Opendiem Training

Exercise 13

Opendiem-TRN-0013

Revision	5.0.0		
Status	Initials	Date	Comment
Released	RAC	11/18/2010	Updated format and content

Engine   Connect   Designer

Exercise 13 –Opendiem Chronos Schedules

Introduction

Opendiem Chronos is a simplified Scheduling service designed to offer simple yet powerful scheduling capability that complements the power of the Opendiem Scheduler. All of the features of Chronos are available via a full web based graphical scheduling front end.

Chronos is an Opendiem Client Service.

The Chronos Service communicates via the Opendiem Engine to set Network variables at specified times and can also send messages to other Opendiem Services. Chronos Service messages can be used for example to start and stop alarms at specified times in the Alarm Manager or to enable and disable data logging within the Logger Service. Chronos can schedule individual events or entire action lists.

The Chronos Service has flexible and powerful scheduling capability coupled with simple holiday planning where individual and recurring dates can be grouped to enable or disable the scheduling during the holiday periods.

Full web based configuration allows all scheduling settings to be viewed and modified using a standard Web Browser interface. Chronos project tree extensions allow Chronos schedules to be viewed and controlled from within an Opendiem screen.

Objective

In this exercise you will use Opendiem Chronos to setup some sample schedules that control network device data. You will also gain an appreciation of Chronos Heartbeats, action lists and Holidays.

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Chronos Details

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

Chronos displays dates based upon the Short Date format of the 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. A maximum of four on off periods per schedule are possible with Chronos.

Multiple instances of Chronos may be activated from the Opendiem Engine to offer additional scheduling capabilities.

All Chronos data including schedules, actions, and holidays are stored in the project database. Chronos settings are saved after a schedule is saved, a holiday is saved, the preferences are altered or when Chronos is terminated by Opendiem.
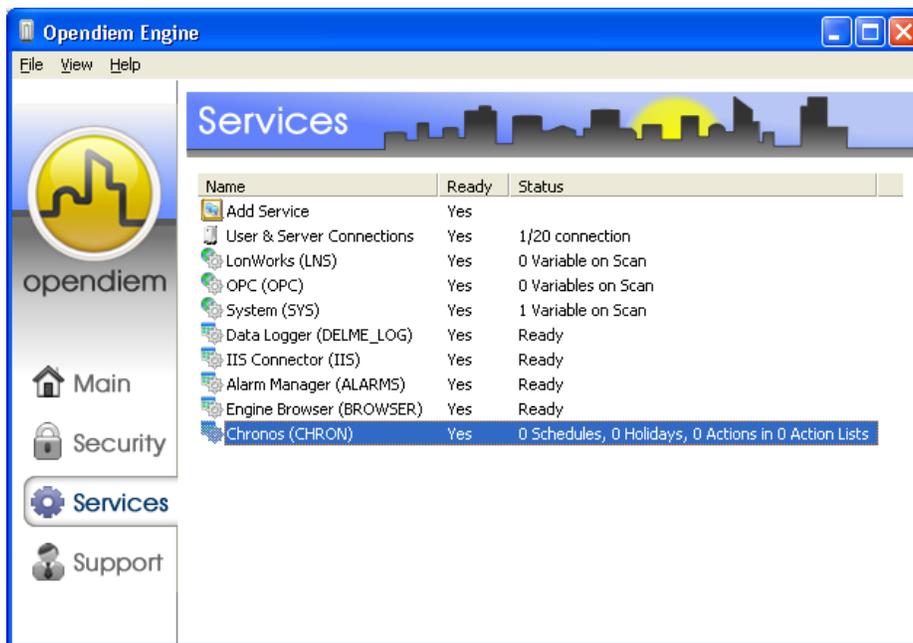
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Starting Opendiem Chronos Service

Exercise Instructions

Opendiem Chronos works on groups of schedules, schedules contain times and days/dates when an Event will occur. Each Event has one or more Actions which define which messages are to be sent and to where in response to an Event occurring. Additionally, each schedule can have a configurable on and off heartbeat.

Ensure that Opendiem Engine is running on your Server and if necessary restart it.

Starting Opendiem Chronos

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

Double click on the service to configure it. The following screen appears:
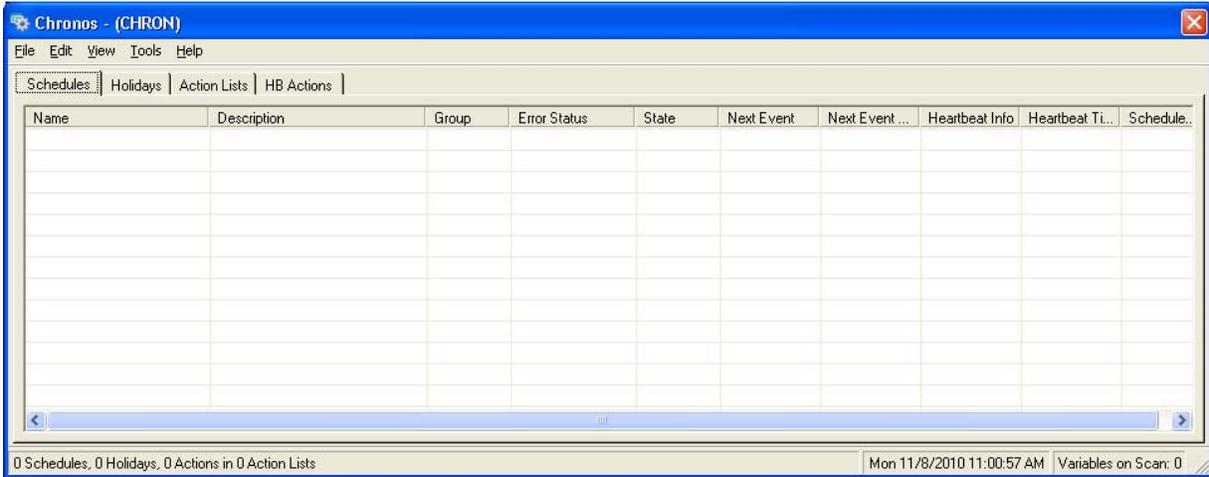
Right click inside the Chronos window and from the context menu select **Add Schedule**. The Schedule Wizard will appear. Select the General menu:
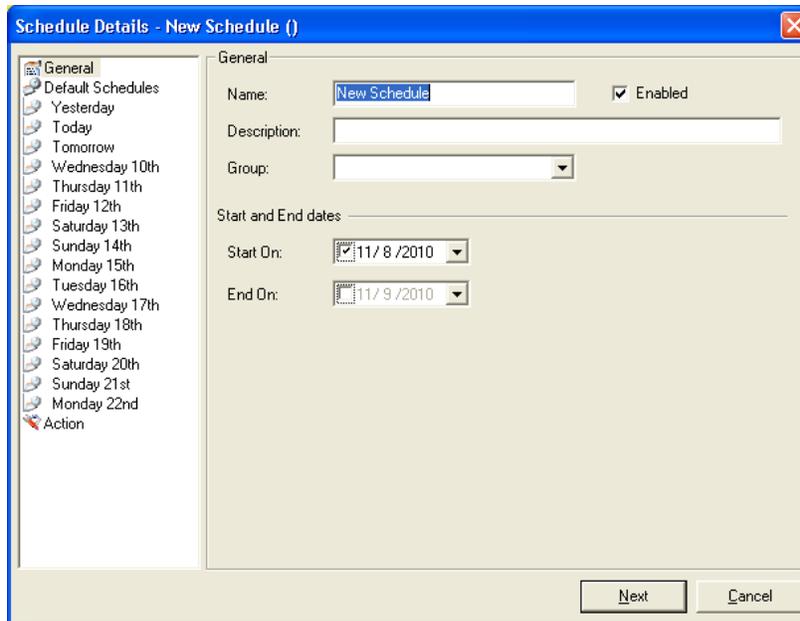
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| Name & Description	Enter a Name & Description to document the Schedule
Group	Enter a Group Name for this schedule, schedule groups contain one or more schedules each with one or more events.
Start & End Dates	Enter the desired start and optional end dates for your schedule. If no end date is entered, the schedule will run indefinitely.

