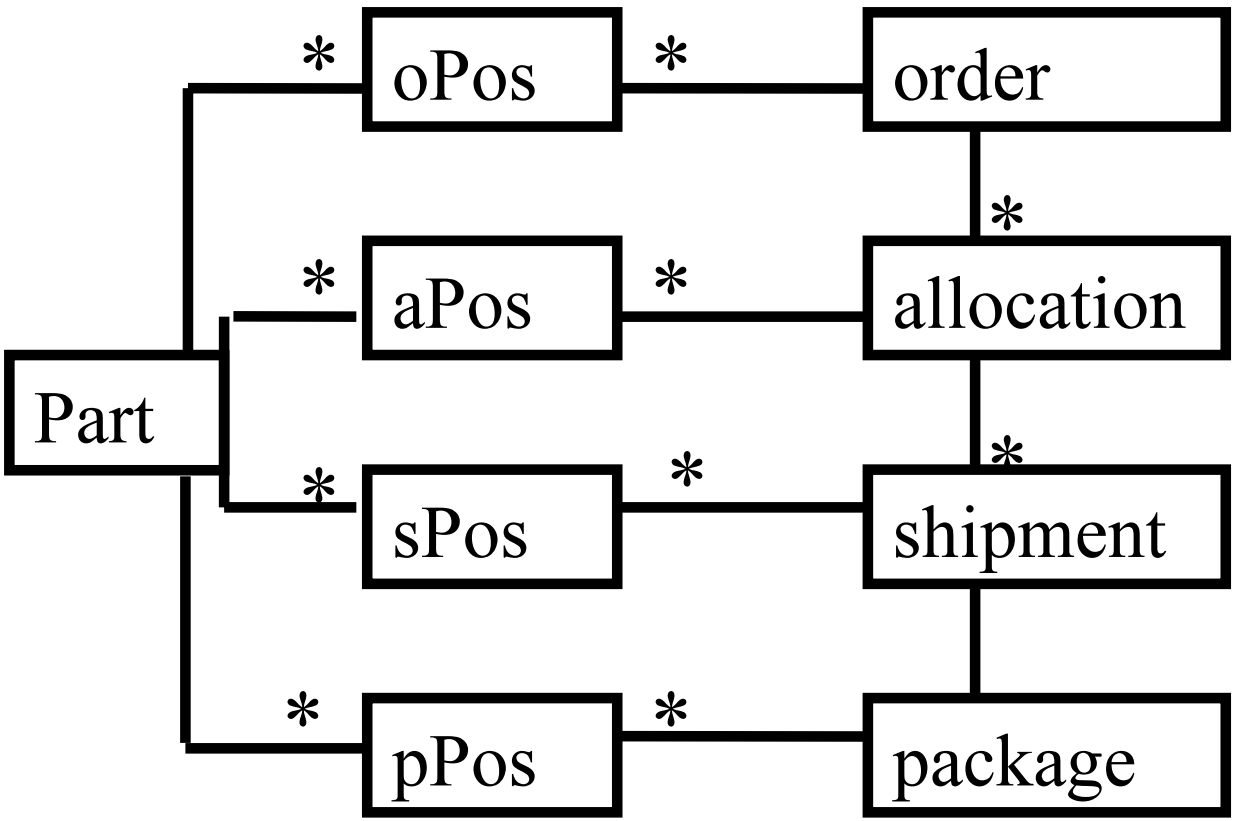
Petri-Net Models

- software engineering by folding
- clustering of structured programming terms
- data flow
- control flow
- dynamic traces
- Petri nets

