# InterSystems TrakCare Implementation

## Comprehensive Performance Evaluation by Planit

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## Key outcomes

- Aided successful deployment of TrakCare, seamlessly integrating with the healthcare provider's systems
- 2,000 concurrent users supported under peak loads, with response times below five seconds.
- Increased patient satisfaction through reduced wait times and streamlined care processes.
- Improved operational efficiency across multiple healthcare facilities.

## Delivered

- Performance testing and engineering
- Test automation
- System monitoring

## Tools

- JMeter
- Grafana
- InfluxDB
- Power BI
- JIRA

# Executive summary

Planit recently concluded a comprehensive performance testing engagement for a leading healthcare provider in New Zealand, aimed at ensuring the robustness, reliability, and scalability of their critical healthcare applications. Utilising industry-leading tools and methodologies, Planit meticulously assessed the system's performance under various load conditions, identifying potential bottlenecks and providing actionable insights for optimisation. The engagement not only validated the system's capacity to handle peak user demands but also enhanced its overall efficiency and user experience. This strategic initiative underscores the healthcare provider's commitment to delivering uninterrupted, high-quality care services, thereby fortifying their operational resilience and patient satisfaction.

# The challenge

Replacing an outdated legacy system can be challenging for many businesses, but the stakes are always exponentially higher when it involves critical care services and sensitive patient healthcare information. That was the case for a leading healthcare provider in New Zealand, who wanted to transform their operations by transitioning to TrakCare, a cutting-edge healthcare information system developed by InterSystems.

Planit was engaged as a trusted partner to deliver comprehensive performance testing, ensuring TrakCare could handle peak loads and guarantee scalability, performance, and reliability. Through our rigorous testing and monitoring approach, we replicated real-world conditions, swiftly identifying and addressing potential performance challenges. In addition, seamless collaboration between us and InterSystems further ensured smoother integration, enabling the project to stay on track and deliver superior results.

Essentially, the success of the project is a true testament to the power of partnership and our superior technical expertise in performance testing.
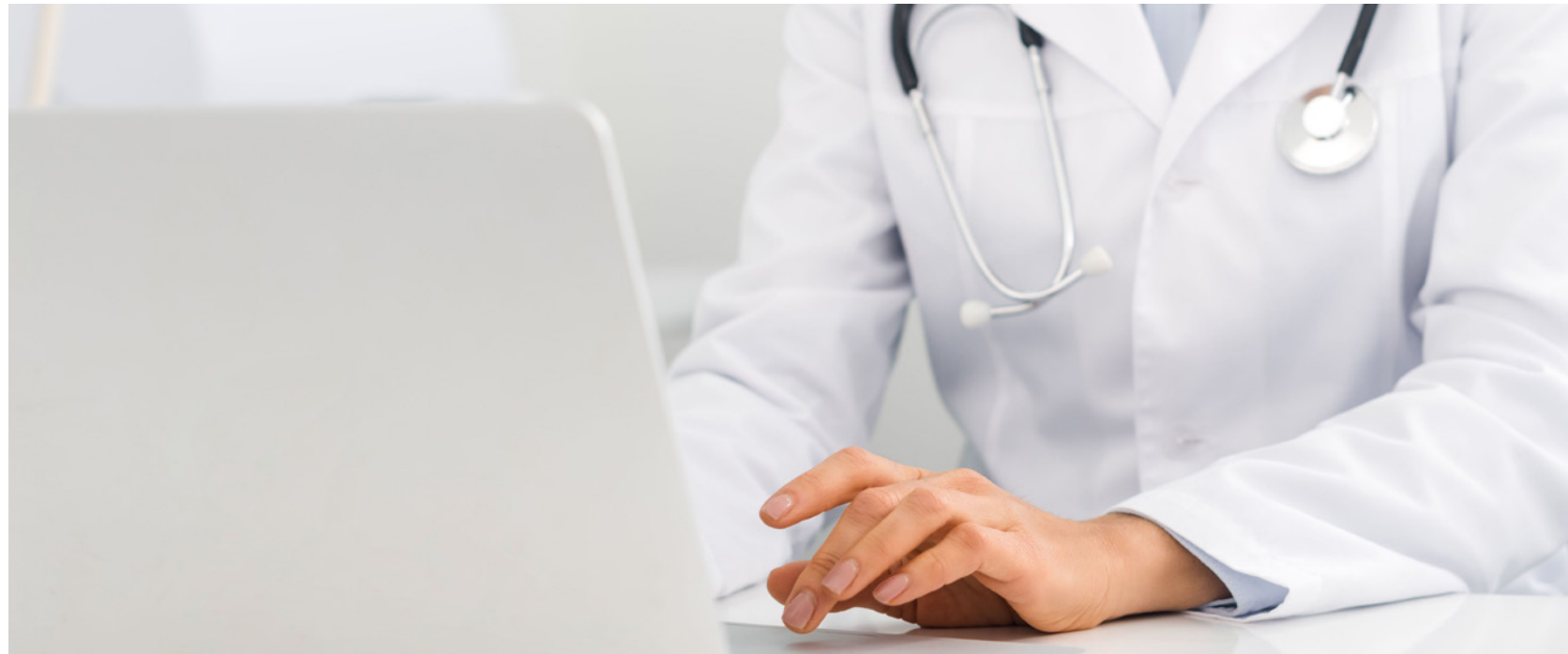
# Modernising infrastructure to meet growing healthcare demands

