

# Differential State Management

In software engineering, the "Diff Problem" is that LLMs are bad at precise edits. in Novel-to-Video, this is the root cause of **Video Flicker and Character Hallucination**.

When you ask an AI to generate Scene 2, it doesn't "edit" Scene 1; it re-imagines it. It accidentally "refactors" your main character's face, their clothes, or the room layout because it didn't know how to execute a precise "diff."

## The Mapping: Code vs. Narrative

We implement the Cursor/Composer "Diff Architecture" directly into Continuum Flow.

### The "Cursor" Model (Code)

#### THE "CODEBASE"

file.ts (1,000 lines)

#### THE DIFF PROBLEM

LLM creates Syntax Errors by deleting a closing bracket '}'.

#### THE GOAL

Apply change **ONLY** to the function.

### The "Continuum Flow" Model



#### THE "VISUAL STATE"

TOON File (Scene & Characters)

#### THE HALLUCINATION

LLM gives sword but **changes shirt from Blue to Red**.

#### THE GOAL

**Add sword, FREEZE all other pixels.**

## The Solution: "Narrative Edit Trajectories"

You can't retrain a model easily, but you can force your Orchestrator to use **State Diffs** instead of State Descriptions.

## The "Anti-Regeneration" Rule

Standard prompting forces re-rendering of known assets.

*"Generate Scene 2: Arjun is standing in the cave. He is wearing armor. He draws his sword."*

✗ Risk: Armor design changes, Cave lighting shifts.

## The "Diff-Based" Protocol

Orchestrator generates a PATCH, not a new file.

### STEP A: BASELINE (LOCKED STATE)

```
State_Frame_01:  
Arjun: [Wear: Rusty Armor], [Face: Scarred], [Hand: Empty]  
Bg: [Cave, Wet Walls]
```



### STEP B: THE DIFF COMMAND

```
{  
  "operation": "UPDATE",  
  "target": "Arjun.Hand",  
  "value": "Iron Sword",  
  "constraint": "PRESERVE_ALL_OTHER_ATTRIBUTES"  
}
```

## Implementation: The "Visual Patching" Workflow

To leverage "Search and Replace" logic, we implement a specific tool in the Orchestrator that acts like ``git apply``.

### STATE PATCHING ALGORITHM

1

#### Input Patch

Receive DIFF Packet  
(Target, New Value)

2

### Verify State

Check Old Value matches  
Current State

Safety Guard

3

### Apply Patch

Update State Buffer  
Freeze other pixels

## Why This Fixes Video Generation

The biggest issue in AI video is **Temporal Stability**.



### Without Diffs:

Frame 1 and Frame 2 are treated as two different paintings. The AI "guesses" the continuity.



### With Diffs:

You instruct the Video AI (ControlNet): *"Keep 90% exactly the same. Only use diffusion to change the pixels around the hand."*