Echo Visual Atlas

Standalone diagrams for understanding Echo's architecture. These diagrams complement the main guide "What Makes Echo Tick?"

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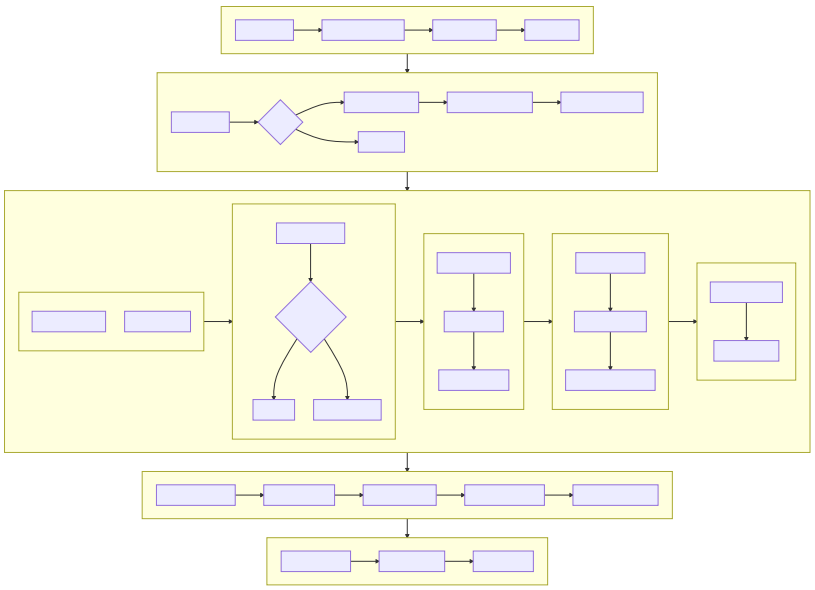
1. The Complete Tick Pipeline



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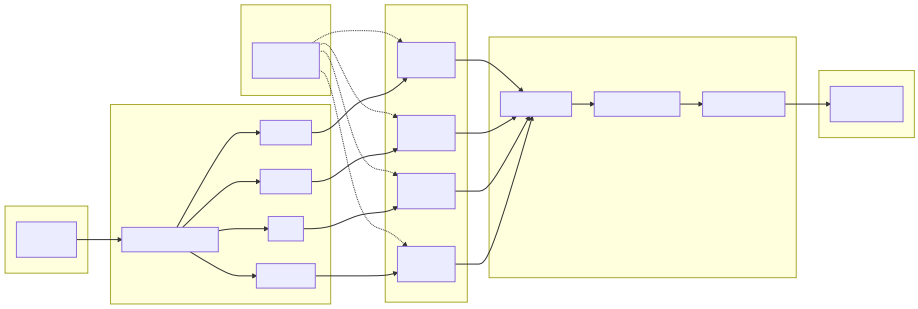
2. BOAW Parallel Execution Model



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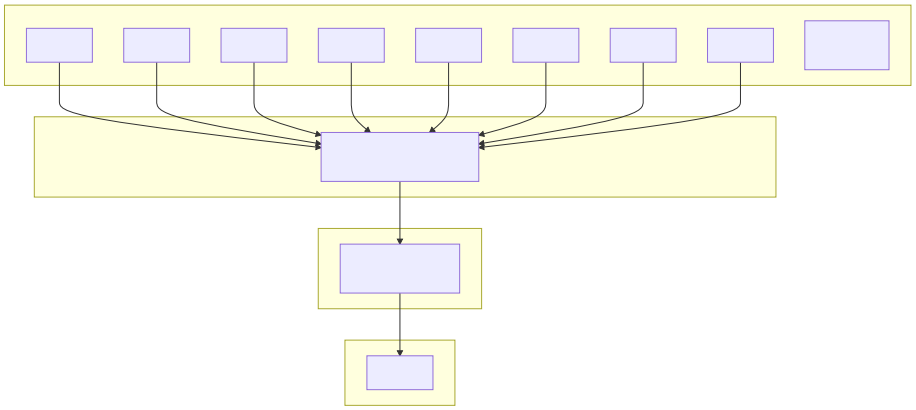
3. Virtual Shard Routing



Test Vectors (Frozen Protocol)

Input (first 8 bytes)	LE u64	Shard
`0xDEADBEEFCAFEBABE`	`0xBEBAFECAEFBEADDE`	190 (0xBE)
`0x0000000000000000`	`0x0000000000000000`	0
`0x2A00000000000000`	`0x000000000000002A`	42
`0xFFFFFFFFFFFFFFFF`	`0xFFFFFFFFFFFFFFFF`	255

