

White Paper

How big is your WMS?

- How big is your Warehouse Management System (WMS)?
- How big should your next WMS be?

These are not the questions directly asked during the procurement stage of a new or replacement WMS. That is unless your last WMS was too small or too slow for the job. The focus is usually on functionality.

- Is there a single metric that provides a headline figure?
- Are there a few key metrics?

The search for answers needs to consider the amount of data and the performance of the WMS and Warehouse Control Systems (WCS).

The Warehouse

The first question to ask could be, "How Big is Your Warehouse"?

Warehouses come in a myriad of sizes and complexities.

Some warehouse size metrics are:

- Capital cost
- Area
- Number of storage locations and storage zones
- Number of receiving and despatching bays, assembly areas, ...
- Number of staff, number of workstations and mobile equipment
- Quantity and type of automation equipment

WMS Size Factors

WMS are generally not affected by the capital cost of the building and non IT equipment. Nor does the area matter provided the data networks are adequate.

Most WMS have a core of configuration data of a similar size for any warehouse.

Key size factors for WMS are:

- How much data space is required to represent the live warehouse? That includes storage and other locations, stock and containers, SKU master data, live and future receipt and despatch data
- How much data space is required to retain historical data?

These can be expected to remain fairly static once the maximum historical data retention and maximum throughput has been reached. The space for historical data may be hundreds times greater than the live data.

The biggest data sources need to be the focal point when trying to identify a few key metrics.

The volume of stock and container data is related to the number of locations.

A slightly more subtle question is, "How much data is generated for stock to be received, stored, and despatched?"

Logical and Physical Data

Stock is typically received in a consolidated form as far as the WMS is concerned. Whilst one ream of paper is physically much smaller than 1000 reams, as far as the WMS is concerned the only difference is the number 1000 instead of 1.

From a WMS and warehouse operations point of view, one despatch order for 1000 reams of paper is quite different to 1000 orders for 1 reams of paper. Physically the same volume of material will leave the warehouse.

An increase in the physical stock despatched must be matched by a similar increase in the stock received. However, since stock is normally received in bulk, the amount of data required for despatched stock can be significantly higher, particularly in the case where stock is picked for despatch.

Despatch Data

Warehouse operations often use the number of cases despatched as a metric. This is a useful comparison to allow a warehouse to compare despatches over a period of time, provided the average quantity per order line does not change significantly. It does not provide a good comparison between warehouses with markedly different average despatch order line quantities.

The better WMS data size metric is the number of order lines despatched. Again 1 or 100 makes little difference to the WMS provided it is a single stock record. So the amount of transaction and historical data is more closely aligned to order lines than despatched quantity. Also each order line will have a stock record and hopefully just one.

Picking can add to the data load of the WMS as it typically causes consolidated stock records to split. A site where all despatched stock is picked will have a pick record for every order line.

Despatch sortation is normally just a big fast picking system, so it does not need extra consideration for data sizing.

Key Data Size Metrics

The stock and container data is related to the number of locations and quantity received and despatched. The quantity received is related to and is less or much less than the despatch data.

The key size metrics are:

- Number of order lines
- Data retention periods
- Number of locations

WMS Performance Factors

WMS and WCS performance is exposed all day every day for the life of the warehouse, so it is essential that the WMS and the IT infrastructure that supports it are adequate.

The goal is a WMS that is 'fast enough'. Too slow and operators and automation equipment will be waiting for instructions. Too fast may not be seen as a problem but it could mean that IT equipment was over specified adding unnecessary cost of the system.

Of course demand on a warehouse can change so some spare capacity should be available and additional capacity may need to be provided initially where the future requirements will grow or are unclear.

What the Users Experience

Warehouse Management and Control System performance is observed as:

- Response times communicating with operator devices, automation equipment and external interfaces
- Time to complete background tasks such as selecting stock for despatch and selecting storage locations
- Delays in providing live status information or run management reports

Sites with no budget constraints can have IT infrastructure that will ensure 'no delays'. In the real world of logistics, cost is critical so selecting equipment to provide a WMS that is 'fast enough' is vital.

System Load

Big Warehouse Management Systems need to do lots of things simultaneously. Factors to consider when assessing the load on a WMS include:

- The amount of automation equipment and required response times
- The number of operators
- The number of users simultaneously requesting management and site supervision information
- The volume of work to be completed per shift/day/hour

The final point is the key: the volume of work. This is because the other factors scale to this metric: doubling the volume probably means doubling the automation equipment, operators and volume of management information (raw data).

Another potential performance problem can be described as the amount of work optimisation required. Compare two warehouses both despatching the same number of order lines per day:

- Site 1 has despatch orders with a few order lines arriving at the WMS where they are immediately released for allocation, picking, packing and despatch

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- Site 2 has orders and lines arrive overnight and grouped into loads or waves of several thousand before being released
 - Site 1 will have a frequent but small load on the WMS
 - The WMS on Site 2 may have a higher total load as the WMS as it has more possibilities grouping and optimising stock selection, replenishments and pick walks. If the WMS is not correctly sized it may not be 'fast enough'

A final observation is that performance issues effect despatching rather than goods inbound. That is because the amount of WMS and WCS work required for despatching is usually greater and despatching is more time critical.

Performance Metric

So what is the key performance metric? It is the volume of work. Following the same arguments when considering data size, the volume is proportional to the number of order lines.

For performance it is rate of order line processing:

- Maximum despatch order lines per minute/hour/shift/day.

Conclusion

Correctly estimating the ideal size of a WMS and WCS as part of the procurement process will help deliver a solution that is fast enough, big enough and avoids unnecessary costs.

A number of metrics have been identified that need to be considered when sizing databases and server for WMS installation.

The single key metric for both server data size and performance is:

- Number of despatch order lines per hour/shift/day

Additional key metrics are:

- Data retention periods
- Number of physical locations
- Maximum despatch rate (order lines per minute/hour)