

U.S. Army FusionNet: Distributing “Ground Truth” Throughout the Battlespace



CASE STUDY

CHALLENGE

While most relevant battlefield information was electronically captured in one form or another, it is estimated that only about five percent of it was effectively delivered to the people who really needed it.

SOLUTION

FusionNet, based on Progress® DataXtend™, is a distributed system used to disseminate “ground truth” intelligence and unit management information throughout the Battlespace.

WHY PROGRESS® SOFTWARE

After extensive on-site testing, DataXtend was the only replication technology that could complete the test in the most extreme conditions.

BENEFIT

FusionNet delivers its DataXtend-fueled services in extreme conditions, both to warfighters via in-theatre servers and to users globally via servers in the U.S. and Europe.

FusionNet is a distributed system deployed by the U.S. Army to disseminate “ground truth” intelligence and unit management information throughout the Battlespace. It is associated with the Horizontal Fusion program (<http://horizontalfusion.dtic.mil>), which was established after the 9/11 attacks to encourage more effective collaboration and information sharing throughout the military.

Before FusionNet, battlefield event information was scattered among numerous Army systems and databases. Even worse, these stovepipes couldn't communicate with one another and were based on a variety of technologies: Microsoft Excel spreadsheets, systems of record maintained by the Army or jointly among the service branches, and Microsoft Access databases.

While most relevant battlefield information was electronically captured in one form or another, it is estimated that only about 5 percent of it was effectively delivered to the people who really needed it. The “muddy boots” on the front line especially suffered because they were on the wrong end of a disadvantaged network that made information delivery almost impossible at times. However, this vital information is now being liberated by FusionNet and its underlying Progress DataXtend RE database replication technology.

“As the new version of FusionNet is implemented throughout the current theatre of operation, we expect the data capture rate, and more importantly the information availability rate for battlefield events to increase to 75 percent or more, an improvement of more than 1,500 percent,” says Major Kurt Warner, Knowledge Management Officer for the U.S. Army XVIII Airborne Corps and Multi-National Corps Iraq G-6. He also serves as the FusionNet program lead.

WHAT'S THE PROBLEM?

The extraordinarily poor quality of the Army's tactical network in many areas of the Iraq theatre presented a unique challenge to FusionNet's system architects. High packet loss rates and network delays exceeding five seconds are the rule, not the exception. Yet the system's mandate called for widespread dissemination of bulk data, including video and photographs, throughout this environment.

Any architecture that required reliable network connectivity to a central site was a non-starter. Traditional, centralized client-server and web-based deployments were immediately rejected. A rich-client interface was necessary, but requiring a connection to a central database was out of the question.

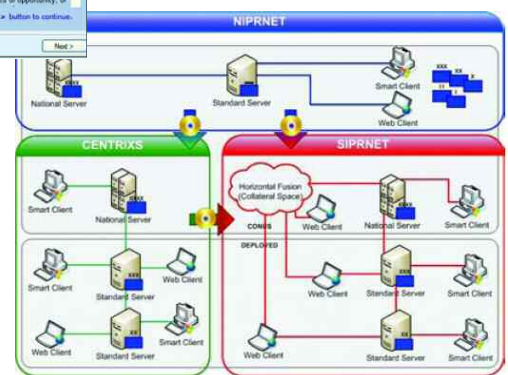
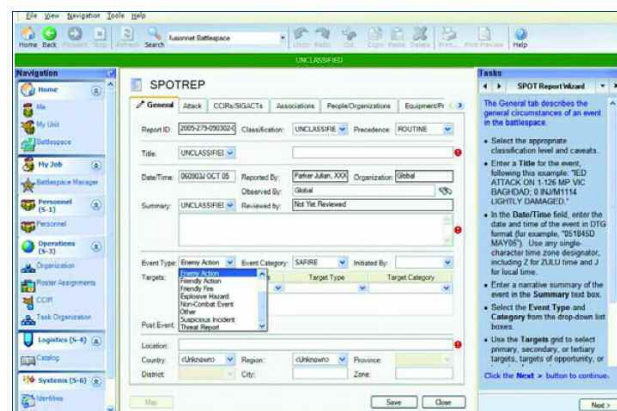
Database replication technology was selected as a cornerstone of the FusionNet solution, for it would allow a rich-client interface to operate uninterrupted off of a local database, even during periods of complete network unavailability. It would then allow updates to stream back and forth over the network during periods of acceptable network QoS.

WHY PROGRESS DATAXTEND® RE?

The Army and its system integration partner, CC Intelligent Solutions of Raleigh, NC, (www.ccis-inc.com), rigorously evaluated multiple database replication technologies. Their initial impulse was to use the native replication technology in their chosen database, Microsoft SQL Server.

However, after extensive on-site testing, CCIS and the Army found Progress DataXtend RE to be a superior alternative. The primary difference was DataXtend's ability to handle the poor network conditions encountered in the battlespace. The Army tested several replication technologies using a Shunra Storm WAN emulator in order to reproduce conditions on the ground in Iraq. Double-digit packet loss percentages and network latencies exceeding five seconds are common. Most products simply failed to complete the tests, and some even corrupted the database. DataXtend was the only replication technology that could complete the test in the most extreme conditions.

In addition, DataXtend offered flexible deployment topologies, including peer-to-peer, hub-and-spoke, and cloud-and-spoke. This was in stark contrast to alternative technologies that enforced strict master-slave or publisher-subscriber topologies.



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FUSIONNET ARCHITECTURE

To the end user, the architecture of FusionNet appears to be simple client-server. A rich .NET client delivers core services to each user's desktop, and it is supported by a Microsoft SQL Server database on the LAN.

However, this reliability and apparent simplicity are enabled by the sophistication of the DataXtend RE replication engine. DXRE reliably delivers reports from any node where they are entered over an unreliable WAN to every other node in the network, typically in a matter of minutes. Thus, a commander in Baghdad planning a convoy to Fallujah can learn in near-real-time of any recent insurgent activity along his planned route, without waiting for an intelligence officer to produce a report days later based on what would be stale information at that time.

Furthermore, DXRE servers are synchronized across physically separate networks as shown in the network architecture diagram. This allows the military to ensure secrecy of sensitive information while allowing information from less sensitive networks to be replicated freely across networks requiring more strict security.

FusionNet leverages the intelligence of DXRE's internal data tables to manage the asymmetric distribution of this sensitive information, even via "sneaker-net" across network "airgaps."

DELIVERING INNOVATION

After finalizing its selection of DataXtend in December 2004, CCIS entered an intense period of development using an agile methodology and successfully deployed FusionNet in April 2005. Now multiple releases later, FusionNet delivers its DataXtend-fueled services in extreme conditions, both to warfighters via in-theatre servers and to users globally via servers in the U.S. and Europe.

Currently, over 3,000 users are supported on multiple physical networks with approximately 15 servers and gigabytes of information distributed around the world. Over 200 new reports are entered each day, many containing rich media such as photos and video, which are then distributed within minutes throughout the FusionNet replication network.

Less than a year after its initial deployment, FusionNet's phenomenal success was recognized by its selection as the Most Innovative U.S. Government Program of 2006 by the Institute for Defense and Government Advancement (www.idga.org), as part of its annual Network Centric Warfare Awards.

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