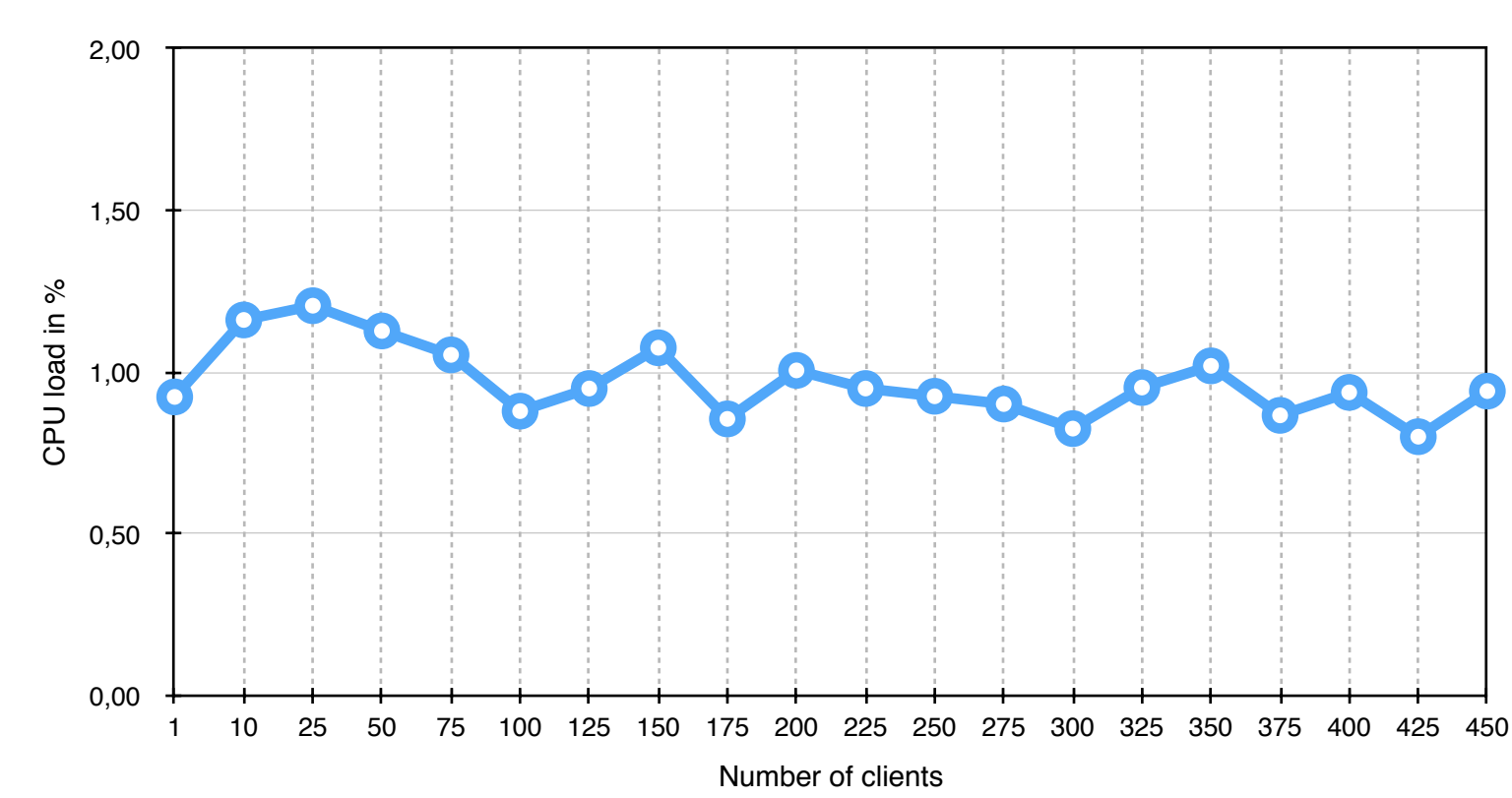


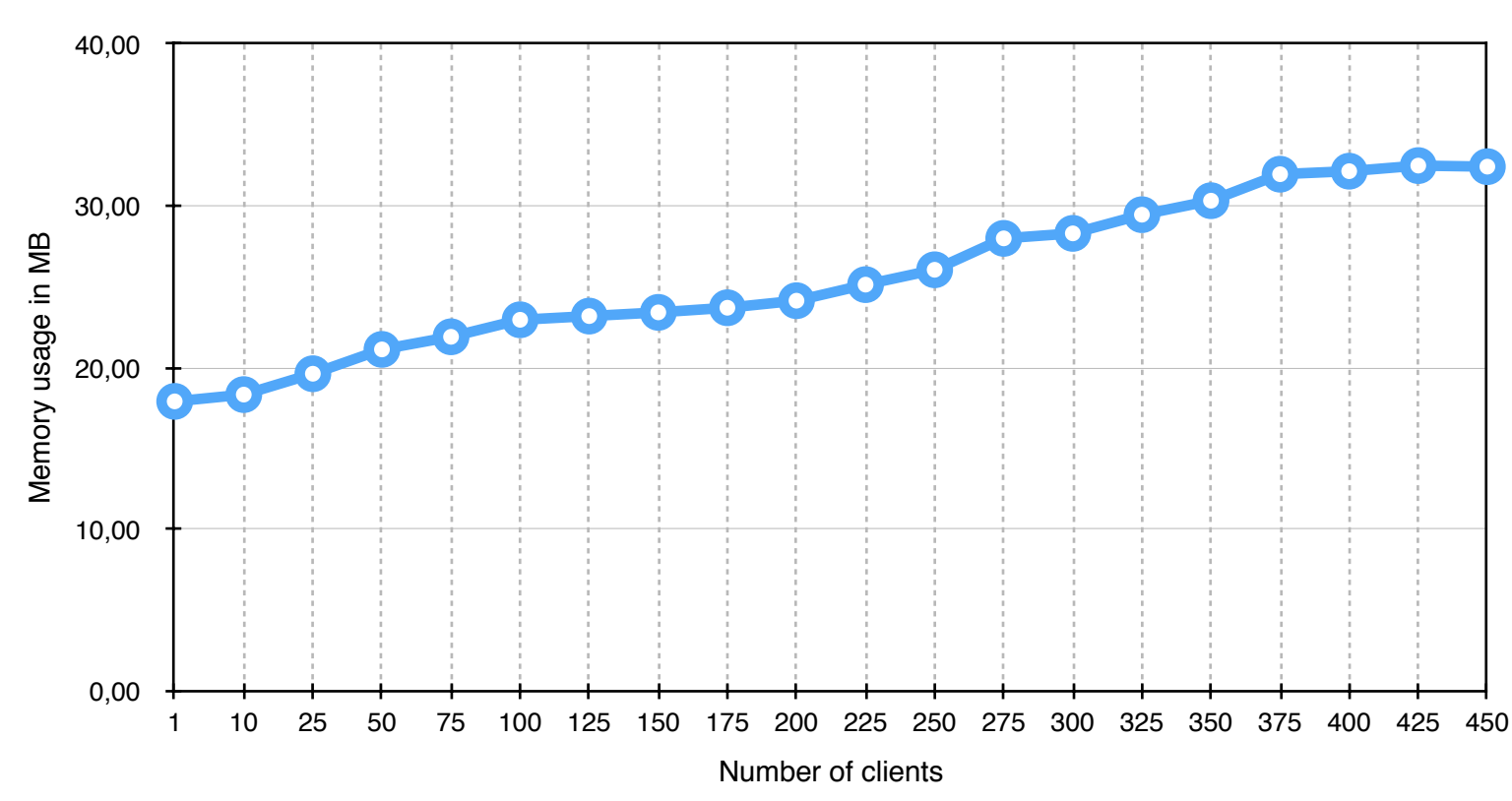
WebSocket

Before Broadcast

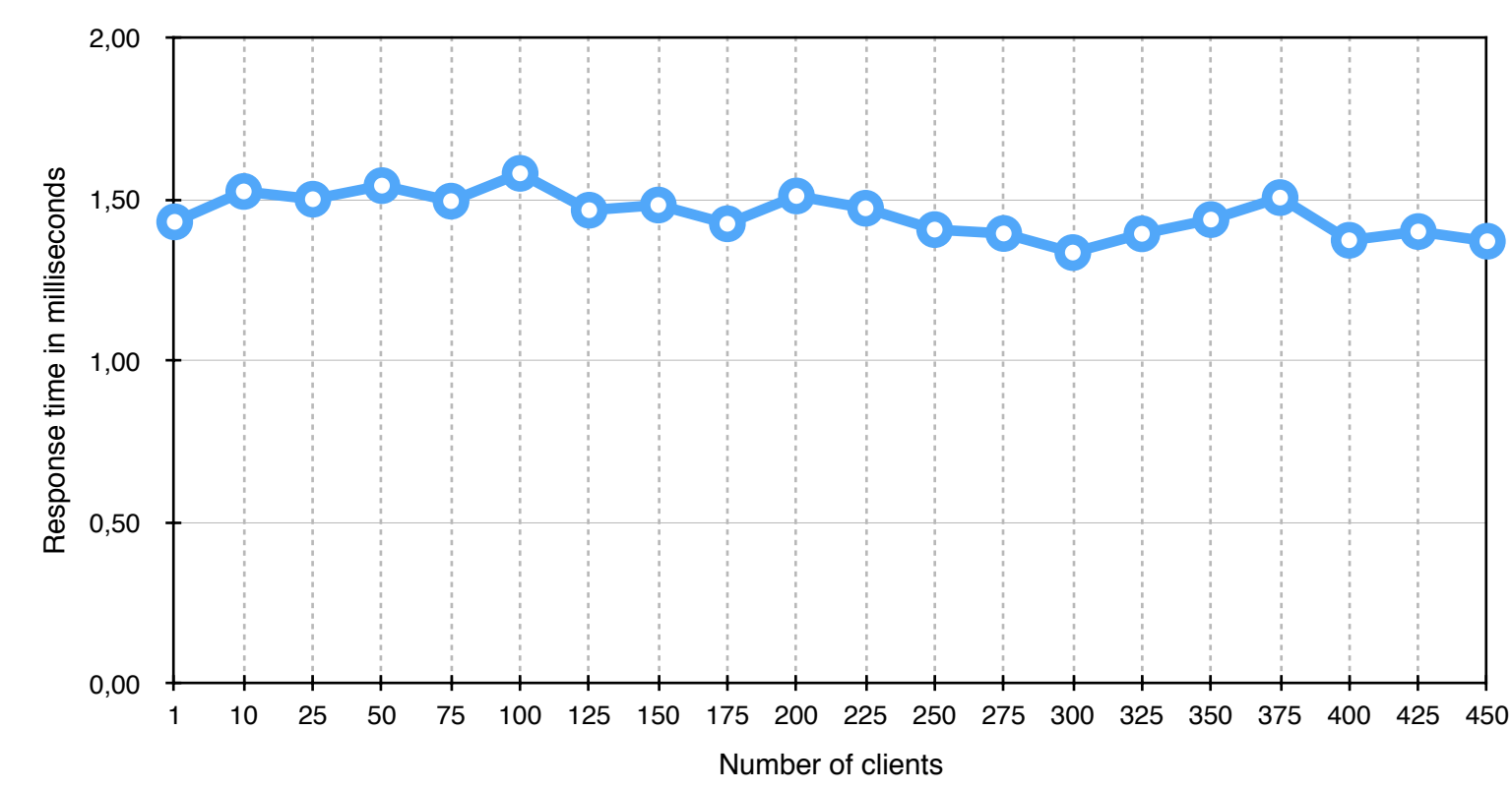
Average CPU Load with WebSocket Before Broadcast																			
1	10	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
0.99	0.97	1.42	1.20	1.18	0.97	1.08	1.18	0.94	0.95	0.82	1.00	0.67	1.02	0.97	0.86	1.08	0.98	0.58	0.93
0.91	1.26	1.21	1.36	1.16	0.90	1.18	0.97	0.62	0.94	0.90	0.58	1.19	0.64	1.05	0.62	0.79	0.72	0.49	0.75
0.63	1.26	1.32	1.11	1.08	1.00	0.94	1.08	1.14	0.93	0.94	1.03	0.76	1.14	0.92	1.14	1.05	0.72	1.14	1.05
0.90	1.08	0.98	0.94	0.90	0.62	0.93	1.20	0.67	1.04	0.94	0.97	1.15	0.90	0.83	1.03	0.72	1.16	1.05	1.16
1.19	1.24	1.10	1.03	0.95	0.91	0.62	0.95	0.91	1.17	1.15	1.05	0.74	0.86	0.99	0.89	1.00	0.88	0.78	1.00
													0.63	0.98	1.05	0.72	1.23	0.89	0.86
													0.61	0.47	1.15	0.64	1.00	0.66	1.15
													0.72	1.12	1.10	0.98	0.90	0.82	0.87
													0.95	1.07	1.13	0.95	0.82	0.95	0.95
													0.79	1.13	1.23	0.74	0.97	0.65	0.70
0.92	1.16	1.206	1.13	1.05	0.88	0.95	1.08	0.86	1.01	0.95	0.93	0.90	0.83	0.95	1.02	0.87	0.94	0.80	0.94



