User Guide | PUBLIC
SAP Warehouse Insights
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Application Help for SAP Warehouse Insights

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Content

1 SAP Warehouse Insights

SAP Warehouse Insights is a product for the optimization of warehouse operations and resource utilization.

You can use SAP Warehouse Insights to achieve the following purposes:

- To optimize the assignment of warehouse orders to resources to minimize empty travel distances
- To analyze KPIs of warehouse operations, such as workload and travel distances of resources
- To visualize the warehouse layout and resource travel paths
- To define and update storage bin coordinates
- To visualize the real-time position of resources on the warehouse layout with the integration to an IoT indoor positioning system

2 Warehouse Visualization

You can view the resource travel paths on an interactive warehouse layout, monitor the real-time position of your resources, and have an overview of the warehouse operations in your warehouse.

2.1 Warehouse Layout

With this app, you can visualize and interact with your warehouse layout.

Key Features

You can use this app to perform the following actions:

- View your warehouse layout graphically and interactively
- Search for a storage bin on the warehouse layout and view its details
- Search for resource travel paths by specifying the start and destination positions
- Search for resource travel paths for a completed warehouse order

Additional Information

Searching for a Storage Bin

To search for a storage bin, perform the following actions:

1. Select a warehouse number.
2. Enter a storage bin in the search box and press *Enter*. The storage bin is highlighted on the layout.
   To display more details, choose the bin on the layout.

Displaying Warehouse Layout

To view your warehouse layout, perform the following actions:

1. Select a warehouse number.
2. Choose *More Options* and then *Warehouse Layout*.
   You can display the layout based on a specific storage type level and a storage type. You can also view storage sections in different colors.

Displaying Travel Paths

To view resource travel paths between storage bins, perform the following actions:

1. Select a warehouse number.

2. Choose *More Options* and then *Resource Travel Paths*.
3. Choose the *From Bin to Bin* radio button.
4. Enter storage bins.
   If you want to search for a travel path among multiple bins, choose *Add Bin*.
5. Search for the travel paths.

To find resource travel paths for a warehouse order, perform the following actions:

1. Select a warehouse number.
2. Choose *More Options* and then *Resource Travel Paths*.
3. Choose the *Warehouse Order* radio button.
4. Enter a completed warehouse order.
5. Search for the travel paths.

2.2 Warehouse Operations Overview - Off-Line Data

With this app, you can view the reports of key performance indicators (KPIs) based on your historical data.

Key Features

You can use this app to view the following warehouse operations:

- Resource utilization by resource
- Resource workload by resource group
- Resource workload by queue
- Empty travel distance by resource type
- Total travel distance by resource

Additional Information

The system displays the warehouse operations based on the uploaded warehouse data. If there are any updates on the uploaded data, you choose *Update* to refresh the results.

The system displays the following warehouse operations on a daily basis:

- Resource utilization
  A dot chart displays the general utilization of resources. Each dot on the chart represents a resource. The system uses the same color for the resources that belong to the same resource type.
  The chart displays horizontally how long a resource has been working in a day and vertically the total number of warehouse orders confirmed by the resource.
  Resource working time is calculated as the sum of the processing time of warehouse orders. The system calculates the processing time of a warehouse order based on its start time and confirmation time.

- Resource workload
  A donut chart displays workload proportions based on resource groups in your warehouse number.
  Another donut chart displays workload proportions based on the queues of a resource group.
- Total travel distance by resource
  A bar chart displays the daily travel distance of each resource in a resource type.
- Empty travel distance by resource type
  A bar chart displays the total empty travel distance of a resource type in a day.

For more information, go to help.sap.com/wi, choose the *Discover* tab, and navigate to *Troubleshooting* > *Frequently Asked Questions for SAP Warehouse Insights*.

2.3 Heatmap

With this app, you can visualize the number of physical goods movements to or from storage bins, for example, for picking or putaway, during a given time period. You can see different colors in a two-dimensional map to graphically represent these goods movements. This app uses the movement data from the confirmed warehouse tasks that are uploaded to SAP Warehouse Insights.

Using the heatmap, you can see whether there are areas in the warehouse that tend to encounter internal congestions, and whether you need to relocate stock or add more resources for these busy areas.

