Opendiem Training

Exercise 12

Opendiem-TRN-0012

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Exercise 12 –Opendiem Scheduler

Introduction

The Opendiem Scheduler is an Opendiem Client Service that provides scheduling for the Opendiem system.

The Scheduler Service communicates via the Opendiem Engine Service to set Network variables at specified times and can also send messages to other Opendiem Services. For example, the Scheduler Service messages can be used to start and stop alarms at specified times in the Alarm Service or to enable and disable data logging within the Logger Service.

The Scheduler Service has flexible and powerful scheduling capability coupled with comprehensive exception handling where individual and recurring dates can be grouped to enable or disable the scheduling during the exception periods.

Web based configuration (WBC) allows common scheduling settings to be viewed and modified using a standard Web Browser interface.

Objective

In this exercise you will use Opendiem Scheduler to setup some sample schedules that control Data Tags and also Opendiem services. You will also become familiar with Scheduler Heartbeats and Exceptions.

Scheduler Details

The Scheduler Client Service uses the local computer time and date. Daylight saving will be altered, if necessary, by the operating system, and this will be handled by the Scheduler. The Scheduler works with a resolution of 1 minute.

The Scheduler displays dates based upon the Short Date format of the Opendiem Server computer which are set using Regional Settings in Control Panel. Typically this will be used to distinguish between US, UK and other international date formats.

The Scheduler has limits on the maximum numbers of Schedules, Events, Actions and Exceptions it can store. There can be a total maximum of 3000 of the following objects in any combination:

- Schedules
- Events per Schedule
- Actions Per Event
- Exceptions

Multiple instances of the Scheduler may be activated from the Opendiem Engine to extend the above capabilities.

All Scheduler data including schedules, events, actions, linking information and exceptions are stored in the project database. The Scheduler settings are saved after a schedule is saved, an exception is saved, the preferences are altered or when the Scheduler is terminated by Opendiem.

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Starting Opendiem Scheduler Service

Exercise Instructions

The Opendiem Scheduler works on Schedules which group Events, Events contain times and days/dates when an Event will occur. Each Event has one or more Actions, which define the messages to be sent and to where, in response to an Event occurring.

Ensure that Opendiem Engine is running on your NSX-1000 and if necessary restart it.

Starting Opendiem Scheduler
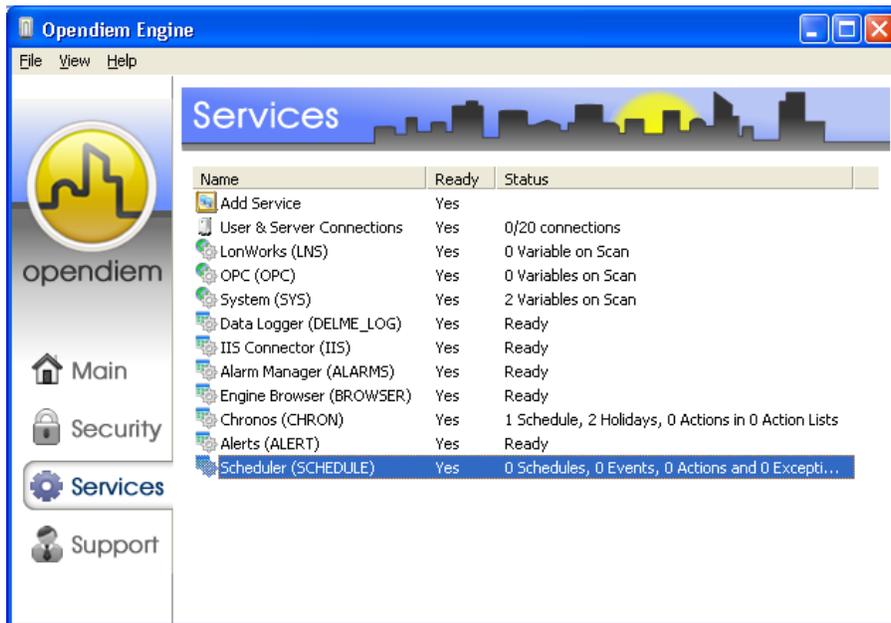
From the Services screen of Opendiem Engine check that the Opendiem Scheduler service is ready, if necessary add the service from the Client services.

Double click on the service to configure it.

Right click on the Schedules icon as shown and from the context menu select **Add Schedule**. And a screen similar to the one below will appear.

