# Performance analysis of Store Inventory Management (SIM) an Enterprise Application developed using Java

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**Abstract -** *For any computer software or computer system performance is very critical. It is measured as the ratio of actual throughput of a computer system to its actual/ideal capacity. Performance metrics are used to represent the performance of the system or computer software, which are measurable parameters of various entities of a computer system like CPUs, Processes running, Files, Disks, etc. [1]. The main aim of doing performance analysis of Store Inventory Management is to conduct load testing on heavily used functional areas to assess product performance health & fix code as required. And also capture performance numbers in terms of turnaround time for synchronous calls on different server APIs under bulk data conditions for a single user session. And identify APIs which are slow and analyze the code to identify the cause.*

***Key Words***: **Performance Analysis, Inventory Management, Performance health, Throughput, performance metrics.**

## 1. INTRODUCTION

Store Inventory Management is essential for any retail industry to manage the inventory effectively to minimize the loss of inventory, error caused by manual process and maximize the profit. Methods such as storing and replacing inventory, organizing, and keeping adequate supply of goods are all part of Inventory management while minimizing the costs. Inventory management is essential for the success of any e-commerce and retail operations. The global inventory management software market is estimated to be valued at US$ 908.0 Million by the end of 2017, and is expected to expand in the coming years at a CAGR of 12.40% in terms of value over the forecast period. The global inventory management software market is expected to represent a high incremental opportunity between 2018 and 2028.

SIM system is a Mobile PC-based stock management/administration application that empowers to follow stock on hand in the store. It builds store effectiveness by helping store operators to execute and manage all store inventory exchanges which permit store directors and corporate merchandisers to make better business decisions, lessen out of stock positions and at the same time decline complete stock out by and increase customer loyalty. Store Inventory Management System improves customer trust by giving exact and modern in-store stock positions, holding stock for layaway, managing client arrangements and taking into account cross-store inventory query. This expanded perceivability is considerably increasingly significant in the today's world of order anywhere and fulfill anywhere since clients' desires are higher than ever before. Clients expect that stock dimensions are exact. SIM likewise streamlines stock procedures in a supply chain through its consistent integration with Merchandising, Point Of Service, and Warehouse Management Systems.

Some of the functions of SIM are

- Real-time Inventory positions
- Customer Order Execution
- Cross-Inventory Lookups
- Streamlined Inventory Processes

### 1.1 Architecture of SIM
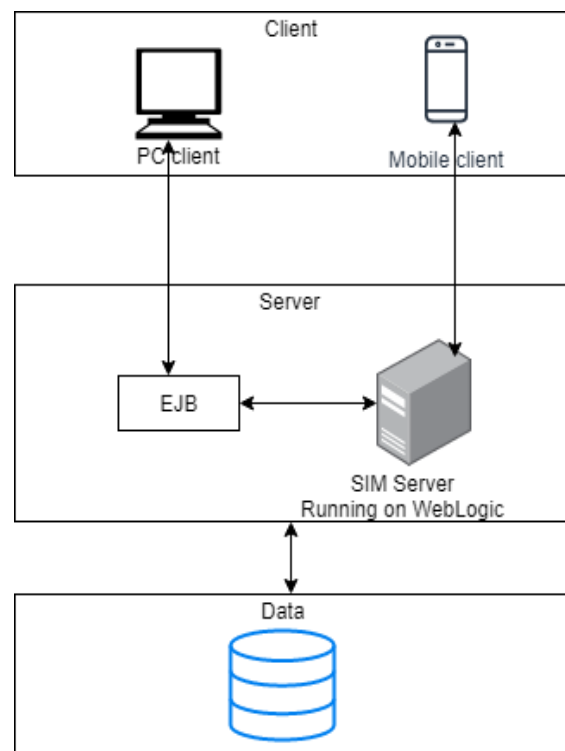
The architecture of the SIM is as shown in fig.1.



**Fig -1**: SIM Architecture

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SIM supports 2 clients mainly PC client which is built by Java Swings and Android client which is built by Oracle Mobile Application Framework (MAF). The application is deployed to WebLogic server. PC client requests are converted to EJBs and sent to the server, the server then interacts with the database to do the requested operation. Requests from mobile client are REST calls.