Average Memory Usage with WebSocket Before Broadcast																			
1	10	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
17.73	18.59	19.96	21.20	22.03	23.03	23.21	23.46	23.76	24.15	25.05	26.99	27.98	28.45	29.20	30.12	31.78	31.87	32.32	32.48
17.69	18.31	19.82	21.11	21.88	23.20	23.25	23.36	23.87	23.82	24.97	25.94	28.09	28.32	29.15	29.92	31.87	32.21	32.23	32.24
18.78	18.24	19.51	20.99	21.88	22.82	23.07	23.36	23.85	24.10	25.07	25.98	27.93	28.59	29.21	30.29	32.03	32.21	32.46	32.45
17.72	18.24	19.53	21.29	21.85	22.79	23.29	23.36	23.60	24.51	25.09	25.57	27.95	28.35	29.13	30.48	31.84	32.30	32.18	32.32
17.70	18.34	19.35	21.10	21.95	23.01	23.17	23.60	23.49	24.17	25.54	25.83	28.07	28.32	29.12	30.04	31.93	32.19	32.38	32.54
													28.25	29.63	30.48	31.85	32.13	34.13	32.52
													28.07	30.65	30.25	32.08	32.15	32.25	32.49
													28.36	29.38	30.22	32.16	32.04	32.26	32.54
													28.07	29.78	30.10	32.31	32.32	32.48	32.40
													28.35	29.43	31.44	31.87	32.16	32.35	32.41
17.92	18.34	19.634	21.14	21.92	22.97	23.20	23.43	23.71	24.15	25.14	26.06	28.00	28.31	29.47	30.33	31.97	32.16	32.50	32.44

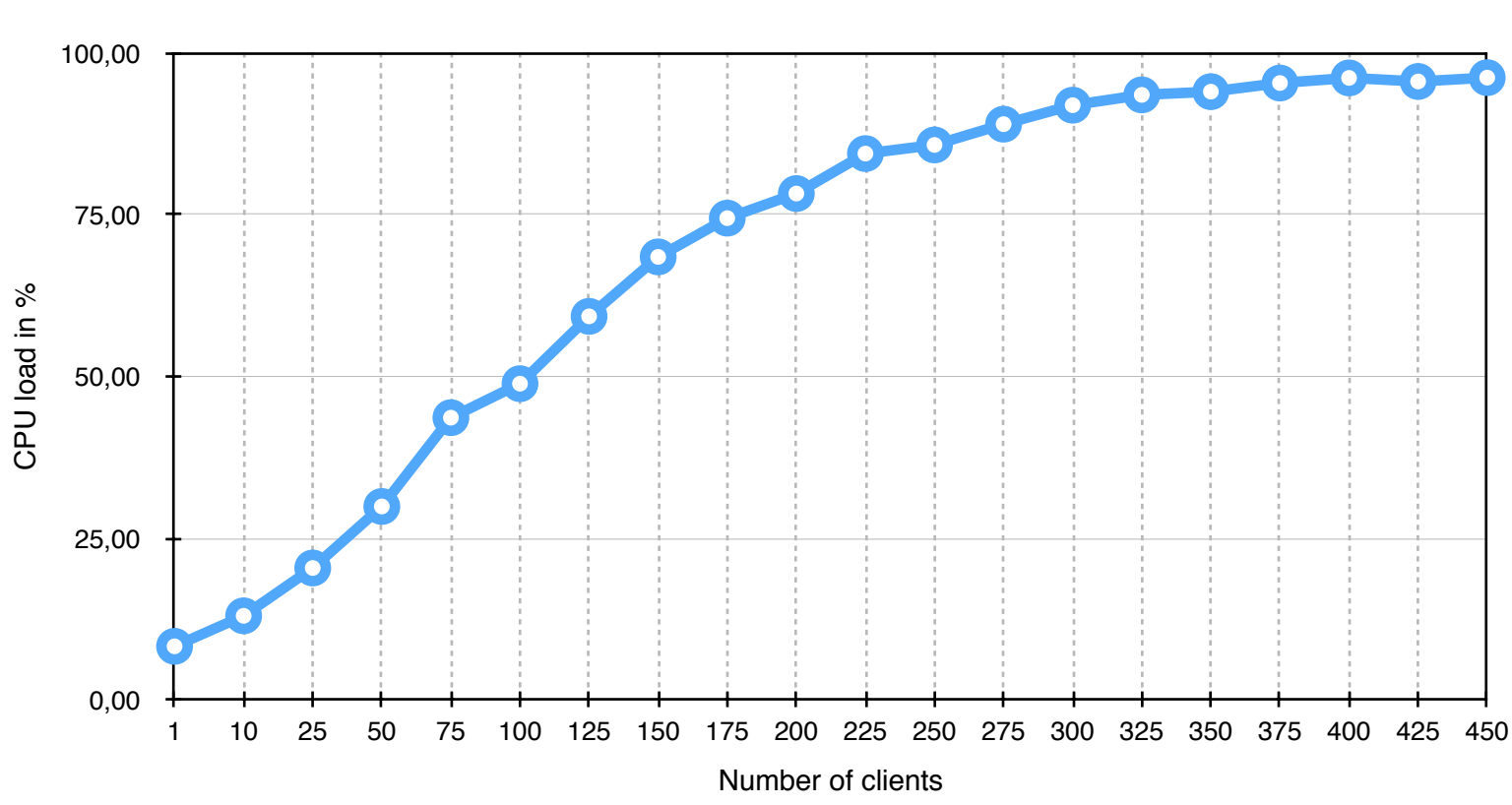


Average Response Time with WebSocket Before Broadcast																			
1	10	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
1.43	1.48	1.58	1.64	1.44	1.55	1.48	1.44	1.43	1.51	1.53	1.39	1.41	1.38	1.36	1.41	1.66	1.36	1.30	1.46
1.43	1.59	1.58	1.55	1.49	1.55	1.47	1.50	1.40	1.50	1.39	1.29	1.45	1.30	1.35	1.37	1.49	1.41	1.38	1.31
1.36	1.53	1.48	1.56	1.53	1.62	1.57	1.53	1.47	1.50	1.54	1.46	1.32	1.40	1.51	1.51	1.47	1.36	1.43	1.46
1.43	1.50	1.40	1.52	1.54	1.53	1.45	1.47	1.36	1.49	1.43	1.34	1.36	1.34	1.35	1.37	1.41	1.46	1.56	1.38
1.50	1.52	1.46	1.44	1.47	1.65	1.36	1.47	1.46	1.55	1.47	1.55	1.43	1.36	1.50	1.50	1.59	1.43	1.41	1.38
													1.35	1.38	1.45	1.50	1.34	1.22	1.36
													1.30	1.26	1.47	1.39	1.40	1.42	1.35
													1.27	1.39	1.46	1.52	1.34	1.38	1.35
													1.32	1.45	1.42	1.59	1.31	1.55	1.28
													1.33	1.38	1.41	1.43	1.32	1.35	
1.43	1.52	1.5	1.54	1.49	1.58	1.47	1.48	1.42	1.51	1.47	1.41	1.39	1.34	1.39	1.44	1.51	1.37	1.40	1.37



During Broadcast

Average CPU Load with WebSocket during Load - 2000 updates from backend, one every 5 milliseconds																			
1	10	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
8.37	12.88	19.59	30.17	44.29	49.00	60.57	67.67	75.41	77.46	82.22	84.61	88.55	90.87	92.76	91.60	89.31	96.34	92.50	95.41
8.36	13.05	20.98	30.64	43.65	48.58	58.86	70.24	76.13	79.09	82.64	87.30	89.61	87.65	94.63	91.02	96.06	97.78	95.12	92.43
8.06	13.06	20.39	29.75	43.94	47.65	59.32	67.63	72.78	78.37	86.82	85.00	88.24	92.89	94.99	93.83	94.98	96.71	94.25	93.86
8.34	13.02	20.71	29.56	43.46	50.74	59.17	68.83	74.07	77.26	82.75	86.21	88.94	90.98	92.87	93.85	93.87	92.46	96.23	97.93
8.23	12.94	20.24	29.34	42.75	48.39	58.48	67.99	73.92	79.14	87.77	85.77	89.61	92.74	95.10	94.46	97.39	97.91	95.11	97.87
													93.26	92.43	96.65	94.96	94.17	97.64	97.76
													93.20	93.78	96.73	95.82	95.45	95.59	96.40
													93.11	93.35	94.56	97.35	97.59	96.80	97.68
													91.84	92.26	93.42	96.36	95.16	97.51	96.72
													92.69	92.98	94.00	97.39	97.80	95.11	95.73
8.27	12.99	20.382	29.89	43.62	48.87	59.28	68.47	74.46	78.26	84.44	85.78	88.99	91.92	93.52	94.01	95.35	96.14	95.59	96.18

