



U.S. General Services Administration



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Office of Citizen Services and Innovative Technologies

Leveraging Cloud Services

Monitoring Usage to Support a Government-Wide Marketplace



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1. Introduction

The second point of the “25 POINT IMPLEMENTATION PLAN TO REFORM FEDERAL INFORMATION TECHNOLOGY MANAGEMENT”¹ by the US CIO calls for the creation of a government-wide marketplace for data center availability. This call to action is to allow departments and agencies that need more data center capacity to find it within already operational government data centers with spare capacity—and for those organizations with spare capacity to drive up their utilization and charge other users for the resources they consume. This approach has significant advantages for both the “buying” and “selling” organizations by increasing asset utilization, reducing costs, and reducing the time needed to acquire additional IT resources. In this paper, we will describe an approach for Federal data centers to gain the ability to implement this requirement.

2. Description of Problem & Goals

For any marketplace to succeed, there must be a method for sellers or providers to charge buyers or users for the products and services they consume. In this case, a providing agency must be able to track resources used and the consumers of those resources, as well as their costs for providing those services. Although many agencies currently have chargeback mechanisms within their organizations, these are often based on pre-determined shares or percentages of costs, without an accurate measuring and monitoring system. Measuring IT resource use has long posed a challenge, with cost allocation products typically unable to work effectively in today’s distributed and virtualized computing environments.

3. Description of Approach, Rationale, Results & Timeline

To be successful in marketing your excess capacity, you need to be able to monitor your environment, measure usage, and bill appropriately, based on usage and services provided, which can be especially challenging in shared-service or cloud environments.

Critical concerns to be considered include:

- Specifics regarding the consumption of IT resources
- The cost of resources consuming IT resources, including those that are shared
- How to allocate cost for chargeback, ROI, costing analysis, and billing

To address these concerns, you need data collectors for IT infrastructure that can review consumption across multiple dimensions; a costing engine that assigns cost to resource usage; and a costing and reporting engine that associates usage costs to consumers of IT resources.

Government agencies need a robust monitoring solution

To present a complete and actionable solution, the monitoring solution must address the complex and heterogeneous environment of today’s modern data center, which involves the ability to process information from various IT systems using data collectors and other interfaces, and then analyze and store that information in a central database. The monitoring solution must work with various operating environments from multiple vendors such as:

- Microsoft Windows
- VMware

¹ Vivek Kundra, US Chief Information Officer, 25 POINT IMPLEMENTATION PLAN TO REFORM FEDERAL INFORMATION TECHNOLOGY MANAGEMENT, December 9, 2010.

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- UNIX (IBM AIX, HP-UX, and Sun Solaris)
- Linux (Red Hat and Novell SUSE)
- IBM i5/OS, AIX, z/OS and z/Linux

In addition to collecting data at the operating system level, it is important to be able to monitor certain critical enterprise resources that can span systems. These resources include databases, internet infrastructure components, and email systems, as well as storage, network, and print environment components. With the software's data import collection capabilities, the monitoring system should be able to also collect data from any application or system that provides an interface or application programming interface (API) to enable data extraction for customized use.

As the government embraces cloud computing, this solution will need to accommodate a hybrid environment, including all shared IT resources (cloud and non-cloud related) and allocate the costs of that usage to products, services, and lines of business. A suitable solution should provide a comprehensive view of IT consumer costs within a virtualized environment or across the enterprise. It should show who is using shared resources, what resources (including energy utilization) are being shared, and how much of these resources are being used. The solution should also provide a means to do billing based on this usage.

Government agencies need a comprehensive reporting system

A comprehensive monitoring system will also collect a vast amount of constantly updated data. To support both more efficient IT operations and accurate cost accounting, robust reporting is required. This reporting needs to be flexible to support allocation of costs by division, department, section, user, and project. To support the variety of possible resources tracked and charged for, and users charged back, a comprehensive set of easy-to-customize report types should be provided to cover an organization's specific needs and preferences.

