



BLOCKCHAIN SOLUTION FOR
DRUG RECALL MANAGEMENT



PROJECT OVERVIEW

Drug recalls affect hundreds of pharmaceutical companies every year impacting sales, customer relationships, and supply chain operations. The existing centralized models do not address issues surrounding traceability and recall. Products in the pharmaceutical supply chain move through multiple intermediaries before reaching the consumer, making the recall process complex and cumbersome. Emerging technologies such as blockchain offers pharmaceutical companies the opportunity to drive efficiency across the supply chain. In an effort to create a transparent environment for information access, a leading pharmaceutical company wanted to implement a blockchain solution to ensure accountability at the distributor level.

CLIENT PROFILE

Our client is a US-based multinational pharmaceutical company that manufactures and sells medicinal formulations and active ingredients across 40 countries.

BUSINESS REQUIREMENT

Our client wanted a system that notifies distributors when a particular product or batch/lot number is slated for recall. With distributors spread across geographies, there was a need to augment the process with an effective recall strategy.

QBURST SOLUTION

Our solution is a fully decoupled, microservices-based architecture on Ethereum blockchain involving smart contracts. The parties involved in the supply chain log their data into a common blockchain. The manufacturer logs the production date and time of each batch and unit. Every time a batch of drugs is added, it is written to the Ethereum blockchain. The blockchain emits events for predefined scenarios such as potential contamination, mislabeling, or manufacturing defects. This way, any client software on the distributor side, irrespective of technology, can listen to these events and take appropriate action.

Solution Components:

- Manufacturer Services/APIs (set of microservices)
- Distributor-side Application (frontend and backend)
- Solidity Smart Contract (Ethereum blockchain)
- DevOps, Docker Containers, and TDD (Test Driven Development) Approach
- Private Network using POA (Proof of Authority) Consensus Algorithm

The distributor-side web application displays a list of manufacturers with products supplied by them. Every time a batch of products is added or updated, the corresponding supplier/manufacturer is validated via blockchain. Any update with respect to the manufacturing company's line of products is notified in the distributor application along with real-time status change for corresponding batches.

Distributor Node.js backend mainly serves:

- API service for distributor frontend
- Listeners for events triggered by manufacturer blockchain
- WebSockets communication with distributor frontend

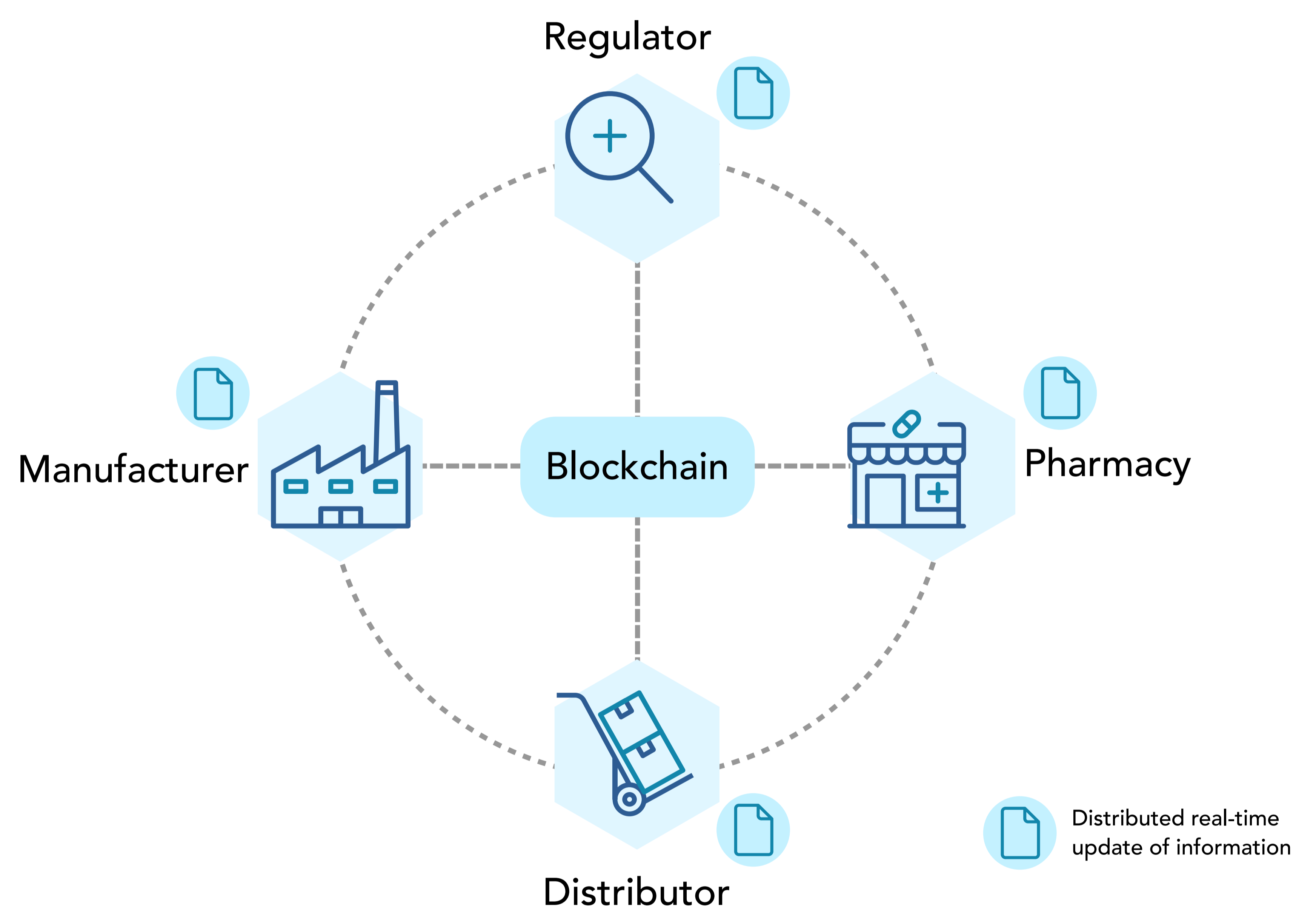
The DevOps side uses Docker-Compose to build and deploy the solution to the target servers. The entire solution is built within Docker containers. We set up Ethereum nodes by writing bash scripts to launch one boot node, and N number of Ethereum validating nodes as Docker containers. The scripts are configured so that the nodes, upon launch, are set up as 'Proof of Authority'.

