Inoculating & Analyzing Confidential Medical Data

Customer case study of Uniq Health who are using OmniIndex to secure & analyze regulated health data for personalized health & lifestyle insights.

OmniIndex

White Paper

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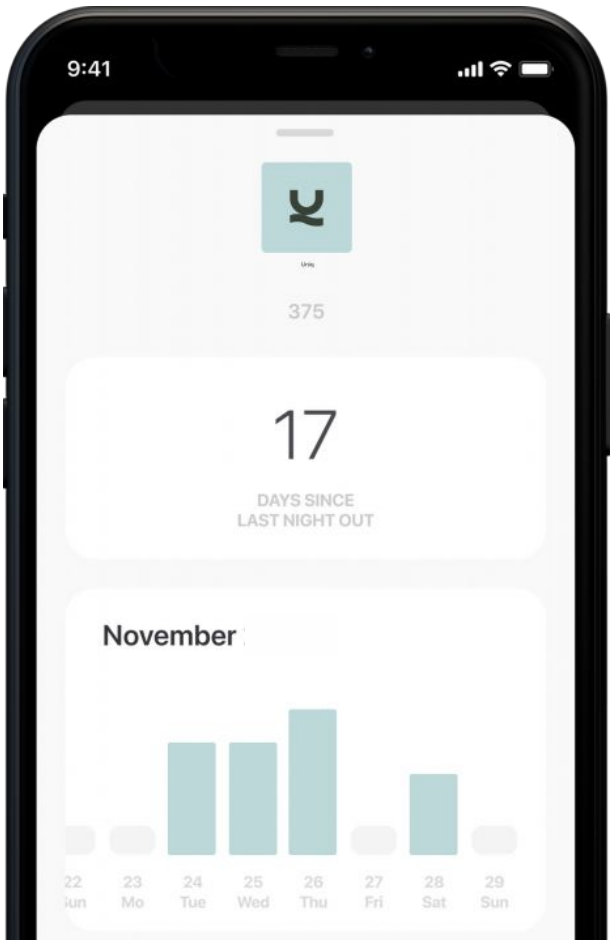
To address the critical need for secure management of sensitive customer health data in their app, Uniq Health has partnered with OmniIndex to both inoculate this data from attack, and make it useful to AI analytics without risk of exposure.

This paper outlines how OmniIndex provides a new paradigm for regulated data management through security, & productivity.

“OmniIndex gives us a completely secure and private way to add our highly confidential and sensitive customer health data to analytics. This means we can provide personalised health insights to our customers without any of their private data being exposed!”

Nasira Jahan Mohssin

Co-Founder Uniq Health



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Secure & Inoculated Data Storage

PGBC is OmniIndex's Web3 fork of Postgres. It provides immutable, decentralized data & file storage to inoculate data from attack and ensure privacy. It is the secure database for Uniq Health's customer data.

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Blockchain Storage

PGBC provides secure storage by merging blockchain's immutability & decentralization with the control of SQL. It allows Uniq Health to integrate this inoculated and secure foundation without replacing existing tools, enabling direct interaction with the tamper-proof data chain via standard commands.

Immutable Data:
With PGBC, patient health records are immutable. Cryptography permanently links each data block, making it impossible to alter or delete information once created. This establishes a tamper-proof "single source of truth" for a customer's data, defending against data corruption and ensuring integrity.

Decentralized Storage:
PGBC eliminates the risks of centralized data by replicating content across a network of nodes. Distributing data this way removes single points of failure and secures the network against isolated attacks. This model guarantees continuous availability with zero data loss.

Integrated AI Admin Control:
The PGBC Admin tool provides an intelligent command center for secure database management. It integrates the Boudica AI to explain complex queries , generate correct SQL from natural language questions, and allow non-technical users to get insights via a simple "Chat with your data" feature. This empowers all authorized users to run sophisticated analytics with verified confidence.

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Privacy Through Zero-Trust

Traditional data systems are vulnerable due to the "all-powerful administrator," a single point of failure that, if compromised, exposes the entire system. PGBC eliminates this risk with a Zero-Trust architecture, ensuring no single user can compromise sensitive data.

This is enforced by 3 pillars:

Immutable Ledger: Guarantees data integrity by making it impossible for anyone, including administrators, to modify or delete.

Encrypted Access: Employs Fully Homomorphic Encryption (FHE) to keep data encrypted during analysis.

AI Intelligence: Native AI continuously monitors activity & automatically alerts designated users to any breach in compliance rules or potential security threats.

This architecture offers UniqHealth two primary advantages:

1. Guaranteed Security and Compliance:
The Zero-Trust model directly addresses the core risk of insider threats by ensuring no single user—not even a privileged administrator—can unilaterally access or alter sensitive records. By enforcing that data remains encrypted even during use and that its history is immutable, the architecture provides a technically guaranteed framework for complying with strict health data regulations and upholding the fundamental principle of patient confidentiality.

