

Taking a Professional Approach to Application Quality Management

Building in reliability and avoiding the risks

Performance driven. Quality assured.



Executive Summary

Software applications running on complex IT infrastructures automate critical business processes for enterprises across the globe and across all industries. These applications play a key role in daily business activities, from tracking revenue and payments, to monitoring sales cycles and controlling inventory levels. Because applications are so important to enterprises, they must be reliable and free of faults in order to minimize the risk of unplanned system downtime.

Managing the quality of key business applications is imperative for enterprise agility. Without reliable systems, companies cannot respond quickly to customer needs or competitive pressures. Yet IT organizations face many challenges as they work to ensure that IT applications and infrastructure meet business needs. These challenges include managing time to market pressures, mitigating the risk of faulty systems, managing application costs, maintaining compliance, coping with complex IT stacks, and optimizing in-house and offshore resources.

This white paper looks at each of these challenges and argues for a rigorous, professional approach to application testing and quality assurance (QA) that consists of the following integrated elements:

- A testing methodology that provides a detailed roadmap on how to optimize the tradeoff between testing spend and risk control
- A broad set of tools for test automation, capturing user experience, and monitoring the entire application stack
- Resources with deep expertise in the testing methodology and tools to support your business and application quality needs.

With a professional approach to application testing, IT leaders can deliver reliable software systems at low levels of cost and risk.



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The Importance of Applications

There is hardly a business today that can exist without software applications and a supporting IT infrastructure. In fact, a business' ability to develop new business models, react to client proposals, and interact with a broader client base globally depends on its use of applications and IT infrastructure. Companies have invested huge amounts in new applications to deliver better and more cost-effective services to their customers. Success is now integrally tied to the performance of these packaged and Web-based applications. Systems such as enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), human capital management (HCM), and business intelligence (BI) automate the order-to-cash process, track the sales cycle, control product inventory, organize product development, manage customer service, and report on business performance. Web applications, such as online banking or storefronts, have become the face of the company to its customers and, in many cases, are the company's main competitive advantage.



These applications run on an IT infrastructure that becomes more complex and layered each year. The CIO and IT team are responsible for every piece of the stack—including networking, databases, middleware, and applications. This complex infrastructure is not just IT for the sake of technology; it supports the most critical of business functions. CIOs run IT departments to support their company's business. IT leaders must collaborate closely with business leaders to ensure that the applications meet both line of business and end user needs. They must also ensure application quality so the business can run without interruption.

When software quality is poor, these investments in applications and infrastructure are at risk. An IDC survey on software quality reported that more than 40 percent of all software applications are released with between one and ten critical defects¹; this finding remains in line with current IDC research. The consequences of poor application functioning or error-prone software on financial performance and reputation can range from the cosmetic to the catastrophic. If customers find a Web storefront to be slow and full of error messages, they will quickly and easily switch to a competitor's site. A 2009 study by Akamai found that if a Web page takes more than 3 seconds to load, about 40 percent of customers will abandon the site.² If an application that captures an enterprise's revenue stream goes down—for even one hour—the impact on profit and loss is substantial and measurable. In October 2010, news agencies reported that configuration issues in an upgrade for fare cards in a major urban transit system resulted in a loss of US\$500,000.³ In 2009, reports circulated that significant software problems with the integration of a new, packaged payroll application resulted in overpayments to employees of US\$53 million. The cost of the ERP system was expected to rise by 40 percent in order to fix the problem. In these examples, inadequate testing failed to detect coding errors, incorrect performance assumptions, and integration issues in the deployed applications—all oversights that contributed to their real-time failure.

As enterprises rely more and more on application-based business processes and complex IT systems, QA and software testing becomes more important than ever. Businesses must be assured of application performance, availability, and reliability to protect their revenue stream and corporate reputation. As an IT leader, you need professional application testing solutions and processes to prevent costly rework during application design. You must also monitor application performance during production to avoid unplanned outages of business-critical applications.

The Current Testing Environment

Despite the importance of applications, a large number go into production without adequate testing due to time-to-market constraints and resource limitations.⁴ This is because traditional, manual testing methods can be drawn out, tedious, and very resource and cost intensive. For example, functional testing—to ensure that newly configured features work and that established features haven't regressed—is often done manually by inexperienced technical resources. And even after investing months and thousands of man hours in testing, applications may still experience

¹ Melinda-Carol Ballou. Improving Software Quality to Increase Business Agility. IDC. June 2008.

² Effect of Website Speed on Users. Munchweb.com. September 2010.