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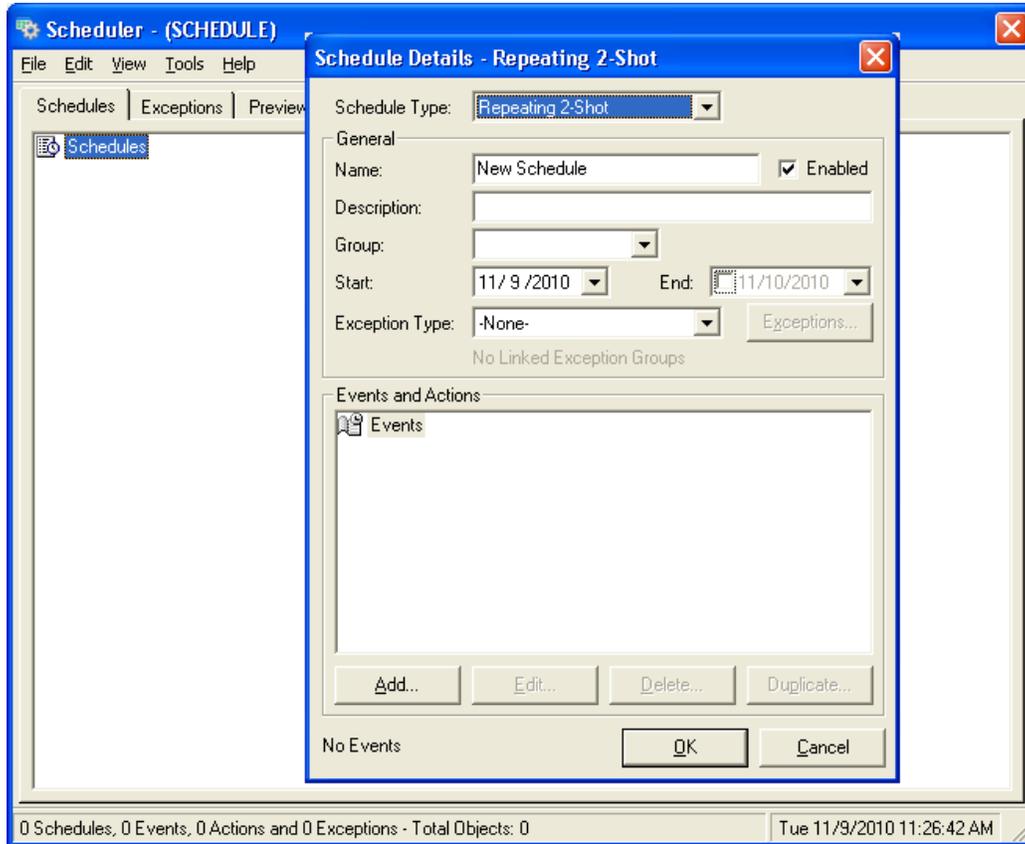
The Schedule Type drop down list contains all of the schedule types.

(1) Simple One Shot	This type of schedule has actions that are sent to Opendiem at one or more specific times of the day (an Event). It is given a specific date on when to fire. This type of schedule ignores exception days.
(2) Repeating One Shot	Like type (1) but it has a **start date** and **end date**. The **end date** can be empty to show **forever**. This type of schedule can repeat with one of the following:

        Every day

        Every week – selecting 1 or more M T W T F S S

        Every month – selecting 1 or more from 1 – 31 *

        Every weekday of the month – selecting 1 or more M T W T F S
            S of a specific week of the month **

        Every last day of the month

        Every Year – on DD/MM

* If dates greater than 28 are selected, the user is warned that actions

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	will only be sent in months that have that specific date. ** For example, 'every last Thursday of the month', 'every third Sunday of the month'.
(3) Periodic One Shot	Like type (1) but it has a **start date** and **end date** as above. However, instead of having specific periods of when to repeat (i.e. @ 09:00 every day) this will have a **start time** and a **waiting period**. This waiting period can be set to, say, 1 – 999, minutes, hours, days, weeks or months. So after the waiting period the actions fire again. E.g. start at 09:00 and repeat after 30 hours.
(4) Simple Two Shot	These have an ON action and an OFF action. Each action is given times when to occur. The OFF time may cross over midnight into the next day. E.g. ON @ 17:00, OFF @ 08:00 – the user is informed if this is the case. If there is a time pair that overlaps into the next day, then the OFF command will only fire on the second day. So, for the above example, the 17:00 ON actions will fire on the required date, and the OFF actions at 08:00 the following day. The Schedule is given a specific date on when to start. Again, this simple type ignores Exception days and so is always enabled (since it is only going to run once).
(5) Repeating Two Shot	As type (4) above, but with 'start date' and 'end date' (or empty). As before, if there is a time pair that overlaps into the next day, then the final OFF command will fire on the day following the end date (if applicable). This type of schedule has the same repeating options as type (2) above.
(6) Periodic Two Shot	As type (4) but it has a 'start date' and 'end date' as above. However, instead of having specific periods of when to repeat (i.e. ON @ 09:00, OFF @ 17:00, repeating every day) this will have a 'start time' an 'ON period' and an 'OFF period'. These periods can be set to, say, 1 – 999, minutes, hours, days, weeks or months.

