Test Environment Management - Principles and Best Practices
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Importance of testing gets emphasized every time an IT project gets rolled back from production due to issues with quality. Without thorough testing, the project will definitely fail and undoubtedly have an impact on the performance of the business if the organization. Whenever there is a budget constraint in a project, the immediate impact will be on pruning the testing effort or on reduction in the funds allocated for the non-production environment (for testing). At times, the program management team doesn’t realize that the cost spent on managing these test environments (non-production environments) would contribute to yield better results in delivering a high quality application/product in the market. Establishing the right testing environment is an essential component of an effective and efficient software testing process.

In most of the projects, the test environments are managed partially by a team of employees from development and production support team with no dedicated ownership. Due to lack of accountability, there is no clear guidance on how the environment has to be managed and that further emphasizes the need of an environment management strategy.

In this paper, we discuss about the best practices for test environment management and the required capabilities to deliver as part of the environment management team – referred as – Deployment & Environment Services (DES). This framework will help to establish a robust process and controlled test environment management strategy with optimized resources and a lever to lower costs through reduction in time to market and early defect detection.

DES – A One-Stop Solution

- A critical support function to guarantee that the application can be deployed and tested successfully with varying configurations from development to production
- Planning & ensuring the environments are built as per the requirements, pre-requisites and with necessary interfaces and connectivity.
- Ensuring enough capacity is available in the environment to run multiple software application releases
- Environments are scheduled and managed for parallel or multiple releases and optimum performance
- Routine Environments Health Check is done to ensure its availability.
- Helps in reducing the risk of deploying the application directly into production, by testing through different environments with varying configurations
- Establishes greater confidence to the development teams and business
- Empowers better Decision Making Better on application deployment & management
- Provides Standards and Framework, Provides Visibility & Control
- Better Quality (Process, Procedures, Audit)

Currently at least 20-30% of the effort involved in SDLC lifecycle is consumed for Managing Environment Related Issues and defects.
How to Create a Consistent Environment

It is ideal to have a production like test environment with all the interfaces and connectivity available in it. Also it should include all necessary components to build and run the application. Following are some of the components which constitute an environment.

- Operating System (eg. solaris, AIX)
- System Libraries (eg SH, openSSL)
- Services (eg Apache, Oracle/Sybase)
- Run time Environments (eg JDK, SDK)
- Application Servers (egWeblogic, Websphere)

Consistent Environment can be achieved in following ways

- All Environments (Development, Staging) should use the same components (System, Software) to maintain consistency with the production environment (sometimes non-realistic, due to parallel dev/testing).
- Consistency across all developer environments (workstation etc.) used for development, build and unit test.
- Version control of all components (server, workstation configurations etc.)
- Conduct technical check out on the application to ensure the environment stability after every deployment.
- Centralized storage of the development packages
- Developing a strategy to support multiple versions of same components released as part of parallel releases.
- Automate deployment activities (server, application etc.)
- Identifying and documenting all application dependencies
- Tracking Environment Changes with a good change management tool coupled with a robust process.

DES - Solutions

DES - provides a resolution to all issues, queries, changes related to environment management, thus unearthing the environment issues in the early stage of testing life cycle. This team acts as gatekeepers to monitoring any code changes released for testing and promote that to further levels of testing or to the production.

Broadly, DES end-to-end solutions include the following:

- Setting up new test environment: service on-boarding and build-out.
- Environment Monitoring and Management (hardware, networking, systems software and applications)
- Infrastructure monitoring: Servers, Databases, Third-Party System Connectivity
- Service Request Management: Issue resolution and coordination
- Release Management: systematic updates, terminations and reports
- Script Automation for deployment and data load activities
- Memory Leakage Testing to enhance environment performance

DES – Best Practices

- Issues Repository: By Maintaining an Issue Repository document, the dependency on development team can be completely reduced thus resulting in quick resolution of environment issues. Also by frequently updating the Issue Repository document, everyday issues occurred due to environment or data or deployment can be immediately resolved.
- Environment Checklist: Environment Checklist ensures consistency and completeness of any activity performed in the environment. Maintaining a checklist reduces the number of issues occurring due to deployment, new environment setup or connectivity setup.
- Green Zone Deployment: A Green Zone deployment window facilitates to have a standard deployment where all the testing teams are informed well ahead of the scheduled downtime to plan/estimate the projects. This would help largely in reducing the unplanned downtimes and streamlined release process.
- Better Environment Utilization: It ensures that testing teams have been provided with the efficient test environments which can be optimally used, prompting improved returns on existing environments. For instance, incidents such as over-provisioning, which result in environment slowness can be prevented.
- Proper & Timely Communication: DES creates an effective communication mechanism among the key stakeholders in the event of environment downtime or issues by triggering automated email alerts, etc. At many circumstances, this would help in avoiding any SLA breaches.
DES team acts as one-stop solution for any test environment issues with a host of other benefits such as targeted problem management and root cause analysis; controlled access management; maintaining up-to-date inventory of environments and infrastructure components; compliance with security and standards.

**Key Take Away**

Key elements of an Environment Management Services Team

- Required inputs to build a consistent environment for testing
- Best Practices on the ground to create a robust platform for DES
- Benefits and cost saving on having independent DES team

**Case-Study**

The above services were piloted and later implemented to large project and the metrics were compared before and after implementation of these services. The benefits of DES were highly appreciated and the need for having a detailed test environment management strategy was clearly understood. Below graphs shows the reduction in environment downtime and environment issues after deploying DES team. Metrics captured during a complete release cycle are used here to illustrate the differences.

This resulted in 70% reduction in environment downtime and packages released to next levels of testing was exactly as scheduled. Also the number of environment issues has come down considerably by up to 90% when compared over two different releases.

**Conclusion**

Deployment & Environment Services (DES) provides a consultative methodology, thus making it a better solution for test environment management. The DES framework helps organizations to overcome almost all test environment issues and achieve efficiency in demand fulfillment, resource utilization and environment availability.
Safe Harbor Statement

Certain statements in this press release concerning our future growth prospects are forward-looking statements, which involve a number of risks, and uncertainties that could cause actual results to differ materially from those in such forward-looking statements. The risks and uncertainties relating to these statements include, but are not limited to, risks and uncertainties regarding fluctuations in earnings, our ability to manage growth, intense competition in IT services including those factors which may affect our cost advantage, wage increases in India, our ability to attract and retain highly skilled professionals, time and cost overruns on fixed-price, fixed-time frame contracts, client concentration, restrictions on immigration, our ability to manage our international operations, reduced demand for technology in our key focus areas, disruptions in telecommunication networks, our ability to successfully complete and integrate potential acquisitions, liability for damages on our service contracts, the success of the companies in which Hexaware has made strategic investments, withdrawal of governmental fiscal incentives, political instability, legal restrictions on raising capital or acquiring companies outside India, and unauthorized use of our intellectual property and general economic conditions affecting our industry.

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