Documentación
PRÁCTICA 6

Estructura de computadores

UNIVERSIDAD
DE GRANADA

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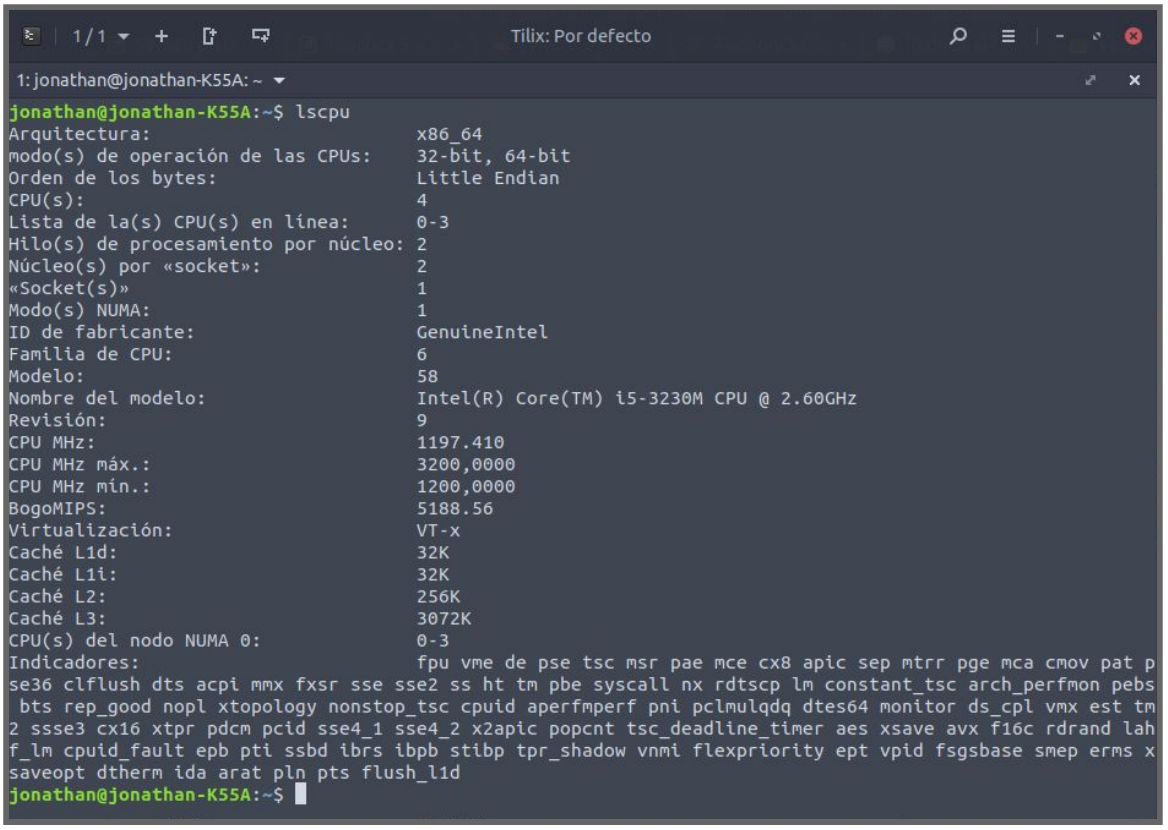
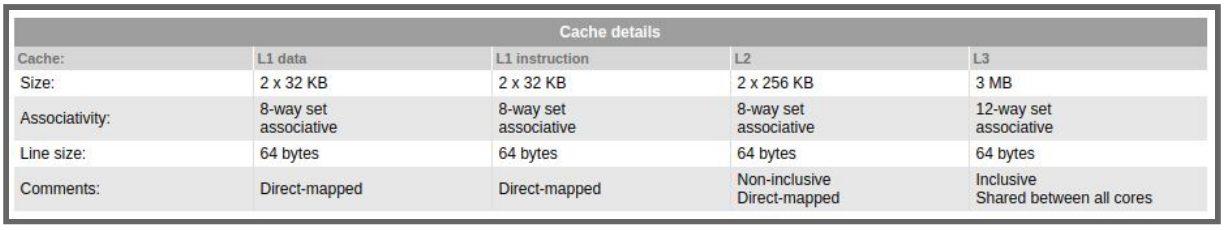
lscpu



cpu-world



Cache details				
Cache:	L1 data	L1 instruction	L2	L3
Size:	2 x 32 KB	2 x 32 KB	2 x 256 KB	3 MB
Associativity:	8-way set associative	8-way set associative	8-way set associative	12-way set associative
Line size:	64 bytes	64 bytes	64 bytes	64 bytes
Comments:	Direct-mapped	Direct-mapped	Non-inclusive Direct-mapped	Inclusive Shared between all cores

