PEAK SEASON PREPARATION

A guide provided by the Manhattan Associates Customer Support Organization
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Over the years, Manhattan Associates has compiled an extensive archive of consulting experiences, best practices and technical recommendations. Rather than keeping all that knowledge in-house, we make an ongoing effort to offer our expertise to our valued customers. This document will guide you through the different considerations involved in planning for your peak seasons.

Being appropriately prepared is important for many reasons:

• Volume may be forecasted to surpass the original design assumptions

• Additional functionality may have been added since implementation

• You may have opportunities to implement industry best practices

• Optimization of system settings may be beneficial if tuning has aged
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Introduction

It is important that any resulting action items are documented and run as a project to ensure all tasks, many of which can be time-intensive, are completed well before peak season. We recommend that you consult with Manhattan as part of the careful development and execution of the planned project.

Manhattan Associates is available to assist throughout planning, execution and support of peak season activities.

We encourage our clients to take advantage of our expertise wherever and whenever it is needed. This may be as a simple as a walk-through of this document or as complex as a services engagement to implement design changes and perform volume testing.

Please contact your assigned Manhattan Project Manager or Support Manager to discuss the level of support that is appropriate for your operations.

Preparation Checklist

- Determine and communicate the peak season data and timeframes
- Review the contents of this preparation document
- Set up a meeting with Manhattan to review the document as needed
- Develop a project plan with clear action items and target dates
- Communicate and review the action plans with key stakeholders including Manhattan Associates
- Execute the plan
It is recommended that this guide be thoroughly reviewed with your operations and technical support teams. Manhattan is available via conference call or onsite meeting to review the contents in more detail upon request.
When planning for peak season, it is helpful to collect historic and forecasted volume data as well as the expected peak season timeframe(s). (See sample graphic below.) After collecting this data, it should be communicated to key stakeholders.

### 2.1 Collect Peak Season Data

When planning for peak season, it is helpful to collect historic and forecasted volume data as well as the expected peak season timeframe(s). (See sample graphic below.) After collecting this data, it should be communicated to key stakeholders.

#### Peak Season 2015

**Historical and Projected Inbound / Outbound Volumes**

<table>
<thead>
<tr>
<th>Month</th>
<th>2014 Actual Inbound</th>
<th>2014 Actual Outbound</th>
<th>2015 Projected Inbound</th>
<th>2015 Projected Outbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>July</td>
<td>160,000</td>
<td></td>
<td>180,000</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>140,000</td>
<td></td>
<td>160,000</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>120,000</td>
<td></td>
<td>140,000</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>100,000</td>
<td></td>
<td>120,000</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>80,000</td>
<td></td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>60,000</td>
<td></td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>40,000</td>
<td></td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>20,000</td>
<td></td>
<td>40,000</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>0</td>
<td></td>
<td>20,000</td>
<td></td>
</tr>
</tbody>
</table>

#### Peak Season 2015

**Actual and Projected Order Flow into Order Management**

<table>
<thead>
<tr>
<th>Day Type</th>
<th>2015 Actual</th>
<th>2015 Projected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Normal Day</td>
<td>80,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Day before Thanksgiving</td>
<td>70,000</td>
<td>90,000</td>
</tr>
<tr>
<td>Thanksgiving Day</td>
<td>60,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Black Friday</td>
<td>50,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Saturday after Black Friday</td>
<td>40,000</td>
<td>60,000</td>
</tr>
<tr>
<td>Sunday before Cyber Monday</td>
<td>30,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Cyber Monday</td>
<td>20,000</td>
<td>40,000</td>
</tr>
</tbody>
</table>

*This is a sample only. Each customer must decide on their key metrics (i.e., MHE, number of users, % of singles, VAS, etc.).*
2.2 Develop the Plan

This preparation overview can be used to review and build out the details of the plan internally or in cooperation with other partners (including your Manhattan representative). Once the details for each phase and department are documented and timelines are set, the plan should be agreed upon by the various action item owners and key stakeholders. The finalized plan should also be communicated to Manhattan Associates to initiate any associated services engagements and to make your representative aware of key action items.

