

ComS 425: Homework # 2 (Part II) — 60 points

Due Feb. 1, 2007, in class

1. (30 points) Insert OpenMP directives into the following code segments such that the most parallelism is uncovered.

(a)

```
for (i = 0; i < (int) sqrt (x); i++) {
    a[i] = 2.3 * i ;
    if (i < 10) b[i] = a[i] ;
}
```

(b)

```
flag = 0;
for (i = 0; (i < n) & (!flag); i++) {
    a[i] = 2.3 * i ;
    if (a[i] < b[i]) flag = 1 ;
}
```

(c)

```
for (i = 0; i < n; i++)
    a[i] = foo(i) ;
```

(d)

```
for (i = 0; i < n; i++) {
    a[i] = foo(i) ;
    if (a[i] < b[i]) a[i] = b[i] ;
}
```

(e)

```
dotp = 0;
for (i = 0; i < n; i++)
    dotp += a[i] * b[i];
```

(f)

```
for (i = k; i < 2*k; i++)
    a[i] = a[i] + a[i-k];
```

2. (30 points) Use OpenMP directives to implement a column-oriented parallel version of matrix-vector multiplication. Run your program on **hpc-class** for matrix dimensions

$n = 2^k$, $k = 8, 10, 12$ and number of threads $t = 1, 2, 4$. Each element of the matrix is defined as $a_{ij} = (i + j) * k$ and is a double precision number. Take $b_i = k/i$, also as double precision number.

Submit the following items:

- (a) listing of your program;
- (b) your batch script;
- (c) timing of your program for all the values n and t ;
- (d) the value of $\sum_i^n c_i$.

Send me by email the source file of your program.