OPTO 22

CREATE A WEATHER APP WITH groov AND NODE-RED (QUICK START GUIDE)



Last Updated on August 9, 11:40 AM PDT

Wednesday Night, A clear sky. Low 61F. Winds SSW at 10 to 15 Thursday, Mainly sunny. High near 95F. Winds SW at 10 to 15 n Thursday Night, A mostly clear sky. Low 66F. Winds WNW at 5



With this quick start OptoTutorial, you'll create a fully-functioning weather reporting application with minimal effort. You don't even need to know *groov*—this tutorial walks you through each step from beginning to end.

The tutorial's zip file contains code for a *groov* page, prebuilt with gadgets to display weather data. It also contains code for Node-RED flows that get, package, and send data from the Weather Underground (wunderground) API to *groov*.

What you need

- A groov Box (part GROOV-AR1-BASE) with internet access and running groov R3.4c or higher¹
- A groov API key

•

•

- Node-RED and the groov Nodes package (which comes preinstalled on groov Boxes)
- A wunderground API key, free with registration on their website
- 2232_OptoTutorial_groov_Node_RED_Weather_Quick_Start.zip, which includes:

Files in the Zip	Description	
NR-Basic_WU_C.txt* NR-Basic_WU_F.txt*	Node-RED flows that get, package, and send wunderground weather data to groov.	
grv-Basic_WU_C.JSON* grv-Basic_WU_F.JSON*	Code for groov web and mobile user interfaces that display weather data.	
icons.zip	A set of weather condition icons. [Icons by Ashley Jager, https://dribbble.com/ajager.]	
* File names with _C use metric measurements (for example, Celsius); file names with _F use imperial (Fahrenheit).		

Summary of steps

To create the app, you'll do some work in *groov* and the rest in Node-RED:

- First, you'll import a file that creates a *groov* page, build a Data Store, and assign tags to gadgets.
- Next, you'll import a Node-RED flow, configure it with your API keys, and then deploy and test the flow.

Then you're good to go!

- ···

Part I: groov Build	
Import the Quick Start Weather groov page	page 2
Configure a groov Data Store and tags	page 4
Assign tags to gadgets	page 6
Part 2: Node-RED	
Import nodes	page 12
Configure API keys	page 13
Deploy and test	page 15

^{1.} The latest version of *groov* is available at https://www.opto22.com/groov-management/manage-my-groov. Instructions and images in this tutorial were created using *groov* R3.4c with Node-RED for Opto 22 v0.17.4.



PART 1: groov BUILD

Import the Quick Start Weather groov page

- 1. Download 2232_OptoTutorial_groov_Node_RED_Weather_Quick_Start.zip from the Opto 22 website, and extract the files to your computer.
- 2. In a browser, start groov Build (https://<your groov Box's hostname>/#build).

	<i>groov</i> Build menu bar	- 🗆 X
🗢 groov Build 🛛 🗙		
← → C ☆ B Secure	http s://opto-00-00/# build	* :
File Edit View Configure	Security Help	≜ groov
Pages Uncategorized	Desktop & Tablet Handheld	Gadget Palette Tags Gadgets
		Configure Devices & Tags
Add Page Add Category		⊕ WeatherData
Page Properties Name:		
Background:		
Edit Page Permissions		
	Increase Height 200m out to show page stash Show grid	

3. In the menu bar, click File -> Import Page. The Import Page dialog box is displayed.

rom the rife menta.		
Import Page (*.json):		Browse
Page Name:		
Category:	Uncategorized	
Tag references, page na unlinked during an expo import.	wigators, images, and lin rt. Please relink those ite	nited access groups are ems after a successful

