Assignment Submission Coversheet

Faculty of Science, Engineering and Built Environment
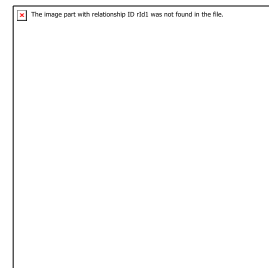
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Assignment Title:	Problem Solving Report 3		
Due Date:	September 20th 2019	**Assessment Item:**	3
Course Code/Name:	S334 / Bachelor of Cyber Security		
Unit Code/Name:	SIT202 Computer Networks	**Unit Chair / Campus Coordinator:**	Prof Jinho Choi
Practical Group: (if applicable)			

If this assignment has been completed by a group or team:
1. Each student in the group must complete and sign a separate coversheet
2. The assignment will be returned to the student in the group nominated below

Assignment to be returned to: (Student name and Student ID number)	

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Signed:	Justin Bland	**Date:**	26/06/2021

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COMMENTS				
Mark Awarded:		**Assessor's Signature:**		**Date:**

SIT202 Computer Networks - Problem Solving Report 3

Question 1

Consider a scenario where a web portal uses cookies to track the users and provides a customized view to the individual user based on the previously visited sites. The web portal sends a cookie to the browser which is stored in the browser at the client's side along with the visited sites. This helps to keep track the previously visited pages of a client from different sites. Prepare a diagram illustrating how the cookie is used between a browser and the web portal when a user revisits the web portal and how the pages are retrieved from different webservers to provide a customized view to the user. Consider two different webservers for two visited sites, a web portal and a client in your diagram. Explain the steps of your diagram

Question 2

In the following diagram, a web client is communicating with a web server which opens a TCP connection at client's end. The client is using an initial sequence number (ISN) 2048 with a port of 51000 and receiving window size of 2000. In response, server also opens a TCP connection with ISN 21732 and receiving window size of 4000, port 80. After connection establishment, client sends two data segments each of size 500 bytes. Then server responds in a single segment with 1000 bytes. Then client closes the connection, in response server also closes the connection.

Show all TCP segments during connection establishment, data transfer and connection termination between client and server (no segments are corrupted/dropped in the exchange). For each segment, write header information which should include port number, sequence number, acknowledgement number, values of all bits in the control field, window sizes and ranges of data bytes in the data section (as appropriate for the segment type). Each segment needs to be placed in a separate table. First row in the table should mention the label of segment based on their type and direction clearly client to server or vice versa. All tables should have a number at the beginning (on top of the table) which indicates the order they are sent by either the client or the server.

Segment Number:	1		
Segment Direction:	Client to Server	Comment:	Initiate Connection / Handshake

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15						16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Source Port Number						Destination Port Number
51000						80

Sequence Number
2048

Acknowledgment Number

Header Len	Reserved			Flags			Window Size
		URG	ACK	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number:	2		
Segment Direction:	Server to Client	Comment:	Initiate Connection / Handshake

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Source Port Number	Destination Port Number
80	51000

Sequence Number
21732

Acknowledgment Number
2049

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	4000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number:	3		
Segment Direction:	Client to Server	Comment:	Initiate Connection / Handshake

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Source Port Number	Destination Port Number
51000	80

Sequence Number
2049

Acknowledgment Number
21733

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number:	4		
Segment Direction:	Client to Server	Comment:	Start of Data Transfer A

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Source Port Number																Destination Port Number															
51000																80															
Sequence Number																															
2049																															
Acknowledgment Number																															
21733																															

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
500 Bytes of Data to Send

Segment Number:	5		
Segment Direction:	Server to Client	Comment:	Acknowledgement of Transfer A

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Source Port Number																Destination Port Number															
80																51000															
Sequence Number																															
21733																															
Acknowledgment Number																															
2550																															

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	4000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number:	6		
Segment Direction:	Client to Server	Comment:	Start of Data Transfer B

0 1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Source Port Number	Destination Port Number
51000	80

Sequence Number
2550

Acknowledgment Number
21733

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
500 Bytes

Segment Number:	7		
Segment Direction:	Server to Client	Comment:	Acknowledgement of Transfer B

0 1 2 3 4 5 6 7	8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Source Port Number	Destination Port Number
80	51000

Sequence Number
21733

Acknowledgment Number
3051

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	4000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number: 8

Segment Direction: Server to Client   Comment: Start of Data Transfer C

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Source Port Number	Destination Port Number
80	51000
Sequence Number	
21733	
Acknowledgment Number	
3051	

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	FIN	4000

TCP Checksum	Urgent Pointer

Options

Data
1000 Bytes

Segment Number: 9

Segment Direction: Client to Server   Comment: Acknowledgement of Transfer C

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
Source Port Number	Destination Port Number
51000	80
Sequence Number	
3051	
Acknowledgment Number	
22734	

Header Len	Reserved	Flags						Window Size
		URG	==ACK==	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number: 10

Segment Direction: Client to Server

Comment: Close Connection

0 1 2 3 4 5 6 7 8 9	10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Source Port Number		Destination Port Number
51000		80
Sequence Number		
3051		
Acknowledgment Number		
22734		

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	**FIN**	2000

TCP Checksum		Urgent Pointer
Options		
Data		
NONE		

Segment Number: 11

Segment Direction: Server to Client

Comment: Acknowledgement of Close Connection

0 1 2 3 4 5 6 7 8 9	10 11 12 13 14 15	16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Source Port Number		Destination Port Number
80		51000
Sequence Number		
22734		
Acknowledgment Number		
3051		

Header Len	Reserved	Flags						Window Size
		URG	**ACK**	PSH	RST	SYN	FIN	4000

TCP Checksum		Urgent Pointer
Options		
Data		
NONE		

Segment Number: 12

Segment Direction: Server to Client

Comment: Close Connection

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|0|1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22|23|24|25|26|27|28|29|30|31|

Source Port Number	Destination Port Number
80	51000

Sequence Number
22734

Acknowledgment Number
3051

Header Len	Reserved	Flags						Window Size
		URG	ACK	PSH	RST	SYN	**FIN**	4000

TCP Checksum	Urgent Pointer

Options

Data
NONE

Segment Number: 13

Segment Direction: Client to Server

Comment: Acknowledgement of Close Connection

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|0|1|2|3|4|5|6|7|8|9|10|11|12|13|14|15|16|17|18|19|20|21|22|23|24|25|26|27|28|29|30|31|

Source Port Number	Destination Port Number
51000	80

Sequence Number
3051

Acknowledgment Number
22734

Header Len	Reserved	Flags						Window Size
		URG	**ACK**	PSH	RST	SYN	FIN	2000

TCP Checksum	Urgent Pointer

Options

Data
NONE