Reporting should enable the following key capabilities:

- The ability to invoice users based on popular cost allocation methods by business unit, division, department, section, user, project, and application
- The ability to track and report departmental or agency or bureau use and related costs of virtualized servers
- The ability to support usage data from multiple virtualization environments
- Flexible and easy-to-use browser reports with instant drill-down capability

To reflect the real-time nature of this data and to support more efficient IT operations, monitoring solutions should have the ability to present information collected through customized dashboards. These dashboards allow administrators to track performance, availability, use, and capacity of resources, and to proactively forecast and plan for future needs. For example, administrators should be able to easily track the usage of resources based on the services requested, and provide that information to development and test managers so they can adjust resource reservations to support their projects. Because the development and test managers can see the utilization of the assets their teams have requested, they are able to identify and release assets that are no longer required, as well as to manage their budgets because they can see the resources they are consuming and for which they will be billed.

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Case Study #1

Summary:

A specialized provider of IT services, based in the US, avoided more than \$4.5 million in capital expenditures, saved more than \$3 million in operational expenses, increased average server utilization from 5% to as much as 60%, and delivered improved services to its users when it implemented a cloud computing solution using IBM Tivoli software for usage monitoring and charge-back.

Solution:

IBM Tivoli Usage and Accounting Manager (TUAM) provides an extremely flexible, end-to-end tool that helps improve IT cost management by appropriating costs to an organization's products, services, and business functions, and then allowing cost allocation or charge-back to the consumers of the services. As indicated in the following figure, TUAM measures, analyzes, reports, and bills the use and costs of different computing resources, including servers, storage, networks, databases, virtualized environments, power, messaging, and many other shared services, such as those based on a Service Oriented Architecture (SOA).

