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WebSphere Everyplace Server, Service Provider Offering for Multiplatforms
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Contents

Overview

With the growing popularity of handheld computing devices, such as cellular phones, personal data assistants (PDAs) and pagers, many telecommunications and Internet service providers (ISPs) are becoming concerned about the ability of their digital communications infrastructures to efficiently handle the growing workload. With the spreading use of applications, such as location-based services, short messaging service, onboard Internet-connected automotive systems, wireless reservation systems and wireless financial transaction systems, the demands on wireless service providers are growing dramatically. Other Internet-connected devices are also emerging, for example, home gateways and connected appliances. IBM WebSphere® Everyplace™ Server, Service Provider Offering for Multiplatforms (WebSphere Everyplace Server) was introduced to help customers extend e-business support to this new class of Internet-connected devices.

WebSphere Everyplace Server is intended for enterprises, content providers and service providers. These customers anticipate the number of devices connecting to their networks will grow to hundreds of thousands, or even millions. They require an infrastructure that scales to accommodate this growth. IBM conducted an evaluation test known as "The WebSphere Everyplace Server 20-Million-User Test" to satisfy this need. The test was designed to demonstrate that in this case WebSphere Everyplace Server is scalable to support large numbers of users (20 million) and that many of these users can access the system simultaneously, during peak periods, with a reasonable response time.

A WebSphere Everyplace Server configuration was defined and scalability measures were used to ensure that the configuration could support the required load. Multiple instances of the Everyplace Wireless Gateway component were installed on different machines and configured as a software cluster. Two other WebSphere Everyplace Server components, Everyplace Authentication Server and IBM HTTP Server, were configured in load-balancing clusters, with IBM WebSphere Edge Server used for load balancing among different instances of these components. The IBM SecureWay® Directory and Tivoli® Personalized Services (TPSM) databases were configured for fast search and access operations.

The WebSphere Everyplace Server configuration was populated with 20 million users. Two representative user scenarios were run using a Wireless Access Protocol (WAP) simulation tool to create requests from users. The test demonstrated that, in the environment used, WebSphere Everyplace Server can scale to accommodate the millions of users anticipated by customers, with large numbers of these users

accessing WebSphere Everyplace Server services simultaneously and with response time below five seconds. IBM plans to conduct additional tests that include more scenarios and test more WebSphere Everyplace Server components for scalability and performance.

Introduction

In the last few years, a new class of devices, called pervasive computing devices, emerged and gained popularity with consumers and businesses alike. These devices include cellular phones, PDAs, residential gateways and others. Such devices can be connected to the Internet and corporate networks over wired and wireless connections. End users want access to consumer Internet data, such as weather, maps, e-mail, product information and financial transactions through pervasive computing devices, as well as personal computers. Businesses interested in supporting pervasive computing devices include two important categories. Businesses that provide access to:

- *Products for customers*
- *Enterprise information and line-of-business applications for employees*

IBM introduced WebSphere Everyplace Server to help its customers extend e-business to support this new class of devices. WebSphere Everyplace Server provides connection services, authentication services, device management, rendering and subscriber services for pervasive computing devices.

As the popularity of pervasive computing increases, wireless telecommunications companies, ISPs and content providers have become concerned about the ability of their digital infrastructures to handle the increased load of wireless subscribers and quickly respond to user requests. A 10- to 20-second latency may be acceptable on a query from an office or home-based Web browser, but a wireless user on the move cannot be expected to wait for more than five to 10 seconds after a request for weather information, a stock quote or even the display of an e-mail message. What will happen to performance of wireless servers at the end of a busy week in a major metropolitan area, when a large number of wireless users decide to use their wireless services to request the closing prices of their stocks, the information on their flights out of town, or information about the weather in Chicago? Will the infrastructure be able to handle the workload?

To answer this question, IBM conducted The WebSphere Everyplace Server 20-Million-User Test, an activity designed to demonstrate that WebSphere Everyplace Server is scalable to support a large number of users (20 million). The test also demonstrates that many of these users can access the system during peak periods, with a reasonable WebSphere Everyplace Server response time, targeted to be less than five seconds. This paper describes the WebSphere Everyplace Server 20-Million-User Test, its system environment, configuration, assumptions and the results. It also describes some of the scalability mechanisms used in the project.

