

PORTIA Performance & Scalability

Executive Summary

A portfolio management and accounting system is at the heart of operations for all buy-side asset management firms. It integrates information feeds from various sources; it validates, augments, and processes that information, and then it provides the resultant data ready to go back into the firm's business process workflow. The Thomson PORTIA team recognizes that PORTIA holds this critical role in the business workflow. As we look ahead at the landscape in our industry, we see rapidly increasing data volumes as a key challenge for firms in their efforts to maintain efficiency in their workflow processes. We are fully committed to delivering a scalable product to ensure that firms can meet current and future needs for large volume processing and maximize operational efficiency without missing a beat.

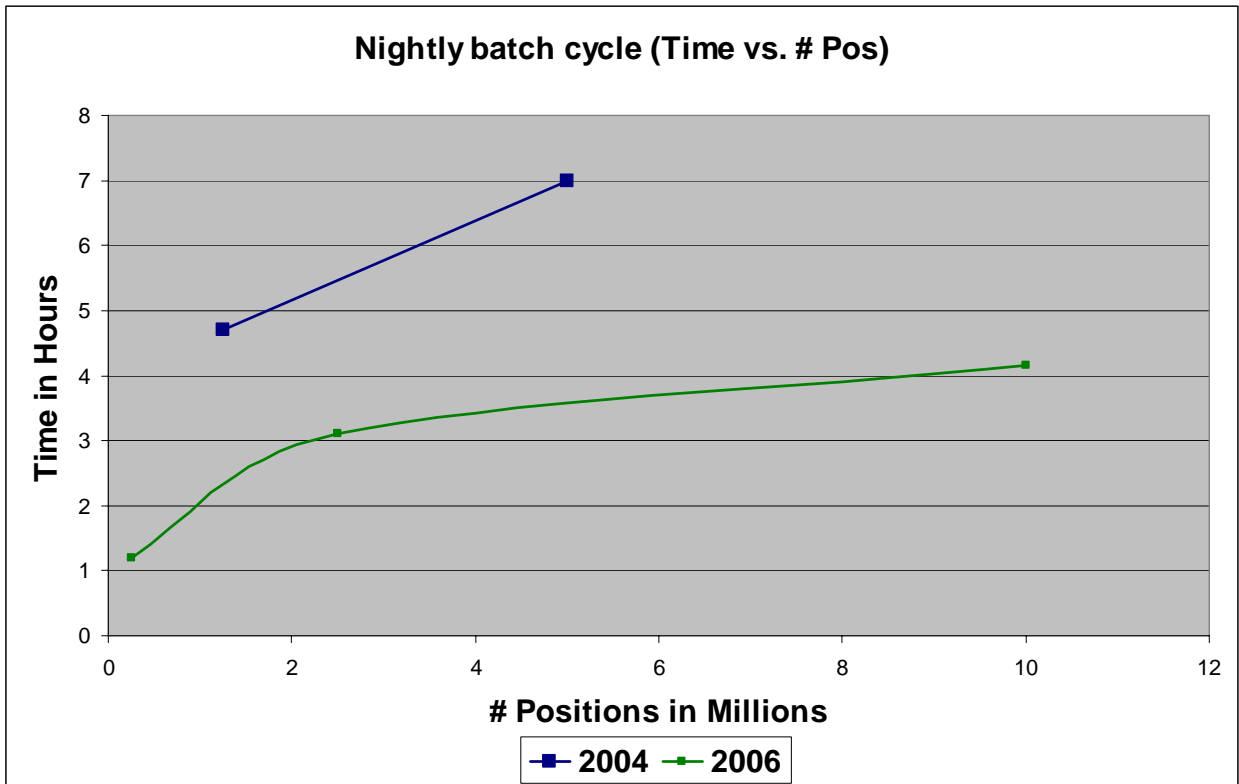
During the 1990s, we incrementally improved PORTIA performance and scalability to enable our customers to stay in line with current market volume demands. Over the past two years, we have greatly accelerated our efforts and have worked with renewed focus to drive well beyond current volume demands to ensure that PORTIA can handle volumes that exceed current market needs. With this focus on moving past incremental change to a much more dramatic improvement in performance and scalability, we have invested heavily in the people, tools, and processes needed to drive PORTIA performance and scalability to a very high level. Our initiatives have already yielded substantial improvements and we will continue investing in initiatives to optimize performance and scalability to ensure that PORTIA stays well ahead of market volume needs. All benchmark testing showed PORTIA easily handling loads of

- 150,000,000 transactions
- 9,800,000 positions
- 250,000 portfolios
- 135,000 securities
- 300 concurrent users

Over data sets of this size, PORTIA showed improvements across all key batch processes with huge gains in

- Importing Securities, Prices, Portfolio & Transaction data
- Generating positional information

The results recorded in our benchmark tests over the last 3 years also show a dramatic improvement in PORTIA performance & scalability. The picture below shows the time required to run a typical nightly batch cycle in 2 benchmark tests of PORTIA (2004 & 2006) on comparable hardware, this is a good illustration of how PORTIA Performance & scalability has improved over the years. As can be seen, enhancements made in core PORTIA in the last few years have yielded huge reduction in processing throughput time and significant improvement in application scalability.



The results clearly indicate that PORTIA is positioned to reliably handle large volume processing, and we do not intend to rest on the successes we've had to date. We will continue our focus on performance and scalability and will drive aggressively for continuous improvement to ensure that we stay well ahead of market volume demands.

Test approach and methodology

In our performance and scalability initiatives, we have invested heavily in the people, tools, and processes needed to drive PORTIA performance and scalability to a very high level. We have established a separate development team that is specifically focused on performance and scalability measurement and improvement. In our test environment, we have built a high-quality, in-house lab where we run continuous testing for performance through our development lifecycle. In addition, we take PORTIA to external labs for benchmark testing in a pure, objective environment before each major release.