Click Next
From the Default Schedules menu:
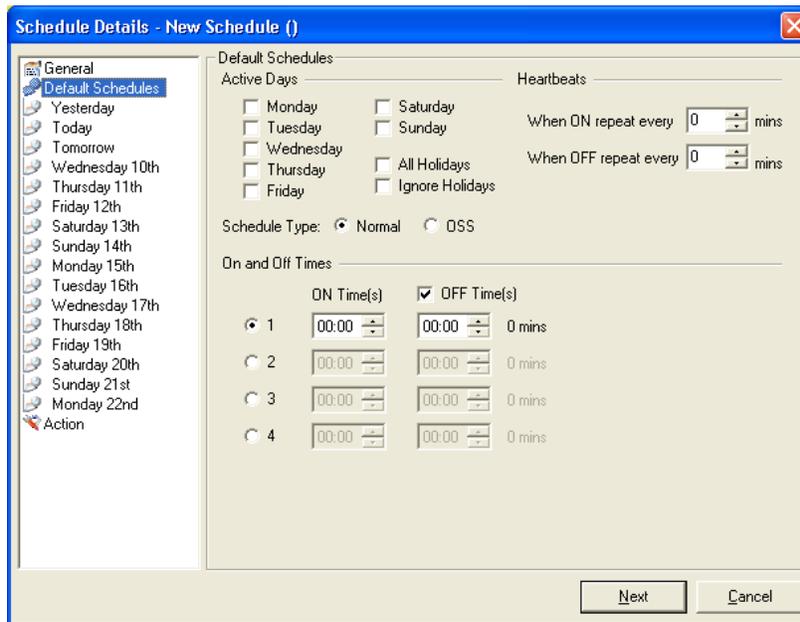
Complete the Active Days, Heartbeats (optional), On and Off Times.

| Active Days	Select the days that you want this schedule to be active on. **All Holidays** makes this schedule active during holiday periods. **Ignore Holidays** makes this schedule operate even if a holiday period is active.
Schedule Type	Check Normal for most cases. OSS = Optimized Start/Stop. This topic will be covered in a future exercise. Checking this button will bring up the OSS menu and options.

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On and Off Times	The radio button allows you to select between one and four On/[Off] periods per schedule. The Off time is optional. Enter the time you wish the event to be on from and optionally enter the time you wish the event to enter the off state.

Heartbeats	Each Schedule can optionally have an On and an Off heartbeat selectable in 1 minute increments between 0 and 999. A setting of 0 disables the heartbeat.

Actions	This pane lists all of the Actions for this schedule. The options here are to set an individual variable, send a message to an Opendiem Service or to fire an entire action list.

From the Action menu:
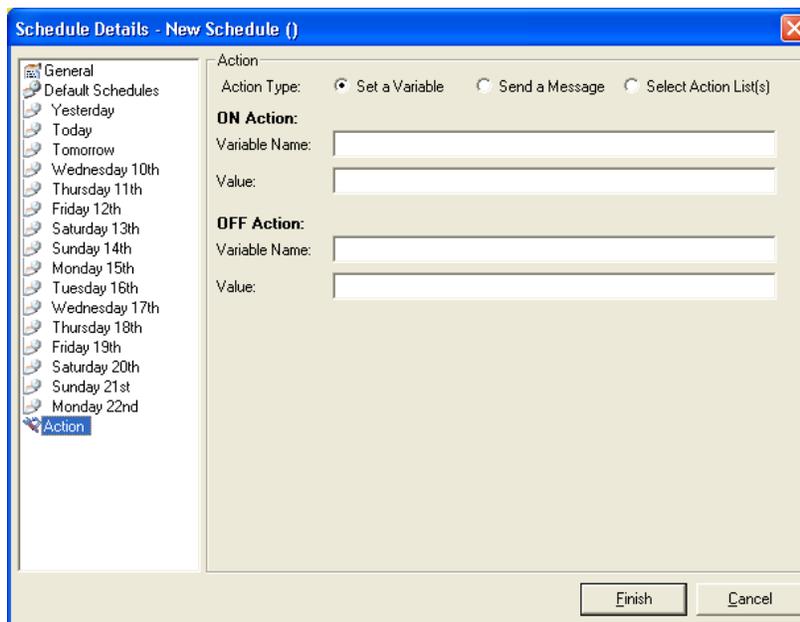
Actions	This pane lists all of the Actions for this schedule. The options here are to set an individual variable, send a message to an Opendiem Service or to fire an entire action list. Enter a variable Tag name for the On Event Action and the Off Event Action - note that the ON & OFF could contain different Tags. You can drag & drop a Variable name from the Opendiem Browser or enter it manually. When you have entered the required data click Finish.

Enter some more schedules - note that once the schedules are set up, details on the current status such as Error status, Current State, Next Event and Heartbeat status are shown on the **Schedules** tab.

Name	Description	Group	Error Status	State	Next Event	Next Event ...	Heartbeat Info	Heartbeat Ti...
Plant number 1	Controls Plant 1	Plant 1	0 - OK	ON	OFF Thu - 2...	OFF in 4 hrs...	When ON, ...	ON in 1 min
Plant number 1 Lighting	Controls Plant 1 Lighting	Plant 1	0 - OK	ON	OFF Thu - 2...	OFF in 5 hrs...	When ON, ...	ON in 1 min
Plant number 2	Controls Plant 2	Plant 2	0 - OK	ON	OFF Thu - 2...	OFF in 4 hrs...	When ON, ...	ON in 1 min
Plant number 2 Lighting	Controls Plant 2 Lighting	Plant 2	0 - OK	ON	OFF Thu - 2...	OFF in 5 hrs...	When ON, ...	ON in 1 min

4 Schedules, 1 Holiday, 3 Actions in 1 Action List   Thu 27/03/2003 16:46:04

Note that the pop-up context menu (right-click) also provides additional convenience features such as **Duplicate Schedule** and **Send ON Action(s)**.

Click on the **Holidays** tab. Right click in the form and from the context menu select **Add Holiday...** The dialogue below will appear, enter a name for the holiday period and select start and stop dates from the pop up calendar.

The holiday will appear in the **Holiday** tab and will also show the holiday duration.

Click on the **Action Lists** tab and right click on the form and from the context menu select **Add Action List...** a new action list form will appear - give the action list a name and description. Right click on the form and select **Add Action...** From the form that appears add the required action item, as shown below. This operation is the same as for the single schedule action detailed earlier.

Repeat the process to add as many action items as required.

