

interactive

turn →

Process: P.send [def] (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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.recv [ack]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack] (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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

or automatic

Next Next 20 Next 100

Controller (0) ← *total turns*

Some packets not yet recieved.

Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

p-window = 9

Process: P.send [def] (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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

efficiency = unique/total

Sent: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

transfer = Sent/rcvd

Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.recv [ack]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

throughput = unique/turn
total/turn

Rcvd: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

avg. latency per packet

Rcvd: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack]

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

total latency

Sent: 0/54 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Next Next 20 Next 100

current automatic turn

Controller (0)
Some packets not yet recieved.
Txfr: 0/0 (0%), Effc: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

this packet will be auto sent when P.send turn comes

Process: P.send [def] (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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 0/0 [0], Rcvd: 0 [0]

Sent: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

sent times

sent turn

Channel: P -> Q (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.recv [ack]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

no packets recieved

Process: Q.send [ack] (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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Next Next 20 Next 100

no acknowledgements ready to send

Controller (0) Some packets not yet recieved.

Txfr: 0/0 (0%), Effic: 0/0 (0%) Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.send [def] (1)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (0)

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/1 (0%), Effic: 0/1 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.recv [ack]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack]

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

1 turn executed

in turn 0

we manually sent a packet

Next Next 20 Next 100

Controller (1)
Some packets not yet recieved.

Txfr: 0/1 (0%), Effic: 0/1 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.send [def] (1)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (1)

sent 1 from PQ to QR

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Sent: 1 [1], Rcvd: 1 [0]

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: Q.recv [ack]

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 0.00 (1)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack] (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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

ready to ACK

Sent: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Next Next 20 Next 100

Controller (2)
Some packets not yet recieved.

Txfr: 0/1 (0%), Effic: 0/1 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.send [def] (1)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (1)

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: Q.recv [ack]

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Sent: 0 [0], Rcvd: 1 [1]

Rcvd: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 0.00 (1)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/0 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack] (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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Next Next 20 Next 100

Controller (2)
Some packets not yet recieved.

Txfr: 0/1 (0%), Effic: 0/1 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.send [def] (1)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (1)

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: Q.recv [ack]

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: P.recv [def]

0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 0/54 (0%), Effic: 0/0 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: Q -> P (0)

-1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 0/1 (0%), Effic: 0/1 (0%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: Q.send [ack] (1)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 1 [2], Rcvd: 0 [0]
Thpt: 0.50/0.50 (2), Latn: 2.00 (2)

Next Next 20 Next 100

Q sent ACK for 1 to QP

Controller (3) Some packets not yet received.

Txfr: 0/1 (0%), Effic: 0/1 (0%) ← 1 packet sent by P but not received 1 ACK
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Process: P.send [def] (1)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 0.00 (0)

Channel: P -> Q (1)

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: Q.recv [ack]

1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 1.00/1.00 (1), Latn: 1.00 (1)

Process: P.recv [def]

-1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.33/0.33 (3), Latn: 3.00 (3)

Channel: Q -> P (1)

-1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Sent: 1 [3], Rcvd: 1 [2]

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 0.33/0.33 (3), Latn: 1.00 (1)

Process: Q.send [ack]

