

SAP liveCache  
**NEW HYBRID FOR MAXIMUM  
PERFORMANCE**

What do fruit trees have to do with databases?  
The answer is simple. Crossing two types of fruit can create a more productive, fertile variety. In the same way, SAP has combined relational and object-oriented database technologies to create a new “species” – SAP liveCache. This hybrid database system can process enormous volumes of information, such as planning data for supply chain management, in real time.



Ever since the publication of Gregor Mendel’s revolutionary work in the nineteenth century, it has been well known that cross-breeds are more resistant and efficient than pure-bred species. This applies equally to technical developments as to new breeds in the animal and plant kingdoms.

Higher performance levels were required for databases within the mySAP Supply Chain Management (mySAP SCM) solution. Processing data for planning and controlling the supply chain is a task that most conventional database management systems (DBMS) cannot even begin to cope with: It is not unusual to have planning runs that last



12 hours. That's just too long for companies that must respond flexibly and quickly to fluctuations in incoming orders or failed deliveries. They need a comprehensive real-time overview of all their resources – materials, machines, people, and means of transport – at their own as well as their vendors' and business partners' sites.

Conventional database management systems, such as relational Structured Query Language (SQL) databases, cannot achieve this, partly because of the sheer volume of information involved: several million data objects, including real objects such as batches, pallets, or truck loads, as well as such abstract objects as purchase orders, stock, Bills of Material (BOMs), and production or transport orders. And these objects are arranged in a hierarchy that must also be taken into account.

Planning runs are not just about balancing the available resources with existing orders. Factors, such as the chronological order of the production steps and setup times in the planning process, must also be considered to ensure that processes run optimally. A relational data model, which stores data in tables and columns, cannot map this hierarchical structure of processes and dependencies effectively. What's more, each new query – for an order and its subitems, for example – generates a new database call, which is very time-consuming.

**FORM FOLLOWS FUNCTION** Modeling logistics networks is easier with an object-oriented approach. This involves interlinked data structures, such as trees and networks comprising nodes, or data objects. Pointers (object identifiers or OIDs) link the nodes and refer to the next element in the hierarchy. Pointer sets provide quicker navigation in a query. Modeling data and navigating in an object-oriented system is 50 times faster than using SQL tables. But there is a downside to object-oriented data models. A short program has to be run for each query, and some of the data must be linked manually.

So what's the solution? SAP has combined the benefits of relational and object-oriented data modeling. SAP liveCache unites the more user-friendly SQL queries and their higher abstraction level with the faster navigation speeds of the object-oriented database system. This is done in a main-memory-based database system. Because data is processed in main memory, the disk does not have to be accessed as often. The number of time-consuming roundtrips can also be reduced because data does not have to be transferred repeatedly between the disk and the main memory.

**BUILT-IN TURBO EFFECT** SAP liveCache functions like a hybrid vehicle. Depending on the speed required, the driver of a hybrid car switches between the different types of drive, for example, electric drive for urban traffic and gasoline for the highway. In the same way, the hybrid database system switches between its two database models. High-level queries, such as sales or purchase orders, are executed in SQL, while lower-level, data-intensive queries of individual items, such as raw materials and BOMs, are executed in the object-oriented database system. A pointer creates the reference from SQL to the object-oriented DBMS.

Stored procedures provide a kind of turbo effect. This sequence of stored statements makes running complex applications a piece of cake. The stored procedures are called from the application and executed as a C++ procedure in SAP liveCache. Because all the application data is held in main memory and is only transferred back to the application server once it has been processed, data-intensive parts of the application logic – for example, scheduling an order – can be executed quickly.

SAP liveCache is the database management system for SAP Advanced Planning and Optimization (SAP APO), the planning solution within mySAP SCM. SAP APO collects data from a variety of SAP R/3 instances and, where appropriate, from third-party systems. SAP liveCache can help carry out resource-intensive planning activities, such as capacity leveling for a company's plants, warehouses, and vendors. And as satisfied customers testify, the DBMS is doing its name proud. SAP liveCache is not simply intermediate memory, as was originally planned. Given how quickly it can supply data, it is every bit as effective as a conventional cache.

**INNOVATION HIGHLIGHT** SAP liveCache combines the benefits of relational and object-oriented data modeling in a main-memory-based database system to optimize performance.