

# Citigroup transforms application development with an IBM cloud solution

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## Overview

### The need

Citigroup wanted to dramatically reduce time to market by rapidly accelerating development cycles for the company's more than 20,000 internal application developers, who were typically forced to wait up to 45 days for server resources to be provisioned.

### The solution

Citigroup built an internal cloud using IBM® Cloudburst™ and Tivoli® software solutions, enabling self-service request, automated provisioning, and internal chargeback capabilities, while at the same time boosting utilization rates and improving operational efficiencies.

### The benefit

With the IBM solution, Citigroup slashed server provisioning times from 45 days to less than 20 minutes, speeding development cycles and allowing the company to put new features and enhancements in the hands of customers more rapidly.

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Based in New York City, Citigroup Inc. is one of the world's leading financial services companies. Citigroup has approximately 200 million customer accounts and conducts business in more than 140 countries. Through two divisions—Citicorp and Citi Holdings—the company offers a broad range of financial products and services for consumers, corporations, governments and institutions, including consumer banking and credit, corporate and investment banking, securities brokerage, transaction services, and wealth management.

## Meeting the needs of a global development community

A division called Citi Technology Infrastructure (CTI) serves as the IT backbone for Citigroup and is responsible for more than 60,000 physical and virtual servers located in 14 data centers. These servers include 8,500 development servers, serving Citigroup's community of more than 20,000 internal application developers. This massive development team is responsible for improving customer experiences through thousands of new development initiatives annually. Unfortunately, these developers have historically had to wait as long as 45 days to receive a provisioned server they had requested—a natural symptom of dealing with physical infrastructures.

In 2010, Citigroup began looking for a smarter approach to service delivery, including one that would automate and expedite the procedure for requesting and provisioning development servers for writing and testing code. Led by a core team of five Citigroup employees, the ultimate goal was to build an internal cloud that would give developers an automated, self-service process for submitting development server requests, which typically number between 2,500 and 3,000 annually, and would give CTI an automated process for provisioning those resources. “We saw this as an evolution of IT infrastructure that goes from a dedicated world where servers are built to order, to a virtual infrastructure in which the focus is on improving the utilization rates of our infrastructure,” says Graham Hill, senior vice president at Citigroup.



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### Integrated

- Unified virtual machine provisioning, administration, patch management and usage accounting processes on a single platform
- Integrated the development server request process with an existing employee self-service portal

### Automated

- Automated administrative tasks to improve systems administrator ratios and reduce operational overhead
- Automated provisioning processes to reduce provisioning times from 45 days to less than 20 minutes

### Protected

- Improved the security and compliance of development servers with automated agent-based patching
- Ensured consistent security configuration of new development servers

### Transformed

- Dramatically accelerated development lifecycles and reduced time to market for new applications and features that enhance the customer experience
  - Enabled smarter use of resources by increasing server utilization rates, implementing chargeback capabilities and automating administrative tasks
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## Building a global development solution—in the cloud

After a number of successful proof of concept phases using the IBM Cloudburst Appliance, Citigroup decided to implement a private cloud based on the Cloudburst software architecture. Instead of taking a staged approach to hardware and software provisioning, Citigroup's cloud deployment offered both infrastructure as a service and software as a service from the outset. This architecture gives Citigroup the flexibility to optimize service delivery in a number of areas over the long term.

The solution enables image-based standard OS deployments with predefined middleware stacks running on a bank of Intel® processor-based commodity servers. Plans are underway to extend cloud deployment to IBM Power Systems™ and IBM zEnterprise™ System running Linux® on System z®. Once it is deployed to the zEnterprise 196, Hill says Citigroup will be able to offer the world's fastest private cloud.

To support service delivery processes, the team selected a suite of IBM Tivoli automation software solutions. Tivoli Service Automation Manager provides automation of administrative tasks, and Tivoli Provisioning Manager manages the provisioning workflow. Tivoli Usage and Accounting Manager enables usage-based chargeback to the relevant department, a process that encourages timely decommissioning of servers that are no longer required.

## Accelerating time to market

Jonathan Moore, senior vice president at Citigroup, says improving time to market for new applications has always been the primary driver to create an internal cloud. "Time to market was one of the key complaints that we got from the development community," Moore says. "It forced us to look at our process of server provisioning, and this is when we decided to place our development in the cloud. With this implementation, we've reduced provisioning time from 45 days to less than 20 minutes, after approvals."

As a result, developers can begin work on new initiatives without delay, and the combination of hardware and software as a service provides them with flexible middleware deployment scenarios.

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Solution Components:

**Software**

- IBM® CloudBurst™ Appliance
- IBM Tivoli® Service Automation Manager
- Tivoli Provisioning Manager
- Tivoli Usage and Accounting Manager
- Tivoli Endpoint Manager

**Hardware**

- IBM zEnterprise™ System
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## Slashing operational overhead through automation

Requests for development servers are now handled through an internal self-service portal called Citi Marketplace, where the company's 250,000 employees can order everything from staplers to smart phones. These requests set off a secure, automated process for provisioning resources in the cloud—a process that has dramatically improved systems administrator ratios, helping to reduce operational overhead. A systems administrator who supported 50 servers in the physical environment can now support more than 600 servers in the cloud.

To help ensure security and continuous compliance in the cloud, Citigroup relies on Tivoli Endpoint Manager. Built on BigFix® technology, Tivoli Endpoint Manager provides unified, real-time visibility and enforcement for software patches by installing an intelligent agent on each endpoint. "The biggest operational overhead is systems administration time," explains Hill. "Tools like Tivoli Endpoint Manager automate functions that otherwise take up a considerable amount of time."

## Transforming IT for enhanced customer experiences

The resulting transformation has been significant—not to mention very popular. Citigroup has provisioned more than 550 virtual machines in the cloud so far, and demand for the new service continues to grow. For example, Citigroup is now taking full advantage of the cloud development environment to support a major development project for the company's retail banking experience.

"The doors have just been opened," says Jason Bisson, a vice president at Citigroup. "Certainly people who are provisioning virtual machines or requesting virtual machines for development are moving to this as soon as they know it's available. It's just a North American initiative right now, but we've got people around the world knocking on the door."

The reason for this overwhelming popularity is simple. Says Hill, "It lets our developers launch new features and enhancements more rapidly, which improves our customer experience in a shorter timeframe. You want developers coding as soon as possible, not waiting for servers. With our development cloud, when a new project comes along, we're ready."

## For more information

To learn more about smarter computing from IBM and how we can help you integrate, automate, protect and transform your IT, contact your IBM representative or IBM Business Partner, or visit [ibm.com/smartercomputing](http://ibm.com/smartercomputing)

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April 2011  
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