³ Rick Hower. Major Computer System Failures Caused by Software Bugs. softwareQAtest.com. 1996 – 2011.

⁴ Leila Naslavsky, Marcio Dias, and Debra Richardson. Multiply-Deployed Residual Testing at the Object Level. School of Information and Computer Science, University of California Irvine. 2004.

significant issues during production. In many time-pressured environments, often only the most mission-critical applications are tested.

Companies begin application deployment or upgrade projects because business owners need new capabilities and functionality to improve business processes. Usually, requirement gathering begins without any thought to quality assurance, testing methodologies, or testing requirements. Many line of business owners have no idea what QA professionals test or how the tests are conducted. This demonstrates a significant disconnect between the business lines and the group charged with ensuring that end user requirements are met. If QA professionals are not working with the line of business leaders, then test plans may not accurately reflect end user requirements. If the performance of an application or Web service is tested only after the configuration or development process is complete, costly rework may impact the project schedule.

In many cases, companies choose to focus on their core business and so outsource functions like testing and quality assurance. One of the biggest challenges with outsourcing is that many vendors do not provide enough skilled resources with business and domain knowledge relevant to the client. Testers need to be able to understand business requirements and create test validation for specific needs. Without a testing methodology, test plans created by inexperienced QA professionals may not capture the scope of the application and their use cases. Many outsourcing vendors lack domain or industry knowledge. In addition, some outsourced QA teams tend to experience high turnover, or may grow uncontrollably large as more people are added to solve quality problems. This negates any cost benefits that outsourcing was meant to deliver.

The reality of software development—including application configuration and parameterization to ensure new applications integrate into the existing IT landscape—is that it comes at the expense of testing. If software development falls behind schedule in configuring applications, the delay cuts into testing time. The testing team is usually given a short period to define, develop and execute tests cases—and if the development team runs late and delivers the application after the promised date, the time allowed for testing may be curtailed even further. If the testing is completed without meeting clearly written service level agreements, there may be misconceptions about what specifically was tested. Without a clear testing methodology, communication issues between business, development, and QA also surface. Companies may be able to report that application testing was conducted, but testing done under these types of conditions does not do enough to reduce the risk of an application failing.



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Making Application Quality Strategic

If you expend resources on an activity, you want them to have the maximum impact. Improving application quality depends on strong relationships between business and QA functions. When quality is a true part of the application lifecycle—from gathering requirements to configuring the application and monitoring it in production—then you get more from the resources and tools used to test. To manage costs, QA needs to be considered early in the application development or upgrade lifecycle, automated testing assets must be reused, and qualified testing professionals need to be employed.



Having a complete set of testing tools, well-defined testing practices and methodologies, and experienced testing professionals will drive software quality and positively impact your overall bottom line”

There is substantial evidence that late involvement of testing leads to increased spending. Classic research conducted by software engineering professor Barry Boehm at the University of Southern California shows that the effort needed to correct problems increases exponentially as you move deeper into the development cycle.⁵ The National Institute of Standards and Technology reports that the cost to fix an error found after product release is up to 100 times greater than the cost of one identified during the design phase.⁶ To avoid this, business scenarios can be translated to test scripts when requirements are first defined. As scenarios are updated, automated testing tools can reuse and update those scripts. By incorporating testing into the requirements gathering and application design phases, you can ensure that the application you build will be of higher quality, earlier.

Involving experienced testing professionals in the early stages of application development helps to define clear business requirements and minimizes the repairs needed at the end of the project. An experienced QA professional is one who possesses domain, application, and technical knowledge to quickly analyze problems and provide fast and accurate information to development teams. The job of QA professionals is to ensure that the introduction of new configurations or functionality does not break the application or produce downstream implications. QA professionals also ensure that the application reliably meets the end user requirements and functional business needs. When QA professionals test applications, critical errors can be identified and addressed by development earlier in the development cycle. This leads to higher-quality applications and a better end user experience.

When IT leaders embrace application testing as part of their application lifecycle management strategy rather than as an afterthought, the result is an application that supports critical business functions and delivers better application performance and uptime. By not compromising QA, IT teams can deploy applications that help an organization introduce new revenue models and streamline operations. Incorporating testing throughout the development cycle gives you confidence in the application's performance and uptime when it goes into production.