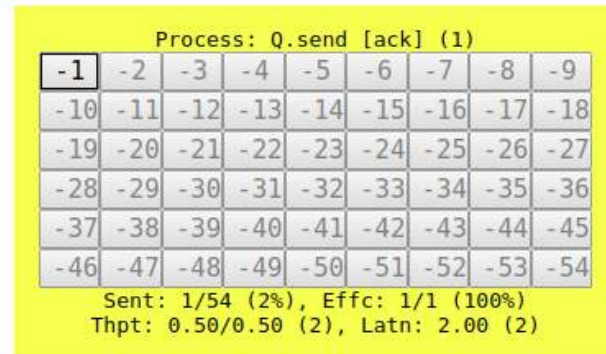
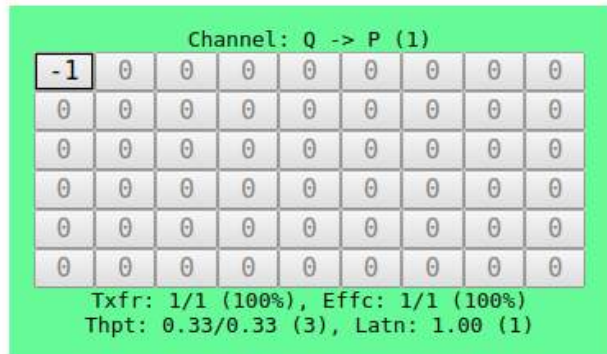
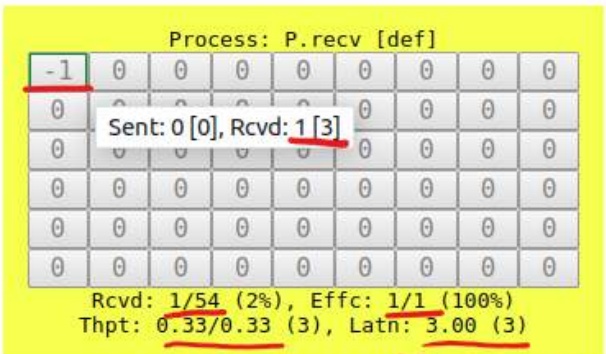
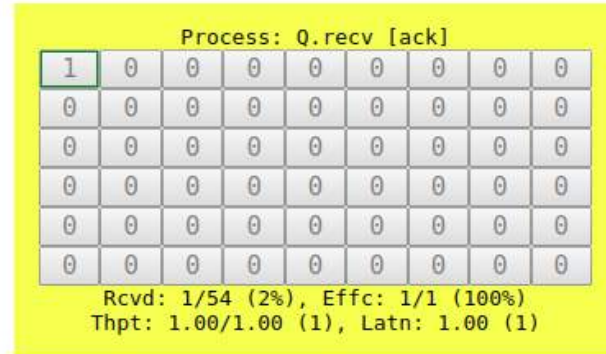
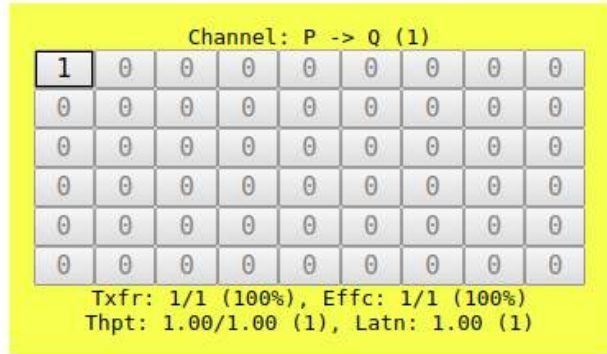
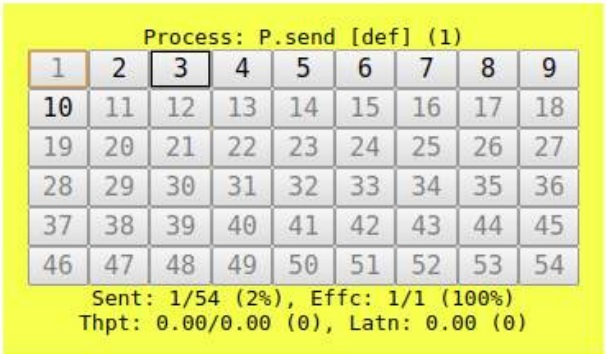
-1	-2	-3	-4	-5	-6	-7	-8	-9
-10	-11	-12	-13	-14	-15	-16	-17	-18
-19	-20	-21	-22	-23	-24	-25	-26	-27
-28	-29	-30	-31	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 1/54 (2%), Effic: 1/1 (100%)
Thpt: 0.50/0.50 (2), Latn: 2.00 (2)

ACK for 1 has now been received

Next Next 20 Next 100

Controller (4)
Some packets not yet received.
Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 3.00 (3)



1 packet ↑
in 3 turns

↑ 3 turns
per packet

Next Next 20 Next 100

Controller (4)
Some packets not yet recieved.

Txfr: 1/1 (100%), Effic: 1/1 (100%)
Thpt: 0.00/0.00 (0), Latn: 3.00 (3)

Process: P.send [def] (6)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 6/54 (11%), Effc: 6/6 (100%)
Thpt: 0.26/0.26 (23), Latn: 3.83 (23)

Channel: P -> Q (6)

1	0	3	4	5	6	7	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 2/6 (33%), Effc: 2/6 (33%)
Thpt: 0.09/0.27 (22), Latn: 6.00 (12)

Process: Q.recv [ack]

1	0	0	4	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 2/54 (4%), Effc: 2/6 (33%)
Thpt: 0.09/0.27 (22), Latn: 23.00 (23)

Process: P.recv [def]

-1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 1/54 (2%), Effc: 1/5 (20%)
Thpt: 0.33/1.67 (3), Latn: 0.50 (3)

Channel: Q -> P (5)

-1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 1/1 (100%), Effc: 1/6 (17%)
Thpt: 0.33/1.67 (3), Latn: 1.00 (1)

Process: Q.send [ack] (6)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 1/54 (2%), Effc: 1/6 (17%)
Thpt: 0.50/3.00 (2), Latn: 2.00 (2)

20 turns in auto



Next Next 20 Next 100

Controller (24)

Some packets not yet recieved.

