

1. Tell what machine you ran this on

This program was run on the flip server.

2. Tell what operating system you were using.

I was using Microsoft Windows 11.

3. Tell what compiler you used.

I used the G++ compiler on the flip server.

4. Include the table of performance data.

0:	85.82		36.04	Murfreesboro	TN		
1:	116.27		37.16	LasVegas	NV		
		1	331			2	50.414
0:	77.42		39.58	Washington	DC		
1:	90.98		33.99	Memphis	TN		
2:	116.71		37.28	LasVegas	NV		
		1	331			3	58.616
0:	74.24		40.72	Newark	NJ		
1:	83.91		35.14	Knoxville	TN		
2:	98.01		35	OklahomaCity	OK		
3:	118.27		37.15	Visalia	CA		
		1	331			4	66.346
0:	74.24		40.72	Newark	NJ		
1:	108.10		36.56	RioRancho	NM		
2:	82.85		34.2	Athens	GA		
3:	94.64		35.37	BrokenArrow	OK		
4:	119.45		37.39	Clovis	CA		
		1	331			5	67.051
0:	74.10		40.73	JerseyCity	NJ		
1:	92.01		41.15	CedarRapids	IA		
2:	111.39		33.45	Mesa	AZ		
3:	81.58		28.82	Orlando	FL		
4:	120.86		45.93	Gresham	OR		
5:	117.77		34.11	Pomona	CA		
6:	96.70		31.77	Waco	TX		
7:	106.77		39.74	Boulder	CO		
8:	83.57		37.95	Lexington	KY		
9:	121.65		37.98	Antioch	CA		
		1	331			10	82.599
0:	73.03		41.52	Waterbury	CT		

1:	112.53	35.42	Peoria	AZ	
2:	119.66	36.04	Visalia	CA	
3:	96.97	31.62	Waco	TX	
4:	120.86	45.93	Gresham	OR	
5:	80.99	27.33	PortSt.Lucie	FL	
6:	86.47	33.49	Birmingham	AL	
7:	78.58	36	Raleigh	NC	
8:	82.22	41.8	Cleveland	OH	
9:	87.51	40.93	Joliet	IL	
10:	94.56	40.89	DesMoines	IA	
11:	105.34	38.45	ColoradoSprings	CO	
12:	118.41	34.17	Burbank	CA	
13:	117.47	33.72	Corona	CA	
14:	121.80	38.07	Antioch	CA	
	1	331		15	86.431
0:	71.89	42.1	Worcester	MA	
1:	121.03	47.58	Bellevue	WA	
2:	120.46	39.63	Reno	NV	
3:	96.22	29.13	SugarLand	TX	
4:	88.08	41.5	Joliet	IL	
5:	78.79	35.47	Cary	NC	
6:	119.66	36.04	Visalia	CA	
7:	97.41	33.42	Denton	TX	
8:	85.75	32.61	Montgomery	AL	
9:	117.65	34.02	Ontario	CA	
10:	80.98	27.1	PortSt.Lucie	FL	
11:	106.77	39.74	Boulder	CO	
12:	75.05	40.63	Allentown	PA	
13:	82.76	41.65	Dearborn	MI	
14:	121.75	38.23	Antioch	CA	
15:	111.39	33.45	Mesa	AZ	
16:	86.22	36.62	Nashville	TN	
17:	120.73	44.6	Bend	OR	
18:	94.40	41.06	DesMoines	IA	
19:	122.18	37.54	Hayward	CA	
	1	331		20	95.513
0:	74.50	40.78	Woodbridge	NJ	
1:	121.67	37.41	SanJose	CA	
2:	78.82	42.17	Buffalo	NY	
3:	120.93	39.1	Roseville	CA	
4:	94.48	44.87	Minneapolis	MN	
5:	119.60	36.65	Clovis	CA	
6:	105.18	39.06	ColoradoSprings	CO	
7:	89.23	42.98	Madison	WI	

