



Alcatel-Lucent uses MySQL Cluster Carrier Grade Edition to handle over 60 million Subscribers



Technical Environment

Hardware: ATCA Pentium M 32 bit and Dual Core Opteron 64 bit

OS: Linux Carrier Grade Edition

Database: MySQL Cluster Carrier Grade Edition

"MySQL Cluster won the performance tests hands down, and it fitted our needs perfectly."

Alain Chastagner

Systems Manager, Alcatel-Lucent



Alcatel-Lucent

Alcatel-Lucent Overview

As a leader in fixed, mobile and converged broadband networking, IP technologies, applications and services, Alcatel-Lucent offers end-to-end solutions that enable service providers, enterprises and governments worldwide, to deliver voice, data and video communication services to end-users.

The Business Challenge

The growth in the number of mobile-phone subscribers is nothing short of spectacular: according to Wireless Intelligence, it took 20 years to reach the first billion of mobile phone users but just a mere three years to add the second billion. During the past couple of years we have also witnessed a series of takeovers and mergers among network operators and telecom equipment manufacturers around the world. These transactions were prompted by a single underlying trend that has become the telecom industry's new mantra: convergence. Convergence refers to the coming together of previously separate communications and entertainment services: fixed and mobile telephony, broadband internet access and television. This has led a number of communication services companies to challenge existing business models offering "triple play" and "quadruple play" services to their customers.

The combination of the exponential growth of mobile phone users, convergence, and the new value added services delivered by communication services companies (MMS, video on demand, chat services...etc) have driven telecom equipment manufacturers to develop new infrastructures to meet their customers' needs. The next generation subscriber database applications such as the HLR (Home Location Register), have become critically important for telecommunication services companies to achieve their goals

Up until 2005, Alcatel's legacy HLR system had been based on proprietary database technology. However given the enormous growth in the number of subscribers the system was to manage effectively, it became apparent to Alcatel that they needed a new solution. In addition to being a viable alternative in the long run, the subscriber database at the heart of the application needed to provide more flexibility and to deliver higher performance, scalability, and reliability at a lower cost. After an extensive evaluation period and numerous performance benchmark tests, Alcatel selected MySQL Cluster Carrier Grade Edition as their database of choice for their next generation HLR solution.

MySQL Cluster Carrier Grade Edition: Flexibility and Low TCO in a Real Time Open Source Relational Database

The MySQL Solution

The first step of the Alcatel project team was to precisely define the requirements of the next generation subscriber database. Those included:

- Performance of read and write queries
- Performance specifically on the ATCA (Advanced Telecommunications Computing Architecture) hardware
- Small footprint
- Flexible architecture allowing the administration of the application and the database on the same platform, or on different platforms linked via a WAN
- Scalability
- Full ACID transaction support
- Local and geographical redundancy
- Ability to modify database schemas online
- Low TCO (Total Cost of Ownership) of the solution

The next step was to select the databases they wanted to evaluate, to determine how well each of them matched the defined requirements, and to run specific benchmarks simulating “real life” conditions to test their performance.

“Performance is absolutely critical” said Alain Chastagner, Systems Manager at Alcatel-Lucent, “the selected database would need to initially handle the information of 7 to 8 million subscribers and to subsequently scale to handle more than 50 million subscribers! MySQL Cluster won the performance tests hands down” continues Alain Chastagner “and it fitted our needs perfectly. The combination of accessing the data in memory and backing it up on disk makes MySQL Cluster an ideal solution for our subscriber database platform. Moreover, competing alternatives offered inferior performance at a higher cost.”



Alcatel consequently selected MySQL Cluster Carrier Grade Edition for its subscriber database platform to be used by the following applications:

- **HLR/AuC:** managing the subscriber’s data, including real time localization , as well as the authentication and encryption functions on the 3GPP networks (GSM/GPRS/UMTS)
- **IM-HSS:** managing subscriber’s information on IMS (IP Multimedia Subsystem) Networks
- **UMA:** for subscribers on UMA (Unlicensed Mobile Access) networks connecting via Bluetooth and Wi-Fi access points
- **AAA** (Authentication, Authorization and Accounting): Access control application for the UMA network and WiMAX

Interoperability and Rapid Migration

The migration to MySQL Cluster Carrier Grade Edition was completed in a record time of 8 months. Alcatel's application data model is based on X.500, and a proprietary layer is used to abstract access to the database. This existing proprietary layer interfacing the application with the legacy database could easily interface with the MySQL Cluster native NDB API. The ability to link directly to the NDB API instead of the SQL interface yielded incredible performance gains. In addition, a specific new software module was developed to interface MySQL Cluster Carrier Grade Edition with Alcatel's proprietary middleware. "The migration was fast and we did not encounter any significant challenges" recalls Alain Chastagner. "The MySQL AB support and Professional Services teams were very responsive and solved any issues along the way. They proved their commitment to our success."