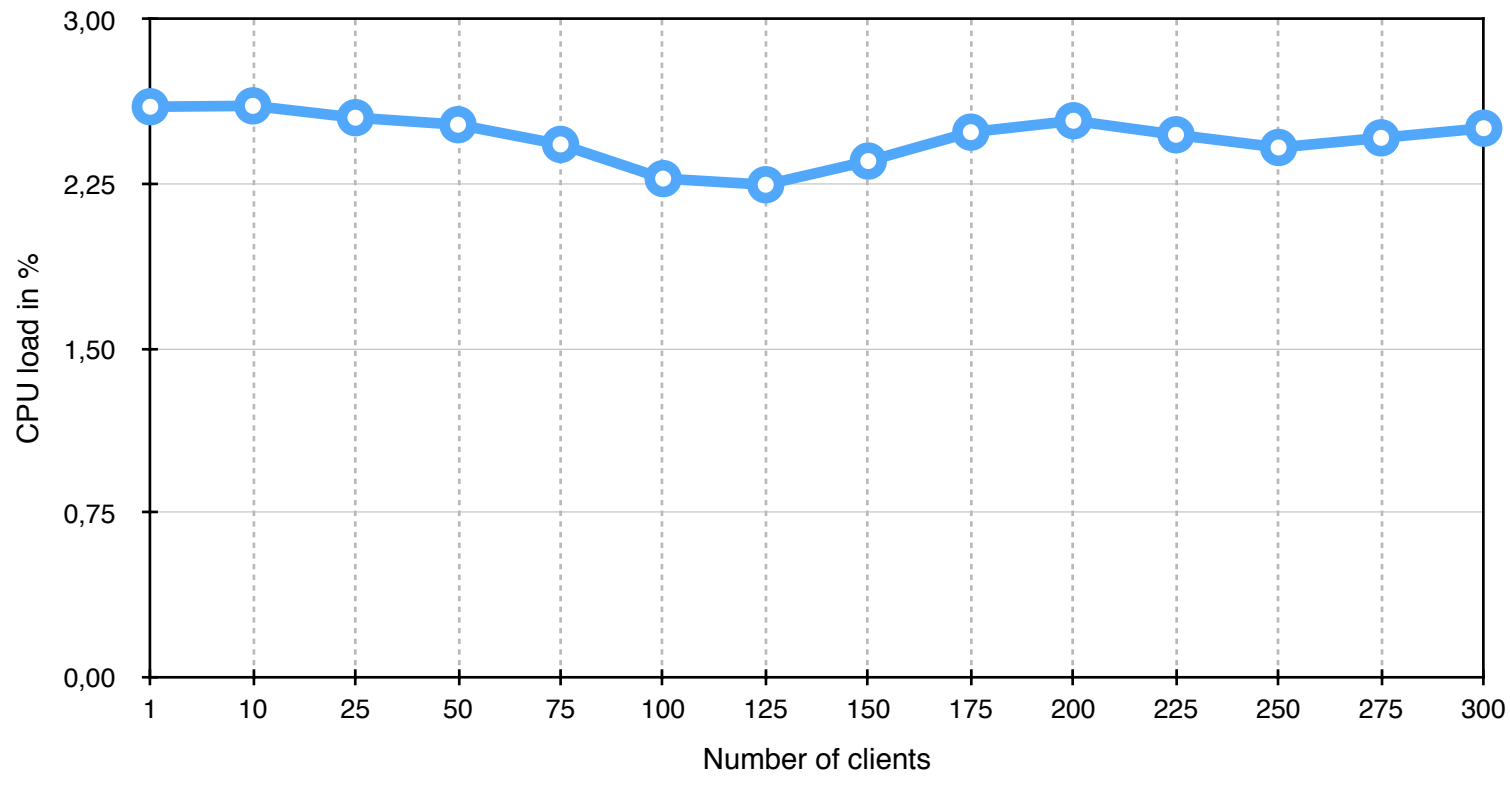


Average Memory Usage with WebSocket During Load - 2000 updates from backend, one every 5 milliseconds																			
1	10	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450
21,72	22,87	24,29	28,65	31,36	32,19	34,50	41,43	44,93	46,88	50,31	51,79	62,63	69,24	101,49	83,73	94,32	242,95	221,53	377,22
21,67	22,93	24,24	28,42	31,29	32,53	34,49	41,10	45,37	46,75	48,43	51,21	67,04	69,96	117,95	93,95	156,08	237,09	299,87	102,00
22,04	22,88	24,26	28,81	31,42	32,46	34,75	41,38	44,39	51,06	48,90	55,70	61,49	84,63	105,75	125,78	105,60	253,59	181,22	192,28
21,70	22,89	24,34	28,65	31,34	32,37	34,83	40,57	43,65	48,93	49,94	52,25	62,37	74,01	81,97	118,22	103,33	202,53	191,93	446,31
21,79	22,99	24,18	28,70	31,44	32,48	34,71	41,36	48,98	46,85	50,01	56,63	61,98	83,24	94,04	93,86	282,53	288,37	128,80	326,78
														81,61	77,35	182,16	112,27	411,45	292,65
														82,65	87,64	171,63	125,59	100,66	246,21
														82,51	137,59	99,19	174,79	272,11	194,34
														76,04	78,59	82,14	211,64	103,47	260,90
														82,43	93,71	105,63	253,46	268,79	192,48
21,78	22,91	24,262	28,65	31,37	32,41	34,66	41,17	45,46	48,09	49,52	53,52	63,10	78,63	97,61	116,13	162,95	208,18	232,87	268,55