In the example above 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. Check that the schedule works as expected by checking the SYS driver service.
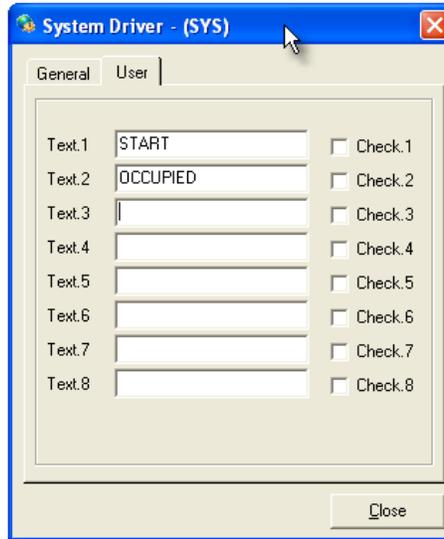
Now that some schedules are configured we will take a look at the Web Based Configuration of Chronos. Start a web browser and enter an address of http://127.0.0.1/wbc/wbc.html a screen similar to the one below will appear, note that the WBC only lists services which are running.
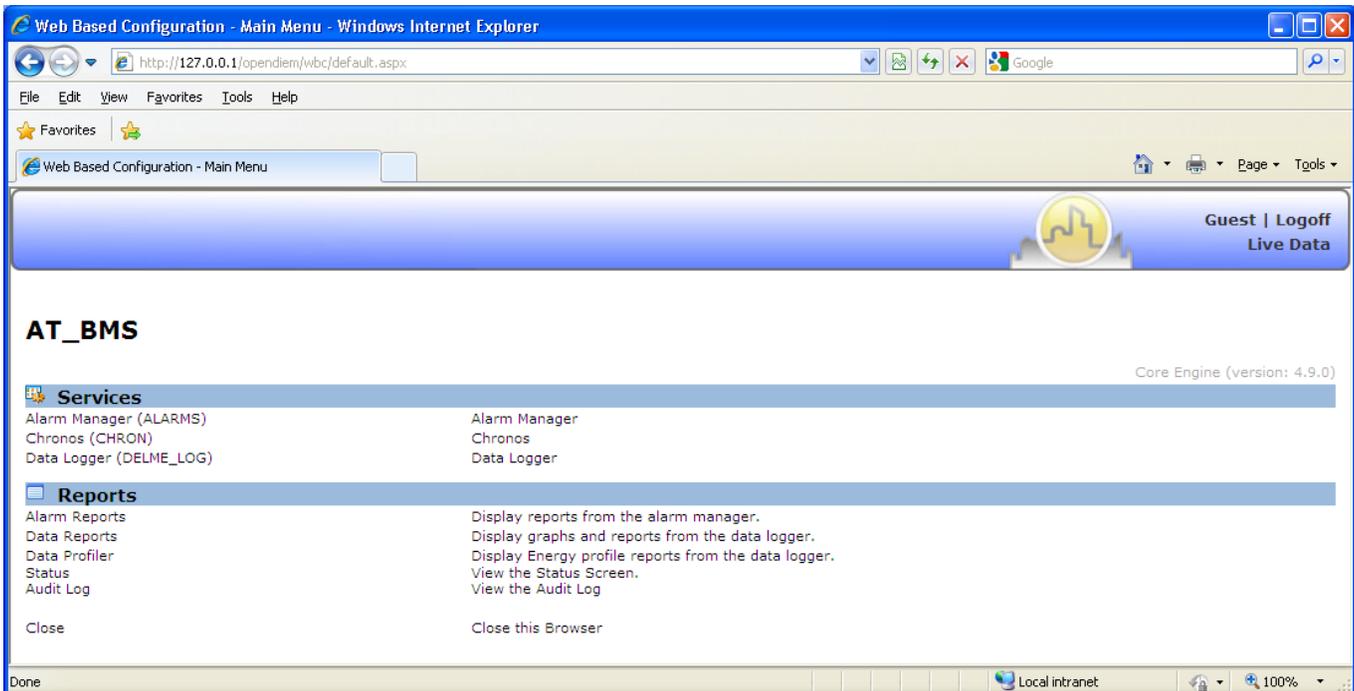
Click on the Chronos link and a screen similar to the one below will appear.
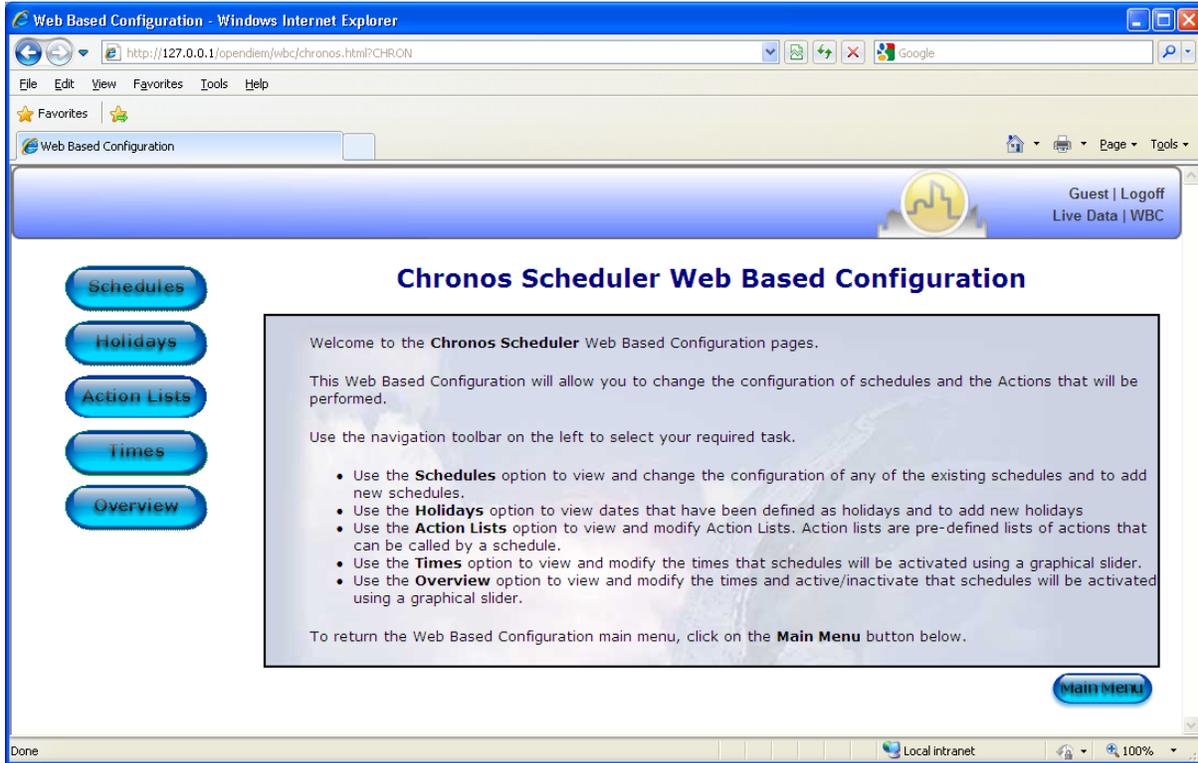
Click on the **Schedules** button, from the screen that appears. Select a schedule, note how the Opendiem WBC groups the schedules. Verify that the settings are the same as those in the Chronos application. Experiment with changing the settings in the browser and note how the changes take immediate effect in the Chronos application.
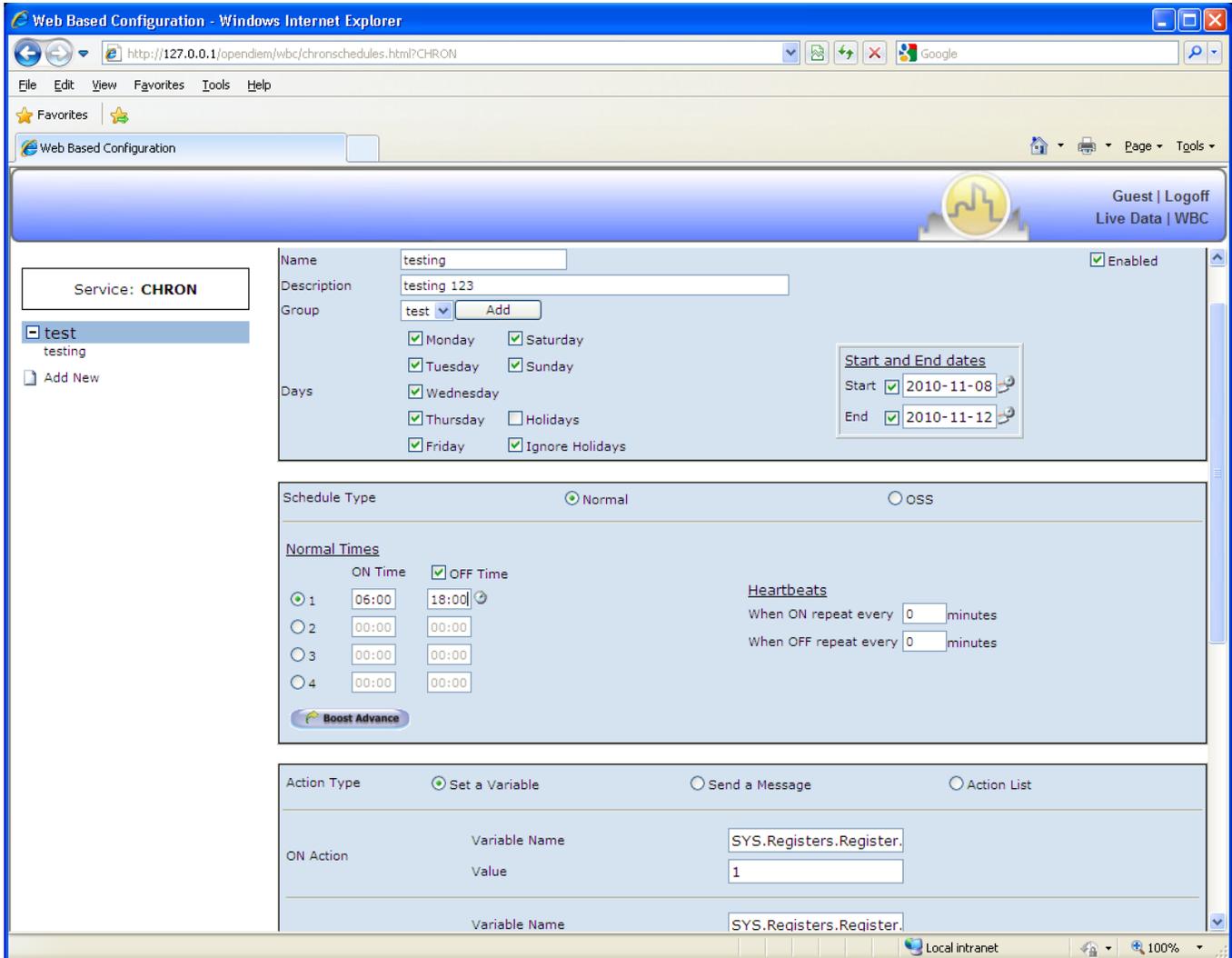
Click on one of the time setting icons associated with a time period as shown above, a graphical pop up time slider will appear as shown below. Move the slider buttons to adjust the start and stop times and click on the **OK** button, the graphic will show the ON period as a gold color. Click on the **Save** button to save any configuration changes to Chronos (bottom of window).