MySQL Cluster on ATCA Hardware

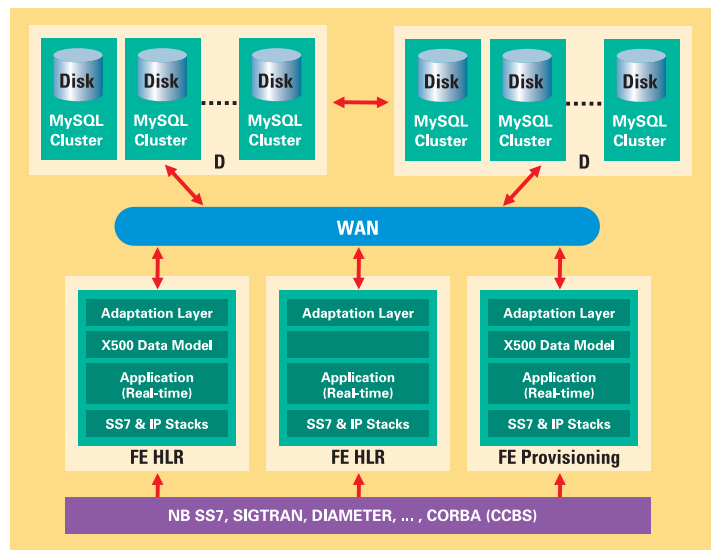
MySQL Cluster Carrier Grade Edition runs on a ATCA-compliant hardware platform. Within this platform, different MySQL Cluster processes run on 3 types of processor boards:

- Control boards for OAM operation and the application database management layer
- "Real time" boards for the application itself, and the MySQL NDB client
- "Database" boards for the MySQL NDB Data Nodes, with the whole cluster distributed over all these boards

All boards are interconnected via an Ethernet 100 Mbit LAN. External interfaces are connected through the LAN either on the control boards, using the OAM protocol, or the "real time" boards.

Higher Performance, Scalability, and Lower Costs

The next generation subscriber database platform based on MySQL Cluster Carrier Grade Edition and ATCA hardware enabled Alcatel customers to reduce their cost per subscriber, and therefore to increase margins while improving their competitiveness. A number of evolutions are already planned for the platform including moving to 64 bit hardware, and upgraded ATCA systems. In addition, thanks to the flexibility of MySQL Cluster Carrier Grade Edition, Alcatel is planning to implement a multi-cluster architecture for the subscriber database that will scale to handle the information and requests of well over 60 million subscribers!

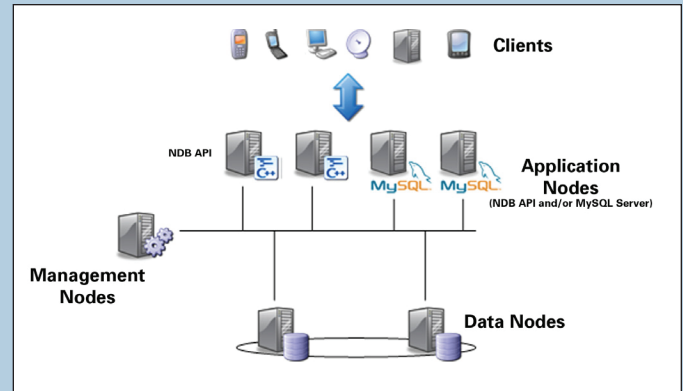


MySQL delivers the real-time performance required by Alcatel's distributed converged network.

MySQL Cluster Carrier Grade Edition

MySQL Cluster Carrier Grade Edition provides the telecom industry with a true real-time database combined with the flexibility of a relational database and the cost savings of open source. It is specifically designed to meet the business and technical challenges currently facing Telecom Equipment Manufacturers (TEM) and Network Service Providers (NSP) with the next-generation of services and applications for converged networks. MySQL Cluster Carrier Grade enables telecom organizations to:

- **Increase Performance** – Satisfies the real-time and low latency requirements or Subscriber-Centric Networks with the best price to performance ratio in the industry
- **Maximize Reliability and Availability** – A parallel server architecture coupled with geographic replication allows for no single point of failure and delivery of 5 nines of availability (99.999%)
- **Promote Interoperability and Flexibility** – Compatible with database-independent APIs or existing subscriber models
- **Lower Total Cost of Ownership (TCO)** – Incrementally scale your applications in a linear fashion on ATCA based, Linux Systems



MySQL Cluster Carrier Grade Edition has a flexible distributed architecture which gives you complete control over the level of performance, reliability and scalability you need to match your application requirements.

About MySQL

MySQL AB develops and supports the MySQL database server, the world's most popular open source database. Over ten million installations use MySQL to power high-volume Web sites and other critical business systems — including industry-leaders like The Associated Press, Yahoo, NASA, Sabre Holdings and Suzuki.

MySQL is an attractive alternative to higher-cost, more complex database technology. Its award-winning speed, scalability and reliability make it the right choice for corporate IT departments, Web developers and packaged software vendors. For more information about MySQL, please go to

www.mysql.com/enterprise



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