OpenMP Basics - Solutions to Exercises

S. Van Criekingen
UPJV / MeCS

www.mecs.u-picardie.fr

December 4, 2014

UNIVERSITÉ de Picardie Jules Verne

PICARDIE LA RÉGION

AMIENS MÉTROPOLE

Solution of exercise 3 (C)

InitVecSol.c

```
{
  [...]
   int nthreads = 2;
   omp_set_num_threads(nthreads);
   int chunk = N/nthreads
   x = (double*) malloc (N*sizeof(double));

   startTime = omp_get_wtime();
   for ( j=0; j < nloops; ++j ) {
     #pragma omp parallel private(i) shared(x,N)
     {
       #pragma omp for schedule(static,chunk)
       for ( i=0; i < N; ++i ) x[i] = 1.;
     }
   }
   endTime = omp_get_wtime();
   printf("With %d thread(s): global time = %10.5f\n", nthreads, endTime - startTime);

   free (x);
}
```

Solution of exercise 3 (Fortran)

InitVecSol.f90

```
{
   […] double precision, allocatable :: x(:)

    integer :: nthreads = 2
    call omp_set_num_threads(nthreads)
    chunk = N/nthreads

    allocate(x(N))
    do j = 1,nloops
    !$omp parallel private(i) shared(N)
      !$omp do schedule(static)
      do i = 1,N
         x(i) = 1.
      enddo
      !$omp end do
    !$omp end parallel
    enddo
  endTime = omp_get_wtime();
  write(*,'(a,i2,a,f10.5)') 'With ', nthreads,' threads: global time =', endTime - startTime
  deallocate(x)
}
```

Note: exercise 3 on MeCS uv100

- **Times in seconds**
- **Speed-up $S_N = T_1 / T_N$**
- **Efficiency $E_N = S_N / N$**

nthreads	time	Speed up	Efficiency
1	114		
2	65	1,8	0,9
4	46	2,5	0,6
8	40	2,9	0,4

Static schedule type

```
int N = 5e6;
int nloops = 15000;
```

Solution of Exercise 4 (product reduction)

reductionProduct.c

```
[…] N=5, var=1;
omp_set_num_threads(4);
#pragma omp parallel shared(var,N) private(i,tid)
{
 tid = omp_get_thread_num();
 #pragma omp for schedule(static, chunk) reduction(*:var)
 for (i=0; i < N; i++)
 {
  var *= 2;
 }
 printf("On thread %d, var=%d \n", tid, var);
}
```

```
>  ./a.out | sort
On thread 0, var=32
On thread 1, var=32
On thread 2, var=32
On thread 3, var=32
```