RIFT Token Architecture: Memory-Type Associations

Token Component Relationships

In the RIFT ecosystem, tokens follow a triplet structure where memory precedes type, which precedes value:

```
token = (token_memory, token_type, token_value)
```

Memory-Type Associations

Memory Type	Token Types (Classical)	Token Types (Quantum)	Value Binding
`span<fixed>`	INT, ROLE, MASK, OP	*Not compatible*	Immediate (`:=`)
`span<row>`	INT, FLOAT, STRING	*Not compatible*	Immediate (`:=`)
`span<continuous>`	ARRAY, VECTOR, MAP	*Not compatible*	Immediate (`:=`)
`span<superposed>`	*Not compatible*	QBYTE, QROLE, QMATRIX	Deferred (`=:`)
`span<entangled>`	*Not compatible*	QBYTE, QROLE, QMATRIX	Deferred (`=:`)
`nil`	*Base initialization*	*Base initialization*	None

Governance Policies by Mode

Feature	Classical Mode	Quantum Mode
Memory Declaration	Must precede type declaration	Must precede type declaration
Memory Alignment	Fixed 4096-bit	Dynamic 8-qubit
Type Checking	Immediate, eager	Deferred, lazy
Value Assignment	Direct (`:=`)	Superposition (`=:`)
Value Resolution	Deterministic	Probabilistic (Bayesian DAG)
Policy Enforcement	At assignment time	At observation time

Value Assignment Examples

Classical Mode

```rift
// Memory declaration first
align span<row> {
  direction: right -> left,
  bytes: 4096,
  type: continuous
}

// Type declaration second
type INT = { bit_width: 32, signed: true }

// Value assignment last
x := 42  // Immediate binding with type inference
```

Quantum Mode

```rift
// Memory declaration first
align span<superposed> {
  direction: bidirectional,
  bytes: dynamic,
  type: entangled
}

// Type declaration second
type QINT = {
  bit_width: 32,
  signed: true,
  superposition: enabled
}

// Value assignment last
y =: superpose(1, 2, 3)  // Deferred binding
```

Memory-Type Policy Enforcement

1. **Classical**: Memory must be aligned before type declaration, and type must be declared before value assignment. Policy enforcement happens immediately.
2. **Quantum**: Memory alignment and type declaration follow the same precedence, but policy enforcement is deferred until observation or explicit collapse.

Memory is not just storage—it's a governance contract that enforces how tokens can be created, accessed, and transformed throughout their lifecycle.