



Improving Patient Care With Federated Learning

Rhino Health is using NVIDIA FLARE to speed healthcare innovation and improve patient outcomes.



“Rhino Health enables developers to create equitable access to AI-based diagnostics and improved treatment pathways by alleviating the need to share data and instead ‘brings the compute to the data.’ Federated learning powered by NVIDIA FLARE makes this possible.”

Ittai Dayan, MD MPH, Co-founder and CEO, Rhino Health

With regulations such as HIPAA and GDPR, patient privacy concerns, and administrative and IT hassles, healthcare organizations are reluctant to share data and enter into material transfer agreements. Unfortunately, this has held back healthcare AI innovation.

Without access to clinically relevant data from diverse patient populations, researchers and healthcare developers are challenged to train accurate and effective AI-powered software solutions and medical devices.

With **NVIDIA FLARE™** (Federated Learning Application Runtime Environment), Rhino Health is harnessing the power of federated learning and edge computing to resolve these challenges. By streamlining collaboration around diverse and disparate datasets, Rhino is providing researchers the access they need to reduce development and deployment times and bring life-saving medical innovations to market faster.

Rhino Health Accelerates Delivery of AI-Based Solutions

The Rhino Health platform accelerates delivery of **AI-based healthcare solutions** with edge computing and federated learning to provide access to large, distributed datasets from a diverse group of real-world patients.

The platform is used in a variety of disciplines, from neurology to oncology, pediatrics, and radiology. The company is headquartered in Boston, with an R&D center in Tel Aviv. Rhino is deployed at world-renowned institutions, including the University of Cambridge, the Massachusetts General Hospital, the Khan Sagol Maccabi Research and Innovation Center in Tel Aviv, National Taiwan University, and more.



The Rhino Health platform integrates NVIDIA FLARE to enable multi-site collaboration for analyzing data and developing medical AI. Models can be trained and deployed without transferring data and without compromising privacy.

Industry

- > Healthcare
- > Life sciences
- > Pharmaceutical

Benefits

- > Data collaboration without data transfer
- > Diverse, accessible, medical data repositories
- > Third-party and custom integrations
- > HIPAA, SOC2, GDPR, and ISO27001 compliant



AI Development With Rhino Health

Rhino Health leverages federated learning powered by NVIDIA FLARE, leaving data at rest at each site. Users can tap into a network of over twenty leading medical centers around the world and centrally perform data preprocessing, harmonization, model training and validation, and results analysis without moving data beyond a medical center's firewall. Patient privacy is never compromised.

The Rhino Health platform integrates with third-party and custom software programs to give developers maximum flexibility to use the applications and tools of their choice. Users can either deploy their code via SDK or the platform's intuitive GUI.

The platform addresses the challenge of data quality that many collaborative projects struggle with. With Rhino, developers can visualize the distribution of raw data and model performance on distributed datasets, enforce data schema when ingesting data, run extract, transform, and load (ETL) operations on raw data, and review detailed logs.

Rhino facilitates every process throughout the healthcare AI lifecycle, including:

- > Data discovery
- > Data analytics and quality assessment
- > Predictive model creation and validation
- > Deployment, monitoring, and continuous learning

These features help to reduce a model's time to value, improve model performance, and prevent model drift.

By providing secure access to distributed health data, Rhino makes multi-site collaboration seamless and resolves the conflict between patient privacy and developer flexibility.



The Rhino Health platform gives users the ability to visualize summary statistics of datasets hosted across collaborator sites, facilitating exploratory analysis and ensuring data quality.

Results

- > Preserved data privacy
- > Seamless multi-site data collaboration
- > Reduced cost of development
- > Expedited deployment
- > More accurate, consistent models

NVIDIA Hardware Used

- > NVIDIA A100 Tensor Core GPUs

NVIDIA Software Used

- > NVIDIA FLARE
- > NVIDIA AI Enterprise

Federated Learning for Early Detection of Pancreatic Cancer

Using the Rhino Health platform, the **Early Detection Research Network (EDRN)** has built a cross-institution working group to improve outcomes for people who have been diagnosed with or are predisposed to pancreatic cancer. Participants include Johns Hopkins Medicine, the University of Texas MD Anderson Cancer Center, Dana-Farber Cancer Institute, the University of Pittsburgh Medical Center, and more.

The majority of pancreatic cancer patients are not diagnosed until symptoms develop. At this point, the cancer is typically stage IV with a five-year survival rate of less than 10 percent. But when diagnosed and treated early, the prognosis is significantly better, with a **five-year survival rate of 80 percent**.

One of the biggest challenges in pancreatic cancer research is creating and accessing a dataset large and diverse enough to train diagnostic algorithms and prove their medical value to at-risk patients. With the Rhino Health platform, participants in EDRN's pancreatic cancer working group are creating an image repository with files contributed from multiple institutions.

With a richer dataset, researchers are building algorithms to assess metabolic changes in blood and body composition through imaging to identify aggressive subtypes of cancer. They are also applying more sensitive imaging methods like cinematic rendering to evaluate risk levels.

With these techniques, researchers hope to enable earlier diagnosis and tailor precise treatment options.

Rhino Health Technology Empowers 40,000+ Radiologists

The American College of Radiology's (ACR) Connect system is designed to interact with individuals and systems, processing data at local healthcare facilities. Similarly, the ACR Data Analysis and Research Toolkit (DART) portal provides a gateway to browse and query data for research, quality improvement, and clinical studies.

