Technical Report

Peak Season Readiness Assessment

kardex

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1. Overall Peak Season Readiness Snapshot

This chart provides an overview of the system's overall health, particularly its ability to handle an increase in units and orders during the upcoming peak season. We are assessing key performance indicators, such as system responsiveness, resource usage, and storage capacity to ensure smooth operation during periods of higher demand.

In this example, the performance status is based off a **45% increase** in units per day during peak season. This will very for each customer.

Category	Guideline	Status	Actual	Comments
Latency	< 100ms	Good	~87ms	Ideal latency. Should not change with peak season.
CPU	<80%	Good	4% - 50%	CPU usage is good. Should not change with peak season.
RAM	<90%	Good	65%	RAM is a little high, but is still below the threshold. Should not change with peak season.
Storage Space – Kardex FulfillX	300 GB	Good	42.96 GB current – 62.29 GB peak season	Storage can handle the 45% increase.
Storage Space – Kardex FulfillX Archive	300 GB	Good	18.01 GB current – 26.11 GB peak season	Storage can handle the 45% increase.
Storage Space – User Management Database	300 GB	Good	720 MB current – 720 MB peak season	Will not change during peak season.
Storage Space - AutoStore	300 GB	Good	7.5 GB current – 7.5 GB peak	Will not change during peak season.
Summary	**We have evaluated the capacity of the current hardware to handle the anticipated increased load of _45_% (Based on customer projections).** The FulfillX Database Server will have sufficient space with the 300GB hard drive. CPU and RAM will NOT increase load during peak season.			

KEY:

Good, will be able to handle peak season increases

Reaching maximum, yet should handle peak season increases

Needs addressed

2. Customer-Provided Projections

The Overall Peak Season Readiness Assessment is based off customer-provided projections and goals. Below is an example of data that we receive from the customer:

Month	Goal (units per day)	Super Goal (units per day)
Current Month	19,617	
Month 1	21,100	
Month 2	23,425	28,100
Month 3	21,000	25,200
Month 4	26,500	31,800
Month 5	22,930	27,500

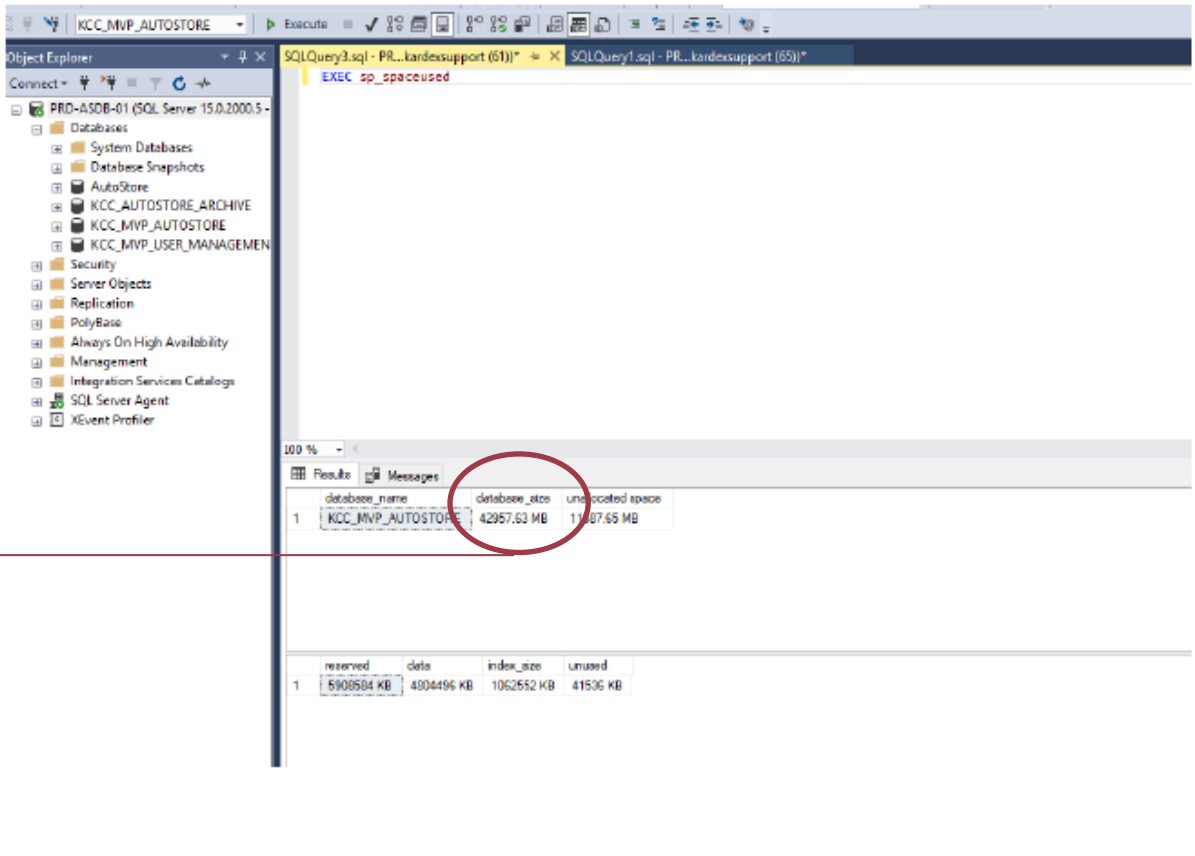
To calculate the percentage increase in volume for peak season, we follow a systematic process based on the projections provided by the customer:

1. **Customer Projections**: The customer provides an estimated number of units they expect to handle during peak season. These projections are based on their specific goals (the number of units they plan to process) and their "super goals" (a higher target if everything goes exceptionally well).
2. **Average Calculation**: We take the average of the customer's regular goals and their super goals. This gives us a balanced estimate that accounts for both their realistic targets and their more ambitious ones.
3. **Cushion Addition**: To ensure the system can handle unexpected surges in volume, we add a buffer (or cushion) on top of this average. This extra percentage accounts for any unforeseen increases in units beyond what was originally estimated.
4. **Percentage Increase**: Using the final adjusted estimate, we calculate the percentage increase compared to their current volume. For example, if the average and cushion lead to a 45% increase in units, this means the customer should expect to process 45% more units during peak season compared to their current operational volume.

3. FulfillX Database Assessment

Purpose: Assess the database hard drive utilization during your peak season. FulfillX itself will not change its rate of productivity but the amount of data needed to be stored onsite will increase drastically (in this example, 45% increase).

Database size on an average day during regular season: 42957.63 MB (shown below)



42957.63 MB = 42.96 GB total used space

42.96 GB + 45% expected increase = **62.29 GB total used space during peak season**

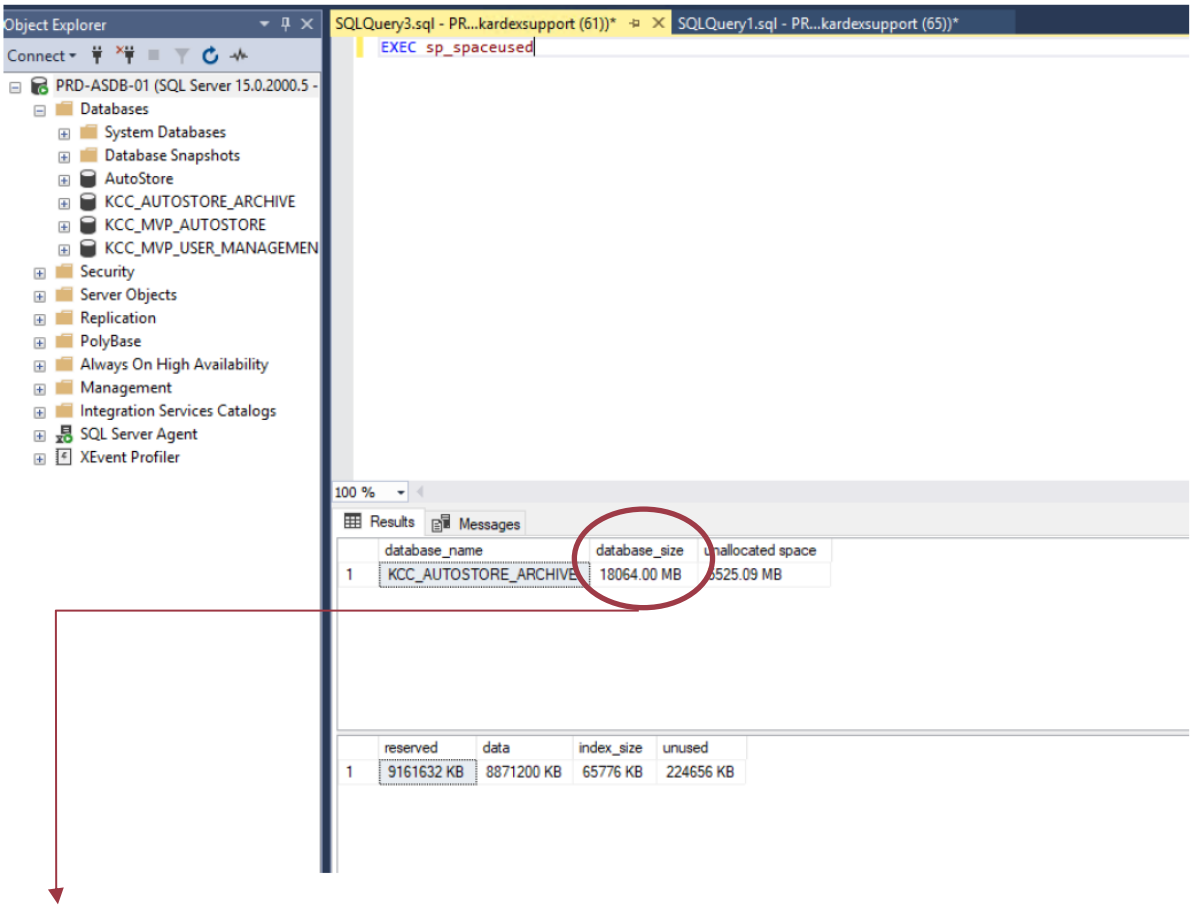
Summary:

The FulFillX database will be **62.29 GB** on an average peak season day which is well under the 300 GB guideline mentioned in The Performance Snapshot.

3.1 FulfillX Archive Database Assessment

Purpose: Assess the archive database hard drive utilization during your peak season. FulfillX itself will not change its rate of productivity but the amount of data needing to be stored onsite will increase drastically (in this example, 45% increase).

Database size on an average day during regular season: 18064MB (shown below)



