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Fortran challenges

Towards Fortran coverage – with code discussion (multi_sdfg branch)

Offsets

AST transformation
Array(-8:34, 45:50) Default: 1

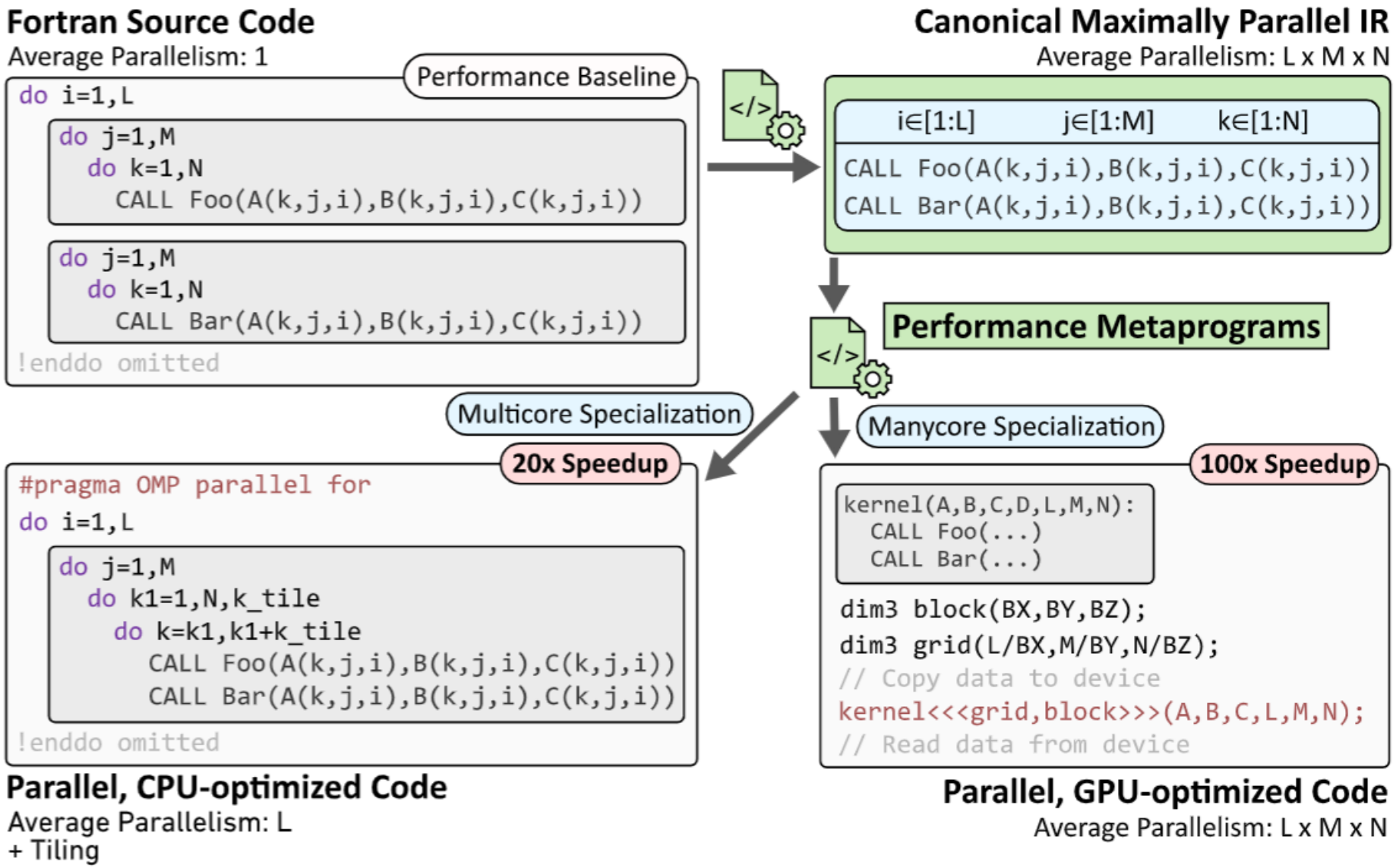
Subroutines

Slices, array slices structure views, global contexts

Nested structures

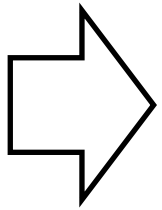
StructArrays in DaCe

Overall plan



Continues in loops

```
26          PROGRAM if_cycle_test
27          implicit none
28          double precision :: d(4)
29          CALL if_cycle_test_function(d)
30          end
31
32          SUBROUTINE if_cycle_test_function(d)
33          double precision d(4,5)
34          integer :: i
35          DO i=1,4
36            if (i .eq. 2) CYCLE
37            d(i)=5.5
38          ENDDO
39          if (d(2) .eq. 42) d(2)=6.5
40
41
42          END SUBROUTINE if_cycle_test_function
```



```
16      for (_for_it_0 = 1; (_for_it_0 <= 4); _for_it_0 = (_for_it_0 + 1)) {
17
18          if ((! (_for_it_0 == 2))) {
19              {
20
21                  {
22                      double d_out_1;
23
24                      ////////////////////
25                      // Tasklet code (T_113_c13)
26                      d_out_1 = 5.5;
27                      ////////////////////
28
29                      d[(_for_it_0 - 1)] = d_out_1;
30                  }
31
32              }
33
34          }