Verify the new time settings in the Chronos application.

Select **Back** and navigate back to the **Main Menu**. Click on the **Holidays** button and the screen below will appear. This view is a holiday planner for the current year and the year after. Note how the planner shows the currently set holiday dates highlighted.

Click on a date, in the planner and you will be prompted to give the holiday a name, select **OK** and the new holiday will be stored and shown highlighted in the planner.
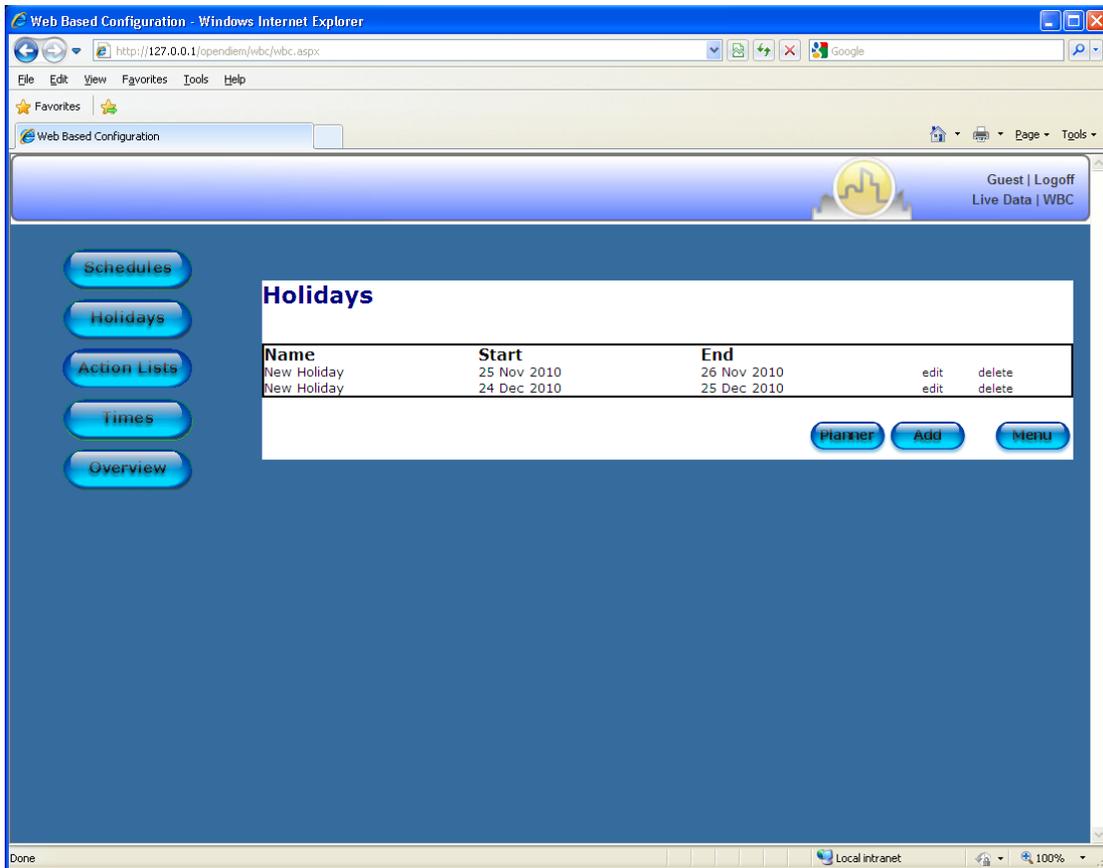
Only single holiday dates may be added in this way, to add a range of holiday days click on **List View** and the screen below will appear, give the holiday a name and select a range of dates to include for the holiday period from the pop-up calendars.