2.3 Identify Peak Season Specific Functional Flows

Peak season preparation does not just mean preparing for additional data volume. It can also require special operational considerations, such as the use of specific functionalities or processes. It is important that these special flows be identified, documented and tested in advance.

Here are a few examples:

- A grocery distributor may use a rarely invoked option when shipping turkeys before Thanksgiving
- A wholesale apparel/footwear distributor may rely on shipping directly to retail stores during back-to-school
- A home improvement retailer may depend on a unique process to ship supplies during hurricane season
- A direct-to-consumer distributor may need to prepare for additional VAS capacity during holiday season

It is important that special flows be identified, documented and tested in advance.
2.4 Consider Different Operational Strategies

A discovery and/or design session should be held to determine if altering operational strategies might be beneficial during peak season. The current functional flow may be adequate under normal volume, but a revised strategy may be necessary to optimally handle increased volumes.

Some options to consider in Warehouse Management can include:

• Reviewing replenishment strategies if changes in volume impact DC traffic (i.e., picking versus replenishment traffic)

• Temporarily changing allocation and picking strategies in order to allocate more bulk than residual active inventory (consider reducing picking tasks and allowing active inventory to build up instead)

• Improving flow-through efficiency by shipping ASNs as full orders to reduce pick, pack and ship processes (distribution orders can then be coordinated up the supply chain)

• Bulk waving and picking strategies:
  – More fluid loads versus order consolidation or pack & hold
  – Implement wave queuing if back-to-back waves are processing
  – Bulk waving and put-to-store

• Reviewing printing strategies to identify opportunities to reduce printing volume

• Qualifying carriers that might not be used for fluid loading under normal volumes but could be utilized during peak season

• Altering pick location min/max during increased volume to better manage replenishment and picking (Replenishment priority bumping may also need to be implemented or updated to improve efficiency)

• Review the rate at which LPNs are introduced into the flow from receiving, cross docking, warehousing, picking, VAS and staging to identify potential bottlenecks caused by increased volumes; adjust operational strategies or labor as needed

• Review special shipping/parcel considerations given the additional volume (set up of new services, obtain additional tracking numbers, etc.)
Some options to consider in Order Management can include:

- Reviewing allocation, distribution or waving strategies for fast moving items. You may want to immediately allocate and release DOs for fast moving items instead of waiting to allocate in a batch along with other items.

- Increasing the frequency of settlement runs to effectively handle invoice processing and peak volume.

- Changing lead time/remorse period in Order Management to facilitate real time order flow to fulfillment facilities thus helping the fulfillment facilities to plan better.

- Disabling or adjusting the timings of process intensive jobs like purge/archive and other external system jobs.

- Temporarily increasing the capacity of the stores that can handle more volume or decreasing the capacity of the stores where there is more foot traffic during the peak season.

- Reviewing new shipping/carrier options to handle additional volume and ensure speedy delivery of items (set up of ship via configurations, transit lanes, carriers, etc. in Order Management system).

- Planning for temporary workforce. For more details, please see Section 2.5.
2.5 Temporary Workers

It is very common to hire temporary workers during peak times to augment the labor force. Preparations for handling these inexperienced workers include:

- Developing a process for administering their user profiles
- Reviewing security and SOX compliance
- Confirming that Manhattan license key restrictions will accommodate the anticipated increase in users
- Ensuring adequate equipment is available and all users are able to connect to the application/system (RF guns, voice units, IPod/IPad or other iOS devices used at stores, printers that print shipping labels/packing slips, etc.)

2.6 Training and Documentation

It is important that standard operating procedures and training materials be in place before peak season begins. Manhattan clients may consider using our Manhattan Training and Change Management Services.

This is a flexible, holistic, hands-on education program designed for rapid results.

It includes software—FastTrack™—that allows you to quickly develop manuals, reference guides and reusable training material.


