PROJECT MEGAGRID: FREQUENTLY ASKED QUESTIONS

What is Project MegaGrid? How can my organization take advantage of Project MegaGrid? Where can I get more information?
Here are answers to these and many other frequently asked questions:

What is Project MegaGrid?
Oracle, Dell, EMC, and Intel have partnered to form Project MegaGrid in an effort to develop a standard approach to building and deploying an enterprise grid infrastructure that can outperform traditional big iron solutions at a fraction of the cost.

Project MegaGrid combines the multiple vendor technology stacks into a single validated set of deployment best practices that reduces customer integration burden and allows customers to achieve the benefits of low cost grid infrastructure.

The phased project addresses customer challenges with regards to infrastructure consolidation and aligning technology with customer business requirements.

What are the primary business and IT challenges that Project MegaGrid addresses?
The deployment of a scalable Enterprise Grid Computing infrastructure can address these and many other challenges:

Reducing Cost: Predefined and pre-tested technology combinations help save money by minimizing downtime, and simplifying the deployment and management of Grid infrastructures.

Improving Quality of Service: End-to-end testing, validation, and documentation of clustering, load balancing, and high availability configurations enables IT to set reliable service levels for the business with fast response times.

Reducing Risk: Validated solutions and cooperative engineering minimize downtime and expedite maintenance and support processes.

Managing Growth: Joint Grid solutions revolve around scalability and centralized management to accommodate growth in hardware and users at a low cost.

Accelerating Time to Value: Pre-tested, validated best practices simplify and accelerate deployment time for customers.

How do you define Enterprise Grid Computing in the context of this initiative?
Many definitions of Enterprise Grid Computing exist in the marketplace. Enterprise Grid Computing provides the capability to pool various IT resources to act as a
single, integrated, connected entity which can be automatically provisioned as needed, based on demand requirements.

Project MegaGrid’s vision is to provide reliable, repeatable, and low cost methods of deploying Enterprise Grid Computing resources to reduce management complexity and provide highly available solutions.

To make this a reality, the four partners combined technologies to ease adoption and implementation. Many customers may already possess one or more of the needed components for Enterprise Grid Computing. Project MegaGrid serves as a means to provide tested, proven, repeatable methodologies to combine these products into a complete solution.

Adopting grid technologies can be done today with fast return on investment by taking these three steps:

1) **Standardize** on cost effective servers and storage utilizing Intel® processors.
2) **Consolidate** your databases, applications, servers, and storage.
3) **Automate** database, server, and storage management.

**What types of businesses can benefit from the MegaGrid Initiative?**
Companies in all industries seeking to reduce operational costs and design their infrastructure to support reliable, high performance solutions. The tests and best practices are designed to help customers better understand the components of Enterprise Grid Computing and the inter-relationships among the four company partners.

**Who in IT can benefit from this collaboration?**

- **DBAs, Storage, and Systems Administrators**: The testing and best practices developed incorporating technologies across the database, servers, and networked storage layers benefit the core end users of these technologies.
- **IT Directors and Chief Architects**: The pre-testing, design, and build-out of end-to-end infrastructures serve to provide customers a building block approach for deploying Enterprise Grid Computing and showing customers how to scale out and manage their environment. IT directors and chief architects can use the Project MegaGrid best practices as a basis to design a tested, proven, performance oriented Enterprise Grid Computing platform for their own businesses.
- **CEO / CIO / CFO**: Ultimately the goal of Project MegaGrid is to help customers reduce the cost and risk of deploying Enterprise Grid Computing solutions while achieving a more rapid realization of the benefits (reduced IT infrastructure costs, reduced operational costs, improved service levels).

**What investments have the four companies made in this initiative?**
All four companies have demonstrated a significant commitment to their customers and each other:

- **Oracle** provides the database, application server, management software and tools...
designed to run in a grid environment. Oracle also hosts the development center for this initiative in their Global IT data center in Austin, Texas. Oracle has managed and documented the benchmark effort to validate the performance and scalability of the Enterprise Grid Computing environment.

**Dell** provides the complete networked server infrastructure for this project, including enterprise class dual and quad processor Dell™ PowerEdge™ servers and their related I/O technologies. Dell has also provided resources to help design, deploy, test and document the results.

**EMC** provides the complete networked storage infrastructure for this project, consisting of both enterprise and midrange networked storage (NAS and SAN), archived storage, and storage management software. In addition, EMC has provided resources to help design, test, and document the results.

**Intel** provides world-class enterprise processors from the Intel® Itanium® 2 and Intel® Xeon™ processor families. In addition, Intel provides processor and server management expertise, optimization tools, and other resources that allow for seamless design integration.

**How was the technological progression of Project MegaGrid designed?**

Project MegaGrid was designed with a phased approach to allow continued advancements to be built upon each prior phase. In this manner, the growth of the project replicates in many ways the deployment of an actual grid computing infrastructure in a production environment, from a smaller footprint to a large, fully supported data center.