WebSphere Everyplace Server: components, functions and operating environment

WebSphere Everyplace Server is a comprehensive, integrated software platform for extending the reach of e-business applications, enterprise data and Internet contents into the realm of pervasive computing. WebSphere Everyplace Server enables delivery of existing content to new devices. It is a security-rich, reliable and flexible IT infrastructure that can scale to the growing number of network-connected pervasive computing devices. The following paragraphs describe the WebSphere Everyplace Server services and components.

Services

Services provided by WebSphere Everyplace Server are:

- *Connectivity gateways. Connectivity gateways encrypt data transmission and enable access from pervasive computing devices to content, data and applications over wireless and wired networks. They include the Everyplace Wireless Gateway and Everyplace Authentication Server components.*
- *Security. Security is built into the WebSphere Everyplace Server design. WebSphere Everyplace Server enables identification of users and authorization of what they may do or see. Strong encryption can be used to help keep information secure when transmitted over a nontrusted network.*
- *Device and subscriber management. WebSphere Everyplace Server manages devices and users separately, easing the burden of administration and system maintenance.*
- *Content handling and content transformation. WebSphere Transcoding Publisher enables transformation of existing content for delivery to new devices, eliminating the need to store and maintain multiple formats for the same information.*
- *Data synchronization. WebSphere Everyplace Server manages the automatic exchange and updating of e-mail, schedules, transactions and database replication between handheld devices and popular database servers. Users can work offline and connect to the network whenever it is convenient.*
- *Scalability and availability. Scalability and availability is an absolute requirement for handling peak loads and future growth. Scalability and availability through load balancing, gateway clusters and WebSphere Everyplace Server database configuration is discussed in more detail in a subsequent section.*

Components

The WebSphere Everyplace Server services are executed using these components:

- *Everyplace Wireless Gateway. Everyplace Wireless Gateway component provides connectivity over a large number of wired and wireless networks using Internet Protocol (IP) and Wireless Access Protocol (WAP). Everyplace Wireless Gateway provides user authentication for WAP and non-WAP users and data encryption. It supports IP and WAP transport layer security and can be configured to use a third-party RADIUS server. Everyplace Wireless Gateway also has software clustering capabilities. Multiple Everyplace Wireless Gateway components can be installed on different machines and configured as a software cluster. Software clustering provides improved availability, reliability and scalability*
- *Everyplace Authentication Server. Everyplace Authentication Server component acts as the point of entry to the WebSphere Everyplace Server domain for devices that do not connect through the Everyplace Wireless Gateway. It also authenticates users defined to WebSphere Everyplace Server when they attempt to access services it provides.*
- *Tivoli Personalized Services Manager. Tivoli Personalized Services Manager component provides tools to centrally manage subscribers and their devices and enables the creation of different groups of users.*
- *WebSphere Transcoding Publisher. WebSphere Transcoding Publisher component adapts, reformats and filters data based on destination device or network.*
- *Everyplace Synchronization Manager. The Everyplace Synchronization Manager component enables mobile devices to link remotely to applications, such as Microsoft® Exchange, Lotus Notes® or IBM DB2® databases.*
- *WebSphere Edge Server. In WebSphere Edge Server, the Caching Proxy component, retrieves Internet data for multiple clients and acts as a caching server and content filter. The Load Balancer component also provides load balancing for increased scalability and reliability and distributes traffic among multiple servers.*

Figure 1 shows the multiple ways that devices can connect to a WebSphere Everyplace Server domain, and the general functions available through it. You can connect through a third-party gateway (directly from the Internet or through a service provider gateway) or directly into the gateway provided by WebSphere Everyplace Server. After determining that the user is permitted to access WebSphere Everyplace Server services (using the Authentication Server and Active Session Table components), the gateway directs the user request to the desired service, such as accessing Web content or synchronizing data in the device with data in the network.