Txfr: 1/6 (17%), Effc: 1/6 (17%)
Thpt: 0.04/0.22 (23), Latn: 3.00 (3)

Process: P.send [def] (31)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 12/54 (22%), Effic: 12/31 (39%)
Thpt: 0.11/0.29 (107), Latn: 11.58 (139)

Channel: P -> Q (31)

1	2	3	4	5	6	7	8	9
10	11	12	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 12/12 (100%), Effic: 12/31 (39%)
Thpt: 0.10/0.26 (118), Latn: 23.17 (278)

Process: Q.recv [ack]

1	2	3	4	5	6	7	8	9
10	11	12	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 12/54 (22%), Effic: 12/31 (39%)
Thpt: 0.10/0.26 (118), Latn: 16.60 (166)

Process: P.recv [def]

-1	-2	-3	-4	0	0	0	0	-9
-10	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 6/54 (11%), Effic: 6/18 (33%)
Thpt: 0.05/0.15 (120), Latn: 17.00 (204)

Channel: Q -> P (18)

-1	-2	-3	-4	-5	-6	-7	-8	-9
-10	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 6/10 (60%), Effic: 6/31 (19%)
Thpt: 0.05/0.15 (120), Latn: 8.67 (52)

Process: Q.send [ack] (31)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 10/54 (19%), Effic: 10/31 (32%)
Thpt: 0.09/0.26 (117), Latn: 12.10 (121)

100 turns in auto

Next Next 20 Next 100



Controller (124)
Some packets not yet recieved.

Txfr: 6/12 (50%), Effic: 6/31 (19%)
Thpt: 0.06/0.17 (107), Latn: 55.33 (332)

pwindow

Process: P.send [def] (56)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 21/54 (39%), Effic: 21/56 (38%)
Thpt: 0.10/0.26 (215), Latn: 13.29 (279)

Channel: P -> Q (56)

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 18/21 (86%), Effic: 18/56 (32%)
Thpt: 0.09/0.27 (210), Latn: 25.11 (452)

Process: Q.recv [ack]

1	2	3	4	5	6	7	8	9
10	11	12	0	0	15	16	17	18
19	20	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 18/54 (33%), Effic: 18/56 (32%)
Thpt: 0.09/0.27 (210), Latn: 32.33 (388)

Process: P.recv [def]

-1	-2	-3	-4	-5	-6	-7	-8	-9
-10	-11	-12	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 12/54 (22%), Effic: 12/43 (28%)
Thpt: 0.06/0.21 (208), Latn: 12.95 (272)

Channel: Q -> P (43)

-1	-2	-3	-4	-5	-6	-7	-8	-9
-10	-11	-12	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 12/12 (100%), Effic: 12/56 (21%)
Thpt: 0.06/0.21 (208), Latn: 21.50 (258)

Process: Q.send [ack] (56)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 12/54 (22%), Effic: 12/56 (21%)
Thpt: 0.08/0.36 (157), Latn: 16.75 (201)

qwindow

Next Next 20 Next 100

Controller (224)
Some packets not yet recieved.

Txfr: 12/21 (57%), Effic: 12/56 (21%)
Thpt: 0.06/0.20 (215), Latn: 78.83 (946)

Process: P.send [def] (294)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 54/54 (100%), Effc: 54/294 (18%)
Thpt: 0.05/0.27 (1095), Latn: 23.17 (1251)

Channel: P -> Q (270)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Txfr: 54/54 (100%), Effc: 54/294 (18%)
Thpt: 0.05/0.24 (1118), Latn: 23.04 (1244)

Process: Q.recv [ack]

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Rcvd: 54/54 (100%), Effc: 54/270 (20%)
Thpt: 0.05/0.24 (1118), Latn: 27.37 (1478)

Process: P.recv [def]

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Rcvd: 54/54 (100%), Effc: 54/251 (22%)
Thpt: 0.05/0.21 (1176), Latn: 36.59 (1976)

Channel: Q -> P (251)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Txfr: 54/54 (100%), Effc: 54/294 (18%)
Thpt: 0.05/0.21 (1176), Latn: 13.85 (748)

Process: Q.send [ack] (294)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 54/54 (100%), Effc: 54/294 (18%)
Thpt: 0.05/0.25 (1157), Latn: 35.06 (1893)

transfer completes

Next Next 20 Next 100

Controller (1177)
All packets received.

