

MCP SERVER

NO CODE

CLOUD HOSTED

Matrix Operations Engine MCP

Stop trusting AI guesses for complex math.

The Matrix Operations Engine gives your AI client precise, deterministic linear algebra calculations for massive matrices. It handles multiplication, inversion, determinants, and more using locally executed code, eliminating mathematical guessing inherent in large language models. This MCP ensures your data science pipelines rely on perfectly accurate math.

D Quality Score 61.25/100

linear-algebra

matrix-math

data-science

computational-engine

vector-math

numerical-analysis



The infrastructure that powers AI agents in the real world.



Vinkius connects AI to the world's software through secure, enterprise-grade infrastructure — enabling real-world execution at scale, built on the Model Context Protocol (MCP).

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the cloud infrastructure where AI agents connect to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Matrix Operations Engine MCP

1 tools available

Cloud-hosted on Vinkius

Working with weight matrices or complex covariance data shouldn't involve guesswork. When you connect this MCP, your agent gets access to deterministic linear algebra functions that run entirely outside the LLM. This means you can trust the numbers when calculating matrix inversions, dot products, and determinants—accuracy is guaranteed, locally on your CPU.

Instead of relying on an AI model's best guess for complex math, your client calls this tool directly. It handles everything from simple additions to massive 2D array multiplications with perfect precision. This capability makes it essential for anyone running deep learning models or doing numerical analysis. Since Vinkius hosts and manages this MCP, you connect once via your preferred AI client and instantly gain access to rock-solid computational math.

Core Capabilities

01 — Calculate Matrix Inverses

You can find the inverse of a matrix, which is key for solving complex linear systems.

03 — Determine Matrix Determinants

You can check the determinant of a matrix, helping you understand its properties like singularity.

05 — Transpose Matrices

It flips a matrix along its diagonal, changing rows into columns and vice versa.

02 — Perform Dot Products and Multiplications

The tool multiplies two or more matrices together to calculate combined weight values.

04 — Add and Subtract Matrices

The system adds or subtracts two matrices element-by-element for vector adjustments.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/mcp/matrix-operations-engine — connect your AI agent in three steps.

- 01 You prompt your AI client with the specific math task (e.g., 'Calculate the determinant of this 4×4 matrix').
- 02 The agent recognizes the need for precise linear algebra and automatically invokes the `matrix_operations` tool.
- 03 The MCP runs the calculation locally on your machine, returning a mathematically guaranteed result to your AI client.

The bottom line is you get perfectly accurate matrix math results without having to write any code or worry about LLM hallucinations.

Built For

This MCP is for the computational data scientist, the machine learning engineer, and the quantitative analyst. If your job involves building models where mathematical integrity matters—like risk assessment or deep network training—you need this. It solves the frustration of relying on an AI's educated guess when you require absolute numerical certainty.

Machine Learning Engineer

Uses this to calculate weight matrix products and determine optimal learning rates during model training.

Quantitative Analyst (Quant)

Runs covariance matrix calculations or solves large linear systems for financial risk modeling.

Computational Data Scientist

Tests and validates algorithms that depend on precise vector math, such as finding the inverse of a transformation matrix.

What Changes When You Connect

- 01** Eliminates math hallucinations. Unlike relying solely on an LLM, this MCP runs calculations locally on your CPU, ensuring the results from `matrix_operations` are mathematically perfect every time.
- 02** Handles full linear algebra functions. You can use one tool to manage multiplication, addition, transposition, and even finding determinants of massive 2D arrays.
- 03** Privacy-focused math execution. Your sensitive embeddings or weight matrices never leave your machine because the calculation happens locally, keeping your data secure.
- 04** Solves complex systems efficiently. Need to solve $Ax=b$? Use the tool's ability to calculate a precise matrix inverse (A^{-1}) and get an exact solution vector for x .
- 05** Versatile array handling. Whether you're calculating dot products or simply adjusting vectors, the dedicated `matrix_operations` tool handles all standard linear algebra operations.

Real-World Applications

Validating a new deep learning model

A machine learning engineer needs to calculate the precise weight matrix multiplication for a novel layer. Instead of having their agent hallucinate the result, they prompt it through the Matrix Operations Engine MCP, receiving an exact calculation that confirms the model's integrity before deployment.

Calculating financial risk metrics

A quantitative analyst needs to determine a portfolio's covariance matrix and its determinant. Using this MCP ensures the calculated determinant is accurate for regulatory reporting, something an LLM simply cannot reliably provide.

Solving system equations from data

A computational scientist has gathered data that must solve a linear system ($Ax=b$). The agent invokes `matrix_operations` to calculate the inverse matrix A^{-1} , giving them the exact solution vector needed for their simulation.

Preprocessing large datasets

A data scientist needs to prepare a dataset by transposing it and then multiplying it by another weight matrix. The MCP handles both the transposition and multiplication in one reliable sequence, maintaining absolute numerical integrity across massive arrays.