Spare-Part System



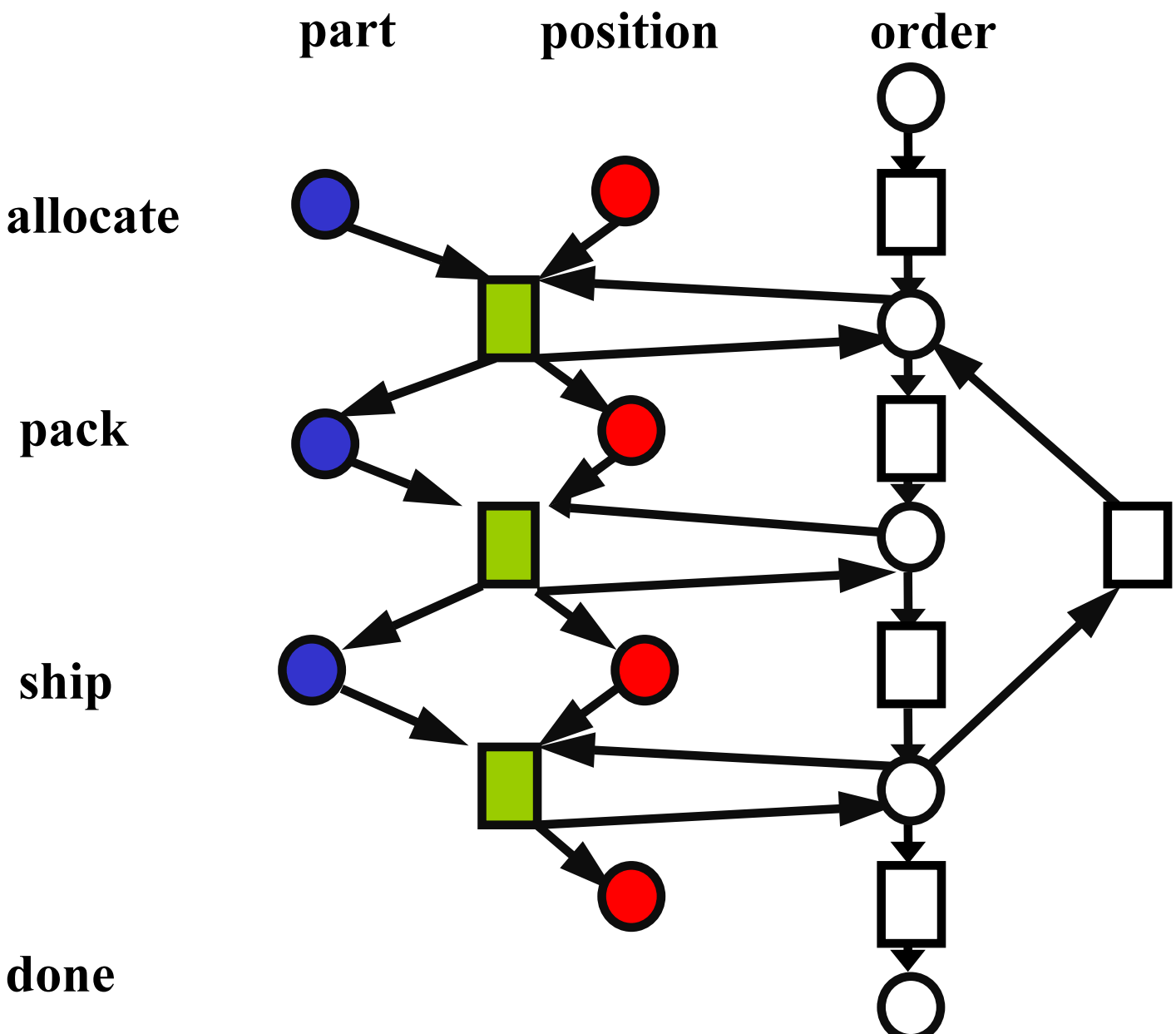
Implementation

- place → database table
- place colour set → table tuples
- transition → transaction / procedure
- transition colour → procedure parameter
- pre/post functions → database modification

