

# Systemics Composition (K1)

## Charter

### Charter (*normative*)

This spec defines how lawful kernels compose in serial, parallel, and temporal forms, preserving lawfulness via posted adapters/combinators and monotone contract combination.

## Serial Composition

### Posted adapter requirement (*normative*)

For serial composition with  $K1^\wedge = (v1, 1, )$  and  $K2^\wedge = (v2, 2, )$ , any adapter  $f$  used to produce the second valuation **MUST** be posted as part of the record/contract. In particular, if  $v2$  is defined from  $u$  and the upstream decision by:  $v2(u) = f(u, 1(v1(u), 1, 1))$ , then  $f$  **MUST** be included in posted data so downstream decisions remain records-only.

### Monotone contract combination (*normative*)

The composite kernel  $K2 \ K1$  is lawful only if (-A1 -A7) hold for the composite and if the combined contracts  $(, , C)$  are formed via a monotone operator (domain-chosen), i.e. tightening in any component must not rely on hidden slack.

## Parallel / Product Composition

### Posted decision combinator (*normative*)

For parallel/product composition  $K1 \ K2$ , both kernels evaluate and decisions are aggregated via a posted combinator  $comb: 2 \rightarrow 2$  (e.g., AND/OR). The choice of  $comb$  **MUST** be posted as part of the record/contract.

### Monotone floors/budgets (*normative*)

Floors and budgets for parallel composition **MUST** be combined monotonically (tightening cannot rely on hidden slack).

## Temporal Composition (window page book)

### Pages and books (*normative*)

A page is a lawful record for one window. A book is an ordered sequence of pages; optionally, pages may be hash-chained. Chaining preserves replay and does not alter decisions.

## Composition Invariants

### Records-only preserved (*normative*)

Composition **MUST** preserve -A2 (records-only): any dependency introduced by composition must be posted.

### Replay preserved (*normative*)

Composition MUST preserve reflexive reproducibility and replayability obligations implied by the contract.

## References

- GraphFrame K0 (GF0) (spec://\_kernel/gf/gf0-k1)
- SpecFrame K1 (spec://\_kernel/spec/specframe-k1)
- Systemics Minimal Specification (spec://domains/systemics/sigma-k1)