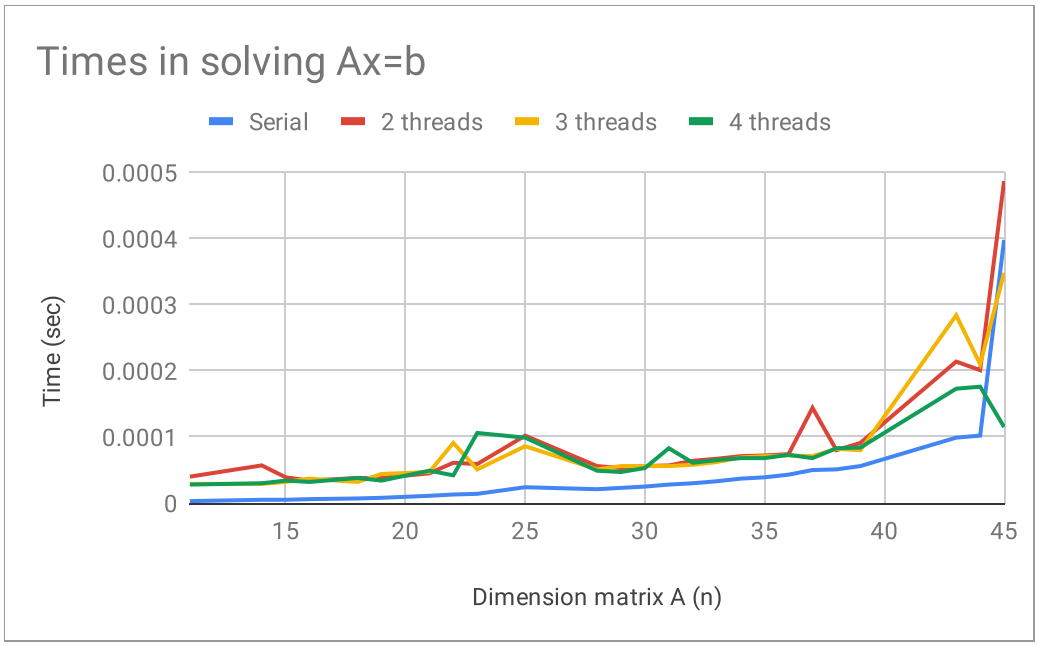
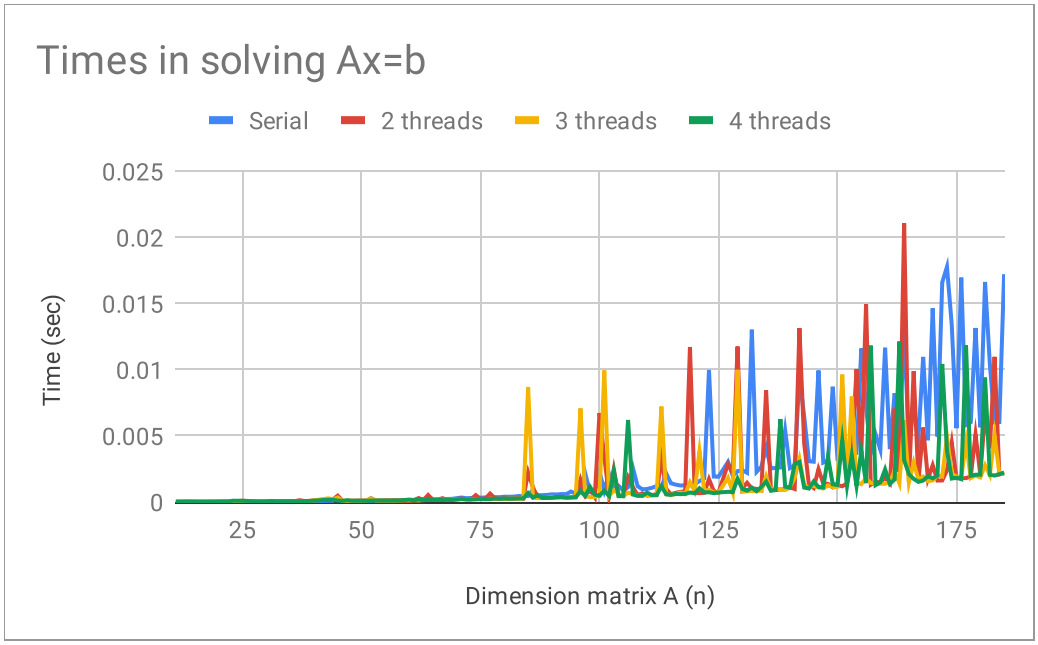
Speed analysis in solving linear system of equations for different dimensions and nthreads





The first thing to notice is that the serial algorithm has better performance than the parallelization strategy (regardless amount of threads) for small matrices with dimension smaller than around 50x50. A possible reason for this is that the amount of work of synchronizing the threads is not worth the amount of work each of them do in parallel.
As the dimension of the matrix increases, especially over 100x100, parallelization becomes more useful and increases performance compared to serialized version. From the graph it seems clear that using the more cores we use to parallelize, the better for the performance. Over 150x150, serial performance is very poor.
An important conclusion from this exercise is that we shall always study our problem and its dimension so as to decide if a serial or parallel approach is most efficient.

