

# Engineering Processes - Software Development Process of SAP HANA

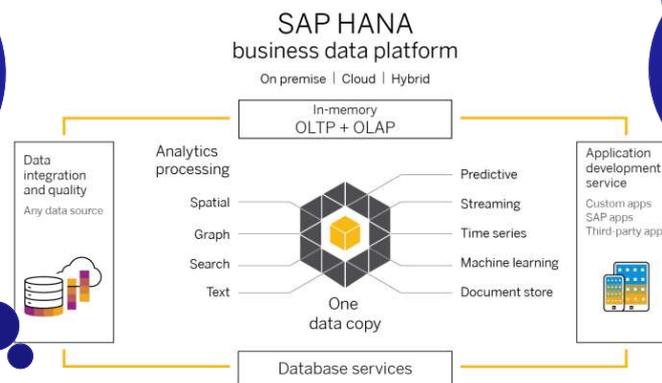
**SAP HANA** is an in-memory column-store database developed by SAP SE. This large and highly complex relational database management system poses challenges for the development tools and throughout the development environment for large C/C++ projects. SAP HANA's primary function as a database server is to store and retrieve data, but it also performs advanced analytics such as predictive analytics and also provides ETL capabilities as well as application server capabilities.

**Development Process** The development process of SAP HANA makes use of Test-Driven Development Principles as well as special software development tools. For its more than 11 million lines of C/C++ code, tools such as Bugzilla, JIRA, Google Test, Intel Vtune, Undo and rr by Mozilla are vital to fix bugs, benchmark code, find bottlenecks and consistently keep track of the overall development status.

## The product and development of SAP HANA

### Functionality:

- predictive analytics
- spatial data processing
- text analytics
- text search
- streaming analytics
- graph data processing

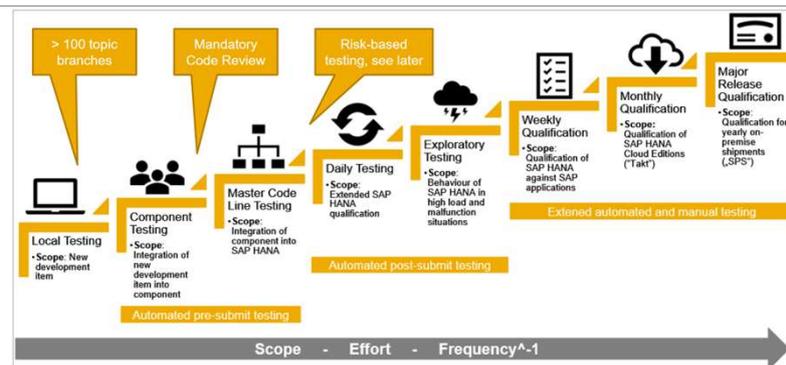
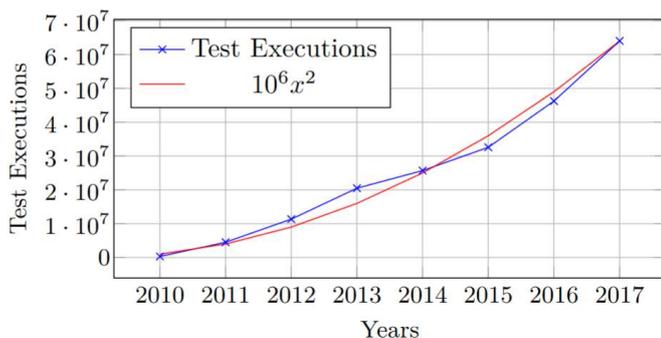


### Development:

- Yearly on-premise / monthly cloud version release cycle
- Use of Continuous Delivery/ Integration (CI/CD) principles
- 1500 commits/day
- 1.2 million tests for full build

## Continuous Integration Practice

- Changes enter CI / CD pipeline, not added to central branch but to one of one hundred topic branches → collaboration and review of peer developers → after review merger with release branch → further complex tests of the CI pipeline are triggered.
- Also includes performance tests from 200 test suites with 35000 KPIs.



## Test-Driven Development

Increased testing effort with growing scope → risk and code-coverage based selection of tests → Test-budget per component → efficiency and risk-driven approach and economic decision making saved 104 years of sequential test runtime.