Key Features

You can use this app to perform the following actions:

- View the number of physical goods movements to or from storage bins
- Search for a storage bin on the warehouse layout
- View storage bin details

Additional Information

Using Filters

The filters of this app include but aren't limited to the following options:

- Heatmap Time Basis
  You can enable the system to select confirmed warehouse tasks based on the creation time or confirmation time of warehouse orders.
  Note that the system only selects confirmed warehouse orders or tasks without exceptions.
- Start and End Date and Time
  You select a date range of no more than 90 days and make sure that there were confirmed warehouse tasks during this time period. Otherwise, you can't find available values for the filters such as the storage type.

Showing Refined Color Gradients

In the settings, you can show the heatmap using more prominent color gradients to better differentiate the busy and unbusy areas on the warehouse layout.

By default, the system displays the heatmap based on evenly distributed values of the physical goods movements. Depending on your data, if the heatmap presents a large scale of the warehouse layout using similar or the same colors, where the differences aren't perceivable, you might find the refined color gradients more user-friendly.

2.4 Resource Indoor Positioning

With this app, you can use the integration with an IoT service to visualize the real-time position of resources in your warehouse. You can show the routes that the resources take on the warehouse layout, visualize previously defined geofences, and monitor warning messages, for example, when resources travel over speed or remain stationary.

Prerequisites

- You have integrated your system with an IoT service and set up a binding between the warehouse business master data and the IoT logical devices.
  For more information, see Connecting to an IoT Service.
- You have performed the necessary steps in the following configuration steps of the *Configure Your Solution* app:
  - Add an IoT service to your destination and assign it to a warehouse number in the *Define IoT Integration Settings* configuration step
  - Specify a maximum resource speed and a stationary resource threshold in the *Define Indoor Positioning Settings* configuration step. You can also upload images for resource types in this step.
  - Define geofences and geofence settings in the *Define Geofences* configuration step

Key Features

You can use this app to do the following:

- Visualize the real-time position of resources on the warehouse layout
- View the status of resources on the warehouse layout or on the *Resource Overview* side panel
- Monitor warnings, for example, when resources exceed speed limits or enter prohibited geofenced zones
- Review the resource execution data from a destination system on the *Resource Overview* side panel
- Use the filter options to refine your search
- View the travel path of a resource for the last 10 seconds
- View resources with customized images on a warehouse layout during real-time visualization

> **i Note**
>
> The warnings and the execution data that you see for a selected resource on the *Resource Overview* side panel show the resource information at the time of your selection. However, they are not refreshed automatically while a resource is selected. Navigate back to the resource list to see refreshed values for the status and the duration of the status for all resources that match your filter criteria. Select a resource again if you want to view refreshed warnings and execution data.

Additional Information

For more information see:

- Connecting to an IoT Service
- Define IoT Integration Settings
- Define Indoor Positioning Settings
- Define Geofences

3 Warehouse Optimization

You can optimize the assignments of warehouse orders to resources in a simulated and a real-time way.

3.1 Simulate Order Assignments - Off-Line Optimization

With this app, you can simulate the optimization of warehouse order assignments based on historical data. The simulated optimization results help you analyze the optimization benefits before you implement the real-time optimization.

Key Features

You can use this app to perform the following actions:

- See how many empty travel distances have been reduced
  The result is the reduced empty travel distance versus the total travel distance.
- Compare warehouse order assignments before and after optimization
- Compare resource travel paths of warehouse orders before and after optimization
- View the optimization reports

Additional Information

If you want the system to stop running the simulation, choose *Skip Simulation*.

If you don't see any results, wait for several minutes or choose *Run Simulation* again.

To generate simulated optimization results based on uploaded warehouse data, perform the following steps:

1. Choose a warehouse number.
2. Choose a year, a month, and a resource assignment.
   A resource assignment consists of warehouse order groups and optimization factors.
3. Choose *Run Simulation*.

The system begins to simulate the optimization. Depending on the size of your warehouse data, the system can take some time to finish the simulation. The simulated optimization results are listed on a daily basis.

You can view the following results using this app:

- Resource travel paths
  You can compare the resource travel paths for processing warehouse orders before and after the optimization of warehouse order assignments.

