layer: Application Layer

Operation: NTP is used to synchronise clocks between computers on a network, ensuring that systems all over the world keep correct and consistent time.

RFC: RFC 5905

LDAP (Lightweight Directory Access Protocol)

Layer: Application Layer

Operation: LDAP is a protocol for accessing and administering directory services, such as requesting user information in an organization's database for authentication and directory search.

RFC: RFC 4511

Telnet

Layer: Application Layer

Operation: Telnet allows a user to log into a distant device or computer across a network and provides a command-line interface for remote administration.

RFC: RFC 854

b)

Analysis of Request Line, Protocol Version, and Persistent Connection

By visiting the websites Netflix, GitHub, and Canara Bank, we have analyzed the request-response details, including the IP addresses, request line, and persistent connections.

Browser - Chrome

1. Canara Bank:

- **Request Line:**
 - GET / HTTP/1.1
- **IP Address:**
 - 107.162.160.8:443
- **Connection Type:**
 - **Persistent/Non-Persistent:** The connection is non-persistent, as indicated by the `connection: close` header in the response, which tells the server to close the connection after completing the request.
- **Request Header Fields:**

- accept:
 - text/html,application/xhtml+xml,application/xml;q=0.9,
 - image/avif,image/webp,image/apng,*/*;q=0.8,application
 - /signed-exchange;v=b3;q=0.7
 - accept-encoding: gzip, deflate, br, zstd
 - accept-language: en-GB,en-US;q=0.9,en;q=0.8
 - **Response Header Fields:**
 - cache-control: public, max-age=36000
 - connection: close
 - content-security-policy: default-src data: https;;
 - img-src * 'self' data: https;; style-src 'self'
 - 'unsafe-inline' fonts.googleapis.com
 - stackpath.bootstrapcdn.com cdnjs.cloudflare.com
 - cdn.jsdelivr.net; script-src 'self'
 - cdnjs.cloudflare.com cdn.jsdelivr.net
 - www.googletagmanager.com code.highcharts.com
 - cabprod.gupshup.io 'unsafe-inline' 'unsafe-eval';
 - **Connection: Persistent**
-

2. Netflix:

Set-Cookie:	netflix-sans-normal-3-loaded=true; Max-Age=7776000; Domain=.netflix.com; Path=
Set-Cookie:	netflix-sans-bold-3-loaded=true; Max-Age=7776000; Domain=.netflix.com; Path=
Set-Cookie:	flwssn=af2888d7-a177-4807-8547-f5f98aa27cc9; Max-Age=10800;

Cookie: flwssn=af2888d7-a177-4807-8547-f5f98aa27cc9;
nfvdid=BQFmAAEBElxgJRUAHAU_9scblRYPrxA0vaTIEU2sRyqC8-
smvqN4KBWNE2rc7n4SLT0xM7N6lnHCPEVJYmd4L6GcvFIIVmPM6zXrut9UGQDWjAM
1grSmA%3D%3D;
NetflixId=v%3D3%26ct%3DBgjHlOvcAxLAAUJUT1NlvKOEEQjwduo_oNrBM0zr1nMk
wrjpf-
xCbTO3ICZQneE4qTPUhe97CvKkdhtaPDCOPAv9PiMCyKaKPJ3f7oUbEjpThnc3U7SH
wKhnlQ6BmeEYDzKxkPLPPP92InGUjFLRk1WMms6SxFC46NFp0ioRIU3AbM5DN5spl
UGNG6ml_dIAvMWfyeQO1YKD0KrbhZ_8BFuzF8tnsHtwO7wSLOdoJaLLe8i1IZHoOtq
Kx0nrWATYQpIF3PAVXnBgGlg4KDFwVkwSERTWpk5oEUg.; netflix-sans-normal-3-
loaded=true; netflix-sans-bold-3-loaded=true;
OptanonConsent=isGpcEnabled=0×tamp=Sat+Feb+01+2025+21%3A05%3A3
3+GMT%2B0530+
(India+Standard+Time)&version=202411.1.0&browserGpcFlag=0&isABGlobal=false
&hosts=&consentId=9d1ed2e4-7b39-420c-b7d6-
7d740d0ca1c9&interactionCount=1&isAnonUser=1&landingPath=https%3A%2F%2
Fwww.netflix.com%2Ffin%2F&groups=C0001%3A1%2CC0002%3A1%2CC0003%3A1
%2CC0004%3A1

**Set-Cookie: netflix-sans-normal-3-loaded=true; Max-Age=7776000;
Domain=.netflix.com; Path=/; Secure; HttpOnly**

**Set-Cookie: netflix-sans-bold-3-loaded=true; Max-Age=7776000;
Domain=.netflix.com; Path=/; Secure; HttpOnly**

**Set-Cookie: flwssn=af2888d7-a177-4807-8547-f5f98aa27cc9; Max-Age=10800;
Domain=.netflix.com; Path=/; Secure; HttpOnly**

- **Request Line:**
 - GET / HTTP/2
- **IP Address:**
 - 54.246.79.9:443
- **Connection Type:**
 - **Persistent/Non-Persistent:** The connection is non-persistent, as the `cache-control: no-cache, no-store` header and the `content-security-policy-report-only` header suggest that the resources are not cached, implying a fresh connection each time.
- **Request Header Fields:**
 - `accept:`
`text/html,application/xhtml+xml,application/xml;q=0.9,`

```
image/avif,image/webp,image/apng,*/*;q=0.8,application
/signed-exchange;v=b3;q=0.7
```

- accept-encoding: gzip, deflate, br, zstd
- accept-language: en-GB,en-US;q=0.9,en;q=0.8