Our testing is based on an industry-standard performance test methodology called Transactional Cost Analysis. This methodology requires that the test be designed so that one can determine the processing resource required for a unit of work to be completed. Knowing the unit cost of a transaction allows meaningful prediction of performance and scalability. Under this methodology, the tests are run to characterize the application performance in terms of performance throughput (processing rate like positions/min, transactions/min, etc.), scalability (effect on performance from increased data load), and concurrency (impact on performance from running multiple streams of simultaneous activity).

Performance and scalability improvement is never just an end-of-cycle test exercise for us. We ingrain performance and scalability initiatives into our entire release planning and development lifecycle so that we drive iterative improvement from early requirements gathering through functional and technical design and into our coding and testing phase.

Early in the PORTIA release lifecycle, we establish a baseline performance test workflow designed to cover typical PORTIA usage in a client environment. We then execute tests over this workflow continuously throughout our development lifecycle and iterate over the following three-step process:

- Measure – Execute the test workflow and measure the execution time and system metrics (CPU usage, IO usage, network usage, database statistics, etc.) to calculate the transaction cost for each test scenario
- Analyze – Analyze the system metrics from the measurement phase and publish recommendations for improvements
- Implement – Develop the recommendations and cycle back to measurement

Results

A typical set of performance test workflow scenarios is listed below. This workflow is executed over two databases - a small database (5 million transactions, 10,000 portfolios, 70,000 securities, 34 currencies, 9 million prices) and a large database (44 million transactions, 150,000 portfolios, 135,000 securities, 45 currencies, 40 million prices). The workflow we execute over these databases is as follows:

- Batch Imports (Securities, Prices, Transactions)
- Auto Processing (Coupons, Splits, Dividends, Settlement, Mature)

- APF & Stored Holdings Generation
- Performance update
- Cash Flow Projection
- Reports (Daily Performance, Transaction Summary, Holdings, Appraisal)

From our test execution and analysis of results, we've had a range of recommendations for performance and scalability improvement that we've implemented in PORTIA. The changes implemented range from optimizing database queries and configuration, to moving processing from client-side to server-side, to refactoring and rewriting core PORTIA business logic. A summary of the performance and scalability improvements to date is listed below. More details are available in our benchmark reports.

- Improvements from 2004 to 2006
 - Batch imports for transactions & prices are 20-30% faster
 - Variable Rate Securities processing is 10-20X faster
 - Performance update for a FI-heavy portfolio is 50-100% faster
 - APF generation is extremely fast (large db first run 12 hours, subsequent runs 8 minutes)
 - Holdings reports with Stored Holdings is 4-10X faster
 - Autoprocessing (Post, Mature, & Settle) runs 10-20% faster
- PORTIA ACCESS performance gains
 - Security import is 10-20X faster
 - Portfolio import is 10-20X faster
 - Price import is 10-20X faster
 - Exchange rate import is 10-20X faster
 - Transaction import is 2X faster
- Concurrency
 - No adverse impact in performance with up to 300 concurrent users
- Typical nightly batch cycle for large database completes in 4 hours
 - 158 million transactions, 10 million positions, 27 million prices, 250,000 portfolios, 135,000 securities (60% Fixed Income, 35% equities)
 - Importing 50,000 transactions, 100,000 prices
 - Auto post (Coupons, Stock Dividends, Cash Dividends etc.), Auto Expire, Auto Mature, Auto settle, APF generation, Stored Holdings generation, transaction/holding/appraisal extracts

We ran multiple tests on the large database mentioned above, increasing the transaction import incrementally from 25,000 to 100,000 transactions to evaluate the effect of increased load. The total increase in processing time between a 25,000 transaction import and a 100,000 transaction import was about 25%. This 25% increase in processing time over a 400% increase in volume proves that PORTIA scales very well to large volumes.

Case Study

Our success in delivering on performance and scalability goals was well tested recently in response to a client request. A client approached the PORTIA team with a request for recommendation on implementing PORTIA to manage large volume, global operations. The client's objective was to centralize portfolio management and accounting for multiple global operating units. Scalability and performance for this very large volume system were the critical factors in determining success for this effort.

We tackled the performance and scalability concerns head-on. In partnership with the client, we designed a proof of concept exercise to prove that PORTIA could easily manage the volume demands. Using PORTIA v8.0, we loaded the clients full data set expanded to 5 times their current volume (44 million transactions). We then worked through detailed workflow analysis with the client to ensure that we optimized for the client's specific needs and ran a baseline performance test. We then expanded the data to have 25 times the original volumes (158 million transactions) and ran our performance test again. The results showed beyond doubt that PORTIA could scale to meet future volume demands.

Our confidence, based on the results from our lab tests, proved to be well founded in this real-world test over specific client data and workflow needs. System performance was well within requirements for the client's needs and our proof of concept showed minimal increase in response times as we increased transaction volumes (a 33% increase in processing time for a 500% increase in volume). As expected, our initiatives in specific large-step improvements yielded excellent results with, for example, response time for running price & transaction imports improving from 2 hours to 28 minutes.

This proof of concept was a very good test of our performance and scalability initiatives to date. It validated both our methodology and our implementation of improvements and shows that our lab results carry very well into live production environment. We're excited to see such good results and are further enthused to continue to build on this success.

Conclusion

Our investment and focus on performance and scalability has yielded results that show PORTIA today can support volumes in excess of market volume demands. We've refined our approach and have the right methodology and environment in place for effective ongoing performance and scalability initiatives. Given PORTIA's mission critical position at the heart of our clients' workflow, we will maintain focus on continuous improvement to ensure that PORTIA stays well ahead of market demands for performance and scalability.