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Start
Time

ON Period   OFF Period

Time

ON
Action(s)

OFF
Action(s)
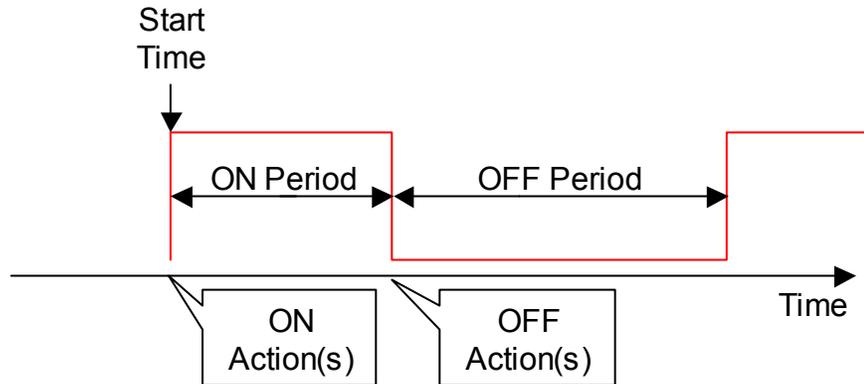
Schedule Type	For this exercise, select the schedule type as Repeating 2-Shot.
Name & Description	Enter a Name & Description to document the Schedule
Group	Enter a Group Name for this schedule, schedule groups contain one or more schedule types each with one or more events.
Start	Select the start date when this schedule is to be active from. Selecting the button will present a pop up calendar.
End	Optionally, you can specify an end date for this schedule. If the End is unselected then the schedule will run indefinitely.
Exception Type	Each Schedule can have multiple linked Exceptions defined in the Exceptions tab. The schedule can be active Only during the exception, Not during the exception or **–none-**. For this exercise set the exception to **-none-**
Events & Actions	This pane lists all of the Events and Actions for this schedule
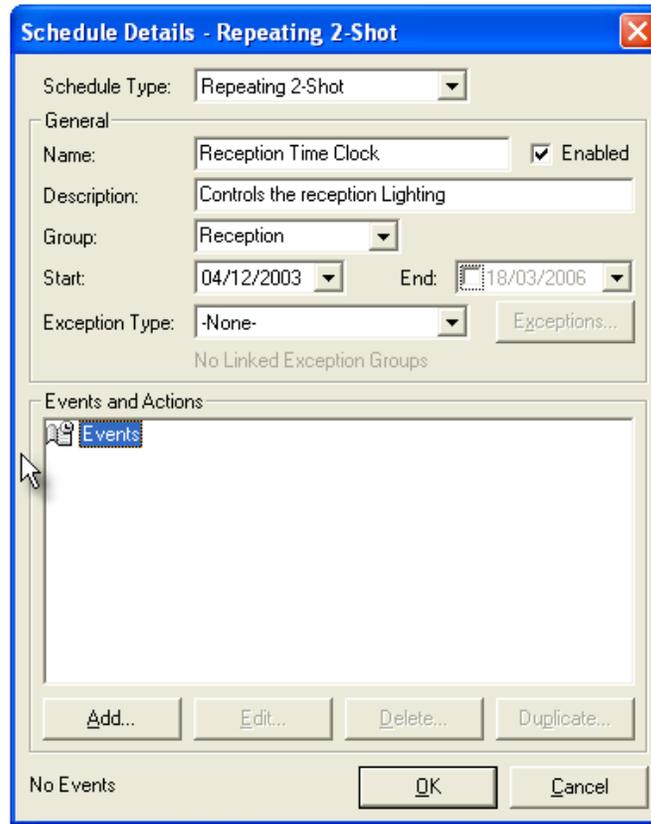
Click right on the **Events** icon and select **Add Event...** from the context menu. A screen similar to the one below will appear.