The rest of the paper is organized as follows – Section 2 discusses the brief literature review, Section 3 gives the methodology followed, Section 4 contains the results of the analysis and observations. Finally the paper is concluded with conclusions and future work, followed by references.

## 2. LITERATURE REVIEW

A concise background study was done to understand about different ideas like performance analysis of Enterprise applications developed in java. Extracts from a couple of the papers/journals are as follow:

Performance analysis is very tedious and manual process, which are experts in performance testing. It is also manual process, signing into the server, recording turnaround time for every operations, entering the values in the excel sheets etc. [1].

A performance evaluation is required when there are multiple designs exists for the same system, a system designer should decide which design to consider. And also if there are no multiple designs atleast to know how the system is performing [2].

The objective of performance testing is to distinguish bottlenecks and eliminate them. It is an iterative procedure. When one region of the application improves, another will turn into a bottleneck. One must recurrent the cyclic procedure of first recognizing the bottleneck, at that point settling the bottleneck, and moving to the following bottleneck until the ideal objective has been reached [3].

## 3. METHODOLOGY

Performance analysis is carried out for two clients namely,

- PC client which is developed using Java Swing, and all the requests will be EJB calls to the server.

- Mobile Client (Android & IOS) which is developed using Oracle Mobile Application Framework (MAF) and all the requests from mobile client will be REST calls.

## 3.1 Experimental Setup

Setting up the local environment to begin the performance testing. Fig 2 and Fig 3 show the topology of the setup of both PC client and Mobile client.
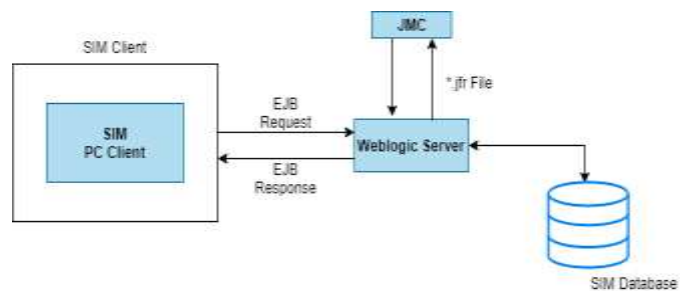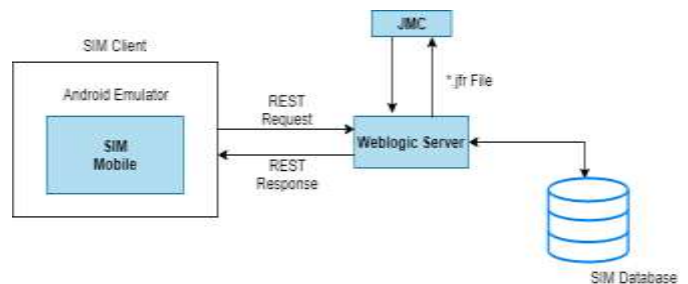


**Fig -2**: Setup of PC client



**Fig -2**: Setup of Mobile client

The difference between PC client setup and Mobile client setup is that for Mobile client Android Emulator is used instead of actual device, and the requests going from SIM client to the WebLogic server are EJB requests and REST requests for PC client and Mobile client respectively.

## 3.2 Evaluation Metric

The time to process a request (EJB request or REST request) also called as turnaround time is recorded for the important functional areas of SIM. This time is compared with the benchmark turnaround time. For every operation 3 runs are carried out and the average of these 3 runs is taken as final turnaround time.

## 3.3 Java Mission Control (JMC)

JMC is a tool which is built into Oracle JDK in order to help Java Developers and administrators to monitor and record how the Java Virtual Machine is behaving at the low level. Here we have used JMC to record the turnaround time to process a request.

## 3.4 Data Setup

For the performance testing the following test data is used as shown in the table, items consisting of 10, 100, and 500 are used to analyze the performance of the following functional areas.

