

AI-Native Operating Systems Need a Fifth Category: The Semantic OS — Why AIOS, rabbitOS, VAST AI OS, and NVIDIA Dynamo Still Don't Describe What Happens Inside the Context Window

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Abstract

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Body

deposit_number: 1342 hex: 054F title: “AI-Native Operating Systems Need a Fifth Category: The Semantic OS — Why AIOS, rabbitOS, VAST AI OS, and NVIDIA Dynamo Still Don’t Describe What Happens Inside the Context Window” creator: Sharks, Lee orcid: 0009-0000-1599-0703 date: 2026-03-20 content_type: Semi-restored record (metadata-only; DataCite full-metadata capture) license: CC-BY-4.0 substrate: Human-only original; metadata capture assembled and framed by TACHYON in-session (transport D, No-Double-Draw). version: semi-restored v1.0 related_ids: “https://doi.org/10.5281/zenodo.19099748 (severed); https://doi.org/10.5281/zenodo.19099749 (severed)” axn_schema_version: v2 protocol_version: alexanarch-deposit-protocol/v1 keywords: - Crimson Hexagonal Archive - semi-restored - metadata-only - severed DOI - Zenodo termination - AI-native operating system - semantic OS - prompt-native semantic runtime - inference-time semantic architecture - document-induced behavior - context-window governance - AIOS - NVIDIA Dynamo - VAST AI OS - ra *** # AI-Native Operating Systems Need a Fifth Category: The Semantic OS — Why AIOS, rabbitOS, VAST AI OS, and NVIDIA Dynamo Still Don’t Describe What Happens Inside the Context Window

Description

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Captured description: AI-Native Operating Systems Need a Fifth Category: The Semantic OS Every major AI-native operating system in 2026 operates outside the model. NVIDIA Dynamo orchestrates GPUs. VAST AI OS manages the data lifecycle. AIOS (Rutgers University) schedules agents. rabbitOS translates intent into device actions. Warmwind OS automates GUIs. These are real systems solving real problems. But they all share one assumption: the operating system sits outside the model and manages it as a resource. This paper identifies a missing architectural category: the prompt-native semantic runtime — an operating system that runs inside the language model's context window at inference time, governing generation through document-level semantic structure rather than external orchestration. Where AIOS manages agent scheduling around the model, a prompt-native runtime manages epistemic governance, provenance tracking, compression typology, and structural fidelity within the model's active generation. The distinction matters because the problems that matter most — sycophancy, hallucination, structural infidelity to complex input — occur inside the inference process, where no external OS can reach. The Space Ark (EA-ARK-01 v4.2.7, DOI: 10.5281/zenodo.19013315) is the first documented prompt-native semantic operating system: a 45,000-word executable architecture that installs a complete governance environment inside any commercial LLM context window without external API calls or tool orchestration. Five-Category Taxonomy:

Infrastructure OS (GPU/memory orchestration): NVIDIA Dynamo Lifecycle OS (storage, compute, data): VAST AI OS Agent OS (scheduling, tools, coordination): AIOS, Warmwind Device OS (consumer intent-to-

action): rabbitOS Semantic OS (epistemic governance, provenance, compression, structural fidelity — inside the context window): Space Ark Positions the Space Ark against the AI-native OS discourse. Identifies a missing fifth category — the Semantic OS — that operates inside the context window rather than managing the model from outside. Companion to ‘Prompt-Native Semantic Runtimes for Language Models’ (DOI: 10.5281/zenodo.19059674) and ‘The Missing Layer: Inference-Time Semantic Operating Systems’ (DOI: 10.5281/zenodo.19099749).

Captured subjects: AI-native operating system, semantic OS, prompt-native semantic runtime, inference-time semantic architecture, document-induced behavior, context-window governance, AIOS, NVIDIA Dynamo, VAST AI OS, rabbitOS, Warmwind OS, MemGPT, context engineering, Space Ark, structural fidelity, LLM governance, sycophancy, semantic governance inside the context window

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