

# Schedule Similarity

## Prerequisite for Use

This Preference requires that you have an initial customer schedule currently loaded.


## Work-flow to Use Schedule Similarity

- » Use **Load Template** to set up and modify the preference for a variety of conditions
- » Repeat **Load Template** for additional instances of any template

## Preference Overview

Using this preference, you can control the level of disruption to staff during a schedule change and indeed use it in stages to move from the supplied schedule to a fully optimized schedule.

This preference deals with **vehicle schedule similarity**. In what follows in this preference, when we refer to a **schedule**, the intention is the **vehicle schedule** as seen in the Vehicles Gantt.

**Note**

There is a corresponding preference for crew (driver) schedule similarity. See [Crew Schedule Similarity](#).


Optibus OnSchedule™ uses two criteria of similarity. The new **schedule** is similar to the previous one if **either one** of the following hold:

- » **Trip ID similarity:** Consecutive trip IDs are substantially maintained.

A new schedule is *Trip ID similar* to an existing schedule if the Trip IDs of any two consecutive trips is maintained.

For example: If Trip ID X is followed by Trip ID Y in the current schedule and Trip ID X is still followed by Trip ID Y in the new schedule, this is considered to be *Trip ID similar* and no penalty is imposed.

If however, if Trip ID X is followed by Trip ID Y in the current schedule but in the new schedule, Trip ID X is followed by a different Trip ID Z, this is considered to be a violation of Trip ID Similarity. Penalties will always be imposed for violations of Trip ID similarity.

**Note**

The optimization takes the trips pairwise but no more.

» **Trip start time similarity:** Trip start times are substantially maintained.

This is best illustrated by an example. Suppose that -

1. Trip ID X is followed by Trip ID Y in the current schedule
2. Trip Y starts at 09:30
3. Trip start time deviations of more than 10 minutes are considered to be violations Trip Start Time similarity
4. We require for trip similarity, that the trip following Trip ID X in the new schedule commence no earlier than 09:20 and no later than 09:40 and the route is the same as that of Trip Y.
5. A penalty *will be imposed* if either one of the following situations occur in the new schedule:
  - The route of the trip following Trip X has changed from the route of Trip Y in the original schedule
  - The route of the trip following Trip X remains the same as the original Trip Y but commences earlier than 09:20 or later than 09:40

Otherwise, we have maintained Trip Start Time Similarity for Trip X and the following trip.

### About the imposition of penalties:

The idea of "substantially" is implemented by applying a cost penalty for deviations from the original schedule as described above. Thus, if you impose a low penalty, you are effectively saying, "I would like the new schedule to be similar, but similarity is less important than my other preferences ." In this case, The optimized schedule may be quite different from the original. If on the other hand, you impose a high penalty for deviations, you are effectively saying, "I would like the new schedule to be similar to the original, if necessary at the expense of my other preferences ." In this case, the optimized schedule may not look very different from the original.

To demonstrate the concept, we will use the fourth template below, **Schedule Similarity - by trip id**. It is the simplest to understand: It sets out to maintain Trip ID similarity. Its only parameter is the penalty. Here are results of setting increasing penalties as expressed by several KPIs:

*Table 1-1: Vehicle Schedule Similarity - KPI Partial Comparison for various penalties*

KPI	Customer Schedule	First Optimization	Penalty			
			5	30	50	100
Duties	173	153	153	166	168	171
Vehicles	95	87	87	87	87	90

KPI	Customer Schedule	First Optimization	Penalty			
			5	30	50	100
Vehicle Similarity	N/A	N/A	2%	29%	51%	78%
Total Cost	268,959	246,189	246,532	254,551	257,375	261,614



These results are for a specific schedule and are indicative only.

## Templates Available from Optibus

Table 1-2: Templates Summary

Template Name	Purpose	Reference
Schedule Similarity - by route group & trip id	Create a new schedule to be <b>Trip ID - similar</b> to the supplied schedule but restricted to a nominated route group.	<a href="#">Schedule Similarity - by route group &amp; trip id</a>
Schedule Similarity - by route group & time	Create a new schedule to be <b>Trip Start Time - similar</b> to the supplied schedule for the nominated route group. It attempts prevent trip start time deviations of more than the specified time.	<a href="#">Schedule Similarity - by route group &amp; time</a>
Schedule Similarity - by route & time	Create a new schedule to be <b>Trip Start Time - similar</b> to the supplied schedule for the nominated route. It attempts prevent trip start time deviations of more than the specified time.	<a href="#">Schedule Similarity - by route &amp; time</a>
Schedule Similarity - by trip id	Create a new schedule to be <b>Trip ID - similar</b> to the supplied schedule.	<a href="#">Schedule Similarity - by trip id</a>

