



# Hippocratic Database Privacy Enforcement and Compliance Auditing

- Value Proposition

FOAK in the Healthcare Industry

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# HIPAA and its challenges

## HIPAA, 1996

### TITLE 2

#### 2.1 The Privacy Rule

**Indicate intention to use Protected Health Information policy**

regarding sharing of non-public personal Information with affiliates and third-parties

**To disclose only the minimum amount of Protected Health Information** when reporting adverse events to entities outside of the partner system...

### Challenges in implementing HIPAA

1. Determining the scope of the HIPAA rule
2. Risk Assessment
3. Cost of implementation
4. Ease of implementation
5. Information sharing

**Satisfied by the Hippocratic database solution**

There have been **22,664** privacy-related complaints ever since the privacy rule took effect in 2003....

**- Department of Health and Human Sciences**

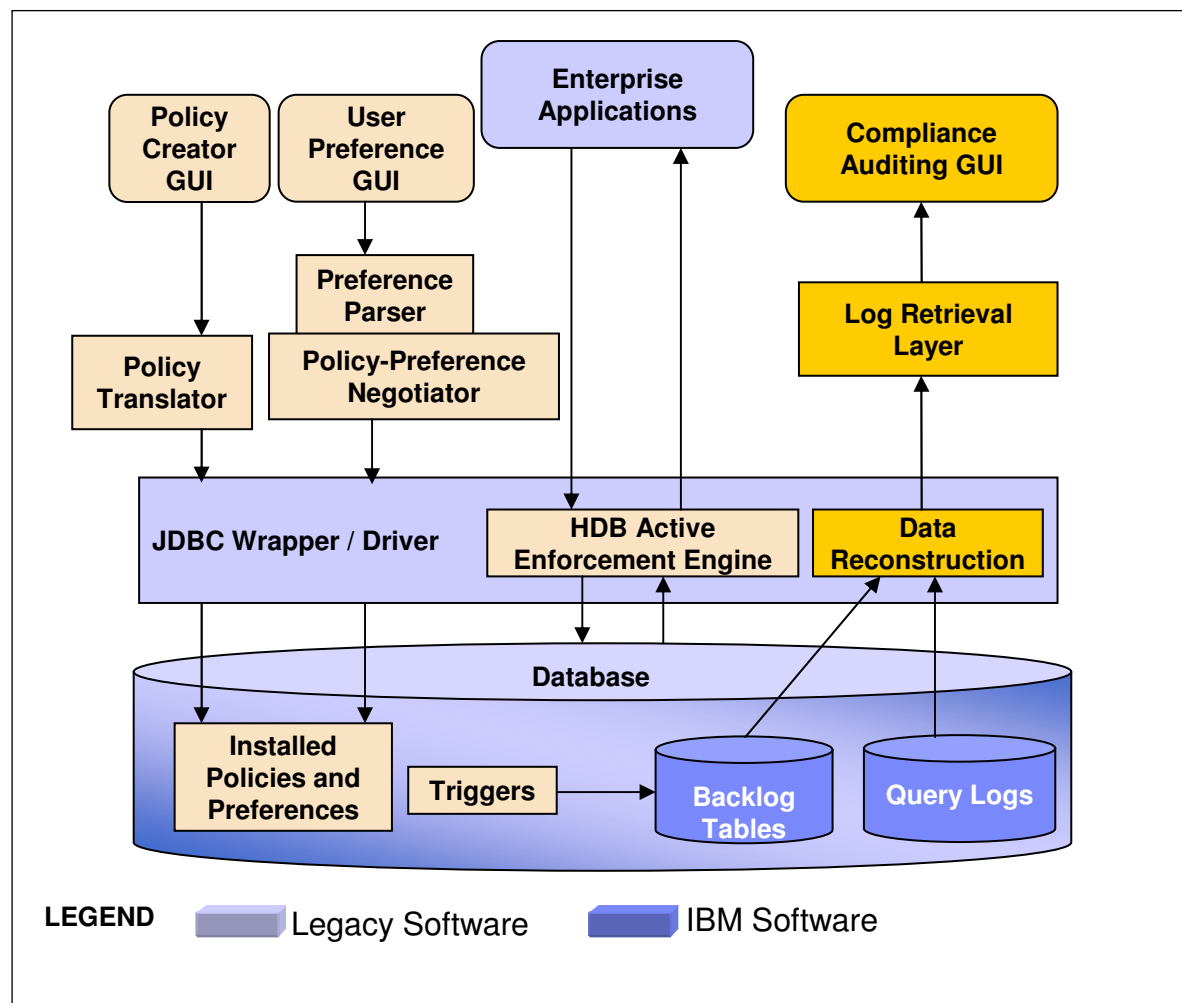
# The Hippocratic Database solution

This solution consists of –

**a) Active Enforcement Component**

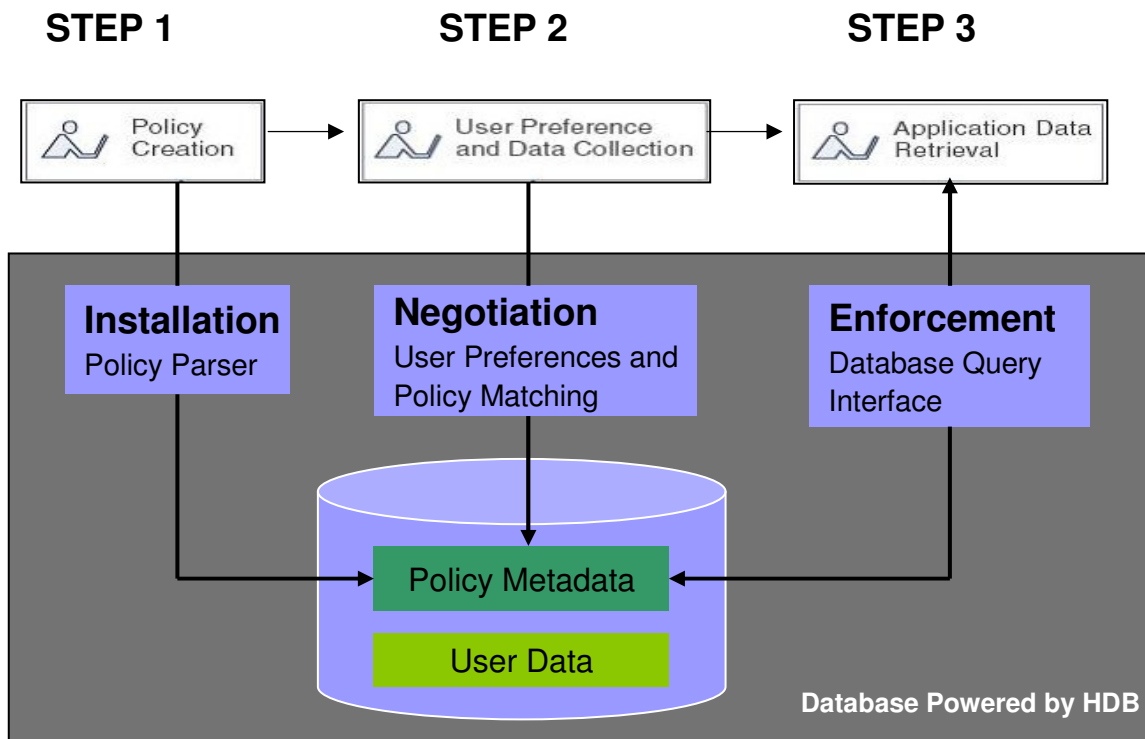


**b) Compliance Auditing Component**



# 1. Active Enforcement component

*Enables the Hippocratic database to reveal only data compliant with policy*



# Active Enforcement value proposition

➤ **EASE OF INTEGRATION**

- Existing applications do not require modifications

➤ **DATABASE AGNOSTIC**

- Does not require changes to the Database

➤ **EASY ENFORCEMENT AFTER POLICY MODIFICATION**

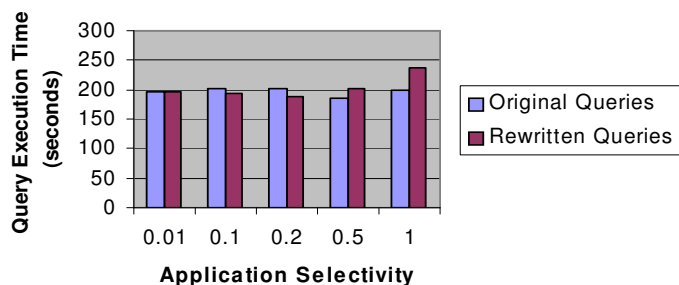
- Centralized creation and updating of policies  
 - User need not be educated of new or changed policies