**Is a specific application part of this initiative?**

No. Project MegaGrid is designed to focus on the information infrastructure, specifically reducing the cost and risk of deploying, scaling, and managing an Enterprise Grid Computing infrastructure while maintaining performance.

Ultimately the value of any infrastructure is to serve all of the applications running on that infrastructure, as the applications drive the business needs. All major ISV applications, including Oracle Applications, run across Oracle, Dell, EMC, and Intel technologies.

**What applications were used to validate the Enterprise Grid environment?**

A network provisioning application provided by Cramer Systems was used to simulate a real world application for Tier 1 customers (e.g. British Telecom, SBC, etc.). The project also chose a Telco vertical based upon the high scalability, I/O throughput, and quality of service requirements from this vertical, in addition to the fact that Telco is a highly cost constrained environment, like many verticals, presenting a suitable target audience for Project MegaGrid.

**What discoveries and achievements were completed during Phase I?**

Phase I testing was done on a 32-node Intel Xeon processor based Dell/Linux server infrastructure and an Intel Itanium processor based Dell/Linux infrastructure, both
running Oracle Database 10g and Oracle Real Application Clusters 10g. The storage tier consisted of a midrange SAN infrastructure scaled into an enterprise SAN for the database tier, coupled with NAS used for non-Oracle database information. By executing Project MegaGrid for both the Dell PowerEdge 1750 and Dell PowerEdge 7250 product lines, proof points for real world deployments on either architecture were created.

Project MegaGrid analyzed two separate grid configurations of servers, the Dell PowerEdge 1750 dual processor Intel Xeon based servers and PowerEdge 7250 quad processor Intel Itanium 2 based servers. These two configurations represent grids based on light nodes and heavy nodes. Each configuration provides advantages, and both demonstrated the capability to effectively scale, provision, and manage Oracle Real Application Clusters on lower-cost Linux-based clustered servers, achieving better performance at drastically reduced server costs as compared to one of the latest generation large SMP Unix® platforms on the market today.

Specifically, the project benchmarked against a large SMP UNIX server, targeting 550,000 transactions per hour running a real-world Telco application to simulate an environment needing high scalability, I/O throughput, and quality of service requirements.

Through this test, Project MegaGrid demonstrated that both the Intel Xeon and Intel Itanium infrastructures scaled a 1.2TB Oracle Database 10g and exceeded 550,000 transactions per hour with either 11 Dell PowerEdge 1750 dual processor Intel Xeon based servers or six Dell PowerEdge 7250 quad processor Itanium 2 based servers.

Coupled with the Oracle Database 10g clustered server scalability focus, Project MegaGrid also tested a tiered networked storage model consisting of both a midrange SAN infrastructure scaled into an enterprise SAN for the database tier, coupled with NAS to cost-effectively replicate and share non-Oracle database information across all Oracle Real Application Clusters. The results demonstrate the storage capabilities of Oracle and all database related files on a low cost storage platform in line with throughput, scalability, and quality of service requirements.

In summary, we were able to demonstrate linear scalability of Oracle Real Application Clusters requiring no application changes, and a simple, modular “scale out” approach to adding servers and storage. The application workload used proves this solution is a viable alternative for either mid-market or enterprise environments.

**What technical deliverables are available as the result of Phase I testing?**

Best practices for scaling, provisioning, and management were tested and documented using a combination of Oracle and EMC software. Specifically, the project will have three joint best practices guides available for customers:

1) Practical guidance for deployment.
2) Performance management in large clusters.
3) Capacity planning for large commodity cluster environments.
What are the future plans for Project MegaGrid?
The next phase of Project MegaGrid—Phase II—will continue testing of both Intel and Itanium based server infrastructures and networked storage for Oracle Real Application Clusters, adding more server nodes to demonstrate additional scalability in an enterprise environment.

In addition, testing will be expanded to include Workload Management and Resource Provisioning across mid-tier, database, and storage tiers. Further, impact of any single point of failure, planned or unplanned, will be validated to ensure continuous application availability. Best practices, guidance, and business blueprints will be produced for the deployment of business applications in large-scale Grid-like server and storage systems.

If I can't call one point of contact, why is this initiative good for me?
While buying the products from any of the four partners can be done through any of the direct sales or channel partners, this initiative focuses on the bigger challenge of creating integrated Enterprise Grid Computing best practices for customers and partners. This means the availability of pre-defined and pre-tested optimal combinations of Oracle, Dell, EMC, and Intel technologies, which more accurately support the needs of a traditional heterogeneous data center environment.

Is this initiative a product bundle?
No. This is a project designed to offer documented results and best practices on how to design, deploy, and manage an Enterprise Grid Computing infrastructure.

How does Project MegaGrid relate to the Enterprise Grid Alliance?
Project MegaGrid and the Enterprise Grid Alliance (EGA) are complementary to one another. All four companies are members of the Enterprise Grid Alliance.

Project MegaGrid was developed to build blueprints for the deployment of enterprise grid computing solutions today using products from Oracle, Dell, EMC, and Intel. The four companies have combined certain core technologies and technical resources to ease the burden of integration for customers, and to develop a complete enterprise grid computing solution that outperforms traditional SMP offerings at a fraction of the cost.

