

Implementing Resource Management

Using Business Service Management Principles

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Executive Summary

How would you schedule one thousand servers in three different locations so that you could test software from four separate locations? You might start with spreadsheets and white boards, but you would realize quickly that your customers require heavy-duty scheduling and request processing. For a heterogeneous computer environment supporting UNIX from IBM, HP, and Sun, as well as Linux and many Microsoft Windows variations, the combinations are endless.

This paper describes a resource-management approach for software test labs using BMC Software tools. You can apply these resource management principles to similar situations, ranging from a manufacturing environment to production-type corporate IT departments.

Background of the Lab Environment and its Customers

BMC Software provides distributed-systems management products and thoroughly tests products during all phases of the development cycle. This development cycle requires that software engineers and quality assurance (QA) engineers have access to all the supported platforms on which the product operates. Software engineers have to test the code as they write it, and QA engineers test completed code and candidates for final product releases. In an Agile software development environment, development and testing phases can be intense.

The distributed-systems lab team requires heavy-duty scheduling systems that can offer constant uptime for the many different operating systems. The software and QA engineers are the internal customers that the lab team strives to collaborate with by providing computers during the correct period of time and with the right operating system version installed. The lab team must also keep up with patch and version change requests and monitor the health of each lab computer.

Heterogeneous Environment

As an example, this lab must respond to requests within a matrix of fifty different operating system combinations. At BMC Software, a platform is defined as a combination of an operating system, its version, hardware (32- or 64-bit), type of kernel (32- or 64-bit), and might include 32- or 64-bit Application Binary Interface (ABI) or a particular chip set.

Following is a sample list of requested test platforms for a single product group:

- > HP Tru64 UNIX 5.1a
- > HP-UX 11i (B.11.11) - RISC (64-bit)

- > HP-UX 11i (B11.23) PA-RISC (64-bit only)
- > IBM AIX 5.1 (32-bit hardware, 32-bit kernel, 32-bit ABI)
- > IBM AIX 5.2 (64-bit hardware, 64-bit kernel, 64-bit ABI)
- > Microsoft Windows Server 2003 Standard Edition (i32)
- > Microsoft Windows 2000 Advanced Server (SP4)
- > Red Hat Enterprise Linux AS 3.0 (Intel)
- > Red Hat Enterprise Linux AS 3.0 (zSeries 31-bit)
- > Sun Solaris 8 (32-bit)
- > Sun Solaris 8 (64-bit)
- > Sun Solaris 10 (64-bit only)
- > SUSE Linux Enterprise Server 8.0 (Itanium 2)
- > SUSE Linux Enterprise Server 9.0 (zSeries 64-bit)

The QA engineer must schedule 14 different platforms for this particular test cycle. The lab can re-image a computer with a new operating system version if the availability of 14 separate computers conflicts with other teams' needs, but this example is typical of the lab platforms and environments that teams request.

Typical Customer Needs and Requests

Internal customers want to plan for and reserve the resources that they need ahead of time. Looking forward helps with planning and consolidating purchases of lab equipment. Although the internal customers play different roles in the development process, all have similar testing needs. Usually they need access to certain platforms for a certain period of time. Few customers need root access, but they do want downtime notifications and information about the status of the platforms on which they plan to test. Usually requests that are beyond a platform, such as a request for Oracle 9i on AIX 5.1 32-bit, are application requests that become part of the request ticket for the resource.

Occasionally, request collisions can occur on specialty environments. The response to a duplicate request from two teams is to determine if the teams can share the resource. Often they can share the resource without negatively affecting performance. In fact, sharing resources might more closely simulate real customer environments (dedicated systems do not exist at every site). The lab team defines a shared resource with an open communication process, so that they can communicate changes such as a kernel version update. If sharing is not possible based on the type of resource or the performance demands of the test, the lab team dedicates separate platforms for testing.

Asset Management for Inventory and Record Keeping

This section describes how the BMC® Remedy® Asset Management tool helps the lab record all the lab assets and maintain a record of available platforms. The next section, "Scheduling Resources," describes how to use this information to populate the availability in a scheduling tool.

Importing Known Assets

As in many other IT organizations, the original inventory tracker for this test lab was a spreadsheet file that contained a record of all the available computers for the lab. They did not use an automated discovery process, such as the BMC Discovery Express product, for gathering information about each computer. The lab members knew the assets they had, tracked maintenance information, and stored the asset's hardware and operating system information in the spreadsheet. Fortunately, they could import the information in the spreadsheet into BMC Remedy Asset Management, thereby populating their known list of individual platforms.

