Search and Event Architecture in BOSCH Access Management System (AMS) 6.1

This position paper explains the architectural decision behind BOSCH Access Management System (AMS) 6.1 to combine Microsoft SQL Server and Apache Lucene. The goal is to ensure high performance, scalability, and operational stability for enterprise-grade access control installations.

1. Architectural Context

AMS 6.1 follows a clear separation of responsibilities between transactional master data and high-volume event data. This separation is a deliberate architectural choice aligned with modern enterprise system design principles.

2. SQL Server as System of Record

Microsoft SQL Server is used as the system of record within AMS. It stores all security-relevant master and configuration data such as cardholders, credentials, access rights, schedules, tenants, and system configuration. Personal data protection, encryption, and transactional consistency are ensured at this layer.

3. Apache Lucene as System of Search

Access events, alarms, and system events are generated at a very high rate in large installations. To support fast retrieval, filtering, auditing, and visualization of this data, AMS indexes all event data using Apache Lucene.

Lucene enables millisecond-level search performance even with millions of stored events, while keeping the SQL Server isolated from search-intensive workloads.

4. Functional Benefits for AMS

- High-performance event and alarm search for Dialog Manager and Map View

- Stable UI response times even with many parallel operators

- Efficient support for reporting, auditing, and compliance use cases

- Reduced load and risk for the SQL Server backend

5. Security and Compliance Considerations

Lucene does not replace the system of record and does not store authoritative personal data. Indexes are derived, reproducible, and fully controlled by the AMS application logic.

6. Industry References

Apache Lucene is a proven, industry-standard search technology and forms the core of several widely adopted platforms:

- Elasticsearch – Enterprise Search and Analytics

- Apache Solr – Enterprise Search Platform

- OpenSearch – AWS-supported distributed search engine

- Used in large-scale production systems such as Wikipedia, LinkedIn, Netflix, and Apple

7. AMS Event Bridge

Standard reporting tools like Power BI, Excel cannot query Lucene directly. They need SQL.
AMS Event Bridge is a tool which bridges the gap while copying events from AMS Server via REST-API into any SQL Server database, automatically running on a schedule.

8. Conclusion

By combining SQL Server and Apache Lucene, AMS 6.1 achieves a scalable, performant, and robust architecture. SQL Server remains focused on transactional integrity, while Lucene enables fast and flexible access to large volumes of event data. This design ensures long-term stability and future-proof operation of enterprise access control systems.
AMS Event Bridge copies events from AMS Server to SQL in case standard SQL reporting tools are needed.