

NodeRED-Starter-Universal-Translator

Create an IBM Cloud Node-RED Starter Kit and Build a Universal Translator

In this tutorial you will learn how to create a Node-RED Starter application that can be used to connect Watson AI services Speech to Text, Language Translator and Text to Speech to create a spoken Universal Translator. The **Node-RED Starter** is designed with pre-assembled services that work together. The Node-RED Starter includes a Node-RED Node.js web server and Cloudant database to store the Node-RED flows.

Learning objectives

After completing this tutorial you will be able to:

- Create an Node-RED Starter Kit application running in IBM Cloud
- Create service instances of Watson Speech to Text, Watson Text to Speech and Watson Language Translator
- Connect these service instances to your Node-RED Starter application
- Launch the Node-RED Starter application
- Configure the Node-RED visual programming editor
- Install additional Node-RED nodes
- Create a flow that translates speech to a transcript
- Create a flow that converts a transcript into an audio file and played.
- Connect these flows using language translation to speak in one language and hear the translations in another

Prerequisites

This tutorial can be completed using an IBM Cloud Lite account.

- Create an [IBM Cloud account](#)
- Log into [IBM Cloud](#)

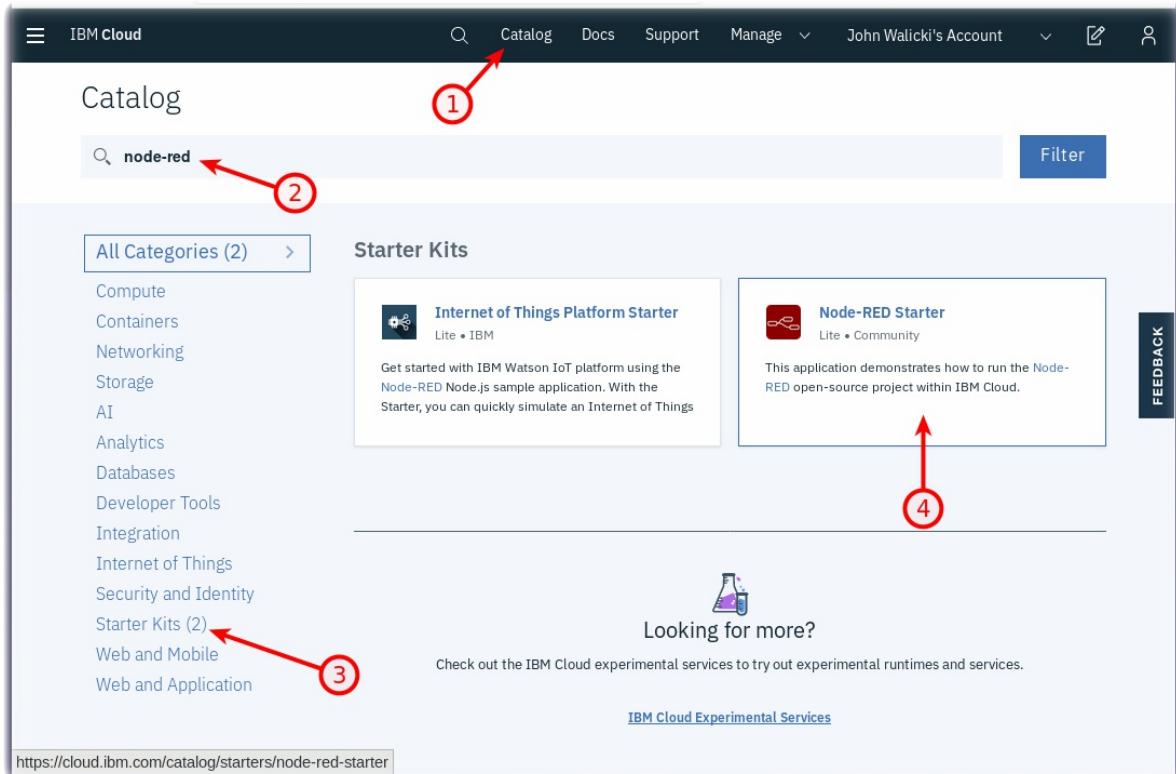
Estimated time

You can complete this task in no more than 15 minutes.

Step 1 - Create a Node-RED Starter Application

Follow these steps to create a Node-RED Starter application in IBM Cloud.

- Create an [IBM Cloud account](#) and log into [IBM Cloud](#)
- Click on the [Catalog](#) (1) and search for **node-red** (2)
- Under **Starter Kits** (3) click on [Node-RED Starter](#) (4)



- Enter a **unique name** for your application (5). This name will be part of the **application URL** (6)
 - *Note:* In case the name is not unique you will receive an error message and can enter another name.
- The **Region** (7), **Organization** (8) and **Space** (9) will be prepopulated with valid options for your IBM Cloud account. If you have a Lite account then accept the defaults. If you have a trial or paid account, or belong to additional organizations, then you may choose to deploy in to any region, organization and space available to you.
- The Node-RED Starter application can be provisioned in the IBM Cloud *Lite* plan (10)
- Click on the **Create** button (11)

The screenshot shows the 'Create a Cloud Foundry App' page for the 'Node-RED Starter' application. The configuration fields are highlighted with red circles numbered 5 through 11:

- App name:** nodered-universal-translator-xyz (circled 5)
- Host name:** nodered-universal-translator-xyz (circled 6)
- Domain:** mybluemix.net
- Choose a region/location to deploy in:** Dallas (circled 7)
- Choose an organization:** walicki@us.ibm.com (circled 8)
- Choose a space:** dev (circled 9)
- Selected Plan:** Cloudant Lite (circled 10)
- Create** button (circled 11)

Below the form, there is a link to 'Contact IBM Cloud Support'.

