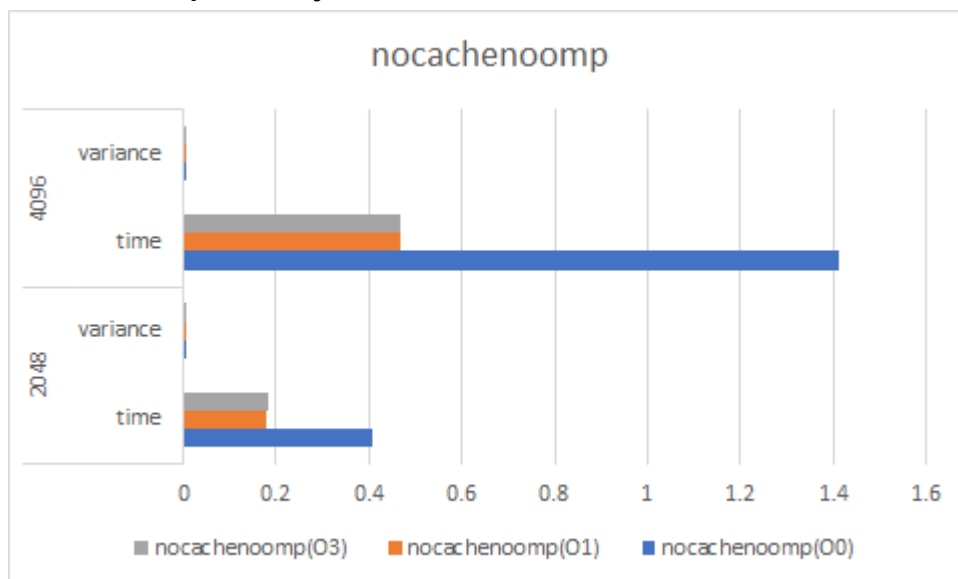


## Izveštaj - Proračun srednje kvadratne greške matrica (Nikola Granolić, 1146/20)

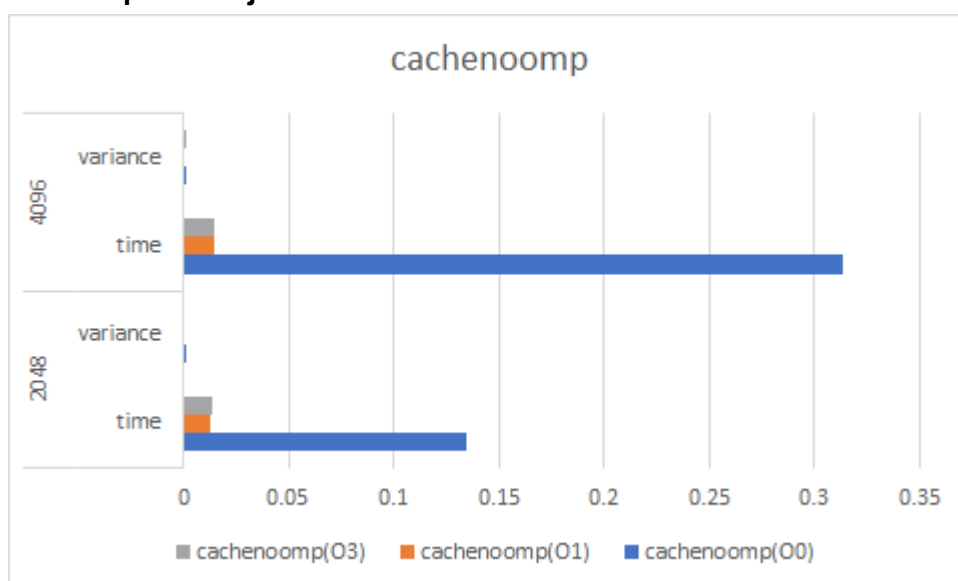
Napomena: sva vremena predstavljaju prosjek koji je izračunat na osnovu 4 različita mjerenja. U svim mjerenjima rezultat je bio isti što potvrđuje ispravnost optimizovanih algoritama. U svim slučajevima kao argumenti programa proslijeđeni su "matA" i "matB" sa odgovarajućim sufiksima koji označavaju dimenzije matrice (nazivi fajlova koji sadrže matrice). Sva vremena su izražena u sekundama (s).

Vrijeme koje je mjereno predstavlja vrijeme provedeno u prolasku kroz matrice (izvršavanje algoritma proračuna srednje kvadratne greške između matrica te kao takvo ne uključuje vrijeme čitanja matrica iz fajlova).