To delete a holiday simply click on a holiday date in the planner, a prompt will appear requesting confirmation for removing the holiday. Holiday ranges of one or more days can be deleted in this way.
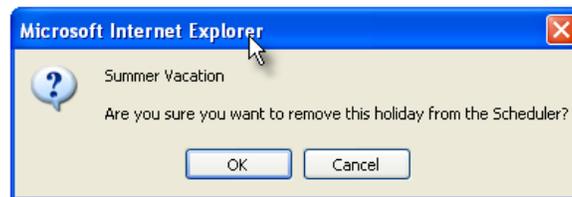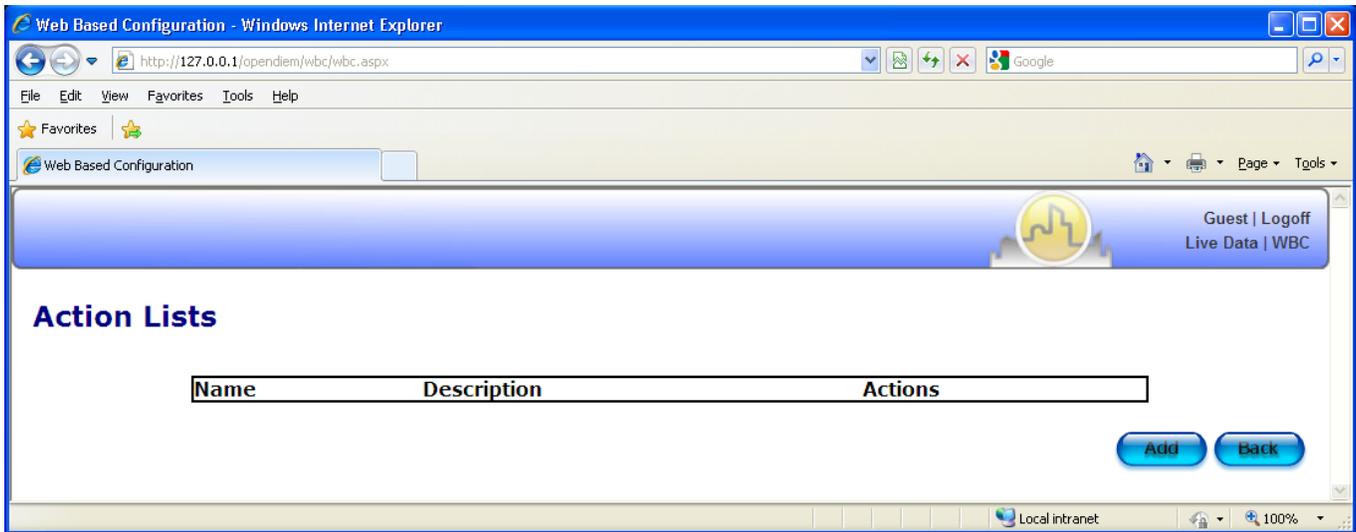
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Navigate back to the Chronos main screen and click on **Action Lists**, a screen similar to the one below will appear, click on the delete link next to an action list to delete it or click on an action list name to edit it.

Click on an action list name and the details for the action list will show, click on the action type link to edit an individual item, the **delete** link will delete the individual action list variable and the **Add** button will allow you to add an additional action list item.

Clicking on **Add** or an **Action Type** variable will show a screen similar to the one below where the item can be edited. Investigate adding different action list items and verify that they operate as expected.
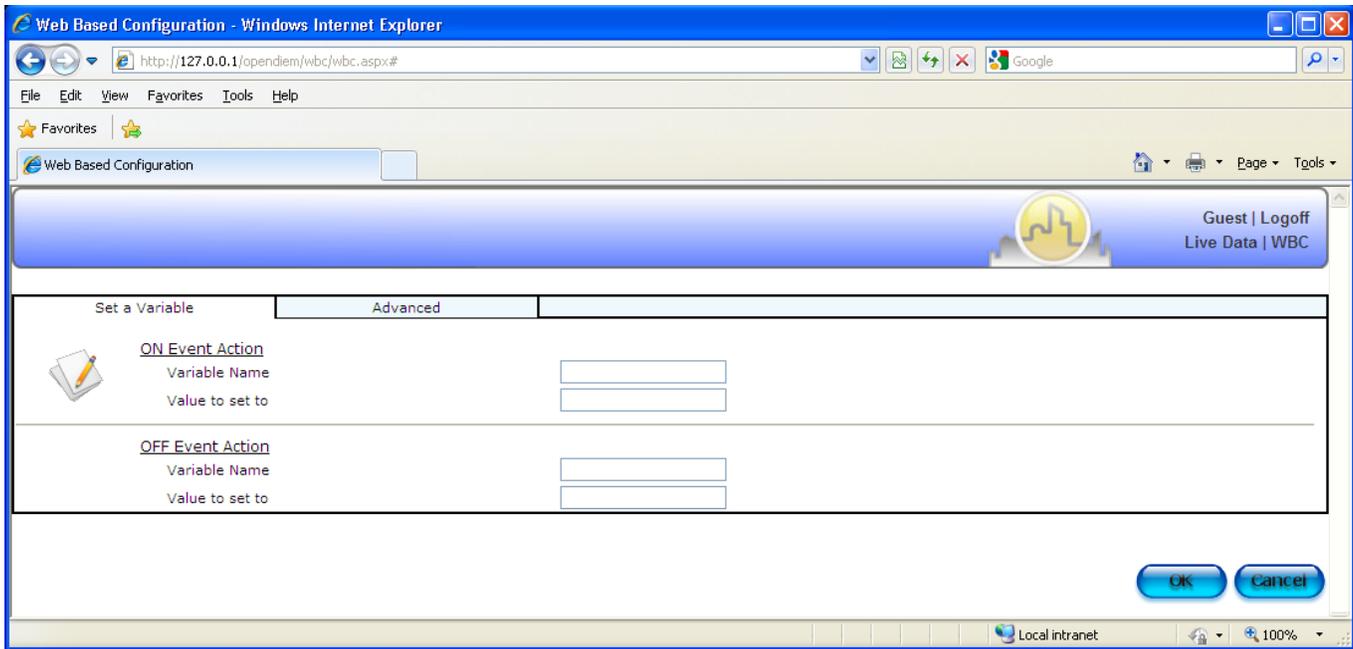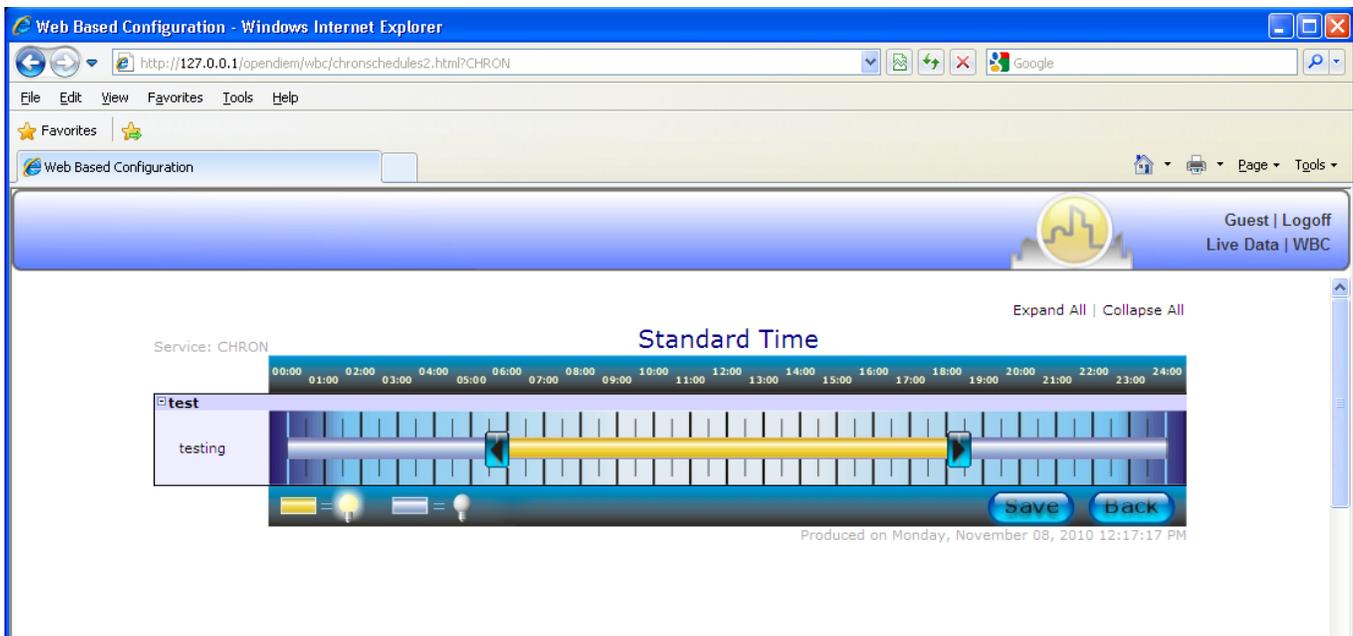
Navigate back to the Chronos main screen and select the Times button, a screen similar to the one below will appear. This view presents the time schedules in a graphical format, experiment with changing the times, up to four sets of time settings sliders can appear on each schedule, depending on the settings of the individual Schedule.