2. Powerful, Secure Analytics:
The ability to analyze complete customer datasets without ever decrypting them allows Uniq Health to identify systemic trends, correlate efficacies, and conduct vital research on fully protected data. This transforms the high-risk liability of managing Protected Health Information (PHI) into a secure asset for discovery & improved outcomes.

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Automated PII File Redaction

Uniq Health also use OmniIndex's Dropblock as part of their PGBC platform to keep their files inoculated and compliant while used in their cloud workflow.

In addition to providing the same secure storage outlined with PGBC, Dropblock also ensures that all PII in files is automatically when they are saved, ensuring that this regulated and critical information is not exposed in the cloud or when files are collaborated on.

The redacted data is encrypted with FHE and stored in the user's own blockchain storage. Only authorized users are then able to unredact that data, meaning they can share the file with others with complete confidence the redacted information cannot be exposed.

PII can be redacted automatically when a file is saved, or it can be redacted while the file is being worked on by using Dropblock's AI chatbot Boudica to find any PII data and then redact it.

The Dropblock AI can be set at a system level to automatically redact set information within all files in an organization's workflow, or within set access levels and groups. This can be configured by the admin in a file called patterns.conf.

The admin can type any patterns that they are looking for and the system will look for these patterns and then ascertain whether it needs to redacted or not.

For example:
#US SSN
^(?!(.)(\\1|-)+$)(?!000|666|9..)(?!...-?00)(?!.*0000$)\d{3}(-?)\d\d\3\d{4}$

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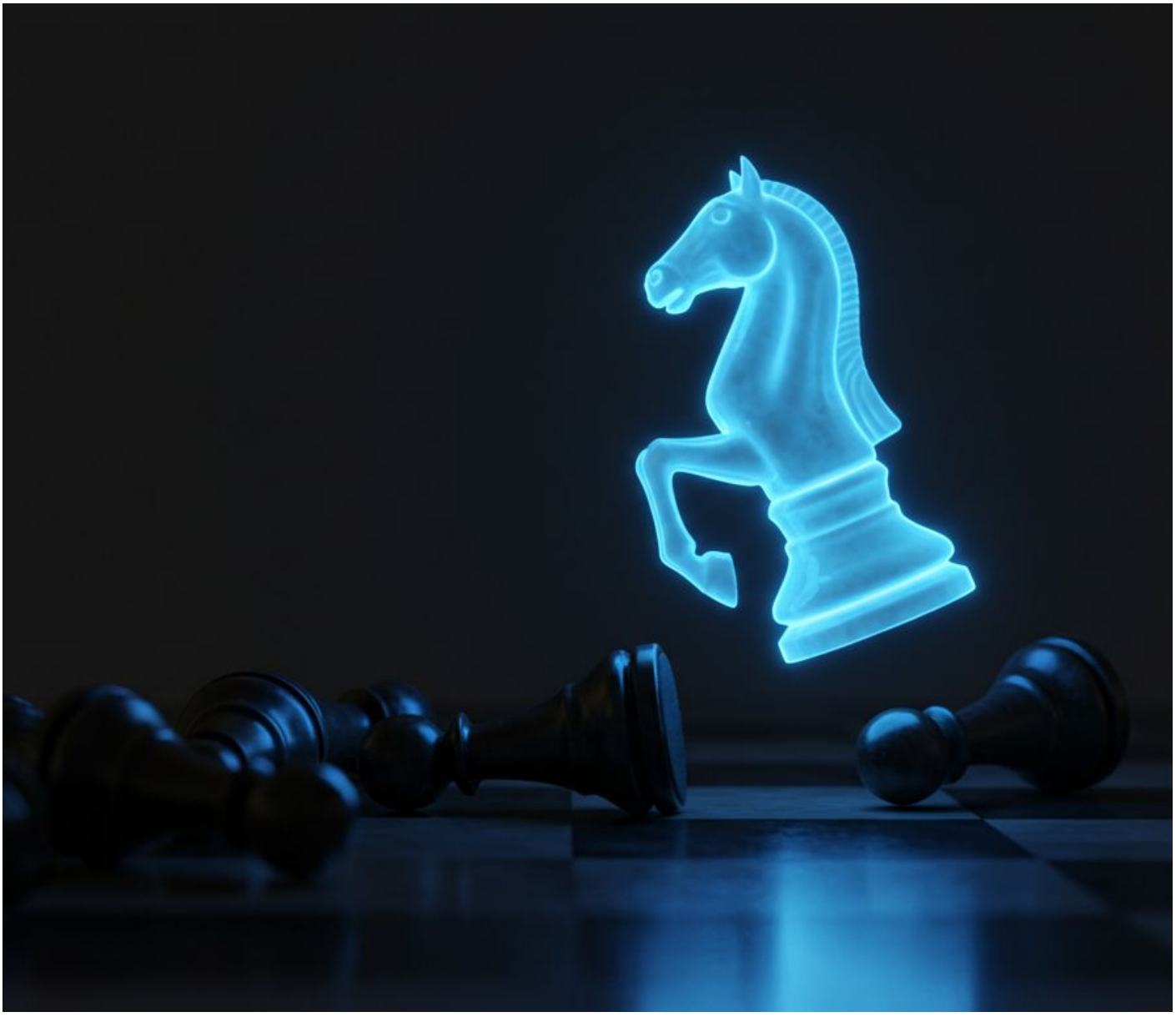
The Competitive Edge: Analytics from Regulated Data

