

Cutting Software Development Time

*Rational ClearCase Users Run
“Merges” & “Builds” 2.5 Times Faster*

Introduction

Software development has always been a complex, collaborative and time-consuming iterative process. It has always taken time to build a solid team, educate team members, partition the work and pull it all together to produce a complete, comprehensive and working system.

Today, one thing has changed – a high quality result must be produced sooner.

Faster time to market requirements, driven by Internet developments, rising customer expectations and fiercer competition has changed the key time element. Development cycles that permitted months now allow only weeks or, in the most demanding situations, even just days for project completion. Once completed, project definitions change frequently, requiring developers to change yet again – and these changes must be made quickly and accurately. No longer can a product be released with missing features. Nor can a product be released with errors since the instant the software is released and on-line, customers use it immediately and the errors show up instantaneously. Today, software must be completed on time or ahead of schedule without any mistakes. Time has become the most precious resource in software development.

But how is it humanly possible to keep producing more and increasingly complex software in less time? Developing software is a time-consuming, detail-oriented and error-prone process requiring expertise, skill and discipline. The only way to improve the quality and timeliness of the process is to improve the process and execute faster.

FlashDisk Ultra-High Performance

The typical software development process incorporates a wide variety of tasks, many of which creates high disk I/O demands in both random and sequential modes at various stages in the development process. FlashDisk OpenRAID is an ultra-high performance “open systems” RAID disk array that speeds every step of the development process to accelerate completion and reduce development cycle times.

FlashDisk OpenRAID is designed for speed. It is used in the most demanding applications in the world to speed I/O intense applications. It delivers up to 13,000 I/O operations per second for random access applications including e-commerce, software development, database, financial, manufacturing, publishing and more. It also delivers up to 177 MB per second data throughput for sequential applications including video and audio streaming, file copying, backup, data warehousing, data mining, data acquisition and more.

Software development has always been a leading-edge industry that benefits greatly from a high-speed computing infrastructure. For the past 30 years or more, software developers have always opted to equip their projects with the best hardware available since the labor costs have always been relatively high and the work always critical – and never more so than today. Since the software development process is especially storage-heavy and disk intensive, it is a unique industry in that it benefits from both the high-speed sequential performance and high-speed random performance of high-speed data storage like FlashDisk OpenRAID.

Rational ClearCase Version Control

Software developers everywhere have the same version control issues and have individually and collectively recognized the value using the best version control system available – and they have selected Rational ClearCase* with such frequency to make it a nearly universal industry standard.

Rational ClearCase configuration management software offers many administrative functions and creates and maintains a “multi-version” repository of artifacts. This repository stores, and makes available for recall, any and all versions of every development artifact related to the software development process including requirements documents, specifications, code, test plans, test data, test procedures and related objects. When items are entered into this repository, they are “merged” and when they are retrieved, the results are considered “views” that are presented to the requestor. Finally, Rational ClearCase performs complete “builds” that result in executable versions of the software. It is the “merge” and “build” functions that are the most time-consuming.

Local Disk Requirement

Rational ClearCase “Version Object Base” (VOB) and developer workspace (VIEWS) repositories reside on a *local* disk due to the frequency and disk intensity of the application. The FlashDisk OpenRAID disk array, containing up to 12 disk drives, looks like just one very large local disk to the server and all applications, including Rational ClearCase that happens to run very fast. Although FlashDisk OpenRAID offers both Storage Area Network (SAN) and Network Attached Storage (NAS) capabilities, for Rational ClearCase applications it is directly attached via SCSI bus or point-to-point fibre channel interfaces and thus is a local device as required.