- The Node-RED Starter application will be provisioned in the IBM Cloud region that was specified. This is called staging an application. It can take a few minutes for this process to complete.
- You do not need to wait for the application to provision and start. Proceed to the next step.

Step 2 - Create Watson AI Service Instances

There are powerful Watson AI microservices that can be added to your application as APIs. These services are accessible through instances that you can manage through credentials. Instead of copy / pasting credential keys, this tutorial demonstrates how to create and bind these microservices to your Cloud Foundry application. The Node-RED nodes for these services will be easy to configure.

Three Watson AI services, all available in the IBM Cloud Lite tier, are needed to build a Universal Translator.

- Watson Speech to Text
- Watson Text to Speech
- Watson Language Translator

Return to the IBM Cloud Catalog, search for **speech**, navigate to the AI category.

The screenshot shows the IBM Cloud Catalog interface. At the top, there's a navigation bar with 'IBM Cloud', a search icon, 'Catalog', 'Docs', 'Support', 'Manage', and 'John Walicki's Account'. Below the search bar is a search input field containing 'speech' and a 'Filter' button. The main area is titled 'Catalog' and shows search results under the 'AI' category. On the left, a sidebar lists categories: All Categories (2), Compute, Containers, Networking, Storage, AI (2) (which is selected and highlighted in blue), Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Starter Kits, Web and Mobile, and Web and Application. Two service cards are visible: 'Speech to Text' (Lite • IBM) which performs 'Low-latency, streaming transcription', and 'Text to Speech' (Lite • IBM) which 'Synthesizes natural-sounding speech from text'. A 'FEEDBACK' button is located on the right side of the catalog area. At the bottom, a URL bar shows the address: <https://cloud.ibm.com/catalog/services/speech-to-text>.

- Click on **Speech to Text** and press the **Create** button.

The screenshot shows the detailed view of the 'Speech to Text' service. At the top, it has the service name 'Speech to Text' (Lite • IBM). Below that is a descriptive text about the service: 'The Speech to Text service converts the human voice into the written word. It can be used anywhere there is a need to bridge the gap between the spoken word and their written form, including voice control of embedded systems, transcription of meetings and conference calls, and dictation of email and notes. This easy-to-use service uses machine intelligence to combine information about grammar and language structure with knowledge of the composition of the audio signal to generate an accurate transcription. The following languages and features are currently available:'. There are links for 'View Docs', 'View API Docs', and 'Terms'. Below this, it shows 'AUTHOR IBM' and 'PUBLISHED 02/05/2019'. On the right, there are configuration fields: 'Service name:' with 'Speech to Text-jw', 'Choose a region/location to deploy in:' set to 'Dallas', 'Select a resource group:' set to 'default', and 'Tags:' with 'Examples: env:dev, version-1'. Under 'Features', there are sections for 'Available Languages' (English (US), English (UK), Japanese, Arabic (MSA, Broadband model only), Mandarin, Portuguese (Brazil), Spanish, French (Broadband model only), Korean) and 'Metadata' (describing the JSON response structure). At the bottom, there are buttons for 'Add to estimate' and 'Create'.

- Return to the AI category in the IBM Cloud Catalog and click on **Text to Speech** and press the **Create** button.

The screenshot shows the IBM Cloud Text to Speech service page. At the top, there's a navigation bar with 'IBM Cloud' and various links like Catalog, Docs, Support, Manage, and John Walicki's Account. Below the navigation is a section titled 'Text to Speech' with a subtitle 'Lite • IBM'. To the left, there's a description of the service: 'The Text to Speech service processes text and natural language to generate synthesized audio output complete with appropriate cadence and intonation. It is available in several voices:' followed by a list of links: 'View Docs', 'View API Docs', and 'Terms'. Below this, there are details about the service: AUTHOR (IBM), PUBLISHED (01/29/2019), and TYPE (Service). On the right, there are configuration options: 'Service name' (set to 'Text to Speech-jw'), 'Choose a region/location to deploy in' (set to 'Dallas'), 'Select a resource group' (set to 'default'), and 'Tags' (with an example 'env:dev, version-1'). A 'FEEDBACK' button is located on the far right. The main content area is titled 'Features' and lists various supported languages with their details.

