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IBM Deep Computing Visualization Offering

Parijat Sharma,

Infrastructure Solution Architect, IBM India Pvt Ltd . email: parijatsharma@in.ibm.com

Summary

Deep Computing Visualization in Oil & Gas is increasingly used to support more efficient and effective interpretation. Leveraging the commoditization of technologies such as graphics and network adaptors, new visualization capabilities are starting to emerge, enabling improved graphics performance and increases in size and resolution of images. These advances provide the capability for real- time remote visualization. By moving pixels and not data, multi-user remote collaboration around a single model is possible. Access to graphic images over low bandwidth networks with low latency, such as the internet, is also possible, allowing, for instance, workers at the well site to collaborate with experts located anywhere.

Introduction

Primary challenge faced by the Oil & Gas majors is the need to scale up infrastructure with everyday increasingly large distributed data sets without being price prohibitive. One needs to take real time decision support from teams of experts from different disciplines that may be down the hall or across the world. One needs to increase the screen resolution and/or size while maintaining performance allowing better decisions based upon increased display content.

Visualization is the process of transforming data into insight, this is the natural next level of progression in business intelligence. By translating abstract data and rendering it into graphical information, visualization allows organizations to display high dimensional data and complex in order to simplify understanding, analysis and ultimately their decision making.
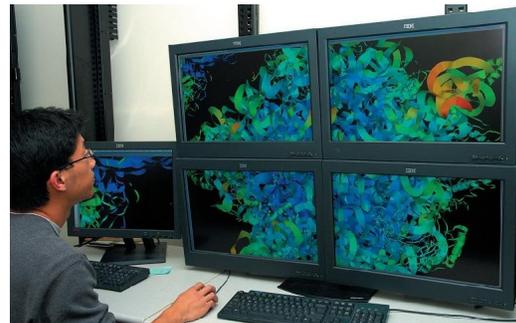

Figure 1. DCV in use by a researcher

IBM Research works to promote, develop and advance solutions to previously intractable business and scientific problems. Realizing the business challenges faced by emerging very large scale computational, data and communications capabilities in solving critical problems of business and science, the newly formed Deep Computing organization of IBM Research focuses on exploiting IBM strengths in high-end computing data storage and management, modeling and simulation, algorithms, and of course visualization and graphics.

IBM Deep Computing Visualization solutions use high performance workstations with NVIDIA graphics providing OpenGL rendering capability. Running on Linux® with a Gigabit Ethernet or InfiniBand interconnect, middleware manages one or more physical displays as a single logical display and controls the high performance transmission of graphics commands to appropriate rendering nodes in a manner that is transparent to the user and the application. This architecture allows you to manage your hardware, applications and data centrally and offers the ability to scale to fit your needs. Deep Computing Visualization makes graphics applications much easier to manage by keeping the application in one central location and securely transferring data to remote collaborators anywhere on the network.

Based on open standards, IBM's DCV technology provides a low cost, high performance solution that leverages the newest workstation technology, coupled with software that improves both performance and function. This latest technology is part of IBM's growing list of new supercomputing solutions.

Deep Computing Visualization for Linux offers improved price/performance. In response to customer needs, the latest version provides the following new capabilities:

- Support on select IBM eServer servers. Enablement of pSeries 64-bit POWER architecture servers and eServer xSeries 64-bit-capable servers as application hosts

- High-performance connectivity between eServer application host and IntelliStation® rendering servers, with transparent support for mixedbyte order communications.

- Support for Microsoft Windows clients for use as Remote Visual Networking (RVN) endstations

- Improved user experience through enhanced compatibility between RVN's dashboard and the application's user interface.