Schedule Overview

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Chronos Project Tree Extensions

Chronos project tree extensions make it possible to view the status of Chronos schedules from within an Opendiem screen. It is also possible to set time schedules using standard Opendiem components such as direct edit buttons, sliders etc. In this section we will add some Chronos data to an Opendiem screen for viewing the current schedule state and also construct some controls to allow us to set Chronos times in an Opendiem screen.

The Chronos information available through the project tree for each schedule is:

Number	Name	Description	Read/Write
1	Next Event Due	The number of minutes to the next scheduled Chronos event for this item.	Read Only
2	Next Event Time	The time and date of the next scheduled Chronos event for this item.	Read Only
3	Status	The current status of this Chronos schedule.<table><tr><th>Value</th><th>State</th></tr><tr><td>0</td><td>Off</td></tr><tr><td>1</td><td>On</td></tr><tr><td>2</td><td>N/A Error</td></tr><tr><td>3</td><td>1 - shot event</td></tr><tr><td>4</td><td>Expired</td></tr><tr><td>5</td><td>Disabled</td></tr></table>	Read Only
4	Enabled	Enabled status of this Chronos schedule .<table><tr><th>Value</th><th>State</th></tr><tr><td>0</td><td>Disabled</td></tr><tr><td>1</td><td>Enabled</td></tr></table>	Read and Write
5	On/Off Times	The On / Off Times for each schedule.<table><tr><th>Name</th><th>State</th></tr><tr><td>Full Mins</td><td>Time of event expressed in minutes from midnight 0-1439; for this start / stop time e.g. 148 is 02:28 AM.</td></tr><tr><td>Hour</td><td>The start / stop hour. (0 to 23)</td></tr><tr><td>Minute</td><td>The start / stop minute. (0 to 59)</td></tr></table>	Read and Write

Start the Opendiem Browser service and expand the project tree to reveal the Chronos tree data as shown below, drag the various Chronos items onto the Browser view pane to show their current values:
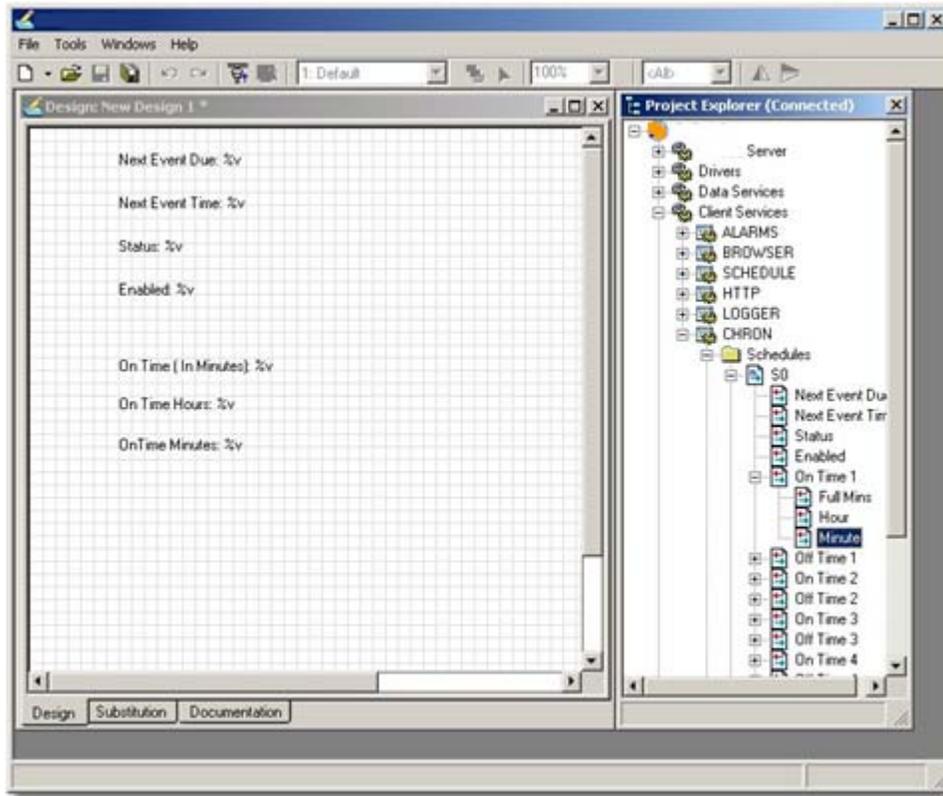
Using the data in an Opendiem Screen

The above information can easily be accessed in an Opendiem Screen and is exposed in the project tree within Designer. As an exercise, place some of the above Chronos items onto a new Opendiem Designer screen as shown in the screen below. Preview the data in a web browser.

Editing Chronos tree data

This Chronos data may be edited within an Opendiem screen in a number of ways, the following exercises illustrate two methods of setting times. Why not test your skills and build the controls using your Designer skills. If you need help then follow the section below.
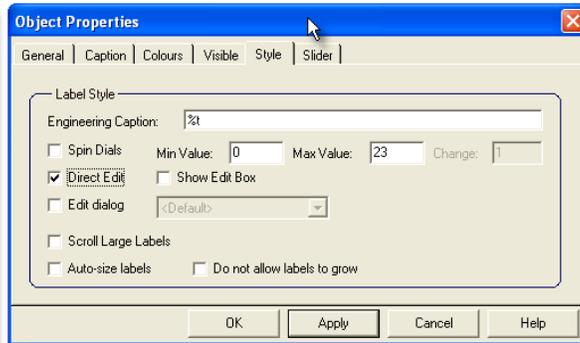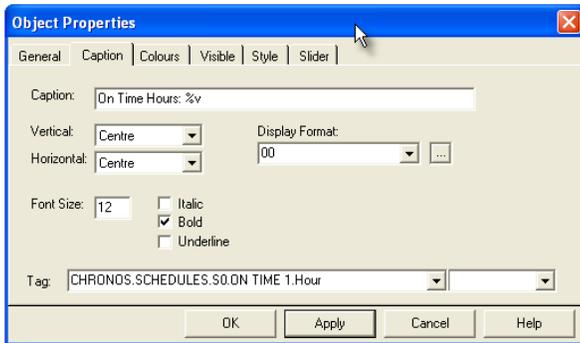
Editing Start / Stop Times Using Direct Edit Buttons