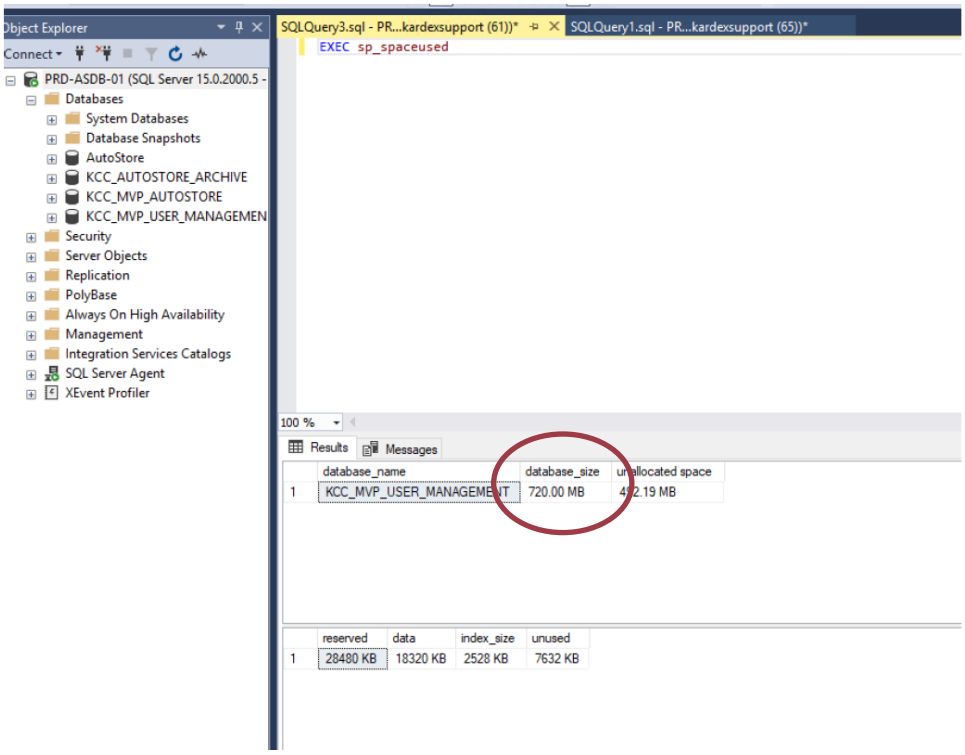
18064MB = 18.01 GB total used space

18.01 GB + 45% expected increase = **26.11GB total used space during peak season**

Summary:

The FulFillX Archive database will be 26.11 GB on an average peak season day which is well under the 300 GB guideline. The system is ready to proceed.

