DIGITAL INDUSTRIES SOFTWARE

Delivering Enterprise-Ready Performance with Polarion

Executive summary

While Polarion's performance has always been on par with market expectations for enterprise applications in mid-size deployments with up to 500 concurrent users, this paper outlines its unparalleled scalability under heavy loads at the enterprise level, supporting 7000 concurrent users working simultaneously across a large set of 20 million Work Items.

Our Polarion ALM 2512 performance validation confirms that the system remains highly performant and scalable under very heavy loads over extended periods, with even highly complex operations completing in under five seconds on average.

This paper includes detailed information about our test infrastructure, the methodology used, our results, and configuration suggestions to help organizations maximize their utilization of Polarion ALM 2512 with an optimal deployment.

Purpose and Scope

Every Polarion ALM™ version undergoes mandatory load test scenarios as part of the release verification process. These scenarios focus not on peak performance, but on system stability under heavy loads because that's what enterprise deployments require.

We use both artificially generated data and anonymized production data in our performance test labs to simulate real-world scenarios as closely as possible.

Our test scenarios cover the entire scope of end-user operations from working with Work Items and Live Documents to generating and publishing Live Reports.

This is all done in a repository with 20 million Work Items, each with links, rich text, and attachments.

Enterprise scalability has always been, and remains, a top priority for Polarion, driven by a close feedback loop from real-world usage. The results documented in this paper demonstrate the rock-solid stability we have achieved through this consistent approach.

If your current Polarion deployment is not performing as well as the numbers in this paper indicate, you should update your deployment and contact Siemens for a system analysis.

We can suggest configuration adjustments to get you up to speed in no time.

Polarion 2512 Performance tests

Test Hardware Configuration

The virtual machines used for the load test are hosted on three physical hosts with the following hardware specifications:

Physical Servers (Infrastructure Hosts)

- Dell PowerEdge R840 + 2x R640 server
- 8x Intel Xeon (352 logical processors)
- 3x 766 GB RAM
- RAID 5 solid-state drive (SSD)
- 10 gigabits per second (Gbps) VSwitch

Virtual Machine Allocation

Polarion test Virtualized Environment		
Role	**CPUs**	**RAM**
Polarion Nodes (4)	16	230 GB
Coordinator	4	16 GB
Load Balancer	20	64 GB
Subversion	16	128 GB
Storage	8	114 GB

Load Generation Virtualized Environment			
Role	**Count**	**CPUs (Each)**	**RAM (Each)**
JMeter Primary	1	8	32 GB
JMeter Nodes	4	8	32 GB

