



## PRODUCT BUILD | APPLICATION MODERNIZATION

# Electronic Data Capture

## Pharmaceutical Technology

Our client is a well-established American technology company developing Software as a Service for clinical trials. While functional, their legacy Clinical Trial Management System (CTMS) proved increasingly difficult to develop, with growing performance issues during scaling. This put the solution and the business at risk of lagging behind competing products that could innovate faster and scale better.

gravity9 and MongoDB were engaged to partner with the client's three internal teams to provide a ground-up modernized CTMS to replace the legacy system. Collaboration was key between teams, ensuring rapid yet stable and secure production. Initial requirement gathering to identify key needs and pain points led quickly to identifying the most suitable technologies and approaches.

MongoDB was selected as the database, thanks to its efficiency in this kind of project, as well as Liquibase, ReactJS, Java, and Quarkus. The existing monolithic architecture was replaced by a gravity9 recommended microservice approach, allowing the scaling of challenges and greater control over component development.

gravity9 played a crucial role in developing a fully functional, modernized CTMS that is efficient, easier to scale, and provides a better platform for further innovation. This new product puts the client in an excellent position compared to its competitors and has received strong praise since its launch.



### Review of Challenges

Our client is an American technology company that develops Software as a Service for the healthcare industry, such as electronic data capture and Clinical Trial Management Systems (CTMS).

Their Site Monitoring application connects clinical research administrators with trial sites, giving them a centralized environment to contact suitable trial candidates and gather clinical trial data in an organized way. Predefined sets of questions in the form of templates make the creation of trial workspaces easy and repeatable.

However, the previous Site Monitoring solution struggled to cope with increasing usage load demands. Based on a MySQL database, it was not efficient and did not scale well. Many integrated systems also had a long response time, making the platform frustrating for clinical administrators to use.

A rapidly evolving and complex trial ecosystem made it more difficult to manage and oversee clinical trials effectively.

Furthermore, legacy code made rapid iteration of new features difficult and cumbersome, where newer competing products could pivot or grow in a more agile fashion. Our Client sought to modernize its solution, ensure a competitive market position, and enhance customer value.

### Utilized Technology Stack

- Cloud: AWS
- Database: MongoDB Atlas, Liquibase
- Backend: Java, Quarkus
- Frontend: ReactJS

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## Our Solution

The client turned to gravity9 and NoSQL database specialist MongoDB to partner with three client teams in developing a modernized, fast, scalable version of the Site Monitoring application within their Rave CTMS platform.

gravity9's team delivered the core functionality of the system. This included the settings used in the workspace configuration and the workspace itself (made up of visit type, conduct method, placeholders, sections, and questions). This workspace operates as a kind of template that research administrators use to create visit instances. There can be thousands of visits per template, so change propagation was a key requirement, and this, too, was implemented by gravity9, along with relevant integrations and configurations.

As a result of this enhanced functionality, Rave CTMS improves the efficiency and speed of studies thanks to intelligent automation and workflow management. Data transfer is streamlined and automated between several parts of the client ecosystem, eliminating the need for manual data re-entry and enabling user-centric workflows that bridge applications.

Automated workflows streamline manual processes for key activities, and dashboards focus the user on what matters most. Milestones, tasks, issues, and document statuses are easily tracked in one place, and data is entered once and then used everywhere, eliminating information silos, and significantly improving efficiency and data quality.

## Our Approach

Development took place with gravity9 specialists and internal client teams, requiring extensive communication and coordination to ensure we could proceed at pace without compromising the security and stability of the development process. Technical approaches were discussed with client-side architects, and requirements were gathered from client-side analytics and stakeholders, allowing gravity9 to make informed development proposals based on discovered knowledge. Requirements and development estimates were refined as development progressed, allowing gravity9 to best coordinate testing and action changes based on developing requests.

Technologies were chosen based on a blend of existing tech stack requirements and suggestions from our own expertise. In some cases, such as the Quarkus Java framework, gravity9's developers

quickly rose to the challenge of learning new technologies per the project's requirements.

Initially, the application was developed with a Monolithic architectural approach. However, this frequently leads to issues as applications scale, and so gravity9 spearheaded a shift to microservice-based architecture, which allows larger components and challenges to be broken down, enabling growth and greater granular control as requirements change.

MongoDB was selected as a database over other options like MySQL because of its efficiency and scalability in this kind of project. MongoDB's schema allowed data migration from old sources to the new system. Liquibase was also suggested and adopted to track database changes and Index creation. For the front-end framework, ReactJS was preferable due to its flexibility and the experience of both gravity9 and internal development teams. This was paired with a custom components library with components built specifically for this domain.

Established client teams handled some aspects of development, with UX assets developed in-house and supplied to gravity9 for integration. Testing was also carried out internally.

This mix of the right technologies, focused teams, architectural choices, and gravity9's experience in rapid development allowed swift but safe progress to be made toward the completed product.

## Subsequent Outcomes

Our client had become encumbered by their previous legacy CTMS, which, due to its age, made rapid innovation and reaction to changing market needs difficult. Within the agreed one-year development timetable, from the ground up, gravity9 delivered a functioning and complete Clinical Trial Management System ready for public use.

This new CTMS boasts comparable functionality with the legacy system but in a streamlined, modernized, fit-for-future package that is ready for rapid development to suit customer requirements and outpace competitor products. As a business, the client now possesses a cutting-edge product that will give it a greater market share.

Users enjoy the familiar, powerful functionality of the legacy system but in a more efficient form that boasts a much-improved user interface, making for a more modern and enjoyable user experience. Users can also look forward to additional feature development at an accelerated pace, improving the value

of the product and the efficiency and accuracy with which clinical trials can be conducted, benefiting the medical sector as a whole.



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