

**GRUPA: 1**

**ZADATAK: 2**

**NAZIV: KOMPRESIJA PODATAKA**

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Implementirao sam LZW algoritam za kompresiju podataka u c++ i assembly - u

**Nisam implementirao SIMD**

Smatram da ne trebam objašnjavati sami algoritam jer se to podrazumijeva da znam ili se obrađuje pri odbrani projekta.

Ukoliko zelite da pregledate rezultate tj. fajlove kompresovane i dekompresovane kao i velicinu kompajliranih programa koji su optimizovani a i sam kod algoritma za kompresiju ili dekompresiju napisnaim u c++ i neke ostale informacije to se nalazi u folderu **testiranje**, za c++ program testiranje/c++

Korištenje assembly programa:

- pozicionirate se u folder u kome se nalaze fajlovi programa kao main.asm i sl
- zatim **make**
- onda pokrenete program sa **./main**

Korištenje c++ programa:

- **g++ main.cpp Timer.cpp -o main**
- zatim **./main**

Napomene:

- nisam se obazirao na greške koje korisnik prouzrokuje pri korištenju tj. npr. da unese pogrešnu putanju i fajl nepostojeci i sl.
- c++ nije bas identično isti kao i assembly program jer kod c++ postoje neke olakšice kao sto su **map** tako da vrijeme koje se dobije kao rezultat c++ programa treba da bude jos manje.

### Moja Implementacija:

	Compress[s]	Decompress[s]	Compression ratio	Space saving
Test1	0	0	2.991	0.606
Test2	6	0	2.975	0.663
Test3	21	0	2.919	0.657
Test4	47	0	2.862	0.650
Test5	272	0	2.766	0.638
Test6	49	0	2.679	0.626
Test7	366	0	1.061	0.058
Test8	0	0	1.327	0.246

Vrijeme izvršavanja sljedeća dva algoritma je zanemarljiva tj je približno 0[s] za sve primjere od Test 1 ... Test 8 !!!!!!!!!!!!!!!

### BZIP2

	Compression Ratio	Space Saving
Test1	6.757	0.852
Test2	4.663	0.7856
Test3	3.973	0.7483
Test4	3.648	0.7259
Test5	3.277	0.6948
Test6	45.966	0.9782
Test7	1.326	0.246
Test8	2.440	0.5901

1. test.txt: 6.757:1, 1.184 bits/byte, **85.20% saved**, 133381 in, 19741 out.
2. test.txt: 4.663:1, 1.716 bits/byte, **78.56% saved**, 171304 in, 36735 out.
3. test.txt: 3.973:1, 2.014 bits/byte, **74.83% saved**, 213102 in, 53644 out.
4. test.txt: 3.648:1, 2.193 bits/byte, **72.59% saved**, 258213 in, 70778 out.
5. test.txt: 3.277:1, 2.441 bits/byte, **69.48% saved**, 500459 in, 152718 out.
6. test.txt: 45.966:1, 0.174 bits/byte, **97.82% saved**, 217281 in, 4727 out.
7. test.txt: 1.326:1, 6.032 bits/byte, **24.60% saved**, 210358 in, 158610 out.
8. test.txt: 2.440:1, 3.279 bits/byte, **59.01% saved**, 7348 in, 3012 out.

Dodatne informacije: <https://en.wikipedia.org/wiki/Bzip2>

## GZIP

	Compression Ratio	Space Saving
<b>Test1</b>	6.475	0.845
<b>Test2</b>	4.421	0.776
<b>Test3</b>	3.732	0.735
<b>Test4</b>	3.418	0.71
<b>Test5</b>	3.031	0.67
<b>Test6</b>	61.27	0.984
<b>Test7</b>	1.329	0.248
<b>Test8</b>	2.212	0.551

1. test.txt: 84.5% -- replaced with test.txt.gz
2. test.txt: 77.6% -- replaced with test.txt.gz
3. test.txt: 73.5% -- replaced with test.txt.gz
4. test.txt: 71.0% -- replaced with test.txt.gz
5. test.txt: 67.0% -- replaced with test.txt.gz
6. test.txt: 98.4% -- replaced with test.txt.gz
7. test.txt: 24.8% -- replaced with test.txt.gz
8. test.txt: 55.1% -- replaced with test.txt.gz

### Dodatne informacije:

<https://en.wikipedia.org/wiki/Gzip#:~:text=From%20Wikipedia%2C%20the%20free%20encyclopedia%20gzip%20is%20a,use%20by%20GNU%20%28the%20%22g%22%20is%20from%20%22GNU%22%29.>

### Optimizacija c++ programa:

- **BEZ OPTIMIZACIJE**
  - g++ -o main main.cpp Timer.cpp
  - -rwxr-xr-x 1 aleksandar aleksandar **90K** Jan 24 21:00 main
  - g++ -S main.cpp
  - **main.s = 443.3 KB**
- **os**
  - g++ -Os -o main main.cpp Timer.cpp
  - -rwxr-xr-x 1 aleksandar aleksandar **27K** Jan 24 21:03 main
  - g++ -Os -S main.cpp
  - **main.s = 62.9 KB**
- **o1**
  - g++ -O1 -o main main.cpp Timer.cpp
  - -rwxr-xr-x 1 aleksandar aleksandar **32K** Jan 24 21:04 main
  - g++ -O1 -S main.cpp
  - **main.s = 95.4 KB**
- **o2**
  - g++ -O2 -o main main.cpp Timer.cpp
  - -rwxr-xr-x 1 aleksandar aleksandar **31K** Jan 24 21:05 main
  - g++ -O2 -S main.cpp
  - **main.s = 90.7 KB**
- **o3**
  - g++ -O3 -o main main.cpp Timer.cpp
  - -rwxr-xr-x 1 aleksandar aleksandar **42K** Jan 24 21:05 main
  - g++ -O3 -S main.cpp
  - **main.s = 116.1 KB**

- BEZ OPTIMIZACIJE

	Compression Time[s]	Decompression Time[s]
Test1	0.124	0.045
Test2	0.184	0.059
Test3	0.248	0.084
Test4	0.322	0.116
Test5	0.694	0.266
Test6	0.299	0.122
Test7	0.496	0.364
Test8	0.022	0.018

- OS

	Compression Time[s]	Decompression Time[s]
Test1	0.084	0.011
Test2	0.092	0.016
Test3	0.096	0.023
Test4	0.142	0.031
Test5	0.284	0.067
Test6	0.120	0.030
Test7	0.200	0.090
Test8	0.034	0.006

- o1

	Compression Time[s]	Decompression Time[s]
Test1	0.065	0.012
Test2	0.078	0.016
Test3	0.071	0.023
Test4	0.094	0.029
Test5	0.220	0.067
Test6	0.096	0.030
Test7	0.186	0.088
Test8	0.024	0.005

- o2

	Compression Time[s]	Decompression Time[s]
Test1	0.054	0.013
Test2	0.065	0.015
Test3	0.070	0.021
Test4	0.095	0.029
Test5	0.217	0.062
Test6	0.093	0.030
Test7	0.171	0.086
Test8	0.026	0.005

- o3

	Compression Time[s]	Decompression Time[s]
Test1	0.047	0.010
Test2	0.063	0.020
Test3	0.073	0.022
Test4	0.096	0.029
Test5	0.218	0.064
Test6	0.093	0.029
Test7	0.184	0.086
Test8	0.022	0.005