IBM Worklight

IBM Worklight and Mobile Platform 5.0.5

Scalability & Hardware Sizing

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Figures and Tables

About this document

This document discusses scalability-related parameters of the IBM® Worklight® Mobile Platform and the scalability tests performed. It serves as an accompanying guide to the included hardware sizing calculator 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
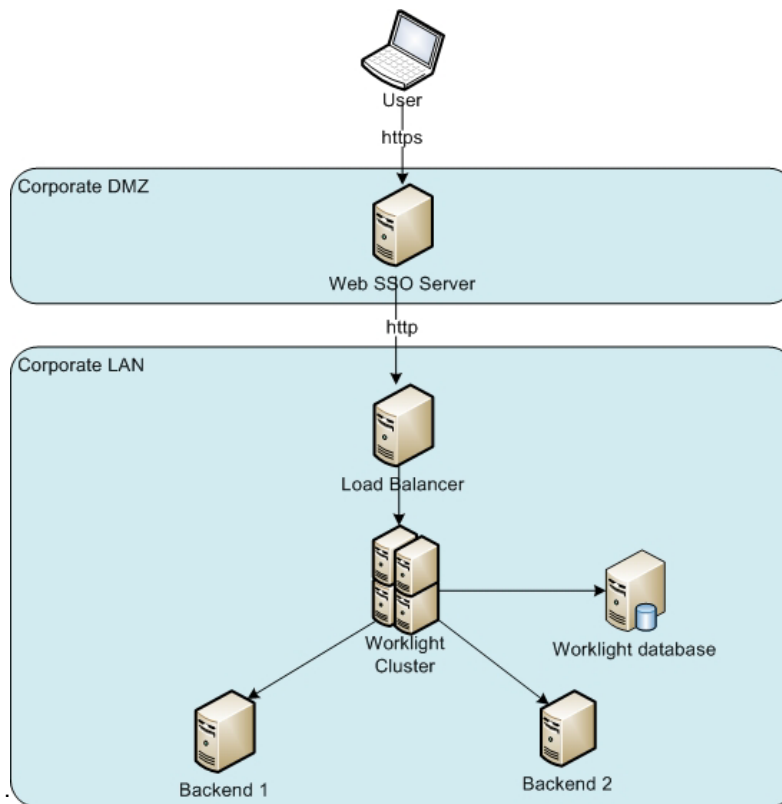
Figure 1-1: Typical IBM Worklight topology

Such a topology is based on the following principles:

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

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

- IBM Worklight Server uses a database. The database is used for storing push notification information, statistics for reporting and analytics and storing 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, using the tools and methods provided by the database vendor.

- The IBM 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 etc.

2 Scalability Tests

IBM® has 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 provides basic stability/endurance of server under "some" load. No crashes, memory leaks, errors for 12 hours.
3	Regression from former version	This test verifies that the system performs "at least as good" as the former version.
4	Multiple user performance test	This test understands 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 duration of 72 hours under typical load scenario.
7	Stress testing	This test increases the load until the server reaches 100% CPU and starts failing. Reduce load and see that the server is recovering.
8	Recoverability	This test stops various components of the IBM Worklight solution (internet, database, backend). 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 repeatedly run, does the following:

- A typical banking application is simulated to log-in, makes multiple calls for account list, transaction lists, and logout.

- The IBM Worklight application server uses an HTTP adapter to call a simulated backend. On Average, a client - IBM Worklight server call generated 1.1 requests to the backend.

- Backend is called via HTTP and returns with a canned 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 utilized, use accompanying calculator to compute required RAM)

- NetExtreme II BCM5790 Gigabit Ethernet

- 500 GB SAS HDD 6 GB/s

IBM Worklight Database:

- Hardware same as specified for the application server above.

IBM Worklight Client:

- Simulated by 7 Virtual machines running multiple client threads. Running Ubuntu 10.04 64-Bit 4 GB RAM

- Client load is achieved via jMeter – a popular open source server performance testing tool by Apache

2.4 Results

Tests were successful in achieving goals defined above table. Specifically, the final test on a single IBM Worklight server has run for 3 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 required by the hardware planning calculator:

Parameter	Description	Effect
Application Server	Name of Web Application Server used: Apache Tomcat, WebSphere Application Server or Liberty Profile	Server Memory footprint for Tomcat is smaller
Peak Throughput	Peak transactions/sec rate required by customer	Effects both CPU consumption and Server memory
Complexity	IBM Worklight Server runs code written by the customer using the IBM Worklight Studio. We require some estimate as to the complexity of the Server-side code written for the customer compared to a baseline	CPU consumption
Peak # of active user sessions	A session is an object 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 opened vs. the sessions timing out due to lack of activity. Default session timeout is 30 minutes. The default can and should be configured. Customers typically set this to anywhere from 5 to 10 minutes. Note that the mobile client has a "heartbeat" property which allows the mobile client to ping the server while the App is in the foreground so that the session will not time out Also note that when a mobile App moved 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: Suppose every minute 1,000 users start a session against the server. Even if they exit the application after 3 minutes, their session will remain active on the server for 30 minutes, leaving us with 30x1,000 = 30,000 sessions	Server memory footprint
Server developer per-session overhead	IBM Worklight Server runs code written by the customer using the Worklight Studio. The server-side code can store per-session data.	Server memory footprint

Parameter	Description	Effect
Backend delay (millisecond)	Average roundtrip time for a call to the organization's backend.	IBM Worklight Server latency
Reporting history required before purge (days)	Worklight creates significant amounts of raw reporting data which must be purged after aggregation. Otherwise, the system may slow down and disk space consumption may increase dramatically. Typical time between purges is 1-3 days.	Database size
Average Throughput as % of peak	What is the average throughput as compared to the peak defined above. Reflects on the raw reporting data size.	Database size
Active hours/day	# of active hours per day, used to compute # of transactions per day and hence reporting data size	Database size

Table 3-1: Hardware planning calculator parameters

The calculator computes:

- Number of required servers. Server hardware baseline spec is as defined in the test above.
- Amount of RAM required for each server.
- IBM Worklight Server average request latency.

4 Push Notification

Push notification hardware calculator is not covered in this document. Depending on expected message capacity, the effect on hardware sizing can be from negligent to a single IBM® Worklight® Server.

5 Database Size

Database size is determined almost solely by the chosen reporting mechanism. The Worklight Administration Guide provides details about reporting options. Reports are based on a raw data feed that is coming of the IBM Worklight server which logs all client activity, specifically – every transaction. This data feed is the primary source of data for the IBM Worklight database.

The data feed itself is too large to be used for effective reporting and must be aggregated into special tables. There are two options:

1. Use the out of the box reports which automatically aggregate the raw data feed into report tables

2. Use the raw data feed to aggregate the data into the organization's data warehouse.

In either case, the raw data feed must be **manually purged on a regular basis**. Typically 1-3 days.

The application developer may also choose to add custom log messages, in which case the table size will become bigger.

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

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