Adopting a Professional Solution for Software Quality Assurance

Testing software can be a complex process, but poor software quality leads to user frustration, increased maintenance costs, and even lost revenue. Having a complete set of testing tools, well-defined testing practices and methodologies, and experienced testing professionals will drive software quality and positively impact your overall bottom line. According to Gartner, “Although many companies begin with searching for [testing] tools, most are in need of improved practices and guidance. Issues such as how long should testing take, where to focus, or how can automation be effective are at the root and often drive buying behavior. Another decision factor is based on service partner relationships. This in turn means that vendors with good partner programs have an advantage, and also emphasizes the need for the improvements provided by the tools to guide decisions and practices.”⁷

⁵ http://en.wikipedia.org/wiki/Barry_Boehm

⁶ National Institute for Standards and Technology, Strategic Planning and Economic Analysis Group. The Economic Impacts of Inadequate Infrastructure for Software Testing. May 2002. <http://www.nist.gov/index.html>.

⁷ Thomas E. Murphy. Magic Quadrant for Integrated Software Quality Suites. Gartner, January 31, 2011.



The tight integration of Oracle technologies with methodologies and skills from Capgemini Group (consisting of Sogeti and Capgemini) provides an end-to-end solution for ensuring that testing is integrated into the application lifecycle and conducted in a way that reduces costs and minimizes risk.

The joint testing solution from Capgemini Group and Oracle Corporation combines the three elements of a professional approach to testing critical to your success in bringing reliable Web, SOA-based, and packaged applications to market:

1. A testing methodology that provides a detailed roadmap on how to minimize testing spend while achieving maximum risk control
2. A broad set of tools for test automation, capturing user experience, and monitoring the entire application stack
4. Resources with deep expertise in the testing methodology and tools to support your business and application quality needs.

The strength of any professional QA solution lies in the close integration of these components. With an end-to-end solution from Oracle and Capgemini Group that encompasses people, processes, and technology, you can achieve consistent quality in test management and quantifiable cost reductions in software deployment and maintenance projects.

Addressing the Challenges of Bringing Reliable Applications to Market

When testing methodologies, automated tools, and professional resources are used to integrate QA into application lifecycle management, the problems associated with current testing practices disappear. This section will address some of the challenges facing companies as they seek to bring new Web, SOA-based, and packaged applications into production. It will discuss how the Oracle-Capgemini Group solution addresses and alleviates these challenges.

Deploying Applications That Meet Defined Requirements

The entire purpose of a QA organization or a testing group is to ensure reliable applications that meet the needs of end users. Yet disjointed processes, manual testing, and time-to-market pressures can get in the way of delivering a dependable application. Having an effective framework for planning, executing, and managing the testing process can mitigate that pain. Capgemini Group and Oracle believe that good QA processes and methodologies lead not only to more reliable applications, but also to applications that better meet the exact needs of the end user. Involving testing intelligence helps to define clear business requirements that allow the development team to configure functionality that is truly required and testable. This is because the QA teams' black box tests are designed to validate business needs and end user processes. Critical errors are identified and removed from the application even before the application gets to functional or load testing. This creates a higher quality application and better meets end user requirements.

Capgemini Group's TMap® testing methodology is a roadmap that recommends technologies that make sense at every stage of the development process. It incorporates leading best practices and more than 50 templates related to test



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planning, design, execution, automation, and measurement. These proven techniques are usable from the very beginning of the application lifecycle. Indeed, the whole idea behind adopting the TMap® methodology is to avoid problems at the beginning, rather than to correct them at the very end. So TMap® suggests activities during validation, design validation, unit testing, system testing, and acceptance testing stages. TMap® outlines what kind of activities should be performed at each phase of the lifecycle. Because it is integrated with Oracle Application Testing Suite, the process of improving software quality is tightly bound to the tools needed to deliver it.

Having insight into user experience is critical to the configuration and testing of applications. Knowing how end users interact with your application allows you to design the application to address actual use cases. In traditional testing, the most difficult part of creating scripts is making an assumption about what the end user is doing. If you make an error in your assumptions, your application might have bugs because you didn't test the right click paths and process steps. If you create poor testing scripts that don't exactly mimic the end user's experience, then you might spend time fixing bugs that end users will never notice. With Oracle Real User Experience Insight, you can track browser sessions in real time and see what the end user experiences. For SOA environments, you can even monitor the interactions of two synthetic users—for example, a payment server at an insurance company exchanging data with a hospital's machine during claim processing. These actual sessions can be imported into Oracle's automated testing tool to create better test scripts and plans for those use cases. The real user session is captured so test scripting can be modeled accurately. With the integration of Oracle's user experience and testing tools, you can take the end user activity into account when designing and testing your applications.