➤ **FINE-GRAINED**

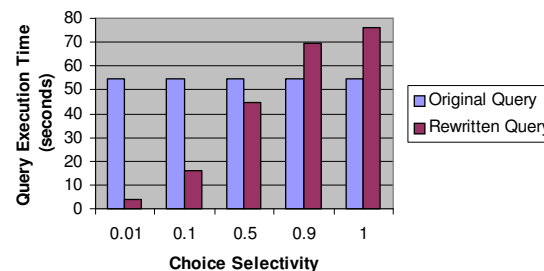
- Policy and user disclosure control at database cell-level as against row/column level

➤ **PERFORMANCE**

- Gives a significant improvement in system performance only in cases where the user has specified disclosure preferences



**WORST CASE:** Everyone discloses everything. Query processing yields no value. The penalty is 5-15% of the execution time of the original query.



**STANDARD CASE:** Choice Selectivity varies. In best case, HDB Active Enforcement gives an order of magnitude improvement.

## 2. Compliance Auditing component

*Enables verification of compliance with policy*

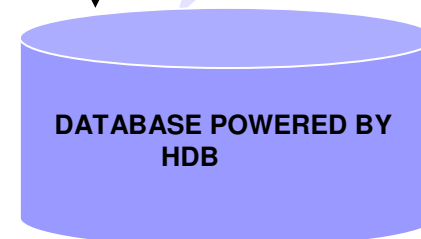
The component -

- *Determines who accessed* designated data, *for what purpose*, *when it was accessed* and *what changes were made*.
- *Is agnostic to enterprise applications and database systems*
- *Has minimal impact* on the company's operations.
- *Tracks disclosures down to the cell level* in the database.
- *Has a security advantage* over logging systems.
- *Reduces audit time*.



Who read  
J.Cherian's  
information in  
1987?

Here is a list:  
S.Sampath got his  
financial details..  
S.Purohit asked for  
his medical records



## Compliance Auditing value proposition

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➤ **Cost Reduction**

*Reduces the cost of manual auditing processes*

➤ **Low Impact**

*Can be integrated into the existing architecture without affecting current operations*

➤ **Extensible**

*Enables development of customer insight applications*

➤ **Security**

*Resistant to predicate-based attacks*

## This is FIRST-OF-A-KIND!

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### The Hippocratic Database (HDB) solution

- ***Does not require alteration*** of enterprise applications, relational database systems
- Provides disclosure auditing and ***policy enforcement at Database Level***
- ***Enforcement at Cell-level*** rather than row/column level offered by other solutions
- ***Improves request processing speed***
- Facilitates a ***check for conflicts*** between user disclosure preferences and company's policies at the system level
- Uses ***Logical Logging*** that records the exact response given to a user
- Simultaneous enforcement and auditing ***without significant performance impact***



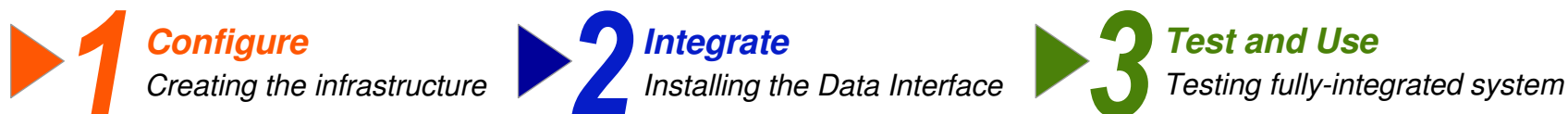
***HDB IS THE FIRST SOLUTION IN THE MARKET TO OFFER ANY OF THE ABOVE MENTIONED FEATURES***

## Solution value proposition

COMPONENT	DISTINGUISHING FEATURES
Overall	<ul style="list-style-type: none"> <li>▪ Enables companies to be <b><i>accountable for unauthorized disclosures</i></b>.</li> <li>▪ <b><i>Can be used in any environment</i></b> with relational/non-relational* databases</li> </ul>
ACTIVE ENFORCEMENT COMPONENT	<ul style="list-style-type: none"> <li>▪ <b><i>Database agnostic</i></b></li> <li>▪ <b><i>Promotes scalability and performance</i></b></li> <li>▪ <b><i>Easier enforcement of policies</i></b></li> </ul>
COMPLIANCE AUDITING COMPONENT	<ul style="list-style-type: none"> <li>▪ <b><i>Performance advantage</i></b> over other auditing applications</li> <li>▪ <b><i>Security advantage</i></b> over other auditing solutions</li> <li>▪ <b><i>Cost-effective</i></b></li> </ul>