35
36
37      }
```

Offsets and placeholders

```
484   TYPE t_nh_state
485
486     !array of prognostic states at different timelevels
487     TYPE(t_nh_prog),  ALLOCATABLE :: prog(:)       !< shape: (timelevels)
488     TYPE(t_nh_diag)    :: diag
489     TYPE(t_nh_ref)     :: ref
490     TYPE(t_nh_metrics) :: metrics
491
492   END TYPE t_nh_state
```

```
49    TYPE t_nh_prog
50
51      REAL(wp), POINTER, CONTIGUOUS :: &
52        w(:,:,:),          & !> orthogonal vertical wind (nproma,nlevp1,nblks_c)     [m/s]
53        vn(:,:,:),         & !! orthogonal normal wind (nproma,nlev,nblks_e)         [m/s]
54        rho(:,:,:),        & !! density (nproma,nlev,nblks_c)                     [kg/m^3]
55        exner(:,:,:),      & !! Exner pressure (nproma,nlev,nblks_c)                  [-]
56        theta_v(:,:,:),    & !! virtual potential temperature (nproma,nlev,nblks_c)    [K]
57        tracer(:,:,:,:),   & !! tracer concentration (nproma,nlev,nblks_c,ntracer) [kg/kg]
58        tke    (:,:,:)     & !! turbulent kinetic energy                          [m^2/s^2]
59          => NULL()          !! (defined on half levels) with 2 time levels
60      TYPE(t_ptr_2d3d),ALLOCATABLE :: tracer_ptr(:)  !< pointer array: one pointer for each tracer
61      TYPE(t_ptr_tracer),ALLOCATABLE :: conv_tracer(:,:)
62      TYPE(t_ptr_tracer),ALLOCATABLE :: turb_tracer(:,:)
63    END TYPE t_nh_prog
```