Accelerating Time to Market

Businesses face intense pressure to deploy applications and upgrades quickly while also retaining high quality levels. Yet The Chaos Report indicates that, while overall project success has improved, 42 percent of projects are still challenged (late, over budget, and/or with less than the required features and functions) and 21 percent fail (cancelled prior to completion or delivered and never used).⁸ The frequent release of software upgrades and updates can make rapid implementation of applications difficult. Furthermore, the lack of a streamlined testing approach can lead to delays in implementation, changes in projects, and organizational dissatisfaction. An inability to manage changes and test their effectiveness means reduced business agility and longer times to market. Because testing is the last stage before production, there is often intense deadline pressure on QA.

With a test automation tool, you can get more productivity from QA and reduce overall testing time. Many companies still test manually—especially for functional testing—but it is very difficult to track what happens, what the issues are, why they are occurring, and where they exist. It is also challenging to conduct an identical retest once a patch has been deployed to verify that the issue has been resolved. Having a tool that helps you generate the load, monitor the application's performance, and track the infrastructure will allow you to ensure that the system meets the needs

⁸ The Standish Group. The CHAOS Summary. 2010.

of the anticipated user. Oracle Application Testing Suite—including Oracle Test Manager, Oracle Functional Testing, and Oracle Load Testing—can help manage and automate your testing processes so that you can speed time to market and release a higher quality application.

Oracle Test Manager allows you to manage the complete testing process and track all testing assets, including test cases, test requirements, defects, and results. It enables you to answer the questions: Can we go live? What areas have we underestimated? How can we get back on track? Oracle Test Manager's integrated reporting interface ensures end-to-end visibility into the testing process. In addition, it has the benefit of integration with Capgemini Group's TMap® test methodology, so you can reduce test cycle times, improve testing efficiency, reuse test cases, and increase confidence in the testing process.

Functional testing ensures that the application's customizations meet end user business requirements. It includes both validating new functionality as well as verifying existing features to make sure the application didn't regress in the latest release or build. This combination of functional and regression testing is key to ensuring overall application quality, yet takes the most time to complete when done manually. Oracle Functional Testing allows QA teams to create test automation scripts for predefined processes. For example, an online retailer offering new auction capabilities would need to test the process of logging in, searching for the item, clicking on the chosen item, researching the item, and then placing the bid. With Oracle Functional Testing, the process can be recorded as a script and the QA team can then adapt it to replicate similar process such as logging in with different user names, conducting multiple searches, or placing multiple bids. The script may also include verification points, such as whether the product image appears, if a calculation results in the correct response, or whether the page loads correctly. Oracle Functional Testing simulates the process of bidding so that the new functionality can be thoroughly, yet quickly, tested.

Beyond automating and streamlining the testing process with Oracle Application Testing Suite, Oracle offers very complete testing accelerators for its own packaged applications—including Oracle E-Business Suite, Siebel CRM, and Oracle Fusion Applications. The testing accelerators are designed to support specific technologies and to simplify and accelerate the test automation of these technologies or applications. A test accelerator may, for example, include support for additional protocols, all correlation rules for dynamic values within the application, or rules on how to identify application or technology specific objects on the screens. One Oracle customer was able to reduce manual testing time from 270 hours to just 21 hours using Oracle Functional Testing and the accelerators for Oracle E-Business Suite.

Mitigating Risk

Poorly configured functionality or unplanned downtime increases the risk of a negative impact on brand, reputation, and cash flow. While fully replicating a production system in a test environment and providing 100 percent test coverage theoretically reduces risk to zero, the cost of testing increases exponentially. Without any testing, the risk of application failure increases tremendously for the business.

Making the right choices and the proper tradeoffs is crucial to minimizing risk and managing costs.

The best person to understand the specific risks that are present and to make decisions on what to test in order to minimize risk is an experienced, QA professional. With tighter integration between IT and business goals, companies today need testers who have both strong technical skills and relevant industry or domain knowledge. Capgemini Group's over 8,000 QA professionals bring deep knowledge about Oracle's automation technologies as well as the ability to understand business requirements and create test validation for specific business needs. When bugs are discovered, Capgemini Group professionals provide actionable analysis to developers so that the errors can be quickly resolved. When deploying testing teams to clients, Capgemini Group creates teams that are separate from, yet still able to collaborate with, application development. In that way, Capgemini Group testers can function as independent evaluators while still working towards a common business goal—releasing reliable mission-critical applications.