Add a direct edit function to the Start Hours and Start Minutes. Use the Min and Max Value parameters to limit the range of permissible values as shown:
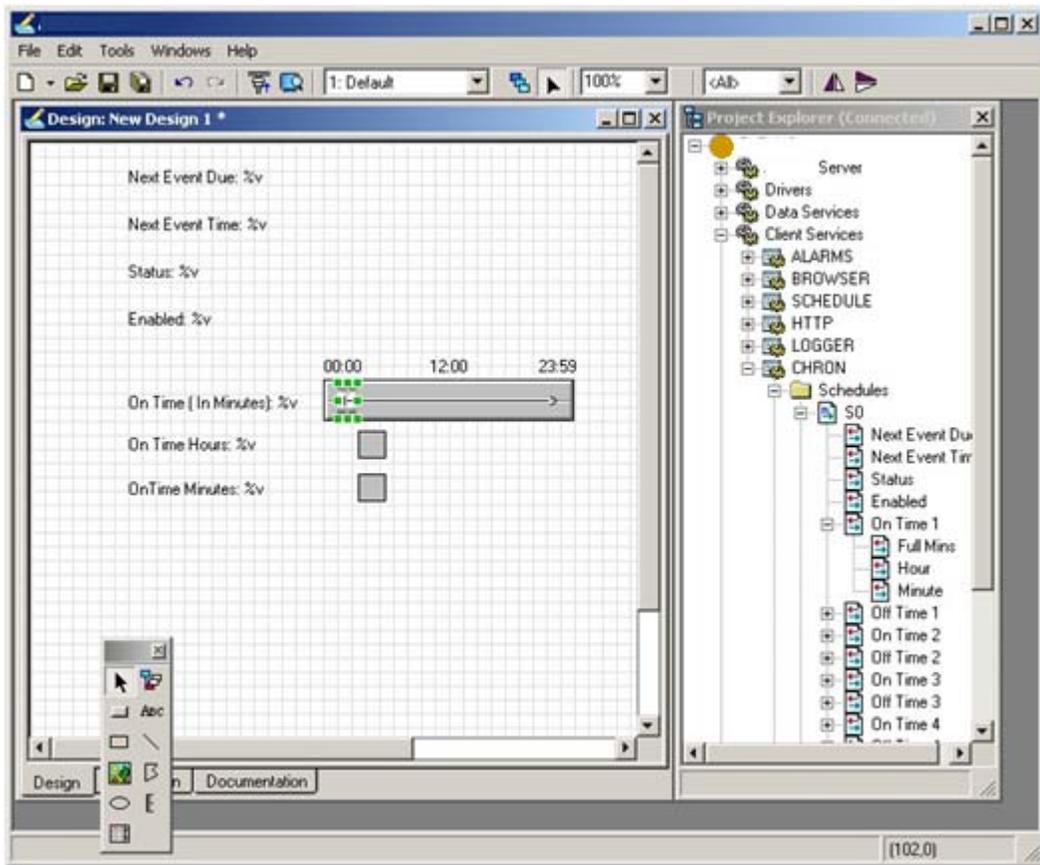
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Editing Start / Stop Times Using a Slider

Using a slider on the Full Mins parameter allows us to construct a slider to change the Start / Stop times in a user friendly way. Add a slider object to the Full Mins. Use the Min and Max parameters to limit the range of permissible values.
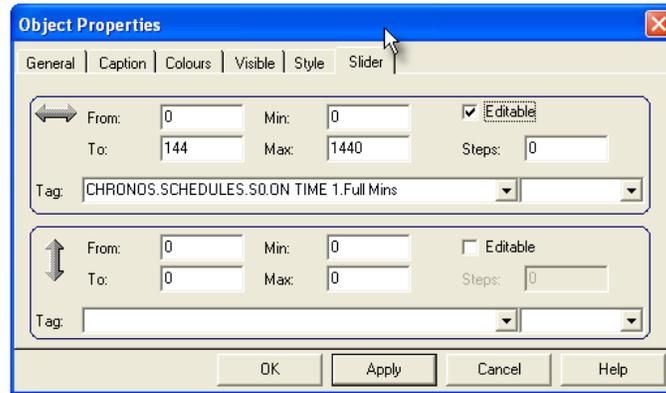
Chronos AutoHolidays

Chronos AutoHolidays provide a way of adding instant variable length holidays as click actions from an Opendiem Screen. This feature is extremely useful for situations where an unforeseen holiday such as a 'Snow Day' at a school is required giving the facility manager a one click holiday that will automatically expire.

How AutoHolidays work.

The Chronos AUTOHOLIDAY system message can be used to set an instant holiday of user defined length and user defined name using the following command and syntax:

Message to: CHRONOS

```
'AUTOHOLIDAY 10, My Holiday Name'

'AUTOHOLIDAY [Length], [Name]'
```

Where Length is the holiday duration in days. The Length must be between 1 and 1000.
Name is the name you wish to call this holiday. The Name gets truncated at 50 characters.

Setting a AutoHoliday using Opendiem Messenger.

First we will us the Opendiem Messenger service to send an Opendiem system message to Chronos. The Messenger service is a useful tool for setting up and testing Opendiem Messages.

Add the Messenger service to your Opendiem project.
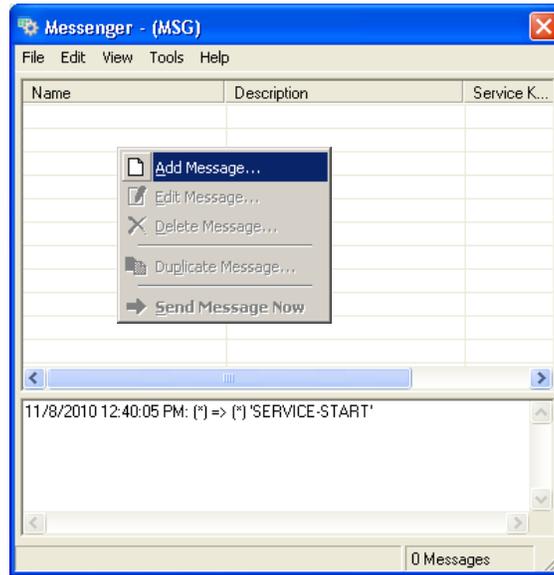
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Double click Messenger to start. Right click on the form and select Add Message…

Enter a name and an optional description for the message as shown. For the service key enter CHRON or the keyname that you gave Chronos when you added Chronos to your project. In the message enter AUTOHOLIDAY followed by the duration and the name of your holiday as shown below.
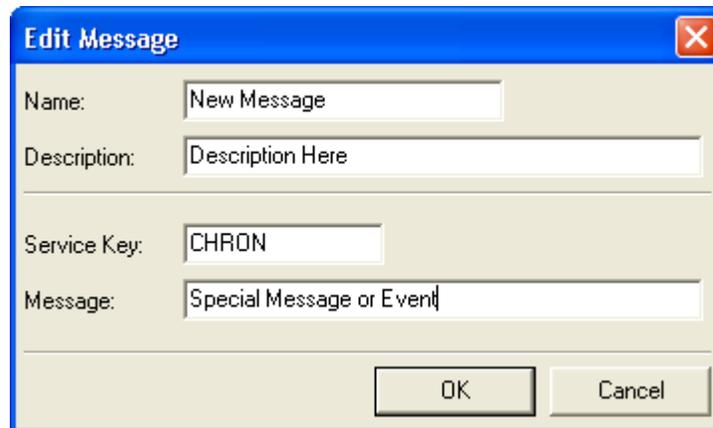
The system message will be added to the Messenger service as shown. Open Chronos and select the Holiday tab so that you can view the results of your message. Next, right click on the message and select **Send Message Now.** The new holiday will be added into Chronos.
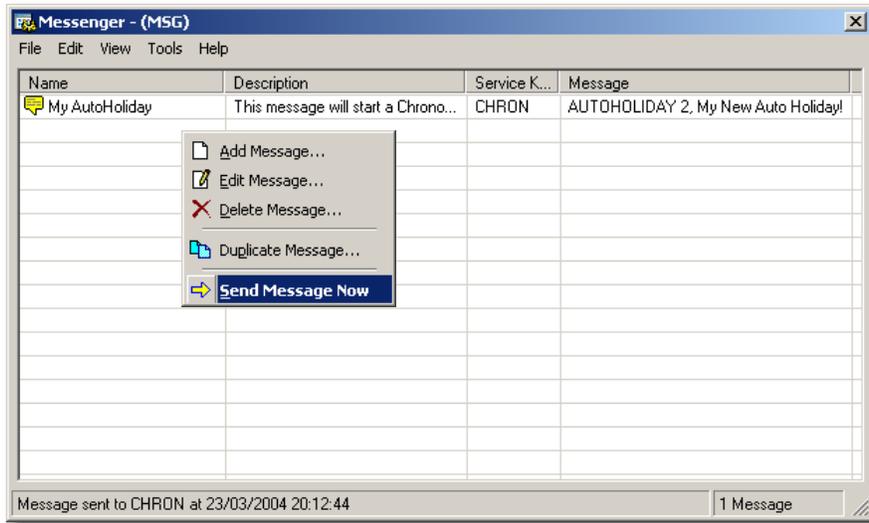
Using AutoHolidays data in an Opendiem Screen

An AutoHoliday can easily be added to an Opendiem Screen using a click action on an object such as a button:

Exercise example 1

To add a AutoHoliday to a Chronos instance with Keyname CHRON using a click action configured in an Opendiem Screen.