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The healthcare provider faced several critical challenges with their aging legacy system. The outdated infrastructure struggled with scalability, making it difficult to keep up with the growing demand for healthcare services. The lack of integration across various departments created data silos, resulting in inconsistent information and inefficient workflows. Additionally, the user interface of the legacy system was cumbersome and unintuitive, causing delays in administrative processes and frustrating both staff and patients.

The provider's goal was to overhaul their entire IT infrastructure by transitioning to TrakCare, a modern, scalable healthcare information system that could unify patient records, manage large volumes of users and data seamlessly, and support telehealth services. The project aimed to improve patient care by reducing wait times, streamlining operations, and providing more intuitive, efficient services to both staff and patients.

Furthermore, TrakCare was designed to ensure compliance with healthcare regulations and enhance the scalability of the system to handle future growth and increased user demands.

# A high-stakes modernisation

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Failure was not an option in this digital transformation as the stakes were high.

Data inconsistencies could lead to inaccurate patient records and even potential medical errors, risking patient safety — expectedly, a serious concern. Workflow inefficiencies would cause delays in both administrative and clinical processes, leading to longer treatment times and impacting overall health outcomes

In addition, financial losses were a concern due to the potential for increased operational costs and legal liabilities. Reputational damage would also have had long-term consequences, affecting stakeholder confidence and hindering the provider's future growth opportunities.

# Planit's strategic edge: Ensuring a high-performance transformation

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Given the critical nature of the project, the healthcare provider turned to Planit for our proven expertise in performance testing. Having already established a strong partnership through previous consultancy work in functional and automation services and knowing that we had a wealth of experience in managing digital transformation projects within the healthcare industry, the client trusted us to lead the performance testing of their digital system.

What set Planit apart was our extensive specialisation in performance testing, particularly our shift-left approach. This methodology allowed us to capture performance feedback early in the project lifecycle, enabling us to identify and address issues long before they could impact the system. In addition, we also built a strong relationship with InterSystems, collaborating closely throughout the project to ensure seamless integration and alignment with their TrakCare platform, further enhancing the project's success.

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# Planit's agile and adaptive approach

From the outset, Planit focused on the client's primary goal: reducing patient wait times by optimising application performance under load. We subjected the system to various load levels, capturing key performance metrics to identify and resolve potential issues early. As the project evolved, secondary goals—enhancing user experience and ensuring scalability—became more prominent, shaping our approach to continually refine system performance to meet changing needs.