Test Methodology

Test tool: Apache Jmeter

Data Volume

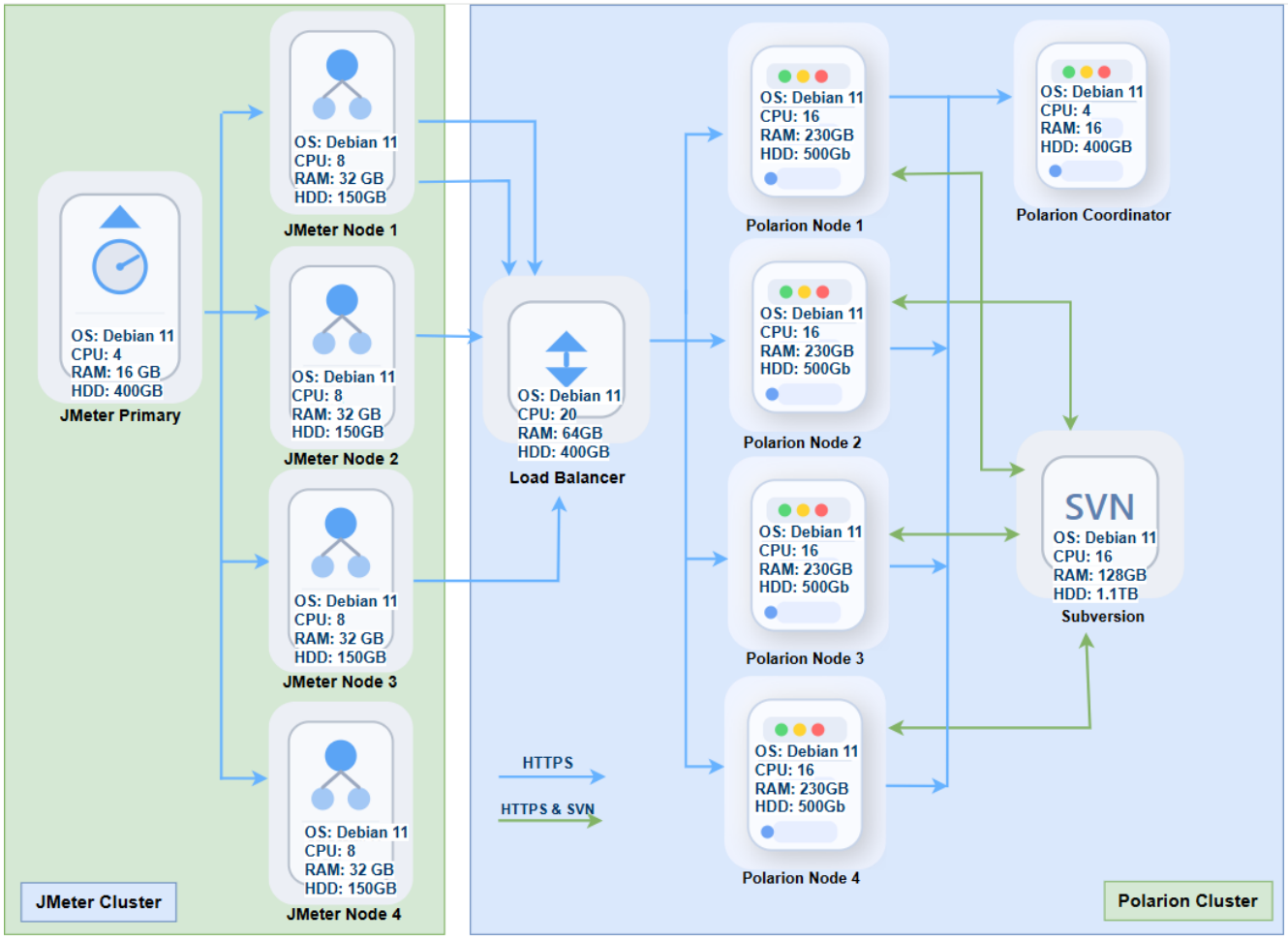
Data	Total Count
Users	18 000
Projects	1 200
Work items	20 million

- Large-scale Document repositories
- Extensive traceability relationships

Deployment Architecture

The following diagram illustrates the high-level deployment architecture used in our scale performance tests:

- On the left, a JMeter Cluster, consisting of one master and four slaves, generates a distributed load.
- On the right is a Polarion Cluster consisting of four Application Nodes behind a Load Balancer, a Coordinator Node, and a dedicated Subversion (SVN) repository server.



System Configuration and Tuning

For performance testing, specific parameters are adjusted to achieve optimal performance under varying loads. These configurations are optimized for the use cases and load patterns used in our validation. Actual configurations for a deployment will vary based on use cases, data sizes, latency, and the number of users. To learn more about these settings, please refer to the relevant sections of our documentation.

You can start here in our **Deployment and Maintenance Guide :** Scaling your installation

Test Scenarios

Our testing regime includes multiple scenarios designed to validate different aspects of Polarion ALM 2512's performance and scalability.

Test One: Daily Operations with 7000 users

This test simulates routine operations in a large organization with 20 million Polarion Work Items and 7,000 simulated users spanning multiple business roles. The test validates system stability and response times under sustained heavy load conditions.

User Load

- 7,000 simulated concurrent users divided into the following roles:

Role	Distribution	Description
Developer	60%	Logs in → Selects a Project → Opens a Plan → Opens Work Item → Creates a related Work Item → Opens and updates it
Manager	5%	Logs in → Selects a Project → Opens two Plans → Opens a Report
QA Engineer	20%	Logs in → Selects a Project → Opens a Traceability Report → Opens and creates a related Work Item → Reuses a different item
Requirements Engineer	15%	Logs in → Selects a Project → Opens a Document → Modifies 3 Work Items → Creates 3 new ones

Load Pattern

- Total Users: 7,000
- Ramp-Up Period: 1 hour
- Steady Load Duration: 4 hours
- Total Test Duration: 5 hours