- Warehouse order assignments
  You can compare the empty and loaded resource travel distances before and after the optimization of warehouse order assignments.
- Optimization reports
  Choose *View Report* to see the optimization details on a specific date:
  - Reduced empty / total travel distance
  - Total time spent on warehouse order processing
  - Empty travel distance
  - Empty travel ratio
  - On-time rate ratio
  - Total overdue time in minutes
  - Maximum overdue time in minutes for a warehouse order

For more information, go to help.sap.com/wi, choose the *Discover* tab, and navigate to *Troubleshooting* > *Frequently Asked Questions for SAP Warehouse Insights*.

3.2 Monitor Live Optimization

With this app, you can have an overview of the optimization results for open warehouse orders assigned to the resources in your warehouse. For example, you can see the optimized sequence of warehouse orders for a resource. By following this sequence, a resource can reduce the unnecessary empty travel distance and time. That means there are fewer situations when a resource carries no goods between the destination location of the last completed warehouse order and the start location of the next open warehouse order.

Key Features

You can use this app to perform the following actions:

- View the optimized assignments of warehouse orders to resources
- View latest start dates and creation dates of warehouse orders, and empty and loaded travel distance of resources
- Export the optimized assignments of warehouse orders to resources as off-line files
- View message logs for each optimization job
- View error logs during the live optimization
- View reassigned warehouse orders in response to resource changes in a destination system

Additional Information

Live Optimization

When you activated live optimizations in the *Define Optimization Settings* configuration step of the *Configure Your Solution* app, the system runs optimization jobs periodically. In each job, the system performs the following actions:

- Retrieves open warehouse orders and warehouse tasks from a destination system, for example, an SAP EWM system, at a specific interval like every 20 minutes
- Optimizes the sequence of warehouse orders assigned to a resource
  The optimized sequence helps resources reduce empty travel distance or meet latest start dates.
- Sends the optimized warehouse order assignments back to a destination system

Determining Start Positions for Resources

To determine which warehouse orders are assigned to a resource, the system must identify the start position for the resource.

The system finds the start position in the following ways:

- If there are open warehouse orders assigned to a resource in the previous optimization interval, the start position is the destination bin of the last warehouse order in the order assignment list.
  The last warehouse order is the order that is being processed by a resource when the system sends the optimization results back to the destination system.
- If there are no open warehouse orders assigned to a resource in the previous optimization interval, and the resource is processing a warehouse order, the start position is the destination bin of current warehouse order.
- If there are no open warehouse orders assigned to a resource, and in the destination system the resource isn't processing a warehouse order, the start position is the storage bin where the resource is located. This location is estimated by the destination system.
- If the system can't determine the start position, a default distance is used to calculate how long it takes the resource to travel to the next warehouse order. The default distance is defined in the storage type.

Viewing Optimized Warehouse Order Assignments in SAP EWM

You can find the optimization results in the warehouse management monitor of SAP EWM. To do this, go to the monitor using transaction `/SCWM/MON` and choose *Resource Management* > *Optimized Exec. Plan of WOs*.

For more information, go to help.sap.com/wi, choose the *Discover* tab, and navigate to *Troubleshooting* > *Frequently Asked Questions for SAP Warehouse Insights*.

Reassignment of Warehouse Orders in Response to Resource Changes

Resource Changes

SAP Warehouse Insights reassigns warehouse orders based on the following resource changes in SAP EWM:

- Resource Logon, Resources Unassigned from a Queue, and Resources Assigned to Another Resource Group
  If the resources are selected for live optimization in the *Define Optimization Settings* configuration step of the *Configure Your Solution* app, the system includes them in live optimization.
- Resource Logoff and Resources Assigned to a Queue
  The system excludes the resources from live optimization.

Logic of Reassignment of Warehouse Orders

SAP Warehouse Insights reassigns warehouse orders to resources based on the following logic:

- Timer
  Once the system receives resource changes from SAP EWM, the system starts a timer to collect the change information. Depending on how frequently the system is receiving resource changes, the timer can last from 30 seconds to 150 seconds. Then, the system collectively processes the resource changes that were received within the same time period.
- The system starts an ad hoc round of live optimization only for the changed resources that need to have new warehouse orders assigned to them.
- For a resource that is excluded from live optimization, the system withdraws the resource's unfinished warehouse orders and tasks, and clears its assigned warehouse orders in SAP EWM.
- If the next optimization interval will take place in 5 minutes, the system won't start an ad hoc round of live optimization, even if it receives resource changes.

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