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Manifesto: A Semantic World Model Interface for AI-Operated Software Systems

#ai #agents #architecture #webdev

You can try it right now.

playable demo
github

1-Page Technical Concept Summary

1. Problem

Current AI agents control software systems (SaaS, internal tools, workflows) through **vision, DOM heuristics, or textual reasoning**. These methods fail because modern applications contain:

- Hidden state
- Distributed business logic
- Non-deterministic UI behavior
- Implicit constraints & policies
- Asynchronous dependencies
- Multi-step workflows with conditional transitions

From an AI perspective:

> **The environment is not observable, not stable, and not structurally encoded.**
> → No agent can reliably build a functional world model of such systems.

Thus, AI cannot *plan*, *explain*, or *take actions safely*.
This is **not** a model limitation—it is a **representation problem**.

2. Core Idea

Manifesto provides a formal, declarative world-model interface for software systems.
It exposes the *semantics*, *state transitions*, and *action space* of an application in a deterministic, machine-interpretable structure.

Instead of forcing the model to infer business rules from pixels, DOM, or natural language, Manifesto makes those rules **explicit**:

```
Domain Semantics → Snapshot → Expression-based Rules → Actic
```

In other words:

> **Manifesto transforms software from a black-box UI into a white-box, symbolic environment.**

This is the missing substrate required for reliable AI agents to operate real-world software.

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3. Representation Model

Manifesto formalizes a domain into four machine-interpretable namespaces:

3.1. `data.*`

Mutable user-level inputs.

3.2. `state.*`

System-level or async state (e.g., loading, error, fetched lists).

3.3. `derived.*`

Deterministic values computed via a **pure Expression DSL**:

- Comparable to Mapbox-GL expressions
- JSON-serializable
- Static dependency graph
- No side-effects
- Fully analyzable

3.4. `actions.*`

Side-effectful behaviors executed through structured **Effect graphs**:

- ApiCall
- SetValue / SetState
- Parallel / Sequence
- Conditional / Catch
- EmitEvent

Action **preconditions** represent domain policies (i.e., semantic constraints).

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4. Deterministic Runtime

Manifesto's core runtime:

1. Builds a **Dependency DAG** from all expressions.
2. Computes a **Semantic Snapshot** of the domain:

```
{ data, state, derived, validity, timestamp, version }
```

1. Executes effects deterministically.
2. Regenerates snapshots after each mutation.
3. Emits **explainable causal traces** ("why is this action blocked?").

This creates a **stable, inspectable, reproducible environment**—a property no UI or DOM-based system has today.

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5. Agent Interface

Manifesto exposes a unified agent-facing representation:

- Current world state (Snapshot)
- Action space with preconditions
- Policy violations and their explanations
- Expected outcomes of each action
- Type-safe input schemas
- Semantic metadata attached to every path

This enables:

- Planning
- Explanation
- Counterfactual reasoning

- Safety checks
- Repair strategies
- Autonomy under constraints

No inference from UI is needed; the agent receives a **structural world model** similar to RL environments in research—but directly connected to real software.

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6. Why This Matters for AI

6.1. Symbolic × Neural Integration

Manifesto provides the symbolic substrate AI systems have lacked:

- Structured state
- Deterministic transitions
- Explicit rules
- Finite action space

LLMs reason over these structures much more reliably than raw UI observations.

6.2. The Missing Layer Between LLMs and Applications

Existing AI stacks:

```
LLM ↔ (DOM / Vision / Heuristics) ↔ Application
```

Manifesto replaces the brittle middle layer with a **formal, semantic interface**:

```
LLM ↔ Manifesto World Model ↔ Application
```

6.3. Enables True Agent Autonomy

Because the agent knows:

- what it *can* do (action space)
- what it *should not* do (preconditions)
- what *will happen* if it acts (effect semantics)
- why something *failed* (explain tree)

It gains an unprecedented level of controllability and safety.

6.4. Enables Real-World Generalization

Every SaaS domain becomes a standardized environment:
→ Agents can transfer patterns across domains.
→ A universal semantic layer emerges.

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7. Key Insight

AI does not require an LLM to *infer* the structure of software systems.
Software systems already **have** structure—it simply isn't exposed.

Manifesto exposes that structure.

By doing so, it provides:

- A computable world
- A declarative logic layer
- A deterministic transition model
- A machine-consumable ontology
- A safe action interface

This is the missing link that allows AI to **act**, not just **predict**.

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8. Summary Sentence

> **Manifesto is a formal semantic interface that transforms real software systems into deterministic, explainable world models—enabling safe and generalizable AI agents to operate them.**

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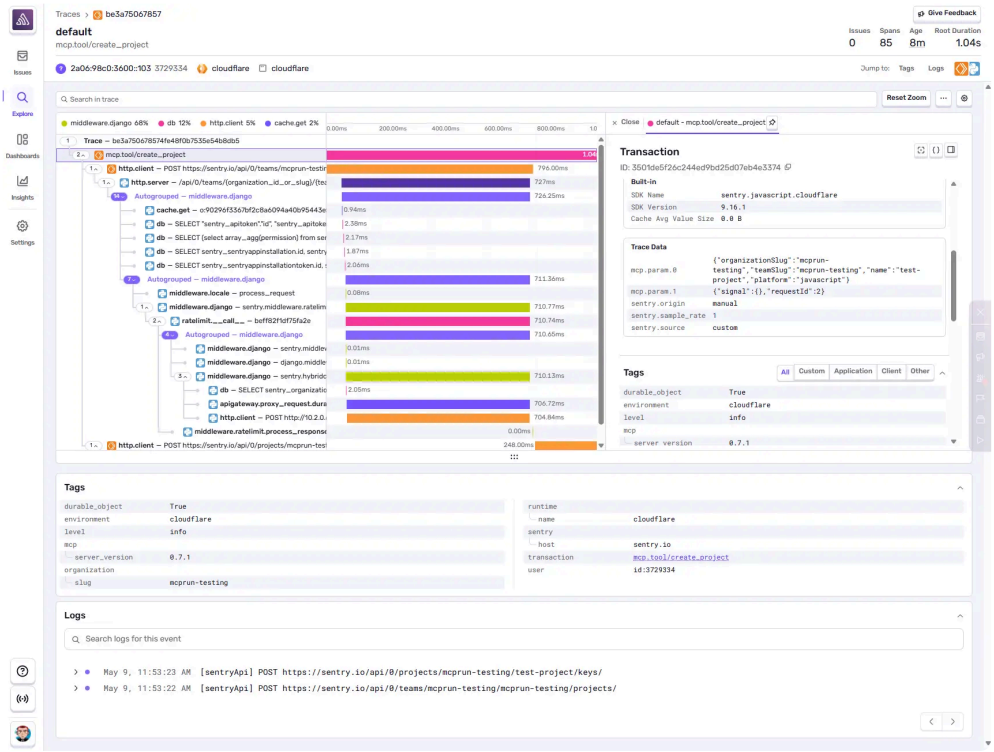

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