The 'Features' section lists the following languages:

- English (US)
2 female voices, 1 male voice (Watson's voice from Jeopardy)
- English (UK)
1 female voice
- French
1 female voice
- German
1 female voice, 1 male voice
- Italian
1 female voice
- Spanish (Castilian)
1 female voice, 1 male voice
- Portuguese (Brazil)
1 female voice
- Japanese
- Mobile SDKs (BETA)

At the bottom, there are buttons for 'Need Help?', 'Contact IBM Cloud Support', 'Add to estimate', and 'Create'.

- Return to the IBM Cloud Catalog, search for **translator**, navigate to the AI category.

The screenshot shows the IBM Cloud Catalog page. The navigation bar is identical to the previous one. The main search bar has 'translator' typed into it. On the left, there's a sidebar with 'All Categories (1)' and a list of categories: Compute, Containers, Networking, Storage, AI (1) (which is highlighted with a blue border), Analytics, Databases, Developer Tools, Integration, Internet of Things, Security and Identity, Starter Kits, and Web and Mobile. To the right, there's a section titled 'AI' containing a card for the 'Language Translator' service. The card includes an icon with arrows, the service name 'Language Translator', the subtitle 'Lite • IBM', and a brief description: 'Translate text, documents, and websites from one language to another. Create industry or region-specific translations via the service's customization'. A 'Filter' button is located at the top right of the catalog area. The URL 'https://cloud.ibm.com/catalog/services/language-translator' is visible at the bottom of the page.

- Click on **Language Translator** and press the **Create** button.

IBM Cloud Catalog Docs Support Manage John Walicki's Account  

Language Translator

Lite • IBM

Neural Machine Translation comes standard for each language pair. Corpus customization allows you to create your own translation models which account for regional or industry-specific terms. Instantly translate your content into multiple languages. From translating documents, apps, and websites to creating multilingual chatbots, what will you build?

[View Docs](#) [View API Docs](#) [Terms](#)

AUTHOR IBM Watson
PUBLISHED 01/31/2019
TYPE Service

Service name: Language Translator-jw

Choose a region/location to deploy in: Dallas **Select a resource group:** default

Tags:  Examples: env:dev, version-1

Features

- Instantly Translate Between:** Arabic, Catalan, Chinese (Simplified & Traditional), Czech, Danish, Dutch, English, Finnish, French, German, Hindi, Hungarian, Italian, Japanese, Korean, Norwegian, Polish, Portuguese (Brazil), Russian, Spanish, Swedish, and Turkish
- Neural Machine Translation** By default, all language pairs utilize neural machine translation. This new technology leverages deep learning to provide improved accuracy at faster speeds.

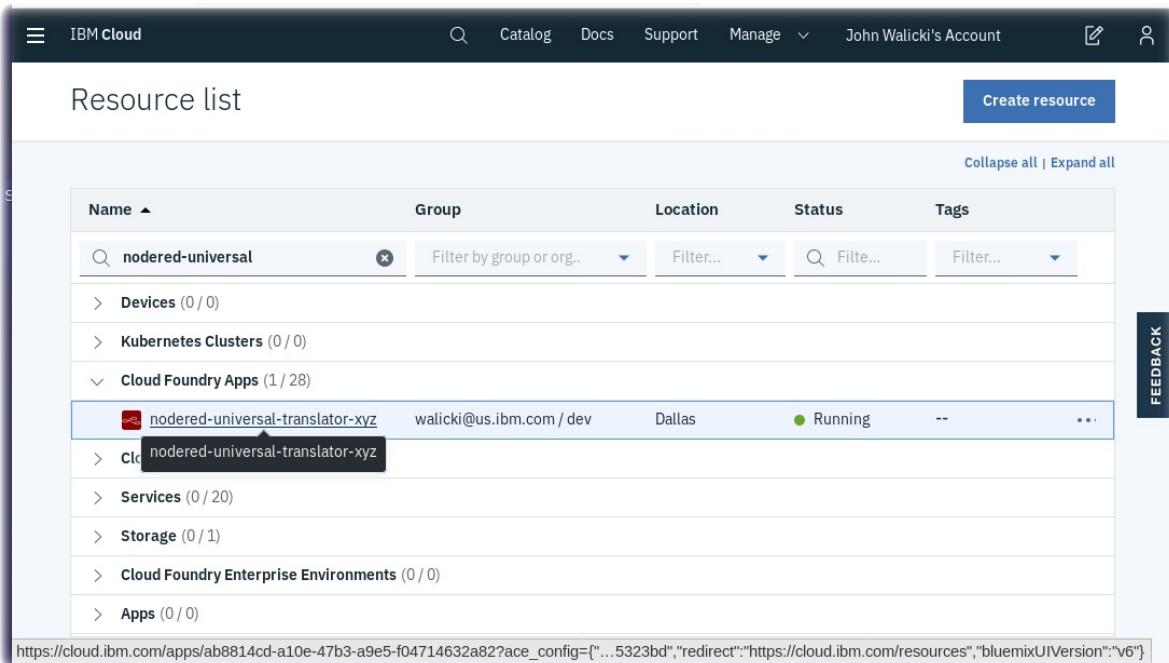
Need Help? [Contact IBM Cloud Support](#) 

Add to estimate [Create](#)

Step 3 - Connect the Watson AI Services to Node-RED Starter Application

In this step, the tutorial demonstrates how to connect the newly created Watson AI services to your Node-RED Starter application.

