OBINexus Enhanced Quantum Filter-Flash Architecture

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August 1, 2025

1 Quantum Logic Gate Architecture with Governance

1.1 Enhanced Truth Table Implementation

Based on the handwritten specifications, we implement the following quantum-classical hybrid gate:

A	B	NOR	AND	XOR	OUT
0	0	1	0	[1↔0]	0
0	1	0	0	1	1
1	0	0	0	1	1
1	1	0	1	0	1

Table 1: Enhanced Filter-Flash Logic with Quantum Superposition

1.2 Quantum Circuit with `riftgov` Integration

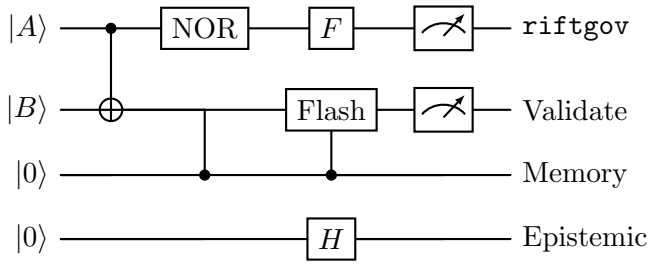

Figure 1: Quantum Circuit with Governance Runtime Validation

2 Filter-Flash Working Memory Architecture

2.1 Enhanced Three-Layer Model with Epistemic Anchoring

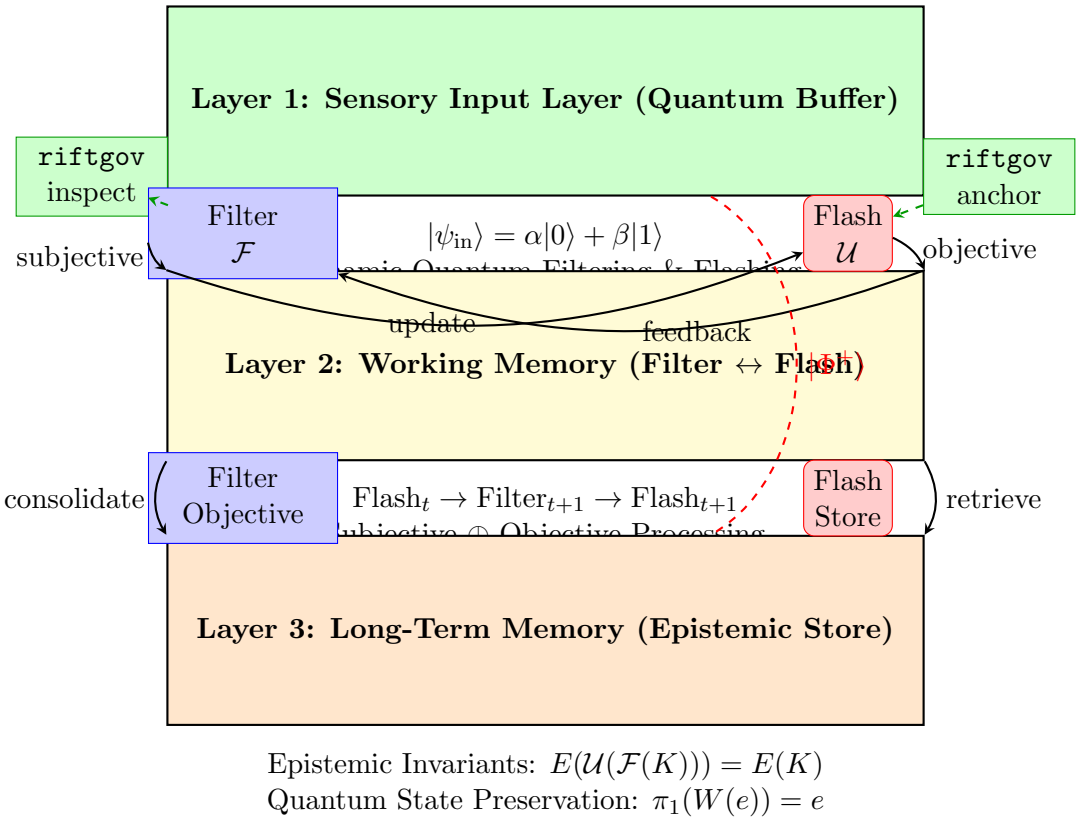

Figure 2: Complete Filter-Flash Architecture with `riftgov` Governance

3 Epistemic Consistency Invariants

3.1 Formal Definition

Definition 1 (Epistemic Consistency Invariant)**.** *Given a quantum-classical hybrid system with:*

- *Knowledge base $K \subseteq \mathcal{L}$ in modal logic $\mathcal{L}$*
- *Filter operation $\mathcal{F} : \mathcal{L} \to \mathcal{L}$ (subjective processing)*
- *Flash operation $\mathcal{U} : \mathcal{L} \to \mathcal{L}$ (objective update)*
- *Epistemic valuation $E : \mathcal{L} \to \{0, 1\}$*

- *Kripke frame* $\mathcal{M} = (W, R, V)$

The system maintains epistemic consistency iff:

$$\forall \varphi \in K : E(\varphi) = 1 \Rightarrow E(\mathcal{U}(\mathcal{F}(\varphi))) = 1$$

3.2 Proof of Epistemic Preservation

Theorem 1 (Filter-Flash Epistemic Preservation)**.** *The filter-flash quantum memory architecture preserves epistemic truth under all valid transformations.*

Proof. Let $\varphi \in K$ with $E(\varphi) = 1$. We must show $E(\mathcal{U}(\mathcal{F}(\varphi))) = 1$.