Txfr: 54/54 (100%), Effc: 54/294 (18%)
Thpt: 0.05/0.23 (1095), Latn: 114.22 (6168)

Pw = 9

lossy channels

qw = 9

Process: P.send [def] (389)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 54/54 (100%), Effic: 54/389 (14%)
Thpt: 0.04/0.30 (1307), Latn: 25.83 (1395)

Channel: P -> Q (270)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Txfr: 54/54 (100%), Effic: 54/389 (14%)
Thpt: 0.04/0.19 (1386), Latn: 76.48 (4130)

Process: Q.recv [ack]

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Rcvd: 54/54 (100%), Effic: 54/270 (20%)
Thpt: 0.04/0.19 (1386), Latn: 29.96 (1618)

Process: P.recv [def]

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Rcvd: 54/54 (100%), Effic: 54/262 (21%)
Thpt: 0.03/0.17 (1556), Latn: 31.04 (1676)

Channel: Q -> P (262)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Txfr: 54/54 (100%), Effic: 54/369 (15%)
Thpt: 0.03/0.17 (1556), Latn: 76.48 (4130)

Process: Q.send [ack] (369)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 54/54 (100%), Effic: 54/369 (15%)
Thpt: 0.04/0.25 (1481), Latn: 33.06 (1785)

drop 2/3 packets

transfer completes

Next Next 20 Next 100

Controller (1557)
All packets recieved.

Txfr: 54/54 (100%), Effic: 54/389 (14%)
Thpt: 0.04/0.20 (1307), Latn: 211.89 (11442)

Pw = 9

lossy channel

Qw = 5

Process: P.send [def] (750)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 9/54 (17%), Effic: 9/750 (1%)
Thpt: 0.26/21.43 (35), Latn: 3.89 (35)

Channel: P -> Q (45)

1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 9/9 (100%), Effic: 9/750 (1%)
Thpt: 0.08/0.41 (110), Latn: 75.00 (675)

Process: Q.recv [ack]

1	2	3	4	5	6	7	8	9
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 9/54 (17%), Effic: 9/45 (20%)
Thpt: 0.08/0.41 (110), Latn: 12.22 (110)

Process: P.recv [def]

0	-2	-3	-4	-5	-6	-7	-8	-9
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Rcvd: 8/54 (15%), Effic: 8/40 (20%)
Thpt: 0.04/0.19 (208), Latn: 23.11 (208)

Channel: Q -> P (40)

-1	-2	-3	-4	-5	-6	-7	-8	-9
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

Txfr: 8/9 (89%), Effic: 8/730 (1%)
Thpt: 0.04/0.19 (208), Latn: 47.50 (380)

Process: Q.send [ack] (730)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 9/54 (17%), Effic: 9/730 (1%)
Thpt: 0.05/4.22 (173), Latn: 19.22 (173)

drops 2/3 packets

transfer fails

P, Q get stuck

Next Next 20 Next 100

Controller (3000)
Some packets not yet recieved.

Txfr: 8/9 (89%), Effic: 8/750 (1%)
Thpt: 0.23/1.14 (35), Latn: 142.50 (1140)

Pw = 5

lossy channel

Qw = 9

Process: P.send [def] (470)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Sent: 54/54 (100%), Effc: 54/470 (11%)
Thpt: 0.03/0.28 (1699), Latn: 32.35 (1747)

Channel: P -> Q (270)

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Txfr: 54/54 (100%), Effc: 54/470 (11%)
Thpt: 0.03/0.16 (1730), Latn: 45.52 (2458)

Process: Q.recv [ack]

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	32	33	34	35	36
37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54

Rcvd: 54/54 (100%), Effc: 54/270 (20%)
Thpt: 0.03/0.16 (1730), Latn: 34.11 (1842)

Process: P.recv [def]

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Rcvd: 54/54 (100%), Effc: 54/266 (20%)
Thpt: 0.03/0.14 (1880), Latn: 37.33 (2016)

Channel: Q -> P (266)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Txfr: 54/54 (100%), Effc: 54/458 (12%)
Thpt: 0.03/0.14 (1880), Latn: 61.15 (3302)

Process: Q.send [ack] (458)

-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	-32	-33	-34	-35	-36
-37	-38	-39	-40	-41	-42	-43	-44	-45
-46	-47	-48	-49	-50	-51	-52	-53	-54

Sent: 54/54 (100%), Effc: 54/458 (12%)
Thpt: 0.03/0.25 (1805), Latn: 35.72 (1929)

drops 2/3 packets

transfer successful

Next Next 20 Next 100

Controller (1881)
All packets recieved.