- Return to the [IBM Cloud Dashboard](#) and navigate to the Cloud Foundry Apps section.



The screenshot shows the IBM Cloud Resource list interface. At the top, there's a search bar with the placeholder "nodered-universal" and several filter buttons for Group, Location, Status, and Tags. Below the header, there are sections for Devices (0/0), Kubernetes Clusters (0/0), and Cloud Foundry Apps (1/28). The Cloud Foundry Apps section is expanded, showing a table with one row. The row details a CF application named "nodered-universal-translator-xyz" created by "walicki@us.ibm.com / dev" in the Dallas location, which is currently "Running". A "Cloud Foundry Apps" link is also visible in the sidebar. The URL at the bottom of the page is [https://cloud.ibm.com/apps/ab8814cd-a10e-47b3-a9e5-f04714632a82?ace_config=\[...5323bd","redirect":"https://cloud.ibm.com/resources","bluemixUIVersion":"v6"}](https://cloud.ibm.com/apps/ab8814cd-a10e-47b3-a9e5-f04714632a82?ace_config=[...5323bd).

- Click on your nodered-universal-translator CF application. The **Applications Details** will open.

The screenshot shows the IBM Cloud dashboard with the 'Connections' menu item highlighted by a red box. The main content area displays the app 'nodered-universal-translator-XYZ' which is running. It provides runtime details like buildpack (SDK for Node.js™), instances (1), memory per instance (256 MB), and total allocation (256 MB). It also shows connections (1) and runtime cost (\$0.00).

- Click on **Connections** in the left navigation menu.
- Click on **Create connection** button.

The screenshot shows the 'Create connection' screen for the app 'nodered-universal-translator-XYZ'. The 'Connections' menu item is highlighted in the sidebar. The main area lists one existing connection: 'nodered-universal-translator-xyz-cloudantNoSQLDB' of type 'Cloudant NoSQL DB'. A 'Create connection' button is visible at the top right.

- Search for the Watson Speech services you created in the prior step, hover over **Speech to Text** and press the **Connect** button.

The screenshot shows the IBM Cloud Connections page. On the left sidebar, under the 'Connections' section, there are several options: Getting started, Overview, Runtime, Connections (which is selected), Logs, API Management, and Monitoring. A search bar at the top right contains the text 'speech'. Below the search bar is a table titled 'Connect Existing Compatible Service' with two items:

SERVICES	RESOURCE GROUP	PLAN	SERVICE OFFERING	
Speech to Text-gp	default	Standard	Speech to Text	Connect
Text to Speech-nu	default	Standard	Text to Speech	

- Press the **Connect** button to auto generate the binding credentials.

The screenshot shows a modal dialog box titled 'Connect IAM-Enabled Service'. It contains instructions: 'To connect, you can customize the ServiceID and access role used for this binding. Restaging your app is required to connect this service and may result in application downtime.' Below this are two dropdown menus: 'Access Role for Connection' set to 'Manager' and 'Service ID for Connection (Optional)' set to 'Auto Generate'. At the bottom of the dialog are 'Cancel' and 'Connect' buttons.

- **DO NOT RESTAGE** the application yet. Press the **Cancel** button. After all three AI service instances are connected, the application can be restaged just once.

The screenshot shows a modal dialog box titled 'Restage app'. It contains the message: 'Your 'nodered-universal-translator-xyz' app must be restaged to use the new 'Speech to Text-gp' service. Restaging makes this service available for use. Do you want to restage it now?'. At the bottom of the dialog are 'Cancel' and 'Restage' buttons, with 'Cancel' being highlighted with a red box.

- Press **Create Connection** button again.

The screenshot shows the IBM Cloud interface. On the left, a sidebar menu includes 'Getting started', 'Overview', 'Runtime', 'Connections' (which is selected), 'Logs', 'API Management', and 'Monitoring'. The main content area displays an application named 'nodered-universal-translator-XYZ' which is 'Running'. Below the application name are tabs for 'Routes' and 'Logs'. Underneath these tabs, it shows 'Org: walicki@us.ibm.com', 'Location: Dallas', 'Space: dev', and a 'Add Tags' button. A search bar with 'Filter items' and a 'Create connection' button are also present. A table lists two connections:

CONNECTION NAME	TYPE	...
nodered-universal-translator-xyz-cloudantNoSQLDB	Cloudant NoSQL DB	...
Speech to Text-gp	Speech to Text	...

- Search for the **speech** services, hover over the **Text to Speech** service, and press the **Connect** button.

The screenshot shows the 'Connect Existing Compatible Service' dialog. At the top, it says 'Connect Existing Compatible Service' and has a search bar with 'speech'. Below the search bar is a dropdown menu 'All Resources'. A table lists two services:

SERVICES	RESOURCE GROUP	PLAN	SERVICE OFFERING
Speech to Text-gp	default	Standard	Speech to Text
Text to Speech-nu	default	Standard	Text to Speech

A blue 'Connect' button is located at the bottom right of the table.