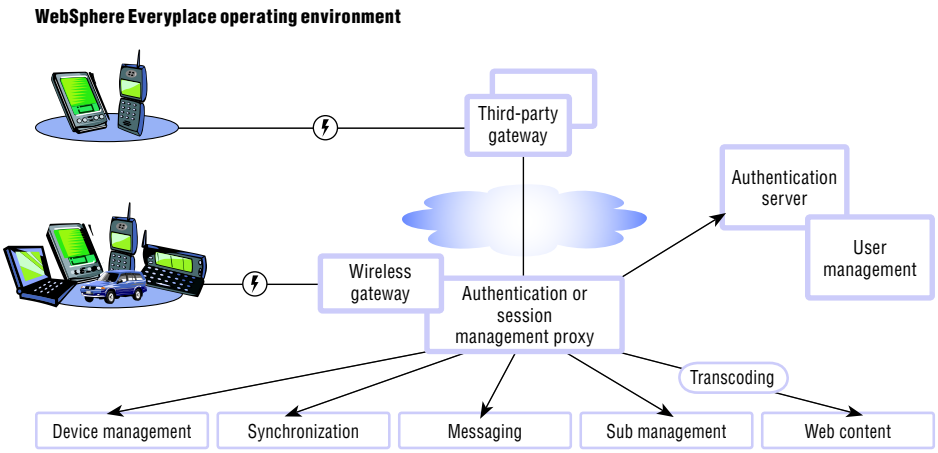

Figure 1. Devices connecting to a WebSphere Everyplace Server domain

The WebSphere Everyplace Server 20-Million-User Test

WebSphere Everyplace Server helps the following types of customers:

- *Enterprise customers. Customers that seek to extend intranet applications to pervasive computing devices and may also want to deliver selected Internet content to users*
- *Content providers. Customers that wish to deliver data, applications and services to consumers, including enterprises providing Internet portals and Internet commerce, finance and information Web sites*
- *Wireless ISPs and telecommunications companies. Customers that wish to provide subscription connection services to consumers and enterprise users*

WebSphere Everyplace Server customers usually have large numbers of users. Enterprise customers may have tens of thousands of employees. Wireless ISPs may have millions of subscribers. Some WebSphere Everyplace Server customers anticipate growing to 20 million users in a few years and require an infrastructure to support this growth. To satisfy this requirement, individual WebSphere Everyplace Server components must be scalable, and the component combination must support such scalability. Scalability is defined by the following measures:

- *Total number of users. The databases holding user information, such as user IDs, passwords and preferences should accommodate millions of entries. The search of these databases should be fast enough to not impact response time.*
- *Number of users accessing the system simultaneously. The largest number of users, the largest load, is expected during peak hours. As the number of users increases, the number of page requests or Web transactions to be processed increases also. WebSphere Everyplace Server components are designed for both horizontal (adding more hardware) and vertical (using more powerful machines) scalability.*

IBM Pervasive Computing Division and the High Volume Web Sites Performance teams conducted The WebSphere Everyplace Server 20-Million-User Test to ensure that WebSphere Everyplace Server could scale to support millions of users. The test proved that WebSphere Everyplace Server can support 20 million users with a large number of users accessing WebSphere Everyplace Server services simultaneously.

The main objective of the test was to demonstrate that an operational WebSphere Everyplace Server environment could be configured with 20 million subscribers and provide reasonable response time for expected maximum concurrency load of the system. For this test, a reasonable response time was considered to be five seconds or less. The maximum number of users accessing the system simultaneously, during the test interval, was 16,000. At this rate, a total of 354,000 users can access the system within one hour.

Test configuration

A system environment was set up at IBM SP Benchmark Center in Poughkeepsie, NY (Figure 2). WebSphere Everyplace Server components and simulators for WAP client requests were installed, using the following hardware, software and network configurations.

Hardware configuration

The following hardware was deployed for the test:

- *Twenty (20) nodes to run a WAP simulation tool, WAPSIM, to simulate the wireless devices working as WAP clients*
- *One (1) node for the SecureWay Directory database*
- *One (1) node for the Tivoli Personalized Services Manager (TPSM) database*
- *Two (2) nodes for the Everyplace Authentication Server component*
- *Five (5) nodes for the Everyplace Wireless Gateway component*
- *One (1) node for the Everyplace Wireless Gateway database*
- *One (1) node for WebSphere Edge Server (for multiple Authentication Server machines and IBM HTTP Server machines)*
- *One (1) node for IBM WebSphere Transcoding Publisher*
- *One (1) node for the enhanced Active Session Table (AST)*
- *Four (4) nodes for IBM HTTP Server*

Each node was a four-way IBM @server pSeries™ SP Winterhawk2. All nodes were 375 MHz and had 4GB of RAM, except for the SecureWay Directory, Tivoli Personalized Services Manager and Everyplace Authentication Server which had 8GB of RAM each.

