



**Bosch GmbH accelerates business processes and reduces costs with Oracle Database In-Memory – no changes to existing SAP application required**

## MAJOR IMPROVEMENT IN SAP CRM USE WITH ORACLE DATABASE IN-MEMORY

The Bosch Group is a leading global supplier of technology and services. It employs roughly 375,000 associates worldwide (as of December 31, 2015). The company generated sales of 70.6 billion euros in 2015. Its operations are divided into four business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology. The Bosch Group comprises Robert Bosch GmbH and its roughly 440 subsidiaries and regional companies in some 60 countries. Including sales and service partners, Bosch's global manufacturing and sales network covers some 150 countries. The basis for the company's future growth is its innovative strength. Bosch employs 55,800 associates in research and development at roughly 118 locations across the globe. The Bosch Group's strategic objective is to deliver innovations for a connected life. Bosch improves quality of life worldwide with products and services that are innovative and spark enthusiasm. In short, Bosch creates technology that is "Invented for life."

Bosch GmbH is known for being a market leader and an innovative company. They often use the tagline "technology invented for life" which provides insight into their business objectives to improve the quality of life, and to deliver innovation for a "connected life".

For well over a decade, Bosch has relied on Oracle as their preferred database vendor for use with SAP. The Oracle database is a core element and important cornerstone in the Bosch infrastructure. Oracle databases are operated autonomously in combination with the various SAP applications and ideally respond to the varied needs of this successful and diversified group.

The IT department consists of more than 1,500 IT specialists and process experts. It was only logical as an Oracle/SAP customer to fully explore the features and options of the new Oracle Database 12c at an early stage. In mid-2015, the primary focus was on the features and benefits of Oracle Database In-Memory.

"We wanted to find out exactly how Oracle Database In-Memory could help us to implement optimizations in our use of SAP. This applied to both OLAP and OLTP applications. We quickly realized that we stood to benefit in many ways, especially in terms of SAP CRM usage," explains a project manager and database expert from the IT operations organization.

The Bosch IT team discussed solution scenarios and use cases both in-house and with Oracle. It became clear that Oracle Database In-Memory offered significant advantages when used with SAP BW Analytics.

But even more important to Bosch was the fact that Oracle Database In-Memory in Oracle 12c also enables planned, prioritized optimizations to be achieved in OLTP systems, and specifically with SAP CRM. This was in fact the most pressing problem. The Bosch IT team needed a suitable solution to eliminate sub-optimum performance when using SAP CRM / OLTP at reasonable cost. Oracle Database In-Memory in Oracle 12c was the right way to go.

### The challenge of secondary indexes

In this CRM use case it was mainly secondary indexes, as well as the extra custom-made indexes that had to be regularly created, that proved to be problematic. According to Bosch: "As a result of the intensive and distinctive use of SAP CRM functions by users, the IT team was obliged to continually create extra indexes for certain CRM objects and tables. This was the only way to use the system in line with our individual usage requirements. However, it wasn't possible to achieve 100% application coverage in this way, especially in terms of search options and search availabilities in CRM. This is because not all such search options can be supported by additional indexes. Some application functions simply resulted in a timeout."

Approximately, 80 additional indexes were created and accumulated over time. This resulted in a considerable increased need for maintenance demands and performance-related tuning as well as cost-intensive resource use. It was also necessary to set aside a large amount of storage capacity for these indexes, which were also large objects.

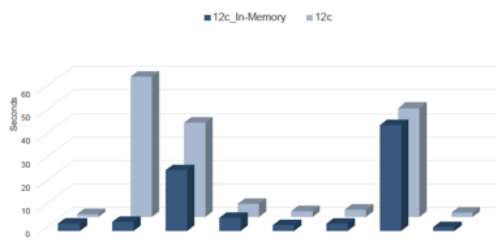
The SAP CRM system is used by around 3,500 users throughout the Bosch Group, The CRM system being discussed here is one of several CRM systems Bosch operates. The largest of which has a data volume of over 1TB.

Following a PoC and several tests, it became clear that Oracle Database In-Memory is not only effective as a performance enhancer but it is equally as effective as a means of countering problematic secondary indexes. With Oracle Database In-Memory, many of these indexes can be removed. This prompted Bosch to put Oracle 12c with Oracle Database In-Memory to productive use in conjunction with the SAP CRM system. A detailed analysis was carried out to find out which tables were suitable for In-Memory. The IT team identified them and the most important ones were able to be replaced. One major advantage is that the benefits of Oracle Database In-Memory technology can be gained without any changes to SAP applications, with the continued use of existing hardware (virtualized and Unix-based servers), and without data migration. It is usually only necessary to provide In-Memory servers / RAM hardware resources (virtualized or non-virtualized) for tables that were to be involved with In-Memory processing.

#### Oracle 12c: In-Memory

##### Results for 8 test cases CRM System

→ response time in Milliseconds, 2<sup>nd</sup> run ("hot caches")



8

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#### High satisfaction with Oracle Database In-Memory

„The improvements achieved in the SAP CRM system through Oracle Database In-Memory have turned out exactly as we planned. User satisfaction has risen considerably and IT-supported business processes are now running smoothly without delays and can be fully utilized as standard. The amount of IT administration has also been noticeably reduced thanks to the substantial reduction in index creation and maintenance, which in turn results in cost savings.

In the use case described, Oracle Database In-Memory eliminated the need for many secondary and custom-made indexes of large tables while accelerating OLAP use. Inserts, Updates and Delete statements processed normally. No negative impact on the system performance was observed.

Additional tuning can be accomplished easily by increasing the cache for the In-Memory Store and assigning specific tables to occupy the space. The Oracle In-Memory Advisor, a component supplied with Oracle 12c, also makes it possible to identify tables suitable for use with In-Memory.

#### Problems / challenges

- Bosch was looking for ways to optimize its use of SAP CRM. Specific tables having a large number of secondary indexes were causing particular difficulties. These difficulties resulted in frequent user dissatisfaction, costly administration and maintenance, and the provision of additional IT resources (such as storage).

#### Solution

- With Oracle Database In-Memory, it is possible to replace additional custom-made indexes. Oracle In-Memory in Oracle 12c is used for the tables that made these indexes necessary

#### Benefits

- Now users can make full and effective use of SAP CRM
- Reduced costs for system / database administration
- In-Memory is only activated for selected tables
- Saving in terms of storage resources for secondary indexes that are no longer needed
- Lower number of indexes means accelerated business processes
- Faster SAP CRM response times and higher system performance.
- Use of Oracle Database In-Memory without changes to SAP applications
- Continued use of existing hardware; only In-Memory / RAM must be provided