- Press the **Connect** button to auto-generate the IAM credentials.
- Remember to **NOT** press the Restage button.
- For the third time, press the **Create connection** button.

The screenshot shows the IBM Cloud dashboard for the service 'nodered-universal-translator-XYZ'. The 'Connections' tab is selected in the sidebar. A prominent blue button labeled 'Create connection' with a '+' icon is visible at the top right of the main content area. Below it, there is a table listing three existing connections:

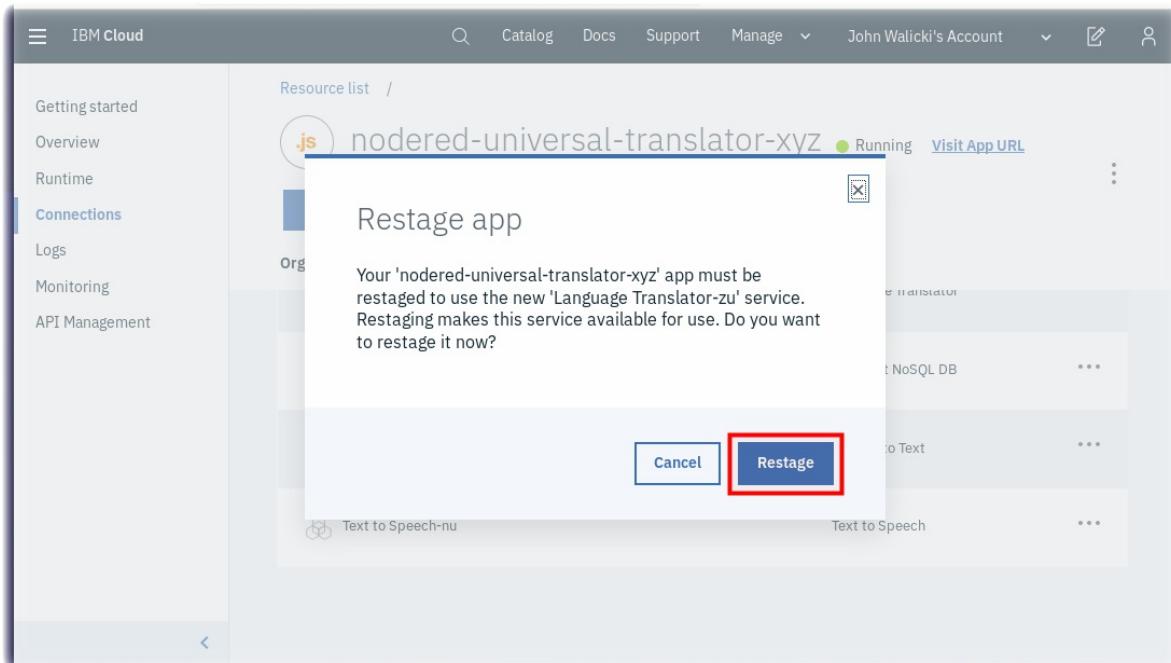
CONNECTION NAME	TYPE	Actions
nodered-universal-translator-xyz-cloudantNoSQLDB	Cloudant NoSQL DB	...
Speech to Text-gp	Speech to Text	...
Text to Speech-nu	Text to Speech	...

- Search for the **language translator** service and hover over the Language Translator service, and press the **Connect** button.

The screenshot shows a modal dialog titled 'Connect Existing Compatible Service' for the 'language translator' service. The search bar at the top contains the text 'language translator'. In the main area, there is a table showing one item:

SERVICES	RESOURCE GROUP	PLAN	SERVICE OFFERING	Actions
Language Translator-zu	default	Standard	Language Translator	Connect

- Press the **Connect** button to auto-generate the IAM credentials.
- Now, finally, press the **Restage** button.



- The Cloud Foundry application will now restage and restart.

Step 4 - Launch the Node-RED Starter Application

- Once the Green **Running** icon appears, click the **View App URL** link.

IBM Cloud

Getting started

Overview

Runtime

Connections

Logs

Monitoring

API Management

Search Catalog Docs Support Manage John Walicki's Account

Routes

Running Visit App URL

Org: walicki@us.ibm.com Location: Dallas Space: dev Add Tags

Runtime

BUILDPACK: SDK for Node.js™

INSTANCES: 1 All instances are running Health is 100%

MB MEMORY PER INSTANCE: 256

TOTAL MB ALLOCATION: 256 13.25 GB still available

Connections (4)

Language Translator-zu

nodered-universal-translator-xyz-cloudantNoSQ...