Software configuration

WebSphere Everyplace Server, Version 1.1.3 was used for the test. The following WebSphere Everyplace Server components were installed:

- *Everyplace Wireless Gateway*
- *Everyplace Authentication Server*
- *Active Session Table*
- *SecureWay Directory*
- *Tivoli Personalized Services Manager WebSphere Edge Server Load Balancer*
- *IBM HTTP Server*
- *WebSphere Transcoding Publisher*

To enable WebSphere Everyplace Server software to handle the large number of intended users, three scaling mechanisms were implemented.

Networks

Two networks were constructed using the following:

- *A 100MB Ethernet, as the backbone for the WAP simulators network*
- *An IBM SP2® high-performance switch, used for communication between the middle tier WebSphere Everyplace Server and IBM HTTP Server or WebSphere Application Server systems*

The workload consisted of eight static Wireless Markup Language (WML) pages, representative of an initial page request from a consumer using a WAP device or phone, followed by a typical WAP session.

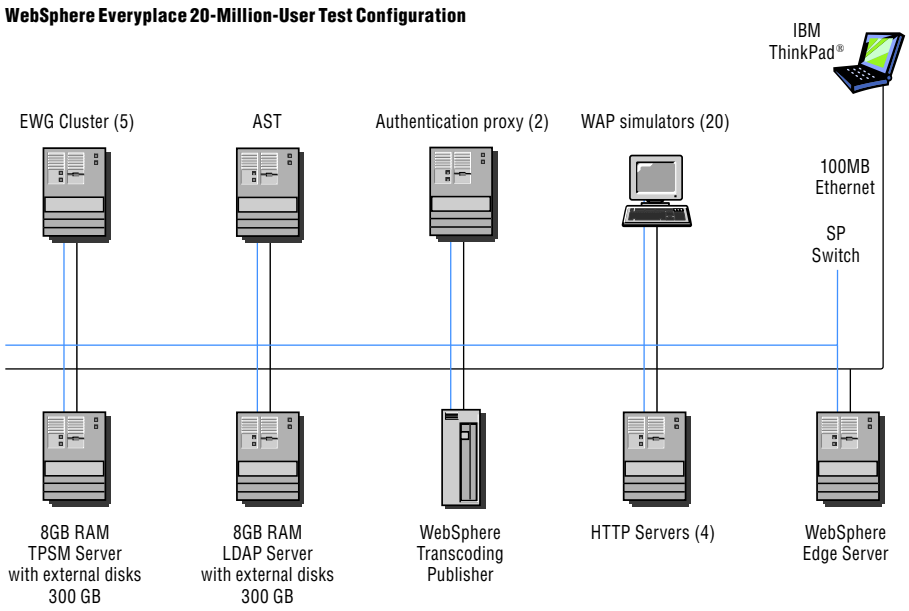

Figure 2. Test configuration. All nodes are 375 MHz 4-way WH2 systems with 4GB of RAM, except as otherwise noted.

Scaling mechanisms

Three different scaling mechanisms were used to accommodate the load in this test: gateway clustering, load balancing and WebSphere Everyplace Server database configuration.

- *Gateway clustering. Everyplace Wireless Gateway scales by linking multiple machines running Everyplace Wireless Gateway components in a software cluster. As demand increases, more Everyplace Wireless Gateway components can be added to the cluster. For this test, five Everyplace Wireless Gateway machines were connected in a cluster. An Everyplace Wireless Gateway configuration tool, Gatekeeper, was used to configure the clustered environment. One gateway was the primary node and the other gateway machines were subordinates. The primary gateway was configured to load balance the traffic onto the subordinate gateway machines.*
- *Load balancing. WebSphere Edge Server Load Balancer was used to load balance traffic to the Everyplace Authentication Server machines and the IBM HTTP Server machines. For example, the WebSphere Edge Server Load Balancer intercepts the Authentication Server requests and distributes the load among multiple machines each running an Authentication Server instance. As demand increases, more Authentication Server machines can be added, and the WebSphere Edge Server can be configured to direct some of the load to these machines.*

In addition to increasing scalability, gateway clustering and load balancing both serve to increase the availability of the system. For example, if one of the subordinate Everyplace Wireless Gateway machines in the software cluster fails, the new incoming requests can be distributed among the remaining Everyplace Wireless Gateway components. The same applies for the Authentication Server components and the IBM HTTP Server components. If one of them fails, WebSphere Edge Server simply directs the incoming load to the remaining instances of the component. The primary wireless gateway and the WebSphere Edge Server can be made highly available using a hardware cluster, such as the IBM AIX® HACMP clusters.

