

Sun Health Information Network Solution

Enabling the exchange of electronic health information for better access and quality healthcare at a lower cost



Highlights

Patient focused benefits

- Improve health quality and prevent medical errors
- Reduce health care costs and expand access to affordable care
- Increase administrative efficiencies and decrease paperwork

Population health benefits — Improving public health activities

- Early detection of and rapid response to infectious disease outbreaks around the country
- Improved tracking of chronic disease management — promotes prevention
- Facilitates health and clinical research and health care quality
- Federal Government benefits



In the next five years, Health IT in the US will reach a critical tipping point that will lead to an industry-wide transformation. There is no question that health IT has gained significant momentum and national attention driven in large part by:

- Rising health care costs
- Increased focus on measuring and ensuring quality outcomes
- 48 million Americans who do not have access to health insurance

The Nationwide Health Information Network (NHIN) is the critical portion of the health IT agenda intended to provide a secure, nationwide, interoperable health information exchange infrastructure that will connect providers, patients, and others involved in supporting health and healthcare. The NHIN will enable electronic health information to follow the patient, be available for clinical decision making, and support appropriate use of healthcare information beyond direct patient care so as to improve health.

The NHIN seeks to achieve these goals by:

- Developing capabilities for standards-based, secure data exchange nationally
- Improving the coordination of care information among hospitals, laboratories, physicians offices, pharmacies, and other providers
- Ensuring appropriate information is available at the time and place of care
- Ensuring that patients health information is secure and confidential
- Reducing risks from medical errors and supporting the delivery of appropriate, evidence-based medical care
- Lowering healthcare costs resulting from inefficiencies, medical errors, and incomplete patient information

NHIN-CONNECT is the Federal Government's implementation of the NHIN developed to securely exchange interoperable health information within agencies and with state, local, tribal, and the private sector. CONNECT includes twenty six federal agencies that are moving to develop a health information exchange network with a shared connection to the NHIN. All the agencies generate or use health information in the course of their work and another half-dozen agencies are contributing expertise and other resources. NHIN-CONNECT is an open-source technology implementation of standards-based specifications for the exchange of health information between NHIN-compliant Health Information Exchanges (NHIEs).

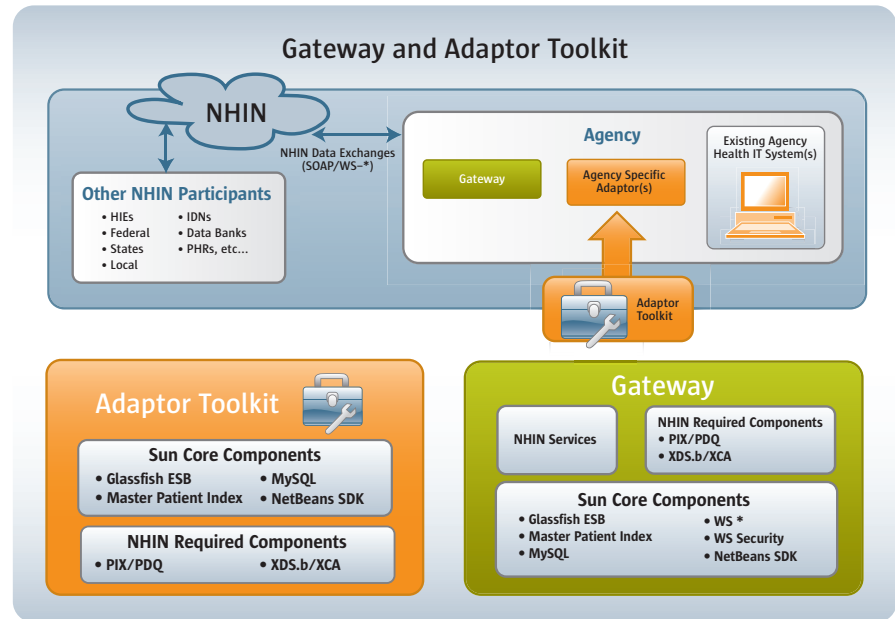
Sun Microsystems is partnering with the Federal Government in delivering the NHIN-CONNECT reference implementation and software framework. The NHIN-CONNECT project infrastructure framework is based on Sun's open source Service Oriented Architecture (SOA) software that is enabling the exchange of electronic health records.