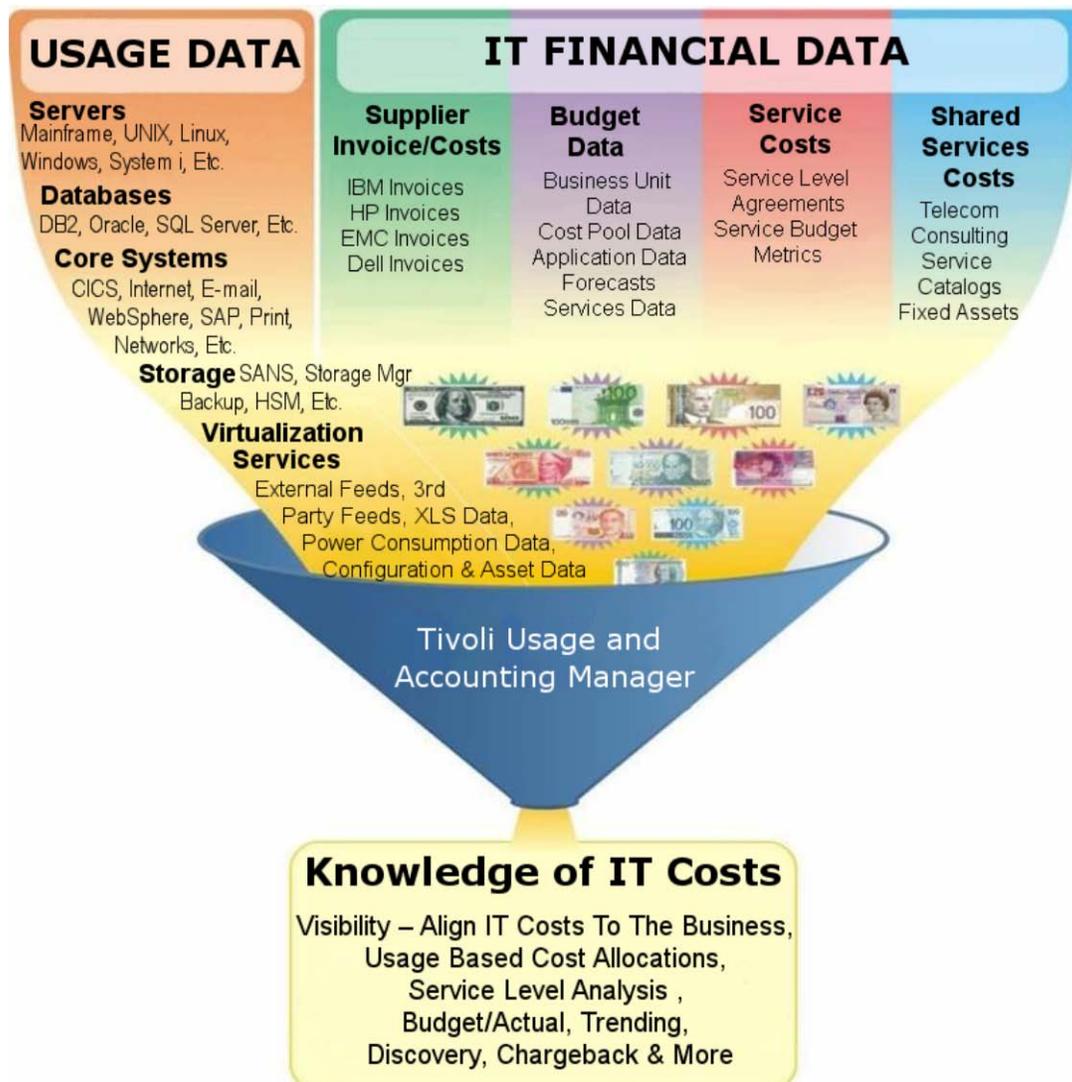


Figure 1: Tivoli Usage and Accounting Manager allows agencies to monitor who is consuming resources, how much those resources cost, and to invoice them appropriately.

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By using TUAM, this organization was able to fully understand its costs and track, allocate, and invoice based on actual resource use by agency, department, user, and many additional criteria. TUAM assisted the organization by aggregating and reporting on the use of applications, servers, storage, networks, and other IT resources, as well as their complex interactions across distributed and mainframe platforms.

The IT services company was able to centralize its IT asset information so staff could define and implement detailed life-cycle workflows to track and manage assets throughout their life cycle. With all asset information in a single application, the staff could quickly search, identify, and deploy inactive assets from a base of more than 30,000 virtual systems to meet a development need worldwide; simply “plugging in” a virtualized infrastructure anywhere in the world increased capacity. Users authenticated against the employee directory to quickly provide secure access to this private cloud.

In just ten months, the team deployed a secure private cloud that enabled the organization to get more use out of existing resources and avoid significant capital expense. So far, the IT services company has avoided more than \$4.5 million in capital expenditures and saved more than \$3 million in operational expenses with its move to cloud computing. Average server utilization has risen from 5% to as much as 60%.

Additionally, the organization provides increasingly better service to its users by delivering services more rapidly, consistently, and with fewer errors. Because they have greater visibility into the usage of their assets, the company has been able to reduce average delivery times for new resources from months and weeks, to days and hours. This improved service enables developers and testers to complete higher-quality work and deliver products to market faster, which results in increased competitiveness and higher revenue for the company. The organization anticipates management and administration costs will continue to decline as service delivery processes are increasingly automated and staff is redirected to work on high-value activities and innovation projects.

Case Study #2

Problem:

The Governor of a large state determined that state agencies needed updated and more cost-effective, secure, and reliable technology to drive down costs and enable sound decisions. IBM was selected to help the state transition to an efficient, stable, and flexible infrastructure capable of handling the state’s future IT needs. To modernize the process of allocating costs and usage reports across the agencies, the state needed to be able to allocate costs and bill or charge back appropriately.

Solution:

IBM successfully deployed TUAM to provide cost transparency to state agencies and other users, allowing the state recovery of not only technology costs, but also costs from other vendors supplying related services. The cost allocations and reporting covered 13 agencies within IT control and over 18,000 customers across the state, including local entities. The charging system presents charges for over 120 resource units for technology and telecommunications services, enabling the state to create a marketplace for IT resources that serve multiple government entities at the state and local levels. The solution meets increasingly complex and stringent government and audit requirements and provides a platform for future financial and reporting requirements.

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Summary

As the federal government implements a government-wide marketplace for data center availability, agencies will need a mechanism for monitoring usage to enable billing. Such monitoring is especially challenging in today's hybrid, virtualized environments. IBM offers solutions, such as TUAM, to address these issues and provide government agencies with the monitoring, management, and billing capabilities needed to support the IT reform initiatives.

4. POC and Vendor information

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