8:	113.17	42.36	SaltLakeCity	UT	
9:	80.98	27.1	PortSt.Lucie	FL	
10:	73.10	41.67	Waterbury	CT	
11:	86.03	32.56	Montgomery	AL	
12:	76.62	37.67	NewportNews	VA	
13:	122.87	38.09	SantaRosa	CA	
14:	111.39	33.45	Mesa	AZ	
15:	94.79	38.59	Olathe	KS	
16:	88.97	41.07	Peoria	IL	
17:	118.02	34	ElMonte	CA	
18:	116.93	34.01	MorenoValley	CA	
19:	97.95	32.87	FortWorth	TX	
20:	119.26	34.53	Ventura	CA	
21:	79.93	34.72	Concord	NC	
22:	86.39	36.37	Nashville	TN	
23:	71.21	42.29	Cambridge	MA	
24:	121.03	47.58	Bellevue	WA	
25:	94.57	30.38	Beaumont	TX	
26:	122.58	45.04	Salem	OR	
27:	98.17	27.57	CorpusChristi	TX	
28:	84.14	41.3	Toledo	OH	
29:	122.17	37.92	Berkeley	CA	
	1	331		30	99.01
0:	78.15	42.39	Buffalo	NY	
1:	95.65	36.07	BrokenArrow	OK	
2:	122.46	37.89	Richmond	CA	
3:	122.26	47.55	Renton	WA	
4:	119.60	36.65	Clovis	CA	
5:	117.67	33.81	Anaheim	CA	
6:	96.88	32.97	Carrollton	TX	
7:	97.76	26.57	Edinburg	TX	
8:	79.48	35.57	Greensboro	NC	
9:	84.23	40.98	FortWayne	IN	
10:	99.49	27.56	Laredo	TX	
11:	82.36	27.69	St.Petersburg	FL	
12:	113.32	38.49	St.George	UT	
13:	76.62	37.67	NewportNews	VA	
14:	94.47	41.29	DesMoines	IA	
15:	87.60	34.06	Tuscaloosa	AL	
16:	110.66	33.44	Mesa	AZ	
17:	122.21	44.06	Bend	OR	
18:	80.29	25.92	Hialeah	FL	
19:	97.61	30.46	RoundRock	TX	
20:	80.32	33.26	NorthCharleston	SC	

21:	88.76	41.47	Aurora	IL	
22:	82.75	30.16	Gainesville	FL	
23:	84.31	33.96	SandySprings	GA	
24:	74.35	40.58	Woodbridge	NJ	
25:	80.26	27.01	WestPalmBeach	FL	
26:	101.58	33.02	Lubbock	TX	
27:	93.92	30.15	Beaumont	TX	
28:	80.96	28.18	Orlando	FL	
29:	81.61	32.68	Savannah	GA	
30:	73.10	41.67	Waterbury	CT	
31:	105.21	40.18	Boulder	CO	
32:	122.73	45.43	Portland	OR	
33:	119.03	34.54	Ventura	CA	
34:	120.46	39.63	Reno	NV	
35:	80.20	26.15	FortLauderdale	FL	
36:	71.13	41.85	Brockton	MA	
37:	116.77	45.22	Meridian	ID	
38:	71.24	42.48	Cambridge	MA	
39:	121.72	37.85	Antioch	CA	
	1	331		40	107.655
0:	74.08	40.68	JerseyCity	NJ	
1:	98.10	26.77	Edinburg	TX	
2:	83.90	39.64	Dayton	OH	
3:	85.24	33.6	SouthFulton	GA	
4:	85.45	36.84	Louisville	KY	
5:	119.60	36.65	Clovis	CA	
6:	77.31	36.38	NewportNews	VA	
7:	119.04	35.35	Bakersfield	CA	
8:	83.74	42.42	AnnArbor	MI	
9:	82.42	28.83	Gainesville	FL	
10:	80.43	34.46	Columbia	SC	
11:	114.74	36.4	NorthLasVegas	NV	
12:	85.94	40.5	Fishers	IN	
13:	112.00	33.37	Tempe	AZ	
14:	122.26	47.55	Renton	WA	
15:	117.33	34.47	Victorville	CA	
16:	117.44	34.03	JurupaValley	CA	
17:	108.55	45.79	Billings	MT	
18:	101.58	33.02	Lubbock	TX	
19:	88.97	41.99	Rockford	IL	
20:	81.06	41	Akron	OH	
21:	91.08	31.55	BatonRouge	LA	
22:	88.77	37.08	Clarksville	TN	
23:	104.93	39.71	Denver	CO	