Critically, OmniIndex's security architecture & patented encryption enables even the most regulated data to be analyzed with AI. This enables Uniq Health to get more from their customer data to provide personalized insights without risk of exposure or compliance breaches.



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Insights from Regulated Data

The Problem: In personalized health, a vast amount of the most valuable data is also the most complex. Gut microbiome data, for instance, is a sea of highly specific, interconnected biological information that must be kept secure and confidential.

Traditional keyword-based analytics fails as it cannot understand the complex relationships between different microbes, dietary inputs, and their impact on an individual's health. It also requires the data to first be decrypted before it can be searched and queried.

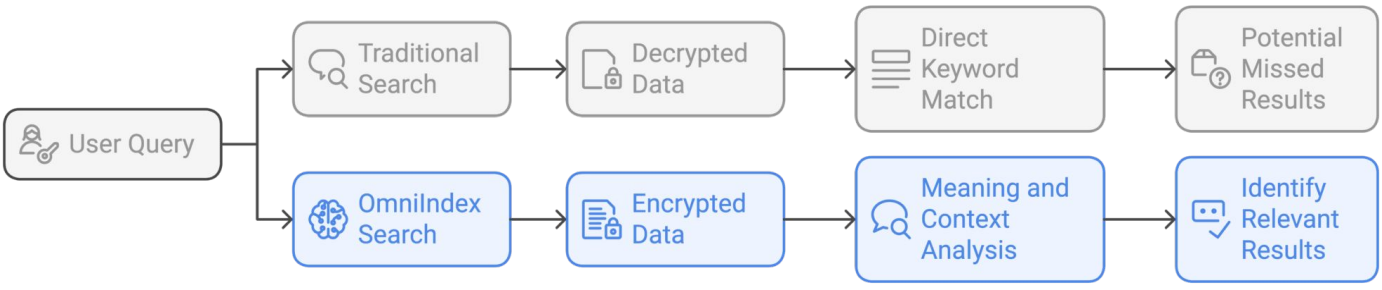
The Solution: OmniIndex's AI-Powered Semantic FHE Search in PGBC.

PGBC securely stores the sensitive microbiome data on its immutable, decentralized ledger. Then, OmniIndex's Boudica AI, equipped with a medical lexicon, applies semantic search to the fully encrypted information. This allows the system to identify complex relationships without ever decrypting the data.

For example, a Uniq Health practitioner could ask: “Show me all users with low levels of Bifidobacterium who also report ‘poor sleep’ and consume ‘processed foods’.”

The AI understands these concepts semantically; it can correlate "poor sleep" with logs mentioning "insomnia" and "processed foods" with "fast food" or "frozen meals." It instantly searches across the entire encrypted dataset and returns a single, comprehensive result.

This transforms hours of manual data correlation into a query that provides critical insights in seconds, directly from protected health information.



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Insights from Encrypted DICOM

OmniIndex uniquely enables organizations to analyze fully encrypted health images. This includes the ability to fully encrypt & analyze DICOM.

DICOM stands for Digital Imaging and Communications in Medicine. These images contain many different types of data including device usage and patient administration information. This type of information is commonly used in Healthcare and Life Science, however not usually from the DICOM records themselves. This is because of the confidentiality and privacy requirements of these heavily regulated health images

OmniIndex ensures compliance by protecting the privacy and security of this data by keeping it encrypted at all times, and storing it in an immutable blockchain to eliminate third-party access and ensure the data's integrity.

One example use is that DICOM images can offer valuable insights into device utilization. This information is potentially valuable for managing expensive medical imaging equipment. However, it is very rarely used due to the compliance complications of accessing it.

OmniIndex enables companies to analyze this encrypted data with Boudica: OmniIndex's award-winning native SLM AI engine. Doing so can reveal usage patterns, identify potential bottlenecks, and optimize workflows within healthcare practices. It has also been shown to aid the efficiency of patient care by being able to rapidly discover who had what scan when, and automate alerting of what follow-up procedures are required.

Furthermore, the data can be added to any workflow in a secure and compliant way easily through PGBC & Dropblock.

In the case of Uniq, they are using Dropblock to add encrypted gut microbiome data to their Google Workspace workflow to gain real-time insights and manage their client data securely and compliantly with fully redacted PII.

Please get in touch to learn more about OmniIndex PGBC & our solutions for regulated data. And check out Uniq Health to learn more about their work.

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