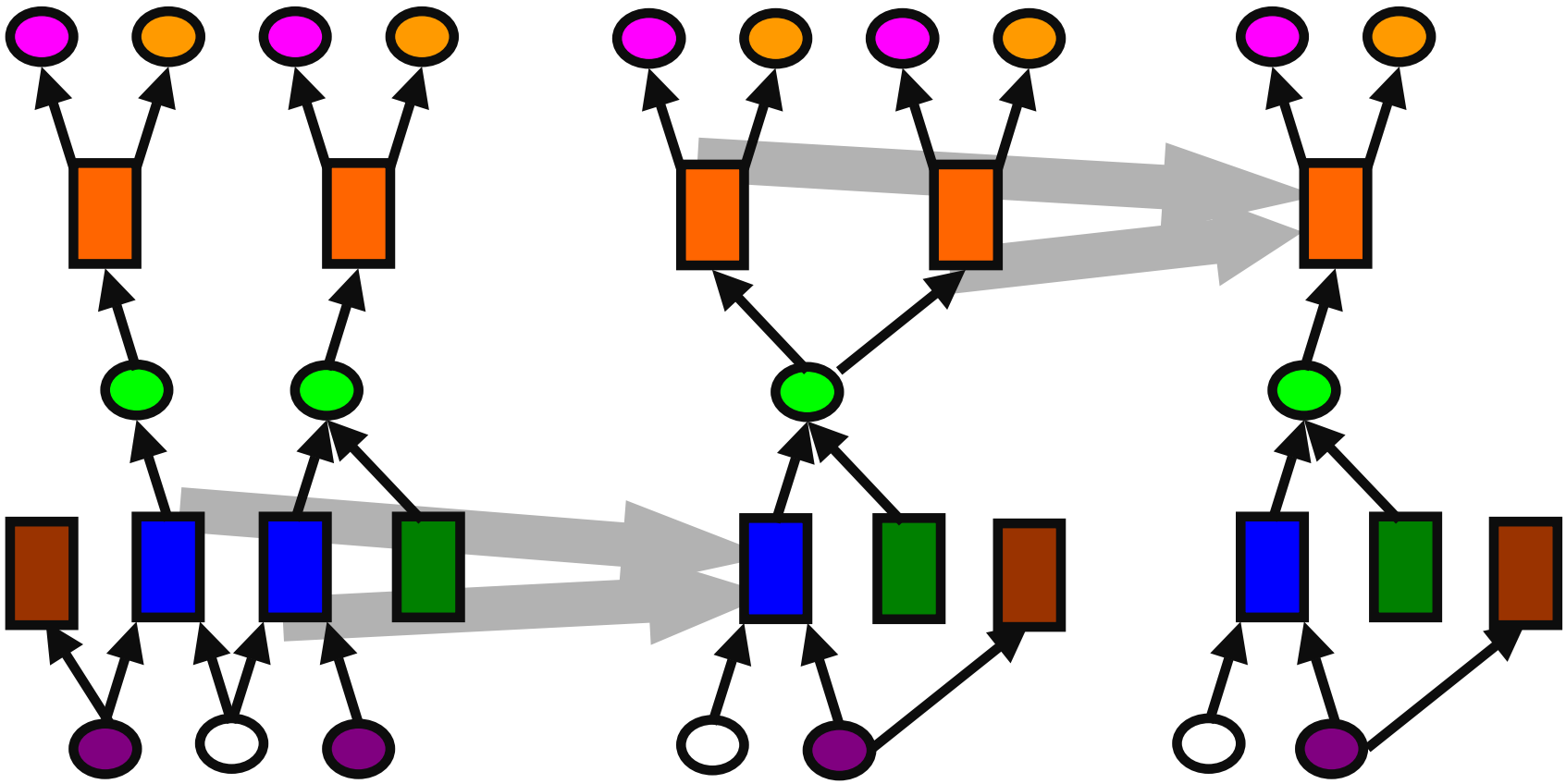
Implementation fragment

```
PROCEDURE startS(anOrder aShip);
        BEGINTRANSACTION;
        DELETE allocating WHERE order = anOrder;
        INSERT INTO shipping (order, ship)
                VALUES (anOrder, aShip);
        COMMIT;
END startS;
```

Spare-Part System



Reductions



Reductions

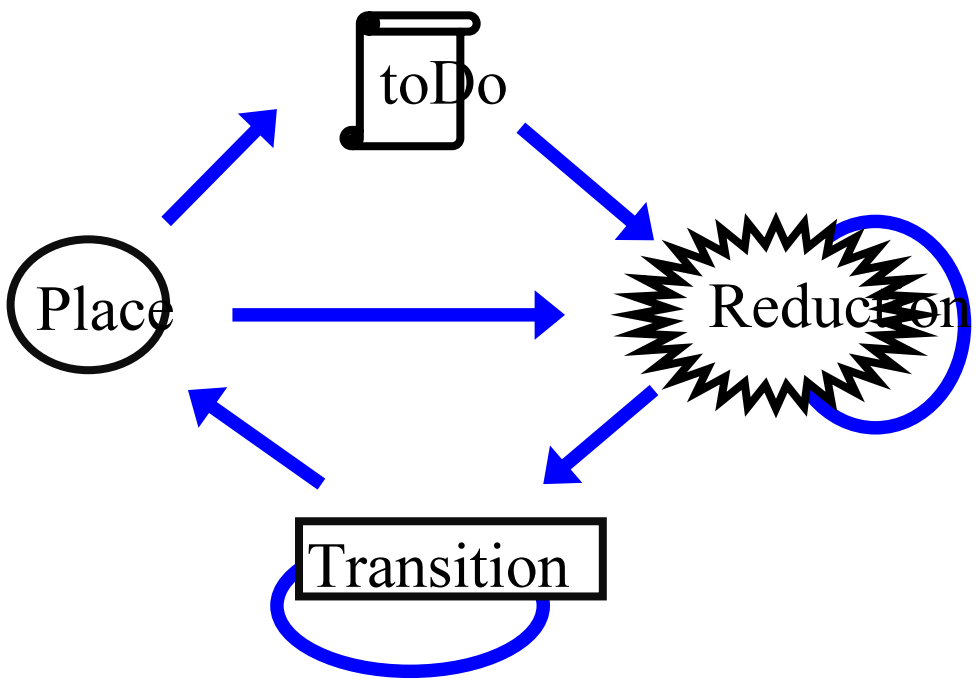
- iterated coequalisers
  - of a set of morphism pairs
- maximal reduction has universal properties
- compute on single transition nets only
- variations in
  - similarity
  - neighbourhood
  - choice

Reduction Algorithm

- unique maximal reduction
- often gives a compact and useful analysis
- good starting point
- allows many variations
- prototype in Smalltalk