4. Click Browse, and then navigate to the location of the files you extracted in step 1.

T	These two files C is set for Ce	s are <i>groov</i> import elsius; _ F is set for	pages Fahrenheit	These two	files are Node-RED flows.
Docume	ents > Opto 22	> documents > quic	k vu groov page	×٥	Search quick wu groov page 🛛 🔎
^	Name		Date modified	Туре	Size
	grv-Basic_V	NU_C.JSON	8/8/2017 10:07 AM	JSON File	41 KB
×	grv-Basic_\	WU_F.JSON	8/8/2017 10:07 AM	JSON File	41 KB
*	NR-Basic_V	VU_C.txt	8/8/2017 10:11 AM	Text Document	8 KB
×	NR-Basic_V	VU_F.txt	8/8/2017 10:12 AM	Text Document	8 KB



 Click the file you want (grv-Basic_WU_C.JSON for Celsius; grv-Basic_WU_F.JSON for Fahrenheit) and then click Open. Except for the measurement systems, the pages are set up exactly the same. Then, type a name for the page.

nport Page		Select the page you want, and enter a name for the page
from the File menu.	age file to import: groov page files are export	ed
Import Page (*.json):	grv-Basic_WU_F.json Browse.	
Page Name:	Wunderground (°F)	
Category:	Uncategorized 🔻	
Tag references, page na unlinked during an expo import.	avigators, images, and limited access groups a ort. Please relink those items after a successful	re When you're done, click Import
	Import C	ancel

6. Click Import to close the dialog box and save the changes.

In groov, you'll see the page. All of its gadgets are visible, but none of them are associated with tags.

File Edit View Configure	Security Help			
Pages	Desktop & Tablet Handheld			
▼ Uncategorized Wunderground (°F)*	0	.00 °F	🗐s like #	
	Image: Contract of the second	110- 90- 70- 50- 30-		0 50 60 30 50 70 20 50 50 10 50 50 0 0.00 150 humidity 5
	0 0 0 0 0		Marka speed	

Next, you'll create tags for the gadgets.

OPTO 22 · www.opto22.com 43044 Business Park Dr. Temecula, CA 92590-3614 **SALES** • sales@opto22.com 800-321-6786 • 1-951-695-3000



Configure a groov Data Store and tags

1. Now click Configure -> Devices and Tags

File	Edit	View	Configure Security	Help
Pag	es		Accounts Devices and Tags	Tablet
•	Uncate	gorized	Image Library	
	Wunder	rground	Project	
	(*)*		<i>groov</i> Admin Licensing	

2. In the Configure Devices and Tags window, click Add New Device, and then click Data Store.

nfigure Devices a	and Tags		
Name	Туре	Address	Add New Device V
	No strategies loa	aded.	Opto 22 Controller
			OPC UA Server
			Modbus Device
			Data Simulator
			System
			Data Store

3. In the Add Data Store dialog box, type "WeatherData" and then click Create. Your new Data Store is displayed in the Configure Devices and Tags window.

Name	Туре	Address	Add New Device V	
WeatherData	Data Store			
			Edit Device	
			Delete	
			Configure Tags	Configure Tag
				button

- 4. Now click Configure Tags. The Configure Data Store Tags window is displayed.
- 5. Click the Add Tag icon F to start configuring tags.

	Configure Data Store Tags		
Add Tag	+ 🗊		
	▼ Tag Name	Tag Id	D
		Click + to create tags for	r thi



For the measurement system you selected, create the following tags.

Be sure to use the exact tag names and data types listed in the table; otherwise, they won't work with the sample Node-RED flow in this tutorial.

TIP: To quickly add a tag name:

- In the Identifying Name field, type the tag name.
- Press Tab, and then type **S** (for string), **I** (for integer), or **D** for (decimal number).
- Press Tab. If the tag is not a table, press Tab again, and then press Enter to save the tag.
 - If the tag is a table, press the space bar to select the Table check box.
 - Press Tab, and then type the table length.
 - Press Tab again, and then press Enter to save the table tag.