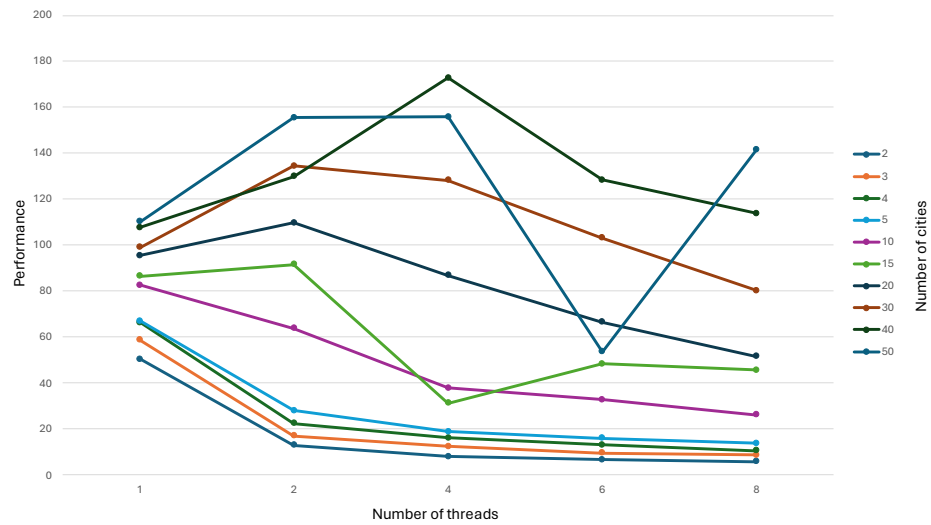
24:	122.17	37.92	Berkeley	CA
25:	71.21	42.29	Cambridge	MA
26:	117.13	32.95	SanDiego	CA
27:	95.18	29.78	Pasadena	TX
28:	77.54	43.03	Rochester	NY
29:	76.90	39.01	Washington	DC
30:	94.34	44.32	Minneapolis	MN
31:	75.31	40.3	Philadelphia	PA
32:	116.40	43.6	Meridian	ID
33:	121.67	37.41	SanJose	CA
34:	97.61	30.46	RoundRock	TX
35:	95.04	38.65	Olathe	KS
36:	120.93	39.1	Roseville	CA
37:	111.98	40.69	WestValleyCity	UT
38:	73.03	41.77	Waterbury	CT
39:	111.65	40.25	Provo	UT
40:	117.17	33.58	Murrieta	CA
41:	117.33	47.67	Spokane	WA
42:	119.63	34.47	Ventura	CA
43:	106.64	33.64	LasCruces	NM
44:	80.40	26.36	CoralSprings	FL
45:	117.93	33.85	Fullerton	CA
46:	118.38	34.23	Burbank	CA
47:	96.94	33.22	Frisco	TX
48:	122.58	45.04	Salem	OR
49:	122.87	38.09	SantaRosa	CA
	1	331	50	110.27
	2	331	2	12.878
	2	331	3	17
	2	331	4	22.474
	2	331	5	27.99
	2	331	10	63.687
	2	331	15	91.578
	2	331	20	109.774
	2	331	30	134.404
	2	331	40	129.932
	2	331	50	155.432
	4	331	2	7.925
	4	331	3	12.452
	4	331	4	16.125
	4	331	5	18.911
	4	331	10	37.776
	4	331	15	31.185
	4	331	20	86.85