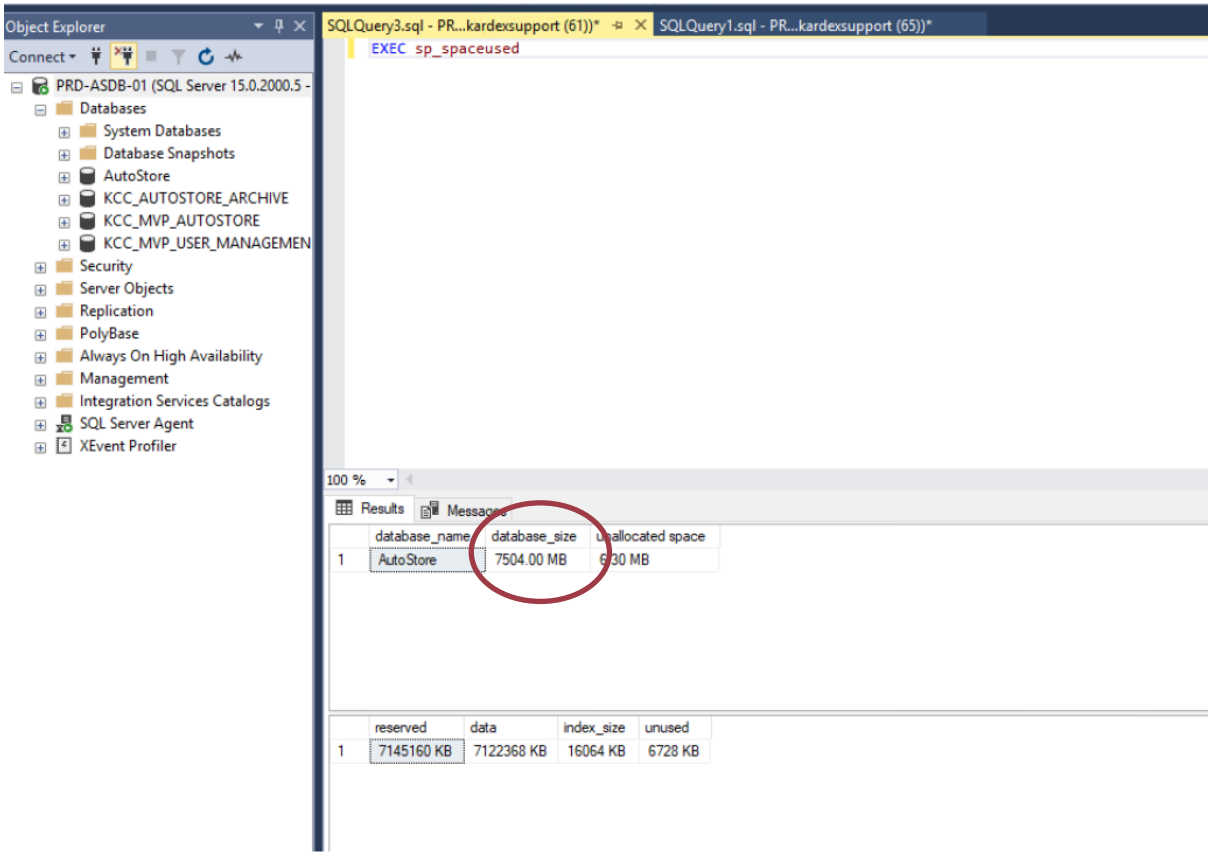
3.2 User Management Database Assessment



Summary:

The storage capacity is confirmed to be stable and is unlikely to change during peak season. 720 MB is well under the 300 GB guideline. The system is ready to proceed.

3.3 AutoStore Database Assessment



Summary:

The AutoStore database is currently ~7,500 MB (7.5 GB) and will not change during peak season. The system is ready to proceed.

3.4 Database Summary:

- The projected total database size, including FulfillX and its archive, will reach 88.4 GB (62.29 FulfillX Database +26.11 FulfillX Archive Database) during peak season, compared to the regular non-peak average of 60.97 GB
- This database will not exceed the 300 GB HDD space that is allocated for the database server so we can assume everything will run as expected during peak season.
- The following are suggestions and describe the minimum requirements. Higher parameters can be used. Deviations with regard to manufacturers (e.g. processor) with constant performance are accepted.

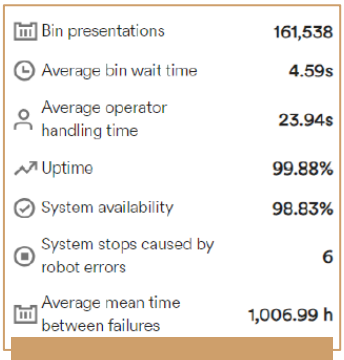
Number of Application Servers	3
Number of Database Servers	1
Processor / Number	Quad-Core-CPU, mind. 2,4GHz
Working Memory Processor	16GB 32 GB
Main Memory Database Server	300 GB free hard disk capacity after installing the operating system

HDD Processor	100 GB free hard disk capacity after installation of the database
HDD Database Computer	24” LCD Monitor, widescreen
Monitor	1x Gigabit Ethernet for host communication 1x Gigabit Ethernet for communication to subordinate controllers

4. AutoStore System

Based on the design specifications of the system and the care taken to keep it running smoothly, the AutoStore is ready and equipped to handle the peak season.

