Q4.

a.

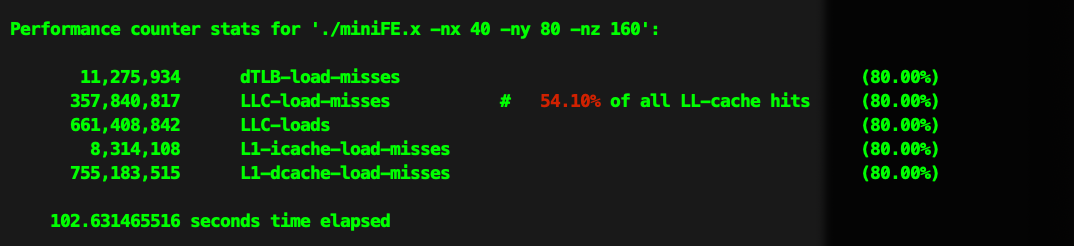
|  |  |  |  |
| --- | --- | --- | --- |
| Index | Name of Function | Number of Calls | Percentage of Execution Time |
| 1. | miniFE::matvec\_std<miniFE::CSRMatrix<double, int, int>, miniFE::Vector<double, int, int> >::operator()(miniFE::CSRMatrix<double, int, int>&, miniFE::Vector<double, int, int>&, miniFE::Vector<double, int, int>&) | 201 | 32 |
| 2. | frame\_dummy | 1622833938 | 15.96 |
| 3. | std::\_Rb\_tree<int, int, std::\_Identity<int>, std::less<int>, std::allocator<int> >::\_S\_key(std::\_Rb\_tree\_node<int> const\*) | 57598102 | 5.81 |
| 4. | std::\_Rb\_tree\_node<int>::\_M\_valptr() | 435928532 | 5.57 |
| 5. | std::pair<int const, int>\* std::\_\_addressof<std::pair<int const, int> >(std::pair<int const, int>&) | 510695430 | 3.93 |
| 6. | void miniFE::Hex8::diffusionMatrix\_symm<double>(double const\*, double const\*, double\*) | 512000 | 3.44 |
| 7. | int\* std::lower\_bound<int\*, unsigned long>(int\*, int\*, unsigned long const&) | 32768000 | 3.36 |
| 8. | std::\_Rb\_tree<int, int, std::\_Identity<int>, std::less<int>, std::allocator<int> >::\_S\_value(std::\_Rb\_tree\_node<int> const\*) | 435792686 | 3.27 |

b. Speedup = 1/[(1-P)\*(P/N)] = 1/[0.68 + 0.32/5] = 1.34408X

c.

A picture containing wall

Description automatically generated



Screen of a cell phone

Description automatically generated