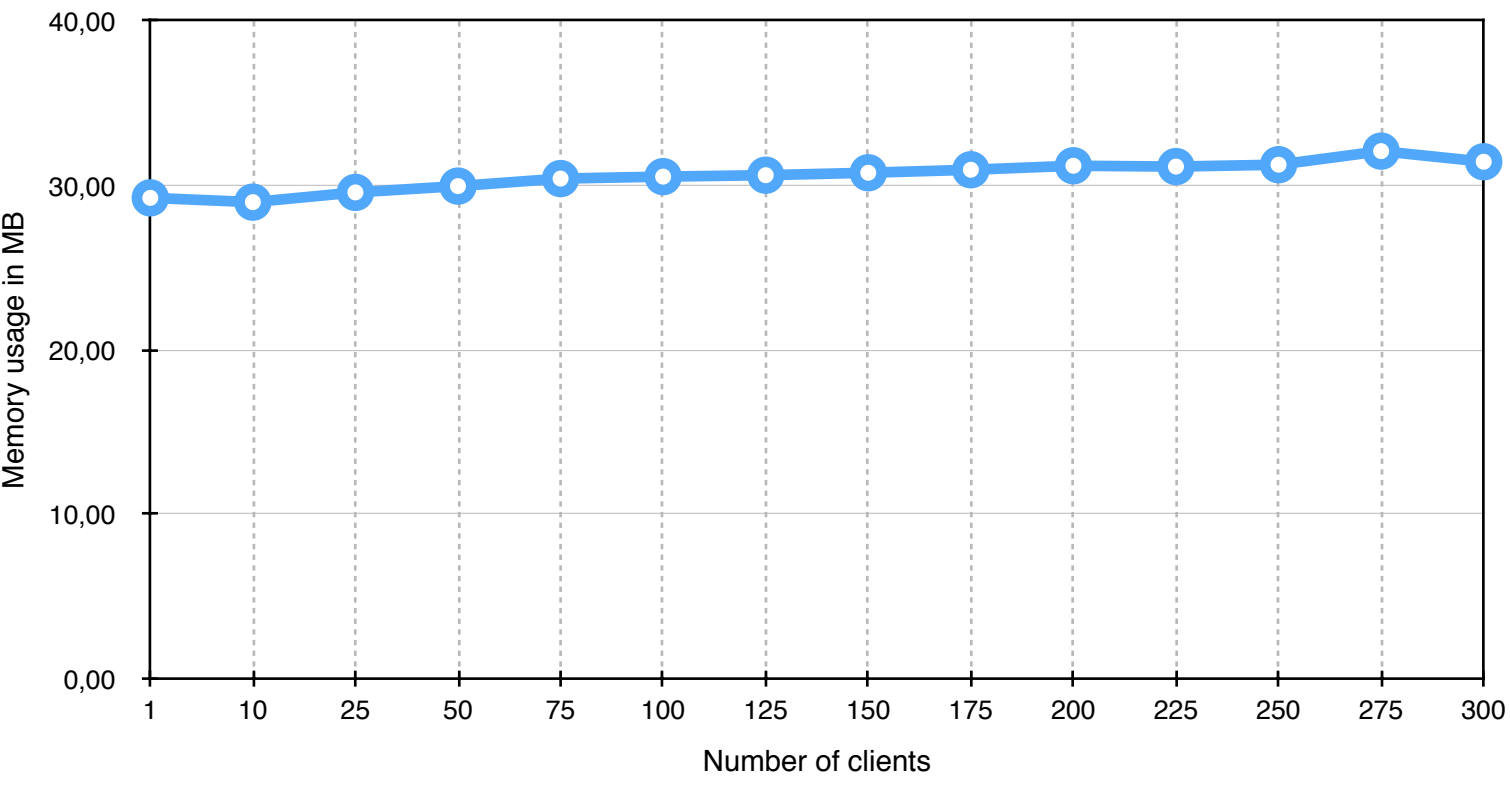
Server Sent Events

Before Broadcast

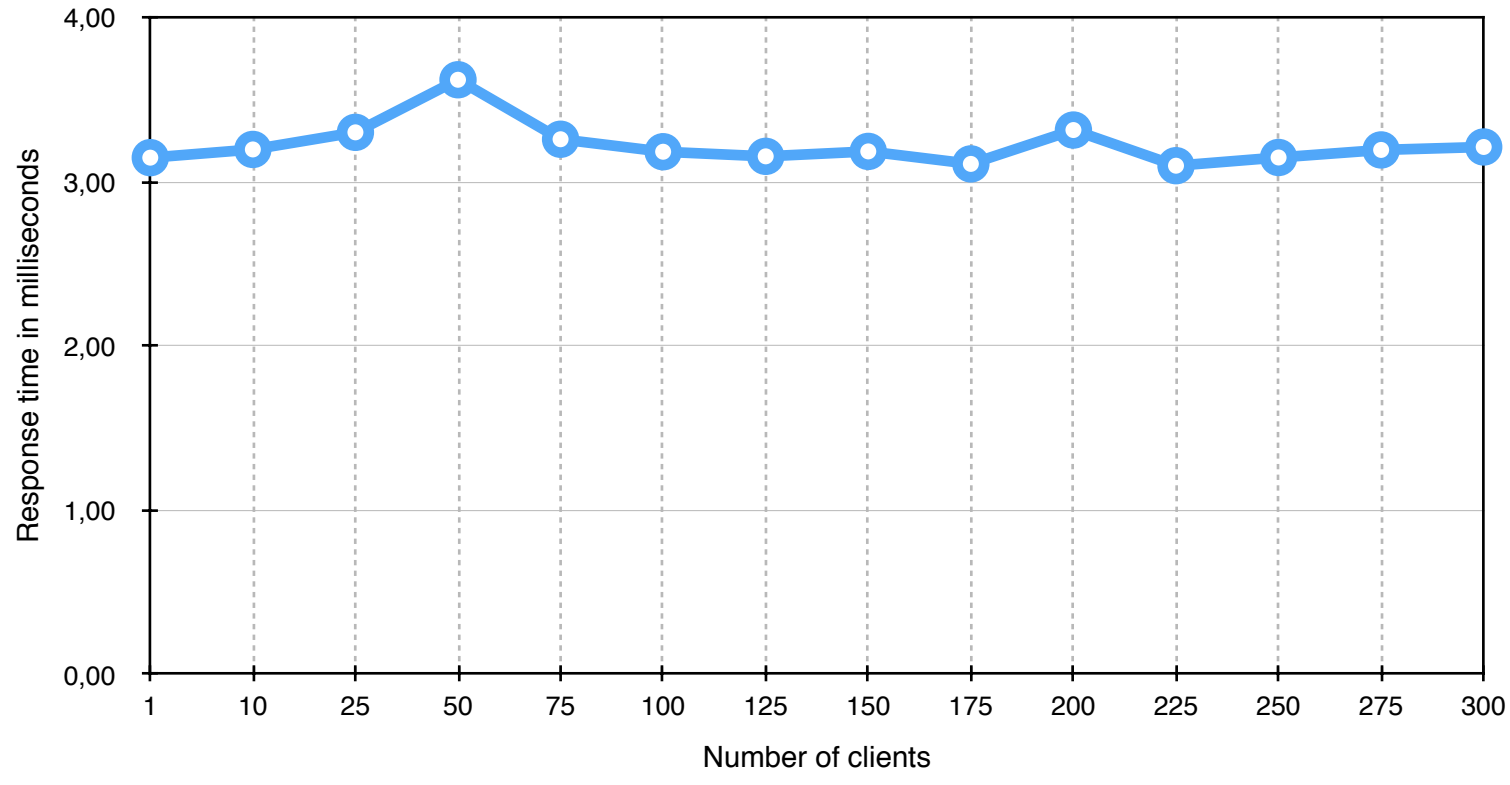
Average CPU Load with SSE Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
2,53	2,50	2,43	2,58	2,46	2,29	2,18	2,27	2,52	2,71	2,45	2,33	2,59	2,65
2,52	2,71	2,42	2,67	2,37	2,20	2,27	2,47	2,58	2,62	2,47	2,52	2,49	2,61
2,67	2,73	2,70	2,37	2,44	2,36	2,17	2,34	2,41	2,61	2,44	2,48	2,78	2,60
2,50	2,53	2,55	2,50	2,42	2,36	2,26	2,41	2,50	2,41	2,67	2,45	2,33	2,32
2,80	2,57	2,67	2,49	2,47	2,17	2,36	2,29	2,43	2,35	2,40	2,65	2,43	2,60
										2,32	2,44	2,48	2,25
										2,55	2,27	2,30	2,68
										2,77	2,51	2,55	2,49
										2,30	2,35	2,42	2,34
										2,39	2,18	2,25	2,52
2,60	2,61	2,554	2,52	2,43	2,28	2,25	2,36	2,49	2,54	2,48	2,42	2,46	2,51



Average Memory Usage with SSE Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
29,54	29,63	29,69	30,03	30,20	30,71	30,53	30,78	31,09	31,81	31,08	31,17	32,66	32,20
29,53	28,16	29,58	29,93	30,58	30,42	30,61	30,93	30,82	31,15	31,28	31,32	31,17	31,46
29,52	29,57	29,64	30,07	30,33	30,55	30,68	30,72	30,86	31,11	31,21	31,37	32,01	31,26
28,15	29,38	29,62	29,83	30,52	30,61	30,54	30,86	30,89	30,87	30,99	31,12	31,39	31,26
29,54	28,24	29,41	30,00	30,52	30,45	30,82	30,63	31,17	31,11	31,19	31,43	31,34	31,73
										31,20	31,44	31,57	31,45
										31,07	31,09	33,14	31,30
										31,06	31,42	31,58	31,39
										31,32	31,12	31,30	31,29
										31,20	31,26	34,84	31,20
29,26	29,00	29,588	29,97	30,43	30,55	30,64	30,78	30,97	31,21	31,16	31,27	32,10	31,45

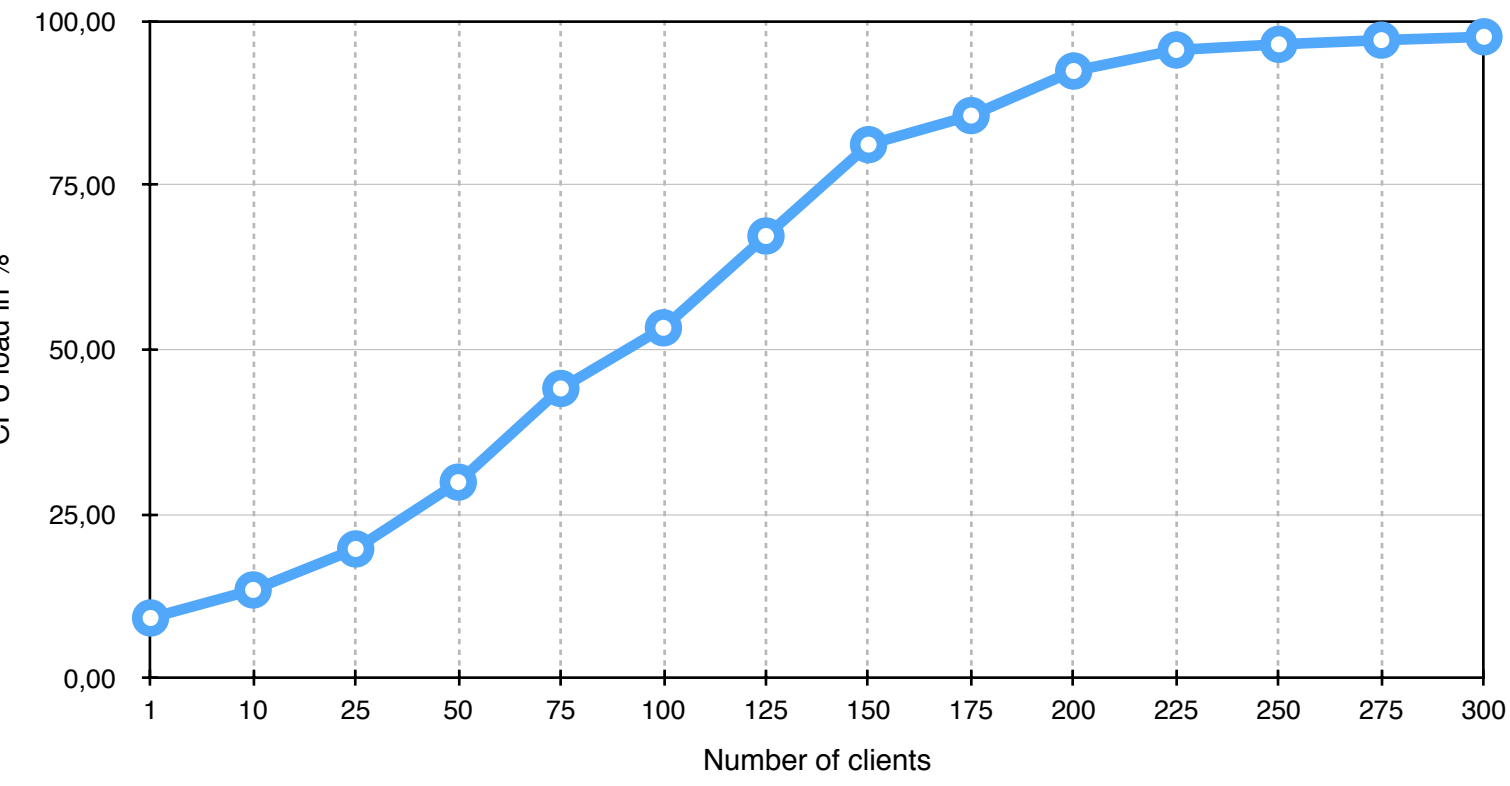


Average Response Time with SSE Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
3,13	3,17	3,28	3,25	2,98	3,07	3,08	3,14	3,07	3,19	3,00	3,00	2,95	3,31
3,06	3,17	3,45	3,29	3,19	3,26	3,10	3,12	3,22	3,30	3,09	3,14	3,30	3,30
3,15	3,25	3,23	3,47	3,20	3,17	3,19	3,23	3,05	3,25	3,05	3,29	3,01	3,16
3,16	3,13	3,19	4,01	3,16	3,21	3,25	3,18	3,14	3,69	3,16	3,14	3,08	3,33
3,23	3,26	3,35	4,08	3,76	3,20	3,15	3,25	3,06	3,14	3,11	3,10	4,16	3,07
										3,08	3,06	3,21	3,24
										3,02	3,22	2,99	3,21
										3,16	3,11	3,14	3,23
										3,11	3,25	3,01	3,21
										3,19	3,16	3,08	3,05
3,15	3,20	3,3	3,62	3,26	3,18	3,15	3,18	3,11	3,31	3,10	3,15	3,19	3,21