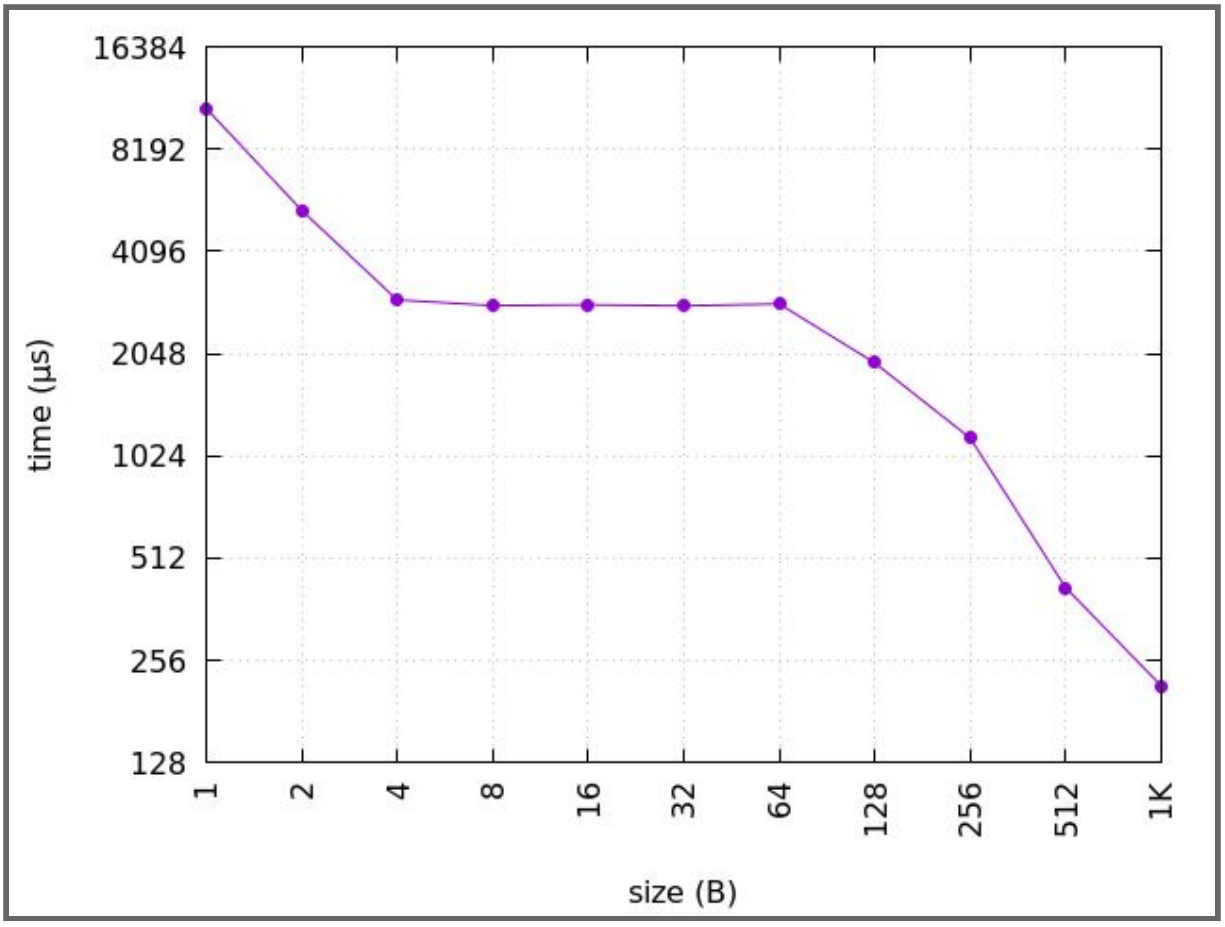
line.cc

Código

```
int main()
{
      std::cout << "#"
                << std::setw(GAP - 1) << "line (B)"
                << std::setw(GAP    ) << "time (µs)"
```

```
                << std::endl;

      for (unsigned line = 1; line <= MAXLINE; line <<= 1) // line in
bytes
      {
            std::vector<duration<double, std::micro>> score(REP);

            for (auto &s: score)
            {
                  std::vector<char> bytes(1 << 24); // 16MB

                  auto start = high_resolution_clock::now();

                  for (unsigned i = 0; i < bytes.size(); i += line)
                        bytes[i] += 1;

                  auto stop = high_resolution_clock::now();

                  s = stop - start;
            }

            std::nth_element(score.begin(),
                             score.begin() + score.size() / 2,
                             score.end());

            std::cout << std::setw(GAP) << line
                      << std::setw(GAP) << std::fixed <<
std::setprecision(1)
                      << std::setw(GAP) << score[score.size() /
2].count()
                      << std::endl;
      }
}
```

Gráfica



Podemos observar cómo se produce un cambio drástico en la velocidad a partir de 64B que se estabiliza, debido a que el tamaño de línea de mi ordenador es precisamente 64B. De esta manera, por debajo de 64, el tiempo es muy similar ya que no se producen errores de caché.

