

Structured and dynamic
collections:
Level 3 support?

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Fundamental modeling issues: How to specify...

- *Structure* of the existence and interactions of state variables
 - “Structure” meaning low Kolmogoroff complexity, via generative procedure
 - Eg. Wuschel; auxin/Pin1 multicellular reaction “rules”; Ste5 reaction “rules”
- *Dynamics* of the existence and interactions of state variables
 - Eg. auxin/Pin1 phyllotaxis model, weak spring mechanics
 - Eg. many rarely-occurring reactions

Array/Collection Specifications

- Control *existence of*:
 - State vbls and interaction connections (graphs)
- Both are *functions of*:
 - Boolean functions of static indices
 - Inequalities on single indices (static arrays)
 - Boolean functions of indices and variables
 - Existence dependency graph: general? DAG? Bounded depth?
 - Boolean functions of other connections as well
 - Graph automata, graph grammars
- Filterable attributes of cells and/or molecules:
 - Static indices, including integer arithmetic;
 - dynamical variables : geometrical, mechanical, biochemical, ...;
 - dynamic labelled connection graphs (e.g. sparse arrays);
 - tuples and (hashed) finite sequences of other attributes;.

Implementable Semantics

- Sets
 - Set builder notation required: $S = \{x | P(\text{attributes}(x))\}$
 - E.g. sum over such sets
 - Indices are static attributes (special case)
 - Like (partially indexed) tables in an RDB
 - Algebra of sets S and predicates P
- Dynamic arrays
 - Functions $f: I \rightarrow V$
 - with array access notation $X[i]$
 - Algebra of index domains, I
 - product, sum
 - mask by Predicate on indices and/or other array vbls
 - recursive subindices = fun comp
 - A start: L3 arrays proposal (Computable Plant group)

Groups willing to contribute

- Computable Plant collaboration
- M. Samsonova, StPbU
- Inst. for Cytology and Genetics (N. Kolchanov), Novosibirsk
- ... how about you?