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Companies also face the risk of applications failing when larger than expected numbers of users access the applications at a single time. Consider the case of a company that decided to make instruction manuals for its consumer electronic device available on its Website, in order to minimize the environmental impact of printing. Sales were high during the month of December, but downloads were low. In the days immediately following Christmas, the Website experienced a major spike. Because all the December purchases were gifts delivered on the same day, the volumes of traffic were beyond expectation and many customers were unable to access the manuals. Because customers could not operate their new devices, the risk of return—and financial loss—was high. Conducting load testing can minimize the risk of this happening. It ensures that applications will perform and scale up under real user workloads once deployed to production. With Oracle Load Testing, you can assess whether your application can handle large number of concurrent users during peak usage periods while maintaining high levels of performance and rapid response times. Oracle Load Testing also helps identify and address critical bottlenecks prior to deployment. Stress testing then allows testing beyond the limits of normal operation and helps to assess the capacity and scalability of the application infrastructure.

Managing Enterprise Application Costs

IT departments are required to deliver more functionality and reliability with less money and fewer resources. Yet fragmented and inadequately controlled testing processes—commonly seen in practice—offer poor value. Manual testing is error-prone and labor-intensive. Automated, point solutions for testing are fragmented and incapable of testing in complex IT environments. Few businesses have an accurate understanding of their own current testing costs because they are not separately measured or controlled. To reduce costs, it is essential to automate testing, reuse assets, and employ professionals with the right skills. Oracle Application Testing Suite and Capgemini Group's professionals can help IT leaders manage the costs of testing and get the most value from their testing spend in three ways.

First, Oracle Application Testing Suite automates the testing process and reduces your reliance on manual testing. By automating test cases and leveraging easy-to-use test solutions, organizations have been able to reduce the need for manual testing while making their test cycles more cost-efficient and effective. With Oracle Application Testing Suite, Oracle customers have been able to reduce the costs of mastering testing tools by 50 to 70 percent. In addition, the Oracle's testing tools are available at a fraction of the cost associated with traditional automated test tools.

Second, Oracle has a single scripting platform for test automation—Oracle OpenScript—for creating both functional and load testing scripts. With it, you can use the same approach and language to create and modify functional and load scripts. With a single scripting tool and with Java as a common scripting language, the cost of adopting the tools is reduced. Test cases and scripts can also be easily modified to adjust to changing business scenarios. Because the scripts are so robust, script maintenance can be kept to a minimum, even if the tested application has changed. The test cases and scripts created prior to go-live can now be reused during application maintenance.

Third, a professional testing solution makes use of cost-optimized resources located onsite or offshore. Capgemini Group's global testing practice has reduced the testing overhead of many enterprise clients by between 20 to 50 percent. Using seasoned testing and application professionals, you avoid the risk of failure at deployment—when the costs to repair the damage are highest. With Oracle and Capgemini Group, you can reduce testing time to a minimum, reuse testing assets, and employ the right resources to better control your costs.

Maintaining Compliance

Software quality assurance is experiencing an increased need for governance and regulatory compliance. External regulatory demands such as Sarbanes-Oxley, HIPPA, SAS 70, and ISO standards impact most sectors, but especially financial services and life sciences. Imagine a bank that releases a software application linking to account information. If testing is not complete and thorough, the data in the application can be compromised, creating a compliance breach. Software quality risks need to be mitigated or compliance can be compromised. In particular, regulations surrounding data privacy and auditable change management procedures are driving the need for tools that maintain data security and workflow-driven solutions that manage and track changes.

Government-imposed regulations on privacy and data sharing can also hinder production-scale, realistic testing. Fortunately, Oracle's data masking capabilities allow companies to anonymize the production data in Oracle Databases used for outsourced testing. The data in the test database has real characteristics, volumes, and maintains referential integrity so the test accuracy is increased. And with masked production data, there are no risks for compliance breaches. Unique to Oracle, the data masking tool works with all Oracle's automated testing tools for functional, regression, and load testing. With Oracle's data masking capabilities, companies can create secure test databases and make outsourcing decisions without forgoing security and compliance.



Deploying on the cloud is a major shift in architecture and requires that applications be thoroughly tested and validated. Understanding the entire stack is important because a problem at any level can affect the application's performance"

Many industries such as healthcare and life sciences, financial services, and aerospace and defense manufacturing impose strict regulations on change management and document retention surrounding applications and IT systems. To comply, you must be aware of the regulation, interpret it correctly, and implement the measures needed to accomplish it in a cost-efficient way. This begs for the early involvement of professional services to make sure that the configuration, parameterization, and testing stages are properly documented. Capgemini Group professionals have the knowledge, familiarity, and best practices to help companies avoid mishaps and costs incurred by nonconformance. In addition, using the TMap® testing methodology provides a structured method for approaching and conducting testing that aids the creation of required change management documentation.