- Enhanced interoperability between Scalable Visual Networking (SVN) and RVN

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- Dynamic collaborative sessions in RVN with connect, disconnect, and reconnect capability

- Improved product stability, problem determination, and error recovery

- Ability to run on Red Hat Enterprise Linux 4 (RHEL 4),and provides Linux EAL security compliance

- Support for large data rendering, which can be performed asynchronously via data integration using IBM's General Parallel File System (GPFS)

- Enhanced user extensibility of Deep Computing Visualization's features through OpenGL overload capability

Support for the latest 64-bit-capable processors available from Intel and AMD on IBM IntelliStations, including dual-core CPUs
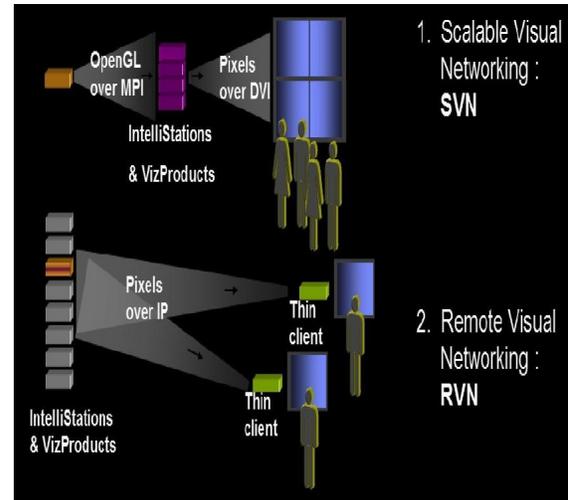

Figure 2. Customer use cases with DCV

IBM's DCV enhances the user's immersive experience and enables remote access to various software applications in a variety of disciplines. It provides a scalable middleware infrastructure to support and enhance the graphics function of OpenGL software applications on IntelliStation A Pro or Z Pro workstations running on the Linux operating system. High-end graphical images can be viewed in two visualization modes - SVN to increase screen resolution and multiplicity of physical displays; and RVN to allow remote use of the application. These modes can enable more accurate decisions to be made on the analysis of complex data. Specifically, SVN allows for larger size and higher resolution images, including immersive, optionally stereographic, environments. RVN allows for distance collaboration over low bandwidth networks.

Smart wells, e-fields, the intelligent oilfield – the E&P industry has many names for the vision of remotely capturing and using real-time data from a well and using intelligent systems to interpret it to make timely and meaningful decisions. The potential benefits of this are huge.

The intelligent oilfield utilizes IT to link earth-science and oilfield technology to provide integrated asset-management capabilities by:

- Establishing permanent in-well monitoring systems combined with automated control, pattern recognition, preventive operations and maintenance technology;

- Integrating those systems with evolving reservoir-characterization, simulation, visualization and financial and economic modeling technologies; and

- Integrating a distributed workforce, including the equipment, service and product supply-chains,

across the internet.

- These capabilities will assist reservoir and production engineers, geologists, operators, field support staff and oilfield services and equipment firms in identifying and reacting to potential problems before they occur.

DCV SVN Offering

Scalable Visual Networking (SVN) offers an open platform choice to customers using 3D visualization offerings that are highly customized, cost-prohibitive and proprietary. Most technologies are either application or domain specific. IBM's DCV Scalable Visual Networking (SVN) uses software to scale-out the traditional graphics pipeline over an integrated cluster of commodity components.
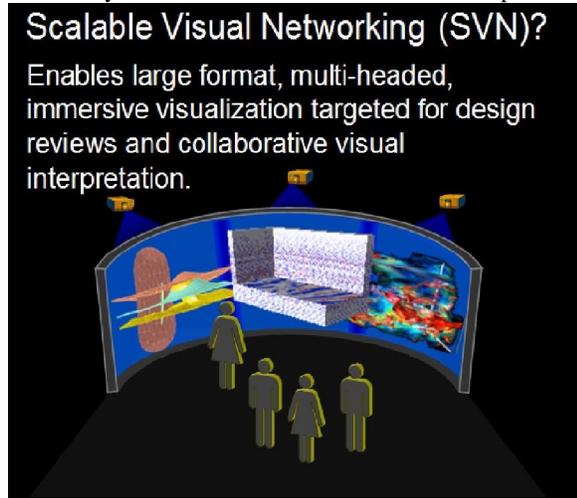

Figure 3. SVN Demo Setup

DCV SVN helps reduce guesswork from the process. As mistakes and suboptimal decisions become more costly, due to the amount of capital at stake, analytical sophistication becomes more critical. With more data characterizing a reservoir, for instance, E&P companies can model its viability, more accurately predicting its profitability and anticipating difficulties that may be encountered during hydrocarbon extraction.