\* **Note:** Can be reused in environments with a non-relational database with the help of a compiler to enable the system to interact with the HDB layer

# Implementation Methodology



<b>Phase 0: Preparation and evaluation</b>	<b>Phase 1:</b>	<b>Phase 2:</b>	<b>Phase 3:</b>
	<u><b>Inputs</b></u> <ul style="list-style-type: none"> <li>• Disclosure policy requirements, including users/roles, purposes, recipients and the connections to application contexts</li> </ul>	<u><b>Inputs</b></u> <ul style="list-style-type: none"> <li>▪ The data interface points for the target system Micro design</li> </ul>	<u><b>Inputs</b></u> <ul style="list-style-type: none"> <li>▪ HDB-enabled system</li> </ul>
	<u><b>Activities</b></u> <ul style="list-style-type: none"> <li>• Define the policy rules</li> <li>• Use the HDB Control Center to install HDB metadata policy files for the data source(s)</li> <li>• Use the HDB Control Center to create the auditing infrastructure</li> </ul>	<u><b>Activities</b></u> <ul style="list-style-type: none"> <li>▪ Augment the chosen interface points to perform query rewriting and query logging.</li> </ul>	<u><b>Activities</b></u> <ul style="list-style-type: none"> <li>▪ Perform integration testing</li> <li>▪ Perform use case testing</li> </ul>
	<u><b>Output</b></u> Data system contains the necessary structures to perform fine-grained enforcement and auditing	<u><b>Output</b></u> HDB-enabled data system	<u><b>Output</b></u> Executing, policy-compliant system in active state

## ACADEMIC MEDICAL CENTER (AMC), AMSTERDAM

Medical centers in the Netherlands have a *wealth of information that can be leveraged to drive breakthroughs* and deliver innovation in healthcare. However, *data sensitivity*, the fragmentation of records *and complexity* in retrieving the same *have inhibited advances* in this area. In order to open up this data to researchers,

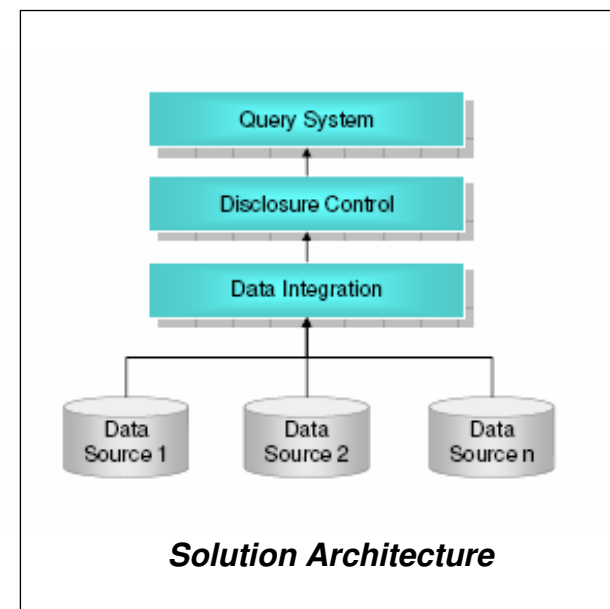
*AMC has setup a framework that addresses problems outlined, mitigates risks for practitioners and patients and enables medical innovation to proceed.*

### ISSUES ADDRESSED BY THE SOLUTION

1. *Data Integration* through WebSphere Information Integrator (WSII)
2. *Disclosure Control* through **Hippocratic database technology**
3. *User Interface to facilitate querying* provided by Data Discovery and Query Builder

### SYSTEM BENEFITS

- *Efficient data management*
- *Privacy and security issues enforced* by the system.