- **Response Header Fields:**

- accept-ch: Sec-CH-UA-Platform-Version,Sec-CH-UA-Model
- cache-control: no-cache, no-store
- content-security-policy-report-only: default-src https: wss: 'unsafe-inline' 'unsafe-eval'; font-src https: data: ; img-src https: data: blob: ; media-src https: blob: ; worker-src https: blob: ; report-uri https://www.netflix.com/log/www/csp/1;

- **Connection: Not Persistent**

3. GitHub:

- **Request Line:**

- GET / HTTP/2

- **IP Address:**

- 20.207.73.82:443

- **Connection Type:**

- **Persistent/Non-Persistent:** The connection is likely persistent since there is no explicit `connection: close` header, and the `cache-control: max-age=0, private, must-revalidate` suggests that resources might be re-used for the current session.

- **Request Header Fields:**

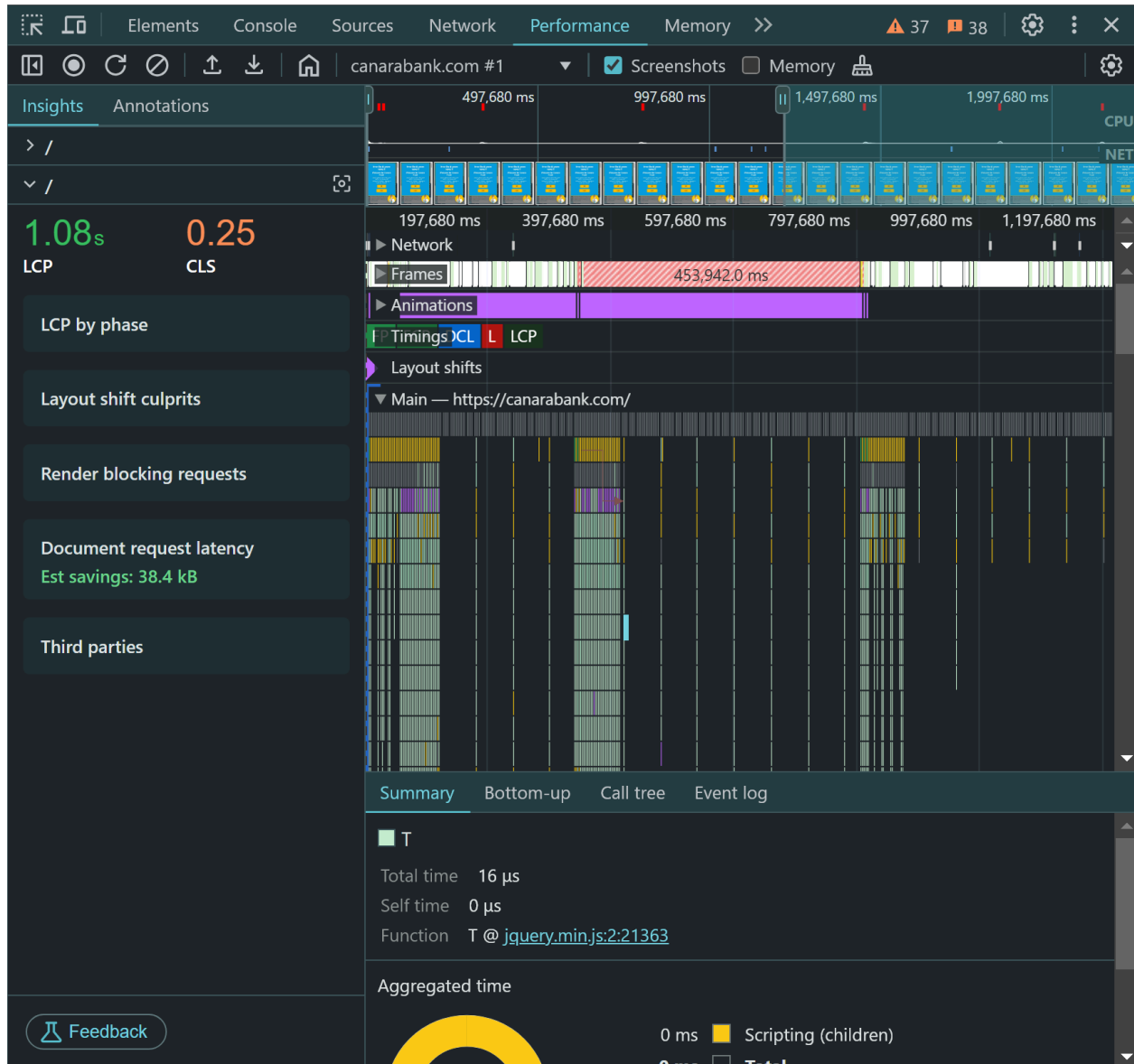
- accept: text/html,application/xhtml+xml,application/xml;q=0.9, image/avif,image/webp,image/apng,*/*;q=0.8,application /signed-exchange;v=b3;q=0.7
- accept-encoding: gzip, deflate, br, zstd
- accept-language: en-GB,en-US;q=0.9,en;q=0.8

- **Response Header Fields:**

- cache-control: max-age=0, private, must-revalidate
- content-encoding: gzip
- content-language: en-US

- **Connection: Not Persistent**

Performance of Canara Bank:



HTTP Error Codes:

There is No error in Network but this Error can be Found

1. **404 Not Found** – The requested resource could not be found on the server.
2. **500 Internal Server Error** – The server encountered an error while processing the request.
3. **403 Forbidden** – The server understood the request, but refuses to authorize it.