Compilers for Parallel Systems SS 2018 185.A64

H. Moritsch

Homework 2018-05-05

1. For the following program

```
L  for i = 1 to 100
      for j = 1 to 100
         S a[i,j]=i*100+j
      end for
   end for

L' for i = 2 to 99
      for j = 1 to 100
         S' a[i,j]=(a[i-1,j]+a[i+1,j])/2.0
      end for
   end for

L" for i = 1 to 100
      for j = 2 to 99
         S" a[i,j]=(a[i,j-1]+a[i,j+1])/2.0
      end for
   end for
```

give

- the iteration space of the loops L, L', L",
- the execution index sets [S], [S'], [S"],
- the standard execution order for the instances of S' and S",
- the control sets [S',S'] and [S",S"],
- for [S',S']: dist((2,1),(99,1)), dist((2,1),(99,100)), dist((2,100),(99,1)), dir((2,100),(99,100)), dir((99,100),(99,1)), dir((99,1),(2,1))
- dir([S',S'])

By adding a loop L_

```
L_ for k=1 to 1
      L
      L'
      L"
end for
```

give also the control sets [S,S'], [S,S"], [S',S"].

See matrix multiplication example.

2. eflf.zip contains a source-to-source compiler from EFL to Fortran 90. Fortran 90 can be compiled with gfortran (http://gcc.gnu.org/wiki/GFortran).

Get familiar with the compiler and extend the code generation such that the generated code logs all accesses to array elements (USE: write access, DEF: read access).

See implementation of DEF in efl2f.c and example test1.efl, test1_log.f90.

Abgabe: Senden Sie Ihre Lösungen bis 17.5. 9:00 an hans@complang.tuwien.ac.at. Geben Sie bitte als Betreffzeile “COMPAR: Homework 1, Nachname” an und hängen Sie die Antworten auf die Textfrage 1 als PDF-Datei, den Code für Teilaufgabe 2 als .c-Datei an.