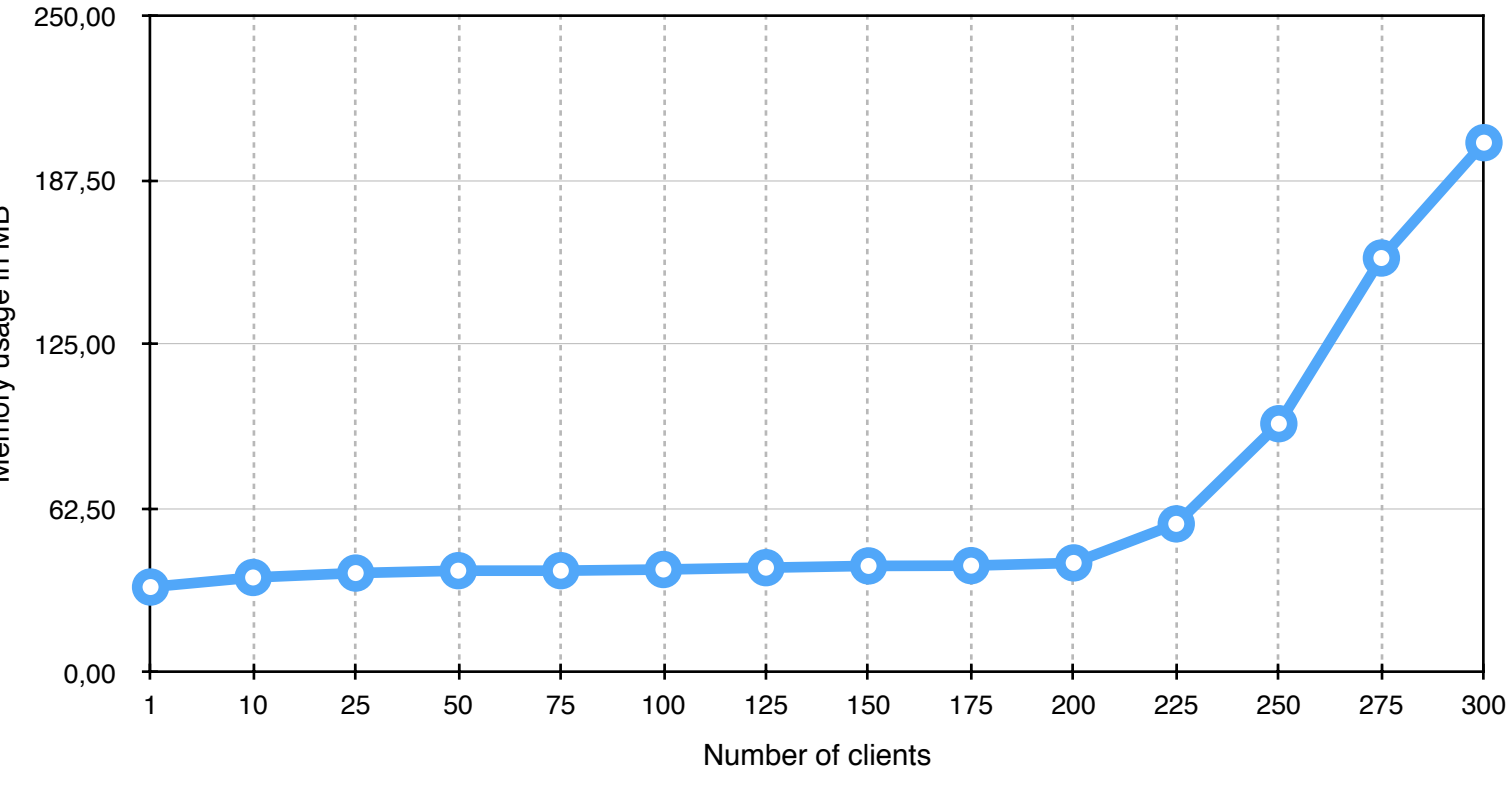


During Broadcast

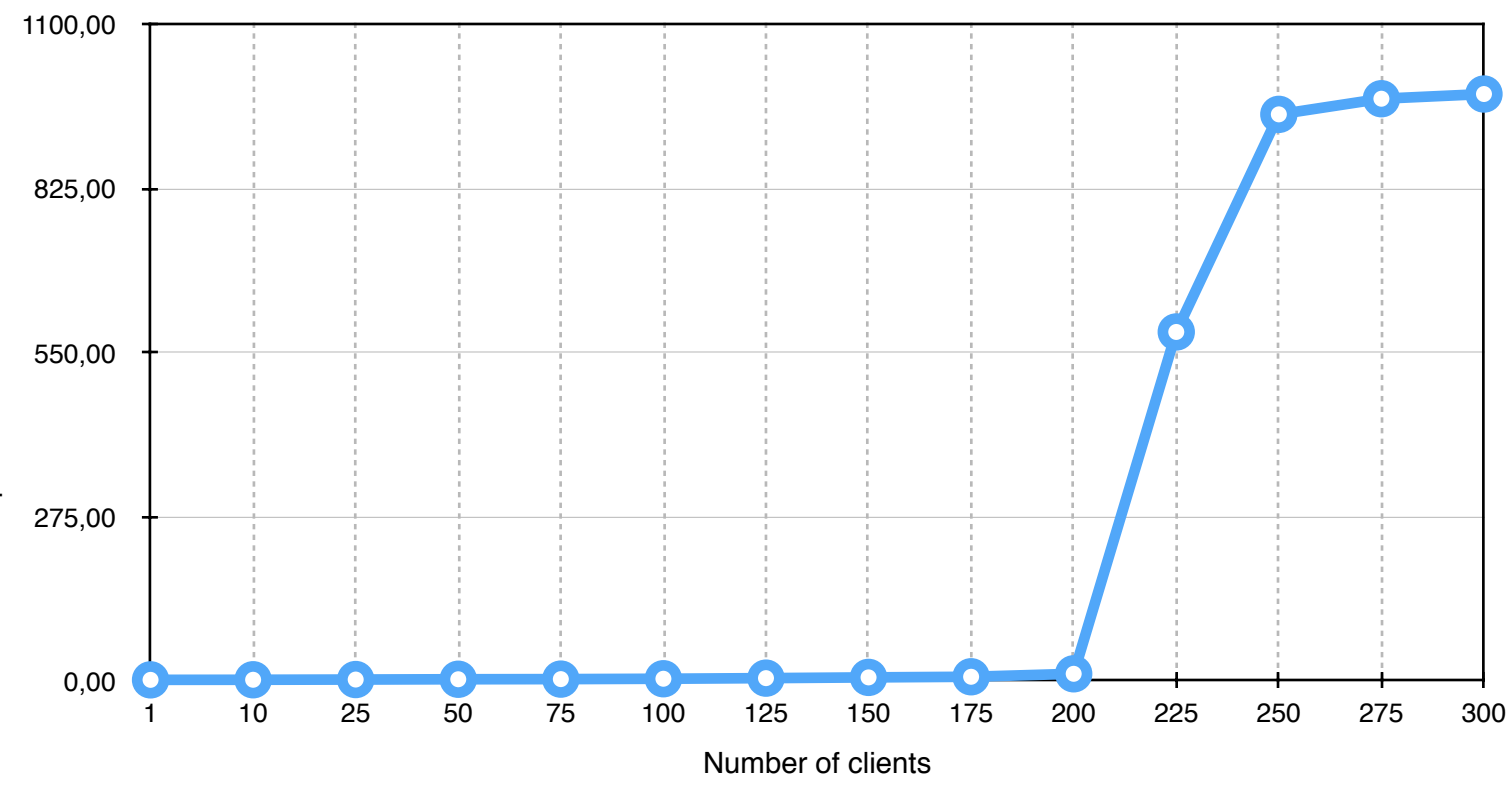
Average CPU Load with SSE during Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
9,18	13,68	19,79	30,16	44,55	52,96	66,35	80,95	85,75	93,39	94,02	95,67	97,24	97,36
9,22	13,57	20,22	29,16	44,52	52,56	65,15	82,66	84,04	89,52	94,44	96,83	96,79	97,50
9,25	13,26	19,55	30,59	45,58	54,56	67,89	83,22	86,24	93,34	96,92	96,58	97,39	97,58
9,10	13,40	19,56	29,77	43,97	52,64	71,96	82,62	83,46	91,29	96,71	95,98	96,72	97,55
9,09	13,26	19,23	29,49	41,78	53,83	65,03	76,43	88,50	94,34	94,18	96,83	96,41	97,87
										95,08	95,15	96,82	97,63
										96,70	96,61	97,58	97,37
										96,61	96,97	97,01	97,51
										95,48	96,56	97,40	97,76
										95,64	97,18	97,37	97,69
9,17	13,43	19,67	29,83	44,08	53,31	67,28	81,18	85,60	92,38	95,58	96,44	97,07	97,58



Average Memory Usage with SSE During Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
32,96	37,31	37,64	38,97	39,18	39,55	40,00	40,52	40,82	41,88	50,07	123,71	192,19	191,27
32,76	35,21	38,05	38,69	38,86	39,26	40,06	40,91	40,76	41,57	44,62	103,55	75,28	208,65
32,77	37,06	38,23	38,98	38,82	39,45	40,26	40,74	40,77	42,41	84,98	90,24	172,29	207,30
32,02	36,87	37,99	38,87	38,90	39,38	39,88	40,75	40,85	41,37	63,82	58,85	149,78	192,00
32,93	35,18	38,10	39,02	38,79	39,13	40,05	40,67	40,92	42,11	42,36	116,98	66,88	238,69
										43,45	86,37	179,93	208,61
										74,91	86,45	185,97	185,97
										60,94	97,46	168,63	202,88
										56,04	84,44	186,92	176,02
										45,97	100,02	200,29	205,47
32,69	36,33	38,002	38,91	38,91	39,35	40,05	40,72	40,82	41,87	56,72	94,81	157,82	201,69