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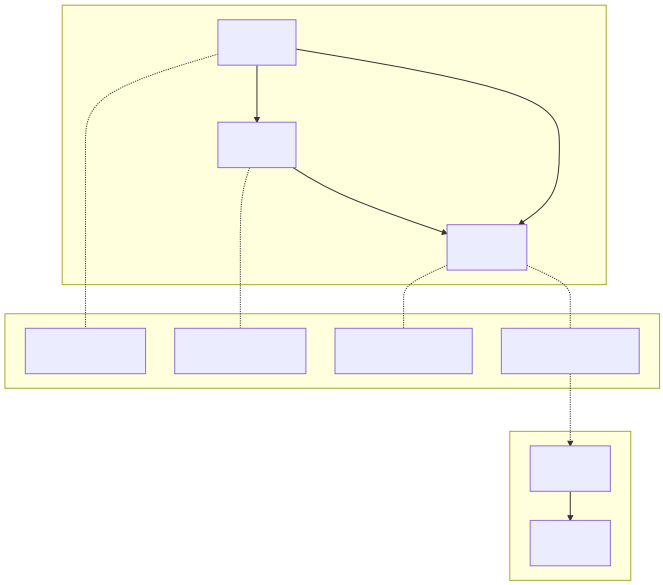
4. Two-Plane WARP Architecture



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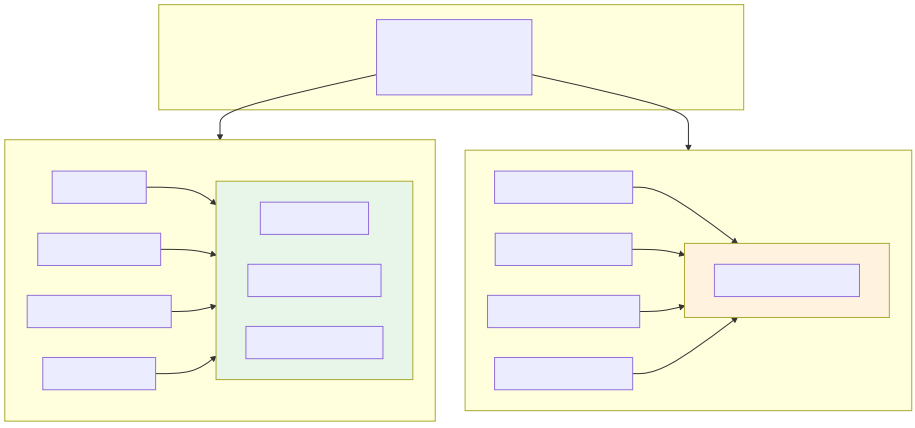
5. GraphView Contract Enforcement



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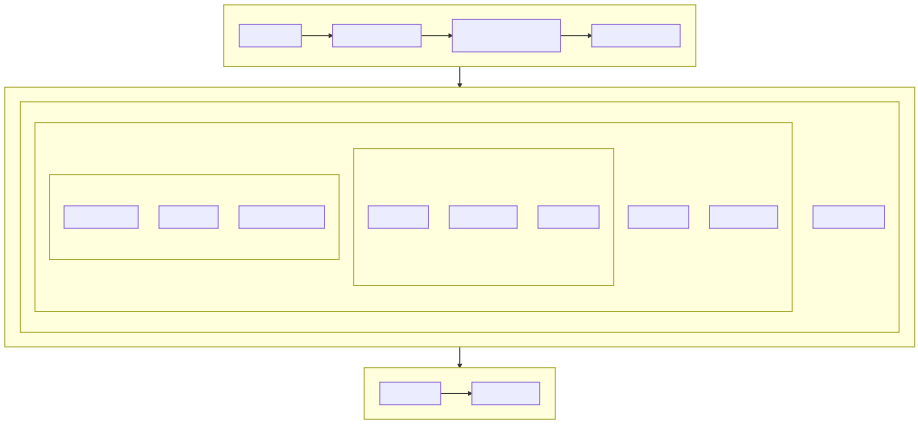
6. State Root Hash Computation



