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Solutions for Digital Video Transmission Technology Final Report CRADA No. TC02068.0

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Solutions for Digital Video Transmission Technology

Final Report
CRADA No. TC02068.0
Date Technical Work Ended: December 31, 2008

Date: May 8, 2009 Revision: 2

A. Parties

This project was a relationship between Lawrence Livermore National Laboratory (LLNL) and Multimax, Inc., in conjunction with the Snezhinsk Open Computer Center (Strela) in Snezhinsk, Russia.

Lawrence Livermore National Security, LLC
Lawrence Livermore National Laboratory
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13665 Dulles Technology Drive, Suite 250
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Tel: (703) 885-1112
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B. Project Scope

This Project aimed at development of software for seismic data processing based on the Geotool code developed by the American company Multimax, Inc. The Geotool code was written in early 90-es for the UNIX platform. Under Project # 2821, functions of the old Geotool code were transferred into a commercial version for the Microsoft XP and Vista platform with addition of new capabilities on visualization and data processing. The developed new version of the Geotool+ was implemented using the up-to-date tool Microsoft Visual Studio 2005 and uses capabilities of the .NET platform. C++ was selected as the main programming language for the Geotool+. The two-year Project was extended by six months and funding levels increased from 600,000 to $670,000. All tasks were successfully completed and all deliverables were met for the project even though both the industrial partner and LLNL principal investigator left the project before its final report.

This was a collaborative effort between Lawrence Livermore National Security (formerly the University of California)/Lawrence Livermore National Laboratory (LLNL) and Multimax Inc. (Multimax), to enhance the U.S. ability to develop commercial software for implementing

remote digital time series analysis and visualization applicable to a broad area of applications via the Internet. The work involved collaborative work between LLNL, Multimax and the Snezhinsk Open Computer Center (Strela) in Snezhinsk, Russia. The Department of Energy (DOE) Global Initiatives for Proliferation Prevention Program (IPP) provided the funds for Strela and the LLNL participation. Multimax matched the DOE contribution through in-kind funding.

The technical objective was to create analysis and visualization solutions for a web-based *geotool* using cross-platform Java and the upcoming Windows 2006 release. The specific applications and products to be developed are described below.

Multimax was to identify the specific specifications for the product and provide Strela with specific direction. The work to develop this software involved the addition of new code to the existing code base on a daily basis. Throughout the project identical copies of the entire software system had to be maintained at Multimax and in Russia. Communications and code sharing was done between Multimax and Strela via the Internet.

LLNL was to provide technical evaluation of software specific algorithms developed by the Strela/Multimax team for the applications described below, and resultant input into documentation. LLNL had overall management of the project.

The desired result of this two (2)-year project was the development of software products that would enable digital data and time-series analysis and visualization via a web-based connection. The project would initially develop the following three products.

1. A LINUX-based version of *geotool* for digital time-series and data analysis and visualization using expanded communication capabilities based on the Internet.

2. A cross-platform Java-based software version of *geotool* for time-series analysis and visualization developed for retrieving and displaying time-series data.

3. A *geotool*-like version for Microsoft 2006 Windows (Longhorn) but with enhanced data communications and graphics, and positioned within the market for immediate availability for advanced time-series analysis and visualization.

This project consisted of 13 major tasks and the following major deliverables.

The scope of this work involved algorithm and software for the applications mentioned above. For each of the software products developed in collaboration with Multimax, the specific deliverables were as follows:

1. Design documentation and testing procedures (Strela, Multimax, LLNL)
   Initial Plan. End of 1st Quarter
   Results and Testing Plan - End of 4th Quarter
2. Program source code (Strela)
   Upgrade version 1 Geotool for Linux - End of 2nd Quarter
   Version 1, cross-platform Java - End of 3rd Quarter
   Release 1 of MS Windows version - End of 4th Quarter
   Release 2 of Linux version - End of 4th Quarter
   Release 2 of cross-platform Java - 5th Quarter
   Release 2 of MS Windows version - 7th Quarter
3. Final Report for Project Year 1 (Strela, MultiMax, and LLNL)
   Beginning of 4th Quarter
4. Program source code documentation (LLNL, Multimax)
   Linux version - End of 4th Quarter.
   Java cross-platform - End of 5th Quarter
   Final documentation - End of 8th Quarter
5. Compiled applications (Strela, Multimax)
   Final compilation - 8th Quarter
6. Installation procedures (Strela, Multimax) 8th Quarter
7. Test report (LLNL, Multimax)
   Release 2 of Java tools - 5th Quarter
   Release 2 of Linux version - 5th Quarter
   Release 2 of MS Windows - 7th Quarter
8. Six month Project extension (Quarters 9&10)
   Development of automatic Geotool+ installation
   Development of the Geotool+ safety and authorization system
   Organization of results exchange
   Development of on-line services for the Geotool
   Development of a client-server version of the Geotool+.
9. Final Report and Abstract due within thirty (30) days of completion or termination of the project, as required under Article XI of the CRADA. (LLNL, Multimax).