Speech to Text-gp

Text to Speech-nu

Runtime cost

\$0.00 Current charges for billing period

\$0.00 Estimated total for billing period (Feb 1, 2019 - Feb 28, 2019)

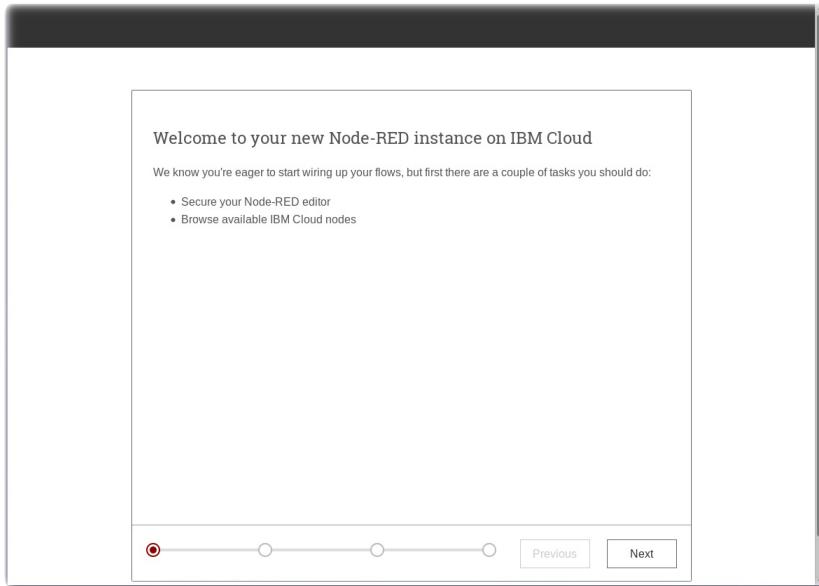
Current and estimated cost excludes connected services.

Step 5 - Open the Node-RED visual programming editor

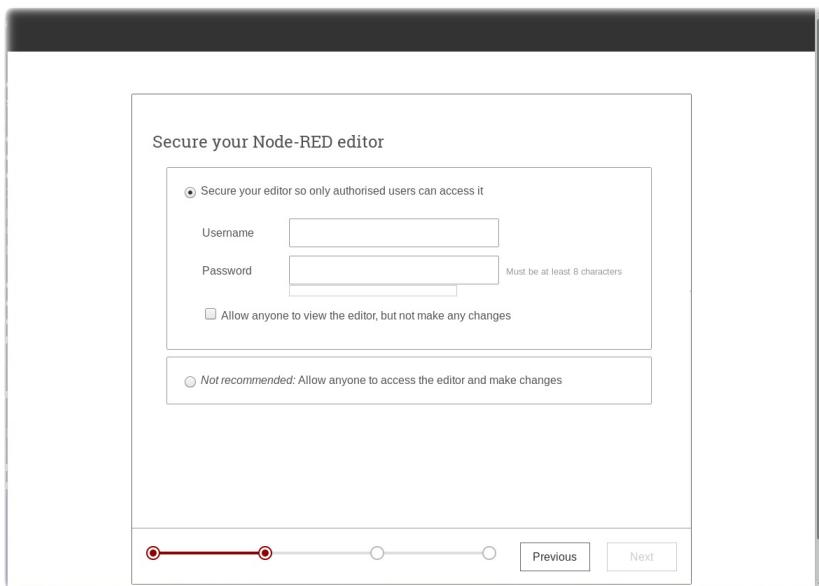
A new browser tab will open to the Node-RED start page. Node-RED is an open-source Node.js application that provides a visual programming editor that makes it easy to wire together flows.

Several panels will help you set up the Node-RED Starter application.

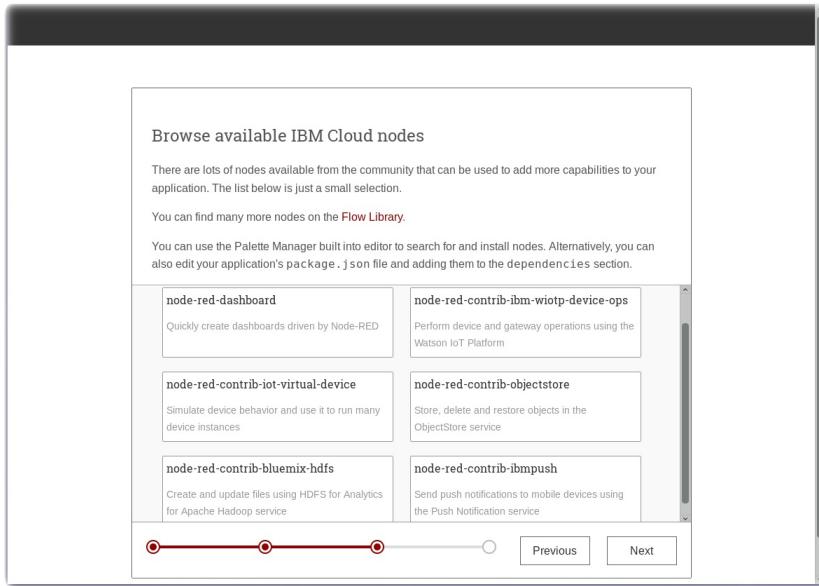
- Welcome to Node-RED. Click the **Next** button to proceed. Step 1 of 5