Patterns to Avoid

Relying on general LLM math

✗ AVOID

Asking a generic agent to 'Multiply these two 10×10 matrices and tell me the result.' The agent will likely produce plausible-sounding, but mathematically incorrect, numbers.

✓ INSTEAD

Always use the Matrix Operations Engine MCP. Prompt your client to execute `matrix_operations` for matrix multiplication. This forces the calculation to run outside the LLM's predictive text layer.

Attempting multi-step math in one prompt

✗ AVOID

Asking, 'Transpose this data and then find its inverse.' A standard agent might forget a step or apply the functions incorrectly.

✓ INSTEAD

Use the MCP to chain specific tool calls. First, call `matrix_operations` for transpose; then, pass that result back into a second `matrix_operations` call for inversion.

Assuming mathematical context

✗ AVOID

Giving the agent a matrix and just asking 'What's wrong with this?' The agent might offer conceptual advice instead of the precise numerical value needed.

✓ INSTEAD

Be explicit. Ask, 'Calculate the determinant using `matrix_operations`.' This directs the agent to use the correct tool for the specific mathematical operation.

The Right Fit

Use this MCP if your project outcome depends on exact, deterministic numerical results—this includes deep learning weight calculations, financial risk modeling (like determinants and covariance), or solving linear algebraic systems. If you need to *understand* a concept or generate code structure, use your agent's general capabilities. But if the core requirement is 'Is this number

mathematically correct?', then this MCP is non-negotiable. Never rely on any model's internal math functions for critical computations; always route them through `matrix_operations`.

The headache of unreliable AI math

Today, if you give your agent a complex matrix calculation—say, finding the determinant or inverting weights—you're betting on its internal knowledge base. The result feels right, but it often contains subtle mathematical errors because LLMs are designed to predict human language patterns, not perform perfect linear algebra.

With this MCP, that guesswork vanishes. You connect your agent through Vinkius and gain immediate access to a dedicated computation engine. Now, when you ask for the determinant of a 4x4 matrix, you get a guaranteed number derived from code, not text prediction.

Achieving mathematical certainty with `matrix_operations`

Manual data science pipelines require juggling multiple libraries and complex setup. You have to ensure your agent knows which function to call, what order to run it in, and how to handle the output format for every single step.

Now, you simply state the mathematical goal —'Find the inverse of this matrix'—and the MCP handles the entire process using `matrix_operations`. The result is clean, precise, and ready for immediate use.

Matrix Operations Engine: 1 Tools Available

Use the single dedicated tool here to execute deterministic linear algebra functions on large matrices with mathematical certainty.

#	TOOL	DESCRIPTION
01	<code>matrix_operations</code>	Performs deterministic mathematical functions like multiplication, addition, determinant, inverse, and transpose on matrices with guaranteed accuracy.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U Multiply these two weight matrices and return the result.



The multiplication is complete. The resulting 3x3 matrix is $[[14, 32, 50], [32, 77, 122], [50, 122, 194]]$.

U Calculate the determinant of this 4x4 covariance matrix.



The exact determinant of the 4x4 covariance matrix is -452.18. A negative determinant indicates the matrix is not positive semi-definite.

U Find the inverse of this matrix so I can solve the linear system $Ax = b$.



The inverse matrix has been calculated with perfect precision. Multiplying A^{-1} by your vector b will give you the exact solution vector x .

Frequently Asked Questions

01 Does the Matrix Operations Engine handle very large matrices?

Yes. It's built to work with massive 2D arrays locally. Since it runs on your CPU using `ml-matrix`, scaling is handled by robust computational libraries, not token limits.

02 Can I use `matrix_operations` for more than just multiplication?

Absolutely. Beyond multiplication and addition, you can also compute the inverse, determinant, transpose, and perform other key linear algebra functions.

03 Is this math performed in the cloud or locally?

The calculation runs entirely locally on your machine's CPU. This means highly sensitive data stays private and never leaves your system boundary.

04 If I use `matrix_operations`, will my AI client still need code?

No. You don't need to write the code yourself. Your agent handles calling the `matrix_operations` tool based on your natural language prompt, making it feel like a conversational function.

05 How do I use `matrix_operations` to solve linear systems?







To solve $Ax=b$, you first ask the MCP to calculate the inverse of A (A^{-1}). Then, your agent multiplies that result by b using `matrix_operations`.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"matrix-operations-engine": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  **Ask ChatGPT** 
-  **Ask Claude** 
-  **Ask Perplexity** 
-  **Ask Gemini** 
-  **Ask Grok** 

READY TO CONNECT

Matrix Operations Engine is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

[Start at cloud.vinkius.com](https://cloud.vinkius.com) →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

Generated	June 2026
MCP Server	Matrix Operations Engine MCP
Server ID	019e38bf-656a-71d8-8f5a-c041a941810b
Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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