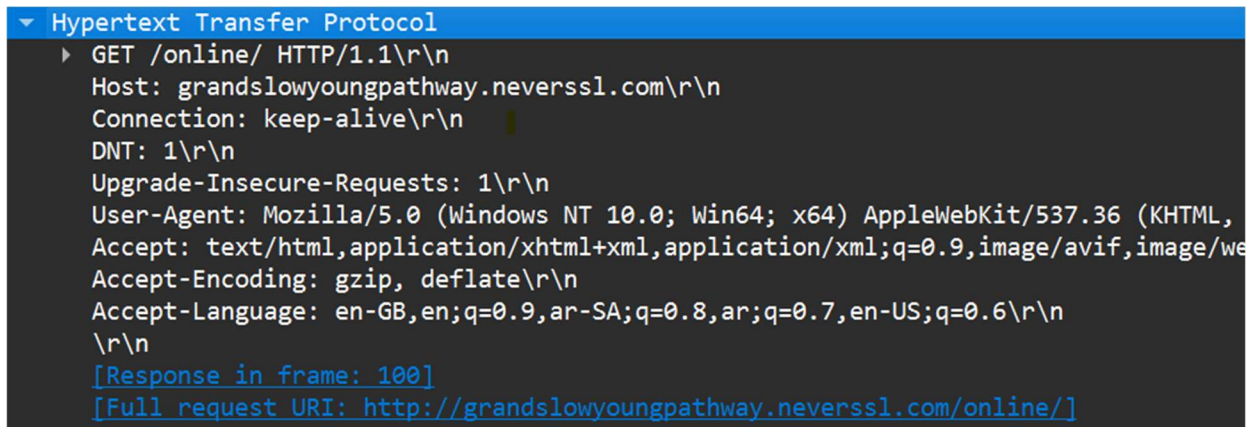


Lab – 1

1- Wireshark Screenshots:

a- HTTP header:

A screenshot of the Wireshark network protocol analyzer interface. The 'Hypertext Transfer Protocol' section is expanded, showing the details of an HTTP GET request. The request is for the path '/online/' on the host 'grandslowyoungpathway.neverssl.com'. The screenshot shows various headers including Host, Connection, DNT, Upgrade-Insecure-Requests, User-Agent, Accept, Accept-Encoding, and Accept-Language. It also indicates the response is in frame 100 and provides the full request URI.

```
▼ Hypertext Transfer Protocol
  ▶ GET /online/ HTTP/1.1\r\n
    Host: grandslowyoungpathway.neverssl.com\r\n
    Connection: keep-alive\r\n
    DNT: 1\r\n
    Upgrade-Insecure-Requests: 1\r\n
    User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML,
    Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/we
    Accept-Encoding: gzip, deflate\r\n
    Accept-Language: en-GB,en;q=0.9,ar-SA;q=0.8,ar;q=0.7,en-US;q=0.6\r\n
    \r\n
    [Response in frame: 100]
    [Full request URI: http://grandslowyoungpathway.neverssl.com/online/]
```

b- TCP header:

```
▼ Transmission Control Protocol, Src Port: 50650, Dst Port: 80, Seq: 0, Len: 0
  Source Port: 50650
  Destination Port: 80
  [Stream index: 6]
  ▶ [Conversation completeness: Complete, WITH_DATA (31)]
  [TCP Segment Len: 0]
  Sequence Number: 0 (relative sequence number)
  Sequence Number (raw): 4143079767
  [Next Sequence Number: 1 (relative sequence number)]
  Acknowledgment Number: 0
  Acknowledgment number (raw): 0
  1000 .... = Header Length: 32 bytes (8)
  ▶ Flags: 0x002 (SYN)
  Window: 64800
  [Calculated window size: 64800]
  Checksum: 0xadcd [unverified]
```

c- TCP handshake:

No.	Time	Source	Destination	Protocol	Length	Info
37	4.006514	2001:16a2:c054:5783...	2600:1f13:37c:1400:...	TCP	86	50650 → 80 [SYN] Seq=0 Win=64800 Len=0 MSS=1440 WS=256 SACK_PERM
65	4.262870	2600:1f13:37c:1400:...	2001:16a2:c054:5783...	TCP	86	80 → 50650 [SYN, ACK] Seq=0 Ack=1 Win=26883 Len=0 MSS=1400 SACK_PERM WS=128
66	4.262997	2001:16a2:c054:5783...	2600:1f13:37c:1400:...	TCP	74	50650 → 80 [ACK] Seq=1 Ack=1 Win=131584 Len=0
67	4.263490	2001:16a2:c054:5783...	2600:1f13:37c:1400:...	HTTP	571	GET /online/ HTTP/1.1

d- UDP header:

```
▼ User Datagram Protocol, Src Port: 64573, Dst Port: 443
  Source Port: 64573
  Destination Port: 443
  Length: 42
  Checksum: 0x8b45 [unverified]
  [Checksum Status: Unverified]
  [Stream index: 63]
  [Stream Packet Number: 1799]
  ▶ [Timestamps]
  UDP payload (34 bytes)
```

2- TCP VS UDP

Feature	TCP	UDP
1. Connection Establishment	Connection-oriented (requires a three-way handshake: SYN, SYN-ACK, ACK before data transfer).	Connectionless (sends data without establishing a connection).
2. Data Integrity	Ensures data integrity using error detection, acknowledgments, and retransmission of lost packets.	Provides basic checksum error detection but no retransmission or correction of lost/corrupted data.
3. Ordering	Guarantees ordered data delivery using sequence numbers and reassembly.	No ordering guarantee; packets may arrive out of order.
4. Reliability	Reliable due to acknowledgments, retransmission, and congestion control.	Unreliable; no acknowledgment or retransmission, meaning lost packets are not recovered.
5. Use Cases	Web browsing (HTTP/HTTPS), email (SMTP, IMAP, POP3), file transfer (FTP, SFTP), database transactions, remote login (SSH, Telnet).	Live streaming, VoIP, online gaming, DNS, DHCP, real-time video/audio communication.
6. Performance	Slower due to overhead from connection setup, acknowledgments, and error checking.	Faster and more efficient due to lower overhead and no connection setup.