- *Database configuration. In addition to the two scaling mechanisms discussed above, WebSphere Everyplace Server databases were configured to quickly and efficiently load them with data for 20 million subscribers. The database configuration also supported fast search and access of data so that it would not impact the total WebSphere Everyplace Server response time to user requests.*

Two databases were used in WebSphere Everyplace Server as backstore for SecureWay Directory and Tivoli Personalized Services Manager. DB2 was used as the database for both components. The TPSM database contains subscriber information. A new entry is written to this database when a new user registers for a service. When a registered user attempts to use the service, the RADIUS component of WebSphere Everyplace Server performs a lookup in the TPSM database to start accounting information, and in some cases, to authenticate the user. The SecureWay Directory database contains a subset of the subscriber information that is held in the TPSM database. The SecureWay Directory database is queried when a user enters a service with an MSISDN number rather than a userid and password. The authentication proxy component of WebSphere Everyplace Server needs the userid and password that corresponds to the MSISDN number and obtains it from SecureWay Directory. Each of the two WebSphere Everyplace Server databases was configured and populated with 20 million users. Each database resided on its own SP2 Winterhawk node, and 300GB of memory was allocated to each node. The following paragraphs describe the methodology used for configuring TPSM and SecureWay Directory for the WebSphere Everyplace Server 20-Million-User Test.

When the SecureWay Directory database is created by WebSphere Everyplace Server installation, the database has three System Managed Space (SMS) tablespaces.

- *SYSCATSPACE*
- *TEMPSPACE1*
- *USERSPACE1*

The directory information is stored in the user tablespace (USERSPACE1). By default, there is only one container for the user tablespace. For the TPSM database, there are six SMS tablespaces. It is impossible and undesirable to store information for 20 million users on one disk. Better performance is achieved by spreading user information across multiple disks.

The physical layout of the database and the placement of data affects the performance of database operations. The overall objective is to spread the database across as many disks as possible to minimize the input/output wait. For each of the SecureWay Directory and TPSM databases, a volume group was created with multiple external disks (16 disks for SecureWay Directory and 30 disks for TPSM), and the data is stored across all of these disks.

The WAP Simulator Tool

WAPSIM is a WAP simulation tool developed by IBM in Yamato, Japan. It is used to simulate wireless device traffic to the Everyplace Wireless Gateway. The WAP Client Simulator simulates the wireless devices working as WAP clients. Though wireless devices typically establish the session with the WAP gateway over the wireless network, the WAP Client Simulator establishes a direct connection to the gateway through the User Datagram Protocol/Internet Protocol (UDP/IP) network. WAPSIM performs Internet Protocol (IP) spoofing, which means that it sends a different source IP address for each device being simulated. These IP addresses exist as aliases on the network adapter on each WAPSIM machine. In addition to client simulation, the tool reports on the success and response times of sessions. Twenty WAPSIM machines were used in The WebSphere Everyplace Server 20-Million-User Test, each capable of simulating 2000 WAP clients.

Test scenarios

Two test scenarios were identified. In each scenario, a new user request was followed by eight additional requests from the same user with a ten-second think time in between requests. All of the files used were actual WML/WBMP content available from sites on the Internet.

Userid and password scenario. WAPSIM sends a userid and password with the request for a WML file to the WebSphere Everyplace Server Wireless Gateway component. Authentication is performed by a Network Access Server (NAS).

MSISDN scenario. WAPSIM sends an MSISDN number with the request for a WML file to the Wireless Gateway. The Authentication Server component must look up the userid and password that corresponds to the MSISDN number in the SecureWay Directory database before forwarding the request. Data flow for each of the two scenarios is described in detail in the following paragraphs.

Userid and password scenario data flow

WAPSIM is used to send a userid and password, as well as a request for a WML or WBMP file to the Wireless Gateway. Authentication is assumed to have been handled by an NAS. Because the device sends the userid and password with the request, the Everyplace Authentication Server does not need to retrieve this information from SecureWay Directory (LDAP). Because the content is already in WML and WBMP formats, no transcoding is required. WAPSIM sends a preauthenticated request with userid and password to the Primary Wireless Gateway. WAPSIM performs IP spoofing, sending a different source IP address for each device being simulated. These IP addresses exist as aliases on the network adapter on each WAPSIM machine.

