Revolutionizing Educational Data Management with Web3

An OmniIndex PostgresBC Case Study:
FutureX Education

OmniIndex

The Problem

FutureX Education manages the educational data of students in Nigeria.
This data is heavily regulated and should never be exposed.

The Solution:

Secure Web3 Data Storage
Constant Encryption with OmniIndex FHE
Secure AI Insights of fully encrypted data

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Securing the path to compliance with Web3 data storage and encrypted analytics

OmniIndex enables users to drive profit and optimize their business operations by adding valuable data to the cloud without compromising governance or compliance requirements.

This is possible because OmniIndex has built the world's only commercial decentralized data platform enabling analytics and data visualizations to be performed on fully encrypted data.

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Use Case:
OmniIndex is partnered with Future-X Education to provide a secure blockchain data platform for the storage and AI analytics of educational data in Nigeria.

OmniIndex's web3 data platform is the only commercial data solution in the world enabling AI & ML analytics to be performed on fully encrypted data in real-time. As such, by migrating their leading EMIS (Educational Management Information System) to OmniIndex, Future-X have ensured they can provide Nigerian schools, students and teachers with world-leading data security and insights.

This secure blockchain solution for educational data analytics and management was first implemented in Cross River State in 2023 where around 500,000 students and teachers are being added to the platform.

This paper looks at the OmniIndex Web3, encryption and AI technologies that power this joint endeavor.

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Web3 Data Storage:
Full Privacy & Security with Blockchain

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Blockchain technology provides a more secure and private data storage option than legacy solutions for two key reasons:

1: Data is Immutable & Secure

This means that once data is stored in the blockchain, it cannot be changed or deleted.

Regarding security, this eliminates the threat of ransomware attacks because an attacker cannot overwrite stored data with their own encryption and demand payment for its decryption.

Regarding Educational data, this immutable technology provides a transparent and trustworthy way to validate an individual's qualifications and credentials. This is because once an institution awards a certificate and uploads it to the blockchain, that information can never be edited and it can be transparently and permanently traced back to the institute for validation.

2: Data is Private

This means that only authorized and authenticated users can access the blockchain and view the content. Not even OmniIndex nor Future-X are able to access the stored data without express permission.

This is further enhanced through OmniIndex's patented encryption technology that enables data to remain encrypted at all times - even while being searched and analyzed.

This complete privacy and protection for educational data is crucial because of its highly sensitive and regulated nature with it containing the private and identifying information of children as well as teachers.

> "OmniIndex aligns with UNESCO's requirements for EMIS by offering secure data sharing, traceability, and accessibility. With the integration of Web3 technology, our educational data becomes tamper-proof and easily auditable. This enhances Nigeria's educational data infrastructure by ensuring the integrity and accuracy of data, which is crucial for effective policy making and monitoring progress."

Dr. Patrick Adeneye,
Future-X Education
CEO.

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Fully Homomorphic Encryption:
OmniIndex's patented technology uniquely enabling real-time search and analytics of encrypted data.

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OmniIndex's patented FHE uniquely enables users to search and analyze fully encrypted data in real-time - both directly inside the database with native AI & ML, or in leading tools including Google Looker. Two key benefits of this for Future-X and educational data management are:

1: Complete Security.

FHE ensures sensitive and regulated data such as student private information including their name and address can remain encrypted at rest, in transit and in use. This is an upgrade on legacy encryption technology which frequently leaves sensitive data vulnerable when it is being used because it has to be decrypted while being searched or used in collaboration, productivity and analytics tools.

2: Enhanced Insights

As data can remain encrypted at all times, even the most sensitive and regulated data can be safely & compliantly analyzed.

For example, a reported issue with educational data in Nigeria is live information around out-of-school children. Indeed, even the United Nations Children's Fund (UNICEF) and the United Nations Education Scientific and Cultural Organisation (UNSECO) provided conflicting figures despite both being UN agencies.

By digitizing school data thanks to Future-X's EMIS and storing it in the OmniIndex platform, it is possible to aggregate the data in real-time and see how many children are out of school while the private information (for example the student's name) remains fully encrypted and is therefore not exposed.

This can either be done within the database, or in an external tool like Google Looker.

> "With OmniIndex's Fully Homomorphic Encryption (FHE) mechanisms, we ensure that sensitive information remains confidential while still gaining much needed and valuable insights. For instance, when analyzing learners' performance, our system can process encrypted data, such as test scores, without decrypting it. This means that educational institutions can gain valuable insights into trends and areas that need improvement without compromising individual privacy."

Dr. Patrick Adeneye,
Future-X Education
CEO.

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Private AI:
OmniIndex Boudica

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Boudica is an SLM (Small Language Model) AI engine empowering users to gain insights on their encrypted data without any data ever being exposed or shared externally. This private AI engine has a number of direct benefits for FutureX and other organizations working with sensitive and regulated data.

1: Privacy

Boudica is a private and native AI solution. This means user data is not shared externally of the system to generate answers, and there is no third-party access to the user's queries or answers.

What's more, because of OmniIndex's patented encryption technology, all data is encrypted while it is being subjected to AI analytics.