DCV RVN Offering

Typically data is often collected at different locations where it is analyzed by a team collaborating at various locations aiding multi-discipline support. Replicating data is too expensive and potentially insecure.

Remote visual Networking (RVN) allows collaborative analysis of data without replication. RVN allows enterprises to remove expensive workstations from every engineer's desk, and consolidate them into a managed research that can be shared among a larger

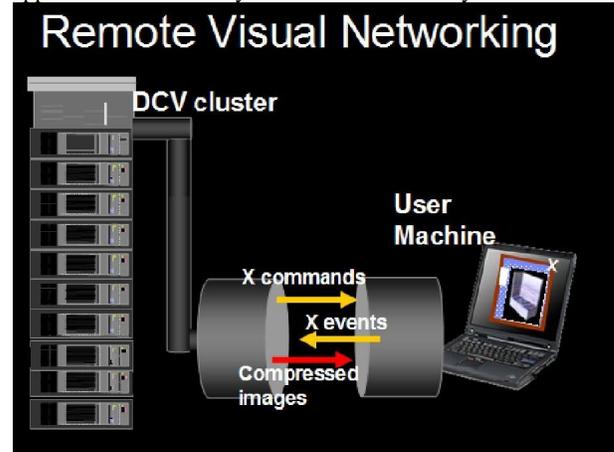number of workers. It provides for a long-haul application delivery over commodity networks

Figure 4: DCV RVN Demo Setup.

RVN provides a new desktop paradigm by allowing netmeeting forever, remote X forever, remote nucleus forever. Using RVN Technology you can easily share the desktop between users, provide collaboration with adequate security and low maintenance. As fewer copies of models are to be stored reducing data storage requirements – requires one copy in data center and one in failsafe location. Handles versioning and ensures latest copy of data is shared between all users.

RVN provides avoiding pushing data world wide and keeping it synchronized. Thereby reducing the effort of Data Maintenance and provides greater control in data centers. With better hardware utilization levels RVN lowers the cost of upgrades in the data center.

At the client side, RVN requires for a lower configuration machine compared to currently utilized workstations thereby saving on initial and ongoing cost.

Paradigm	Remote Desktop Paradigm
Collaboration	Geographically dispersed collaboration with multiple users providing full application functionality
Data Security	Models secure in data center, only pixels leave the data center
Data Replication	Data consolidated in few data centers
Maintenance	Maintenance one place
Hardware Exploitation	Longer useful life spans of client system. No 3D hardware acceleration required.
Hardware Utilization	Higher utilization, shared resource
Hardware Enhancement	More powerful hardware available at server side.

DCV Relevant links & information

For more information on DCV and any relevant information you should contact your IBM representative.

For information on Deep Computing offering from IBM please visit : http://www-03.ibm.com/servers/deepcomputing/

For details on Deep Computing Visualization from IBM please visit : http://www-03.ibm.com/servers/ deepcomputing/visualization/

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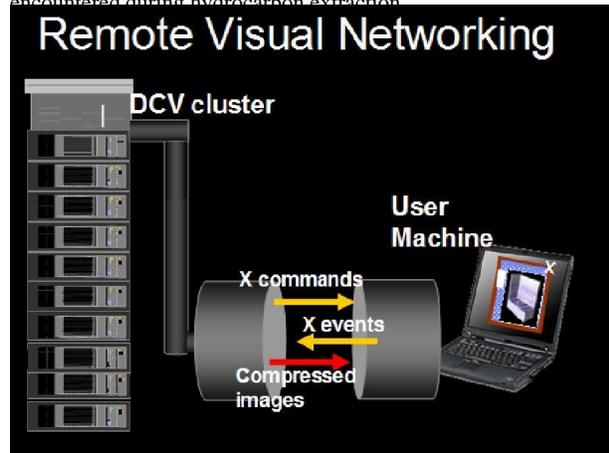
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