IBM Worklight

IBM Worklight and Mobile Platform V5.0.6

Scalability and Hardware Sizing

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About IBM®

See http://www.ibm.com/ibm/us/en/.

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About this document

This document contains information about scalability-related parameters of the IBM® Worklight® Mobile Platform, and the scalability tests performed. It serves as a guide to the included hardware sizing calculator that is used to determine the required hardware for an IBM Worklight deployment.

This document is not a replacement for the IBM Worklight Administration Guide, which describes an IBM Worklight server architecture, server setup, and daily maintenance requirements.

1 Architecture
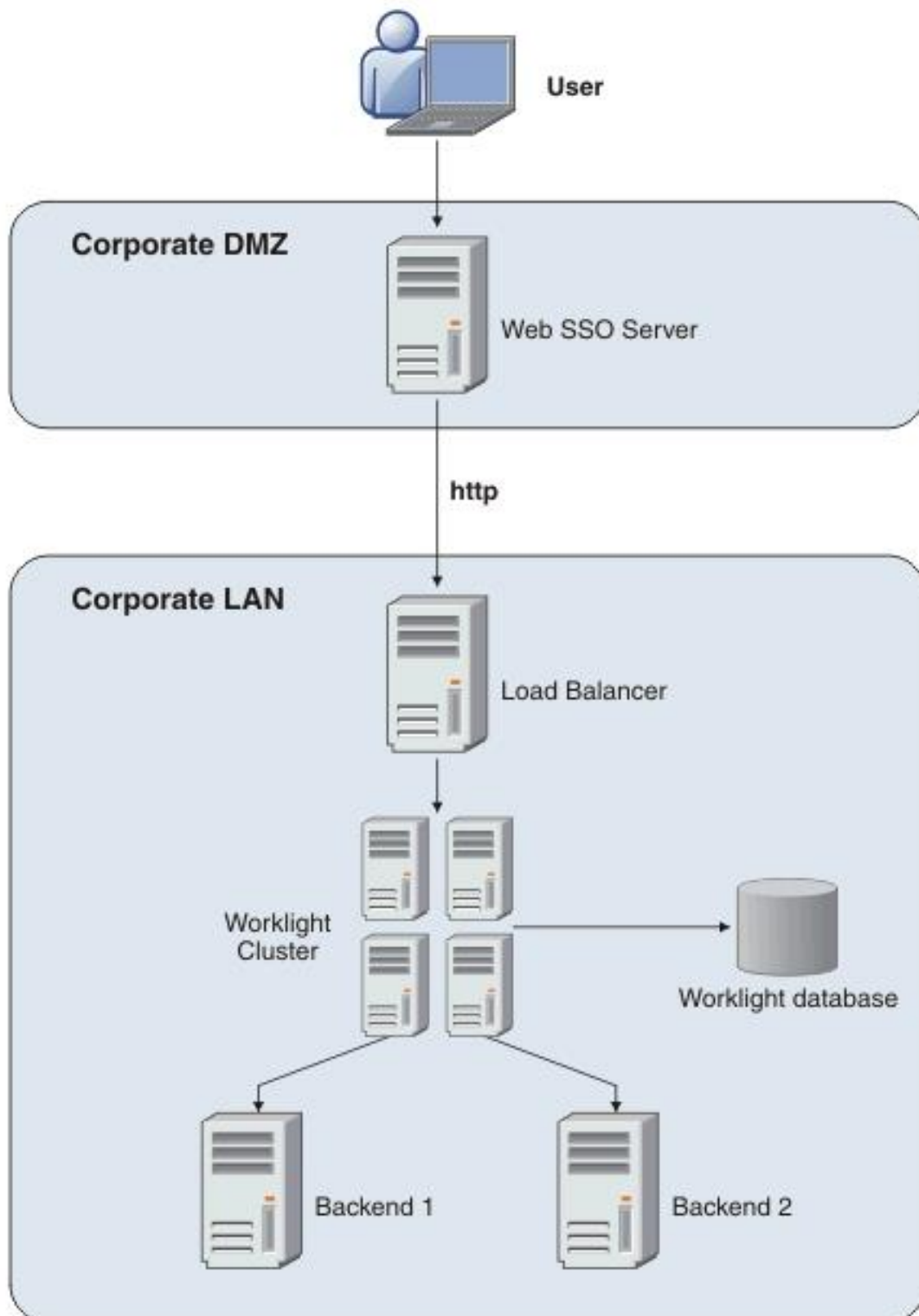
Figure 1-1: Typical IBM Worklight topology

The IBM Worklight topology is based on the following principles:

- Worklight® Server is installed in the organization LAN, connecting to various enterprise back-end systems.

- Worklight Server can be clustered for high availability and scalability.

- Worklight Server uses a database. The database is used for storing push notification information, and statistics for reporting and analytics. The database is also used to store metadata required by the server at run time. A single instance of the database is shared by all IBM Worklight servers. It is possible to cluster the database by using the tools and methods that are provided by the database vendor.

- Worklight Server is installed behind a web authentication infrastructure (Web SSO) acting as a reverse proxy, and providing SSL.

There can be different topologies, depending on the corporate network architecture, disaster recovery, different back-end systems, and so on.

2 Scalability Tests

IBM® conducted a series of scalability tests before releasing IBM Worklight®. The following table contains a short summary of the tests performed.

2.1 Tests

#	Test	Goal
1	Single user performance test	This test creates a performance baseline for future tests using a typical user scenario.
2	Basic stability	This test checks the basic stability and endurance of the server under some load. No crashes, memory leaks, or errors for 12 hours.
3	Regression from former version	This test verifies that the system performs at least as well as the former version.
4	Multiple user performance test	This test checks the performance of a typical user scenario under typical load.
5	Scalability tests	This test proves that IBM Worklight can linearly scale to multiple servers under a single database.
6	Endurance testing	This test proves that the server can stay up without memory leaks for a duration of 72 hours under a typical load scenario.
7	Stress testing	This test increases the load until the server reaches 100% CPU and starts failing. Reduce the load and see that the server is recovering.
8	Recoverability	This test stops various components of the IBM Worklight solution (internet, database, and back end). It starts components again and ensures that the server has recovered.

Table 2-1: Scalability tests performed

2.2 Test Flow

The test, which is run repeatedly, involves the following actions:

1. A typical banking application is simulated. It logs in, makes multiple calls for account list and transaction lists, and then logs out.

2. The IBM Worklight application server uses an HTTP adapter to call a simulated back end. On average, a client-IBM Worklight server call generates 1.1 requests that are sent to the back end.

3. The back end is called via HTTP and returns with a predefined response.

2.3 Hardware

The following hardware was used for IBM Worklight Application Server:

- 2 x Intel (R) Xeon E5540 2.53 GHz (4C, Hyper-Threading)
- 18 GB 1066 DDR3 ECC RAM

Note: Not all RAM was used. Use the accompanying calculator to compute required RAM).

- NetExtreme II BCM5790 Gigabit Ethernet
- 500 GB SAS HDD 6 GB/s

The following hardware was used during testing for the IBM Worklight database:

- 2 Intel Xeon 8C 2.3 GHz/20 MB
- 20 GB DDR3 RAM
- 6-7 500 GB 7.2 Krpm SATA disks
- 1 RAID 5 controller

IBM Worklight Client:

- Simulated by seven virtual machines running multiple client threads. Running Ubuntu 10.04 64-Bit 4 GB RAM
- Client load is achieved with jMeter, an open source server performance testing tool by Apache.

2.4 Results

Tests were successful in achieving the goals that are defined in Table 2.1. Specifically, the final test on a single IBM Worklight server ran for three days, without memory loss or performance loss. Throughput was measured at 2,000 requests per second per server with CPU at an average of 50% utilization.

3 Using the Hardware Planning Calculator

This document is accompanied by an Excel spreadsheet whose purpose is to help organizations calculate the required hardware for an IBM Worklight deployment.

