

Case Study: Turkcell İletişim Hizmetleri A.Ş.



Europe's Second Largest and Turkey's Leading Telecommunication and Technology Company Consolidates more than 18 Database Instances into a Single Oracle RAC Cluster over Voltaire InfiniBand

As part of its transformation from a telecomm service provider to a technology company offering hundreds of value added services, Turkcell (Turkcell İletişim Hizmetleri A.Ş.) has made some major modifications to its IT infrastructure. The Istanbul-based communications and technology company chose Oracle 11g Real Application Cluster (RAC), which leverages Voltaire's InfiniBand-based I/O fabric, to support its rapid growth in Turkey and Europe. Turkcell was able to painlessly port its existing infrastructure to the new technology. The result was immediate and substantial cost reductions through increased server utilization, reduction in the number of CPUs, and lower data center power requirements.

The Turkcell Challenge

"We were looking for a highway," said Hüsnü Şensoy, Turkcell Database Architect. "When we started operations in 1994, we were a service provider offering data, voice and SMS services. But today we are a fast growing technology company with hundreds of value-added services available to our 37 million subscribers. As a result, Turkcell is the leading telecommunication and technology company in Turkey and the second largest GSM operator in Europe in terms of subscriber numbers."

Orhan Bıyıklıoğlu, Turkcell System Architect added, "To support that kind of growth and provide our subscribers with the services they want on a 24x7 basis, we needed to upgrade our IT infrastructure – we had to turn it from a serviceable but low speed roadway into a modern superhighway."

Before the infrastructure upgrade, every time Turkcell added a new application, a new database had to be created, each with its own server running a proprietary operating system. The Turkcell business site aggressively responding to their customers' enthusiastic embrace of new services created enough new applications to boost the number of database servers. To compound the problem, each critical server had a backup node for high availability. Plus, each individual database came with its own assorted database administrators and other personnel to handle backup, maintenance, and support services.

The high-end servers, Şensoy recalled, had about 10% to 20% utilization. In addition, the complexity of managing the many databases not only had a negative impact on operating expenses (Opex), but also slowed time-to-market for new applications, blunting Turkcell's competitive edge. Commented Şensoy, "We asked ourselves, why not consolidate all the databases that can be used for service deployment and just use one platform to launch new services?"

The Oracle RAC/Voltaire Solution

As a first step in their search for a new architecture, the Turkcell engineers examined a variety of database solutions. They found that only the Oracle 11g Real Application Cluster (RAC) provided the flexibility, scalability, and high availability needed to meet their requirements.

Oracle RAC allows Turkcell to transparently deploy a single database across a cluster of servers – in this case six servers – providing high availability, scalability, and low cost computing. Particularly important for Turkcell is Oracle RAC's support of real-time OLTP operations, a major part of the data center's workload. The solution meets Turkcell's requirement for high availability by removing the single point of failure at a single server. If a node in the cluster fails, the Oracle database continues running on the remaining nodes. Also, individual nodes can be shut down for maintenance while applications continue to run on the rest of the cluster. Two nodes support archival applications; the other four are dedicated to OLTP operations.



Key Results Delivered by Oracle RAC over Voltaire InfiniBand

- Provides higher server utilization as well as significant costs savings by consolidating and streamlining infrastructure
- Resulted in significant efficiencies in the administration, monitoring and maintenance of the overall system
- Enables the rapid implementation of new high margin, value-added services to meet the needs of Turkcell's rapidly growing customer base
- Provides a flexible architecture that can be scaled quickly and economically to meet changing business conditions
- Reduced risk associated with the migration by eliminating the need to re-architect and tune existing applications

Products

- Oracle 11g Real Application Clusters (RAC)
- Voltaire 20 Gb/s InfiniBand switches
- HP ProLiant DL580 servers
- Red Hat 5.2 operating system



With the database solutions selected, next on Turkcell's shopping list was servers, an operating system, and interconnect technology. Biyiklioglu says they selected Intel-based, commodity servers from HP due to their low cost, ready availability, and modularity. This flexible architecture would allow them to easily add more servers to the cluster as the company's requirements changed.

The initial configuration was a five-node, 120 CPU cluster. (Turkcell has since added another node and 24 additional CPUs and plans to add more to meet the growing customer demand for new applications and products.) Linux was the operating system of choice because it supported many new technologies, including InfiniBand, their preference for a high-speed I/O interconnect.

For Şensoy, InfiniBand supplied the highway they were looking for.

Why Voltaire?

"We needed a highway because our applications were not well-tuned, and we did not want to get into the tedious, costly and risky business of re-architecting and tuning the applications after moving them to the new platform," he said. "We knew that interconnect traffic might be very heavy, so we wanted the fastest interconnect technology available on the market. InfiniBand, with its high bandwidth and low latency, gave us that technology and made applications migration a non-issue."

Biyiklioglu added that one of the key reasons that Oracle RAC is able to deliver business applications with improved scalability and lower costs than single instance database environments is its use of the Voltaire InfiniBand-based I/O fabric. Benchmarks of the combined technologies show improved transaction rates and shortened query times for both data warehouse and OLTP applications.

He said there were several factors that led Turkcell to select the Voltaire solution. For example, they were impressed by the substantial number of Oracle and Voltaire joint customers. Another plus was the use of Voltaire InfiniBand in the HP Oracle Database Machine – a system that runs multi-terabyte data warehouses at least 10x faster than conventional data warehouse systems. The HP Oracle Database Machine uses Oracle 11g RAC and has a complete InfiniBand infrastructure. "If Voltaire InfiniBand worked for the HP Oracle Database Machine and Exadata, we knew it would work for us," Şensoy said.

The Results

A whole series of benefits resulted from updating the infrastructure by replacing 18 databases and their expensive, individual servers with a six-node cluster running Linux open source software and the Oracle RAC solution with InfiniBand.

"Not only did we save money on the servers, but now we have a much more flexible system that will allow us to scale to meet future requirements," commented Biyiklioglu.

"The cluster approach is also giving us much better utilization of our compute resources. To support Turkcell's continued growth, we're planning on evolving to a larger cluster. This is relatively easy to do – you just add more inexpensive commodity servers to handle the new services. The combination of commodity servers, Oracle RAC and Voltaire InfiniBand is allowing our infrastructure to look very much like a scalable, flexible high performance computing (HPC) cluster."

The consolidation and streamlining of the infrastructure has had another major benefit: the drastic reduction in separate databases has allowed a corresponding reduction in the costs associated with administering, monitoring and maintaining the system. And, as an added bonus, the dramatic reduction in the number of servers and their power requirements has resulted in lower power bills and a greener IT environment.

Overall, the new, improved infrastructure has given Turkcell a future proof, high performing, resilient system that will allow the operator to offer highly profitable value added services to its customers in Turkey and around the world. The combination of Oracle RAC and Voltaire InfiniBand will support that growth.