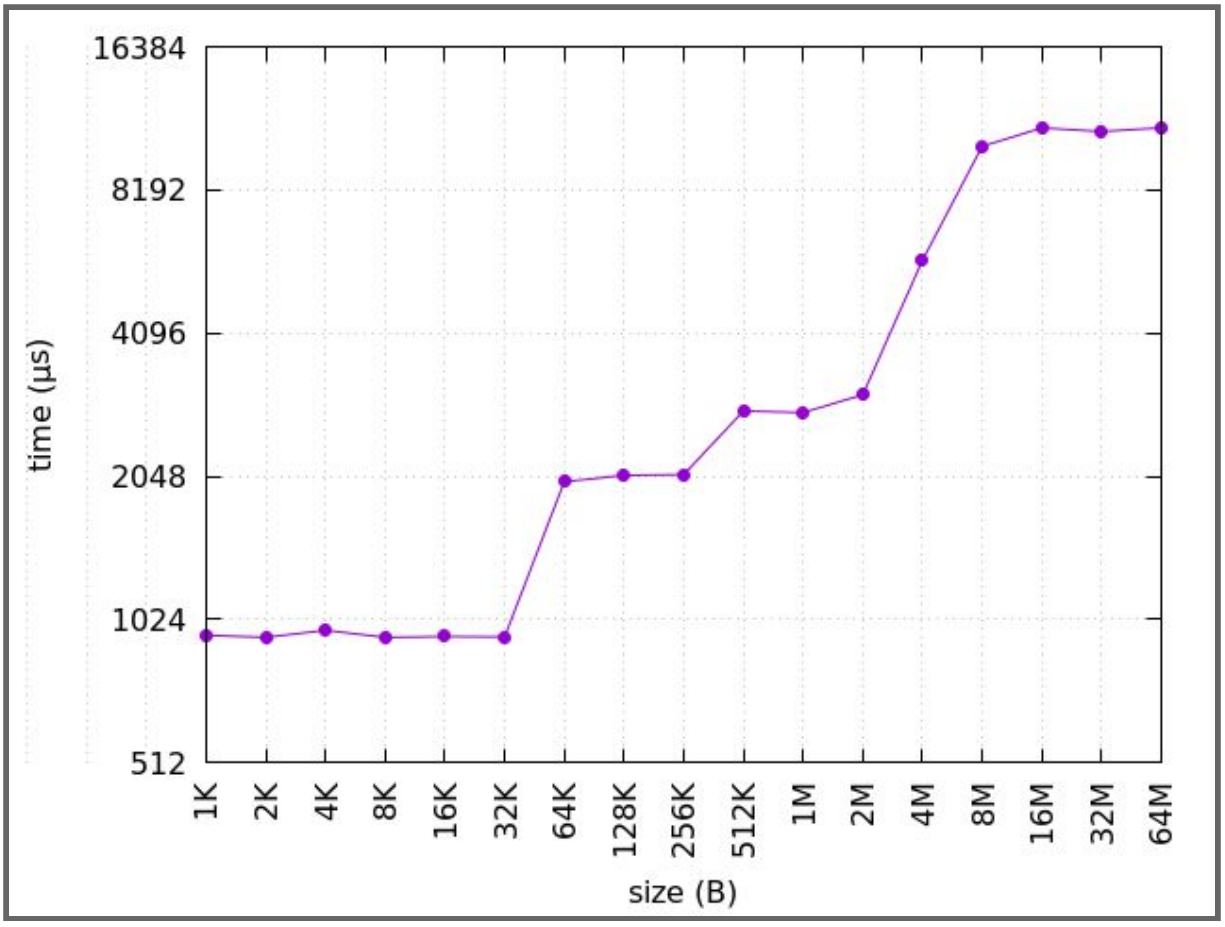
size.cc

Código

```
int main()
{
	std::cout << "#"
		  << std::setw(GAP - 1) << "line (B)"
		  << std::setw(GAP    ) << "time (µs)"
		  << std::endl;

	for (unsigned size = MINSIZE; size <= MAXSIZE; size *= 2)
```

```
      {
            std::vector<duration<double, std::micro>> score(REP);

            for (auto &s: score)
            {
                  std::vector<char> bytes(size);

                  auto start = high_resolution_clock::now();

                  for (unsigned i = 0; i < STEPS; ++i){
                        bytes[i* (1<<6) & (size - 1)]++;
                  }

                  auto stop = high_resolution_clock::now();

                  s = stop - start;
            }

            std::nth_element(score.begin(),
                        score.begin() + score.size() / 2,
                        score.end());

            std::cout << std::setw(GAP) << size
                      << std::setw(GAP) << std::fixed <<
std::setprecision(1)
                      << std::setw(GAP) << score[score.size() /
2].count()
                      << std::endl;
      }
}
```

Gráfica



En esta gráfica podemos observar los diferentes niveles de cache, que en mi caso, son 3:

- L1: 32K
- L2: 256K
- L3: 3M

y los saltos de tiempos que se producen en cada uno de ellos, siendo más notables los saltos de L1 y L3