*Outliers points have been removed from analysis

Dimension(n)	Serial	2 threads	3 threads	4 threads
11	0.000003	0.00004	0.000029	0.000028
14	0.000005	0.000057	0.000029	0.00003
15	0.000005	0.000039	0.000032	0.000034
16	0.000006	0.000034	0.000037	0.000032
18	0.000007	0.000038	0.000032	0.000038
19	0.000008	0.000038	0.000044	0.000034
21	0.000011	0.000045	0.000047	0.000049
22	0.000013	0.000061	0.000091	0.000042
23	0.000014	0.000059	0.000051	0.000106
25	0.000024	0.000102	0.000086	0.000099
28	0.000021	0.000056	0.000051	0.000049
29	0.000023	0.000053	0.000056	0.000047
30	0.000025	0.000056	0.000056	0.000053
31	0.000028	0.000057	0.000056	0.000083
32	0.00003	0.000064	0.000058	0.000061
33	0.000033	0.000067	0.000062	0.000065
34	0.000037	0.000071	0.000069	0.000068
35	0.000039	0.000072	0.000071	0.000068
36	0.000043	0.000074	0.000072	0.000073
37	0.00005	0.000144	0.000071	0.000068
38	0.000051	0.00008	0.000082	0.000083
39	0.000056	0.000091	0.00008	0.000084
43	0.000099	0.000214	0.000284	0.000173
44	0.000102	0.000201	0.00021	0.000176
45	0.000398	0.000487	0.000348	0.000115
46	0.00008	0.000091	0.000089	0.000093
47	0.000085	0.000096	0.000094	0.00014
48	0.000087	0.000102	0.000096	0.000099
49	0.000094	0.000103	0.000101	0.000104

50	0.0001	0.000109	0.000104	0.000102
51	0.000106	0.000107	0.000111	0.000091
52	0.000112	0.000292	0.000271	0.000114
53	0.000118	0.000117	0.000112	0.000116
54	0.000126	0.000097	0.000123	0.000116
55	0.000124	0.000126	0.000118	0.000114
56	0.000132	0.000118	0.000115	0.000116
57	0.000138	0.000133	0.00011	0.000122
58	0.000145	0.000127	0.000127	0.000125
59	0.000156	0.000138	0.000132	0.000158
60	0.000161	0.000124	0.000132	0.000188
61	0.00017	0.000143	0.000136	0.000143
62	0.00021	0.000306	0.000121	0.000198
63	0.000188	0.000155	0.000154	0.000148
64	0.000389	0.000538	0.000156	0.000165
65	0.000206	0.000162	0.000159	0.000161
66	0.000216	0.000168	0.00017	0.000168
67	0.000232	0.000298	0.000176	0.000155
68	0.000235	0.000178	0.000181	0.00017
69	0.000247	0.000182	0.000189	0.000158
71	0.000345	0.000276	0.000229	0.000229
72	0.000295	0.000207	0.000199	0.000206
73	0.000308	0.000215	0.000214	0.000197
74	0.000325	0.000527	0.000216	0.000217
75	0.000336	0.000231	0.000226	0.000229
76	0.000352	0.000255	0.000209	0.00023
77	0.000365	0.000645	0.00025	0.00022
78	0.000375	0.000297	0.000242	0.000265
79	0.00037	0.00025	0.000239	0.000242
80	0.000411	0.000268	0.000239	0.000269
81	0.0004	0.00026	0.000253	0.000251
82	0.000415	0.000267	0.00026	0.00026
83	0.000458	0.0003	0.000267	0.000269
84	0.000445	0.000266	0.000271	0.000274
85	0.000462	0.002252	0.008701	0.000694
86	0.000936	0.001136	0.000336	0.00034
87	0.000508	0.000325	0.000298	0.000518
88	0.000525	0.000338	0.000309	0.000307
89	0.000543	0.000325	0.000315	0.000315
90	0.000587	0.000324	0.000405	0.000343
91	0.000575	0.000337	0.00032	0.000388
92	0.000609	0.000398	0.000334	0.000385