In BMC Remedy Asset Management, internal customers can access the following information about available platforms and more:

- > Host name, Host type, Location, Owner name
- > Processor, Number of processors, Memory, Hard drive space, Hardware type
- > Operating system (OS), OS version, VMware OS, Multiboot OS

A search feature lets the customers enter the type of operating system, the number of processors, or other parameters for which they need availability.

Managing Change Requests Such as Patches

If an internal customer reviews the list in BMC Remedy Asset Management and finds that the patch level required for testing is not available, the customer logs a ticket in the BMC Remedy Service Desk tool. The lab team can look for trends in patch requests and perhaps permanently upgrade or patch a particular operating system if a patch or upgrade is consistently in demand.

When a server or application goes down and the monitoring tool does not discover it first, a customer can log a change request. For test systems, the lab team monitors the inbox set up specifically for the lab for these types of change requests and reacts according to severity and priority. For production systems, the team does not allow changes on build, packaging, or other infrastructure systems without approved change requests that have both IT and the customer on the approver list.

Scheduling Resources

By using the Application Programming Interface (API) provided with BMC Remedy Asset Management, the lab team can use the BMC Remedy Action Request System® as a scheduling platform. With this scheduling tool, internal customers can plan their matrix of platform requirements with the phases of software development.

The API informs the schedule of which resources are available. The development team member who needs a certain resource can view asset availability week by week.

Figure 1 Weekly Schedule at a Glance



Looking for Collisions and Resolving Schedule Conflicts

The lab team uses the API to create a weekly view of the lab resources. QA engineers can match their matrix of platform requirements with the weeks that they expect to complete different levels of testing.

To help internal customers understand which types of servers are available and which privileges they have for each type of server, the lab team defines servers using the following definitions for reservations:

Shared Servers - Lab servers that support QA product testing are generally set up in a shared access mode. Multiple teams can use these servers simultaneously, and the testing environments needed by each team (database installations, system configurations) are configured by the lab team. QA and Support teams for all distributed-systems products primarily use these servers. No destructive development or testing is permitted, and access is cut if abuses are identified. Work on shared servers must be scheduled with the lab team. Scheduling is required to maintain workloads and schedule maintenance periods for lab equipment.

Checkout Servers - Several servers of each OS type are reserved for stand-alone work. A product team may check out these servers for up to two weeks at a time. The product team has exclusive use of this server or environment in up to two-week increments.

Dedicated Servers - These servers are preconfigured environments that are permanently checked out to a particular product team. These servers are usually specialty environments or resources purchased and maintained for support of a particular product.

Production Servers - Build servers, lab-management servers, and other static environments are not available for general use. Access is restricted, and no system changes, updates, or product installations are allowed without consulting the lab team or the product team who owns the servers.

Depending on the testing needs, a combination of Shared and Dedicated Servers meets the needs of nearly all development teams at BMC Software. By using development roadmaps and planning cycles, the lab team can anticipate peak demand for these servers. Eventually, the team will correlate planning cycles directly to the lab resources to look for trends that indicate high demand on resources.

Monitoring Computer Resources

The lab team uses BMC Performance Manager Express agentless monitoring tools to monitor the

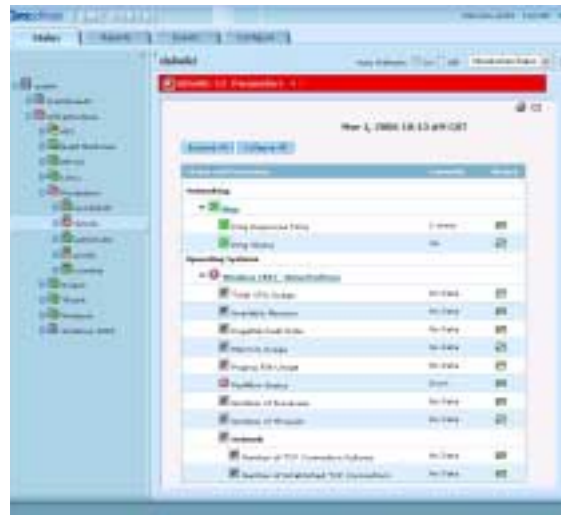
lab servers. This monitoring enables the QA and development team members to check the status of servers at any time by using a URL provided on the lab's website.