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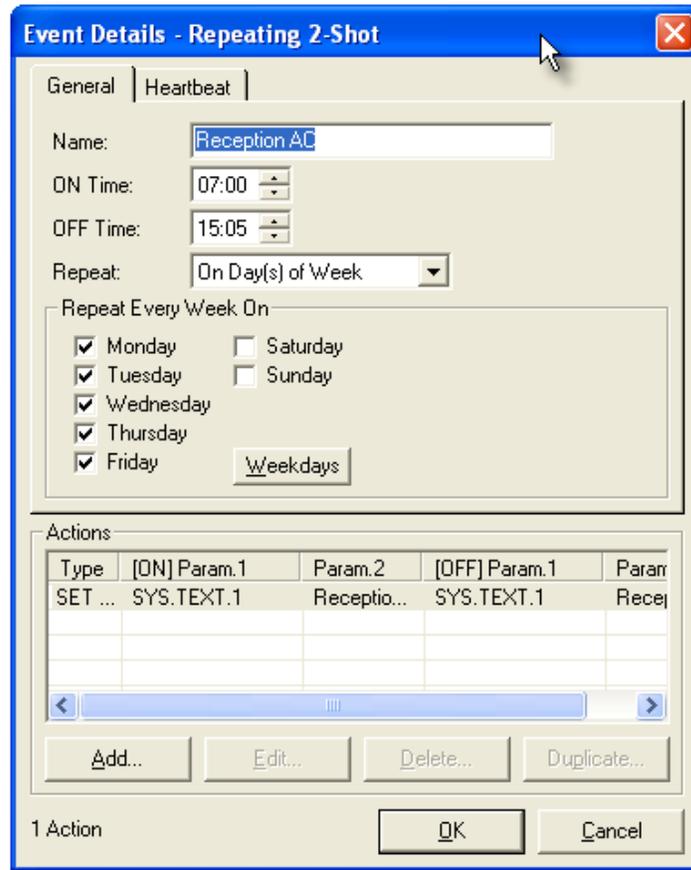
This screen defines Events for the schedule.

An Event is used to group Actions together that have a common on and off time and/or repeating pattern. The event times and options are determined depending on the type of schedule that they belong.

Name	Enter a meaningful name for the Event.
On Time	Enter the time you wish the event to be on from.
Off Time	Enter the time you wish the event to enter the off state.
Repeat	This drop down list displays the various repeat options as described previously. Select the required repeat interval.
Actions	This pane lists all of the Actions associated with this Event. You can define up to 16 Actions per Event, so for example you could set the setpoint with one Action and set the Boiler to Enabled with another both linked to the same event.

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Right click in the Actions Pane and select **Add Action**.

Actions are commands sent to Opendiem that are interpreted and acted upon by the receiving system.
Actions are either:

(1) Setting a Project Variable to a Value
(2) Sending a Text Command to a Web Client or another Opendiem Service (Advanced)
(3) Running an external application (Advanced)

Enter a variable Tag name for the On Event Action and the Off Event Action, note that the ON & OFF could contain different Tags. You can drag & drop a Variable name from the Opendiem Browser or enter it manually.

In the example below we have sent a text message to the Opendiem SYS driver. The **Set Var Now** button allows the Action to be sent immediately for test purposes.
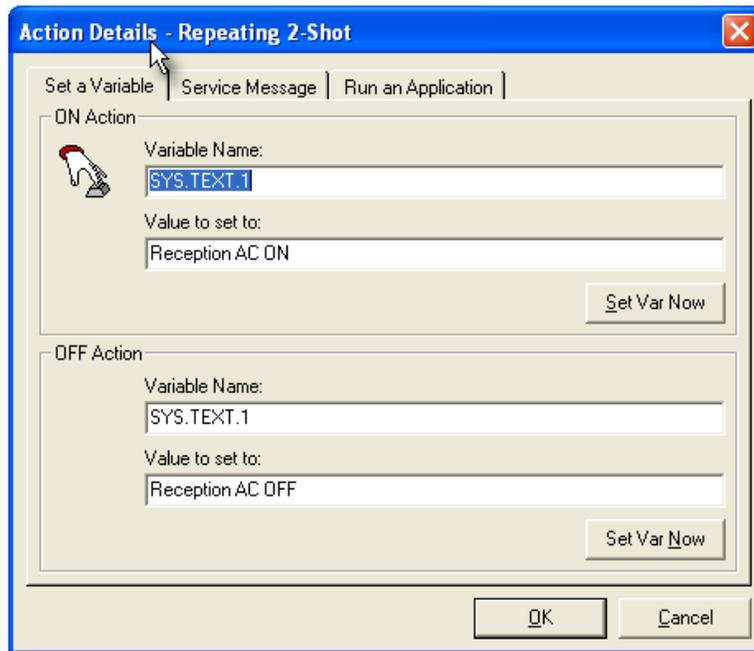
Select **OK** and you will return to the Event screen. Select the Heartbeat tab and the screen below will show.

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The Heartbeat feature allows you to re-send the current Action status for On and Off actions at a rate of between 1 and 999 minutes. A Heartbeat rate of zero will only send the Action when the state changes from Off to On or On to Off.