Performance numbers

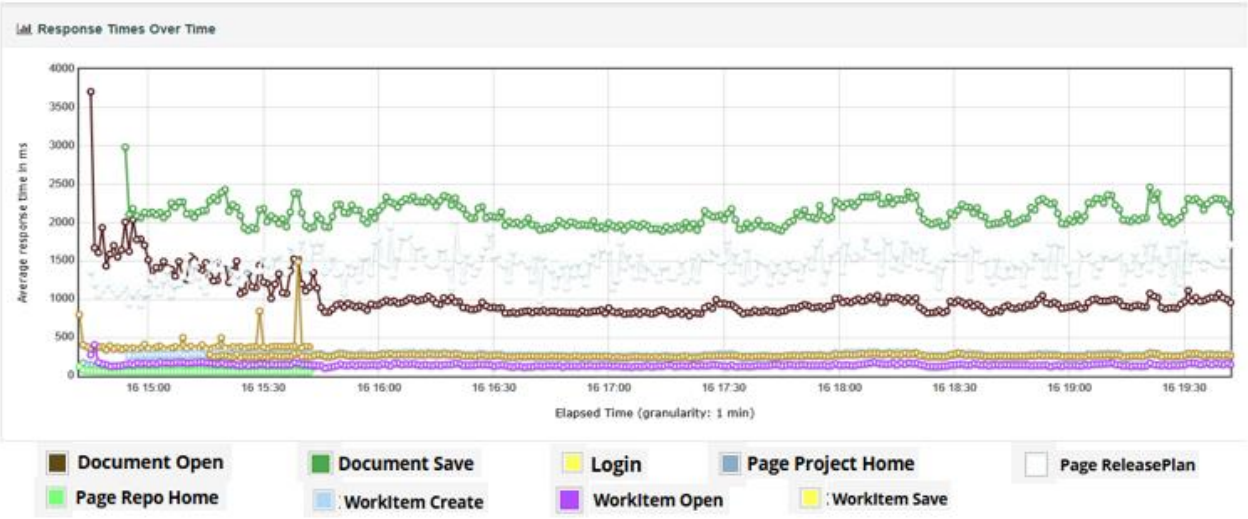


Figure 1: Test 1: Response time results

Test one: Most common operation durations

Use case	Test executions	Average (ms)	95th percentile (ms)	99th percentile (ms)	Maximum (ms)	Executions per second	Color legend
Document Open	19,208	971	1,550	2,257	9,425	1.07	Dark Brown
Document Save	18,491	2,111	2,646	3,061	4,461	1.07	Dark Green
Login	7,000	404	598	1,641	7,349	1.95	Yellow
Page Project Home	7,000	124	169	224	489	1.94	Light grey
Page Release Plan	3,802	1,485	2,221	2,628	3,937	0.21	White
Page Repo Home	7,000	59	77	118	385	1.95	Light green
WorkItem Create	54,207	282	376	457	1,080	3.14	Sky blue
WorkItem Open	103,599	142	427	578	1,646	5.82	Purple
WorkItem Save	19,521	265	348	415	874	1.22	Yellow

Performance results can vary based on configuration, data structure, and enabled security features. To help readers interpret the results in context, an additional comparison matrix has been provided in **Annexure 1**, showing how the same "daily operations" workload behaves under different active user levels.

Performance Inferences

Polarion's performance under this enterprise-level load for 4 hours is stable, with even the most complex operations averaging below 5 seconds.

Siemens Digital Industries Software invests significant time and resources to map real-world scenarios and data into our performance and scalability testing framework. Still, it cannot entirely account for real-world systems and data variability.

These test results are based on the scalability validation of Polarion ALM 2512. If your Polarion deployment behaves significantly different from what is described here, please contact Siemens for a system configuration analysis and recommended adjustments.