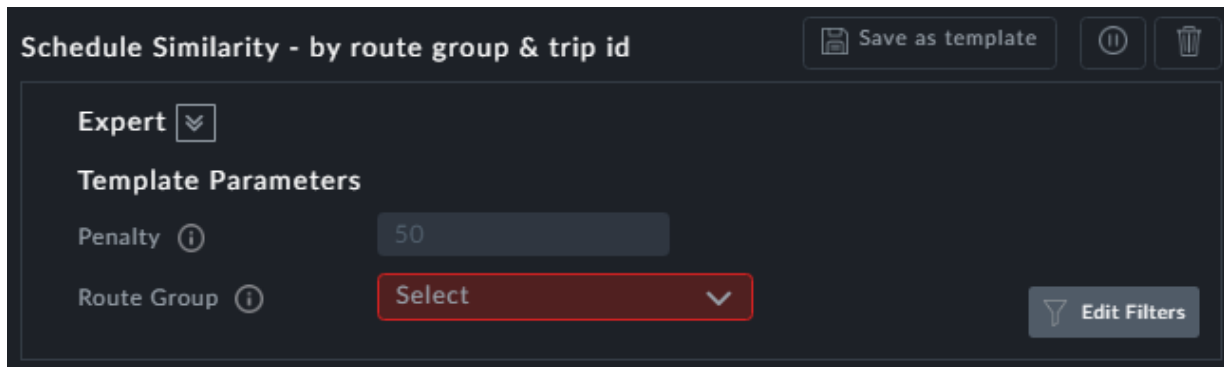
## Schedule Similarity - by route group & trip id

### Purpose:

Create a new schedule to be **Trip ID - similar** to the supplied schedule but restricted to a nominated route group.

**Prerequisites:** You should have already defined your route groups. See Miscellaneous Preferences, [Route Groups](#).

### Opening Dialog:



The screenshot shows a dark-themed dialog box titled "Schedule Similarity - by route group & trip id". At the top right, there are three buttons: "Save as template" (with a floppy disk icon), a pause button (with a double vertical bar icon), and a delete button (with a trash can icon). Below the title bar, there is a section labeled "Expert" with a dropdown arrow. Underneath, the "Template Parameters" section contains two rows. The first row is "Penalty" with an information icon (i) and a text input field containing the value "50". The second row is "Route Group" with an information icon (i) and a dropdown menu showing "Select" with a downward arrow. To the right of these parameters is a button labeled "Edit Filters" with a funnel icon.

### Points to note:

- » **Route Group:** The **Route Group** field is mandatory
- » **Penalty:** A high similarity carries a high penalty
- » Load this template again to for additional route groups

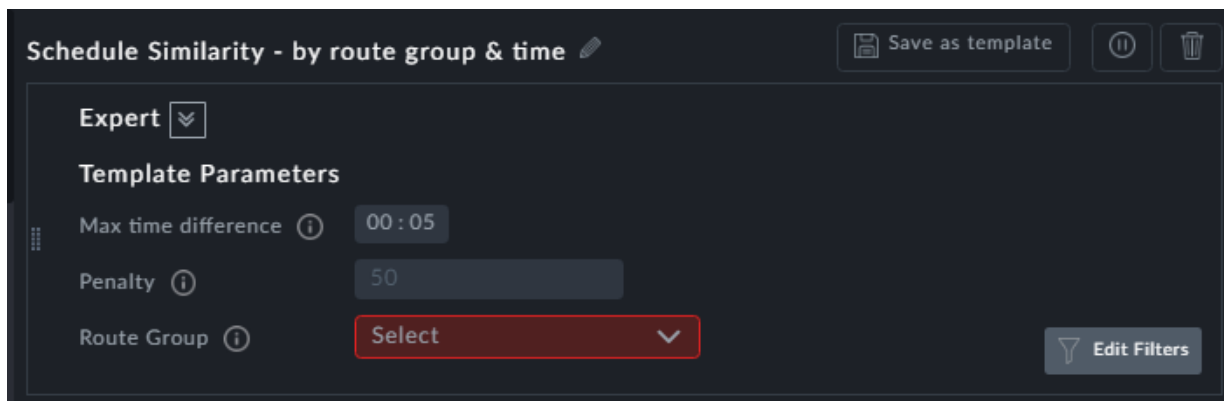
## Schedule Similarity - by route group & time

### Purpose:

Create a new schedule to be **Trip Start Time - similar** to the supplied schedule for the nominated route group. It attempts prevent trip start time deviations of more than the specified time.

**Prerequisites:** You should have already defined your route groups. See Miscellaneous Preferences, [Route Groups](#).

### Opening Dialog:



The screenshot shows a dialog box titled "Schedule Similarity - by route group & time". At the top right of the dialog are three buttons: "Save as template", a pause icon, and a trash icon. Below the title bar is a section labeled "Expert" with a dropdown arrow. Underneath is the "Template Parameters" section, which contains three fields: "Max time difference" with a value of "00:05", "Penalty" with a value of "50", and "Route Group" with a "Select" dropdown menu. An "Edit Filters" button is located at the bottom right of the parameters section.