Set the Heartbeat rates to 1 minute for On and Off Actions.
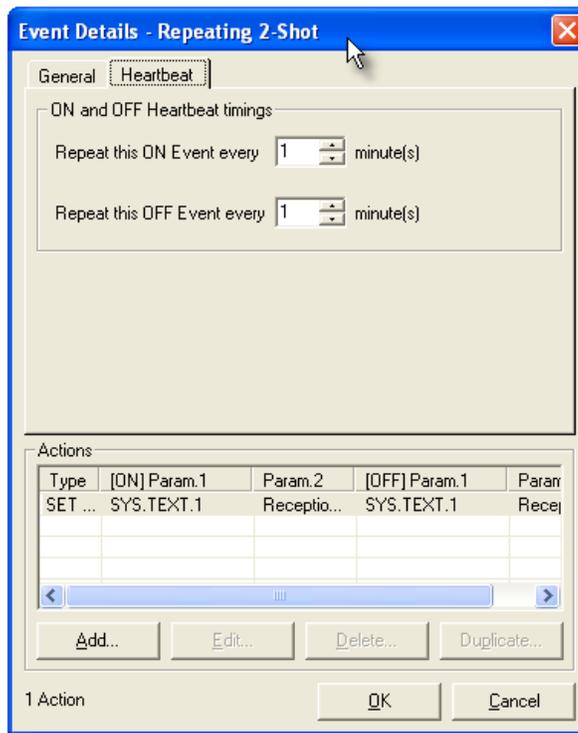
Select **OK** and the main screen of the scheduler should be similar to the one below.
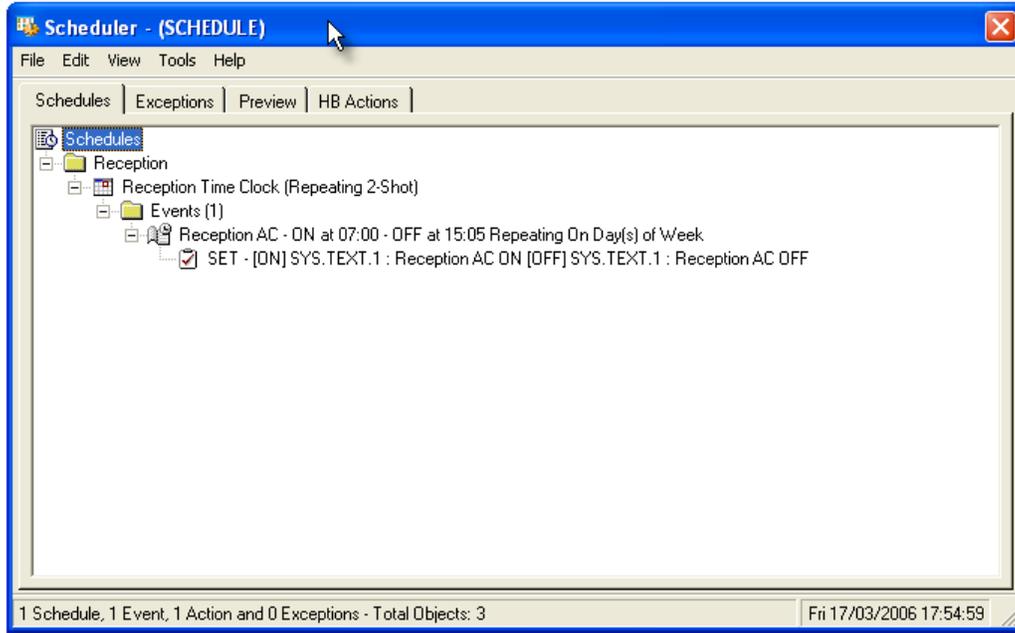
Any item in the tree may be edited by double clicking on it.

Check that the schedule works as expected by checking the SYS driver service.
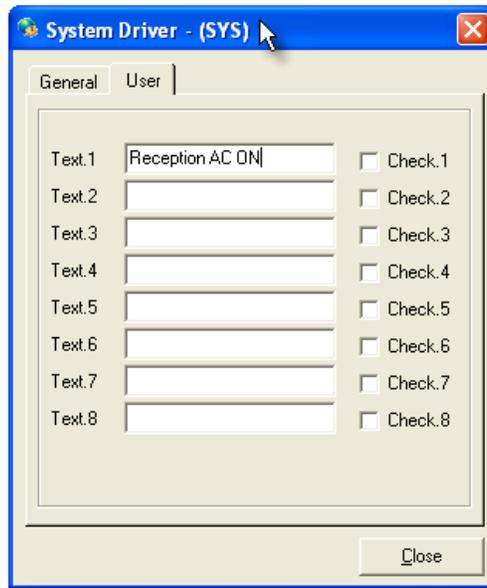
Select the preview tab on the Scheduler main screen.