The NHIN-CONNECT reference implementation

“Healthcare delivery” as a concept can be divided into two distinct categories, the “business of medicine” and the “art of medicine”. Technology has often been regarded as the catalyst to bridge these two often competing interests in healthcare. Within the Office of the National Coordinator (ONC), the Federal Health Architecture (FHA) was established as a multi-agency initiative to foster collaboration between all federal government participants in the NHIN. Of the many challenges facing FHA and the implementation of the NHIN, attempting to reconcile delivery and continuity of care within an appropriately sustainable business model was at the heart of what became the NHIN-CONNECT solution. The creation of a secure open source architecture was critical to establish a trusted network that would maximize the ability of civilian partners to implement the NHIN standards. Sun’s open source software was instrumental in creating the NHIN-CONNECT solution helping to move toward a “reference implementation” of a Service Oriented Architecture for national healthcare information exchange.

Sun enabling the transformation of healthcare — Benefits of Sun Health Information Network Solution

NHIN-CONNECT will transform the medical community by creating a national open architecture upon which multiple services can be built to promote higher quality of and access to care and reduce costs of healthcare delivery. NHIN-CONNECT will facilitate the exchange of information between disparate healthcare organizations and enable interoperability and collaboration between multiple government and civilian agencies.



Gateway and Adaptor Toolkit Components

One of the most important benefits of the NHIN is the collaboration and cooperation that is taking place between the federal government and the private sector healthcare community. NHIN will provide a secure, interoperable infrastructure to allow doctors, hospitals, laboratories, pharmacies, and others involved in supporting health and healthcare to share information.

NHIN-CONNECT will provide benefits to citizens and the general population by providing appropriate information to help guide medical decisions at the time and place of care. Medical errors can be prevented by improving the coordination of care and information amongst hospitals, laboratories, physician offices and other entities through an effective infrastructure for the secure and authorized exchange of health care information. Healthcare cost can be reduced by eliminating inefficiency, medical errors, inappropriate care, duplicative care, and incomplete information.

NHIN-CONNECT will ultimately improve population health by facilitating health and clinical research because it will allow the early detection of and rapid response to infectious disease outbreaks on the battlefield and around the country. In addition it will improve the tracking of chronic disease management which promotes prevention.

Why Sun’s Open source software is used in NHIN-CONNECT

Open source development provides a collaborative way for all organizations, both large and small, to contribute and invest in the future NHIN. By delivering on top of open source software, NHIN is helping to encourage genuinely open innovation; open source is available to everyone. Sun is the only major vendor developing production SOA software as open source.

“The NHIN-CONNECT software solution, developed by the Office of the National Coordinator (ONC) and the Federal Health Architecture (FHA), enables federal agencies to tie into the Nationwide Health Information Network and was intentionally built on open-source technologies. The open-source, unified software provided to the CONNECT team satisfied a need for functionality and scalability and helped deliver a required solution for the federal agencies to advance exchange of interoperable health information.”

Federal Health Architecture (FHA)

The ONC successfully developed, tested and demonstrated NHIN-CONNECT proof of concept with Sun’s open source software.

- Twenty-six NHIN-CONNECT Government agencies are able to deploy production NHIN-CONNECT Gateways using Sun’s commercially supported and indemnified software with the assurance that the code meets business and technical requirements.
- Open source provides better security than proprietary products, and by making all of the code available within the NHIN community, it protects the code against ‘trojan horses’ and ‘embedded viruses’ because there are many more eyes on the code than in a proprietary code development environment.
- Supports the Obama Administration’s Open Government policy through the use of open standards and open source in addition to Obama’s push to “e” enable the federal government.
- Sun’s Open Source products are high quality enterprise and web scale products that enable web build out and are used in the largest, most scalable Web 2.0 environments on the Internet today.

How taxpayers have benefited from open source?

- Using open source software that is available for download without a fee for a proof of concept is one of the best ways to determine whether a software product meets your business and technical requirements before a purchase order is cut. This is exactly what the ONC did for NHIN-CONNECT.
- This approach insures that there is no money expended without 100% assurance that the product is required and necessary. Hence, hard earned tax payer money was not spent on products that did not meet NHIN requirements.

- In addition, a higher quality system is deployed because the government is not stuck with an inferior IT product that they have to make fit because they already spent the money to procure.
- By selecting to use open source over a proprietary product, the Government will save the taxpayers an estimated \$700M, and reduce the procurement and deployment time by as much as three years.
- Bottom Line: Better Security, Faster deployment, not being locked-in, lower cost, increased quality, and flexible community engagement. All of these are key components of the Obama Administrations policies.