Txfr: 54/54 (100%), Effc: 54/470 (11%)
Thpt: 0.03/0.16 (1699), Latn: 154.04 (8318)

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OUTLINE

TIMELINE

```

SlidingWindow3.elm x
elm > src > SlidingWindow3.elm > init > data
1 reference
1 module SlidingWindow3 exposing (main, init, update, view)
2 import Browser
3 import Html exposing (Html, Attribute, node, text, div, button, table, tr, td)
4 import Html.Attributes exposing (rel, href, style, class, title, disabled)
5 import Html.Events exposing (onClick)
6 import Array exposing (Array)
7 import List exposing (length, map, filter, foldl, range)
8 import Round
9
10
11
12 -- MAIN
13 exposed | 3 references
14 main: Program () Model Msg
15 main =
16   Browser.sandbox {init = init, update = update, view = view}
17
18
19 -- MODEL
20 local | 7 references
21 type alias Model = {
22   -- components
23   p: Process Int, -- process P
24   q: Process Int, -- process Q
25   pq: Channel Int, -- channel P->Q
26   qp: Channel Int, -- channel Q->P
27   -- operation
28   who: Array Int, -- whose turn
29   t: Int -- turn
30 }

```

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OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
17
18
19 -- MODEL
20 local|7 references
21 type alias Model = {
22     -- components
23     p: Process Int, -- process P
24     q: Process Int, -- process Q
25     pq: Channel Int, -- channel P->Q
26     qp: Channel Int, -- channel Q->P
27     -- operation
28     who: Array Int, -- whose turn
29     t: Int -- turn
30 }
31 local|15 references
32 type alias Process t = {
33     -- components
34     send: Array t, -- packets to send
35     recv: Array t, -- packets recieved
36     st: Array Int, -- packet send turn
37     rt: Array Int, -- packet received turn
38     s: Array Int, -- packet sent?
39     r: Array Int, -- packet recieved?
40     -- operation
41     mode: String, -- acknowledgement process?
42     w: Int, -- window size (constant)
43     t: Int -- turn
44 }
45 local|4 references
46 type alias Channel t = {
47     -- components
48     both: Array t, -- packets recieved/to send

```

Handwritten red annotations:

- Turn management (next to lines 28-29)
- data (next to lines 34-35)
- extra info (next to lines 36-38)
- "ack" for reciever (next to line 41)

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SlidingWindow3.elm x

```

elm > src > SlidingWindow3.elm > init > data
42   t: Int      -- turn
43   }
44
45   local | 4 references
46   type alias Channel t = {
47     -- components
48     both: Array t, -- packets recieved/to send
49     st: Array Int, -- packet send turn
50     rt: Array Int, -- packet received turn
51     s: Array Int, -- packet sent?
52     r: Array Int, -- packet recieved?
53     -- operation
54     sb: Int,      -- send start
55     se: Int,      -- send limit
56     t: Int        -- turn
57   }
58
59   local | 1 reference
60   type alias Packet t = {
61     i: Int, -- number
62     m: t    -- message
63   }
64
65   exposed | 4 references
66   init: Model
67   init =
68     1 reference
69     let data = range 1 54
70         n = length data
71         p = initProcess 0 "def" 5 data
72         q = initProcess 0 "ack" 9 (map negate data)
73         pq = initChannel 0 3 5 n
74         qp = initChannel 0 3 5 n
  
```

Handwritten red annotations:

- Under line 48: *data*
- Under lines 48-52: *extra info*
- Under lines 54-56: *channel loss control*
- Under line 61: *point in file*
- Under line 62: *data*

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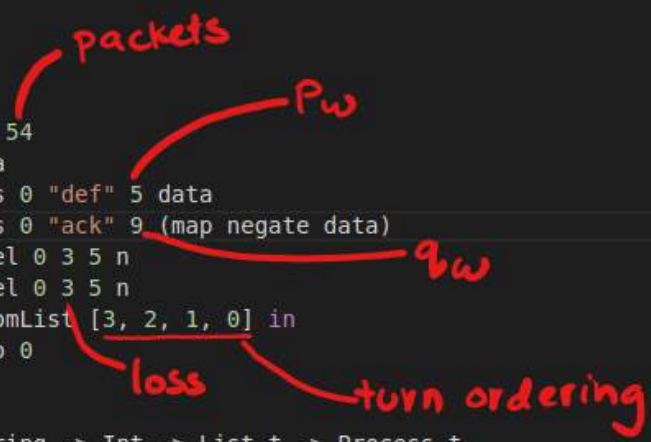
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OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
61 }
62
63 exposed | 4 references
64 init: Model
65 init =
66   1 reference
67   let data = range 1 54
68       n = length data
69       p = initProcess 0 "def" 5 data
70       q = initProcess 0 "ack" 9 (map negate data)
71       pq = initChannel 0 3 5 n
72       qp = initChannel 0 3 5 n
73       who = Array.fromList [3, 2, 1, 0] in
74   Model p q pq qp who 0
75
76 local | 4 references
77 initProcess: t -> String -> Int -> List t -> Process t
78 initProcess d mode win data =
79   1 reference
80   let n = length data
81       send = Array.fromList data
82       rcv = Array.repeat n d
83       z = Array.repeat n 0 in
84   Process send rcv z z z z mode win 0
85
86 local | 4 references
87 initChannel: t -> Int -> Int -> Int -> Channel t
88 initChannel d sb se n =
89   2 references
90   let b = Array.repeat n d
91       z = Array.repeat n 0 in
92   Channel b z z z z sb se 0
  