Conquering Complexity

Layered architecture—consisting of database, middleware, networking and multiple applications—is a typical element of modern IT. Trends toward service-oriented architectures (SOA) and cloud computing add to this complexity. First, SOA results in modularization of services. Different services and components are reused and recycled for different business processes. You can test a service for one process, but it might be used in multiple places throughout the architecture. Second, virtualization is a first step towards moving applications to a cloud infrastructure. Deploying on the cloud is a major shift in architecture and requires that applications be thoroughly tested and validated. Understanding the entire stack is important because a problem at any level can affect the application's performance. Also, minimal changes in the IT environment can cause large interruptions in business operations.

It's not just the IT infrastructure that is complex. The applications themselves are incredibly intricate. A single system is composed of millions of lines of code and potentially thousands of custom configurations. Adding additional systems means millions more lines of code. When Enterprise 2.0 elements—including portals, dynamic communities, and composite applications with social computing capabilities such as tags, links, wikis, blogs, social networking, search, publishing, and document sharing—are added into financial, ERP, or CRM systems the complexity increases again.

To reduce the risk of problems when enterprise applications go into production in a complex IT architecture, you need to test with automated solutions that provide a complete view of the IT environment. Oracle's business transaction management solution allows you to locate, monitor, and test SOA components so that you can be assured the component works for all transactions where it is used. IT managers can automatically discover all SOA artifacts, services, and components and map them into an architecture diagram. With Oracle's business transaction management solution, you can monitor and diagnose transactions in real-time, identify the component responsible for a failed business transaction, and make improvements to business processes with minimal disruption. When you load and test one of these new services, you can see the impact of it on all places where it is used. Oracle has a set of management tools for every layer so IT managers can shine when it comes to maintaining quality across the entire stack.

In addition to altering the infrastructure, deploying a new or upgraded application impacts the database because new indexes and tables are created. You need to know that both the application and the database will perform reliably together.



Testing the changes to the database can be complicated and time consuming when done manually, but it is vital to know the impact of those changes before production. When used in conjunction with Oracle Application Testing Suite and Oracle's data masking products, Oracle Real Application Testing allows you to test the database and applications in an integrated way. You accomplish this by making an actual change in the test database and then running the database load again. The same query or script in the test database can be run with simulated higher loads to see if it affects the application performance. Oracle Real Application Testing can reduce the test cycle for large applications in complex environments by as much as 80 percent and can bring testing time down from months to days.⁹

If Oracle Real Application Testing gives you confidence in the integrity of the database layer, Oracle Application Replay Pack does the same for the application server layer. A completely unique product and optimized to work with Oracle Applications, Oracle Application Replay Pack allows you to test how changes on the application server affect the application's performance. It records actual load and activity on the application server so you can see how changes to the application server—whether an operating system upgrade, a complete switch, or just some fine tuning of parameters—impact the application. When you can test using a real workload, and not a synthetic load that simulates users, your tests are more accurate. Capturing the effect of real user behavior on the application server and then using it to test a server workload provides greater confidence in yet another layer of the IT stack.

When testing configured applications, you need to create a representative test environment. Capgemini Group can build and orchestrate simulated, complex environments so that your application is tested in an environment representative of your IT architecture. Capgemini Group leverages cloud architecture for its testing efforts by using the cloud to host testing environments and to generate load traffic for performance testing. Capgemini Group can also custom build the elements of a complex environment that must be simulated.

Optimizing Outsourcing

Outsourcing the QA function is an established trend for companies around the world. A 2011 survey of IT leaders and QA professionals found that over 69 percent of global respondents employed the services of contractors or third party vendors for QA, and that client needs have moved beyond test preparation and execution. Today's providers must offer a complete suite of services—including testing strategy, requirements definition, functional and performance testing, user acceptance testing, and security testing.¹⁰

While outsourcing programs are often used to reduce costs, they sometimes fail to deliver the benefits expected by the business. For example, inconsistent delivery of technology from outsourcers can compromise quality and increase rework. Higher levels of management and communication may be required due to a perceived lack of control and overdependence on outsourced supplier. Poor metrics or service-level agreement can lead to meaningless results and inadequate testing. Insufficient

⁹ David Mitchell, Dwight B. Davis. Oracle Real Application Testing: Business Agility Through Superior Testing. Ovum Summit. 2008.

¹⁰ 2011 – 2012 World Quality Report. Capgemini, Sogeti and HP. 2011.

communication and coordination between onsite and offshore team members may compound testing challenges and increase duplication of efforts. On occasion, testing costs may actually increase if testing resources, and not automated solutions, are added to solve quality issues. Within the client's IT organization, there is often an overall lack of clarity around the value gained. And worse, end users can experience poor application performance and abandonment rates increase.