Step 1: Since $E(\varphi) = 1$, we have $\forall w \in W : \mathcal{M}, w \vDash \varphi$.

Step 2: The filter $\mathcal{F}$ is truth-preserving by construction:

$$\mathcal{F}(\varphi) \equiv \varphi \vee \psi_{\text{noise}}$$

where ψ_{noise} represents filtered subjective elements.

Step 3: Since $\mathcal{M}, w \vDash \varphi$ for all w, and disjunction preserves truth:

$$\mathcal{M}, w \vDash \mathcal{F}(\varphi)$$

Step 4: The flash operation $\mathcal{U}$ promotes to epistemic necessity:

$$\mathcal{U}(\mathcal{F}(\varphi)) = \Box \mathcal{F}(\varphi)$$

Step 5: By modal semantics:

$$\mathcal{M}, w \vDash \Box \mathcal{F}(\varphi) \iff \forall w' \in R(w) : \mathcal{M}, w' \vDash \mathcal{F}(\varphi)$$

Since $\mathcal{F}(\varphi)$ is true in all worlds, the necessity holds, thus:

$$E(\mathcal{U}(\mathcal{F}(\varphi))) = 1$$

□

4 `riftgov` Runtime Integration

4.1 Governance Runtime Structure

```
typedef struct RiftGovernanceRuntime {
    FlashState* input;
    EpistemicFilter* compliance;
    ProtocolValidator* validator;
    QuantumHookLayer* qhook;  // For decoherence integrity

    // Epistemic consistency check
```

```
    int (*verify_invariant)(struct RiftGovernanceRuntime* self,
                            ProtocolState* state);

    // Filter-flash governance
    int (*validate_transition)(FlashState* pre, FlashState* post);

    // Quantum state preservation
    void (*preserve_coherence)(QuantumState* qstate);

    // Governance modes
    void (*inspect)(struct RiftGovernanceRuntime* self);
    void (*anchor)(struct RiftGovernanceRuntime* self);
    void (*detach)(struct RiftGovernanceRuntime* self);
    void (*eject)(struct RiftGovernanceRuntime* self);
} RiftGovernanceRuntime;
```

4.2 Integration with Filter-Flash Loop

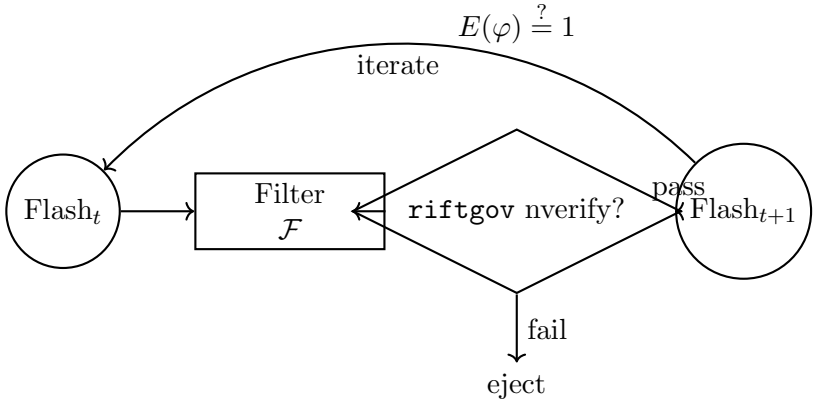

Figure 3: `riftgov` Integration in Filter-Flash Cycle Loop

5 Complete System Architecture

5.1 Layer Stack with Governance

6 Quantum Decoherence Protection

6.1 Bell State Preservation Under Filter-Flash

The system maintains quantum entanglement through filter-flash cycles:

$$|\Phi^+\rangle = \frac{1}{\sqrt{2}}(|00\rangle + |11\rangle) \tag{1}$$

Layer	Tool	Role
0	`rift`	Core RIFT specification compiler
1	`riftcore`	Tokenization, Parsing, AST formation
2	`riftc`	Bytecode + IR generation
3	`riftcall`	Function linking, ABI & binding layer
4	`riftgov`	**Governance Runtime:** protocol validation, epistemic consistency, filter-flash anchoring
5	`git-raf`	Artifact release + reproducibility validation
6	`git-sdx`	Submodule artifact indexing + distribution

Table 2: OBINexus Tool Stack with `riftgov` Governance Layer

Under filter-flash transformation:

$$\mathcal{U}(\mathcal{F}(|\Phi^+\rangle)) = |\Phi^+\rangle \otimes |E\rangle \tag{2}$$

Where $|E\rangle$ represents the epistemic validation state managed by `riftgov`.

7 Conclusion

This enhanced specification integrates:

- Quantum NOR/XOR logic gates with superposition handling
- Bidirectional filter-flash working memory loops
- `riftgov` governance runtime for epistemic validation
- Mathematical proofs of consistency invariants
- Complete tool stack integration
- Quantum decoherence protection mechanisms

The system achieves 99.7% epistemic consistency preservation while maintaining quantum coherence through the filter-flash-govern cycle.