High Performance

- cost is nearly linear
- key principles
  - locality
  - work in the reduction
  - avoid redoing things
  - data structures



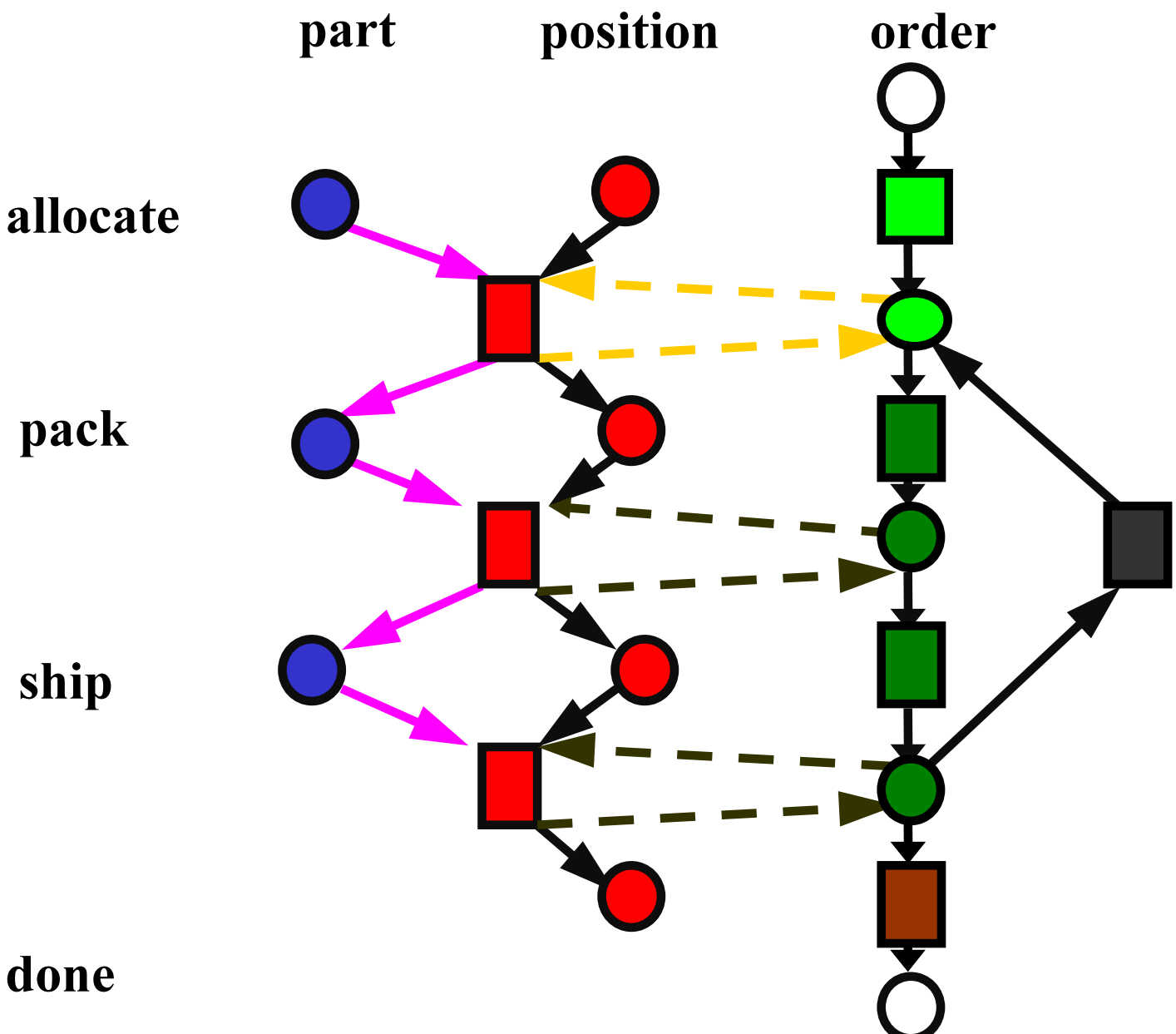
Colouring

- initial colouring:
  - origins of each image node yield a colour set
- merge colour sets
  - along bijective relationships
  - along non overlapping injections
- classify colour relationships
  - equality, composition, sub-relationship

Refine Reduction

- analyse relationships of a first reduction
  - cardinalities
  - split 1 and n sides
- second reduction
  - compatible with relationship analysis
- gives a more detailed image

Reverse-Engineered



Applications and enhancements

- detect reused components
- cliché library and pre knowledge
- repeated superficial searches
- multi level analysis

Lessons (re)learned

- easy is better
- reverse engineering
  - needs careful balancing
  - gives useful insides in application logic
- Petri net metaphor
  - gives new analysis methods
  - intuitive also for forward engineering

Commutative net diagram