

Turkcell Accelerates Reporting Tenfold, Saves on Storage and Energy Costs with Consolidated Oracle Exadata Platform



About Turkcell

Turkcell is the leading communications and technology company in Turkey with 33.1 million subscribers and a market share of approximately 54% as of March 31, 2011 (Source: Our estimations, operators' and Authority's announcements). Turkcell is a leading regional player, with market leadership in five of the nine countries in which it operates with its approximately 60.4 million subscribers as of March 31, 2011.

Turkcell reported a TRY2.1 billion (US\$1.3 billion) net revenue with total assets of TRY15.2 billion (US\$9.8 billion) as of March 31, 2011. Turkcell covers approximately 83% of the Turkish population through its 3G and 99% through its 2G technology-supported network. It has become one of the first among the global operators to have implemented HSDPA+ and achieved a 42.2 Mbps speed using the HSPA multi-carrier solution.

Turkcell has been listed on the NYSE and the ISE since July 2000, and is the only NYSE-listed company in Turkey. 51.00% of Turkcell's share capital is held by Turkcell Holding, 0.05% by Cukurova Holding, 13.07% by Sonera Holding and 1.19% by others, while the remaining 34.69% is free float. Read more at www.turkcell.com.tr/en

EXECUTIVE SUMMARY

Turkcell is Turkey's leading mobile communications and technology company and ranks third in Europe and 16th in the world by number of subscribers. Each day, Turkcell's networks process about 1.5 billion call records, which form the basis for critical business reports used by teams in finance, marketing and other parts of the company. The amount of data managed by the company is huge—over 500 TB and growing—and Turkcell wanted to make sure that the heavy volume wouldn't slow down the delivery of critical business reports.

Turkcell found a solution in Oracle Exadata Database Machine, a new computing platform that takes advantage of innovations in smart storage to radically boost system speed and lower cost. After making the move to Oracle Exadata, Turkcell boosted reporting speeds tenfold, eliminating long waits for users while also providing data compression capabilities that cut the size of its data repository by a factor of eight. The Exadata migration required no changes to system interfaces and allowed Turkcell to consolidate hardware and create a highly scalable framework to handle future growth.

Mainstay Partners estimates that Turkcell's investment in Oracle Exadata will break even within 30 months and achieve an ROI of at least 25% over three years, with total benefits expected to reach into the millions of US dollars over three years.

Turkcell should realize additional savings from a range of other improvements, including more efficient disk space utilization, higher business user productivity, and faster system deployments.

"It was a never-ending race to match the company's requirements for business performance and capacity. After the test migration, users were so happy that they did not let us go back. With Oracle Exadata Database Machine, we have outperformed expectations and prepared Turkcell for future growth."

METIN YILMAZ, IT MANAGER, TURKCELL

ORACLE PRODUCTS

- Oracle Exadata Database Machine

KEY BENEFITS

- Achieved 25% ROI over three years
- Estimated \$2M in total benefits
- Accelerated report run time by 10x, eliminating long wait times for business intelligence
- Enabled significant infrastructure consolidation, reducing hardware footprint by 90%
- Leaner hardware environment reduced energy costs
- Improved capacity and scalability to handle future business data and business growth
- Increased data throughput performance, reducing backup time by 3x
- Achieve up to 10x data compression, reducing overall data volume 8x

BACKGROUND

In addition to Turkey, Turkcell operates in nine countries and has approximately 60.4 million subscribers.¹ The Istanbul-based company was the first—and remains the only—Turkish company listed on the New York Stock Exchange. In 2010, Turkcell Group reported revenue of US\$6.0 billion.

Each day, Turkcell's communications network generates about 1.5 billion call detail records (CDRs), the computer records containing details of every phone call that passes through the network. The CDRs, along with other business information, adds up to a total of about 600 TB of data, which Turkcell holds in more than 500 databases across the company.