2.7 Dashboards and Reports

The fast-paced environment during peak season may require additional operations tools to manage increased workflow. Peak season dashboards and reports can be instrumental in helping to manage operations during this time. Consideration should be given to reducing impact on the system for resource intensive reporting. This includes performance tuning reports and minimizing the number of reports run in an on-demand manner.
3.1 Maintenance Windows

If peak season involves additional or extended shifts, the following items should be reviewed to ensure they are not negatively affected:

- Scheduled waves, allocation/reallocation, supply balance and inventory sync from fulfillment center to Order Management jobs
- Automatic operating system jobs (start/stops, system bounce, etc.)
- Database scripts (i.e., index browning)
- Purge schedules (purge start time and duration should be reviewed)
- Host system jobs
- Item/Facility import
- SCI reports, Order Management Ad hoc queries, etc.

3.2 Hardware Sizing & Infrastructure Considerations

System Administrators should validate several hardware and infrastructure considerations when planning for peak season:

- Perform a hardware sizing for Application/DB/Integration servers (Cores/Processor, Memory, etc.) with Manhattan’s TSG Audit team to confirm the original sizing can handle an increase in volume
- Ensure previously executed TSG audit recommendations on Heap Size, Listeners & Threads pool settings, JVM & JMS parameters, performance enhancement parameters, etc. are in place
- Consider load balancing to increase performance
- A hardware disaster recovery plan should be in place
- Ensure recent RF and Vocollect hardware setup and access validations and included in VPT and Compression testing

Disaster recovery plan should be in place
3.3 Database Administration and Tuning

It is imperative that Manhattan clients have their DBA to review these elements extremely carefully since proper database auditing, administration and tuning can make the difference between a successful peak season and one plagued with technical challenges. Additionally, they must be completed in advance since several of the following tasks cannot be implemented on-demand in urgent situations.

- **Hardware and infrastructure**
  - Analyze database (DB) and operating system (OS) reports to ensure the capacity to meet expected demand
  - Verify the health of the database server infrastructure (IO/Network)
- **Database administration**
  - Audit the database server to ensure OS and DB parameters are optimized for peak performance
  - Implement alerts and monitors to track database issues
  - Audit and adjust disk layouts
  - Track SQLs that will degrade due to high volume and tune them to avoid performance degradation
  - Analyze database connections for potential leaks
- **Database maintenance**
  - Verify that all DB maintenance practices (e.g., index browning, etc.) are in place (see System Administration guide)
  - Ensure a process for collecting database statistics is in place
  - Review AWR reports and ensure there are no un-optimized SQLs
3.4 Advanced Administrator Settings

The following recommendations involve advanced settings, so assistance from your Manhattan representative is highly recommended if adjustments are necessary. If changes are made, they should not be implemented before comprehensive testing is completed.

Administrator settings that can be reviewed include:

• Commit frequencies for process intensive areas
• Multi-threading settings
• wmservers.dat for number of servers
• Start/stop scripts
• Environmental/Configuration audits of:
  – Queue depth
  – Server time out changes
  – Adjustment of LockWaitTimeOut for all the servers
  – Adjustment of number of instances of the servers
  – JIT versus Onstart mode
• Temporary system changes*:
  – Purge retention (consider adjusting tables with high transaction loads during peak season if performance or disk space is a concern)
  – Multi-threading of certain wave components
  – Number of MIS Queues
  – Installation of temporary physical servers for load balancing or an additional SAN to accommodate disk space needs

*It is highly recommended that a schedule be developed both for implementing these changes and for reversing them after peak season.
3.5 Code and Configuration Freeze

Changes to the system should be avoided during peak season in an effort to minimize disruptions. Therefore, a code and configuration deadline should be agreed upon and implemented. However, a process for approving and installing “hot fixes” should also be documented in order to accommodate situations in which system changes are necessary. Additionally, a pre-code freeze deployment plan of all “must needed for peak” changes should be planned with targeted deadlines.

Changes to the system should be avoided during peak season in an effort to minimize disruptions.

3.6 Test and Production Synchronization

Synchronization of test and production runs will confirm that the latest code updates have been installed and will minimize issue research delays caused by inconsistencies.

Synchronization audits include:

- SDNs/executables
- Configuration data (a database dump from production to test is ideal)
- Database stored procedures
- Database indexes
- Providing a current purged database dump to the Manhattan team to assist with synchronization of testing
A checkpoint should be added to the peak season preparation calendar to confirm all audit recommendations are implemented by a pre-determined date.