Open the Opendiem HTML page for your project and check the JavaScript section (excerpt shown below) and check for the presence of a section with a function sendMessage shown in red below. If the function does not exist enter it into your HTML.

```
<HTML>
<HEAD>
<META NAME="GENERATOR" Content="Opendiem Designer 2.3">
<TITLE>Building Clouds :: Opendiem Demonstration</TITLE>
<SCRIPT LANGUAGE=JAVASCRIPT TYPE="TEXT/JAVASCRIPT">
<!--
function message(source, msg) {
}
function sendMessage(dest,msg){
  OpendiemClient.post(dest,msg)
}
function action(page) {
  actionWin=window.open(page,'actionWin')
}
```
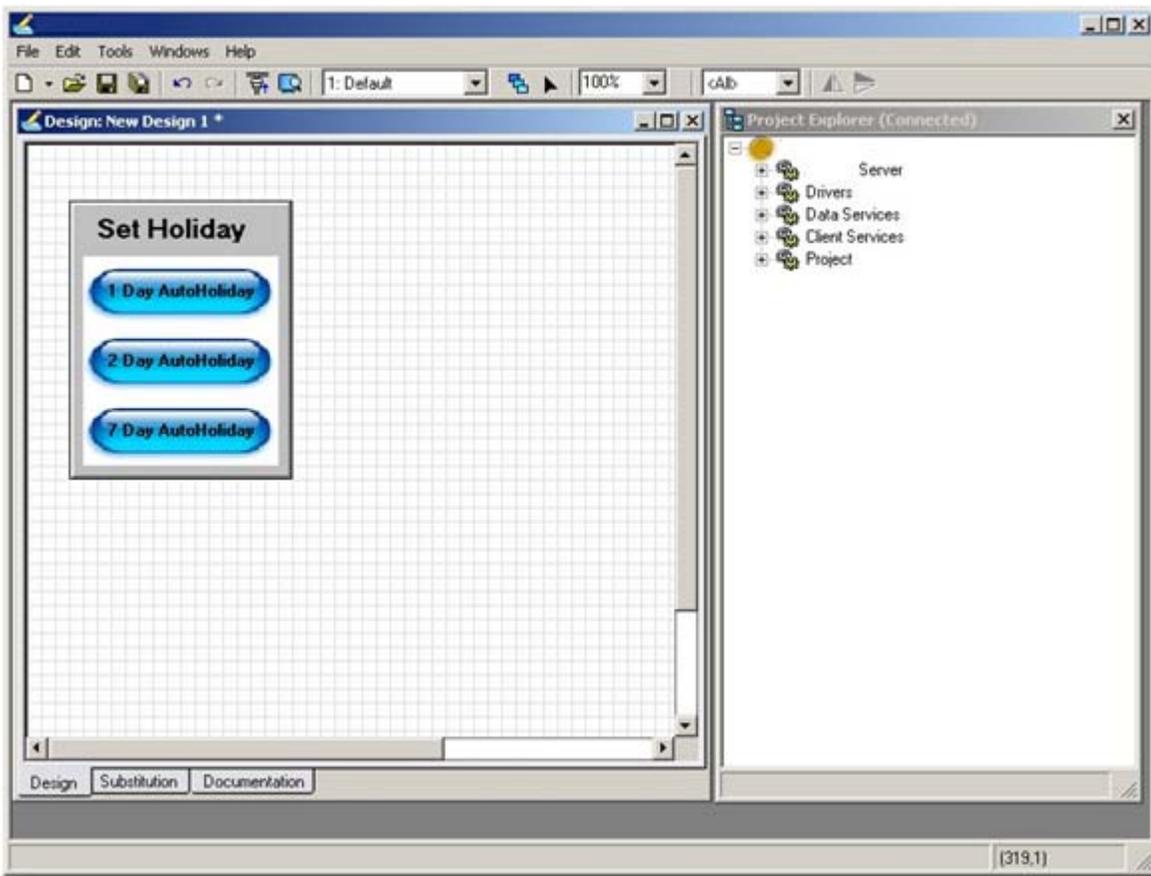
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```
function newbrowser(page) {
browserWin=window.open(page,'browserWin')
}
function onReady() {
}
function onValue(tag, value, units, id) {
}
function user(page) {
userpwd=window.open(page,'userpwd','menubar=no,toolbar=no,location=no,scrollbars=no,wid
th=380,height=260')
}
// -->
</SCRIPT>
```

Create a new Opendiem Designer screen and add a button or other clickable object as shown:

Add a Click Action and in the Hyperlink section add a JavaScript link with the text:

```
sendMessage("CHRON","AUTOHOLIDAY 1, My Second AutoHoliday")
```
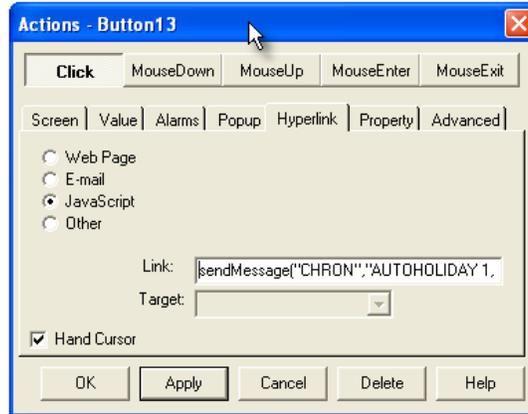
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where `"CHRON"` is the Chronos service keyname and `"AUTOHOLIDAY"` is the command, "`1`" is the holiday duration and "My Second AutoHoliday" is the name of the new holiday.

When a button is clicked in the Opendiem screen the holiday is added instantly and any Chronos schedules will be affected by the new holiday setting immediately. Check your AutoHoliday works as expected.

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Details of Chronos Operation

Chronos is a stateless scheduler, for example: when times within a schedule overlap, the last action event to occur is the one that is in effect and is the state that heartbeats will follow.

Take the following example, On time 1 is 01:00am so at 01:00am Chronos sets the schedule to ON and the heartbeats are for the ON state. At 02:00am On time 2 occurs and the state is still ON. At 04:00am Off time 1 occurs and the state changes to OFF and the heartbeats follow the off state. Finally at 06:00am Off time 2 occurs and the state remains OFF. The net effect of these scheduled times is that the action is ON from 01:00am until 04:00am when it turns OFF again.

Event	Time	State	
On time 1	01:00	ON	🔴
Off Time 1	04:00	OFF	🚫
On Time 2	02:00	ON	🔴
Off Time 2	06:00	OFF	🟡

This operation is analogous to a mechanical 'Pin wheel clock' where on and off pins are placed on a rotating dial around the edge of the clock, each pin can change the state of the clock until the next pin and transition is reached, however the clock has no concept of which 'state' it is in it simply responds to events.
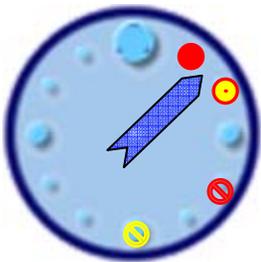
Representation of a mechanical 'pin wheel' clock.

End of Exercise 13

Opendiem Chronos is a simple yet comprehensive scheduler with an ultra friendly Web based graphical user interface. Chronos complements the complex yet comprehensive scheduling capabilities of the Opendiem Scheduler service. In this exercise we have explored how Chronos is configured and also investigated the Web based graphical interface.

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