Primary Everyplace Wireless Gateway receives the initial request to initiate RADIUS, accounting for the device IP address, and registers this valid user to receive requests. Next, WAPSIM sends the first page request. The primary Wireless Gateway then routes the request to one of the subordinate gateways.

Subordinate Everyplace Wireless Gateway first converts protocols—WAP to HTTP—because the Authentication Server component accepts only HTTP. Then, it passes the request to Authentication Server. The request is intercepted by WebSphere Edge Server Load Balancer.

WebSphere Edge Server Load Balancer forwards the request to one of the Authentication Server machines.

Everyplace Authentication Server sends a request to the AST server to create an entry for this session. On subsequent requests the existing session table entry will be used.

AST creates an entry in the session table and sends an acknowledgment to Authentication Server of the active session.

Everyplace Authentication Server sends the client request to the Web server. This request is intercepted by the WebSphere Edge Server Load Balancer.

WebSphere Edge Server Load Balancer forwards the request to one of the IBM HTTP Servers.

IBM HTTP Server retrieves the page and returns it to the Authentication Server component.

Everyplace Authentication Server sends the page back to the subordinate Wireless Gateway.

Subordinate Everyplace Wireless Gateway converts protocols —HTTP to WAP— and returns the page to WAPSIM.

MSISDN scenario data flow

WAPSIM is used to send an MSISDN number with a request for a WML or WBMP file to the WebSphere Everyplace Server Wireless Gateway. The Authentication Server component must look up the userid and password that corresponds to the MSISDN number in the SecureWay Directory database before forwarding the request. Again, no transcoding is required. WAPSIM sends a preauthenticated request with MSISDN number to the Primary Wireless Gateway.

Primary Everyplace Wireless Gateway receives the initial request to initiate RADIUS, accounting for the device IP alias address, and registers this valid user to receive requests. The gateway then goes back to the WAP device, WAPSIM, in this case, and asks for the next request. WAPSIM sends the first page request. The primary Wireless Gateway then routes the request to one of the subordinate gateways.

Subordinate Everyplace Wireless Gateway first converts the protocols —WAP to HTTP— because the Authentication Server accepts only HTTP, then passes the request to Authentication Server. The request is intercepted by the Edge Server Load Balancer.

WebSphere Edge Server Load Balancer forwards the request to one of the Authentication Servers.

Everyplace Authentication Server performs a directory database lookup with the MSISDN number to get the associated userid and password. Authentication Server then sends a request to the AST server to create an entry for this session. On subsequent requests the existing session table entry will be used.

AST creates an entry in the session table and sends an acknowledgment to the Authentication Server component of the active session.

WebSphere Everyplace Server Authentication Server component sends the client's request to the IBM HTTP Server. This request is intercepted by the Edge Server Load Balancer.

WebSphere Edge Server Load Balancer forwards the request to one of the IBM HTTP Server machines.

IBM HTTP Server retrieves the page and returns it to Authentication Server.

Everyplace Authentication Server sends the page back to the subordinate WebSphere Wireless Gateway.

Subordinate Everyplace Wireless Gateway converts HTTP to WAP and returns the page to WAPSIM.

Results

WebSphere Everyplace Server performance and scalability were measured using the results from the two scenarios described earlier. Three measures of performance and scalability were taken:

- *Support for a large number of simultaneous users and requests*
- *Linear throughput as the load increases*
- *Effective load balancing*

Support for large numbers of simultaneous users and requests

Figures 3 and 4 represent the results achieved in The WebSphere Everyplace Server 20-Million-User Test for each of the test scenarios. The results show that the WebSphere Everyplace Server environment as configured for the test, populated with 20 million users, can support a large number of requests without degradation in performance.

In the userid and password scenario (Figure 3), when the requests arrived from a network access server, the environment supported simultaneous requests from 16,000 users (represented by eight simulators) and a page request rate of 518 pages per second with an extremely short average WebSphere Everyplace Server response time of 288 msec (0.288 seconds).

In the MSISDN scenario (Figure 4), when authentication was required by WebSphere Everyplace Server, the environment supported simultaneous requests from 12,000 users (represented by six simulators), requesting pages at a rate of 145.58 pages per second with an average WebSphere Everyplace Server response time of 3.674 seconds.

