Feature Comparison

A comparison of the features available in the two different versions of AlphaZ. I have not verified if any of these commabnds work, only that they claim to exist.

Core Commands

Commands that are useful to the basic operation of the AlphaZ compiler. The `RenameVariable` and `WriteToFile` commands should be categorized as "Utility" commands, but since they're the only "Utility" commands common to both, I put them here.

Command	CSU AlphaZ	Inria AlphaZ	Notes
ASave, Save	X	X	
ASaveSystem, SaveSystem	X		
AShow, Show	X	X	
CheckProgram	X	X	
CheckSystem	X		
PrintAST	X	X	
ReadAlpha, ReadAlphabets	X	X	
ReadAlphaBundle		X	Reads a whole folder of Alpha files.
RenameVariable	X	X	Inria AlphaZ categorizes this as a "Utility" command.
WriteToFile	X	X	Writes a string to a file. Both AlphaZ categorize this as a "Utility" command.

Reduction Commands

Commands that apply transformations to reduction expressions. These are technically a subset of the "Transformation" category, but both categories are large enough where I wanted to split them.

Command	CSU AlphaZ	Inria AlphaZ	Notes
DetectReductions	X		
Distributivity		X	Automatically applies the `FactorOutFromReduction` command.
FactorOutFromReduction	X	X	CSU AlphaZ does not check legality, but Inria AlphaZ does.
ForceCoB	X		
HigherOrderOperations		X	Converts a summation reduction into a multiplication (if legal).
HoistOutOfReduction		X	Converts a reduction of the form `reduce(op, f, E1 op E2)` to `reduce(op, f, E1) op reduce(op, f, E2)`.
Idempotence		X	No clue what this does.
MergeReductions	X		
NormalizeReduction	X	X	
PermutationCaseReduce	X	X	
ReductionComposition	X	X	
Reduction Decomposition	X	X	
SameOperatorSimplification		X	Automatically applies the `HoistOutOfReduction` command.
SerializeReduction	X		
Simplifying Reductions	X	X	
SplitReductionBody	X		
TransformReductionBody	X		

Transformation Commands

Commands that apply transformations to expressions. Note: the transformation commands that apply to reduction expressions are separated out into their own Reduction Commands category.

Command	CSU AlphaZ	Inria AlphaZ	Notes
AddLocal, AddLocalUnique	X		
alignDimVariable	X		
ApplySTMap	X		

Command	CSU AlphaZ	Inria AlphaZ	Notes
CoB, ChangeOfBasis	X	X	
createFreeScheduler	X		
Inline, InlineForce, InlineAll, InlineAllForce, InlineSubsystem	X		There may be some semi-equivalent commands in Inria AlphaZ, but with different names.
LiftAutoRestrict		X	
Merge	X		
monoparametricTiling_noOutlining, monoparametricTiling_Outlining, monoparametricTiling_Outlining_noSubsystem	X		
Normalize, DeepNormalize	X*	X	*DeepNormalize is only available in Inria AlphaZ, but it does basically the same thing.
OutlineSubSystem	X		
PropagateSimpleEquations		X	Might be similar to the CSU AlphaZ "InlineAll" command.
reduceDimVariable	X		
RemoveUnusedVariables, RemoveUnusedEquations	X	X	
setCoBPreprocess	X		
setMinParamValues	X		
setRatio	X		
setTileGroup	X		
Simplify, SimplifyExpressions	X	X	I'm only assuming these commands are the same, I haven't double checked. TODO.
Split	X		
SplitUnion, SplitUnionIntoCase	X	X	I'm only assuming these commands are the same, I haven't double checked. TODO.
SubstituteByDef		X	Might be similar to some of the CSU AlphaZ "Inline" commands.
UniformizeInContext	X		

Utility Commands

Miscellaneous commands for operating the AlphaZ compiler. The `RenameVariable` and `WriteToFile` commands should be categorized here, but they're the only commands common to both compilers, so I categorized them as "Core" commands. This way, I can break up the "Utility" commands per compiler.

The table below lists the CSU AlphaZ "Utility" commands.

Command	Notes
parseIntegerArray	
print	Inria AlphaZ is supposed to be programmed via Groovy, which has its own standard library function for printing to the console.
readDomain	
readFunction	
renameSystem	
stringListToArray	
True, False	Inria AlphaZ is supposed to be programmed via Groovy, which has its own support for boolean literals.

The table below lists the Inria AlphaZ "Utility" commands. These are all for specifying individual parts of a program. CSU AlphaZ typically implements this by having the function accept a string with either a name or an AST node ID.

Command	Notes
GetEquation	
GetExpression	
GetNode	
GetRoot	Gets a specific "root" (file?) from an Alpha bundle.
GetSystem	Gets a specific system from an Alpha "root".
GetSystemBody	Gets only the "while" and "let" parts of the system.
GetVariable	

Analysis Commands

The table below lists the "Analysis" commands. These are all exclusive to the CSU AlphaZ.

Command	Notes
BuildPRDG	
ExportPRDG	

Command	Notes
Farkas1DScheduler	
FarkasMDScheduler	
PlutoScheduler	
printScheduledStatements	
revertPRDGEdges	
VerifyTargetMapping	

Calculator Commands

The table below lists the "Calculator" commands. These are all exclusive to CSU AlphaZ.

Command	Notes
compose	
difference	
image	
intersection	
inverse	
inverseInContext	
isEmpty	
isEquivalent	
join	
preImage	
readDomain	
readFunction	
simplifyInContext	
union	

Code Generation Commands

The table below lists the "Code Generation" commands. These are all exclusive to CSU AlphaZ. Inria AlphaZ does not implement its own code generator. As a workaround, you must apply the desired functions to the Inria Alpha program (using the Inria AlphaZ compiler), save the program to a file, then read that file into CSU AlphaZ and use CSU AlphaZ commands to set schedules and generate code.

Command	Notes

Command	Notes
addRecursionDepthForPCOT	
createCGOptionForHybridScheduledC	
createCGOptionForHybridScheduledCGPU	
createCGOptionForScheduledC	
createCGOptionForWriteC	
createCGOptionsForPCOT	
createTiledCGOptionForScheduledC	
generateFMPPCode	
generateMakefile	
generateMakefileInternal	
generatePCOTCode	
generateScanC	
generateScheduledCode	
generateVerificationCode	
generateWrapper	
generateWriteC	
getDefaultCodeGenOptions	
setCGOptionDisableNormalize_depreciated	
setCGOptionFlattenArrays	
setTiledCGOptionOptimize	
setVecOptionForTiledC	
setVecVarForTiledC	
setVecVarsForTiledC	

Target Mapping

The table below lists the "Target Mapping" commands. These are all exclusive to the CSU AlphaZ.

Command	Notes
CreateSpaceTimeLevel	
listMemoryMaps	
listSpaceTimeMaps	

Command	Notes
setBandForTiling	
setDefaultDTilerConfiguration	
setMemoryMap	
setMemorySpace	
setMemorySpaceForUseEquationOptimization	
setOrderingDimensions	
setParallel	
setSchedule	
setSpaceTimeMap	
setSpaceTimeMapForMemoryAllocation	
setSpaceTimeMapForMemoryFree	
setSpaceTimeMapForUseEquationOptimization	
setSpaceTimeMapForValueCopy	
setStatementOrdering	
setSubTilingWithinBand	