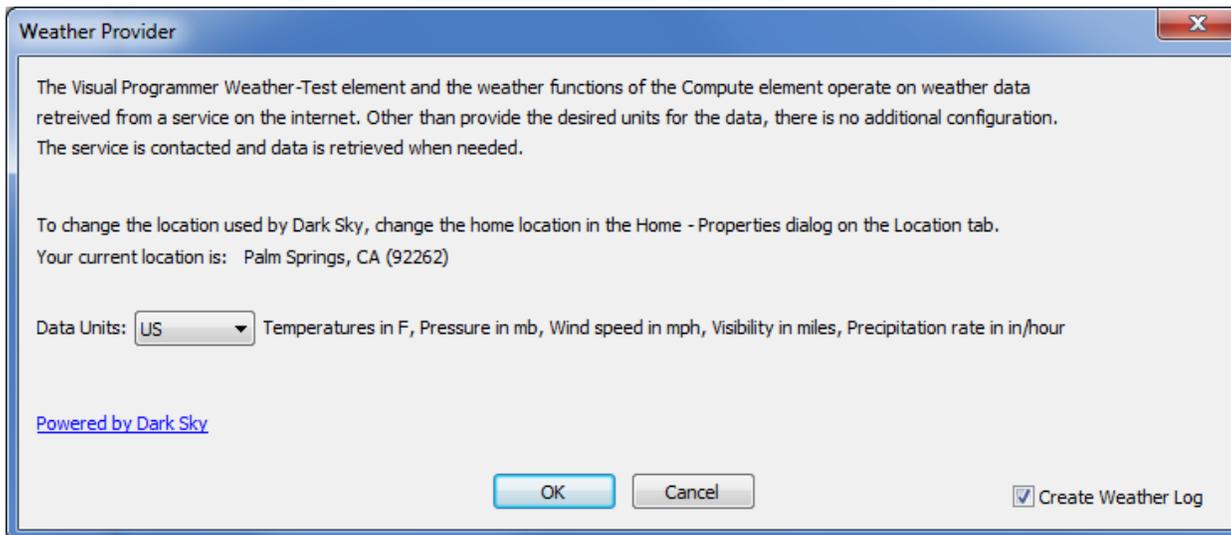




HCA Tech Note 123

Dark Sky Weather Provider

The weather provider for HCA is an internet-based service called *Dark Sky* (www.darksky.com). This provider is available to all HCA users with no additional cost and little configuration. The only setup that may be needed is to choose the units that data is in. Select *Weather Provider Setup* in the *Interfaces* ribbon panel.



One advantage of Dark Sky is that in addition to current weather data, it also provides both historical (past) and future (forecast) data for your location. This makes it possible to quickly answer questions like:

1. Is the current temperature over 80?
2. Has the temperature in the past 4 hours been over 70?
3. Will the current wind speed in the next 2 hours be over 10 mph?
4. Has it rained more than about 1 inch in the last 4 hours?

Dark Sky provides weather data in the following units based upon the *Data Units* selection. These are:

	US	CA	UK	SI
Precipitation Intensity	In/hour	mm/hour	mm/hour	mm/hour
Temperature	F	C	C	C
Apparent Temperature	F	C	C	C
Dew Point	F	C	C	C
Humidity	%	%	%	%
Pressure	mb	hPa	hPa	hPa
Wind Speed	mph	kph	mph	m/s
Wind Gust	mph	kph	mph	m/s



HCA Tech Note 123

Cloud Cover	%	%	%	%
UV Index	#	#	#	#
Visibility	miles	km	miles	km

Weather-Test element and Weather Trigger

The simplest method of working with weather data is to use the Weather-Test element. This element gets current, historical, or forecast weather data and tests the retrieved value against the value provided.

For example, this tests the current temperature being between 70 and 80.

Weather Test

This element tests weather data and executes different elements based upon the outcome.