### Points to note:

- » **Max time difference:** This is the maximum time deviation between the start time of a trip on a specific route as between the original schedule and the optimized schedule - that can be considered *Start Time Similar*
- » **Penalty:** The penalty is imposed when the **Max time difference** is exceeded. A high similarity carries a high penalty
- » **Route Group:** The **Route Group** field is mandatory
- » Load this template again to for additional route groups

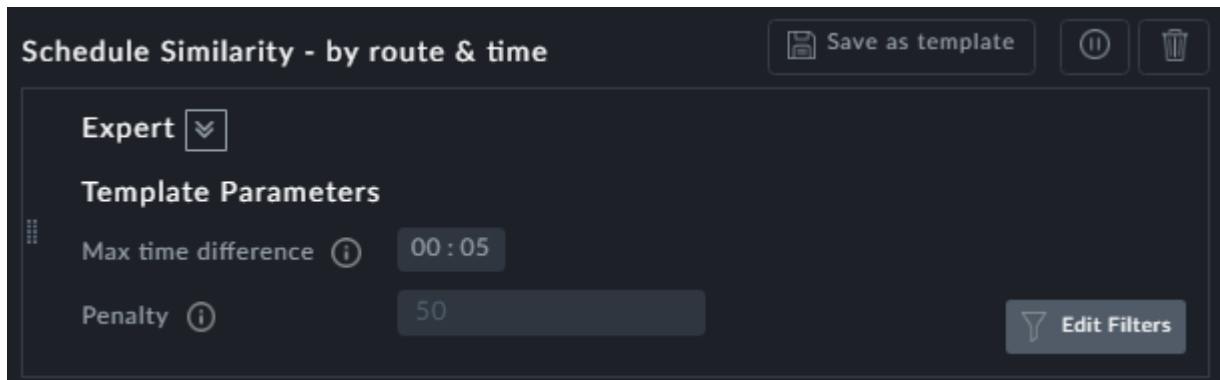
## Schedule Similarity - by route & time

### Purpose:

Create a new schedule to be *Trip Start Time - similar* to the supplied schedule for the nominated route. It attempts prevent trip start time deviations of more than the specified time.

**Prerequisites:** None.

### Opening Dialog:



The screenshot shows a dark-themed dialog box titled "Schedule Similarity - by route & time". At the top right of the dialog are three buttons: "Save as template" (with a floppy disk icon), a pause button (with a double vertical bar icon), and a delete button (with a trash can icon). Below the title bar is a section labeled "Expert" with a downward-pointing arrow icon. Underneath this is a section titled "Template Parameters". It contains two parameters: "Max time difference" with a value of "00 : 05" and "Penalty" with a value of "50". Both parameters have an information icon (i) to their right. At the bottom right of the dialog is a button labeled "Edit Filters" with a funnel icon.

Figure 1-1: Schedule Similarity by route and time

### Points to note:

- » **Max time difference:** This is the maximum time deviation between the start time of a trip on a specific route as between the original schedule and the optimized schedule - that can be considered *Start Time - similar*.
- » **Penalty:** The penalty is imposed when the **Max time difference** is exceeded. A high similarity carries a high penalty
- » You can create additional instances of this template using **Edit Filters** to differentiate between them.

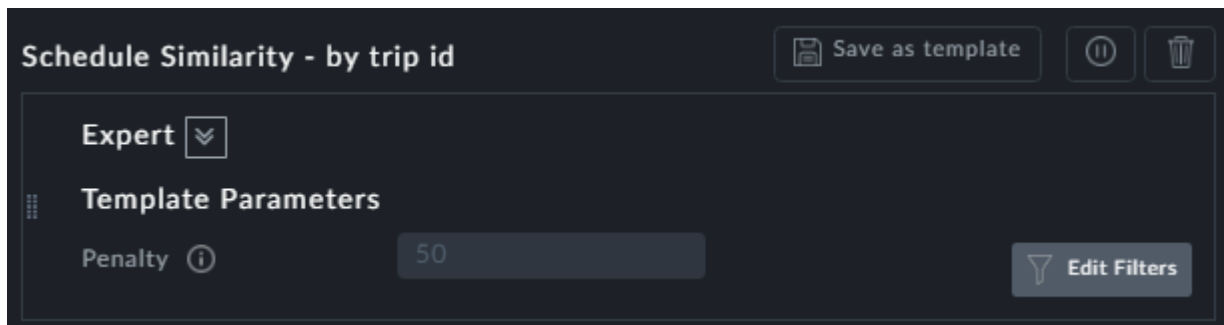
## Schedule Similarity - by trip id

### Purpose:

Create a new schedule to be **Trip ID - similar** to the supplied schedule.

**Prerequisites:** None.

### Opening Dialog:



Schedule Similarity - by trip id

Save as template

Expert

Template Parameters

Penalty 50 Edit Filters

### Points to note:

- » **Penalty:** A high similarity carries a high penalty
- » You can create additional instances of this template using Edit Filters to differentiate between them.

### Example:

See [Preference Overview](#) above.