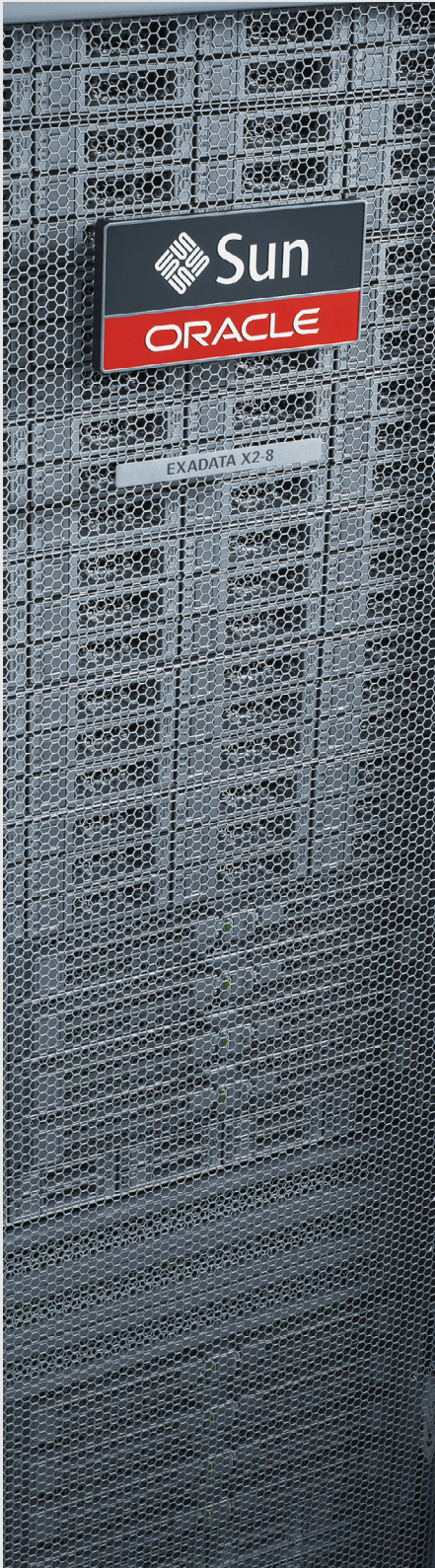
Eager to mine these data for customer and business intelligence, Turkcell built a high-capacity data warehouse that extracts 600 to 1,000 GB of data from more than 20 source databases. Marketers, financial analysts and other business users rely on the data warehouse to run more than 50,000 reports every month, helping Turkcell manage its finances, analyze customer trends, and evaluate marketing campaigns.

But with the volume of data surging in recent years, Turkcell was looking at opportunities to boost the performance of the data warehouse and keep reporting operations running efficiently. Moreover, Turkcell was looking for ways to rein in its sprawling hardware footprint, which had been growing to accommodate the company's expanding data-processing and storage needs. "Data storage requirements have been doubling every year," said Metin Yilmaz, IT manager at Turkcell. "It was a never-ending race to match the business' performance and capacity needs."

THE ORACLE EXADATA SOLUTION

All of these challenges prompted Turkcell to launch a comprehensive initiative in 2009 aimed at simplifying and consolidating its data warehouse infrastructure and meet rising service-delivery expectations. The implementation of Oracle Exadata Database Machine was an essential part of the project, combining servers, storage, networking, and software in an integrated platform that is massively scalable, secure, and redundant. Turkcell also replaced its application server environment, subsequently loading data into the Exadata Database Machine.

¹These countries are: Ukraine, Belarus, Turkish Republic of Northern Cyprus, Germany and in Kazakhstan, Azerbaijan, Moldova, Georgia through Fintur. Subscriber figures are as of March 31, 2011.



Installed and fully tested in less than four months, the Oracle Exadata platform featured an upgrade to Oracle Database 11g and a new clustered server architecture running Oracle RAC (Real Application Clusters) software and Oracle Linux operating system. Because Turkcell could implement the Exadata environment without changing existing extract, transform, load (ETL) and reporting software or application interfaces, it could plan and manage the project as a simple migration. Alternative methods of boosting performance by rewriting source code would have required a two- to three-year project, IT managers said.

OPERATIONAL AND STRATEGIC BENEFITS

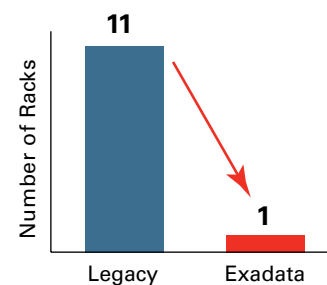
Turkcell saw immediate benefits from the move to Oracle Exadata, with improvements ranging from faster reporting to streamlined system management to reduced business risk. “With the Oracle Exadata Database Machine, we have outperformed our users’ expectations and we are prepared for future growth,” said Yilmaz. Exadata-driven cost and productivity savings are expected to reach into the millions of US dollars over three years.

Consolidated Infrastructure Speeds Deployment

In the migration to Oracle Exadata, Turkcell replaced 10 data-storage cabinets and a Sun M9000 server with a single full-rack high performance Exadata Database Machine, as shown in Figure 1. The consolidated hardware footprint and Exadata’s simple implementation requirements helped minimize Turkcell’s resource commitment. IT managers noted that a comparable system implementation would have required at least five dedicated IT resources (including OS, storage and database administrators) and at least 45 days longer to complete.

“Our main objective was to combine the data warehouse domain databases in a single rack Oracle Exadata Database Machine environment,” said Yilmaz, the IT manager. “One platform, one version, one vendor. Timewise, this was a tremendous savings.” The shortened deployment timeline helped Turkcell avoid substantial labor costs.