2: Accuracy

SLMs like Boudica only work on small pools of controlled data that they are supplied with and are therefore far less likely to contain biases and inaccuracies than LLMs which learn from huge pools of varied data.

Boudica's use of multiple separate thesaurus models and its probability matrices also ensure that only the optimum response is given to a user.
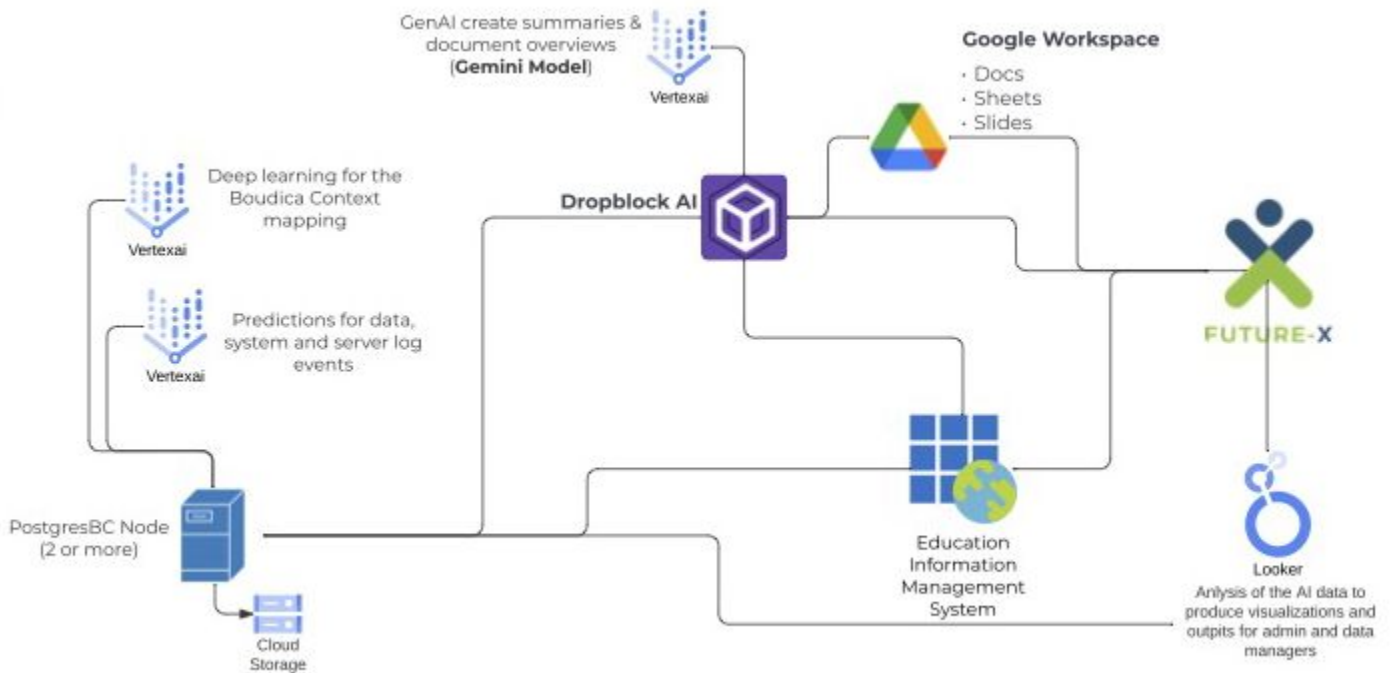
3: Efficient & Optimized

SLMs do not require extensive training on huge pools of data in order to be used and can be adapted to offer specialist services in different languages and areas simply by changing their ontologies. They also require less powerful hardware to run because they use less energy.

> "The real-time AI insights from fully encrypted data represents a groundbreaking step towards improving educational outcomes. For example optimizing school feeding initiatives, fostering healthier and more conductive learning environments for Nigerian children."

Dr. Patrick Adeneye,
Future-X Education
CEO.

OmniIndex

GenAI create summaries &
document overviews
(**Gemini Model**)
Vertexai

Deep learning for the
Boudica Context
mapping
Vertexai

Predictions for data,
system and server log
events
Vertexai

PostgresBC Node
(2 or more)

Cloud
Storage

Dropblock AI

Google Workspace
· Docs
· Sheets
· Slides

Education
Information
Management
System

FUTURE-X

Looker
Anlysis of the AI data to
produce visualizations and
outpits for admin and data
managers

Customer Architecture Diagram

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This diagram shows data stored within PostgresBC with integrations to:

- Google Workspace (Via Dropblock - the OmniIndex Add-on for Workspace)
- Vertex AI Gemini Model
- Vertex AI Deep Learning
- Vertex AI Training
- Looker Analytics

The only way to safely utilize vulnerable and confidential data is to use a data platform that protects that data from attack, and enables it to be analyzed in a fully encrypted state with no third-party access and no risk of exposure.

OmniIndex's technology is the only commercial solution that makes this possible.

This is because of the combination of its core technologies: blockchain, fully homomorphic encryption, and AI.

Please get in touch to learn more about the OmniIndex Web3 data solutions.

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