The Enterprise Grid Alliance (EGA) is a consortium focused on developing and promoting enterprise grid solutions to accelerate the adoption of grid computing in the enterprise. Membership is open to all organizations via multiple participation tiers. For more information, visit www.gridalliance.org.

Are there any cooperative support agreements in place?
All partners have joint support agreements in place with one another, ensuring all tests and best practices are fully supported.

What is the core technology used in the joint development center?
Oracle MegaGrid technology includes:

- Oracle Database 10g
• Oracle Application Server 10g
• Oracle Real Application Clusters 10g
• Oracle Enterprise Manager 10g with Grid Control
• Automatic Storage Management
• Fast Application Notification
• Runtime Load Balancing
• Streams
• Transportable Tablespaces
• Flashback Database
• Oracle JDBC Connection Pooling

Dell MegaGrid technology includes:
Enterprise database, mid-tier and systems management servers with Red Hat Linux:
• PowerEdge 1750 rack-dense 1U servers, each with dual 3.2 GHz Intel Xeon processors, 533 MHz front-side bus, 2 MB cache and 4 GB ECC memory
• PowerEdge 7250 servers, each with quad 1.4 GHz Intel Itanium 2 processors, 6MB cache and 8GB ECC memory.
• Embedded Remote Access (ERA) Console
• Qlogic dual-ported fibre-channel Host Bus Adapters
• Red Hat Enterprise Linux 3.0 Advanced Server
• Dell/Oracle deployment tools

EMC MegaGrid technology includes:
Automated Networked Storage and storage management software technologies:
• Symmetrix DMX1000-P (high-end SAN storage)
• CLARiiON CX600/700 (mid-range SAN storage)
• NS Series/Integrated NS600/700 (integrated NAS storage)
• Celerra Networked Server (high-end NAS gateway)
• EMC ControlCenter (storage management software suite)
• EMC Navisphere Management Suite (web-based management software for CX series)
• EMC PowerPath (host-based SAN client software)
• EMC Solutions Enabler (host-based SAN management software package)

Intel MegaGrid technology includes:
World class processor technology, and optimization and software development tools:
• Intel Itanium 2 processors
• Intel Xeon processors
• Intel VTune™ Performance Analyzer
• Intel Threading Tools
• Intel MPI Library

How is Clustering different from Grid Computing?
Database clustering is the foundation of a grid computing architecture, but clustering alone is not grid. Grid Computing involves other pieces of the infrastructure such as the application server, storage and network layers and also the application layer. Project MegaGrid enterprise grid computing allows database servers, application servers, applications and storage layers to be merged together into a fabric that allows dynamic resource provisioning and the ability to more simply manage infrastructure so that it's better controlled, managed and utilized.

What divisions are sponsoring this initiative?
Oracle Server Technologies, Dell Enterprise Product Group, EMC Global Solutions Group, and Intel Enterprise Platforms Group are sponsoring the MegaGrid initiative.

Will there be any marketing/sales packages delivered either through direct sales or channel partners?
No MegaGrid product bundles will be sold. The primary objective is to provide customers an end-to-end template by which to purchase components for their own Enterprise Grid Computing environments. All of these components are currently available from the four partners, and there will also be marketing and sales tools for direct sales and channel partners to help position the value of MegaGrid.

Will the work that results in the best practices also lead to the formation of a joint Service Level Agreement to customers?
No. The goal of this initiative is to develop joint testing and best practices to simplify and improve the deployment of Enterprise Grid Computing infrastructures. The best practices will help customers set more reliable SLAs by deploying a tested, proven infrastructure without defining or setting specific customer SLAs.

How do customers get help turning Project MegaGrid best practices into real architecture for their business?
There are four primary ways to investigate, plan, or begin your own Enterprise Grid Computing project:

Option 1: Use the Project MegaGrid best practices, architectural diagrams, and other project deliverables with your own IT staff and utilize the industry standard hardware you may already have in your datacenter.

Option 2: Purchase end-to-end validated Enterprise Grid Computing bundles from Dell today; visit www.dell.com/oracle_validated_configs

Option 3: If you already have a good working relationship with one or more of the partners, you can maintain those relationships and buying practices and procure
technology from each company individually. In this case, you act as the general contractor and work with partners independently.

**Option 4**: Utilize the professional services organizations from any one of the four companies and engage them as a general contractor to plan, design, and build your Enterprise Grid Computing environment.

**Is there a qualification or certification program for Project MegaGrid?**
No. The focus is on providing tested and proven best practices rather than establishing any formal certification program. A goal of the project is to demonstrate that by utilizing industry standard architecture and proper software, you should not need complex or costly resources to deploy a production Enterprise Grid Computing environment.

**Where can I go to get more information?**
Oracle, Dell, EMC, and Intel have created sites for materials and resources resulting from Project MegaGrid. Please visit any of our vendor’s sites:

- www.oracle.com/megagrid
- www.dell.com/megagrid
- www.emc.com/megagrid
- www.intel.com/megagrid
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