

Some Thoughts on Generic Programming

CSE 590o, Autumn 2007
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The Source

- An extended comparative study of language support for generic programming
- Ronald Garcia, Jaakko Jarvi, Andrew Lumsdaine, Jeremy Siek and Jeremiah Willcock

Their Terminology

Language	Algorithm	Concept	Refinement	Modeling	Constraint
C++	template	docs	docs	docs	docs
ML	functor	signature	include	implicit	param sig
OCaml	polymorphic function	class interface	inherit	interface	class type
Haskell	polymorphic function	type class	subclass	instance	context
Eiffel	generic class	deferred class	inherit	inherit	conformance
Java	generic method	interface	extends	implements	extends
C#	generic method	interface	inherit	inherit	inherit
Cecil	parameterized method	abstract object	subtyping	subtyping	type constraint

Their Ratings

	C++	SML	OCaml	Haskell	Eiffel	Java	C#	Cecil
Multi-type concepts	-	●	○	●*	○	○	○	◐
Multiple constraints	-	◐	◐	●	○ [†]	●	●	●
Associated type access	●	●	◐	●*	◐	◐	◐	◐
Constraints on assoc. types	-	●	●	●	◐	◐	◐	●
Retroactive modeling	-	●	●	●	○	○	◐	●
Type aliases	●	●	●	●	○	○	○	○
Separate compilation	○	●	◐	●	●	●	●	◐
Implicit arg. deduction	●	○	●	●	○	●	◐	◐

Their Criteria

Criterion	Definition
Multi-type concepts	Multiple types can be simultaneously constrained.
Multiple constraints	More than one constraint can be placed on a type parameter.
Associated type access	Types can be mapped to other types within the context of a generic function.
Constraints on associated types	Concepts may include constraints on associated types.
Retroactive modeling	The ability to add new modeling relationships after a type has been defined.
Type aliases	A mechanism for creating shorter names for types is provided.
Separate compilation	Generic functions can be type checked and compiled independent of calls to them.
Implicit argument deduction	The arguments for the type parameters of a generic function can be deduced and do not need to be explicitly provided by the programmer.

Their Test



How Does Chapel Fit In?

- Most like C++?
- Separate compilation/type checking?
- Constraints on generic functions/classes/...?