- Regular season estimated throughput: 1,440 bins per hour
- Operating hours: 7:00 a.m. – 12:00 a.m.
- The system was designed to handle the 5-year growth plan, so it is in good shape to handle the increased activity.
- Regular monthly check-ins as well as daily maintenance will continue to ensure the system is in top working condition.
    - Uptime has been >99% the past month
    - Average Mean Time Between Failures (MTBF) > 1,000 hours over the past month



Snapshot from Unify Analytics

5. Glossary

- **Kardex FulfillX Database**: This is where we store all SKU information. It holds detailed data about every product, including descriptions, quantities, and any other relevant details needed for efficient operations.
- **Kardex FulfillX Archive Database**: The oldest order data is moved to the archive for historical reference. Once it reaches capacity, the archive purges old data to maintain efficiency. This process helps prevent slow queries in the main database, allowing faster access to current data.
- **User Management Database**: This database contains information about all users who are authorized to log into the system. After the initial setup, it typically experiences minimal change, even when new hires are added, as it doesn't store large amounts of data.
- **AutoStore Database**: This database is managed by AutoStore itself, and we do not interact with it. Its primary function is to track the precise location of each bin within the system, ensuring smooth inventory management and retrieval.
- **Latency**: System response time, ensuring quick and efficient performance
- **CPU Usage**: Processing power to manage workloads
- **RAM Usage**: Active memory