Success was defined by maintaining fast response times, seamless background processes, and ensuring the system's scalability for future growth. While performance remained the top priority, our flexible strategy allowed us to adapt to shifting objectives without compromising on real-world demands.
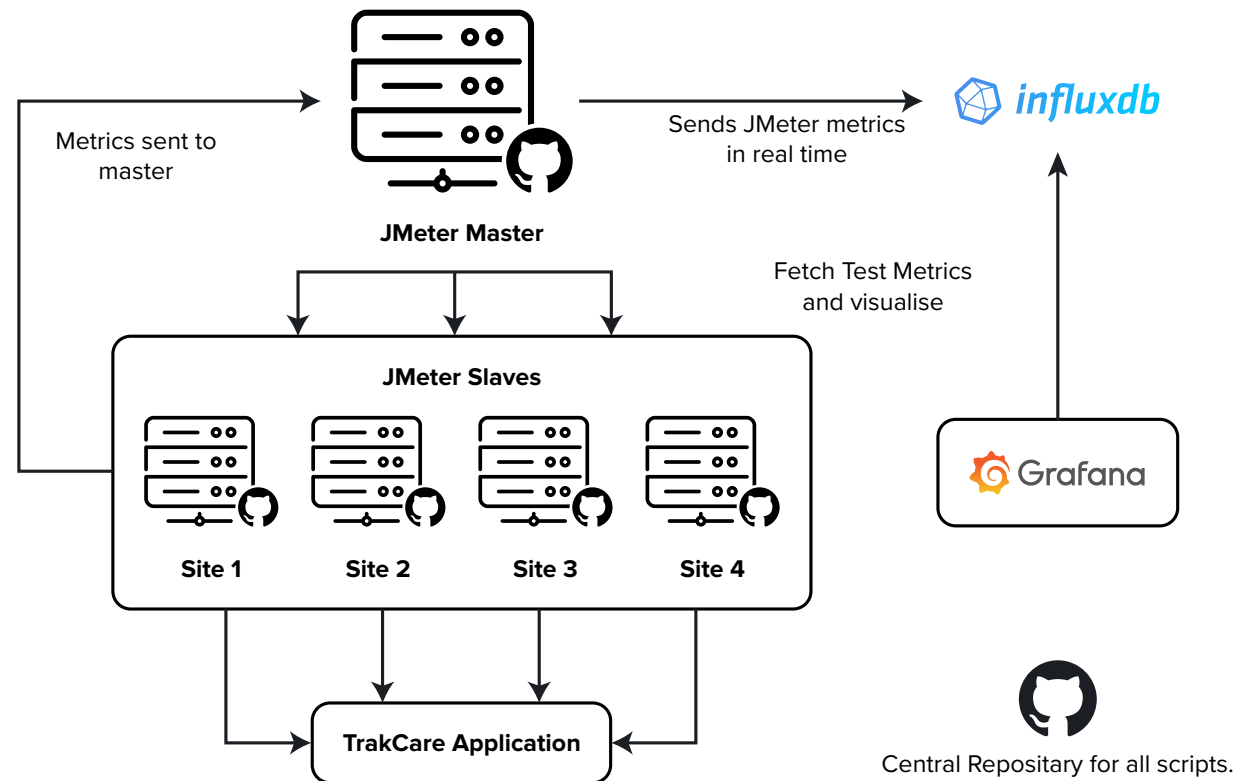
We adopted a local, time-and-materials approach, facilitating on-site collaboration and agility in responding to changes. By leveraging tools like JMeter, Grafana, InfluxDB, and Power BI, our comprehensive testing strategy ensured that TrakCare met all performance and scalability requirements, delivering both a robust system and a superior user experience.

# Setting up a performance testing framework

To ensure the TrakCare system could handle the demands of a large healthcare provider, Planit implemented a sophisticated performance testing strategy using a distributed JMeter framework. Our goal was to simulate real-world usage conditions, evaluating how the system would perform under varying loads, including peak traffic scenarios, while maintaining optimal functionality for critical healthcare services.

We designed a distributed performance testing framework, employing a network of master and slave nodes to simulate high numbers of concurrent users across multiple geographical locations. This setup replicated real-world scenarios to ensure the system could handle user demand effectively.

- **Master Node (Controller):** The master node managed the execution of all test cases, distributing test scripts to slave nodes (load generators). It collected and aggregated data from these nodes, allowing us to conduct a detailed analysis of system performance. The master node ran JMeter in command-line mode and communicated with the slave nodes via Remote Method Invocation (RMI).

- **Slave Nodes (Load Generators):** These remote machines executed the test scripts sent by the master node. Each slave node ran a JMeter server instance that simulated user interactions with the system. These nodes generated load on the target application and sent real-time results back to the master node for analysis.



Metrics sent to master

Sends JMeter metrics in real time

**JMeter Master**

**influxdb**

Fetch Test Metrics and visualise

**JMeter Slaves**

Site 1    Site 2    Site 3    Site 4

**Grafana**

**TrakCare Application**

Central Repositary for all scripts.

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# Implementing a real-time monitoring and data collection framework

To monitor performance in real time, Planit integrated a robust monitoring framework using Grafana and InfluxDB. JMeter continuously fed performance test results into InfluxDB, which stored the data, while Grafana provided real-time visualisations of key metrics. This setup enabled us to track performance in real-time, ensuring immediate detection of any issues or bottlenecks.

Key performance metrics included:

- **Number of active users:** Tracking the number of concurrent users at any given time.