Metric tag name	Imperial tag name	Data type
curr_cond	curr_cond	String
fctcode_int	fctcode_int	Integer
feelslike_c_flt	feelslike_f_flt	Decimal Number
forecast	forecast	String Table (length=4)
high_c_int	high_f_int	Integer
low_c_int	low_f_int	Integer
observation_time	observation_time	String
precip_today_met_flt	precip_today_in_flt	Decimal Number
rel_humidity_int	rel_humidity_int	Integer
solar_rad_int	solar_rad_int	Integer
sunrise	sunrise	String
sunset	sunset	String
temp_c_flt	temp_f_flt	Decimal Number
wind_deg_int	wind_deg_int	Integer
wind_kph_flt	wind_mph_flt	Decimal Number
wind_summ	wind_summ	String



Assign tags to gadgets

In this step, you assign a tag to each gadget—starting with curr_cond.

This map shows which tag goes with which gadget. (" #" in the tag name indicates the tag name depends on the measurement system you selected.)



1. Click the gadget for curr_code. A blue box indicates the gadget is selected.





OPTO 22 • 800-321-6786 • 1-951-695-3000 • www.opto22.com • sales@opto22.com

© 2017–2018 Opto 22. All rights reserved. Dimensions and specifications are subject to change. Brand or product names used herein are trademarks or registered trademarks of their respective companies or organizations.

- PAGE 7
- 2. In the Value Gadget Properties window, click the tag icon S. The Update Tag for Gadget window opens. Expand WeatherData, and then click curr_cond.

held		Value Gadget Properties
€ 0.00 °F €Øs like;#		Tag No Tag Selected
Update Tag for Gadget		
No Tag		Label
WeatherData		9
fctcode_int feelslike_c_fit feelslike_f_fit forecast [4] high_c_int high_f_int low_c_int low_f_int observation_time		Alignment Text Size Gadget Palette Tags Gadgets Configure Devices & Tags Configure Devices & Tags
Array index:	Update Gadget	Cancel

IMPORTANT: If the tag name you want to assign is grayed-out, it means the tag you configured in the Data Store is somehow different from the one in the groov page you imported.



curr_cond is grayed-out and can't be assigned to the selected gadget

This can happen when you mistype a tag name or select the wrong data type—even if you later correct the mistake.

To fix the issue:

Open the Data Store—Configure > Devices and Tags > Configure Tags
 Delete the grayed-out tag—Click the tag, and then click the Delete Tag icon (trashcan)
 Add the tag back to the Data Store—Click the Add tag icon (plus sign) and configure the tag

3. Click Update Gadget. The gadget properties should now look like this:

curr_cond Format #.##	Tag	
Format #.##	curr_cond	
#.##	Format	
	#.##	

Repeat step 1 through step 3 for all tags **except** forecast and fctcode_int.

Then, continue following the steps to assign tags to the rest of the gadgets.



- **4.** To assign the tag for the first item in the forecast table:
 - **a.** Select the gadget for forecast[0].

0	
0	•
0	
0	
	48 Hour Trend

b. Click the tag icon in the Value Gadget Properties window. In the Update Tag for Gadget window, expand WeatherData, and then click forecast[4]. [4] indicates the table can hold up to 4 strings. In the Array index field, 0 is displayed by default.

WeatherData	
curr_cond	
fctcode_int	
feelslike_c_flt	
feelslike_f_flt	
forecast [4]	1
high_c_int	
high_f_int	
low_c_int	
low_f_int	
vray index: 0	0 to 3)

c. Click Update Gadget. In the Valid Gadget Properties window, note that the tag reads forecast[0].

ag	
forecast[0]	٠
forecast[0]	1

- d. Repeat step a through step c to assign gadgets to forecast[1], forecast[2], and forecast[3].
- 5. Most of the gadgets now have tags—there are just two more special cases: the Trend gadget and the Image Indicator gadget.



If you aren't interested in these gadgets, feel free to delete them; otherwise, configure the Trend:

Select the Trend gadget. In the Trend window, click Configure Data Sources.
 The Edit Data Sources dialog box is displayed. Note there are three trend pens: temperature, humidity, and solar radiation.

temperatu	ire			Delete
Tag:	None Selected			
Title:	temperature		Color:	
Axis:	Left	۲		
Line Type:	Line	۲	Fill:	
humidity				 Delete
Tag:	None Selected			
Title	humidity		Color:	
THUC:				

- **b.** To set the tag for temperature:
 - Click "None Selected."
 - From the WeatherData Data Store, select temp_f_flt (or temp_c_flt for metric).
 - Then click Update Gadget.

dit Data So	ources		
tempera	ture		Delete
Tag:	temp_f_flt WeatherData		
Title:	temperature	Color:	
Axis:	Left	T	

- **C.** Repeat step b to assign tags for the humidity and solar radiation pens.
- 6. The last gadget to configure is the Image Indicator. Its tag is *fctcode_int*.