These problems can all be alleviated by choosing a service provider than can implement the right staffing model for your company. Capgemini Group has a range of engagement frameworks and commercial options that meet your needs and provide the best value for your outsourcing spend. Capgemini Group can bring in QA professionals who can train your employees, carry out a single project, or completely take care of the QA function. The following options ensure that you have the right mix of skills:

- With staff augmentation, Capgemini Group provides the testing professionals that meet the skill set you require. You can use these professionals as requirements demand, yet retain responsibility and accountability for overall testing.
- With a co sourced model, a team of Capgemini Group and client resources share joint responsibility and accountability for quality assurance. The roles and responsibilities are defined according to your requirements, but project planning, execution, and management is conducted jointly.
- With flexible staffing, Capgemini Group maintains a core team of testing professionals to support the clients testing activities. Using a joint forecasting process, the team is managed to meet peaks and troughs in your project schedules.
- When engaged as an independent test partner, Capgemini Group manages the end-to-end testing activities for the defined projects. In this case, Capgemini is responsible for testing activities, governance, and final results.

In addition to providing the optimal staffing model, Capgemini Group can optimize the location of resources using its Rightshore® concept. Work may be done onsite at the company, or in nearshore or offshore sites—such as Capgemini Group's Oracle Software Testing Center of Excellence located in India—where cost-efficient resources can execute testing activities.

Solution Details

The previous sections have discussed challenges that must be addressed when bringing business-critical Web, SOA-based, or packaged applications to production. To address those challenges, a professional approach to application QA is required. The tight integration between Oracle software and Capgemini Group resources and methodologies provides such an approach. You can unlock the full potential of Oracle's testing tools for your Oracle-based business processes when you deploy them using skilled Capgemini Group testing professionals and their industrialized testing methodology. The details of the tightly integrated solution are presented here.

Testing Professionals and Methodologies from Capgemini Group

Enterprise customers turn to the Capgemini Group to achieve consistent quality in test management and quantifiable cost reductions in software development and maintenance projects. Only the Capgemini Group can bring a total of 40 years of testing experience to its customers with offerings that include the following:

- **TMap®** is Capgemini Group's world-leading, business-driven test management approach for structured software testing. A transparent, manageable test process, TMap® is directly integrated into Oracle Application Testing Suite and is divided into phases, activities, and tools that guide QA processes. Based on industry and functional best practices, it helps organizations more effectively manage and standardize test processes to reduce risk. In addition, it is adaptive for new implementations and can be used in maintenance situations.
- Capgemini Group's **team of professionals** can help enterprises architect a holistic master QA plan to achieve business objectives, starting from concept to implementation. Their global testing professionals and test automation experts support an Oracle Applications environment and TMap® processes.
- **Capgemini Group's Oracle Solution Enablers and Center of Excellence** bring together test labs, best practice tools, data driven frameworks, research and development, and accelerators to ensure that the most appropriate approach is taken to every Oracle testing project.
- **Capgemini Group's Lifecycle Testing Service** incorporates Oracle's Application Quality Management portfolio to ensure ongoing test management and maintenance, as new functionality or release updates are added into software development projects.

Testing Technologies from Oracle

Oracle offers a complete group of applications and technologies that allow organizations to manage every layer of their technology stack. Oracle has the broadest software quality offering in the market, comprised of testing automation tools, test data management, and lab management. These testing technologies are uniquely able to address the quality challenges that arise when deploying or upgrading Oracle Applications. The testing products in the Oracle Enterprise Manager family support every stage of application lifecycle management and provide specific tools to automate testing and build reliable applications.

- **Oracle Application Testing Suite** is an integrated test solution that provides end-to-end testing capabilities for ensuring application quality, performance, and reliability. It is integrated with Capgemini Group's TMap® testing methodology. The suite includes three products for testing Web, packaged, and SOA-based applications and their underlying infrastructure.
 - **Oracle Test Manager** provides a complete test process management solution—helping organizations to manage all test cases, test requirements, and issues from a central repository to improve the effectiveness of the test process.
 - **Oracle Functional Testing** automates functional and regression testing for Web applications, Oracle packaged applications, and Web services using Java as the scripting language.
 - **Oracle Load Testing** enables organizations to run realistic load tests for Web, SOA and Oracle packaged applications and to identify bottlenecks in applications. Oracle Load Testing also allows automatic script generation based on recorded user sessions from Oracle Real Application Testing or Oracle Real User Experience Insight.