Figure 1: 90% Reduction in Server and Storage Hardware



“We heard before that infrastructure changes would give us performance gains, but this time we were surprised with it. It well surpassed our expectations. Now we can take faster actions in this competitive environment.”

DIRECTOR OF MARKETING DEPARTMENT, TURKCELL

HOW EXADATA MAXIMIZES PERFORMANCE

- **Exadata Smart Scan.** The smart storage software in Exadata offloads data-intensive query processing from Oracle Database 11g servers to Exadata’s storage layer for parallel data processing. Because there’s less data moving through the higher-bandwidth connections, performance improves significantly as well as concurrency for simple and complex data warehousing queries.
- **Exadata Hybrid Columnar Compression.** Exadata features a compression rate of 10x on average for data warehousing data. Exadata organizes and compresses data by columns, resulting in a query mode that’s optimized for speed. It also has an archival mode that is optimized for space, delivering significant storage capacity at a very low cost.
- **Exadata Smart Flash Cache.** With more than 5 TB of flash memory per full rack, Oracle Exadata intelligently caches “hot” data and assigns the rest to disk storage, giving organizations the speed of flash with the cost-effectiveness of disk storage. Exadata Smart Flash Cache can process up to 1.5 million random I/O operations per second and scan up to 50 GB of data per second to deliver ultra-high performance for OLTP applications.

IT Administrative Efficiencies

Database administrators noted that running Oracle Exadata generated significant IT management efficiencies, in large part because of the simplicity of the one-box Oracle solution. “Oracle Exadata requires very minimal storage and OS administrative work,” a Turkcell database administrator said. “We’re only involved during patching and installation activities.” Additional time savings came from significant reductions in performance-tuning requirements and simplified vendor support now that Turkcell has consolidated most of its computing infrastructure on Oracle.

Currently, Turkcell’s IT group employs four system administrators to oversee the Exadata platform in addition to other responsibilities. The company estimates that it has improved administrative efficiency by about 20% during an average week, which is expected to generate additional savings.

10x Boost in Reporting Efficiency

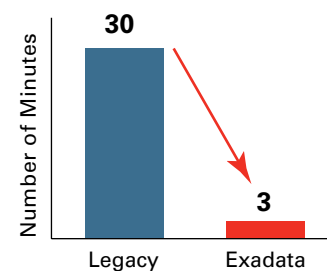
Exadata drove significant increases in reporting speed—a critical improvement for hundreds of business users who run more than 50,000 reports each month to help track market trends, analyze finances, and refine business strategies.² In the previous environment, it took about 30 minutes to generate a typical report and as much as four hours or more for more complex analyses. Today, reports are running almost 10 times faster and about 90% of all reports take less than five minutes to run.³

“End users can easily get the results they need when they arrive at work.

There’s no waiting for hours anymore,” said Yilmaz, adding that business managers and analysts can now focus on productive activities such as generating new business. “This gives us a real advantage because Turkcell is in a highly competitive environment and we can’t afford waiting hours to get answers to questions.”

Turkcell estimates that more efficient reporting is saving users about one hour per week, translating into significant annual productivity benefits. Moreover, the IT department has reduced business risk by moving to a reporting platform that can handle the increase in reporting that is expected in the next few years.

Figure 2: 10x Reduction in Average Report Run Time*



*NOTE: This decrease was measured even as report volumes doubled over the last nine months and data queries tripled.

²Turkcell estimates that it has about 300 active users of reporting services (50% in Marketing, 30% in Finance, and 20% in IT) and about 3,000 distinct reports.

³Turkcell reported that some reports run more than 400 times faster. Reports taking longer than four hours to run, which numbered about 87 in the legacy environment, have been virtually eliminated.

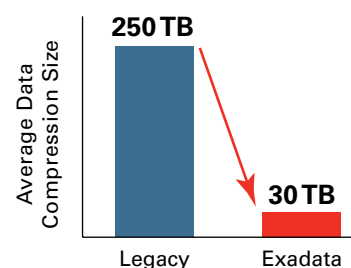


Data Compression Yields Savings, Scalability

As Turkcell's mobile communications business continues to expand, data volume is expected to grow to 500 TB within a few years, up from 250 TB today. Managing and storing such a huge amount of data is a major challenge for IT, and managers stressed the importance of compression technologies to save disk space and speed backups.

The data compression features of Oracle Database 10g helped address the issue to an extent, shrinking data volume from 250 TB to about 100 TB. But with Oracle Exadata's hybrid columnar compression technology, Turkcell achieved exponentially greater space savings, cutting total data size to about 30 TB, an eightfold reduction. As a result, Turkcell expects to benefit from lower costs associated with data storage hardware requirements.