3.7 Perform System Audits

System Administrator and DBA should schedule and conduct an IT process and infrastructure audit before each peak season. A checkpoint should be added to the peak season preparation calendar to confirm all audit recommendations are implemented by a pre-determined date.

- Non-sanctioned (non-Manhattan) scripts, adhoc queries, DB triggers, reports or other processes that may be accessing the system. Establish IT process to control adhoc queries and reports execution during peak.

- Review of all scheduled tasks, jobs and/or crons

- Rehearse emergency restart process including application log collection

- License keys for all products (including those by third parties) to ensure they can accommodate an increased number of users

- Manhattan Technical Audit (provided as a service to ensure optimal configuration of all technical applications and operating systems)

- Manhattan Database Audit (provided as a service to review database settings)

- Purge audit (row counts on all database tables and confirmation that purges are executing correctly)

- Database disk layout

- Review percentage of system used by non-Manhattan applications

Custom audits should be carried out in addition to the standard database and technical reviews. Specifically:

- Purge custom tables (can be accomplished manually or using the custom purge script, if one was included in the scope of the modification)
Manhattan SureCheck can work with you proactively to pinpoint opportunity and ensure you’re running a healthy supply chain environment.

3.8 Manhattan SureCheck™

Proactive audits for optimal system and process health

Through Manhattan SureCheck, our team of experts provides three types of proactive audits to ensure optimal system and process health—the Application Environment Audit, Infrastructure Audit and System Administration Process Audit. These audits help ensure your applications are properly installed, that your infrastructure is optimally configured, and your long-term administration processes are in place.

As part of preparing for a successful peak season, Manhattan SureCheck can work with you proactively to pinpoint opportunity and ensure you’re running a healthy supply chain environment.

To learn more about Manhattan SureCheck or for a project quote, please contact your project or support team.
3.9 Volume Performance Test Planning

A volume performance test (VPT) is recommended when volume is expected to surpass the original design assumptions. It is also suggested if functionality was added after previous volume tests. Testing can be system-wide or specifically focused and should identify any operational and system bottlenecks. Volume testing should be performed after audit tuning recommendations have already been implemented. Manhattan can assist the clients in the VPT planning, execution and post execution recommendations.

The volume test checklist includes:

- Review of current state system response time and hardware utilization
- Evaluation of the percent increase in volume by transaction (users) and messages/data (for MHE)
- Review data creation scripts to include diverse SKU distribution, customer profile, shipping mode, combination scenarios, etc. to ensure volume test conditions are unbiased and in line with production expectations
- Determining if the increase requires a scripted volume test using tools such as HP LoadRunner or can be performed manually
- Evaluating if MHE message volume* and/or frequency is changing due to increased volume (for automated facilities only)

*It is recommended that some sort of MHE simulation tool be used for testing message volume.

Volume tests are typically major projects and should be planned and executed with the assistance of your Manhattan representative.

A volume test is recommended when volume is expected to surpass the original design assumptions.
Example of a Focused Volume Test

Manhattan delivered LoadRunner scripts and the data required to execute scripts for volume performance testing at a large sports apparel and footwear distributor.

Hypothetical scope for scripted volume performance test (VPT):

- Create VPT scripts using HP LoadRunner (LR) or similar tool for major RF transaction flow
- Create data for single execution of scripts on production hardware
- Create data for MHE messages for critical message types
- Execute the HP LR scripts and analyze response time changes and hardware utilization while increasing the load of users on the system to meet new volume requirements

The execution and analysis phase of the VPT typically includes:

- Determining which RF, UI and MHE transactions make the most sense and are most beneficial for VPT and for future regression testing
- Iterative execution of the scripts with a predetermined number of users per transaction at 50%, 100% and 125% of peak volume of period
- Monitoring and tuning of the database (parameters and indexes) and application server-unix system behavior during and after the execution of the tests (includes utilization, memory utilization, disk I/O rate, etc.)
- Re-executing tests until performance objectives in performance agreement are met
3.10 Compression Performance Test Planning

Compression Performance test gives an opportunity for both operations and systems to be validated for peak readiness in a short period of time. A phased compression test is recommended by a controlled hold and release of orders into the system.