For the Schedule just defined the preview looks like the screen below.
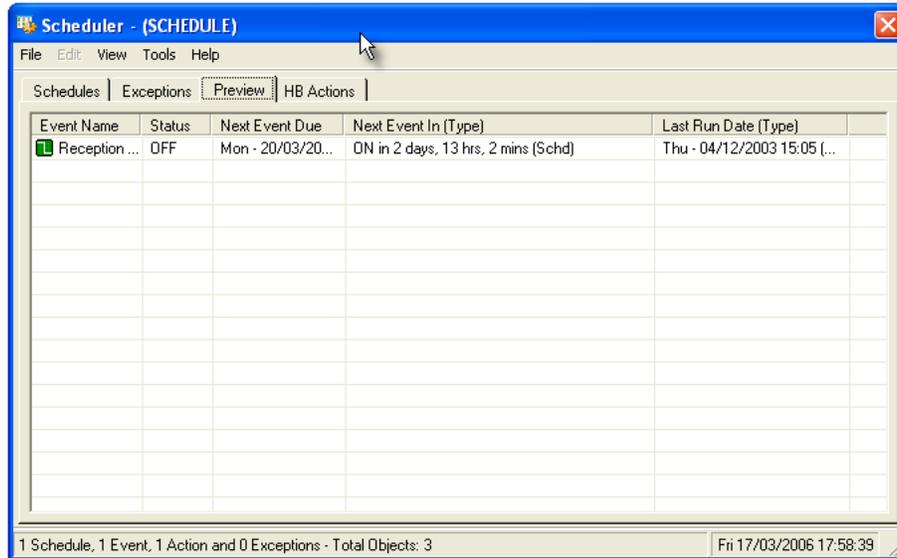
The Preview screen gives a comprehensive view of the scheduler actions and is extremely useful when trying to asses why an Action is behaving in a particular way.

Icons in the Action Preview screen indicate the status of the Action.

- Shows the Action has never run
- Shows the Action is a 1-Shot and it has previously run
- Shows the Action is a 2-Shot and it has sent the ON command (switched from OFF to ON)
- Shows the Action is a 2-Shot and it has sent the OFF command
- Shows the Action is disabled – either through an exception or because the schedule is disabled
- Shows the Action has expired (it's end date has passed)

The columns visible in the Preview screen are configurable by selecting **Tools | Customise** from the main menu.
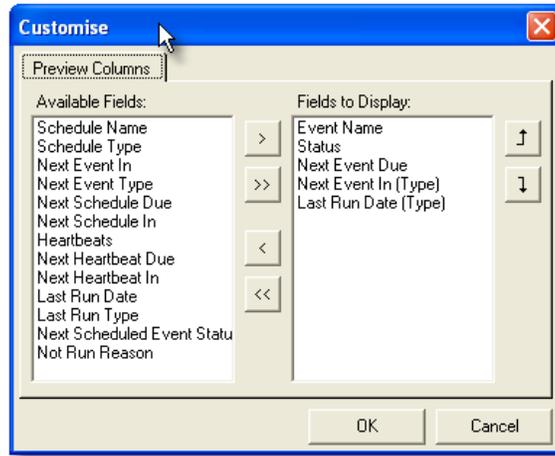
Experiment with different columns.

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Exceptions.

The Exceptions tab shows all Exceptions set up in the Scheduler

Scheduler Exceptions describe dates/times when a particular exceptional time period occurs. These are typically holidays and special events.

E.g. Christmas Holiday
        Starts: 21 December 2011 17:00
        Ends: 02 January 2012 08:30

There two types of exception, 'date/time range' or 'repeating period'. These both have name, description and group, the group being mandatory. 'Date/time range' exceptions have a start date/time and end date/time. The 'repeating period' exceptions can be selected the same way as the repeating schedule types.

Each schedule can be linked to one or more exception days. Exception days are selected by their 'group'. For example, several exception days can be grouped as 'Holidays' or 'Shutdowns'. For example, a schedule can be set to be disabled during 'Holidays'. Similarly, an exception could set a schedule to ONLY run during exception days.
When exceptions are used with 2-Shot schedules, then the exception only affects an ON action. For example, if an ON action has occurred previously, and an exception rules the OFF action time is disabled, then the OFF action will still occur at its due time.
If an exception rules an ON action as disabled, then it's OFF action won't occur, even if the OFF action time is outside the exception period.

If an attempt is made to delete an exception that is a member of a group that has Schedules linked to it, then the user is asked to confirm the deletion. If the exception is the **only** member of a group that has schedules linked to it, the user is asked to confirm the deletion, because by deleting this exception it will also delete all references of the link(s) to each related schedule.