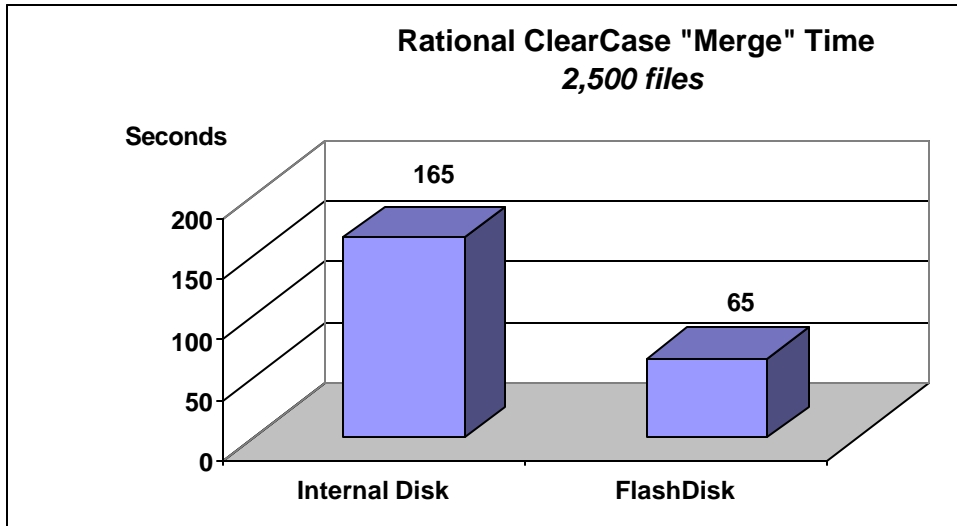
Disk Intense: “Merge” and “Build”

Two key functions of Rational ClearCase are the “merge” and “build” features. Both are especially disk intense and create excessive demands on ordinary disk systems.

The merge function updates library entries and links new modules with existing modules, maintains directories, merges physical text with existing text and coordinates versions across all existing modules to update versions directories. A system build requires versioning of all modules in the library, compiling many or all the source modules into object code, inserting all the resulting object modules in the library, linking all the modules with existing libraries to create executables and logging the final build in the version library. All of this activity, while completely automated, is exceptionally disk intense. It is not unusual for builds to take hours to complete for moderately large projects.

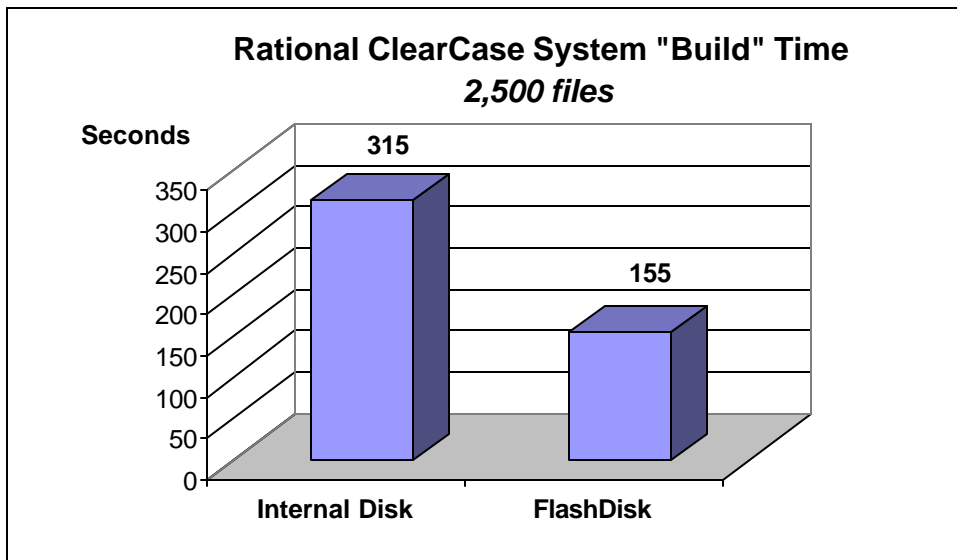
Merge and build activities are always on a project’s “critical path” because no further progress can be made on the project until they are completed. Thus, faster merge and build times translate directly into earlier project completion. In tests performed by Rational Software using FlashDisk OpenRAID, sample merges and builds were demonstrated to run two to 2.5 *times* faster – cutting 50% to 60% from the time needed to perform these tasks just by moving the Version Object Base (VOB) from local, internal disks to the local, external FlashDisk OpenRAID disk array. The benchmark results are outlined in the charts below.

FlashDisk OpenRAID
Runs Merge 2.5 Times Faster



A sample "merge" into a 2,500 module library cut the 165 second merge to just 65 seconds by running the process at more than 2.5 times the speed by moving the "Version Object Base" (VOB) to the FlashDisk OpenRAID disk array. Merge is a frequently used function and this timesaving is multiplied by the large number of merges done by each and every developer on a daily basis throughout the life cycle of the project.