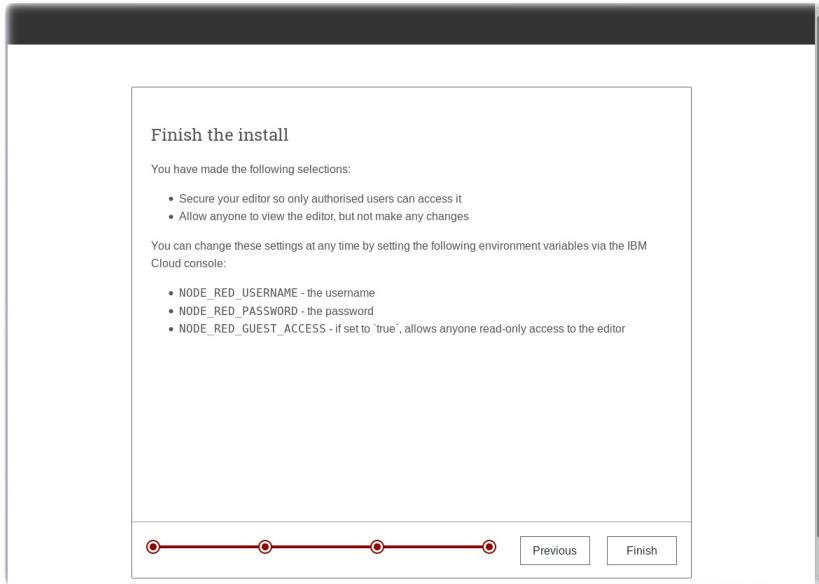
- Secure your Node-RED editor by setting a username / password. Remember your username / password. Click the **Next** button to proceed. Step 2 of 5



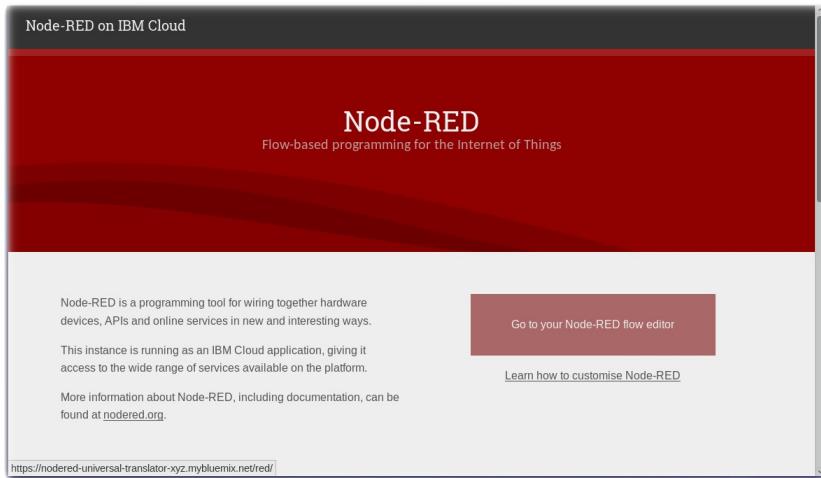
- You can add more nodes. Step 3 of 5



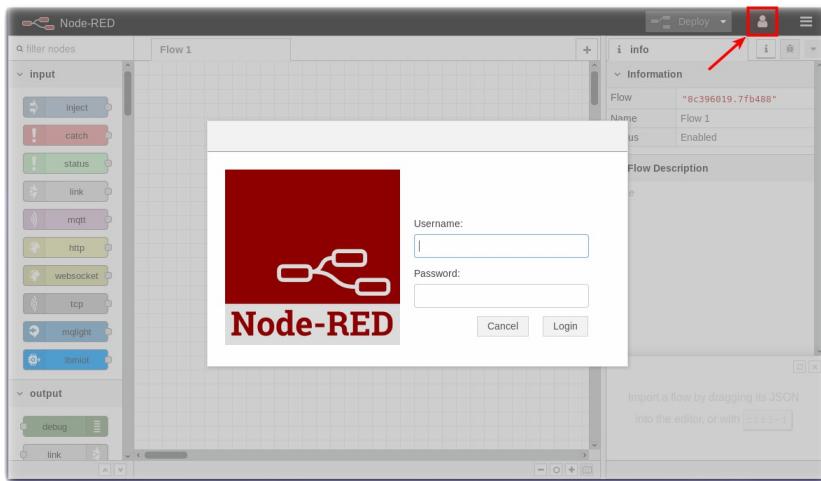
- If you forget, you can reset the username / password in the Cloudant DB or by setting IBM Cloud environment variables. Click the **Finish** button to proceed. Step 4 of 5