Refer to the diagram below showing actions occurring when the Exception Type is set to 'Only During the Exception'
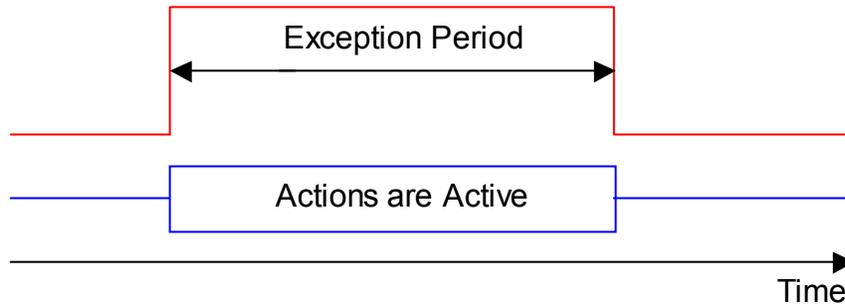
Refer to the figure below showing actions occurring when the Exception Type is set to 'Not During the Exception'
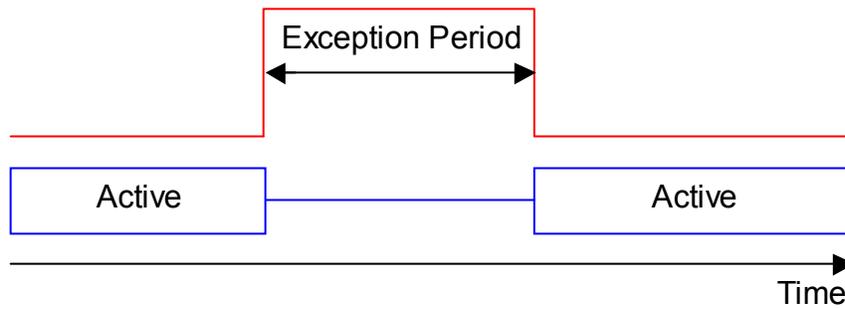
Add an Exception by right clicking in the pane within the Exceptions tab, the following screen will appear.
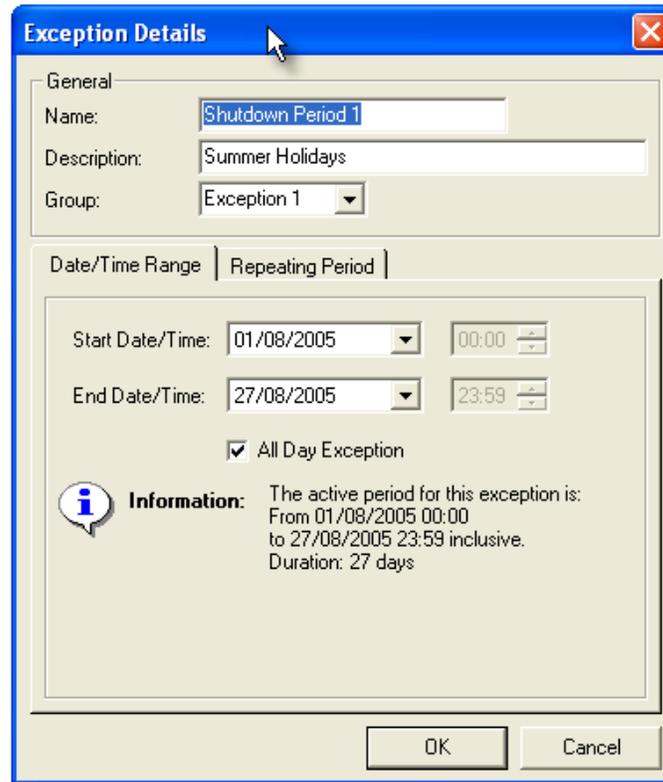
Enter a name & description for the Exception and add the Exception to a group.

Enter the start & End dates for the Exception. The Exception can be an all day exception or only between the Start & End Time. The Repeating Period tab allows you to specify the day types on which to apply the exception. These options are the same as for the repeat options in Events. Details on the Exception are detailed in the pane.

The Exception can now be linked to a Schedule from the Schedule screen.

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Experiment with different Schedule types, Events Actions and Exceptions.

Link Manager

The Link Manager dialog is displayed by selecting Link Manager from the Tools menu.

The Link Manager makes it easier to view and edit schedules with exceptions. The Link Manager enables the links between exceptions and schedules to be simply edited or schedules to be assigned to exception groups - without having to edit each schedule individually.

Select the exception group in the list and the Link Manager shows the schedules that are linked to that exception group. The links can then be altered by selecting the required options.

Options

The user can select to show or hide Unique IDs for Schedules, Events, Actions and Exceptions. If showing, this will display the internal unique reference used by the Scheduler. This reference is used to link, for example, Actions to their corresponding Event. It may be useful when determining which action belongs to which schedule in the Action Preview screen when several actions have been created.