FlashDisk OpenRAID
Doubles Speed of System Build



Benchmark tests on a sample build of 2,500 modules shows that the time was reduced from 315 to 155 seconds on FlashDisk OpenRAID. This time represents over 50% timesavings by running the build at over twice the speed. Larger builds are even more disk intense than this relatively simple build and will benefit even more from the faster storage platform.

High Availability and Fault Tolerance

FlashDisk OpenRAID disk arrays cost no more than other external RAID disk arrays and little more than inexpensive internal RAID disk arrays. External RAID disk arrays offer vastly superior reliability and high availability for software developers who are working in mission critical developments that cannot afford downtime. Hardware failures directly impact project schedules. FlashDisk external RAID arrays offer complete redundant fault tolerant “hot-swap” hardware including redundant fans, power supplies and controllers as well as RAID 1, 3, 5, 10 or 15 data protection with optional “hot-spare” disk drives. If any component fails, it can be replaced on-line without taking down the disk array or server – thus software development continues uninterrupted and the array is repaired completely transparent to software developers.

Return on Investment

Software development is a storage intense activity and storage is obviously needed in large quantities. FlashDisk OpenRAID ultra-high performance systems cost no more than typical external disk arrays offered by UNIX and NT server manufacturers and other reputable third-party providers of external RAID arrays. Running software development on FlashDisk is an easy to justify solution. There are three components to the justification.

(1) Productivity

For example, a project team with 10 developers saves a conservatively estimated 5% of their time by running every step of their project faster and running merges and builds at two to 2.5 times the speed by using FlashDisk OpenRAID. This 5% savings for each of 10 developers is the equivalent of 50% of one developer. At today’s salaries, using \$80,000 per developer, with corporate overhead, this is \$40,000 annually in time savings.

(2) Revenue and Profit Enhancement

To the simple productivity calculation above must be added the market value of completing the project sooner. This varies by application but introducing a project or service a week or two earlier translates

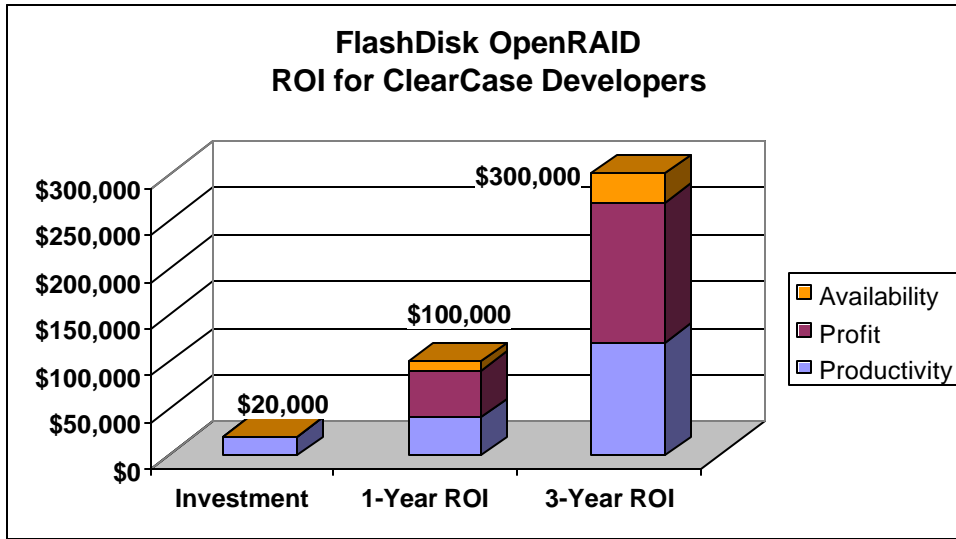
directly into tens of thousands of dollars per week for typical companies. For example, an e-commerce site expecting \$25M per year in revenue and 10% profit of \$2.5M has a weekly profit expectation of \$50,000. If the project is completed just one week earlier, the one-week profit acceleration translates into a measurable and substantial \$50,000 bottom line profit increase and substantial justification to speed development.

(3) High Availability

Software development projects are too important to trust to internal RAID arrays built into inexpensive NT servers or UNIX servers. The incremental cost of FlashDisk OpenRAID is minimal compared to the costs of shortchanging developers with inadequate platforms. Even if a FlashDisk were to be incrementally added, the entire cost would be repaid very quickly. The high availability of an external FlashDisk array will typically save three days of project downtime during a typical year. This is a savings of an estimated 30 developer days or 1.5 developer months. Again, as above, this translates into availability savings of about \$10,000 in direct time savings without counting thousands in revenue losses avoided.