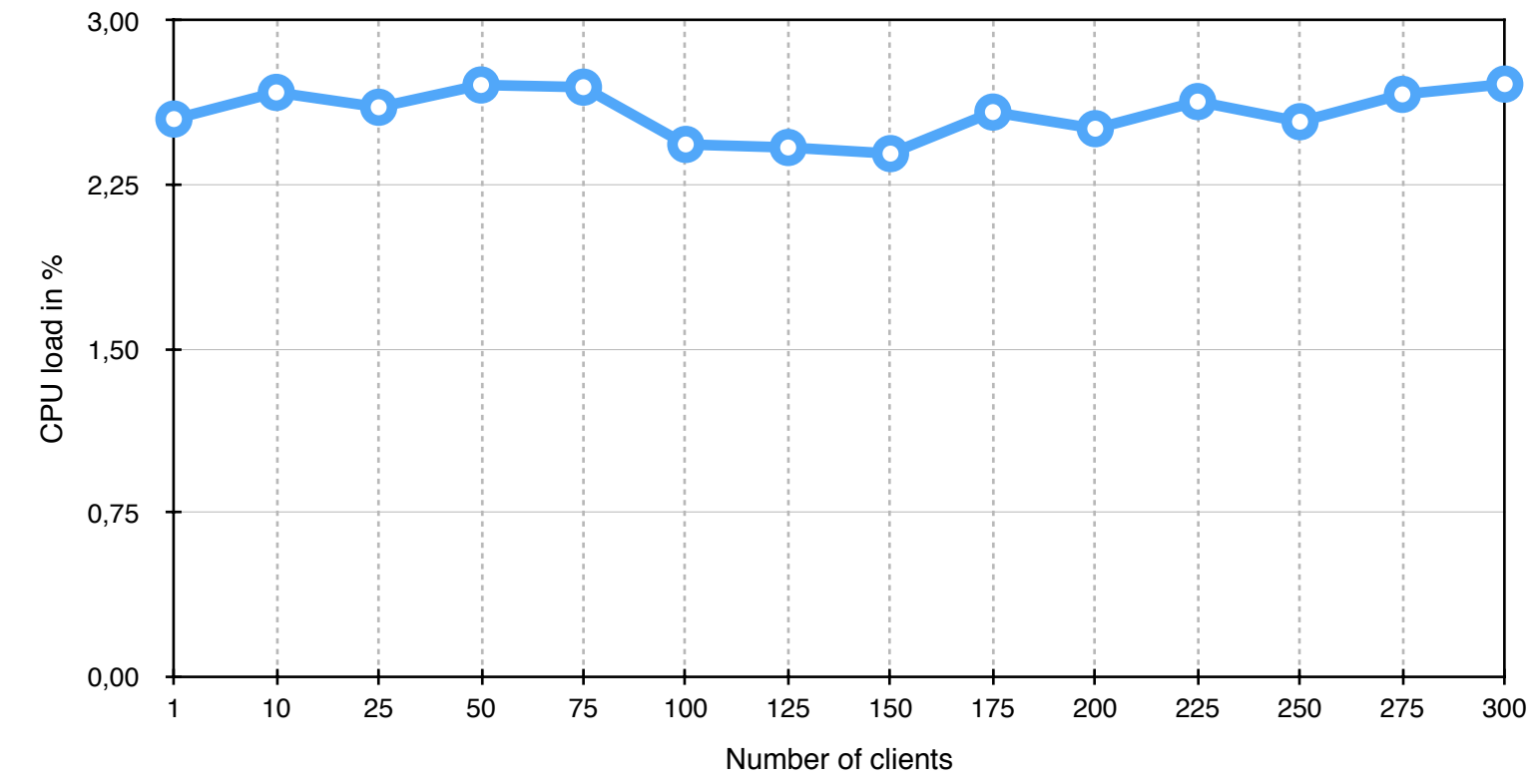
Average Response Time with SSE During Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
2,58	2,62	3,08	3,50	3,75	4,32	5,09	6,41	8,16	13,07	31,08	415,12	1035,92	1175,13
2,44	2,64	2,92	3,47	3,65	4,37	5,18	7,00	6,90	9,44	20,30	739,85	796,63	814,58
2,43	2,57	3,01	3,51	3,72	4,42	5,47	7,14	7,67	16,01	984,55	972,91	416,60	661,21
2,52	2,66	2,94	3,47	3,76	4,24	5,68	6,56	7,59	10,42	1372,02	1381,03	838,03	1043,61
2,39	2,57	2,96	3,40	3,60	4,23	5,26	5,78	7,83	14,02	15,18	1037,97	2007,01	986,44
										17,80	347,82	808,19	1019,07
										1161,05	995,38	1150,63	1198,20
										1200,61	974,02	654,11	985,12
										1012,28	1290,92	1010,81	1057,61
										31,54	1332,63	1031,33	887,00
2,47	2,61	2,982	3,47	3,70	4,32	5,34	6,58	7,63	12,59	584,64	948,77	974,93	982,80



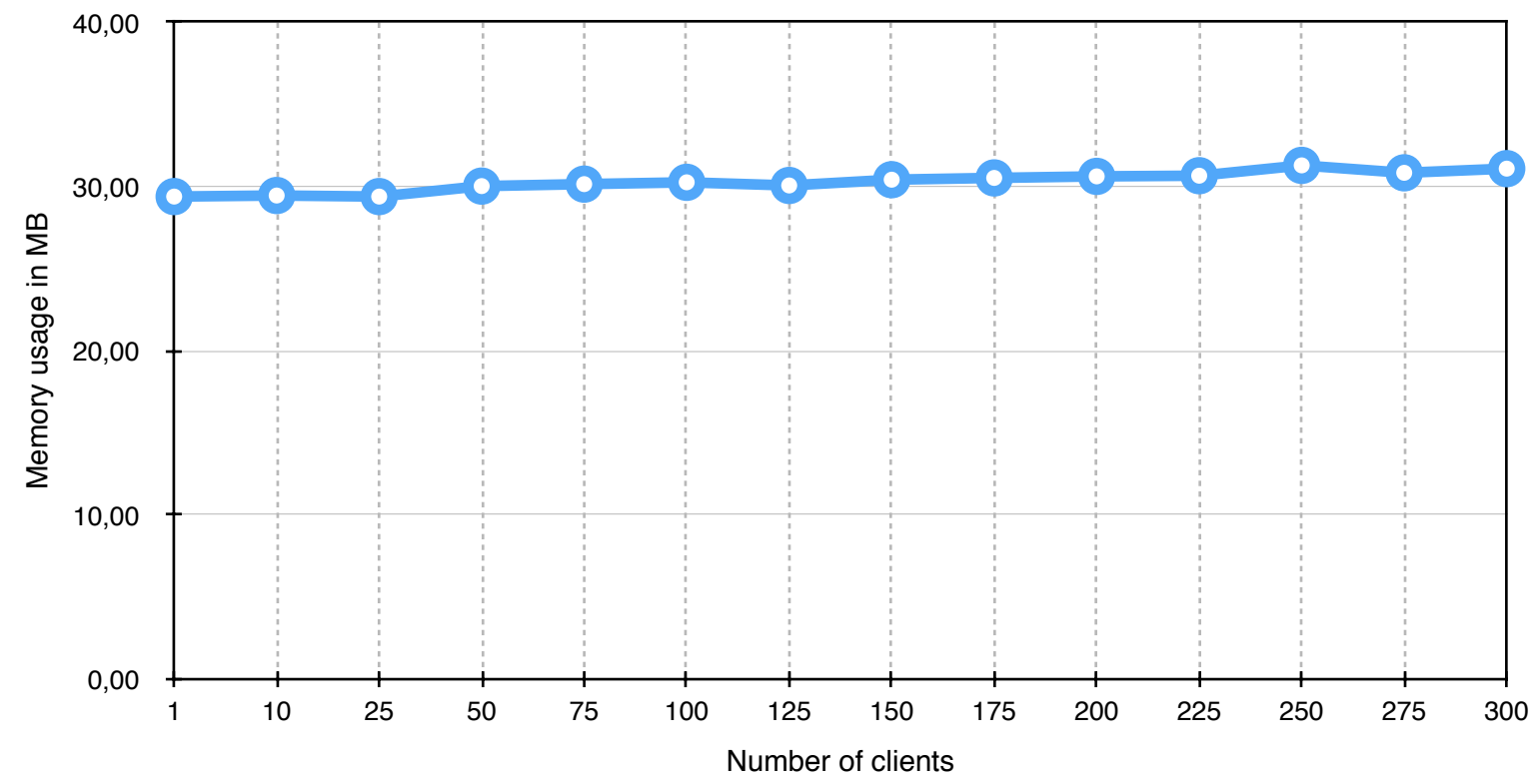
HTTP Long Polling

Before Broadcast

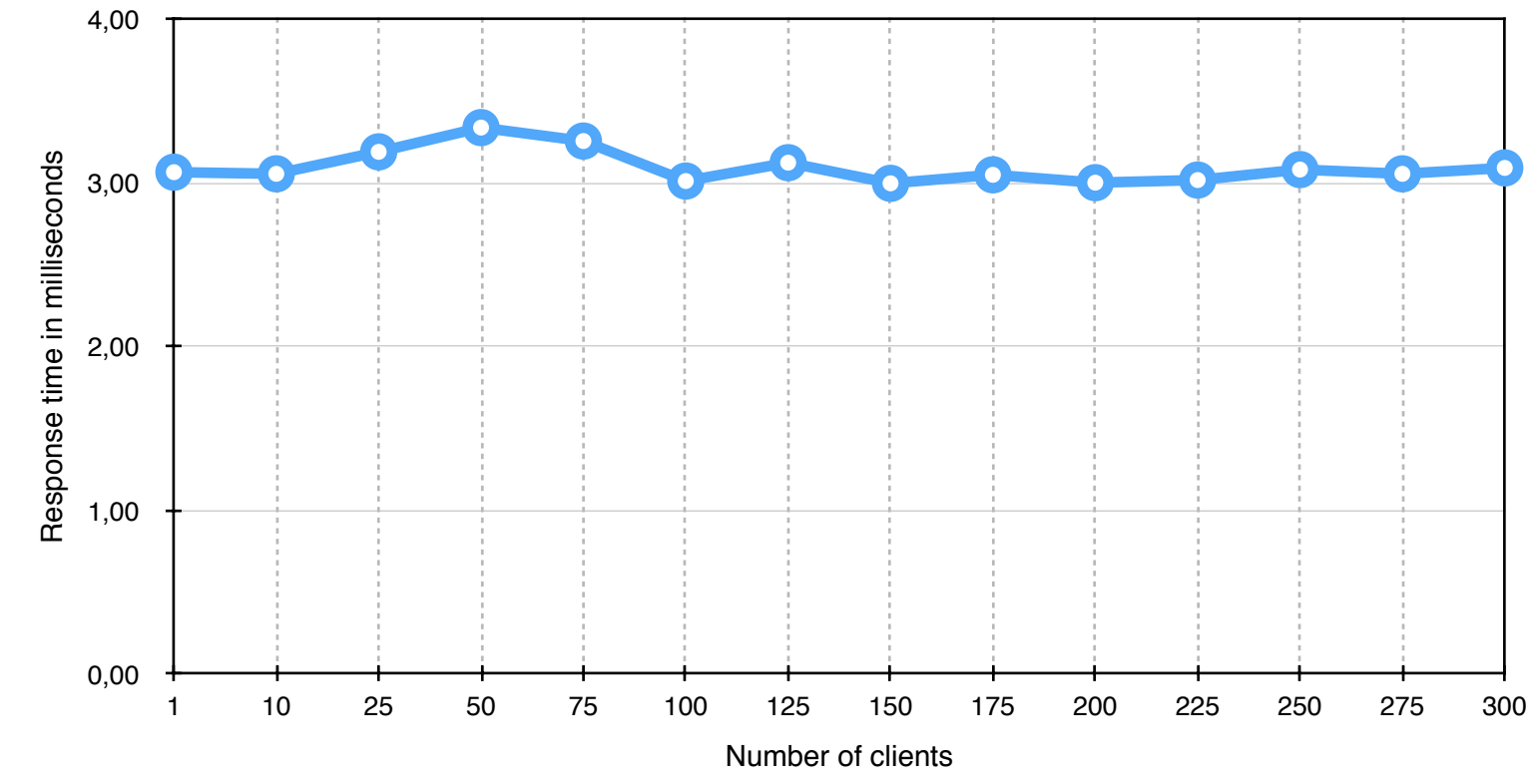
Average CPU Load with HTTP Long Polling Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
2,75	2,98	2,57	2,54	2,67	2,39	2,47	2,39	2,54	2,46	2,53	2,68	2,53	2,84
2,22	2,42	2,72	2,86	2,60	2,38	2,32	2,44	2,50	2,62	2,87	2,74	2,59	2,96
2,41	2,77	2,60	2,60	2,77	2,60	2,28	2,40	2,75	2,38	2,48	2,56	2,69	2,58
2,33	2,38	2,68	2,86	2,71	2,34	2,39	2,37	2,68	2,66	2,76	2,39	2,78	3,02
3,05	2,82	2,46	2,68	2,74	2,47	2,65	2,37	2,45	2,42	2,49	2,53	2,72	2,30
										2,64	2,55	2,48	2,64
										2,60	2,23	2,65	2,81
										2,67	2,54	2,66	2,64
										2,61	2,56	2,67	2,74
										2,67	2,62	2,88	2,59
2,55	2,67	2,606	2,71	2,70	2,44	2,42	2,39	2,58	2,51	2,63	2,54	2,67	2,71