Note: These are not the maximum number of users that can be supported by the environment, but rather the number of users tested during the time allocated for the test.

Number of users	16,000
Number of WAPSIM drivers	8
Average response time in seconds	.288
Average session duration in seconds	163
User login rate per second	98
Page request rate	518.21
% of subscribers active in one hour	1.8

Figure 3. Userid and password scenario results

Number of users	12,000
Number of WAPSIM drivers	6
Average response time in seconds	3.674
Average session duration in seconds	200
User login rate per second	60
Page request rate	145.58
% of subscribers active in one hour	1.1

Figure 4. MSISDN scenario results

Linear throughput with load increase

After populating the WebSphere Everyplace Server databases with 20 million users, tests were conducted starting with simulating 1,000 users simultaneously sending page requests to WebSphere Everyplace Server. The number of simultaneous users was gradually increased. The throughput rate and the average response time are measured as the load increases. Figures 5, 6, 7 and 8 show that WebSphere Everyplace Server exhibited linear scaling. As more users were added to the system, the number of requests serviced grew accordingly and the throughput (average number of page requests per second) increased, while the response time (Figure 6) remained relatively constant.

The WebSphere Everyplace Server total requests chart (Figure 5.) shows the linear scaling capabilities of the WebSphere Everyplace Server system. As the number of users submitting simultaneous WML page requests to WebSphere Everplace Server increased from 1000 to 16,000. The total number of requests executed increased almost linearly from 90 thousand to 1.15 million requests. Linear scaling is also demonstrated by the throughput rate per second. Response time remains relatively constant and well within the five-second criteria

Effective load balancing

Two mechanisms were used for load balancing: WebSphere Everyplace Server Wireless Gateway clustering and WebSphere Edge Server Load Balancer. For balancing the load across four multiple gateways, four Wireless Gateway components were connected in a software cluster. A fifth gateway, the primary Wireless Gateway, received the incoming requests, then forwarded them to the clustered gateways.

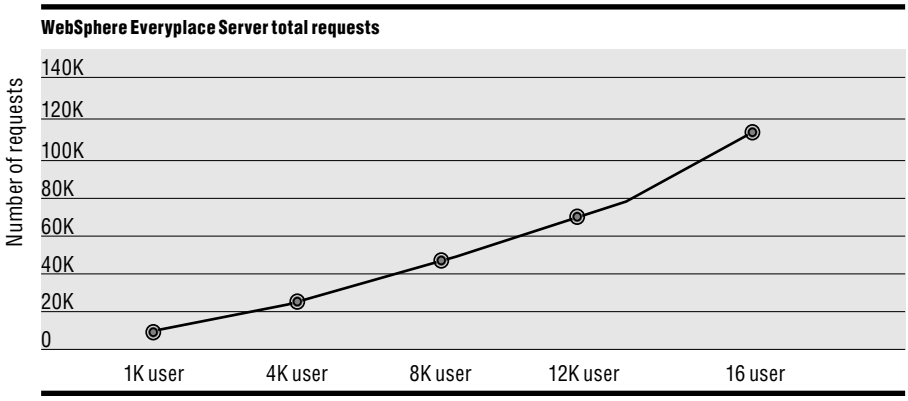

Figure 5. Total requests

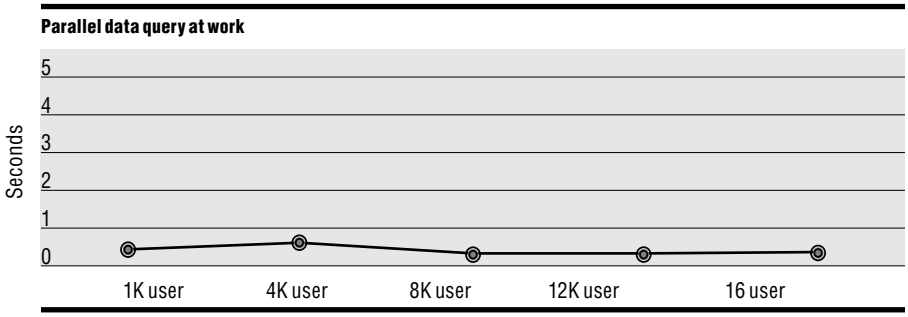

Figure 6. Response times

Figure 7 shows that the clustered WebSphere Everyplace Server Wireless Gateway components are load balanced. The primary gateway (wg66) routes the WAP requests to the subordinate gateways (wg67, wg70, wg71, wg72). The chart shows the excellent effectiveness of the load-balancing capability of WebSphere Everyplace Server Wireless Gateway.

