TRANSFORMING THE CORE OF THE BUSINESS
CREATING A FUTURE-READY MOBILE PLATFORM AT TÜRK TELEKOM
Overview
Türk Telekom, with 177 years of history, is the first integrated telecommunications operator in Turkey. Having grown the mobile side of its business through acquisitions and consolidated under one brand in January 2016, Türk Telekom took the decision to rationalize their mobile business platforms, to become future ready, and eliminate technical challenges and operating complexities in the middleware domain of their IT landscape.

The plan included integration of multiple IT systems, elimination of outdated legacy systems and updating outdated and unsupported versions of the hardware and software platforms. This middleware upgrade and migration project, based on the Oracle Fusion Middleware 12c product family, has created a consolidated and federated middleware platform, improving service functionality, and adheres to TM Forum’s eTOM standards.

Türk Telekom vision of introducing new technologies to Turkey and accelerating the country’s transformation into an information society is now supported and accelerated by a transformed Mobile Middleware (MMW) domain, which is now processing 130 million daily transactions through 1,000+ services and 400+ business processes, and managing more than 18 million mobile subscribers.

Future plans are now being made to extend this type of project into other domains and continue the modernization to future ready platforms.
SCOPE

The existing Türk Telekom MMW domain was architected in five main layers;

2 Service Bus layers;
• OSB 10gR3 – Upgraded in scope of this project
• OSB 11gR1 – Upgraded in scope of this project

2 Business Process layers;
• SOA Suite 11gR1 – Upgraded in scope of this project
• WLI 10 – Migrated to SOA 12c in scope this project

1 Security layer;
• Datapower – Out of scope (no change)

The Mobile Middleware Upgrade and Migration Project was structured to upgrade/migrate all outdated Service and Business Process domains within the MMW stream to the latest version of the Oracle Fusion Middleware 12c product family.

• All Service Bus domains (OSB 10gR3 and OSB 11gR1) were upgraded to Oracle Service Bus 12cR2, including all 1000+ services
• SOA domain (SOA 11gR1) were upgraded to Oracle SOA Suite 12cR2, including all 60+ business processes
• WLI domain (WebLogic Integration 10.3) was migrated to Oracle SOA Suite 12cR2, by re-implementing all 350+ business process from scratch and re-designing according to Service Oriented Architecture.

The project outcome was to achieve following rationalized target state:

Figure 1 - Mobile Middleware High Level Architecture

Figure 2 - Mobile Middleware Target Architecture
OBJECTIVES
The Middleware Upgrade project’s main objective was to replace all the outdated Service and Business Process layers and consolidate them in a 12c domain.

In addition, there were three other main objectives for the project;

• Introduce new native features: New features provided by Oracle in the 12c version have been utilized where applicable. This activity drove the migration of “custom” codes to native features where possible.

• Create a consolidated and federated Middleware architecture: Services were consolidated under Oracle Service Bus 12c, instead of the previous situation of running on two different versions (10g and 11g) of Service Bus. All business processes were consolidated under SOA 12c, instead of running on two different products (SOA 11g and WLI 10). The aim of this move is to create a federated architecture by distributing all the related services and processes to multiple separate domains.

• Service Refactoring and decommissioning of unused components: All services and processes were extracted from OSB, SOA and WLI domains to create a Service Inventory. Unused components were detected according to the transactions received per service. In total 24.5 percent of all services and 19.5 percent of processes were identified as unused, and all decommissioned.

ACCENTURE’S ROLE
During the project, Accenture’s was responsible end-to-end for the delivery and completed analysis and design of the new technology architecture, installation and configuration of new environments from scratch, upgrading and testing of all services and composites, deployment and post-production support.

Accenture helped Türk Telekom upgrade the existing Middleware solution with an Iterative Delivery Model, while introducing elements of New IT to facilitate digital transformation for the future. The approach helped accelerate the successful delivery of the project, which was completed to plan with a seamless transition from old to new.

Accenture’s project team was optimized in multiple tiers;

• On-site Client Team in Istanbul, consisting of Middleware experts with have Integration and Application Architecture capabilities. This team was responsible for the analysis and design activities, team coordination and client-facing activities.

• Near-shore Delivery Team in Izmir Delivery Center (IzDC), consisting of local developers and experts. This team was responsible for the development activities as well as the coordination of the off-shore team in India.

• Off-shore Delivery Team in India Delivery Center (IDC), consisting of expert Middleware developers. This team operated as the Middleware development factory with a skilled resource pool that provides the capability to quickly ramp-up or down according to the project needs.

In the following sections, some of the key elements of the delivery are detailed.
FUTURE READY TRANSFORMATION

• Application Modernization: All outdated Middleware applications were upgraded to the latest version of Oracle Fusion Middleware 12c that led to;
  - the consolidation of platforms and services that had been developed in multiple old technologies.
  - the re-structuring of the application in extendible multiple domains according to business and functional categorization of services.
  - the phasing out of old OSB, SOA, and WLI applications.

• Platform Migration: For the hardware element of the migration, 24 servers running on several old physical servers were replaced with 52 Virtual Machines running only on 2 new physical servers that led to:
  - increased performance on run-time
  - improved scalability
  - decommissioning of the old hardware

• Service Refactoring: All unused services, non-referenced components, and old versions of composites are identified and decommissioned.

• Service Remediation: Custom code to native feature transformation was performed. E.g.; from file based validation to dynamic validation that is introduced with 12c.

• Introducing Security Enhancements: Oracle Web Services Manager (OWSM) is enabled in the newly installed domains, which provides a policy framework to manage and secure Web services both in transport and message level.