Total financial returns on a FlashDisk OpenRAID investment quickly add up and the results are shown in the chart below. In this example, the total financial return exceeds \$100,000 per year. Investments in high performance FlashDisk OpenRAID storage systems range from 4 to 10 cents per megabyte of storage. A software project requiring 250 GB of storage, valued at a typical eight cents per megabyte, will invest \$20,000. The project would receive all the benefits of high performance and high availability for just the price of obtaining the storage needed for the project anyway. Even if the total cost of the storage were considered incremental, the payback of \$100,000 as outlined above on a typical \$20,000 investment, would be a small fraction of a year; in this case the \$20,000 investment on a \$100,000 return is 20% of a year payback period or just 10 weeks.

FlashDisk OpenRAID
Investment vs. Return on Investment



Return-On-Investment (ROI) is clear in this example. A \$20,000 investment produces \$100,000 return in one year and a \$300,000 return in three years. The investment payback period is just 10 weeks. In three years, the investment is repaid 15 times. The chart shows how much of the return is derived from increased productivity, profit enhancement and higher system availability.

Software development projects, due to their high engineering labor content as well as profit and revenue sensitivity, typically pay back their investments exceptionally fast. As in this example, often in several weeks or a couple of months—not years—required by most capital equipment investments. Think about it. In just 10 weeks the investment is repaid and the equipment was then essentially free. In the next 10 weeks it pays for itself again and by the end of the year the \$20,000 investment was repaid five times for a net profit of \$80,000. Over three years, there will be \$300,000 return on a \$20,000 investment resulting in a \$280,000 net gain. Few, if any, other capital investments offer this rate of return and thus it is generally very easy to obtain management and financial approval for equipment investments that speed software development.

A request for equipment that speeds software development may in fact be the best payback investment that the CFO in your organization will have the pleasure to review this year.

Scalability

For very large projects involving hundreds of developers, terabytes of storage, dozens of servers, numerous projects and multiple VOBs for each project, FlashDisk OpenRAID solutions easily scale to meet the most stringent, demanding and critical requirements. Each FlashDisk OpenRAID unit provides a complete and separate increment of performance and storage and thus performance scales linearly with each extra unit. Up to nine units can be housed in an 82” high data center cabinet to support up to 36 servers simultaneously delivering up to a cumulative 117,000 disk operations per second. The data center cabinet can store up to 13 TB in just six square feet of floor space.

Summary

Winchester Systems is a Rational Unified Partner that offers its high performance FlashDisk OpenRAID disk array that speeds software development for Rational Software customers. Performance tests of Rational ClearCase “merge” and “build” functions with high performance FlashDisk arrays demonstrate substantial and material increases in performance of this popular version control software. These speed improvements translate directly into time saved in the software development process. Since shorter development cycles means higher quality software sooner, organizations that utilize FlashDisk ultra-high performance data storage to speed their development will enjoy shorter development cycles, reduced software development costs, higher reliability development environments and increased revenue from bringing software enhancements to market sooner. Faster time to market also creates a strategic and lasting competitive advantage.

These easily observable, measurable, tangible and substantial financial results make FlashDisk OpenRAID an easy justification to management since investment payback is measured in weeks rather than years.

About the Rational Unified Partner Program

Rational Software Corporation provides a platform for software development that speeds time-to-market while improving software quality. This integrated, full-lifecycle solution combines software engineering best practices, market-leading tools, and professional services to help organizations develop and deploy software. The Rational Unified Partner Program supports over 500 participating partners with tools, joint marketing opportunities, qualifications and training, to round out this open platform. The Rational Unified Partner Program ensures that our partner products and services meet the high standards that customers have come to expect from Rational. Companies and individual technology consultants interested in learning more about the Rational Unified Partner Program, including details on how to participate, can visit www.rational.com.

About Winchester Systems

Winchester Systems provides SAN and NAS capable enterprise storage solutions including high performance SCSI and fibre channel RAID disk arrays, solid-state disks, tape backup devices and other high performance commercial and military grade storage for mid-range servers including UNIX and NT. Winchester Systems provides products that support today’s most demanding industrial, government and commercial applications. www.winsys.com



149 Middlesex Turnpike
Burlington, MA 01803
781-265-0200
800-325-3700
www.winsys.com