“Future proof” with open source and open standards

No lock-in means your health IT Infrastructure is safe. Healthcare infrastructure must be built to endure, irrespective of corporate or economic changes. Developing products in the open ensures community driven evolution of the standards and products as different needs evolve.

NHIN is building the foundation to an infrastructure that we will have for decades to come. No one can predict that far into the future to determine the success of any one particular company or even technology. Open source means that this vital piece of our healthcare infrastructure is not subject to the survival or fiscal solvency of any one company. Thus, freely available open source “future proofs” your healthcare IT investments.

Open source/open standards live longer

Interoperable, open source products built on standards mean you can choose a vendor. How much and what kind of support you need. Different health organizations can fix problems and tailor technology to their own requirements.

As the standards of health information exchange continue to mature and their implementation becomes more ubiquitous, other beneficial applications of the NHIN infrastructure are likely to emerge.

Open source is more secure

Security in the Healthcare world is extremely important. Open source is inherently more secure than proprietary solutions because everyone has access to the code. Bugs and vulnerabilities are found more quickly and can be addressed efficiently by the entire community, without any dependency on a proprietary vendors release cycle.

Additionally, open source is not restricted to corporate development cycles or business constraints to implement the latest security technology and innovations.

All Sun's open source projects are commercially supported

Sun contributes extensively to the open source community, but has a complete engineering staff to provide commercially deployable, tested and certified products. Organizations needing to eliminate the risk of uncertain timeframes inherent in the community delivered support can contract for enterprise class support and indemnification.

Sun Health Information Network Solution

Sun's Health Information Network Solution is the technology being used by the Federal Government for the NHIN-CONNECT referenced implementation. The reference implementation has two primary parts which include the Gateway and Agency Adaptor/Software Development Toolkit (SDK). The Health Information Network

Solution contains the open source software required for the Gateway and Agency Adaptor/SDK and consists of Glassfish™ ESB, Master Patient Index part of open source Project Mural, open source security Project Metro, Sun's open database MySQL™, and Sun's open source development tools, NetBeans™.

Glassfish ESB

The NHIN-CONNECT project requires a service oriented architecture (SOA) framework that is comprised of an open source, agile enterprise service bus (ESB) infrastructure. Sun's GlassFish ESB delivers a lightweight ESB and the tools necessary to rapidly build and deploy SOA components, providing flexibility and freedom from the dependencies that have traditionally locked enterprises into proprietary middleware software stacks. Open ESB is a platform for Business Integration, Enterprise Application Integration, and SOA.

- Provides a lightweight, modular architecture that enables agile service development, deployment and testing
- Allows users and vendors to plug and play through a pluggable architecture where components and services can be integrated in a vendor-independent way
- Leverages the transparent development and taps into innovation happening in the NHIN community.
- Allows vertical and horizontal scalability through asynchronous and decoupled component architectures.
- Provides flexibility with the choice of development language, tooling, topology and architecture style (MOM, SOA, EJB, BPM, EDA, etc.)

Master Patient Index from Project Mural

One of the biggest technical challenges faced by the NHIN-CONNECT project was data management. Project Mural is an open source ecosystem that addresses such data management challenges. The Mural community includes the following set of core components:

- Master Index Studio — Provides the capability to create any domain specific master index through the matching, de-duplication, merging, and cleansing of data from various data sources.
- Data Integrator — Provides extract, transform, load capability and supports a wide variety of data sources.
- Data Quality — Features matching, standardization, profiling and cleansing capabilities.
- Data Mashup — Server-side data mashup capability, having multiple forms including real-time views of information for master data consumers.
- Data Migrator — Provides the ability to migrate database objects across database instances.

NetBeans

The NHIN-CONNECT developers wanted an open source, flexible and easy to use development environment so they chose NetBeans. Netbeans is an open-source Integrated Development Environment (IDE) for software developers, provides a rich client platform for application development support. It provides all the tools needed to create professional desktop, enterprise, web, and mobile applications with the Java™ language, C/C++, and even dynamic languages such as PHP, JavaScript, Groovy, and Ruby. NetBeans IDE, straight out of the box, runs on many platforms including Windows, Linux, Mac OS X and Solaris™.

Project Metro

The NHIN-CONNECT project is built using a web-services infrastructure. Metro is a high-performance, extensible, easy-to-use web service stack. It is a one-stop shop for all your web service needs, from the simplest ‘hello world’ web service to reliable, secured, and transacted web service that involves .NET services.

