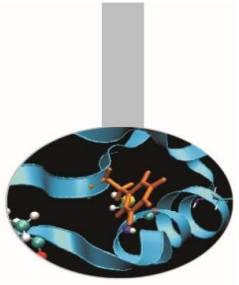
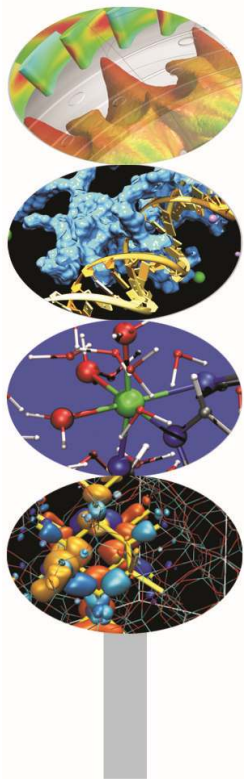
CINECA SCAI
SuperComputing Applications and Innovation



Profiling

- Exercises -

P.Dagna, M.Cremonesi



May 2016

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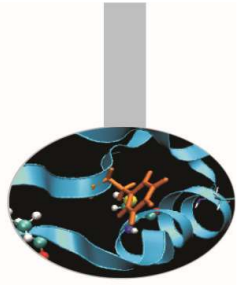
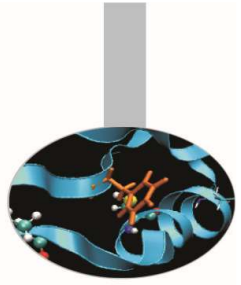
Matrix Multiplication



The program (mat_mult.f90, mat_mult.c), given the matrices A(L,M), B(M,N), C(L,N) computes C = A x B. Moreover if the value of the external loop counter is even, to the element (i,j) of the C matrix we add 4*i^i, otherwise 9*i^i. Check with gprof and gcov the hot spots inside the source and try to find out a solution to increase the efficiency.

```
// Matrix multiplication
for(i=0;i<a_r; i++) {
    for(j=0;j<b_c; j++) {
       for(k=0;k<a_c; k++){
          if (i%2==0) {
            inc=4*pow((double)i,(double)i);
            c[i][j]=c[i][j]+a[i][k]*b[k][j] +inc;
            }
          else {
            inc=9*pow((double)i,(double)i);
            c[i][j]=c[i][j]+a[i][k]*b[k][j] +inc;
          }
       }
   }
}
```

Transport equation



Using scalasca execute the following steps:

- Compile the source `transport_mpi` with the commands
  - `module load autoload scalasca`
  - `scalasca -instrument mpicc transport_mpi.c \`
    `-o transport_mpi`
- Run the executable with MPI processes
  - `scalasca -analyze mpirun transport_mpi`
- *Analyze the results using cube*

Source code: *transport_mpi*