Step 1: Select what to test

Temperature Current

Step 2: Perform the test

[Data from step 1] < 32 F

[Data from step 1] between 70 and 80

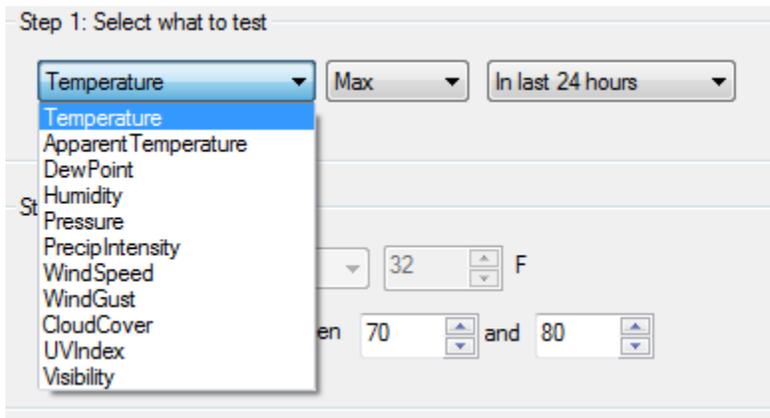
OK Cancel

The possible weather items to test chosen from this list:

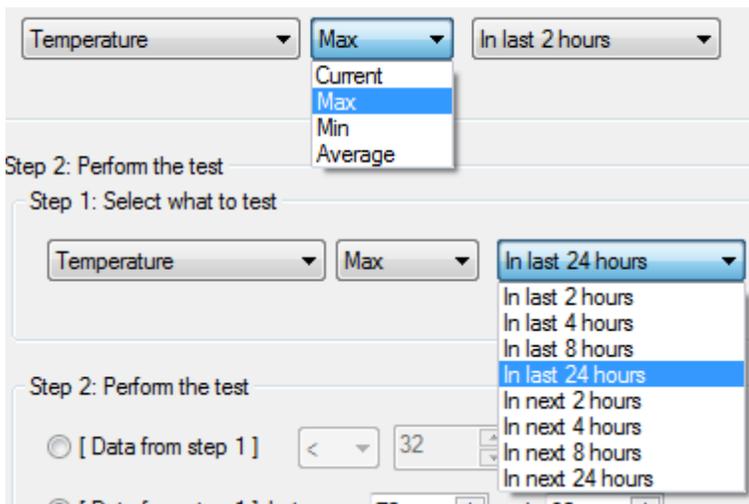
- Temperature
- Apparent Temperature. This considers temperature, humidity, and wind speed. Sometimes called the “feels like” temperature.
- Dew point
- Humidity
- Barometric Pressure
- Wind speed
- Wind gust
- Cloud cover as a percentage of the sky occluded by clouds (100% is totally overcast)
- UV Index. Just a number. Higher numbers mean use more sunscreen.
- Visibility. Distance that can be seen. Capped at 10 miles.



HCA Tech Note 123



Tip: You can experiment with the values of cloud cover, visibility, and UV index and see how they correlate at your location with how bright or dark it is then use that to determine how/if lighting should be controlled. In addition to testing for current conditions, you can also use the Weather-Test element to check for historical and future conditions and aggregate that data to determine the maximum, minimum, or average over the selected time period.



In addition to the weather-test element, you can also add weather triggers to programs. These are evaluated periodically, and the program starts if the test passes. Like all program triggers, these are added using the program triggers tab. For example:



HCA Tech Note 123

Trigger Type:

Start the program on this trigger:

Step 1: Select what to test

Step 2: Perform the test

[Data from step 1]

[Data from step 1] between and

This trigger causes the program to start when the current cloud cover is greater than 80%.

Note: Weather triggers have an implied state. In this example if the temperature goes over 80, the program starts. The program will not be able to start again until the temperatures goes below 80 to “re-arm” the trigger and then back above 80.

WeatherGet function

In addition to the Weather-Test element, you can also use the `_WeatherGet` function in the `Compute` and `_Compute-Test` elements. This function retrieves the named weather item in the units that Dark Sky is configured for. The `_WeatherGet` function is:

```
_WeatherGet ("item name", [code], [#hours])
```

The item name, provided as a string, is the name of the weather item to retrieve. The item names are the same as used in the weather-test element: “Temperature”, “Apparent Temperature”, “Dew Point”, etc.

The code is optional and is specified as: 0=current, 1=max, 2=min, 3=average.

The #hours argument is optional and is specified as a positive number for forecast data and as a negative number for historical data.

For example: `_WeatherGet ("Temperature", 1, 6)`

Determines the maximum temperature predicted in the next 6 hours. The Weather-Test function has two advantages over the Weather-Test element.