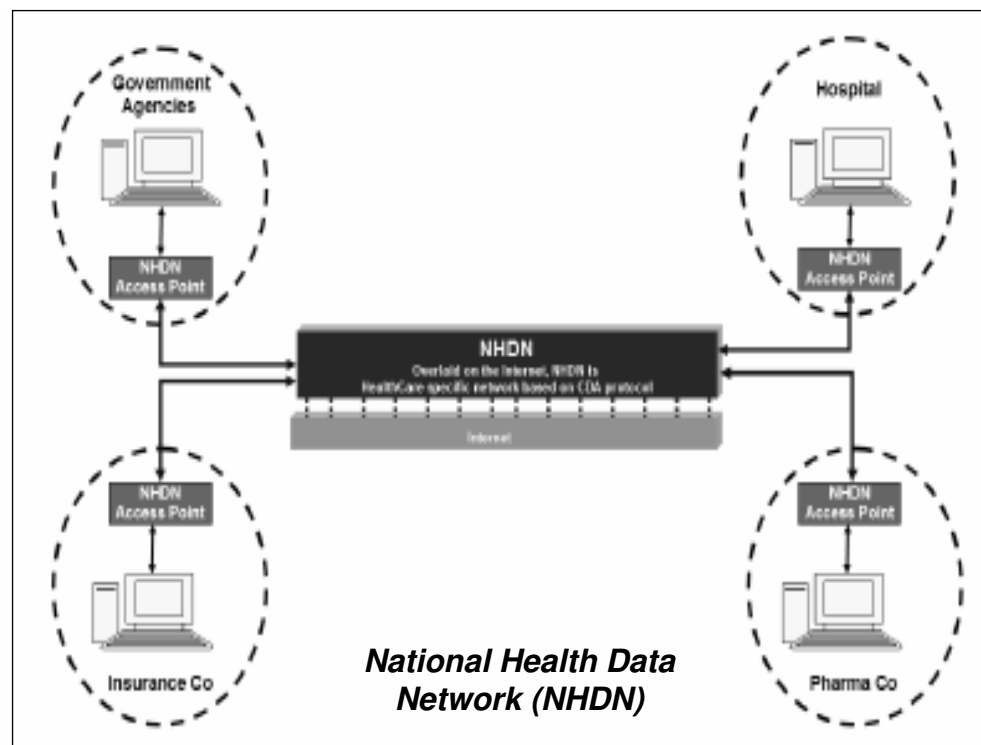
## NATIONAL HEALTH DATA NETWORK (NHDN), INDIA

In India, most of the *healthcare records are on paper* and transactions are managed manually. This *invites error, inefficiency and prevents timely analysis of data* to detect health related emergencies. Hence, it became *crucial to establish a standards-based, safe and secure IT backbone* that naturally *collaborates health institutions* nation-wide and enable service providers to form a network *so operational, clinical and financial synergies can be realized*.

### DESIGN CONSIDERATIONS FOR NHDN

1. *Safe and secure* using **Hippocratic Database technology**
2. *Standards-based* using Structured Query Language
3. *Facilitate data integration* and federation from disparate systems using WebSphere Information Integrator
4. *Scalable and fault-tolerant* for nation-wide deployment using Grid Technology

*This solution is also to be deployed in Taiwan and Israel*



## Additional References

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### Documents

- **Managing Disclosure of Private Healthcare Data with HDB**

A white paper detailing the HDB solution

**Link:**

[http://www.almaden.ibm.com/software/projects/iis/hdb/Publications/papers/nc\\_hdb\\_white\\_paper\\_health.pdf](http://www.almaden.ibm.com/software/projects/iis/hdb/Publications/papers/nc_hdb_white_paper_health.pdf)

- **Enabling Biomedical Research in Europe: Using the Dutch Experience as a Template**

This document details the HDB solution deployed for Academic Medical Center, Amsterdam

**Mail Request to:** [tyroneg@us.ibm.com](mailto:tyroneg@us.ibm.com)

- **A National Healthcare Data Network for India**

This document details the HDB solution deployed for the National Healthcare Data Network, India

**Mail Request to:** [tyroneg@us.ibm.com](mailto:tyroneg@us.ibm.com)

- **HDB User Guides**

These documents outline how to install and use HDB Active Enforcement and HDB Compliance Auditing solutions.

**Link:**

[http://www.almaden.ibm.com/cs/projects/iis/hdb/user\\_docs.shtml](http://www.almaden.ibm.com/cs/projects/iis/hdb/user_docs.shtml)