	=1
.	 #



The Image Indicator has been set up to display one of 23 weather images. The image displayed depends on the value returned by the wunderground API. The Icons.zip file in this tutorial contains 19 weather images. (You'll assign a few of them to more than one tag.)



To assign the fctcode_int tag and icons:

- a. If you haven't already done so, extract the files in lcons.zip to your computer.
- **b.** In the Image Indicator Properties window, click the tag icon S. In the Update Tag for Gadget window, expand WeatherData, click fctcode_int, and then click Update Gadget.
- c. In the Image Indicator Properties window, click Add Image. The Image Library window is displayed.
- d. Click Add New Images.



e. Browse to the location of the weather icons, select all the icons, and then click Open.





OPTO 22 • 800-321-6786 • 1-951-695-3000 • www.opto22.com • sales@opto22.com

© 2017–2018 Opto 22. All rights reserved. Dimensions and specifications are subject to change. Brand or product names used herein are trademarks or registered trademarks of their respective companies or organizations.

DPTO 22 Create a Weather App (*groov* & Node-RED)

PAGE 11

- **f.** To assign the icon for Tag == 0:
 - Click Tag== 0 to select it.

Image Indicator Propertie	ès	Select the tag
Tag	Î	Then sligh Calest Image
		Then click select image
Images A	.dd Image	
Tag :	== 0	
Select Imag		
∢ Gadget Palette		

 Click Select Image. In the Image Library dialog box, scroll down to the last image, ID unknown.png, and then click it.

The Image Library closes, and in the Image Indicator Properties window, unknow.png is displayed next to Tag ==0.

Tag		
fctcode_int		•
Imagas		
tmages	Add Ir	mage
8		
\mathbb{C}	Tag == 0	

- For each image tag, repeat step f, replacing "unknown.png" for the image whose name includes the tag number; for example, for Tag==9, select the image named 9, 20.png. (Note that there isn't a Tag==17.)
- 7. The hardest parts are out of the way!



Now click File -> Save All Changes and Switch to groov View.



In *groov* View, the values for your gadgets will appear as 0's and "---" since none of the tags have a value. In the next part, you'll get values for your tags from the wunderground API.

PART 2: NODE-RED FOR OPTO 22

Import nodes

NOTE: Your groov Box must be able to access the internet to install the nodes. To find out if your groov is connected to the internet, see "Troubleshooting" in the Opto 22 Developer portal.

- 1. First, you need to copy the Node-RED code for the measurement system that matches your groov tags.
 - a. In a text editor, open one of the Node-RED flow files:
 - NR-Basic_WU_C.txt (for metric)
 - NR-Basic_WU_F.txt (for imperial)
 - **b.** Select and copy all the lines in the file. The copied code will stay in the Clipboard until you copy something else (or shut down your computer).
- 2. In a browser, log on to Node-RED for Opto 22 (https://<your groov Box's hostname>:1880).

Make sure that the *groov* nodes are installed. If they aren't, follow the instructions for "Option 1—Install from within Node-RED (including GROOV-AR1) on the Opto 22 Developer portal.





3. Click the Node-RED menu icon.

	Deploy	•	2		NOUE-NLL	' menu i
info		debug				

4. From the menu, click Import -> Clipboard.

Then, in the Import nodes dialog box, paste the code that's in the Clipboard.

