

Übung 5

1 konkrete Schleifentransformation

```
for(i=1; i≤2; i++)  
  for(j=1; j≤3; j++)  
    for(k=1; k≤2; k++)  
      for(h=1; h≤3; h++)  
        A[i][j][k][h] = fun(i,j,k,h);
```

1.1 Verschmolzene Schleife

```
for (l=1; l≤36; l++)  
  i =  $\lceil \frac{l}{18} \rceil - 2 \lfloor \frac{l-1}{36} \rfloor$   
  j =  $\lceil \frac{l}{6} \rceil - 3 \lfloor \frac{l-1}{18} \rfloor$   
  k =  $\lceil \frac{l}{3} \rceil - 2 \lfloor \frac{l-1}{6} \rfloor$   
  h =  $l - 3 \lfloor \frac{l-1}{3} \rfloor$   
  A[i][j][k][h] = fun(i,j,k,h);
```

1.2 Prozessorzugriff

- $P = 3$
- $N = 36$
- jeder Prozessor übernimmt $r = \lceil \frac{36}{3} \rceil = 12$ Iterationen

p=1: A[1][1...2][1...2][1...3]
p=2: A[1...2][3...1][1...2][1...3]
p=3: A[2][2...3][1...2][1...3]

2 Gemischter Schleifenkomplex

```

for(i=0; i<N4; i++) // parallel
  for(j=0; j<N3; j++)
    for(k=0; k<N2; k++) // parallel
      for(h=0; h<N1; h++)
        A[i][j][k][h] = A[i][j+1][k][h+1]

```

transformiert:

```

for(j=0; j<N3; j++)
  for(h=0; h<N1; h++)
    forall(l=1; l≤N4*N2+1; l++)
      i = ⌈ $\frac{l}{N2}$ ⌉ - N4 ⌊ $\frac{l-1}{N2 \times N4}$ ⌋ - 1
      k = l - N2 ⌊ $\frac{l-1}{N2}$ ⌋ - 1
      A[i][j][k][h] = A[i][j+1][k][h+1]

```