Tadashi

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CHAPTER

ONE

TADASHI

1.1 tadashi package

1.1.1 Submodules

1.1.2 tadashi.apps module

```
class tadashi.apps.App
     Bases: object
     property include_paths: list[Path]
     compile() \rightarrow bool
     property compile_cmd: list[str]
     property source_path: Path
     property output_binary: Path
     property run_cmd: list
     measure(*args, **kwargs) \rightarrow float
     static extract\_runtime(stdout) \rightarrow float
class tadashi.apps.Simple(source: str, alt_source: str = ")
     Bases: App
     source: Path
     tmpdir: TemporaryDirectory
     alt_source: Path
     property compile_cmd: list[str]
     property source_path: Path
     property alt_source_path: Path
     property output_binary: Path
     static extract_runtime(stdout)
```

```
class tadashi.apps.Polybench(benchmark: str, base: str, compiler_options=[])
     Bases: App
     A single benchmark in of the Polybench suite.
     benchmark: Path
     base: Path
     property source_path: Path
     property output_binary: Path
     property utilities_path: Path
     property include_paths: list[Path]
     property alt_source_path: Path
     property compile_cmd: list[str]
     static extract_runtime(stdout) \rightarrow float
1.1.3 tadashi.simple module
tadashi.simple.main()
1.1.4 tadashi.tadashilib module
Main Tadashi package.
class tadashi.tadashilib.AstLoopType(value, names=<not given>, *values, module=None,
                                         qualname=None, type=None, start=1, boundary=None)
     Bases: Enum
     Possible values for SET_LOOP_OPT.
     UNROLL should be avoided unless the requirements in the ISL Docs are satisfied.
     ISL Docs
     ISL online user manual (AST generation options).
     DEFAULT = 0
     ATOMIC = 1
     UNROLL = 2
     SEPARATE = 3
class tadashi.tadashilib.NodeType(value, names=<not given>, *values, module=None, qualname=None,
                                      type=None, start=1, boundary=None)
     Bases: Enum
     Type of the schedule tree node.
     Details: ISL online user manual (Schedule Trees).
```

```
BAND = 0
     CONTEXT = 1
     DOMAIN = 2
     EXPANSION = 3
     EXTENSION = 4
     FILTER = 5
     LEAF = 6
     GUARD = 7
     MARK = 8
     SEQUENCE = 9
     SET = 10
class tadashi.tadashilib.TrEnum(value, names=<not given>, *values, module=None, qualname=None,
                                   type=None, start=1, boundary=None)
     Bases: StrEnum
     Enums of implemented transformations.
     One of these enums needs to be passed to Node. transform() (with args) to perform the transformation.
     TILE = 'tile'
     INTERCHANGE = 'interchange'
     FUSE = 'fuse'
     FULL_FUSE = 'full_fuse'
     PARTIAL_SHIFT_VAR = 'partial_shift_var'
     PARTIAL_SHIFT_VAL = 'partial_shift_val'
     FULL_SHIFT_VAR = 'full_shift_var'
     FULL_SHIFT_VAL = 'full_shift_val'
     FULL_SHIFT_PARAM = 'full_shift_param'
     PARTIAL_SHIFT_PARAM = 'partial_shift_param'
     SET_PARALLEL = 'set_parallel'
     SET_LOOP_OPT = 'set_loop_opt'
     PRINT_SCHEDULE_NODE = 'print_schedule_node'
class tadashi.tadashilib.Node(scop: Scop, node_type: NodeType, num_children: int, parent_idx: int,
                                 location: list[int], loop_signature: list[dict], expr: str, children_idx:
                                 list[str])
     Bases: object
     Schedule node (Python representation).
```

```
scop: Scop
     Pointer to the Scop object the node belongs to.
node_type: NodeType
     Type of the node in the schedule tree.
num_children: int
     Number of children of the node in the schedule tree.
parent_idx: int
     The index of the parent of the node in the schedule tree according to Scop.schedule_tree.
location: list[int]
     List of child indexes which determine the location of the node starting from the root. See Scop.locate.
loop_signature: list[dict]
     Description of the band nodes (see Scop.get_loop_signature).
expr: str
     The ISL expression of the schedule node.
children_idx: list[str]
     Index of the children in Scop.schedule_tree.
property parent
     The node which is the parent of the current node.
property children
     List of nodes which are the children of the current node.
locate()
     Set the current_node to point to self.
transform(trkey: TrEnum, *args)
     Execute the selected transformation.
         Parameters
             • trkey (TrEnum) - Transformation Enum.
             • args – Arguments passed to the transformation corresponding toe trkey.
rollback() \rightarrow None
     Roll back (revert) the last transformation.
property valid_transformation: bool
     Check the validity of the transformation.
property available_transformations: list[TrEnum]
     List transformations available at the Node.
valid_args(tr: TrEnum, *args) \rightarrow bool
     Check the validity of args.
available_args(tr: TrEnum) \rightarrow list
     Describe available args.
```

```
class tadashi.tadashilib.LowerUpperBound(lower, upper)
     Bases: tuple
     Integer interval description.
     Lower and upper bounds for describing (integer) intervals of valid arguments for transformations. None indicates
     no upper/lower bound.
     lower
           Alias for field number 0
     upper
           Alias for field number 1
class tadashi.tadashilib.TransformInfo
     Bases: object
     Abstract base class used to describe transformations.
     func_name: str
          The name of the C/C++ function in the so file.
     argtypes: list[type] = []
           Types of arguments as required by ctypes.
     arg_help: list[str] = []
          Help string describing the arg.
     restype
           Type of the result as required by ctypes.
           alias of c_bool
     static valid(node: Node) \rightarrow bool
           Check that the transformation is valid on the node.
     static valid_args(node: Node, *arg, **kwargs) → bool
           Check that args of the transformation is valid on node.
     static available_args(node: Node) \rightarrow list
           Return a list describing each of the args.
class tadashi.tadashilib.TileInfo
     Bases: TransformInfo
     func_name: str = 'tile'
           The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_ulong'>]
           Types of arguments as required by ctypes.
     arg_help: list[str] = ['Tile size']
           Help string describing the arg.
     restype
           alias of c_bool
     static valid_args(node, arg)
           Check that args of the transformation is valid on node.
```

```
static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.InterchangeInfo
     Bases: TransformInfo
     func_name: str = 'interchange'
          The name of the C/C++ function in the so file.
     static valid(node: Node)
          Check that the transformation is valid on the node.
class tadashi.tadashilib.FuseInfo
     Bases: TransformInfo
     func_name: str = 'fuse'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_int'>, <class 'ctypes.c_int'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Index of first loop to fuse', 'Index of second loop to
     fuse'l
          Help string describing the arg.
     static valid(node: Node)
          Check that the transformation is valid on the node.
     static valid_args(node: Node, loop idx1: int, loop idx2: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.FullFuseInfo
     Bases: TransformInfo
     func_name: str = 'full_fuse'
          The name of the C/C++ function in the so file.
     static valid(node: Node)
          Check that the transformation is valid on the node.
class tadashi.tadashilib.FullShiftValInfo
     Bases: TransformInfo
     func_name: str = 'full_shift_val'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Value']
          Help string describing the arg.
     static available_args(node: Node)
          Return a list describing each of the args.
```

```
class tadashi.tadashilib.PartialShiftValInfo
     Bases: TransformInfo
     func_name: str = 'partial_shift_val'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_int'>, <class 'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Statement index', 'Value']
          Help string describing the arg.
     static valid_args(node: Node, stmt_idx: int, value: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.FullShiftVarInfo
     Bases: TransformInfo
     func_name: str = 'full_shift_var'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_long'>, <class 'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Coefficient', 'Variable index']
          Help string describing the arg.
     static valid_args(node: Node, _coeff: int, var_idx: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.PartialShiftVarInfo
     Bases: TransformInfo
     func_name: str = 'partial_shift_var'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_int'>, <class 'ctypes.c_long'>, <class</pre>
     'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Statement index', 'Coefficient', 'Variable index']
          Help string describing the arg.
     static valid_args(node: Node, stmt_idx: int, coeff: int, var_idx: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.FullShiftParamInfo
     Bases: TransformInfo
```

```
func_name: str = 'full_shift_param'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_long'>, <class 'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Coefficient', 'Parameter index']
          Help string describing the arg.
     static valid_args(node: Node, coeff: int, param_idx: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.PartialShiftParamInfo
     Bases: TransformInfo
     func_name: str = 'partial_shift_param'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_int'>, <class 'ctypes.c_long'>, <class</pre>
     'ctypes.c_long'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Statement index', 'Coefficient', 'Parameter index']
          Help string describing the arg.
     static valid_args(node: Node, stmt idx: int, coeff: int, param idx: int)
          Check that args of the transformation is valid on node.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.SetParallelInfo
     Bases: TransformInfo
     func_name: str = 'set_parallel'
          The name of the C/C++ function in the so file.
class tadashi.tadashilib.SetLoopOptInfo
     Bases: TransformInfo
     func_name: str = 'set_loop_opt'
          The name of the C/C++ function in the so file.
     argtypes: list[type] = [<class 'ctypes.c_int'>, <class 'ctypes.c_int'>]
          Types of arguments as required by ctypes.
     arg_help: list[str] = ['Iterator index', 'Option']
          Help string describing the arg.
     static available_args(node: Node)
          Return a list describing each of the args.
class tadashi.tadashilib.PrintScheduleNodeInfo
     Bases: TransformInfo
```