Average Memory Usage with HTTP Long Polling Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
29,45	28,99	29,78	30,17	30,25	30,24	30,26	30,56	30,55	30,66	30,83	30,95	30,83	30,98
29,61	29,46	29,69	30,04	30,19	30,20	30,29	30,40	30,69	30,77	30,71	30,99	30,82	30,87
29,35	29,63	29,49	30,01	30,19	30,55	30,22	30,29	30,51	30,41	30,86	30,93	31,08	31,12
29,23	29,53	28,40	29,99	30,10	30,15	30,21	30,46	30,42	30,65	30,91	31,48	30,61	30,95
29,38	29,73	29,66	30,00	30,08	30,22	29,42	30,45	30,53	30,68	30,67	30,80	30,88	31,85
										30,40	30,84	30,99	31,06
										30,41	34,33	30,54	31,15
										30,65	30,96	30,84	31,14
										30,55	30,80	30,84	31,00
										30,76	30,96	31,08	30,94
29,40	29,47	29,404	30,04	30,16	30,27	30,08	30,43	30,54	30,63	30,68	31,30	30,85	31,11

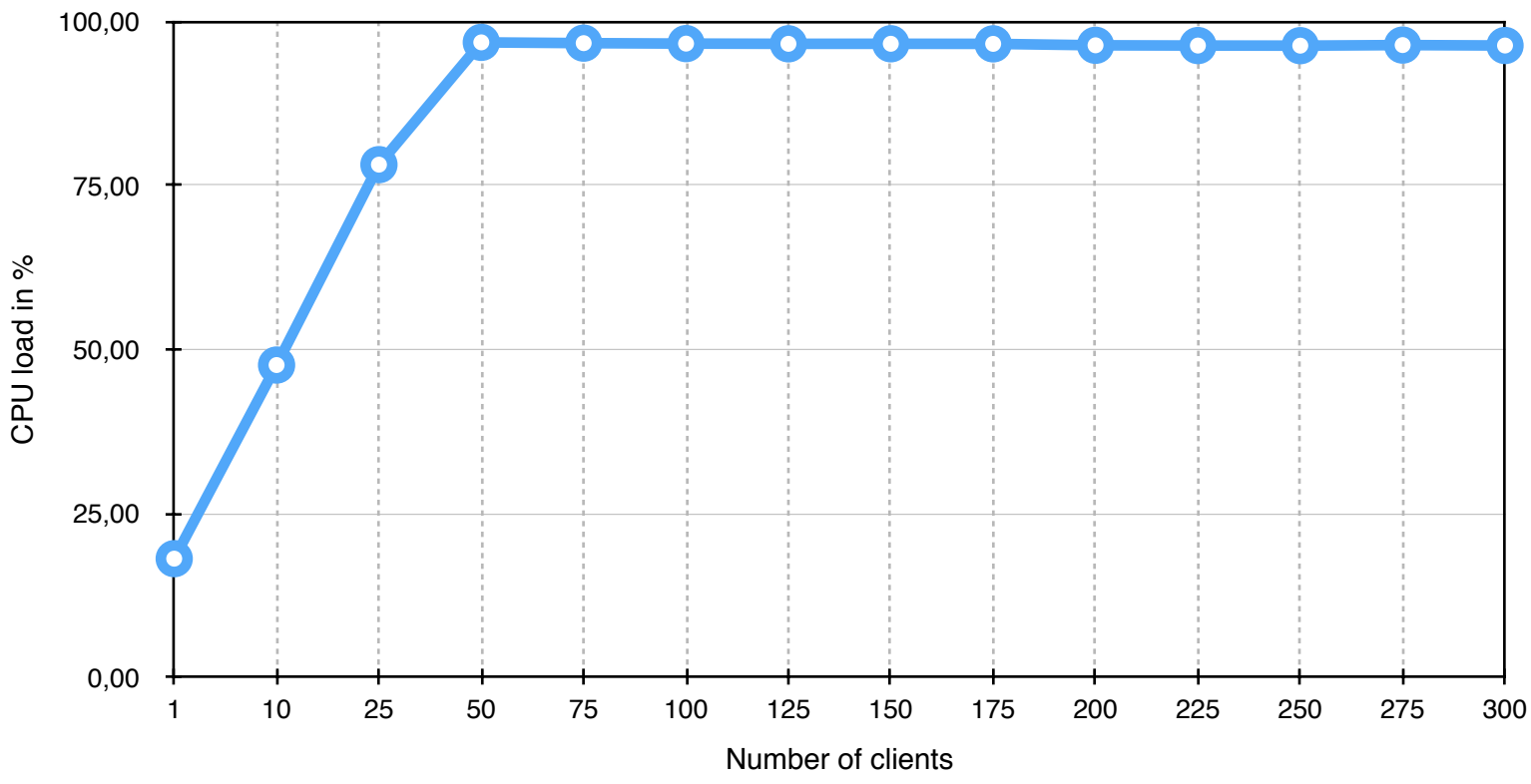


Average Response Time with HTTP Long Polling Before Broadcast													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
3,16	3,25	3,10	3,14	3,17	3,14	3,10	2,86	3,09	2,95	2,93	3,00	3,00	3,13
2,72	3,04	3,19	3,04	3,18	3,03	3,14	2,94	3,06	2,98	3,07	3,17	3,15	3,14
3,06	3,04	3,25	3,27	3,27	2,99	3,13	2,94	3,01	3,10	2,97	3,20	3,04	3,13
3,17	2,87	3,24	3,15	3,18	2,96	3,12	3,24	3,14	3,03	3,04	3,03	3,12	3,21
3,21	3,07	3,16	4,08	3,47	2,93	3,12	3,00	2,94	2,94	3,08	3,09	2,89	3,02
										3,07	3,09	2,95	3,02
										3,06	2,84	3,16	3,17
										2,96	3,10	2,93	3,09
										3,00	3,19	3,20	3,11
										2,98	3,09	3,10	2,88
3,06	3,05	3,188	3,34	3,25	3,01	3,12	3,00	3,05	3,00	3,02	3,08	3,05	3,09