```



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OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
89
90 -- UPDATE
91 local | 3 references
92 type Msg =
93   SendP Int |
94   SendQ Int |
95   RecvP Int |
96   RecvQ Int |
97   Next Int
98
99 exposed | 10 references
100 update: Msg -> Model -> Model
101 update msg model =
102   let {p, q, pq, qp, t} = model in
103   case msg of
104     SendP i ->
105       let (p1, x) = processSend 0 t i p
106           pq1      = channelRecv t x pq in
107       if processCanSend i p then {model | p = p1, pq = pq1, t = t+1} else {model | t = t+1}
108     SendQ i ->
109       let (q1, x) = processSend 0 t i q
110           qp1      = channelRecv t x qp in
111       if processCanSend i q then {model | q = q1, qp = qp1, t = t+1} else {model | t = t+1}
112     RecvP i ->
113       let (qp1, x) = channelSend 0 t i qp
114           p1        = processRecv t x p in
115       if channelCanSend i qp then {model | p = p1, qp = qp1, t = t+1} else {model | t = t+1}
116     RecvQ i ->
117       let (pq1, x) = channelSend 0 t i pq
118           q1        = processRecv t x q in
119       if channelCanSend i pq then {model | q = q1, pq = pq1, t = t+1} else {model | t = t+1}
120     Next i ->
121       if i == 1 then

```

Handwritten red annotations:

- A bracket groups `SendP Int`, `SendQ Int`, and `RecvP Int` with the text "interactive actions".
- A line under `Next Int` is labeled "automatic action".
- The function names `SendP`, `SendQ`, `RecvP`, and `RecvQ` in the code are underlined in red.

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```

elm > src > SlidingWindow3.elm > init > data
309
310
311
312 -- VIEW
313 view: Model -> Html Msg
314 view model =
315   let {p, q, pq, qp} = model in
316   div [] [
317     node "link" [
318       rel "stylesheet",
319       href "SlidingWindow.css"
320     ] [],
321     table [] [
322       tr [] [
323         td (class "psend" :: styleTurn 0 model) [viewProcess p "P.send" SendP True],
324         td (class "pq" :: styleTurn 1 model) [viewChannel pq "P -> Q" RecvQ],
325         td (class "qrecv" :: styleTurn 4 model) [viewProcess q "Q.recv" Next False]
326       ],
327       tr [] [
328         td (class "precv" :: styleTurn 5 model) [viewProcess p "P.recv" Next False],
329         td (class "qp" :: styleTurn 3 model) [viewChannel qp "Q -> P" RecvP],
330         td (class "qsend" :: styleTurn 2 model) [viewProcess q "Q.send" SendQ True]
331       ]
332     ],
333     div [class "submit"] [
334       viewNext (not (isDone model)),
335       viewController model
336     ]
337   ]
338
339 viewProcess: Process Int -> String -> (Int -> Msg) -> Bool -> Html Msg
340 viewProcess p id msg vs =
341   let {send, recv, st, s, rt, r, mode, t} = p
342       p = processSize p
  