Pharmaceutical Information Flow

Before



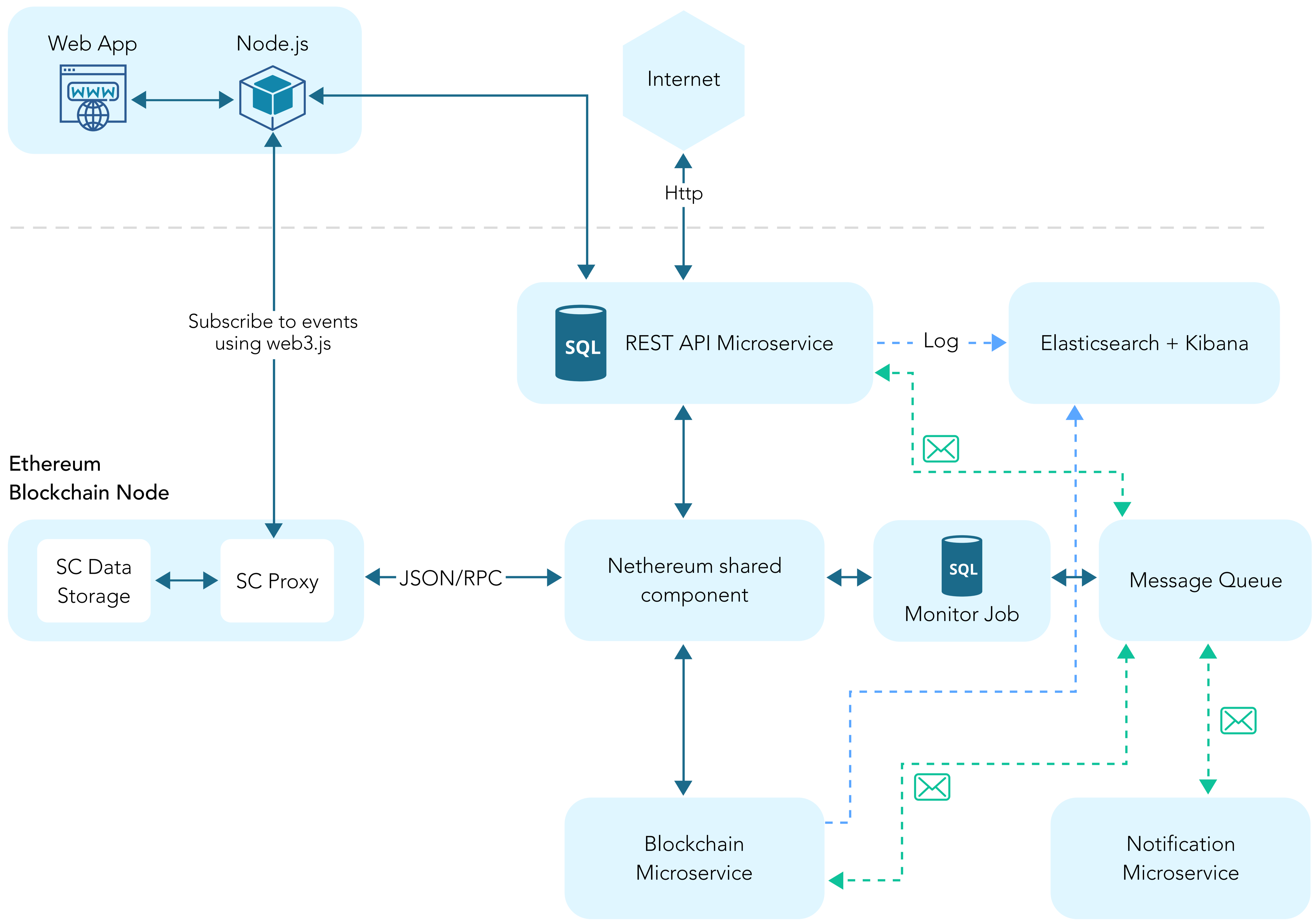
After



KEY FEATURES

The distributor admin can:

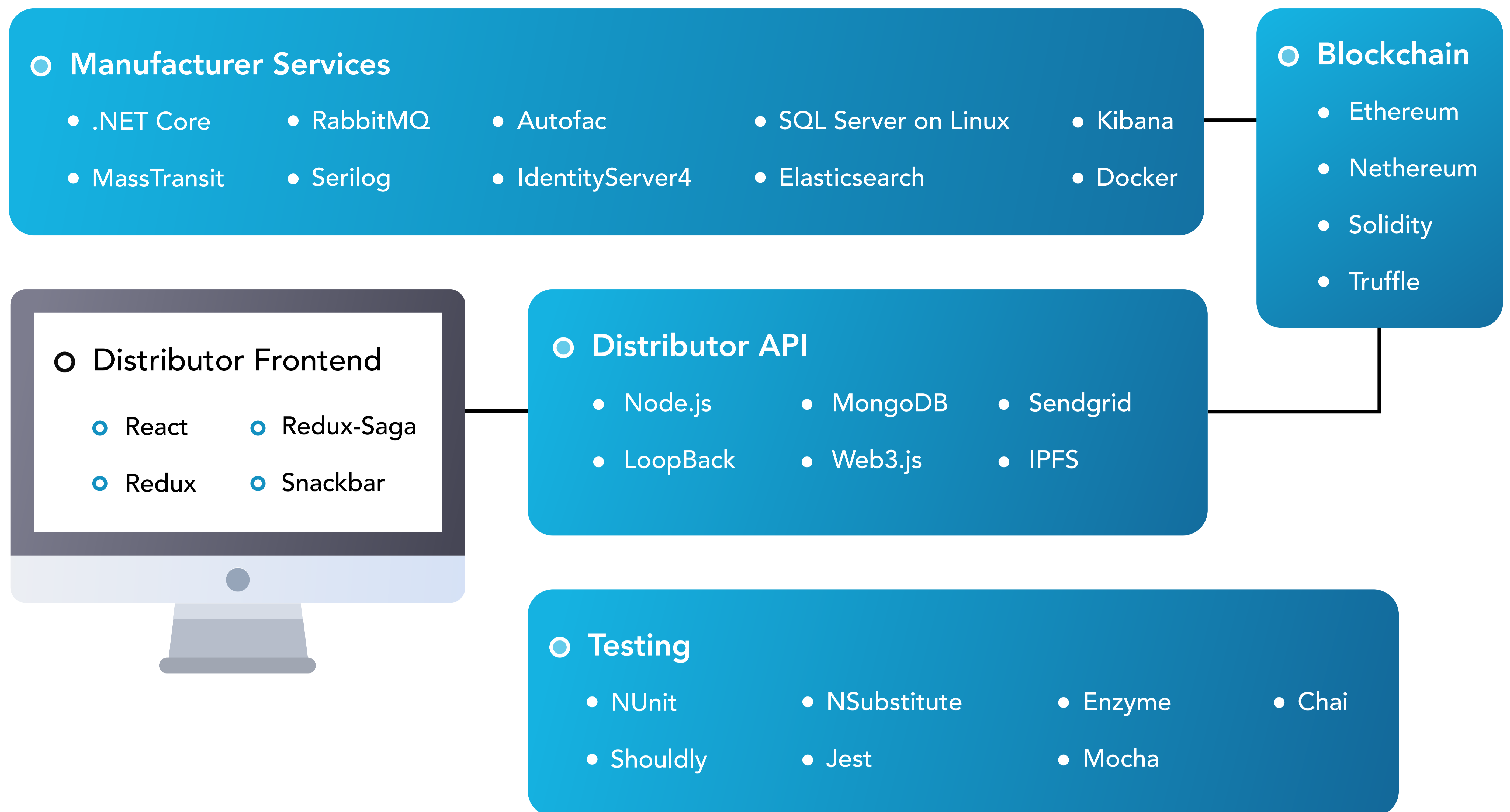
- Login, view list of manufacturers and product batch ID/date
- View more details upon clicking batch ID link
- View and edit fields upon selecting the batch ID
- Filter list of drugs based on active and expired status of batches
- Search for products based on manufacturer/batch ID
- Create a new batch listing with required details
- Verify approval from manufacturing company and regulatory body when adding a new batch
- Receive email notifications if the batch is recalled



BUSINESS BENEFITS

- Decentralized and automated solution
- Targeted dissemination of recall information to concerned distributors and pharmacies
- Distributors need to only contact pharmacies that received the affected lots
- Improved drug recall efficiency protecting commercial goodwill of the manufacturer

TECHNOLOGIES



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