HCA Tech Note 123

- The number hours are not limited to the choices in the Weather-Test element of 2, 4, 8, and 24 hours past or future.
- The first argument to the function is not limited to just the 11 choices in the Weather-test element. You can use any data item name available in the Dark Sky “currently” section. To find those, read the Dark Sky API documentation as shown in the next section.

_DarkSky function

In addition to these facilities that expose only part of what Dark Sky provides, programs can also use the `_DarkSky` function to retrieve any data available from Dark Sky. To use it you first must become conversant in the JSON data that Dark Sky uses. The best way to do that is to read their documentation available at:

<https://darksky.net/dev/docs>

On that page an example is shown and here is a section of it.

```
GET https://api.darksky.net/forecast/0123456789abcdef9876543210fedcba/42.3601,-71.0589
```

```
{
  "latitude": 42.3601,
  "longitude": -71.0589,
  "timezone": "America/New_York",
  "currently": {
    "time": 1509993277,
    "summary": "Drizzle",
    "icon": "rain",
    "nearestStormDistance": 0,
    "precipIntensity": 0.0089,
    "precipIntensityError": 0.0046,
    "precipProbability": 0.9,
    "precipType": "rain",
    "temperature": 66.1,
    "apparentTemperature": 66.31,
    "dewPoint": 60.77,
    "humidity": 0.83,
    "pressure": 1010.34,
    "windSpeed": 5.59,
    "windGust": 12.03,
    "windBearing": 246,
    "cloudCover": 0.7,
    "uvIndex": 1,
    "visibility": 9.84,
    "ozone": 267.44
  },
  "minutely": {
    "summary": "Light rain stopping in 13 min., starting again 30 min. later.",
    "icon": "rain",
    "data": [{
```

To extract what you want, first read the documentation and determine the “data path” by seeing what keys are needed to traverse and arrive at the data you want. For example using the example to the left, to access the current ozone level, the path is to start in the “Currently” section and then the item is “ozone”.

This can be retrieved with the `_DarkSky` function as:

```
_DarkSky ("currently", "ozone")
```

Another example, again using the example to the left, is to extract the summary from the minute-by-minute forecast:

```
_DarkSky ("minutely", "summary")
```



HCA Tech Note 123

```
"hourly": [
  {
    "summary": "Clear throughout the day.",
    "icon": "clear-day",
    "data": [
      {
        "time": 1537725600,
        "summary": "Clear",
        "icon": "clear-day",
        "precipIntensity": 0.0012,
        "precipProbability": 0.01,
        "precipType": "rain",
        "temperature": 93.58,
        "apparentTemperature": 93.58,
        "dewPoint": 44.93,
        "humidity": 0.19,
        "pressure": 1008.73,
        "windSpeed": 8.88,
        "windGust": 10.74,
        "windBearing": 260,
        "cloudCover": 0.01,
        "uvIndex": 7,
        "visibility": 10,
        "ozone": 280.15
      },
      {
        "time": 1537729200,
        "summary": "Clear",
        "icon": "clear-day",
        "precipIntensity": 0,
        "precipProbability": 0,
        "temperature": 96.29,
        "apparentTemperature": 96.29,
        "dewPoint": 44.76,
        "humidity": 0.17,
        "pressure": 1008.91,
        "windSpeed": 7.91,
        "windGust": 10.29,
        "windBearing": 272,
        "cloudCover": 0.06,
        "uvIndex": 8,
        "visibility": 10,
        "ozone": 279.68
      }
    ]
  }
],
```

Some sections of the data are organized into an hour-by-hour or minute-by-minute groups – they provide an “array” of data with one section for each minute or for each hour.

For example, the image to the left shows the hour-by-hour forecast section. To retrieve the predicted wind speed from the first hour in the forecast:

```
_DarkSky ("hourly", "data:1", "windspeed")
```

For the second hour:

```
_DarkSky ("hourly", "data:2", "windspeed")
```

The suffix (the colon and the number) after the “data” tells which of the sections to use to retrieve the data.



HCA Tech Note 123

Weather Cache

Weather data is retrieved when needed and saved to provide the responses for subsequent requests. In that way, if you ask for the current temperature followed immediately by a request for the current humidity, two requests of Dark Sky need not be made.

When requesting current data, anything in the cache older than 60 minutes is discarded and new data retrieved. For requests for past or future data, anything older than 3 hours is discarded and new data retrieved. These timings are not adjustable.

##end##