ITERATIVE DELIVERY

The Middleware Upgrade Project delivery model was designed to be iterative to migrate services to the new domain frequently and faster. To provide an iterative delivery, a strategy was formulated on two key guidelines, which became the main building blocks of the Project. Based on these guidelines, we designed, implemented, tested, and deployed in small chunk of services and processes. This allowed us to achieve deployment at a weekly frequency for chunks of around 40 services and 10 business processes.
THE METHODOLOGY

While planning the upgrade, the most important decision was to choose the correct methodology; In-place or Side-by-side:

- In the In-place upgrade approach, a new Oracle home needs to be installed and the domain and DB are upgraded in-place. All resources (services and composites) should remain in the upgraded domain.

- In the Side-by-side upgrade approach, a new Oracle home needs to be installed and a new 12c domain and DB instance should be created. The 12c domain needs to be configured fully. Afterwards, all services and composites are re-build in 12c IDE (JDeveloper) and deployed to the new domain. Finally cut over should be done from 11g to 12c.

Both methodologies have their advantages & disadvantages and the decision is made according to the project need considering some key criteria; stability of the current version of the product, situation of long running instances, need to retain instance history, required downtime and cut over approach.

OSB Upgrade

- In-place upgrade is not supported from OSB 10g to 12c, therefore a side-by-side methodology was required.

- The same methodology was used upgrading from OSB 11g to 12c to minimize downtime and reduce deployment risks.

- A new OSB domain was created for 12c and all services were migrated to the new domain phase by phase.

SOA Suite Upgrade

- Although in-place upgrade is supported from SOA 11g to 12c, a side-by-side methodology was followed to minimize downtime and reduce deployment risks.

- Not having long running instances was also a key point to choose Side-by-side methodology.

- A new SOA Suite domain was created for 12c and all composites were migrated to the new domain phase by phase.

WLI Migration

- As the product was changed, all business processes were re-implemented and deployed to a new SOA Suite domain.
**PHASED APPROACH**

Instead of a big bang approach, a phased approach was followed to mitigate risks, make a smooth transition to the new domain and to realize benefits early incrementally:

- OSB Services were grouped into chunks according to the transport type. Accordingly, native transports were prioritized as the migration of these services are less complex.
- SOA Composites were grouped into chunks according to their functionalities and dependencies.

While defining the chunks, all services and composites were discovered, decomposed according to their dependencies, double-checked according to reverse references and ordered according to the prioritization. During the discovery stage, unused components were identified and excluded from the migration scope.

As a result of this phasing approach, all services were grouped under service chunks and several small chunks were planned. According to the definition of service chunks, build, test & deploy activities are performed for each chunk one by one.

---

**Figure 3 - Phasing Approach**

<table>
<thead>
<tr>
<th>DISCOVER</th>
<th>DECOMPOSE</th>
<th>DOUBLE-CHECK</th>
<th>DEFINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extract technical service portfolio including all Proxy Service (PX) dependencies &amp; references</td>
<td>Group chunk of services according to Business Service (BS) transport protocol type</td>
<td>Follow reverse references from BS to PX and identify possible chunk of PX list. List all PXs in a chunk and search whether there is a different transport type</td>
<td>Define the content of each service chunk and order them by prioritizing native transports which are followed by custom transports and then mixed</td>
</tr>
</tbody>
</table>
AUTOMATION
Automation was an important enabler that was have implemented in several areas during the project to reduce excessive effort spent in recurring tasks and potential human mistakes. Thanks to this, the project was delivered faster, and hit all milestones.

We installed and configured Oracle Fusion Middleware to more than 60 virtual servers from scratch, which would otherwise require significant effort and time. Empowered by the automation of the following tasks, we made considerable time savings as well as ensured full alignment of all servers minimizing potential human errors:

• Automated distribution of binaries, host files and start scripts to all servers
• Automated deployment of patches to all servers

RESULTS ACHIEVED
The successful completion of the project solved the operational complexities that Türk Telekom faced and made a significant impact by achieving the following results:

• Up-to-date Middleware platform that runs on the latest version of the product with full Vendor support.
• Consolidated and Federated Middleware that is technologically consolidated on the same product version, providing federation capabilities in terms of service functionality.
• Operational efforts cut by 35%, providing savings in log & alarm monitoring, tracking & applying patches, minor upgrade planning and four times faster data purge, by the upgrade and consolidation of the platform.
• Reduced maintenance efforts, providing savings in source code management and resource consumption of unnecessary components on production environment, by decommissioning of 24.5% of all services which were unused.
• 5% decrease in development time, providing additional out-of-the-box functions and quicker deploy duration, by enabling to work on a single and faster IDE instead of three different IDEs.
• 80% reduced environment installation duration by automated distribution of binary files, patches and domain configuration.
• Flexibility to deploy a service/composite to any functionally separated domain.
• Ability to use security policies in Web Services by using OWSM.

TECHNOLOGY
The technology architecture designed for Türk Telekom is based fully on the Oracle stack to avoid any compatibility issues and provide end to end integrity.

• Hardware: Virtual Machines with Oracle Solaris 11.3 SPARC Operating System on Oracle SPARC M7 physical server
• Software: Oracle Fusion Middleware 12c (12.2.1.1) with following products used; Weblogic, Service Bus, SOA Suite, Enterprise Manager, Web Services Manager (OWSM).
• Database: Oracle Database 11g (11.2.0.4)
ABOUT ACCENTURE

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions – underpinned by the world’s largest delivery network – Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With approximately 442,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at www.accenture.com.