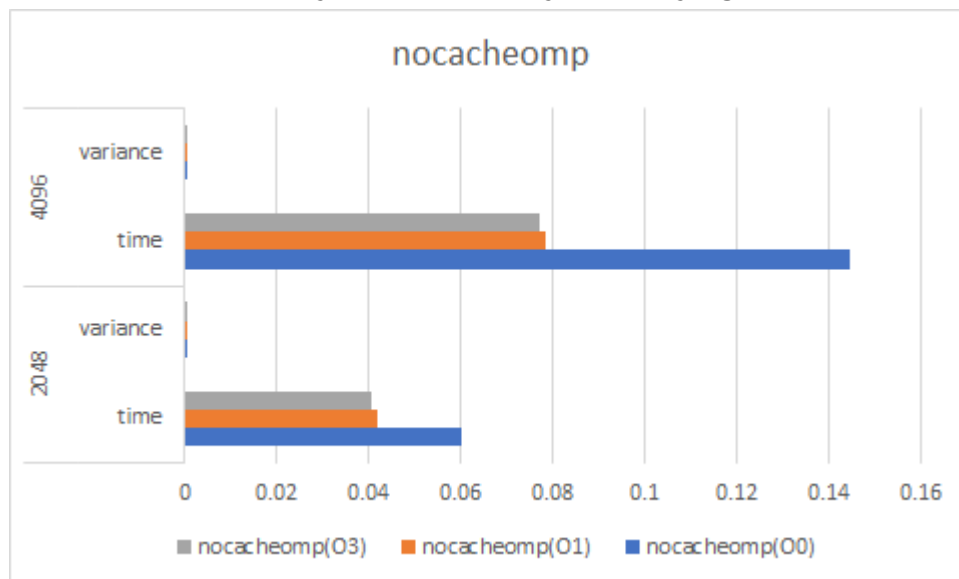
### Bez ikakvih optimizacija:



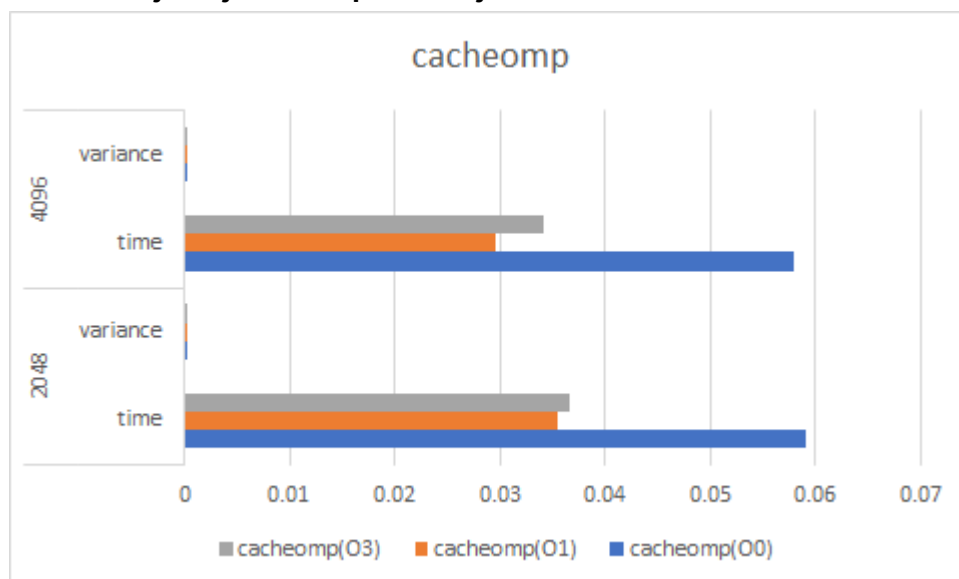
### Sa keš optimizacijom:



**Sa OpenMP optimizacijom (paralelizacija na višejezgarnom procesoru):**



**Kombinacija obje vrste optimizacija:**



## Keš optimizacija (poređenje O0 bez i sa keš optimizacijama):

```
granolic@Nikola:~/Arhitektura_racunara/Projektni$ valgrind --tool=cachegrind ./plainAlgorithmCM_00 matA_4096 matB_4096
==132== Cachegrind, a cache and branch-prediction profiler
==132== Copyright (C) 2002-2017, and GNU GPL'd, by Nicholas Nethercote et al.
==132== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==132== Command: ./plainAlgorithmCM_00 matA_4096 matB_4096
==132==
--132-- warning: L3 cache found, using its data for the LL simulation.
Mean squared error(CM): 66.50
Calculation time(CM): 26.759095
Execution time: 82.359928==132==
==132== I   refs:      24,142,999,960
==132== I1 misses:      1,687
==132== L1i misses:      1,676
==132== I1 miss rate:      0.00%
==132== L1i miss rate:      0.00%
==132==
==132== D   refs:      10,040,949,105 (6,225,283,731 rd + 3,815,665,374 wr)
==132== D1 misses:      35,840,192 ( 33,742,332 rd +  2,097,860 wr)
==132== L1d misses:      35,654,025 ( 33,556,208 rd +  2,097,817 wr)
==132== D1 miss rate:      0.4% ( 0.5% + 0.1% )
==132== L1d miss rate:      0.4% ( 0.5% + 0.1% )
==132==
==132== LL refs:      35,841,879 ( 33,744,019 rd +  2,097,860 wr)
==132== LL misses:      35,655,701 ( 33,557,884 rd +  2,097,817 wr)
==132== LL miss rate:      0.1% ( 0.1% + 0.1% )

granolic@Nikola:~/Arhitektura_racunara/Projektni$ valgrind --tool=cachegrind ./plainAlgorithmCH_00 matA_4096 matB_4096
==148== Cachegrind, a cache and branch-prediction profiler
==148== Copyright (C) 2002-2017, and GNU GPL'd, by Nicholas Nethercote et al.
==148== Using Valgrind-3.18.1 and LibVEX; rerun with -h for copyright info
==148== Command: ./plainAlgorithmCH_00 matA_4096 matB_4096
==148==
--148-- warning: L3 cache found, using its data for the LL simulation.
Mean squared error(CM, CH): 66.50 0.00
Calculation time(CH): 24.487922
Execution time: 79.140399==148==
==148== I   refs:      24,143,001,435
==148== I1 misses:      1,692
==148== L1i misses:      1,681
==148== I1 miss rate:      0.00%
==148== L1i miss rate:      0.00%
==148==
==148== D   refs:      10,040,949,577 (6,225,284,038 rd + 3,815,665,539 wr)
==148== D1 misses:      4,197,407 ( 2,099,546 rd +  2,097,861 wr)
==148== L1d misses:      4,196,725 ( 2,098,907 rd +  2,097,818 wr)
==148== D1 miss rate:      0.0% ( 0.0% + 0.1% )
==148== L1d miss rate:      0.0% ( 0.0% + 0.1% )
==148==
==148== LL refs:      4,199,099 ( 2,101,238 rd +  2,097,861 wr)
==148== LL misses:      4,198,406 ( 2,100,588 rd +  2,097,818 wr)
==148== LL miss rate:      0.0% ( 0.0% + 0.1% )
```

**Tabela sa svim izmjerenim vremenima i varijansama:**

	2048		4096	
	time	variance	time	variance
<b>nocachenomp(O0)</b>	<b>0.4067</b>	<b>0.0007</b>	<b>1.4108</b>	<b>0.002466</b>
<b>nocachenomp(O1)</b>	<b>0.1794</b>	<b>0.000014</b>	<b>0.4676</b>	<b>0.000002</b>
<b>nocachenomp(O3)</b>	<b>0.1851</b>	<b>0.000001</b>	<b>0.4658</b>	<b>0.000014</b>
<b>cachenomp(O0)</b>	<b>0.134643</b>	<b>0.000002</b>	<b>0.312948</b>	<b>0.00001</b>
<b>cachenomp(O1)</b>	<b>0.012972</b>	<b>0</b>	<b>0.015124</b>	<b>0</b>
<b>cachenomp(O3)</b>	<b>0.013678</b>	<b>0</b>	<b>0.014684</b>	<b>0.000001</b>
<b>nocacheomp(O0)</b>	<b>0.060392</b>	<b>0.000025</b>	<b>0.144794</b>	<b>0.000013</b>
<b>nocacheomp(O1)</b>	<b>0.041919</b>	<b>0.000045</b>	<b>0.078312</b>	<b>0.000026</b>
<b>nocacheomp(O3)</b>	<b>0.040466</b>	<b>0.000013</b>	<b>0.077273</b>	<b>0.000039</b>
<b>cacheomp(O0)</b>	<b>0.05904</b>	<b>0.000081</b>	<b>0.057859</b>	<b>0.000041</b>
<b>cacheomp(O1)</b>	<b>0.035539</b>	<b>0.000037</b>	<b>0.029533</b>	<b>0.00012</b>
<b>cacheomp(O3)</b>	<b>0.036612</b>	<b>0.000052</b>	<b>0.03424</b>	<b>0.00001</b>