The compression test checklist includes:

- Review of expected volume spike on the peak day/week
- Plan for an iterative phased approach of compression testing with 15%, 50% and 125% of the expected volume ramp up.
- Determine a plan of execution with orders held up in the upstream applications and released in a controlled manner.
- Review operational preparedness and labor plans to handle the surge in volume (facilities only)
- Identify the infrastructure bottlenecks example - application servers, application host interfaces, print queues and shipping interfaces
- Evaluate performance and readiness of the parcel interfaces like Agile, Metapack, or ScanData to keep up with the peak volumes
Compression Performance test gives an opportunity for both operations and systems to be validated for peak readiness in a short period of time.
Monitoring, Diagnostics and Support

4.1 Troubleshooting Tools

In the event that issues arise during peak season, the following tools should be installed (and staff training completed) well in advance to mitigate impact to production. Manhattan offers a Level 3: System Administration & Troubleshooting class that covers most of these tools and techniques.


• Example Database Tools:
  – Database contention monitoring scripts (along with required permissions)
  – AWR and ASH reports for Oracle databases or Snapshots for DB2
  – Database alerts for various errors on the database server (includes Oracle errors, such as spacing, open sessions/processes, etc.)
  – Create special queries, reports or dashboards to monitor customized or critical areas
  – Latest version of Java SnapShot Collector

• Example Unix and Linux Tools
  – NMON reporting to analyze AIX and Linux performance (presents and monitors performance tuning information such as CPU utilization and memory)
  – Process monitoring scripts to collect memory and CPU statistics

• Example Application Tools
  – Understand the process for setting app and logging to High (High logging enables writing more detailed logs and captures database queries fired from the application)
  – Create special queries, reports or dashboards to monitor customized or critical areas
  – Latest version of Java SnapShot Collector

• Example Network Tools
  – Install Wireshark (or other network monitoring tool) on all servers

• Application (OLM & MIF) Monitoring Alerts
  – CPU, Heap and Memory utilization
  – Failed message count for various message types (Item, Facility, Inventory Updates, Customer Order/Sales Order, Invoices/Shipments, etc.)
  – Monitor inflow of orders and shipments from Stores/Warehouse Management and alert if the volume drops much below the estimated volumes
  – Alerts on orders stuck in unexpected status, over shipments, inventory sync failure, Order Management Warehouse Management balancing, etc.
4.2 Manhattan Support
Manhattan Associates offers different levels of customer support depending on the customer’s depth of product knowledge, resource availability and degree of risk aversion.

24x7 Call Center Support
All customers that are current on their Customer Support & Software Enhancements policy (or “maintenance”) have access to our 24x7 Global Call Center for issue support. The Call Center is able to escalate issues to specialists with in-depth product-specific expertise.

Supplemental Support Services
Remote Dedicated Support
If onsite support is not required, remote dedicated support is available. This provides on-call assistance from specific Manhattan personnel during predetermined hours.

Onsite Support
If this is your first peak season utilizing Manhattan, consider having our personnel onsite on critical days. This ensures that you have immediate access to:

- Expert product knowledge for user questions
- Assistance for your internal team providing extended support coverage
- Expedited research and resolution of operational and technical issues

4.3 Client Triage and Escalation
An issue triage and escalation plan should be developed to expedite issue research and resolution. This plan typically starts at the user level and ends with executive escalation. Contact information (home and mobile numbers) for all key personnel must be provided, including rarely contacted resources such as DBAs, network administrators and operating system administrators. Plans can be in the form of flow-charts or spreadsheets, and should specify escalation timeframes and guidelines for determining various levels of severity.
Post Peak Follow Up

At the conclusion of peak season, it is important to follow up on open action items as well as how critical scenarios were resolved. It is recommended that a post-peak overview meeting (that includes all stakeholders and your Manhattan representative) be held to review:

- Lessons learned
- Code/config unfreeze date
- Action plans (including target dates) for any follow-up items
- Determining the timeframe for planning for the next peak season
- Restoring temporary changes to pre-peak settings

Please let your Manhattan support team know if you would like to review this document in detail, require any special support, or have any questions about peak season preparation. Our team of experts is ready and available to assist you to ensure your success!