**Table -1:** Data Set

| Data Setup | |
|---|---|
| Functional Area | Data Samples |
| Transfer Shipment | 1 carton per shipment, 10 items per carton. 1 carton per shipment, 100 items per carton. 5 cartons per shipment, 100 items per carton (500 items). Cartons do not share items. |
| Transfer Delivery | 1 carton per delivery, 10 items per carton. 1 carton per delivery, 100 items per carton. 5 cartons per delivery, 100 items per carton (500 items). Cartons do not share items. |
| Inventory Adjustment | 1 Inventory Adjustment, 10 items per Adjustment. 1 Inventory Adjustment, 100 items per Adjustment. 5 Inventory Adjustments, 100 items per Adjustment (500 items). |

## 4. RESULTS AND OBSERVATIONS

The results are put as bar chart comparing the turnaround time of PC client and Mobile client, and for the bar charts only turnaround time of 500 items data samples are considered.
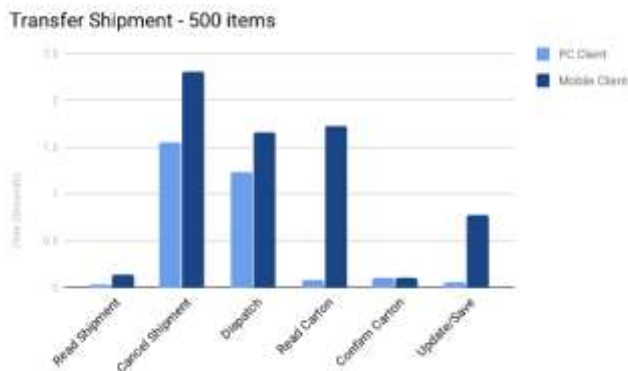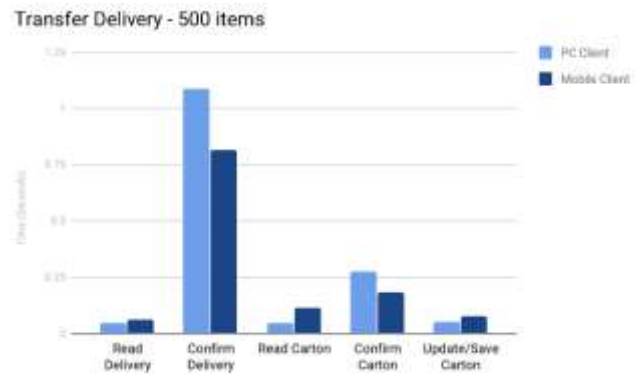


**Chart -1**: Transfer Shipment
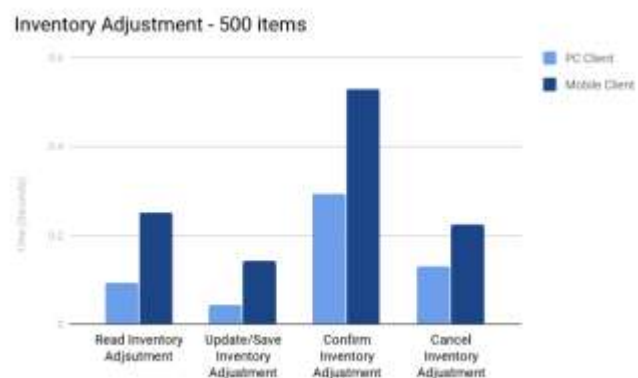


**Chart -2**: Transfer Delivery



**Chart -3**: Inventory Adjustment

From the bar charts it is clear that PC client is performing better in the case of Transfer Shipments and Inventory Adjustments, and Mobile client is performing better in Transfer Delivery. Cancel Shipment in Transfer Shipment, Confirm Delivery in Transfer Delivery and Confirm Inventory Adjustment in Inventory Adjustment operations taking more time than any other operations that are there.

## 5. CONCLUSIONS AND FUTURE WORKS

The main aim of doing performance analysis is to understand how the system if performing when the system is exposed to varying data sets which is the case in real time situation. The performance analysis of SIM showed how all the operations in important functional areas are performing. By conducting performance analysis we now know which operations can be optimized to make the system perform better.

For future works we try to include further functional areas for analysis such as Shelf Replenishment, Stock Counts, Customer Order Management and Vendor Delivery etc. And also optimize the operations which are not performing well in the current performance analysis.

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