

Opgave 2: Test dit Class Library

- b. Kør testen og overvej om din test har god "Code Coverage. Angiv %tallet og redegør kort for dine overvejelser.

Dette var ikke muligt da jeg havde nogle udfordringer med at få code coverage til at fungere. Jeg valgte derfor at springe dette punkt over for ikke at spille for meget tid.

Jeg vil dog argumentere at ud fra de test jeg har skrevet burde min Code Coverage være forholdsvis høj. Der vil dog nok være mangler på metoder som f.eks. Main() da denne ikke er blevet testet fordi jeg ikke mente der ville være nongen grund til det.

Opgave 4: TCP Client

- b. Brug Wireshark eller lign. værktøj til at opfange og vise de sendte beskeder og svar. Gem et par billeder i et dokument, så du let kan besvare næste opgave c).

Client message 1

Wireshark packet capture showing a TCP client message 1. The packet list shows a SYN packet from 127.0.0.1 to 127.0.0.1 on port 6789. The packet details show the TCP header with Seq=0, Win=43690, Len=0, MSS=65495, SACK_PERM=1, TSval=4287638619, TSecr=0, WS=128. The packet bytes show the raw data.

No.	Time	Source	Destination	Protocol	Length	Info
98	13.989831..	127.0.0.1	127.0.0.1	TCP	76	56378 → 6789 [SYN, ECR, CWR] Seq=0 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=0 WS=128
99	13.989846..	127.0.0.1	127.0.0.1	TCP	76	6789 → 56378 [SYN, ACK, ECR] Seq=0 Ack=1 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=4287638619 WS=128
100	13.989857..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=1 Ack=1 Win=43776 Len=0 TSval=4287638619 TSecr=4287638619
188	15.749247..	127.0.0.1	127.0.0.1	TCP	74	56378 → 6789 [PSH, ACK] Seq=1 Ack=1 Win=43776 Len=0 TSval=4287643369 TSecr=4287638619
189	15.749702..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=7 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
190	15.749790..	127.0.0.1	127.0.0.1	TCP	75	56378 → 6789 [PSH, ACK] Seq=7 Ack=1 Win=43776 Len=7 TSval=4287643369 TSecr=4287643369
191	15.749794..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=14 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
192	15.749852..	127.0.0.1	127.0.0.1	TCP	77	6789 → 56378 [PSH, ACK] Seq=1 Ack=14 Win=43776 Len=9 TSval=4287643370 TSecr=4287643369
193	15.749859..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643370 TSecr=4287643370
228	19.293124..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [FIN, ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643922 TSecr=4287643370
221	19.293179..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [FIN, ACK] Seq=10 Ack=15 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922
222	19.293190..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=15 Ack=11 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922

Frame 188: 74 bytes on wire (592 bits), 74 bytes captured (592 bits) on interface 0
Linux cooked capture
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
Transmission Control Protocol, Src Port: 56378, Dst Port: 6789, Seq: 1, Ack: 1, Len: 6
Data (6 bytes)
456c02090c0a
[Length: 6]

0000 00 00 03 04 00 06 00 00 00 00 00 d3 e8 08 00
0010 45 02 00 3a 47 fa 40 00 40 06 f4 bf 7f 00 00 01 E...G...
0020 7f 00 00 01 dc 3a 1a 85 72 12 95 56 a6 fe 14 67r...V...g
0030 80 1b 01 56 fe 2e 00 00 01 01 08 0a ff 00 3e e9 ...V...>...
0040 ff 90 2c 5b 45 5c 02 69 5c 0albi l

Client message 2

Wireshark capture of a client message (Frame 190) showing a TCP segment from 127.0.0.1 to 127.0.0.1. The segment is a SYN, ACK, ECN packet with sequence number 686789 and acknowledgment number 686789. The window size is 0. The segment is 75 bytes long (600 bits) on the wire and 75 bytes captured (600 bits) on interface 0. The data field contains 7 bytes of data: 3132333435360a.

No.	Time	Source	Destination	Protocol	Length	Info
98	13.089831..	127.0.0.1	127.0.0.1	TCP	76	56378 → 6789 [SYN, ECN, CW] Seq=0 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=0 WS=128
99	13.089846..	127.0.0.1	127.0.0.1	TCP	76	6789 → 56378 [SYN, ACK, ECN] Seq=0 Ack=1 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=4287638619 WS=128
100	13.089857..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=1 Ack=1 Win=43776 Len=0 TSval=4287638619 TSecr=4287638619
188	18.740747..	127.0.0.1	127.0.0.1	TCP	74	56378 → 6789 [PSH, ACK] Seq=1 Ack=1 Win=43776 Len=6 TSval=4287643369 TSecr=4287638619
189	18.740762..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=7 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
190	18.740790..	127.0.0.1	127.0.0.1	TCP	75	56378 → 6789 [PSH, ACK] Seq=7 Ack=1 Win=43776 Len=7 TSval=4287643369 TSecr=4287643369
191	18.740794..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=14 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
192	18.740852..	127.0.0.1	127.0.0.1	TCP	77	6789 → 56378 [PSH, ACK] Seq=1 Ack=14 Win=43776 Len=9 TSval=4287643370 TSecr=4287643369
193	18.740859..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643370 TSecr=4287643370
228	19.293124..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [FIN, ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643922 TSecr=4287643370
221	19.293179..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [FIN, ACK] Seq=10 Ack=15 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922
222	19.293190..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=15 Ack=11 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922