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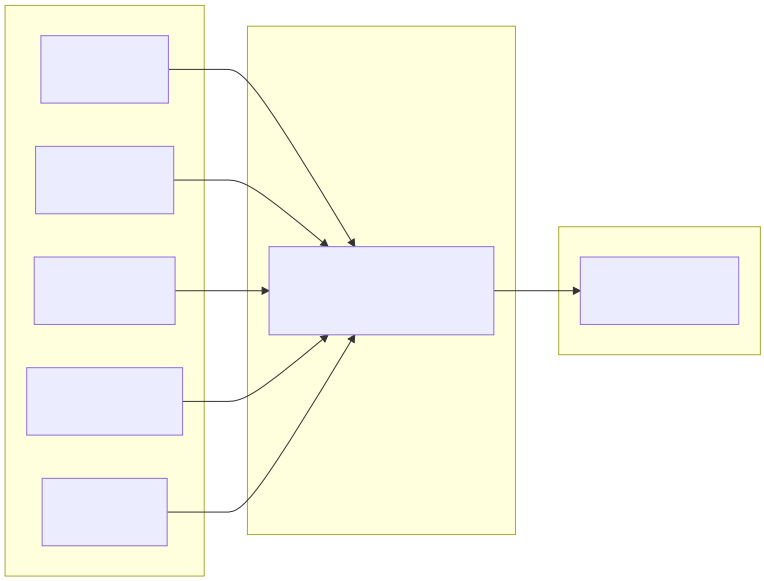
7. Commit Hash v2 Structure



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8. WSC Snapshot Format

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WSC SNAPSHOT FILE
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```
HEADER (fixed size)

  magic     version    node_cnt   edge_cnt   offsets
  8 bytes   8 bytes    8 bytes    8 bytes    8×N bytes



NODES TABLE (sorted by NodeId, 8-byte aligned)

    NodeRow           NodeRow           NodeRow         ...
    64 bytes          64 bytes          64 bytes
 [id:32][type:32]  [id:32][type:32]  [id:32][type:32]



EDGES TABLE (sorted by EdgeId, 8-byte aligned)

       EdgeRow                  EdgeRow              ...
       128 bytes                128 bytes
[id:32][from:32][to:32]   [id:32][from:32][to:32]
[type:32]                 [type:32]



OUT_INDEX (per-node ranges into out_edges)

    Range          Range          Range        ...
   16 bytes       16 bytes       16 bytes
[start:8][len:8] [start:8][len:8] [start:8][len:8]



ATTACHMENT INDEX (per-slot ranges)
Similar structure to OUT_INDEX



BLOB ARENA (variable-length payloads)
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[payload bytes...] [payload bytes...] [payload bytes...] ...

Referenced by (offset: u64, length: u64) tuples
```

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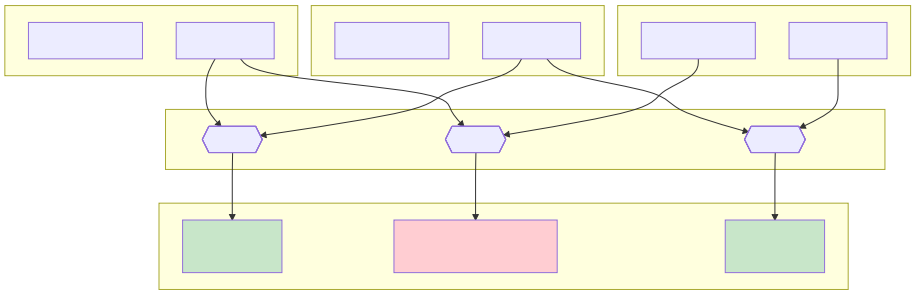
9. Footprint Independence Check



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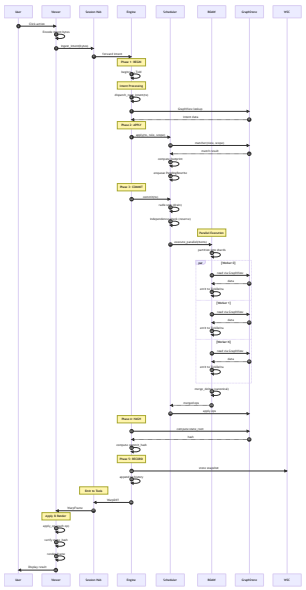
10. Complete Data Flow: Intent to Render



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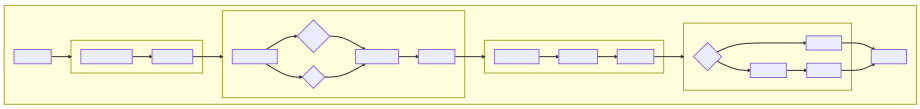
11. Viewer Event Loop



Visual Atlas generated 2026-01-18. Use alongside "What Makes Echo Tick?" for complete understanding.