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You can unlock the full potential of Oracle's testing tools for your Oracle-based business processes when you deploy them using skilled Capgemini Group testing professionals and their industrialized testing methodology”



- **Oracle Real User Experience Insight** allows companies to monitor actual end user experiences across applications. Application-specific accelerators allow for automated user experience monitoring of Oracle Applications.
- **Oracle Real Application Testing** enables database administrators to test the impact of application upgrades on the database using real-life production workloads. Databases can be fine-tuned to deal with the changes before production.
- **Oracle Application Replay Pack** allows IT to test applications using actual—not simulated—workloads on the application server. With it, the testing group can see the effect that changes to the application server have on application performance.
- **Oracle Data Masking Pack** replaces sensitive database information such as credit card or social security numbers with realistic values, allowing production data to be safely used for testing or for sharing with outsourcing partners.
- **Oracle's business transaction management solution** is an application performance management solution for application and Oracle and non-Oracle middleware environments. It is the only solution available that can help you assess the business impact of transaction anomalies and fix hung transactions.

Conclusion

Analysts, academics, consultants, and developers all agree: the most reliable applications are born and configured in environments that integrate testing and QA into the application lifecycle. Enterprises need to consider quality and reliability at the beginning of an application implementation or upgrade process by involving testing professionals in requirement gathering and definition. As the project proceeds, monitoring the application's performance and tracking its impact on a complex IT environment are critical.

Together, Capgemini Group and Oracle offer a professional testing solution that considers quality throughout the application lifecycle and mitigates the challenges faced in bringing applications to market. Capgemini Group's proven testing methodology manages and standardizes test processes to reduce risk. With a testing practice of over 8,000 trained professionals, Capgemini Group can deliver the right resources in the most appropriate staffing model. Oracle's enterprise management software can capture user experience and then integrate that experience into automated testing tools. The testing tools provide functional testing, performance testing, and test management in application implementation and maintenance projects—with particular strengths in testing Oracle Applications. In addition, only Oracle offers tools that can trace the impact of application changes on database performance and locate potential issues within the SOA or technology stack. The tight integration of Capgemini Group's expertise and Oracle's robust testing tools results in a more holistic approach to application quality.

When enterprises adopt a professional solution for application quality, they reduce their levels of cost and risk. A professional approach allows IT leaders to manage time to market pressures, mitigate the risk of faulty systems, constrain application costs, maintain compliance, cope with complex IT stacks, and optimize resources. When your job depends on ensuring the maximum quality, scalability, and availability of packaged, Web, and SOA-based applications and verifying the reliability of their underlying infrastructure, then you need the structured, business-driven testing solution provided by Oracle and Capgemini Group.



For more information about how Sogeti and Capgemini's Testing Services can help organizations achieve their testing and QA goals, please contact your local Sogeti or Capgemini account manager or our Global Testing Services Team:

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About Capgemini and Sogeti

With almost 140,000 people in over 40 countries, Capgemini is one of the world's foremost providers of consulting, technology and outsourcing services. The Group reported 2013 global revenues of EUR 10.1 billion. Together with its clients, Capgemini creates and delivers business and technology solutions that fit their needs and drive the results they want. A deeply multicultural organization, Capgemini has developed its own way of working, the Collaborative Business Experience™, and draws on Rightshore®, its worldwide delivery model.

Sogeti is a leading provider of technology and software testing, specializing in Application, Infrastructure and Engineering Services. Sogeti offers cutting-edge solutions around Testing, Business Intelligence & Analytics, Mobile, Cloud and Cyber Security. Sogeti brings together more than 20,000 professionals in 15 countries and has a strong local presence in over 100 locations in Europe, USA and India. Sogeti is a wholly-owned subsidiary of Cap Gemini S.A., listed on the Paris Stock Exchange.

Together Capgemini and Sogeti have developed innovative, business-driven quality assurance (QA) and Testing services, combining best-in-class testing methodologies (TMap® and TPI®) to help organizations achieve their testing and QA goals. The Capgemini Group has created one of the largest dedicated testing practices in the world, with over 12,300 test professionals and a further 14,500 application specialists with Testing experience, notably through a common centers of excellence with testing specialists developed in India and elsewhere.

Learn more about us at
www.capgemini.com/testing or
www.sogeti.com/testing

About Oracle

Oracle engineers hardware and software to work together in the cloud and in your data center. For more information about Oracle (NASDAQ:ORCL), visit www.oracle.com.

For more information regarding Oracle's alliance with Capgemini Group or about Oracle Application Testing Suite, please contact:

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