Rhino Health has demonstrated an integration with ACR Connect and DART to bring enhanced distributed computational capabilities and edge computing to ACR's 40,000+ radiologists. The integration lets ACR members participate in distributed registries, AI model training, validation, and monitoring, all while data remains secure at its local site.

With the joint solution, users can perform annotation and preprocessing centrally from the cloud and execute model training and deployment. A demonstration at RSNA 2022 showcased how the solution was applied to the Breast Imaging Research Registry (BIRR) to bring cloud technologies to data that resides on premises at individual member sites and in private cloud instances. The implementation showed how an algorithm for breast density was successfully deployed, validated, and retrained on over 1,000 mammography images hosted on several servers.

Powered by NVIDIA

The Rhino Health platform runs on **NVIDIA-Certified Systems™** and can be deployed on any NVIDIA GPUs, including A100 Tensor Core GPUs (on premises or in the cloud) and leverages NVIDIA software, frameworks, and SDKs to power multi-site, multi-stakeholder healthcare data collaboration. NVIDIA GPUs accelerate the federated training experience for all participants, enabling faster turnaround times for model creation.

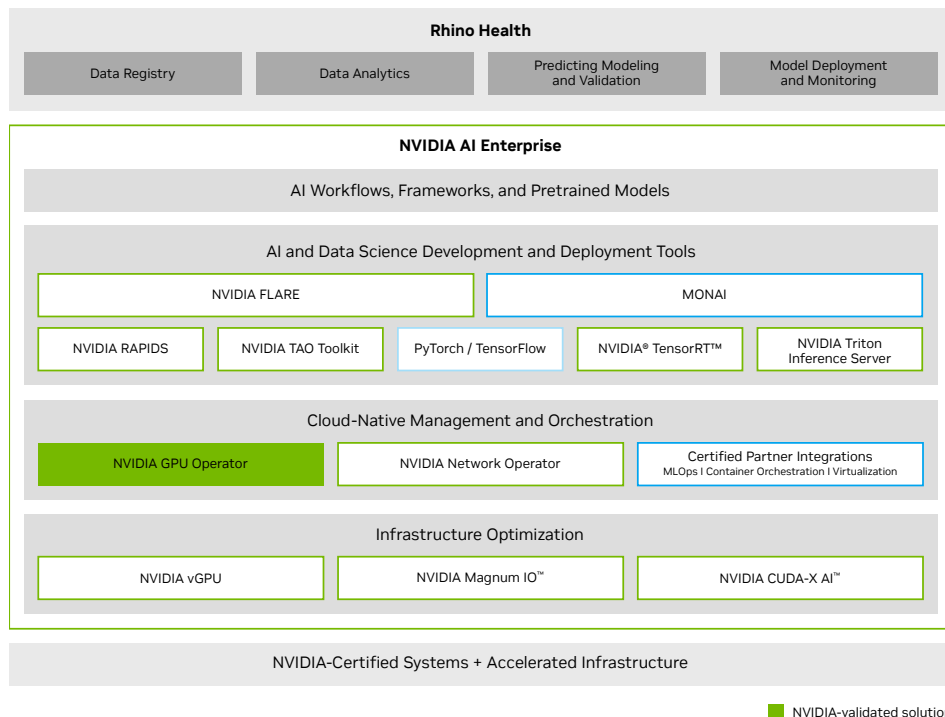
The platform is an NVIDIA AI Enterprise-validated solution. NVIDIA AI Enterprise is an end-to-end, secure, cloud-native suite of AI software that includes tools and frameworks such as MONAI SDKs, NVIDIA RAPIDS™, PyTorch, and NVIDIA Triton™ Inference Server. This enables healthcare developers to focus on building life-changing breakthrough solutions on top of NVIDIA's world-class platforms backed by NVIDIA-Certified Systems.

“ACR Connect and AI-Lab enable members to participate in ACR AI, quality, and research programs while minimizing the need for data upload. The college's demonstrations with Rhino Health are a great example of how we can leverage the open nature of the ACR Connect platform and work with the industry to solve emerging challenges for our members.”

Mike Tilkin, CIO and Executive Vice President of Technology, ACR

Collaboration on the Rhino Health platform is powered by **NVIDIA FLARE**, a domain-agnostic, open-source, and extensible SDK for federated learning. Federated learning, a breakthrough technology that NVIDIA helped to pioneer, enables researchers, data scientists, and enterprises to work together across departments, institutions, and national boundaries to build, test, and validate AI solutions while protecting data confidentiality and sovereignty. NVIDIA FLARE is available through NGC™ and supported within **NVIDIA AI Enterprise**.

Rhino on NVIDIA AI



The Rhino Health platform uses NVIDIA computing tools and infrastructure to democratize data and facilitate collaboration between life sciences and medical professionals.

More Accurate and Consistent Healthcare Solutions With Rhino Health

Rhino Health provides access to an unprecedented quantity and quality of real-world patient data to support companies and researchers developing AI-based medical solutions. By putting the power of federated learning in the hands of medical researchers, Rhino Health is lowering the barriers to AI adoption in healthcare.

As researchers take advantage of faster access to data, generalizable findings and solutions, reduced cost of development, and expedited deployment, patient outcomes benefit from more accurate and consistent AI-powered healthcare solutions.

Ready to Get Started?

To learn more about federated learning, visit www.developer.nvidia.com/flare-rhino

To learn how to accelerate the delivery of AI-based healthcare, visit www.rhinohealth.com/platform

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