Offsets and placeholders

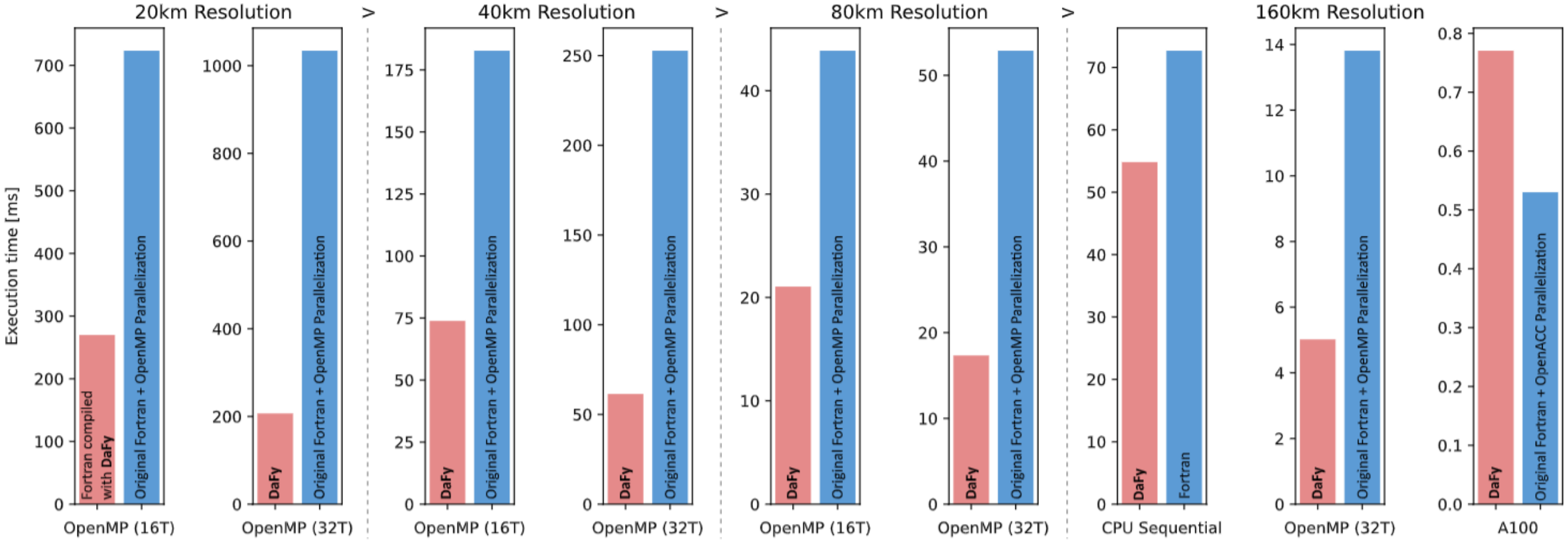
```
15  struct t_dist_dir {
16      int __f2dace_SA_owner_d_0_s_3713;
17      int __f2dace_SOA_owner_d_0_s_3713;
18      int comm;
19      int comm_rank;
20      int comm_size;
21      int global_size;
22      int local_start_index;
23  };
```

```
3117    int __f2dace_SA_ddxt_z_full_c_d_2_s_5247_p_metrics_43;
3118    int __f2dace_SOA_ddxt_z_full_v_d_0_s_5248_p_metrics_43;
3119    int __f2dace_SOA_ddxt_z_full_v_d_1_s_5249_p_metrics_43;
3120    int __f2dace_SOA_ddxt_z_full_v_d_2_s_5250_p_metrics_43;
3121    int __f2dace_SA_ddxt_z_full_v_d_0_s_5248_p_metrics_43;
```

```
DACE_EXPORTED velocity_tendencies_state_t *__dace_init_velocity_tendencies(t_nh_diag* p_diag, t_int_state* p_int,
{
    int __result = 0;
    velocity_tendencies_state_t *__state = new velocity_tendencies_state_t;


    tmp_struct_symbol_0=p_patch->nlev;
    tmp_struct_symbol_1=p_patch->nlevp1;
    tmp_struct_symbol_2=p_patch->nlev;
    tmp_struct_symbol_3=p_patch->nblks_c;
    tmp_struct_symbol_4=p_patch->nlev;
    tmp_struct_symbol_5=p_patch->nblks_e;
    tmp_struct_symbol_6=p_patch->nlevp1;
    tmp_struct_symbol_7=p_patch->nblks_v;
    tmp_struct_symbol_8=p_patch->nlev;
    tmp_struct_symbol_9=p_patch->nblks_v;
    tmp_struct_symbol_10=p_patch->nlev;
    tmp_struct_symbol_11=p_patch->nblks_c;
    tmp_struct_symbol_12=p_patch->nblks_c;
    tmp_struct_symbol_13=p_patch->nblks_c;
    tmp_struct_symbol_14=p_patch->nlev;
    tmp_struct_symbol_15=p_patch->nlev;
    tmp_struct_symbol_16=p_patch->nlevp1;
    __f2dace_SOA_neighbor_idx_d_0_s_3126_cells_p_patch_4 = p_patch->cells->__f2dace_SOA_neighbor_idx_d_0_s_3126;
    __f2dace_SOA_neighbor_idx_d_1_s_3127_cells_p_patch_4 = p_patch->cells->__f2dace_SOA_neighbor_idx_d_1_s_3127;
```

Results



Current ICON results