The following table lists the main parameters that are required by the hardware planning calculator:

Parameter	Description	Effect
Application Server	Name of the server used: • "Tomcat" for Apache Tomcat • "WebSphere Application Server" for WebSphere® Application Server Full Profile • "Liberty" for WebSphere Application Server Liberty Profile	Server memory footprint for Tomcat is smaller.
Peak Throughput	Peak transactions/sec rate that is required by the customer.	Affects both CPU consumption and server memory.
Complexity	Worklight Server runs code that is written by the customer using Worklight Studio. An estimate is required regarding the complexity of the server-side code that is written for the customer, when compared to a baseline.	CPU consumption

Parameter	Description	Effect
Peak # of active user sessions	A session is an object that is stored in the server memory for each connecting device. Among other things, it stores authentication information. Active sessions are determined by the number of sessions that are opened versus the number of sessions timing out because of a lack of activity. The default session timeout is 10 minutes, and must be configured. Customers typically set this session timeout to anywhere from 5 to 10 minutes. The mobile client has a "heartbeat" property that allows the mobile client to ping the server while the app is in the foreground, so that the session does not time out. When a mobile app moves into the background, it no longer interacts with the server or sends a "heartbeat", leading to the server session dropping after the specified server session timeout. Example: If 1,000 users start a session against the server every minute, even if they exit the application after 3 minutes their session remains active on the server for 10 minutes, resulting in 10x1,000 = 10,000 sessions.	Server memory footprint
Server developer per-session overhead	Worklight Server runs code that is written by the customer using Worklight Studio. The server-side code can store per-session data.	Server memory footprint
Back-end delay (millisecond)	Average roundtrip time for a call to the back end of the organization.	Worklight Server latency
Reporting history required before purge (days)	IBM Worklight creates significant amounts of raw reporting data, which must be purged after aggregation. Otherwise, the system might slow down and disk space consumption might increase dramatically. Typical time between purges is 1-3 days.	Database size
Average Throughput as % of peak	The average throughput as compared to the peak throughput defined earlier. Reflects on the raw reporting data size.	Database size
Active hours/day	Number of active hours per day, used to compute the number of transactions per day and hence the reporting data size.	Database size

Table 3-1: Hardware planning calculator parameters

The calculator computes:

- The number of required servers. The server hardware baseline spec is as defined in the preceding test.

- The amount of RAM required for each server.
- The Worklight Server average request latency.

4 Push Notification

The hardware calculator can measure push notification, but this is not covered in this document. Depending on the expected message capacity, the effect on hardware sizing can vary from a negligent effect to a single Worklight® Server.

5 Database usage and size

5.1 IBM Worklight database usage profile

The IBM Worklight database consists of three databases:

- `WRKLGHT`: Main IBM Worklight database

- `WLREPORT`: Reports

- `APPCNTR`: Application Center, if used

For Oracle and DB2, you can use three schemas instead of three actual database instances.

The IBM Worklight database contains mostly metadata, with two notable exceptions:

- Push notification information: the list of users and devices who registered for push notification.

- SSO state information: SSO (Single Sign-On) is the ability for business customers to have multiple apps from the same organization. When they log in with one app, they automatically log in to the other device. Turning on the SSO feature puts a larger overhead on the database because SSO state information is read and updated to the database at the start of each client access to the server.

The Reports database contains a single table called `APP_ACTIVITY_REPORT`, which is append-oriented. Each transaction that is called from a mobile device generates an `INSERT` statement into this single table. This data feed accumulates a large amount of data on what the user does. The data is aggregated at specific intervals (by default, the interval is 20 minutes).

5.2 Database size

Database size is determined almost solely by the size of the data feed described earlier. The hardware sizing calculator attempts to help you in determining the expected size of this feed.

The application developer might also choose to add custom log messages, in which case the table size becomes bigger.

The size of the aggregated tables is negligent compared to the raw data.

Important: It is the responsibility of the customer to purge reporting data regularly, typically every 1-2 days.

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