Figure 3: 8x Data Compression



Cost-Effective System Scaling

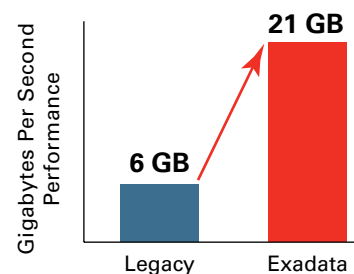
Turkcell will rely on Exadata's space-saving capabilities to cost-effectively manage its exploding data processing and storage requirements, which managers say is almost doubling every year. Oracle RAC clustered database technology will also help Turkcell keep pace with the growth by enabling IT to economically scale out the system. "Going from one to multiple racks will be easy now," one IT administrator noted.

The company is continuing with plans to simplify its database architecture and has launched a project that will consolidate six new databases on the new Exadata platform. Ultimately, IT managers say they want to reduce the total number of production database by two-thirds and keep a tight rein on building new ones.

Faster System Performance and Backups

Among other critical enhancements, the move to Oracle Exadata—with its Smart Scan capabilities and faster throughput—boosted system speed fourfold and led to a range of efficiency gains. Before Exadata, administrators struggled with slow throughput, which, when combined with less data compression, extended backup sessions to as long as 40 hours. Today, administrators

Figure 4: 3x GB Per Second Performance Improvement



“In a word, Oracle Exadata is fantastic. Almost no report takes more than 10 minutes to run, versus hours before. It sounds unreal, but it’s real.”

POWER USER, FINANCE DEPARTMENT, TURKCELL

working with smaller databases and faster throughput can perform backups in just 10 hours with Exadata. Data-transfer speeds rose from 6GB per second to 21GB per second simply by moving to Exadata; no additional changes to the system were required. Furthermore, faster backups and lower data volumes (due to higher data compression) mean that Turkcell needs fewer backup tapes to handle each backup session.

Figure 5: 6x Faster Data Backups

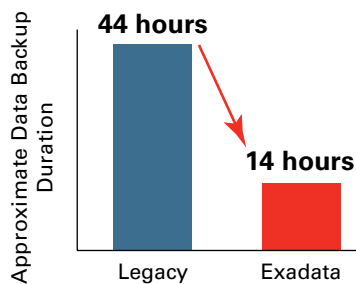
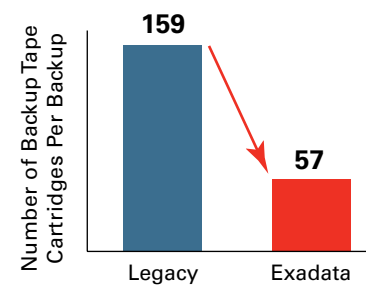


Figure 6: 6x Reduction in Backup Storage Equipment



Lighter Hardware Footprint Cuts Energy Costs By 80%

Turkcell captured additional savings in the form of lower energy costs as it retired its sprawling hardware infrastructure in favor of a consolidated Exadata platform. “The old environment was a big problem for us in terms of electricity usage, and it was only going to get worse,” a senior IT administrator said. “Exadata came to our rescue and allowed us to replace 11 cabinets with just one Exadata cabinet. By making this transition we’re saving space and cutting energy usage in the data center, and getting a 10x performance improvement as well.”

As shown in Table 1, the Exadata and consolidation initiative shrank the company’s floor space needs by 90% and helped Turkcell achieve an 80% reduction in energy consumption. Turkcell is on track to significantly cut energy costs over the coming years.

Table 1: Summary of Floor Space and Energy Savings

	Old System (11 rack)	Duplication of Legacy System (20 rack)	Current Exadata Environment
Floor Space (m²)	33	60	3
Energy Consumption (kw)	50	90	10
Monthly Cost (of base)	100%	180%	20%

ABOUT THIS CASE STUDY

Research and analysis for this study was conducted by Mainstay Partners, an independent consulting firm, drawing from interviews with Turkcell employees, review of planning documents and searches of industry literature. ROI calculations use industry-standard assumptions regarding the time value of money.

Mainstay Partners is the leading provider of independent value assessment and IT strategy services. Our clients include Oracle, SAP, Cisco, Lexmark, Microsoft, Motorola, and HP. For more information, please visit www.mainstaypartners.net. Information contained in this case study has been obtained from sources considered reliable but is not warranted by Mainstay Partners.



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ESTIMATED \$2 MILLION IN TOTAL BENEFITS

Mainstay Partners estimates that Turkcell’s investment in Oracle Exadata will achieve a 25% ROI over three years and break even within 30 months. Turkcell should realize additional savings from a range of other improvements, including more efficient disk space utilization, higher business user productivity, and faster system deployments.

Figure 7: Net Benefits and Cost by Category – Three-Year View