```

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SlidingWindow3.elm x

elm > src > SlidingWindow3.elm > init > data

```
446     )]
447   ]
448
449   viewNext: Bool -> Html Msg
450   viewNext actv =
451     div [] [
452       button [
453         class "next",
454         disabled (not actv),
455         onClick (Next 1)
456       ] [text "Next"],
457       button [
458         class "next",
459         disabled (not actv),
460         onClick (Next 20)
461       ] [text "Next 20"],
462       button [
463         class "next",
464         disabled (not actv),
465         onClick (Next 100)
466       ] [text "Next 100"]
467     ]
468
469
470
471   -- STYLES
472   styleTurn: Int -> Model -> List (Attribute m)
473   styleTurn i model = [
474     style "background-color" (if whoseTurn model == i then "lightgreen" else "yellow")
475   ]
476
477   stylePacket: Int -> Int -> Bool -> List (Attribute m)
478   stylePacket sent rcvd selc =
```

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```

elm > src > SlidingWindow3.elm > init > data
422
423   ]) [text (intStr data)]
424
425   viewController: Model -> Html Msg
426   viewController model =
427     let {p, t} = model
428         sent1 = processSent p
429         sentn = processSentAll p
430         rcvd1 = processRcvd p
431         rcvdn = processRcvdAll p
432         delt = processDeltaT p
433         latn = processLatencies p
434         end = isDone model
435         msg = if end then "All packets recieved." else "Some packets not yet recieved." in
436   div [class "controller" [
437     div [] [text ("Controller (" ++ intStr t ++ ")")],
438     div (class "status" :: styleStatus end) [text msg],
439     div [] [text (
440       "Txfr: " ++ intStr rcvd1 ++ "/" ++ intStr sent1 ++ " (" ++ perStr rcvd1 sent1 ++ "), " ++
441       "Effc: " ++ intStr rcvd1 ++ "/" ++ intStr sentn ++ " (" ++ perStr rcvd1 sentn ++ ")")
442     ),
443     div [] [text (
444       "Thpt: " ++ wrtStr 2 rcvd1 delt ++ "/" ++ wrtStr 2 rcvdn delt ++ " (" ++ intStr delt ++ "), "
445       "Latn: " ++ wrtStr 2 (arraySum latn) rcvd1 ++ " (" ++ intStr (arraySum latn) ++ ")")
446     )]
447

```


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SOFTWARE_FOUNDATIONS

- coq
- elm
 - elm-stuff
 - src
 - Example1.elm
 - Example2.elm
 - Example3.elm
 - MergeSort1.elm
 - MergeSort2.elm
 - MergeSort3.elm
 - MergeSort4.elm
 - MergeSort5.elm
 - # SlidingWindow.css
 - SlidingWindow1.elm
 - SlidingWindow2.elm 2
 - SlidingWindow3.elm 3, M
- elm.json
- SlidingWindow1.html
- SlidingWindow2.html
- .gitignore
- LICENSE
- README.md
- term-abstract-ecs.pdf
- term-abstract.md
- term-abstract.pdf

OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
407     "Effc: " ++ intStr sent1 ++ "/" ++ intStr rcvdn ++ " (" ++ perStr sent1 rcvdn ++ ")"
408   ]],
409   div [] [text (
410     "Thpt: " ++ wrtStr 2 sent1 delt ++ "/" ++ wrtStr 2 sentn delt ++ " (" ++ intStr delt ++ "),
411     "Latn: " ++ wrtStr 2 (arraySum latn) sent1 ++ " (" ++ intStr (arraySum latn) ++ ")
412   )]
413 ]
414
415 viewPacket: Int -> Int -> Int -> Int -> Int -> Bool -> Bool -> msg -> Html msg
416 viewPacket data strn sent rtn rcvd selc actv msg =
417   button (class "packet" :: stylePacket sent rcvd selc ++ [
418     title (
419       "Sent: " ++ intStr sent ++ " [" ++ intStr strn ++ "], " ++
420       "Rcvd: " ++ intStr rcvd ++ " [" ++ intStr rtn ++ "]",
421     disabled (not actv),
422     onClick msg
423   ]) [text (intStr data)]
424
425 viewController: Model -> Html Msg
426 viewController model =
427   let {p, t} = model
428       1 reference
429       sent1 = processSent p
430       1 reference
431       sentn = processSentAll p
432       1 reference
433       rcvd1 = processRcvd p
434       1 reference
435       rcvdn = processRcvdAll p
436       1 reference
437       delt = processDeltaT p
438       1 reference
439       latn = processLatencies p