The two main components of Metro are:

- JAX-WS — The Core Web services platform
- WSIT — Implementation of key WS-* specs and interoperability with .NET 3.0

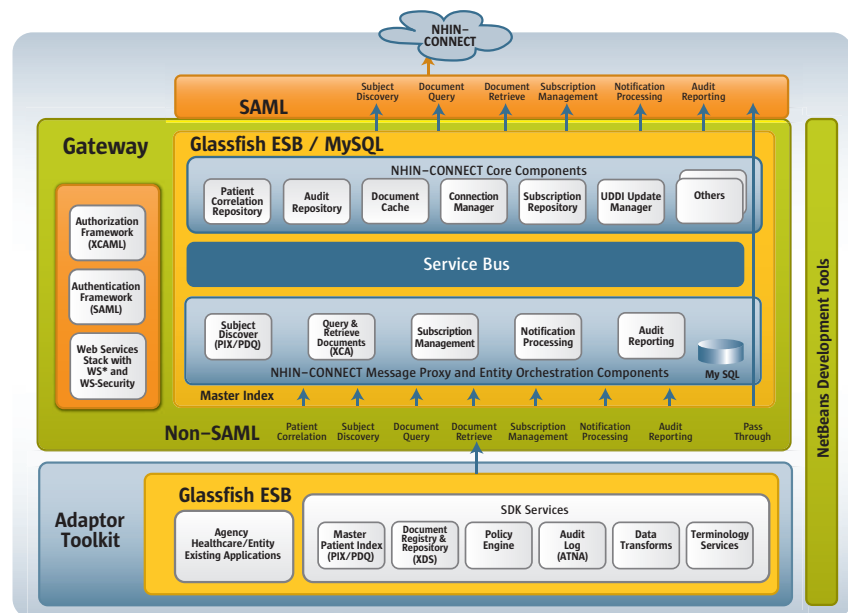
The core web services that provide all the SOAP message functionality, including WS-Addressing and MTOM, is available from JAX-WS.

Open SSO

Security, privacy and the ability to securely send and receive messages are critical to the success of NHIN-CONNECT. The NHIN-CONNECT project is integrating Open SSO into the SOA reference implementation fabric in order to ensure this security and privacy. Open SSO is the single solution for Web access management, federation, and Web services security and provides secure and centralized access control and single sign-on for all applications and Web services, both within the enterprise and beyond. Open SSO includes Sun’s Access Manager and Federated Identity.

MySQL

MySQL is the open source database of choice for NHIN-CONNECT. MySQL offers fast performance, high reliability, ease of use, and dramatic cost savings. The combination of MySQL’s popularity and Sun’s offerings for scalable infrastructure make Sun and MySQL the platform of choice for NHIN-CONNECT.



Gateway and Adaptor Toolkit High Level Architecture

Time to market of any new MySQL based service is critical to ensure competitive advantage and fast ROI. Using a combination of Sun technologies and documented best practices from industry leading Solaris and MySQL experts, users have been able to rapidly prototype new services, trouble shoot and launch with up to 4x higher velocity and 3x fewer developers.

MySQL delivers 90+% lower total cost of ownership (TCO) than traditional database offerings (or up to 14x lower cost) and:

- Reduces database licensing costs by over 90%
- Cuts system downtime by 60%
- Lowers hardware expenditure by 70%
- Reduces administration, engineering and support costs by up to 50%

Additional NHIN-CONNECT code

In addition to the core Sun open source software infrastructure and NHIN services, the NHIN-CONNECT Gateway and Adaptor Toolkit consists of the following applications:

- Patient Index Cross system (PIX) — Unique identifier of patient across systems per community

- Patient Demographics (PDQ) — Single patient view and demographic information on the patient
- Cross Enterprise Document Sharing (XDS.b) (Registry and Repository) — Register of documents available on a patient and keeps track of where they are stored (repository)
- Cross Community Access (XCA) — Ability to exchange documents across health entities

Conclusion

The NHIN-CONNECT using Sun’s Health Information Network Solution will allow military and civilian doctors, hospitals, laboratories, pharmacies, and others involved in supporting health and healthcare to share information in a secure, patient-driven, and standards-based way thus promoting better quality healthcare at a lower cost.

Learn More

This is where you can explain what actions can be taken. Among the opportunities typically listed are:

- Learn more by visiting our Web site at sun.com/product namehere
- To keep up with the latest industry trends, subscribe to our newsletter at sun.com/subscribenow
- email us at findoutmore@sun.com