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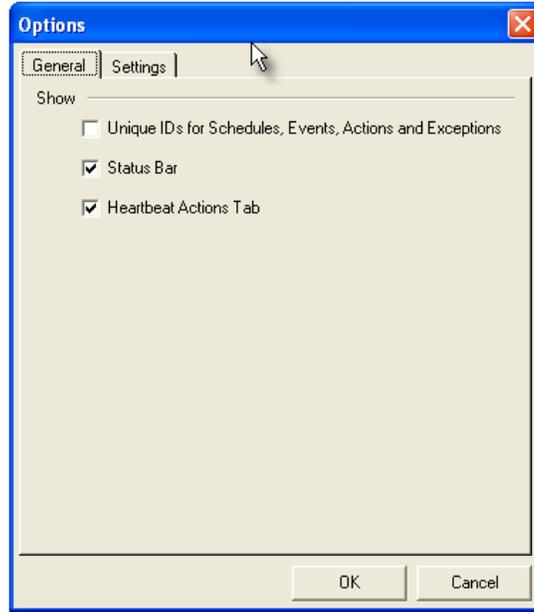
The **Settings** tab provides options on the startup behavior of the scheduler, actions to be taken when editing a schedule and the default scheduler type.
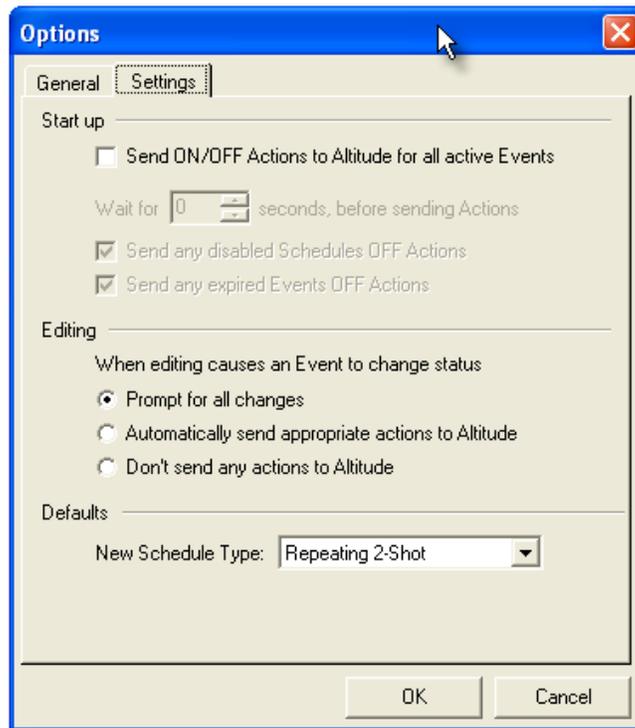
End of Exercise 12

The Opendiem Scheduler is a comprehensive Scheduler with extreme flexibility. In this exercise we have explored the many ways in which the scheduler can be utilized and also investigated the ways in which schedules can be reviewed to investigate why particular events occur.

Common Scheduler Questions & Answers

Q: Do Heartbeats occur when the Schedule has expired?
A: No.

Q: Do Heartbeats occur when the Schedule is disabled?
A: No.

Q: Do Heartbeats occur when the Schedule is disabled by exception?
A: Yes. Only OFF heartbeats will occur. Event is in an Off state.

Q: When does an event get affected by an exception?
A: When exceptions are used with 2-Shot schedules, then the exception only affects an ON action. For example, if an ON event has occurred previously, and an exception rules the OFF event time is disabled, then the OFF event will still occur at its due time. Also, if an exception rules an ON action as disabled, then it's OFF action won't fire, even if the OFF action time is outside the exception period.

Q: When does an Event expire?
A: For 2-Shot Schedules, each event for a schedule can only expire after an OFF event has occurred. Consider an Event, ON at 17:00, OFF at 08:00. If the ON event occurs at 17:00, then the expiry date passes at midnight, the OFF will still fire at 8:00 the following day. The End Date is the day the expiry occurs. So the Previous day is the last day the on event can occur. The End Date is NOT the Last day.

Q: When does the first event occur?
A: Hint: you can click on the Num Actions label in the bottom left corner of the Event Details dialog.
The first event occurs on the first valid day on or after the schedule start date, at the specified time.

Q: Why doesn't sending an ON Override change the status to ON?
A: Because you are only sending the ON action commands to Opendiem - rather than advancing to the ON event.
The Scheduler calculates the current 'virtual' status of the events you have set up. It does not assess the value of variables to determine if something is ON or OFF. Because the 'input' variable it is setting may not indicate the 'output' state. Also, the Scheduler can send messages and start programs - and these are 'stateless'.

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Q: **'Send Events at Startup...**' Which events are sent, and which are not?
A: All active types including disabled by exception (send OFF actions) Depending on the options selected, Expired and/or Disabled events can also send OFF actions.

Q: Why aren't all of the Scheduler options available in the Web Based Configuration?
A: The scheduler is an extremely complex and versatile component and therefore not all of the configuration options can be represented in a standard web page. The Opendiem Chronos Service is a simplified scheduling application and all of the configuration options are presented within a web page.

Notes:

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