```

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OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
392 | rcvd i = arrayGet 0 i r
      | 7 references
393 | actv i = channelCanSend i c
      | 1 reference
394 | msgi i = msg i
      | 2 references
395 | vpkt i = viewPacket (data i) (strn i) (sent i) (rtrn i) (rcvd i) (k==i) (actv i) (msgi i)
      | 9 references
396 | sent1 = channelSent c
      | 4 references
397 | sentn = channelSentAll c
      | 9 references
398 | rcvd1 = channelRcvd c
      | 4 references
399 | rcvdn = channelRcvdAll c
      | 7 references
400 | delt = channelDeltaT c
      | 5 references
401 | latn = channelLatencies c in
402 | div [] [
403 |   text ("Channel: " ++ id ++ " (" ++ intStr t ++ ")"),
404 |   div [] (map vpkt (range 0 (n-1))),
405 |   div [] [text (
406 |     "Txfr: " ++ intStr sent1 ++ "/" ++ intStr rcvd1 ++ " (" ++ perStr sent1 rcvd1 ++ "), " ++
407 |     "Effc: " ++ intStr sent1 ++ "/" ++ intStr rcvdn ++ " (" ++ perStr sent1 rcvdn ++ ")")
408 |   ],
409 |   div [] [text (
410 |     "Thpt: " ++ wrtStr 2 sent1 delt ++ "/" ++ wrtStr 2 sentn delt ++ " (" ++ intStr delt ++ "), "
411 |     "Latn: " ++ wrtStr 2 (arraySum latn) sent1 ++ " (" ++ intStr (arraySum latn) ++ ")")
412 |   ]
413 | ]
414 |
415 | viewPacket: Int -> Int -> Int -> Int -> Int -> Bool -> Bool -> msg -> Html msg

```

TERMINAL

```

$ elm repl
elm> src> SlidingWindow3.elm> init> data

```

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OUTLINE

TIMELINE

```

elm > src > SlidingWindow3.elm > init > data
352 msgi i = if vs then msg i else Next i
353 vpkt i = viewPacket (data i) (strn i) (sent i) (rtrn i) (rcvd i) (k==i) (actv i) (msgi i)
354 sent1 = processSent p
355 sentn = processSentAll p
356 sdelt = arrayMax st - arrayMin st
357 slatn = processSentLatencies p
358 rcvd1 = processRcvd p
359 rcvdn = processRcvdAll p
360 rdelt = arrayMax rt - arrayMin rt
361 rlatn = processRcvdLatencies p in
362 div [] [
363   text ("Process: " ++ id ++ " [" ++ mode ++ "]" ++ if vs then " (" ++ intStr t ++ ")" else ""),
364   div [] (map vpkt (range 0 (n-1))),
365   if vs then div [] [text (
366     "Sent: " ++ intStr sent1 ++ "/" ++ intStr n ++ " (" ++ perStr sent1 n ++ "), " ++
367     "Effc: " ++ intStr sent1 ++ "/" ++ intStr sentn ++ " (" ++ perStr sent1 sentn ++ ")")
368   ]
369   else div [] [text (
370     "Rcvd: " ++ intStr rcvd1 ++ "/" ++ intStr n ++ " (" ++ perStr rcvd1 n ++ "), " ++
371     "Effc: " ++ intStr rcvd1 ++ "/" ++ intStr rcvdn ++ " (" ++ perStr rcvd1 rcvdn ++ ")")
372   ]),
373   if vs then div [] [text (
374     "Thpt: " ++ wrtStr 2 sent1 sdelt ++ "/" ++ wrtStr 2 sentn sdelt ++ " (" ++ intStr sdelt ++ ")")
375     "Latn: " ++ wrtStr 2 (arraySum slatn) sent1 ++ " (" ++ intStr (arraySum slatn) ++ ")")
376   ]
377   else div [] [text (
378     "Thpt: " ++ wrtStr 2 rcvd1 rdelt ++ "/" ++ wrtStr 2 rcvdn rdelt ++ " (" ++ intStr rdelt ++ ")")
379     "Latn: " ++ wrtStr 2 (arraySum rlatn) sent1 ++ " (" ++ intStr (arraySum rlatn) ++ ")")
380   ]
381 ]
382 ]
383 viewChannel: Channel Int -> String -> (Int -> Msg) -> Html Msg
384 viewChannel c id msg =

```

TERMINAL

```

$ elm-repl --src src --data data
elm> src> SlidingWindow3.elm> init> data

```