- **Response times:** Monitoring how quickly the system processed each transaction to ensure Service Level Agreements (SLAs) of less than five seconds were met under peak load.

- **Throughput:** Measuring the number of transactions processed per second.

- **Success and failure rates:** Monitoring the ratio of successful transactions to errors.

- **Requests and error counts:** Capturing the volume of requests and identifying any errors during testing.

# Comprehensive testing strategy and execution

To ensure the TrakCare system's performance and scalability, Planit also implemented a range of tests, each tailored to address specific performance challenges and conducted with regular frequency:

- **Peak load tests:** Simulated maximum user load to assess system performance under the highest expected demand. Conducted over two hours, including setup, execution, and data collection.

- **Scalability tests:** Evaluated the system's ability to scale as user numbers or resource demands increased. These tests lasted about three hours to ensure the system could efficiently handle increased load.

- **Endurance tests:** Ran long-term tests to identify issues such as memory leaks or resource depletion during extended periods of use. These tests spanned 10 hours to evaluate the system's long-term stability.

- **Spike tests:** Simulated sudden, extreme increases in user load, such as during login surges, to test the system's resilience. These short, five-minute tests were crucial for assessing how the system handled sudden surges in demand during high-traffic periods.

We conducted these tests twice a week throughout the project to ensure consistent monitoring of performance metrics and to capture any changes or improvements, ensuring TrakCare's reliability and scalability. Day-in-a-life scenario was also executed ensuring TrakCare works as expected when integrated with multiple backend systems which involved Reporting, Batches and other in-house applications.

# Analysis and reporting

We conducted a thorough analysis of the collected data to identify bottlenecks and areas where performance could be optimised. Each test cycle produced detailed reports documenting the system's performance, with comparisons made against baseline metrics to track improvements.

These reports provided actionable insights to the provider, ensuring they could make informed decisions about further optimisations and readiness for full-scale implementation.

## Execution: Overcoming unique challenges

This project was also complex due to the critical nature of the services being supported. We overcame several key challenges:

- **Geographical spread:** TrakCare needed to support users across multiple locations, including hospitals and clinics.

- **User diversity:** The wide range of users—from healthcare administrators to doctors—required unique performance scenarios tailored to different roles.

- **Critical service continuity:** Ensuring uninterrupted healthcare services during the transition was non-negotiable.

To address these challenges, we used automated load generation to simulate user activities from multiple locations, collating results for real-time analysis and reporting on a master server. We also utilised GitHub for version control, maintaining a centralised repository for scripts and artifacts to ensure consistency and streamline collaboration, allowing us to resolve issues quickly and efficiently. In addition, our rigorous testing included failover strategies to guarantee no disruption in care.

# Key achievements: Delivering performance, scalability, and long-term success

Planit's performance-first strategy exceeded the healthcare provider's expectations, achieving both their primary and secondary goals. The system's scalability and performance significantly reduced patient wait times, a key objective of the project, while modernising their IT infrastructure. Additionally, the secondary goals of enhancing user experience and ensuring system robustness were fully realised, with TrakCare successfully supporting up to 2,000 concurrent users while maintaining response times under five seconds—exceeding industry benchmarks.

The project also brought considerable time and cost savings. Automated performance testing reduced the need for manual processes, while leveraging open-source tools like JMeter saved on licensing costs. Our autonomous testing approach further maximised efficiency by running tests outside of standard hours, preventing disruption to other testing activities. Plus, our monitoring framework ensured real-time tracking and scalability, allowing the client to manage growing demand efficiently and setting them up for future success

Not only did we complete all the planned tests, but we also went above and beyond by conducting additional ad-hoc tests to address emerging needs. These extra tests expanded the testing coverage, providing the healthcare provider with even greater confidence in the system's stability.

Importantly, another unexpected benefit was the enhanced collaboration we facilitated with the InterSystems team. By assisting in the creation of test data, we helped streamline the integration process and kept the project on track, ensuring smooth cooperation across different teams. This proactive support further solidified the project's success, allowing the system to perform beyond expectations.

Ultimately, our comprehensive approach not only met the client's immediate needs but also positioned them for continued growth and resilience in a rapidly evolving healthcare landscape.

# About Planit

At Planit, we are experts in quality engineering and assurance. With strong retail domain experience, our specialist consultants can help you deliver a seamless omni-channel experience and support the successful implementation and integration of your complex range of backend platforms.

Ask us how we can help you delight your customers and unlock more value from your systems!

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