4	331	30	128.191
4	331	40	172.744
4	331	50	155.913
6	331	2	6.646
6	331	3	9.554
6	331	4	13.033
6	331	5	15.961
6	331	10	32.77
6	331	15	48.303
6	331	20	66.487
6	331	30	103.066
6	331	40	128.305
6	331	50	53.666
8	331	2	5.78
8	331	3	8.581
8	331	4	10.548
8	331	5	13.729
8	331	10	26.188
8	331	15	45.685
8	331	20	51.566
8	331	30	80.13
8	331	40	113.772
8	331	50	141.649

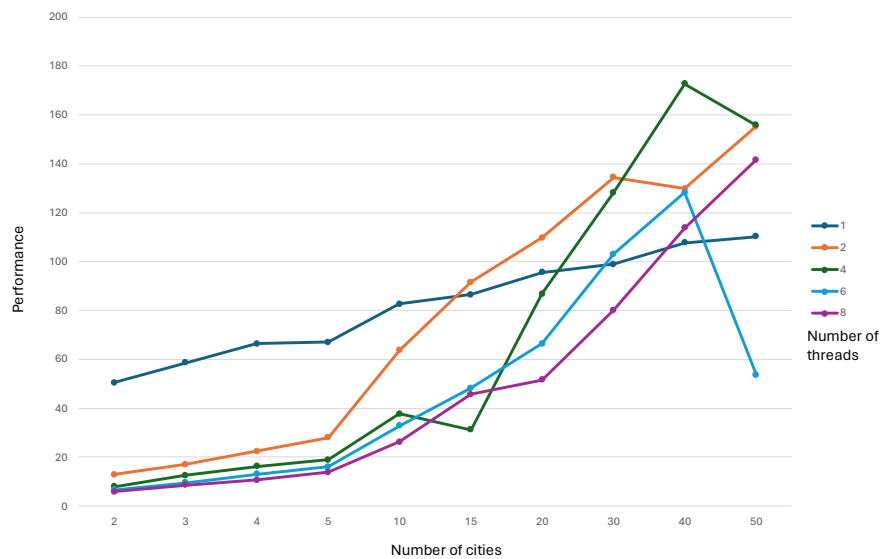
Sum of megaCityCapitalsPerSecond		Column Labels					
Row Labels		1	2	4	6	8	Grand Tot
2		50.414	12.878	7.925	6.646	5.78	83.643
3		58.616	17	12.452	9.554	8.581	106.203
4		66.346	22.474	16.125	13.033	10.548	128.526
5		67.051	27.99	18.911	15.961	13.729	143.642
10		82.599	63.687	37.776	32.77	26.188	243.02
15		86.431	91.578	31.185	48.303	45.685	303.182
20		95.513	109.774	86.85	66.487	51.566	410.19
30		99.01	134.404	128.191	103.066	80.13	544.801
40		107.655	129.932	172.744	128.305	113.77	652.408
50		110.27	155.432	155.913	53.666	141.65	616.93
Grand Total		823.905	765.149	668.072	477.791	497.63	3232.55

Pivot table with columns as number of threads and rows as number of cities.

5. Include a graph of performance vs. NUMT with the colored curves being NUMCAPITALS.



6. Include a graph of performance vs. NUMCAPITALS cities with the colored curves being NUMT.



7. Tell us what you discovered by doing this. What patterns are you seeing in the graphs?

From performance vs. NUMCAPITALS we can see that as the number of capitals to be calculated increases the performance decreases, even if the number of threads is 8. There is a sudden spike or drop due to the inconsistencies in the flip server. From performance vs. NUMT we can see that even though the performance decreases as the NUMCAPITALS increases, the performance also increases as NUMT increases. There is a balance between NUMCAPITALS and NUMT.