Frame 190: 75 bytes on wire (600 bits), 75 bytes captured (600 bits) on interface 0
Linux cooked capture
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
Transmission Control Protocol, Src Port: 56378, Dst Port: 6789, Seq: 7, Ack: 1, Len: 7
Data (7 bytes)
Data: 3132333435360a
[Length: 7]

0000 00 00 03 04 00 06 00 00 00 00 00 60 38 08 008..
0010 45 02 00 3b 47 fb 40 00 40 06 f4 bd 7f 00 00 01 E...000..
0020 7f 00 00 01 dc 3a 1a 85 72 12 95 5c a6 fe 14 67 ...:..f...g
0030 80 18 01 56 fe 2f 00 00 01 01 08 0a ff 90 3e e9 ...V.1.....>
0040 ff 90 3e e9 31 32 33 34 35 36 0a ...-> 1234 56..

Length (data.len) Packets: 1743 Displayed: 12 (0.7%) Profile: Default

Response from server.

Wireshark capture of a response from the server (Frame 192) showing a TCP segment from 127.0.0.1 to 127.0.0.1. The segment is a PSN, ACK packet with sequence number 686789 and acknowledgment number 686789. The window size is 0. The segment is 77 bytes long (616 bits) on the wire and 77 bytes captured (616 bits) on interface 0. The data field contains 9 bytes of data: 32303938372e35320a.

No.	Time	Source	Destination	Protocol	Length	Info
98	13.089831..	127.0.0.1	127.0.0.1	TCP	76	56378 → 6789 [SYN, ECN, CW] Seq=0 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=0 WS=128
99	13.089846..	127.0.0.1	127.0.0.1	TCP	76	6789 → 56378 [SYN, ACK, ECN] Seq=0 Ack=1 Win=43690 Len=0 MSS=65495 SACK_PERM=1 TSval=4287638619 TSecr=4287638619 WS=128
100	13.089857..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=1 Ack=1 Win=43776 Len=0 TSval=4287638619 TSecr=4287638619
188	18.740747..	127.0.0.1	127.0.0.1	TCP	74	56378 → 6789 [PSH, ACK] Seq=1 Ack=1 Win=43776 Len=6 TSval=4287643369 TSecr=4287638619
189	18.740762..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=7 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
190	18.740790..	127.0.0.1	127.0.0.1	TCP	75	56378 → 6789 [PSH, ACK] Seq=7 Ack=1 Win=43776 Len=7 TSval=4287643369 TSecr=4287643369
191	18.740794..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [ACK] Seq=1 Ack=14 Win=43776 Len=0 TSval=4287643369 TSecr=4287643369
192	18.740852..	127.0.0.1	127.0.0.1	TCP	77	6789 → 56378 [PSH, ACK] Seq=1 Ack=14 Win=43776 Len=9 TSval=4287643370 TSecr=4287643369
193	18.740859..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643370 TSecr=4287643370
228	19.293124..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [FIN, ACK] Seq=14 Ack=10 Win=43776 Len=0 TSval=4287643922 TSecr=4287643370
221	19.293179..	127.0.0.1	127.0.0.1	TCP	68	6789 → 56378 [FIN, ACK] Seq=10 Ack=15 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922
222	19.293190..	127.0.0.1	127.0.0.1	TCP	68	56378 → 6789 [ACK] Seq=15 Ack=11 Win=43776 Len=0 TSval=4287643922 TSecr=4287643922

Frame 192: 77 bytes on wire (616 bits), 77 bytes captured (616 bits) on interface 0
Linux cooked capture
Internet Protocol Version 4, Src: 127.0.0.1, Dst: 127.0.0.1
Transmission Control Protocol, Src Port: 6789, Dst Port: 56378, Seq: 1, Ack: 14, Len: 9
Data (9 bytes)
Data: 32303938372e35320a
[Length: 9]

0000 00 00 03 04 00 06 00 00 00 00 00 ec 6e 08 00n..
0010 45 02 00 3d c5 cc 40 00 40 06 75 ea 7f 00 00 01 E...000u..
0020 7f 00 00 01 1a 85 dc 3a a6 fe 14 67 72 12 95 63 ...:..g...c
0030 80 18 01 56 fe 31 00 00 01 01 08 0a ff 90 3e ea ...V.1.....>
0040 ff 90 3e e9 32 30 39 38 37 2e 35 32 0a ...-> 2098 7.52..

Data (data.data), 9 bytes Packets: 1567 Displayed: 12 (0.8%) Profile: Default

c. Forklar formatet og indholdet af et TCP-segment? Husk at skrive din forklaring i dit dokument.

Et TCP-segment kan kort beskrives som en lille ”pakke” der har en header og en smule information. Det kan både være alt hvad der skal sendes eller en lille del af noget større der skal sendes.