Test Execution Process

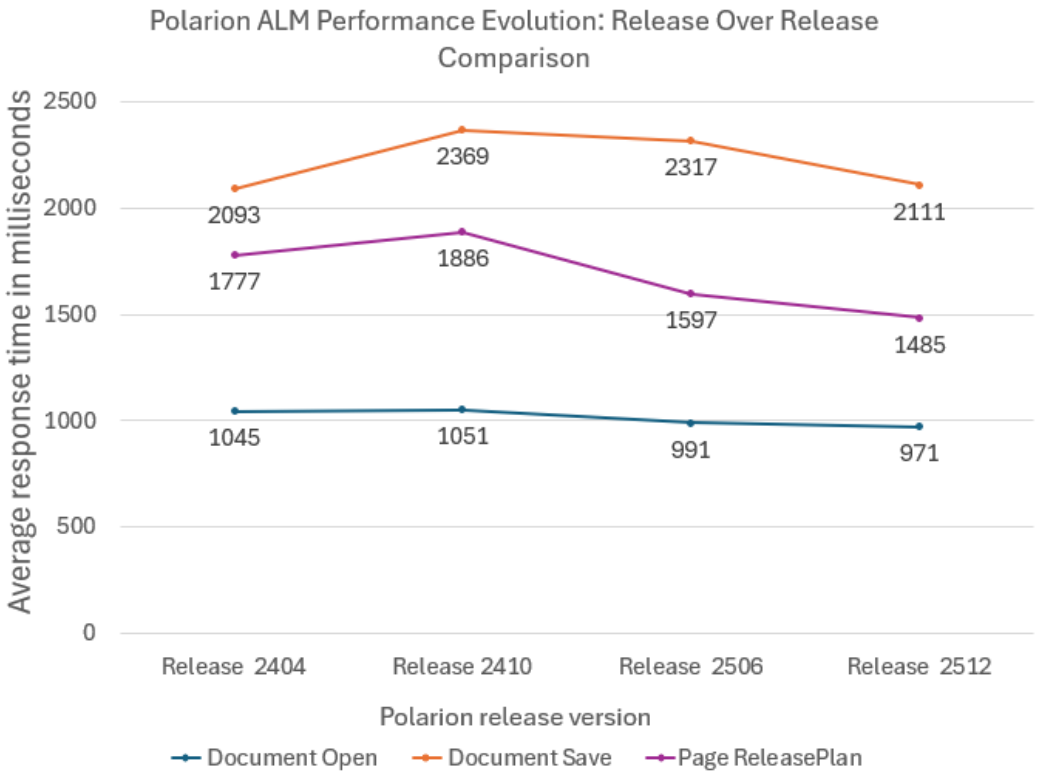
We have built several safeguards into our development and release workflow at Polarion to ensure that expected performance levels are consistently met. They include:

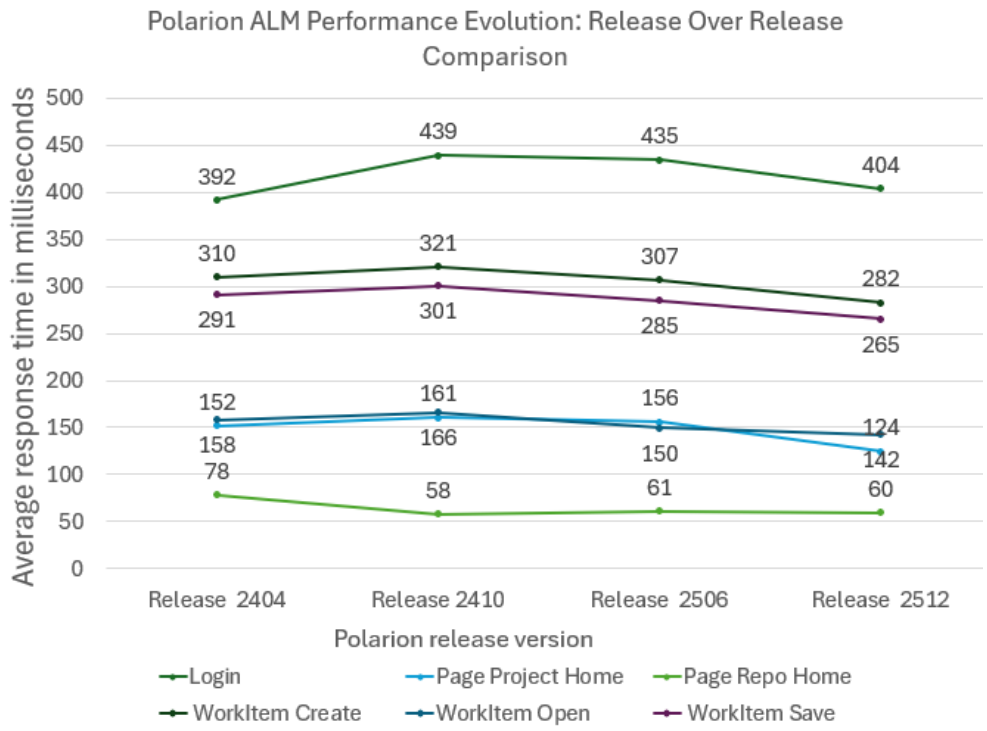
- **Periodic performance jobs** that continuously validate system behavior on large datasets.
- **Per-change performance checks**, where every code change is automatically tested to prevent regressions.
- **Feature-level performance tests** are added whenever new capabilities are introduced to verify that new functionality does not impact existing performance.