Two Authentication Server components were used. They were load balanced using WebSphere Edge Server Load Balancer. Figure 8 shows that the load was spread evenly across the two Authentication Server machines. Similar results were obtained from the MSISDN scenario.

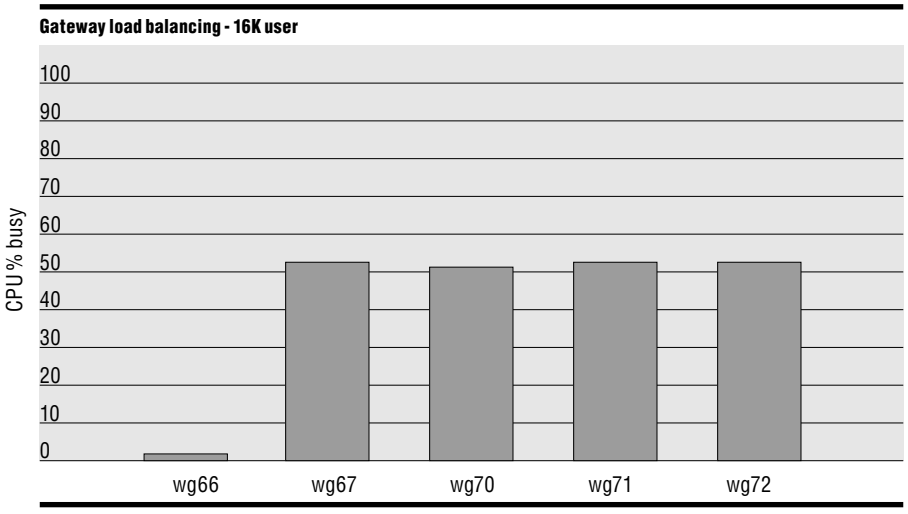

Figure 7. Gateway load balancing

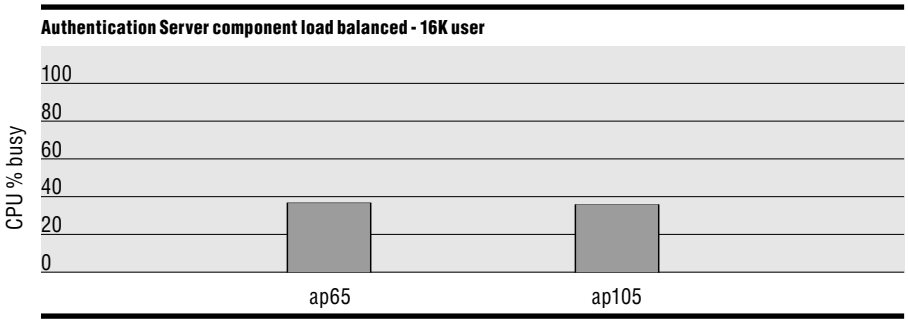

Figure 8. Authentication server load balancing

Summary

The WebSphere Everyplace Ser ver 20-Million-User Test conducted by IBM Pervasive Computing and the High Volume Web Sites Performance teams demonstrated that WebSphere Everyplace Server, Service Provider Offering for Multiplatforms is scalable and can support the large number of users anticipated by IBM customers. In this test, the WebSphere Everyplace Server databases were populated by 20 million users. To support such a load, different WebSphere Everyplace Server components were scaled using gateway clustering, load balancing and WebSphere Everyplace Server database configuration.

Two representative scenarios were run to measure the incoming load and the response time. In both scenarios, the response time was lower than the objective of five seconds, even with hundreds of thousands of concurrent users. More results from The WebSphere Everyplace Server 20-Million-User Test are being analyzed to define more WebSphere Everyplace Server performance data.

To demonstrate that other components in WebSphere Everyplace Server can scale to the required load, other tests are planned. For example, WebSphere Transcoding Publisher will be tested with scenarios that access existing data from pervasive computing devices. This type of scenario will require transformation of the existing data to accommodate device capabilities (such as screen size). Also, Everyplace Synchronization Manager component will be tested with scenarios that require synchronization of data on the device with data on the server.

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