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DaFlEx

C2DaCe challenges

- **Classes**
  - Inheritance
  - Contexts
- **Recursions**
  - Tail recursion
  - Indirect recursion
- **Pointers**
  - Unrestrictred arithmetic
- **Stateful library calls**
  - Automatic assessment
- **Template programming**
- **Library nodes**
- **Encapsulation**

F2DaCe challenges

- **Generalized views**
- **Vector operations**
- **Labels & GoTo's**
- **Intrinsic function coverage**
- **Modern Fortran**

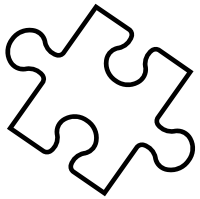
DaCe challenges

- **Application-level ToGPU transform**
  - + Associated transforms

Engineering efforts

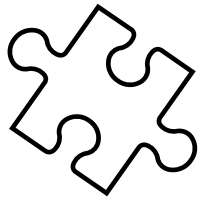
Research efforts

Application-level ToGPU transform



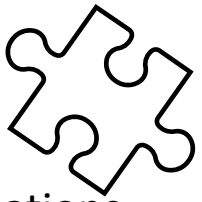
Map Fission 100%

- On any SDFG
- Must handle
  - Edge assignments
  - Scalars
  - Control flow



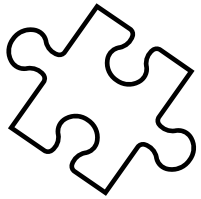
Map Fusion

- On any pair of Maps
- Must accept
  - Conditions
- Needs helper Transformations



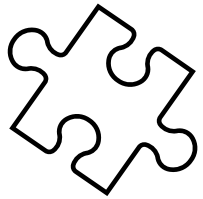
Map to GPU 100%

- Must work on arbitrary Maps
- Not a state-level transformation



Performance heuristics

- Guide SDFG transformations
- Must handle
  - Application requirements
  - Hardware capabilities



Data instrumentation 100%

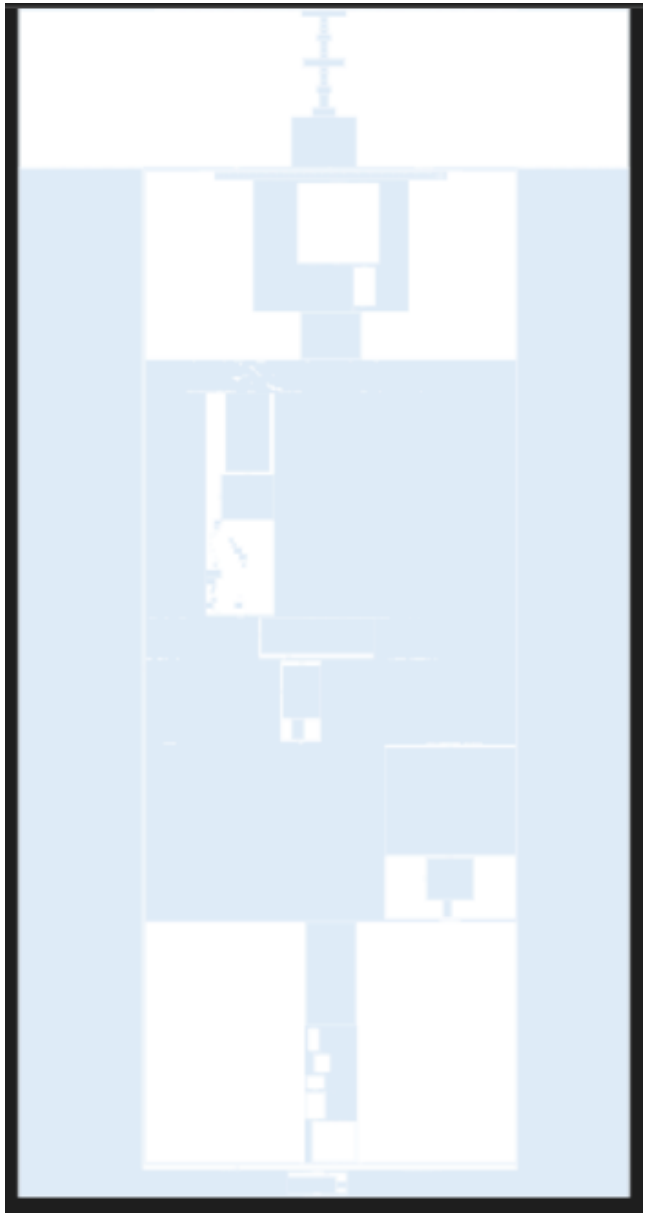
- Simplifies debugging
- Allows faster heuristics development

CloudSC

- **Fully compilable SDFG**
- **Only 160 loops parallelized – 30 loops not parallelized**
  - 26 of which have a range of 1:5 or less
  - 2 of which have loop carried dependencies
  - 2 are still WIP
- **New kind of transformation planned to trade memory footprint with parallelizability**
- **Restricted SSA transformation a success**

CloudSC – Map Fission

- Required to not have large transient allocations on the GPU
- Current solution will allow efficient offloading.
- Works in tandem with the new toGPU transform



CloudSC 2

- Fully compilable SDFG
- Only 6 loops not parallelized – still work in progress
- New kind of transformation planned to trade memory footprint with parallelizability