[["42d16d {"id":"5bf	c31.238754","4 2f326.f970dc",	29bf711.1e7878 "type":"groov-dat	"]]]}, a-	
store","z' {"id":"cb2	":"","project":"cl b7005.0a753"	b2b7005.0a753", ,"type":"groov-	"dsName":"WeatherD	ata"},
project","	z":"","address"	":"localhost"}]		
nport to	current flow	new flow		

5. Click Import. The code is translated into a Node-RED flow, floating on the page. Click the left mouse button to anchor the flow on the page.



Configure API keys

To work properly, this flow requires **two** API keys: your *groov* API key and your wunderground API key.

- 1. First, configure your wunderground API key:
 - a. Double-click the get WU data node to open the Edit http request node dialog box.
 - **b.** In the URL field:
 - Replace <APIKEY> with your wunderground API key.



- PAGE 14
- Replace <STATIONID> with a wunderground weather station ID. For example, use KCATEMEC23 to get data from the weather station at the Opto 22 headquarters in Temecula, California.

Edit http reque	st node		
Delete			
 node prope This is 	a (fake) wunderground API key	This is the station ID for the Opto22 headquarters	
Nethod	GET		•
O URL	http://api.wunderground.com/api/12a34	bc56de789fg/conditions/hourly/forecast/astronomy/q/pws/KCATEMEC2	23.json
Enable sec	ure (SSL/TLS) connection		

- **c.** Click Done to close the dialog box and return to the flow.
- 2. Now, add your groov API key to connect the flow to your groov project.
 - If you don't have a groov API key, see http://developer.opto22.com/groov/#setting-up-api-users.
 - a. Double-click any groov node in your Node-RED flow. The Edit groov node dialog box is displayed.

Edit groov write	node		
Delete		Cancel Done	
v node proper	ties		Data Store edit icon
Data Store	WeatherData	•	Clicking this icon opens the Edit groov-
Tag Name	forecast		you add your <i>groov</i> API key

- **b.** Click the Data Store Edit icon 🖋 to open the Edit groov-data-store node dialog box. Then click the Groov Project Edit icon to open the Edit groov-project node dialog box.
 - If you're running Node-RED and groov on the same groov Box, the value in the Groov Address field should be "localhost".
 - If Node-RED and groov are running on different devices, you'll also need to configure the SSL Certificates fields according to the instructions on the Opto 22 Developer portal website.



In the API key field, enter your groov API key.

Delete		Cancel Up	date
Groov Address	localhost		(Obviously fake) groov API Key
🔩 API Key	abcdefghijklmnopqrstu	defghijklmnopqrstuvwxyz	
SSL Certificates (F	PEM format)		(needed only if groov and Node-f
CA or Self-Sig	Path to CA certifi	Path to CA certificate	
Public	Key Path to certificate	(blank for self-signed)	

3. Click Update, and then click Update again, and then click Done to close the dialog boxes and save your changes.

Deploy and test

1. Click Deploy.

			Deploy	Debug window
Node-RED	for Opto 22	Successfully deployed		py - ≗ \ ≡
Q filter nodes	Flow 1	Flow 22	+	info debug
	and management and a second	and presented a second present and a second se		and a problem of the second

If something goes wrong, check the debug window for error messages.

- If a property is "undefined," there might be something wrong with your URL. Copy the URL configured in your flow, and then enter it in a browser to make sure it returns the full JSON object, including the fields expected in the "parse data" function node.
- An "unknown tag name" error means you missed configuring at least one of the tags in *groov*.
- 2. If the deployment was successful, go back to groov View and enjoy your page full of weather data!

OPTO 22 • www.opto22.com 43044 Business Park Dr. Temecula, CA 92590-3614 **SALES •** sales@opto22.com 800-321-6786 • 1-951-695-3000 **SUPPORT** • support@opto22.com 800-835-6786 • 1-951-695-3080



© 2017–2018 Opto 22. All rights reserved. Dimensions and specifications are subject to change. Brand or product names used herein are trademarks or registered trademarks of their respective companies or organizations.

Note that initially, the trend will be empty. After about 24 hours, it will look similar to the image, and after 48 hours, it will fill the width of the gadget.



For more tips, help, and code samples, visit the Opto 22 Developer portal at http://developer.opto22.com.