func_name: str = 'print_schedule_node'

The name of the C/C++ function in the so file.

```
static valid(node: Node) \rightarrow bool
```

Check that the transformation is valid on the node.

class tadashi.tadashilib.**Scop**(*idx*, *ctadashi*)

Bases: object

One SCoP in Scops, a loop nest (to use a rough analogy).

In the .so file, there is a global std::vector of isl_scop objects. Objects of *Scop* (in python) represents a the isl_scop object by storing its index in the std::vecto.

get_loop_signature()

Extract the value for *Node.loop_signature*.

A "loop signature", contains the information which is relevant for the shift transformations. Loop signature is a list. The entries in this list describes the parameters and iteration variables of each statement covered by the loop/band node.

property schedule_tree: list[Node]

locate(location: list[int])

Update the current node on the C/C++ side.

class tadashi.tadashilib.Scops(app: App)

Bases: object

All SCoPs which belong to a given file.

The object of type *Scops* is similar to a list.

get_input_path_bytes_and_backup_source()

Get the 'input' to generate_code() which is a copy of the current 'source'.

```
generate_code(input_path=", output_path=")
```

Generate the source code.

The transformations happen on the SCoPs (polyhedral representations), and to put that into code, this method needs to be called.

1.1.5 Module contents

Tadashi package root.

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