93	0.000596	0.000348	0.00034	0.000336
94	0.0008	0.00036	0.000354	0.000354
95	0.000638	0.000389	0.000366	0.000357
96	0.00087	0.001692	0.007079	0.000829
97	0.002169	0.000524	0.000456	0.000452
98	0.000751	0.001003	0.000374	0.001154
99	0.000724	0.000395	0.00039	0.000565
100	0.002306	0.006731	0.000482	0.000482
101	0.000871	0.003409	0.009948	0.000868
102	0.002142	0.000499	0.000431	0.000456
103	0.000966	0.002488	0.000909	0.00235
104	0.00123	0.00048	0.000654	0.000449
105	0.000863	0.000532	0.000446	0.000448
106	0.001133	0.001886	0.000713	0.006207
107	0.002602	0.001138	0.000622	0.000572
108	0.001204	0.000527	0.000477	0.000477
109	0.000964	0.000665	0.0005	0.000468
110	0.000991	0.000491	0.000527	0.000715
111	0.00108	0.00053	0.00051	0.000525
112	0.001211	0.000601	0.000536	0.000519
113	0.001074	0.003317	0.007222	0.001199
114	0.002181	0.001004	0.000592	0.000588
115	0.001426	0.000595	0.000549	0.000545
116	0.001322	0.000701	0.000605	0.000616
117	0.001252	0.000776	0.000727	0.000602
118	0.001275	0.000809	0.00061	0.00061
119	0.001263	0.011726	0.001504	0.000727
120	0.001364	0.000677	0.000837	0.000668
121	0.001591	0.000677	0.003836	0.001046
122	0.001788	0.000698	0.000848	0.000729
123	0.009992	0.00174	0.000929	0.000743
124	0.001931	0.00083	0.000731	0.000677
125	0.001919	0.000719	0.000716	0.000728
127	0.003034	0.002887	0.001837	0.000778
128	0.001991	0.002168	0.00074	0.000754
129	0.002342	0.01176	0.010002	0.00177
130	0.002407	0.001015	0.00078	0.000999
131	0.002213	0.001462	0.000817	0.000867
132	0.013036	0.001036	0.000831	0.001097
133	0.002284	0.001002	0.000837	0.000823
134	0.002657	0.000895	0.000868	0.00115
135	0.004108	0.008438	0.001953	0.001553

136	0.002554	0.000993	0.00091	0.000857
137	0.002574	0.000907	0.001068	0.000909
138	0.002615	0.000953	0.000913	0.006275
139	0.005424	0.000968	0.000921	0.001164
140	0.002568	0.001116	0.001111	0.001083
141	0.002765	0.00099	0.001834	0.00287
142	0.009572	0.013149	0.003253	0.003035
143	0.006476	0.004434	0.001304	0.001098
144	0.003088	0.001284	0.001093	0.001026
145	0.003054	0.001058	0.00124	0.001562
146	0.009946	0.002494	0.001103	0.001143
147	0.002983	0.001409	0.001026	0.001105
148	0.003142	0.001381	0.001274	0.003411
149	0.008723	0.001114	0.001137	0.001348
150	0.003281	0.001286	0.001164	0.001296
151	0.00338	0.001195	0.00964	0.004644
152	0.003393	0.001422	0.001359	0.001229
153	0.003523	0.003579	0.007978	0.003544
154	0.003699	0.010061	0.001504	0.001227
155	0.011612	0.003601	0.001356	0.003872
156	0.007162	0.014961	0.001806	0.001435
157	0.003721	0.001317	0.001444	0.01183
158	0.005125	0.001539	0.001399	0.001282
159	0.003965	0.001486	0.001389	0.001496
160	0.011671	0.001853	0.001383	0.002475
161	0.004003	0.001432	0.001534	0.001371
162	0.008227	0.007069	0.002376	0.001713
163	0.004487	0.002262	0.001431	0.012138
164	0.012947	0.021083	0.006165	0.003172
165	0.004501	0.001544	0.00148	0.002115
166	0.007116	0.009896	0.002993	0.001759
167	0.004841	0.001533	0.001697	0.001527
168	0.010979	0.005636	0.00193	0.001629
169	0.004676	0.001757	0.00158	0.001964
170	0.014644	0.002786	0.001635	0.001798
171	0.004963	0.001627	0.002011	0.002007
172	0.016608	0.001635	0.001932	0.010444
173	0.017784	0.002402	0.004947	0.003885
174	0.013414	0.004517	0.002158	0.001781
175	0.005588	0.00181	0.001944	0.001843
176	0.016972	0.001815	0.001855	0.001736
177	0.005826	0.001813	0.004545	0.011847
178	0.006041	0.001939	0.001818	0.001987

179	0.013162	0.005113	0.002007	0.002069
180	0.005655	0.002097	0.001865	0.002073
181	0.016644	0.006667	0.002782	0.009411
182	0.010474	0.004062	0.002046	0.002069
183	0.006023	0.010984	0.00503	0.002008
184	0.006045	0.002087	0.002158	0.002114
185	0.017231	0.002171	0.002122	0.002235
186	0.007019	0.015686	0.002385	0.002127
188	0.007536	0.022734	0.006724	0.005364
189	0.007462	0.002169	0.002267	0.010208
190	0.007928	0.002334	0.002206	0.002385
191	0.01588	0.004416	0.002708	0.002572
192	0.007139	0.002258	0.01455	0.002732
193	0.007169	0.0025	0.002267	0.002424
194	0.015202	0.002411	0.002363	0.002467
195	0.01767	0.0077	0.003004	0.002428
196	0.024818	0.002463	0.003752	0.002979
197	0.007455	0.01592	0.002757	0.002703
198	0.007537	0.013695	0.003532	0.002988
199	0.007636	0.002634	0.019995	0.003206
200	0.00784	0.013487	0.012518	0.012559