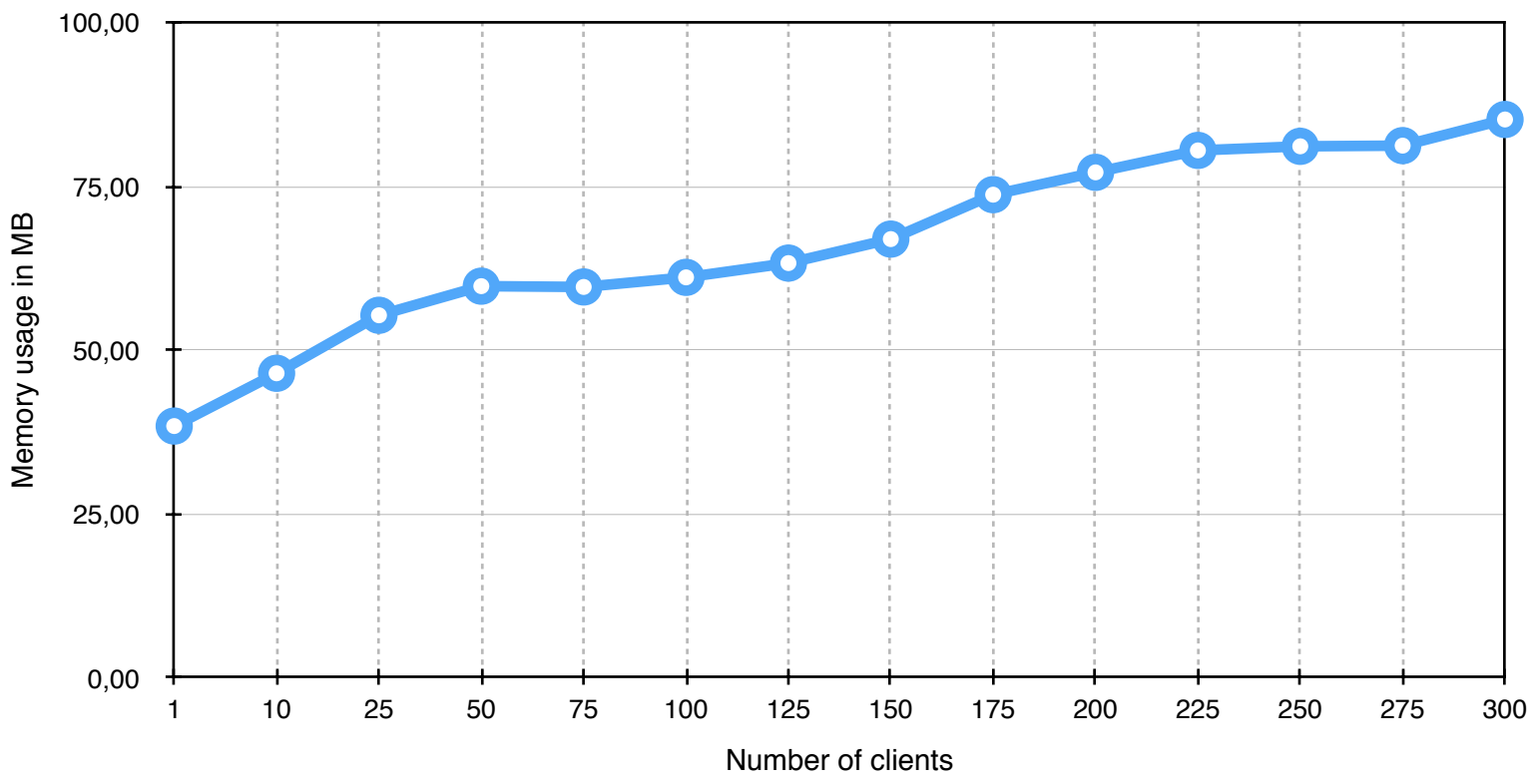


During Broadcast

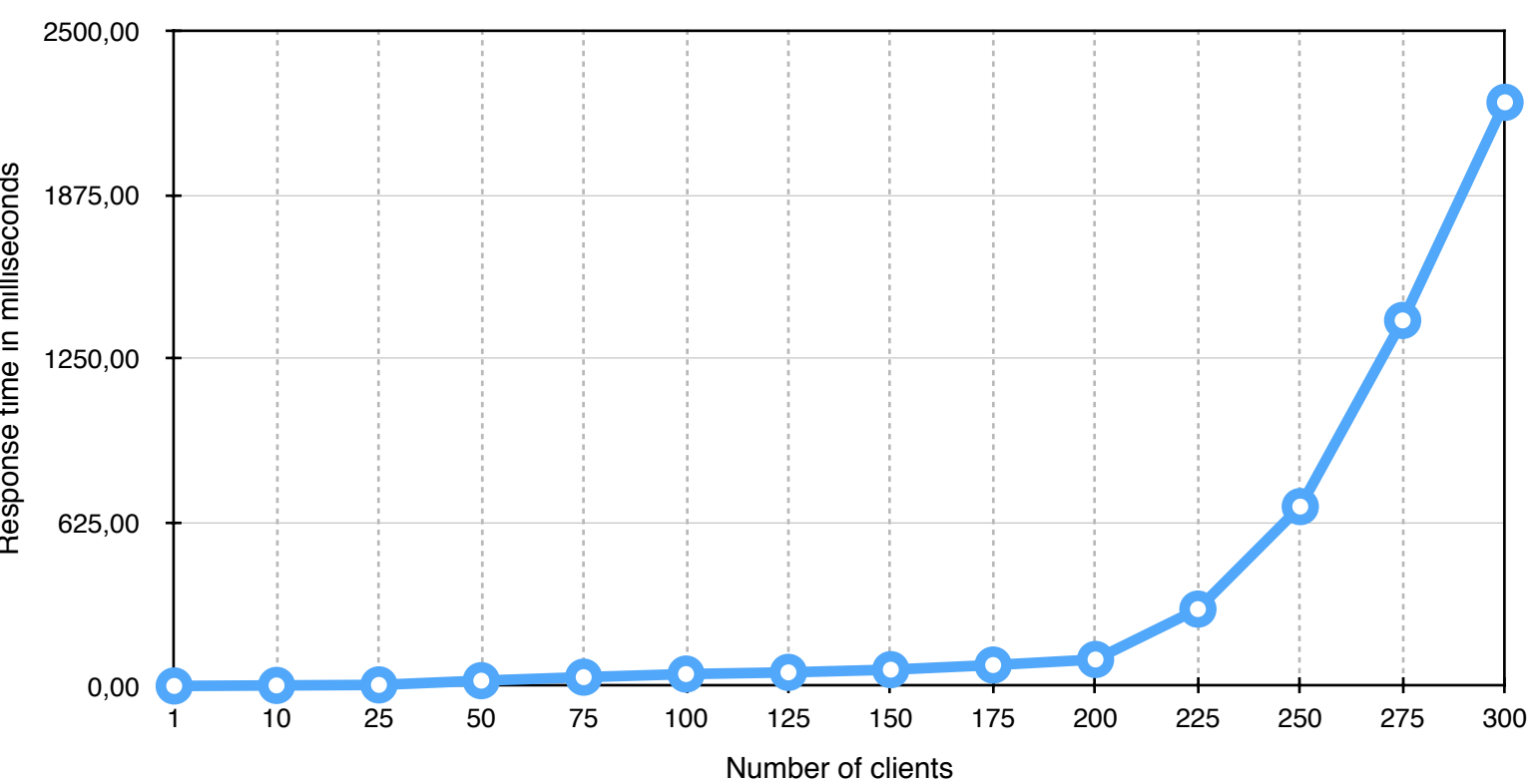
Average CPU Load with HTTP Long Polling during Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
17,92	46,77	78,21	96,84	96,88	96,45	96,59	96,67	96,64	96,15	96,59	96,24	96,28	96,16
18,06	47,33	78,11	96,70	96,63	96,83	96,53	96,69	96,56	96,43	95,93	96,38	96,33	96,47
18,10	47,91	78,16	96,90	96,84	96,35	96,67	96,64	96,45	96,45	96,35	96,09	96,55	96,63
18,08	47,91	78,66	96,62	96,43	96,64	96,41	96,75	96,77	96,20	96,29	96,26	96,16	96,60
18,25	48,12	77,70	97,01	96,70	96,86	96,77	96,25	96,52	96,61	96,20	96,58	96,47	96,35
										96,77	96,08	96,61	96,04
										96,45	96,76	96,28	96,38
										96,62	96,36	96,38	95,92
										96,20	96,16	96,52	96,48
										95,89	96,22	96,43	96,32
18,08	47,61	78,168	96,81	96,70	96,63	96,59	96,60	96,59	96,37	96,33	96,31	96,40	96,34



Average Memory Usage with HTTP Long Polling During Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
37,92	46,01	55,55	58,18	59,59	60,45	63,52	66,27	75,66	76,42	80,75	81,55	84,49	88,39
39,95	45,42	55,40	57,64	59,66	61,03	63,59	66,72	70,96	77,50	83,00	80,28	81,61	81,13
38,25	47,43	55,24	57,36	59,46	61,19	63,13	68,41	74,49	76,77	80,64	81,01	80,99	81,45
38,12	46,56	55,40	58,02	59,05	61,20	64,05	66,51	73,68	77,67	80,68	81,35	80,10	84,01
37,93	46,99	55,05	67,64	60,48	61,68	62,14	66,82	73,80	77,26	79,58	80,50	81,02	89,19
										78,58	80,72	81,20	84,96
										80,11	83,29	80,39	88,40
										79,82	80,85	81,60	82,34
										81,32	81,09	80,33	86,81
										80,21	80,30	80,25	85,18
38,43	46,48	55,328	59,77	59,65	61,11	63,29	66,95	73,72	77,12	80,47	81,09	81,20	85,19



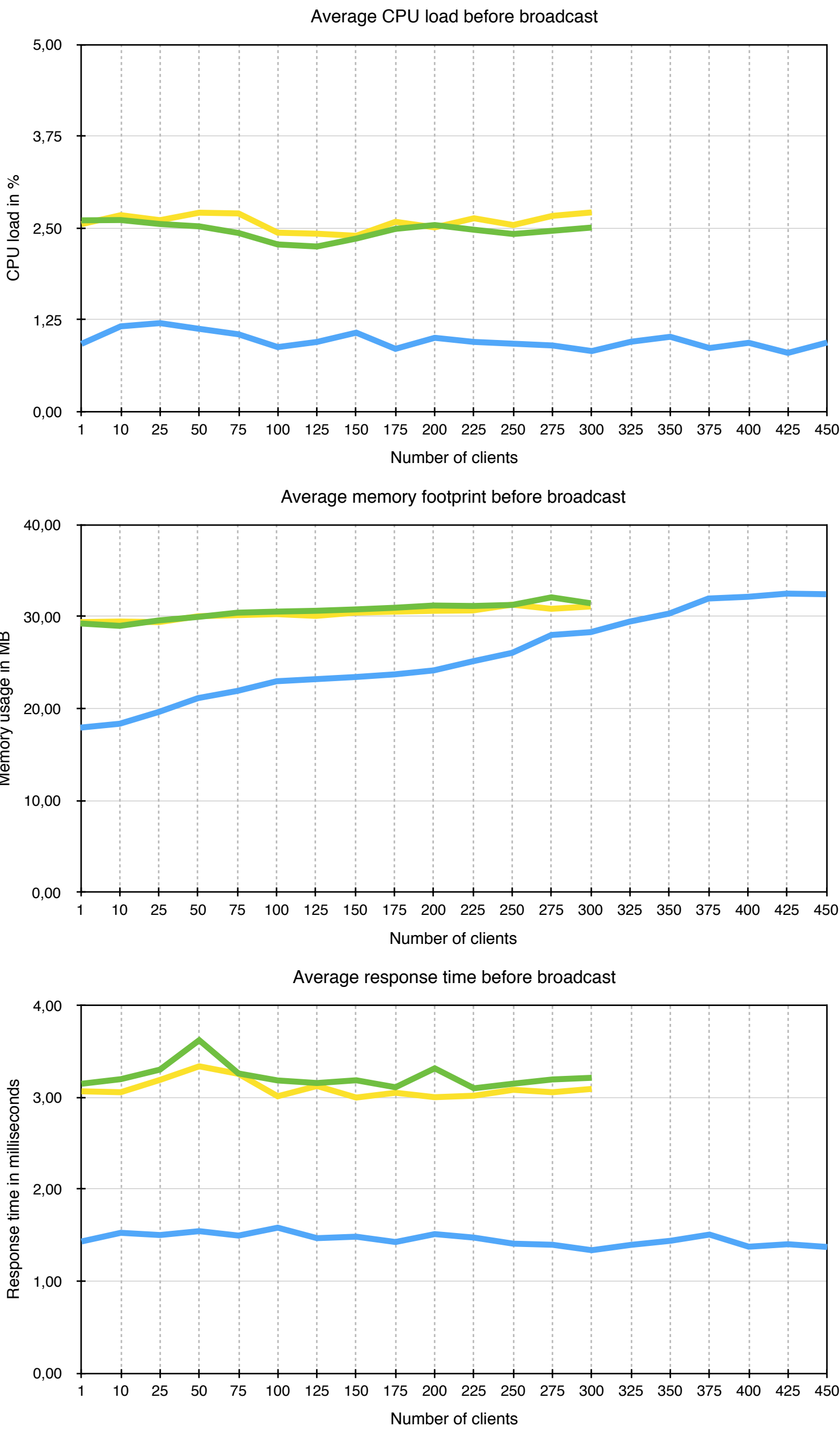
Average Response Time with HTTP Long Polling During Load - 2000 updates from backend, one every 5 milliseconds													
1	10	25	50	75	100	125	150	175	200	225	250	275	300
2,25	4,15	6,46	21,76	35,48	47,54	54,13	63,92	80,25	102,27	369,53	535,84	1167,71	2423,84
2,17	4,24	6,16	23,14	35,67	47,68	53,83	62,89	83,75	108,74	294,41	618,55	1665,51	2006,73
2,25	4,16	6,04	23,07	36,23	46,94	55,17	67,58	77,55	96,71	300,13	929,73	1134,91	2259,59
2,25	4,34	6,13	21,39	35,79	47,15	54,75	63,12	82,19	107,20	327,07	577,85	1134,83	2241,74
2,25	4,24	6,23	22,50	35,58	48,23	52,24	64,04	85,69	100,81	269,66	680,11	1634,31	2273,12
										484,22	708,48	1629,49	2248,68
										272,23	733,18	1076,77	2347,39
										203,67	702,45	1377,62	1854,47
										227,71	664,32	1632,05	2313,42
										202,86	709,45	1504,32	2303,53
2,23	4,23	6,204	22,37	35,75	47,51	54,02	64,31	81,89	103,15	295,15	686,00	1395,75	2227,25



Combined charts

Before Broadcast

- WebSocket
- Server Sent Events
- HTTP Long Polling



During Broadcast

- WebSocket
- Server Sent Events
- HTTP Long Polling