Currently the team is monitoring operating system and hardware parameters such as total CPU usage and free disk space. They are not monitoring applications such as Oracle, even though BMC Performance Manager for Databases offers application monitoring for Oracle, Microsoft SQL Server, and Sybase. The lab team decided that remote monitoring offered "just enough" information for their environment.

Helping Users Set Monitoring Notifications for High Availability

Using the Groups feature of the BMC Performance Manager Portal interface, internal customers simply click a link to get a list of their computers. The lab team creates preset logins for each team, which allows the lab team to control the groups and define which computers are in each group. The QA engineer can get notifications for those computers based on configured parameters. For example, if a process stops on a Saturday during time-sensitive regression testing, the BMC Performance Manager Portal can page or e-mail the QA lead, depending on the notifications that they have set.

Figure 2 BMC Performance Manager Monitoring



Tracking Incidents and Requests

The lab team is service-oriented, and all work requests are honored regardless of how they are submitted, whether by e-mail, phone, or walk-ins. However, the team strongly encourages lab users to log tickets using the BMC Remedy Customer Support system, which helps the lab track and prioritize work. The customers who need resources or patch management can log a help ticket either by sending an e-mail message to a certain address or by using the BMC Remedy Help Desk application and filling out the form using specific Category, Type, and Item information. No matter how a request is received, the lab personnel put it into the customer support system.

When the scheduling tool detects a scheduling conflict, the tool sends an e-mail message that creates a help ticket in the BMC Remedy Customer Support tool. The lab team monitors their inbox constantly to ensure that they find scheduling conflicts right away and work on hardware or software issues when they arrive.

Analyzing for Trends and Future Planning

The lab team continues to improve and analyze their processes, constantly looking for trends and more automation methods. Their ultimate goal is to move from a reactionary culture towards a mature proactive culture.

Moving from Reactive to Proactive Behavior

Although a lab or support environment must be reactionary at times, based on the needs of its customers, a lab team wants to minimize those reactionary moments when it can. One way to move from reactive behavior to proactive behavior is to reward team members for proactive behavior. For example, the distributed-systems lab manager keeps a point system in which a lab team member gets twice the credit for doing work related to planning or automation.

In an effort to get a jump start on purchase consolidation, the lab team exhibited proactive behavior. They compiled information about all computer requests from their cost center, looking for multiple requests for similar platforms (or platforms that could be made similar with bare-metal provisioning). Using trend analysis aided by their asset management and scheduling tools, the team determined when they might run out of AIX platforms, which enabled them to plan hardware purchases timed precisely to future needs. Timing purchases also helps save the company money and ensures that the lab purchases platforms only when

the need is high. The team was able to save over \$2 million over three years by using the historical data that they had gathered and by looking at the year ahead in terms of purchase requests from multiple teams. Without the data from their asset management and scheduling tools, they could not have planned ahead for so much in savings.

Automating More Processes

The team constantly looks for opportunities to automate more processes. For example, they hope to use BMC OS Manager (formerly Marimba OS Management) or BMC Application Manager (formerly Marimba Application Management) to re-image a computer automatically when a request comes in for a new platform version number. By storing platform images that can be accessed and started automatically when a request ticket comes in, the team members can keep a hands-free approach to platform requests.

Another area for automation is related to the performance monitoring that they currently accomplish using BMC Performance Manager. Ideally, the team looks for opportunities to use scripts that automatically fix the cause of an alert when an alarm goes off.

Discovery tools could learn about hardware changes, such as an additional processor or memory, and could automatically update the BMC Remedy Asset Management system with that hardware information. The team has been evaluating the BMC Discovery products and looks forward to implementing automation around change and configuration management for hardware platforms.

Conclusion

This example provides ideas for encouraging proactive behavior in your organization by using resource management methods that apply Business Service Management principles. By looking at the IT tools that they had available and finding ways to get those tools to share data, the lab team was able to schedule nearly 1,000 resources so that QA and development teams could work at peak efficiency. This lab team has invented a new, efficient system for their customers' needs in resource management. Although resource management does not directly match an ITIL guideline, the team found ways to use ITIL categories such as Asset Management, Change Management, and Service Desk principles to work for their customers and their environment. You can use many of these principles when performing resource planning for many different types of resources.

Helping you maintain advantage

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