

Assignment #3

Due: 3/28/2011

Assignment #2

Due: 3/23/2010

1. Matrix-vector multiplication
2. BLAS-2 performance

1. Matrix-Vector Multiplication

HW03/1.cpp

1. Write a program to do matrix-vector product with the following prototype:

```

MATxV_row(const int n, const double *mat, const double *v, double
*out);
MATxV_col(const int n, const double *mat, const double *v, double
*out);
bool check(const int n, const double *a, const double *b);
// return true if a & b are identical, false otherwise.
    
```

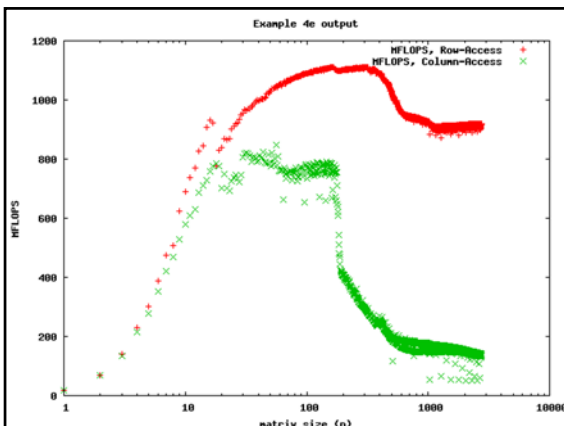
- a) MATxV_row access mat matrix in row-major fashion (e.g. mat[0][0], mat[0][1], mat[0][2], ... ,mat[1][0],mat[1][1], ...) to compute the matrix-vector product.
- b) MATxV_col access mat matrix in column-major fashion (e.g. mat[0][0], mat[1][0], mat[2][0], ... ,mat[0][1],mat[1][1], mat[2][1] ...) to compute the matrix-vector product.
- c) Use these two functions to compute a matrix-vector product generated by random variables (rand(), cstdlib), compare their answers using the function check() to verify that you have implemented these two functions correctly.

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2. Matrix-Vector Multiplication (II)

- d) Compare the time used in computation between MATxV_row and MATxV_col, which one is faster? Assume T1 is the computation time for using MATxV_row, and T2 is the computation time for MATxV_col. Plot N vs. T2/T1 and explain what you observed.
- e) Plot N vs. MFLOPS. How kind of numbers do you get? Are they close to theoretical peaks of the CPUs that you use?

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2. BLAS-2

HW03/2.cpp

- Modify your 1.cpp and replace function calls to your function MATxV_col into using MKL BLAS-2 function to perform matrix-vector product. The purpose is to investigate the performance different between your C++ code and BLAS-2 function. By plotting similar graphs as in 2, please discuss how the performance curve look like, and how much difference in performance you have observed in using your own C++ code versus using MKL BLAS-2 functions.

Deliverables

- HW03/ at your home directory:
 - Given: stopWatch.o, stopWatch.h
 - 01Row.cpp, 01Col.cpp
 - 02.cpp, and other programs that you use to compare performances ...
 - Makefile
- Upload to BlackBoard:
 - Word document or PDF with your collected data, graphs, and discussions.