Release-to-release comparison

Polarion maintains a strong focus on performance engineering to ensure it remains fast and responsive as it grows. To ensure we deliver consistent performance, we measure key use cases in every release and track their evolution over time.

The chart below illustrates the evolution of average response times across releases 2404 through 2512, highlighting the stability and incremental improvements achieved over time:





Each release undergoes continuous performance testing and regression checks, helping us catch issues early and ensure improvements are delivered release after release. This process allows us to maintain strong performance even as new features and larger workloads are introduced.

By regularly testing, monitoring, and optimizing key workflows, we continue to provide a fast, reliable, and scalable ALM platform for our customers.

Profiling and Performance Monitoring

Customers can use standard monitoring and profiling tools to track the health and performance of their Polarion deployment. These tools help identify resource usage patterns, detect bottlenecks, and verify that the system is operating as expected under different load conditions.

A detailed guide on configuring monitoring and interpreting key performance indicators is available in our **Deployment and Maintenance Guide** under:

Monitor the health of your installation.

Running Your Own Performance Tests

To assess the performance of your own Polarion deployment, run performance tests using the same principles described in this document. By following the step-by-step guide ***"Polarion Load Testing using JMeter"*** provided on Siemens Highspot, you can recreate representative load scenarios, apply their own data structures, and measure system behavior under conditions that match their real usage patterns.

This allows you to validate performance expectations, test the impact of configuration changes, and ensure that your Polarion deployment is tuned for optimal responsiveness.

Conclusion

Enterprise scalability at Siemens is not merely a non-functional requirement; it is deeply embedded in every Polarion design and development decision to ensure that every new feature meets the high scalability expectations of our customers. Every change is submitted to mandatory load-test scenarios before it's merged, ensuring it undergoes rigorous performance testing against established benchmarks.

Our continued focus on enterprise scalability clearly distinguishes Polarion in the large-enterprise deployment market, with thousands of users and millions of data points.

Key findings from our performance testing:

1. **Scalability:** Polarion ALM 2512 successfully scales to enterprise requirements with millions of Work Items and thousands of concurrent users
2. **Stability:** The system maintains rock-solid performance over extended test periods (4+ hours) under a heavy load.
3. **Performance:** Most operations, including complex ones, average a response time of less than 5 seconds.
4. **Architecture:** A clustered, load-balanced deployment provides both scalability and high availability.
5. **Document Handling:** Large document import/export capabilities enable efficient processing of complex documents into Polarion's LiveDoc format.

Customers deploying Polarion ALM 2512 can reference these test results for capacity planning and performance expectations. Proper system configuration and tuning are essential for achieving the optimal performance mentioned in this documentation.

Annexure – 1

The comparative results across 500, 1,000, and 7,000 concurrent-user scenarios show a clear, consistent scaling pattern. As expected, response times increase with higher concurrency. Yet, Polarion continues to operate reliably and predictably even at the upper stress boundary, demonstrating that it can support both mid-scale and large-enterprise workloads while maintaining stability and responsiveness as usage grows.

Use case	500 users		1000 users		7000 users	
	#Samples	Average (ms)	#Samples	Average (ms)	#Samples	Average (ms)
Document Open	1,393	753	2,712	766	19,208	971
Document Save	1,343	1,819	2,611	1,826	18,491	2,111
Login	500	401	1,000	401	7,000	404
Page Project Home	500	143	1,000	148	7,000	124
Page ReleasePlan	244	1,015	525	1,065	3,802	1,485
Page Repo Home	500	74	1,000	69	7,000	59
WorkItem Create	3,756	260	7,518	259	54,207	282
WorkItem Open	7,371	109	14,719	111	103,599	142
WorkItem Save	1,457	240	2,893	244	19,521	265