C. Technical Accomplishments

NOTE: The LLNL PI retired from this project shortly before completion of the work. The project was transferred to another LLNL scientist who subsequently retired shortly later. The project closure results represented below are provided from input received from the Russian scientific team as provided by the GIPP Program Manager.

In the framework of the project, the Geotool+ software was developed aimed at processing, transfer and visualization of seismic data. A principal result for the new package, alongside with new functions and creation of a commercial version, is implementation of a flexible "open" architecture for maintenance and development of geophysical software. The main principles of the proposed Geotool+ architecture are:

D.1 Specific Benefits

Benefits to DOE

The project benefits the Department of Energy's non proliferation objectives by creating non-weapons work for Russian scientists at the nuclear weapons institute in Snezhinsk. DOE benefits because it is furthering the goals of an important non-proliferation program for the NNSA. Additional benefits for the DOE as a result of performing software evaluations and helping to develop techniques for data analysis, time series analysis and visualization across the internet, and these core capabilities can be used in other non-proliferation programs at LLNL.

Benefits to Industry

The industrial partner, Multimax, Inc. benefits by potentially capturing the marketplace for remote digital processing technologies using advanced features of the upcoming release of MS Windows (Longhorn). The LLNL and Multimax, Inc. personnel, working alongside with the Russian scientists and engineers gain a greater understanding of the capabilities of this technology and will be better able to identify areas where it can be advantageous to U.S. industry.

E. Partner Contribution

The industrial partner for a majority of the project was represented by Wilmer Rivers. Dr. Rivers was an active participant in all activities relating to this project. He traveled frequently to Russian and was instrumental in molding the software needs to current market needs. At the final meeting held in San Francisco at the Annual AGU conference, discussions were made between Dr. Rivers and the Russian lead Sergey Petunin on potential future work. Unfortunately near the end of the project Dr. Rivers left Multimax and at the time of this final CRADA report, he remains unreachable, therefore any further commercialization of the end product is not known.

The table below provides the annual commitment of the Multimax partner for the two–year project (plus extension).

Annual funding commitment

Labor		Per Year	Sub-total
Manager	1	$30,000	$30,000
Designers	2	$20,000	$40,000
Programmers	10	$20,000	$200,000
Testers	4	$20,000	$80,000
			$350,000

Travel Expense

Review Trips to Washington DC from Moscow
8 persons, 2 trips a year, 2 weeks each

$130 per diem including lodging	$	29,120
Airfare (16 trips @ $1,500 each)	$	24,000
	$	53,120

Equipment		Unit cost	
PC's	10	$1,500	$15,000
Servers	2	$2,500	$5,000
			$20,000
Software Licenses			
Microsoft	2	$ 5,000.00	$10,000
		SUB-total	$453,120
		O/H 10%	$45,312.0
		TOTAL YEAR ONE	$498,432

YEAR TWO

Labor		Per Year	Sub-total
Manager	1	$31,500	$31,500
Designers	2	$21,000	$42,000
Programmers	10	$21,000	$210,000
Testers	4	$21,000	$84,000
			$367,500

F. Documents/Reference List

Reports

Quarterly reports were provided to LLNL in a timely manner throughout the duration of the project as well as the extension. Copies of these reports are maintained by the (retired) Principal Investigator and the GIPP Program manager. All reports were reviewed and approved by PI (or GIPP Program Manager) and the Industry partner where ever possible.

Copyright Activity

None by LLNL, it is unknown whether Multimax had any such activity.

Subject Inventions

None

Background Intellectual Property

There was no background intellectual property disclosed for this CRADA project by either party.

G. Acknowledgement

Industrial Participant's signature of the final report indicates the following:

1) The Participant has reviewed the final report and concurs with the statements made therein.
2) The Participant agrees that any modifications or changes from the initial proposal were discussed and agreed to during the term of the project.
3) The Participant certifies that all reports either completed or in process are listed and all subject inventions and the associated intellectual property protection measures generated by his/her respective company and attributable to the project have been disclosed and included in Section E or are included on a list attached to this report.
4) The Participant certifies that if tangible personal property was exchanged during the agreement, all has either been returned to the initial custodian or transferred permanently.
5) The Participant certifies that proprietary information has been returned or destroyed by LLNL.

Hugh Van Boening, Contracts Manager — Date: 6/25/09
Multimax, Inc.

Paris E. Althouse, GIPP Program Manager — Date: 7/1/09
Lawrence Livermore National Laboratory

for Erik J. Stenehjem, Industrial Partnerships Director — Date: 7/13/09
Lawrence Livermore National Laboratory

Attachment I – Final Abstract

Solutions for Digital Video Transmission Technology

Final Abstract (Attachment I)
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C. Benefit to Industry

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E. Project Dates

April 21, 2007 to December 31, 2008.