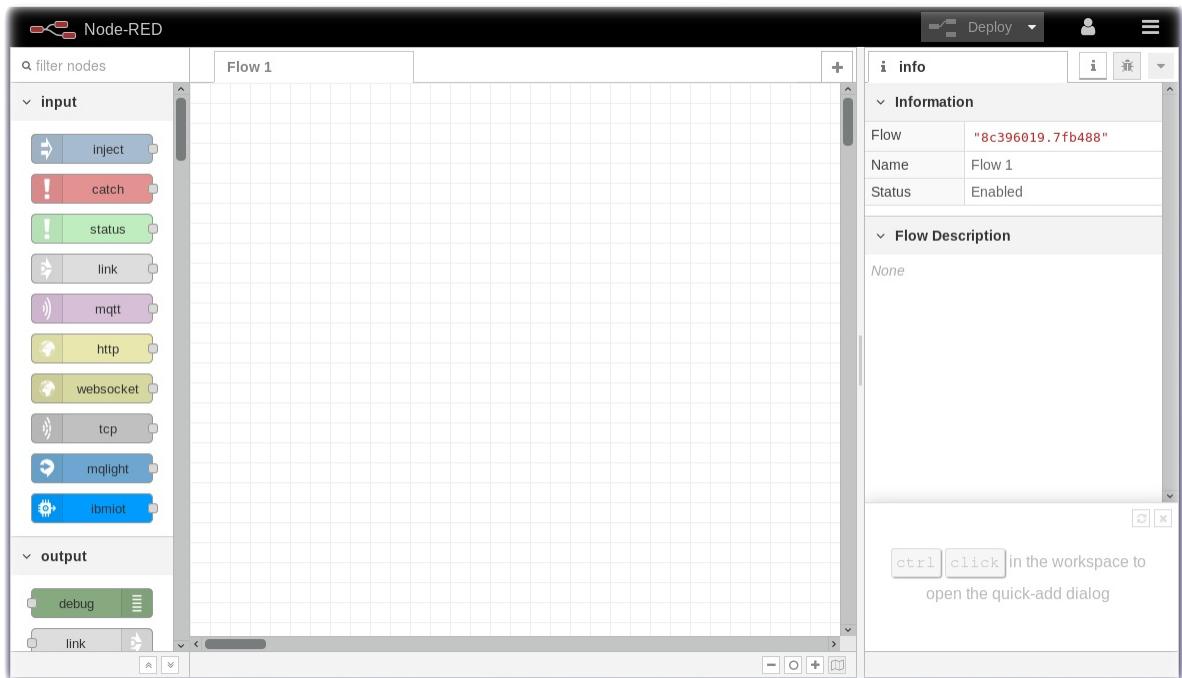
- Click the **Go to your Node-RED flow editor** button to launch the Node-RED flow editor.
Step 4 of 5



- Click on the Person icon in the upper right corner and **Sign in** with your new username and password credentials.



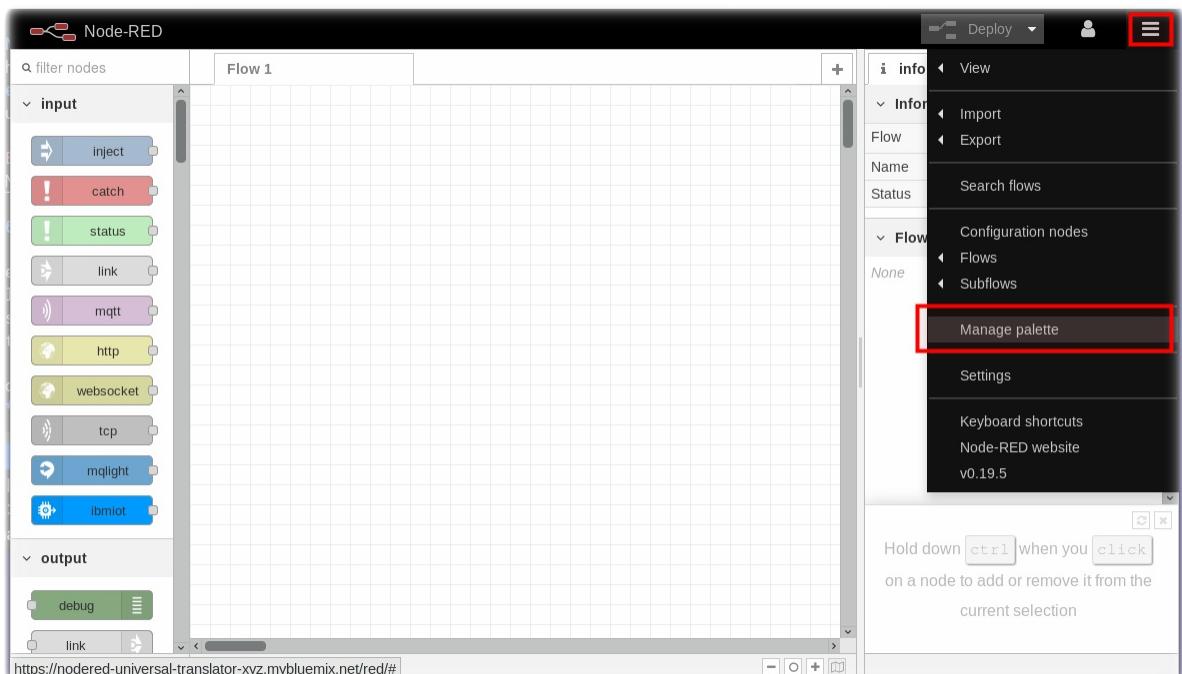
- The **Node-RED Visual Programming Editor** will open with a default flow. On the left side is a **palette of nodes** that you can drag onto the flow. You can **wire nodes together** to create a program.



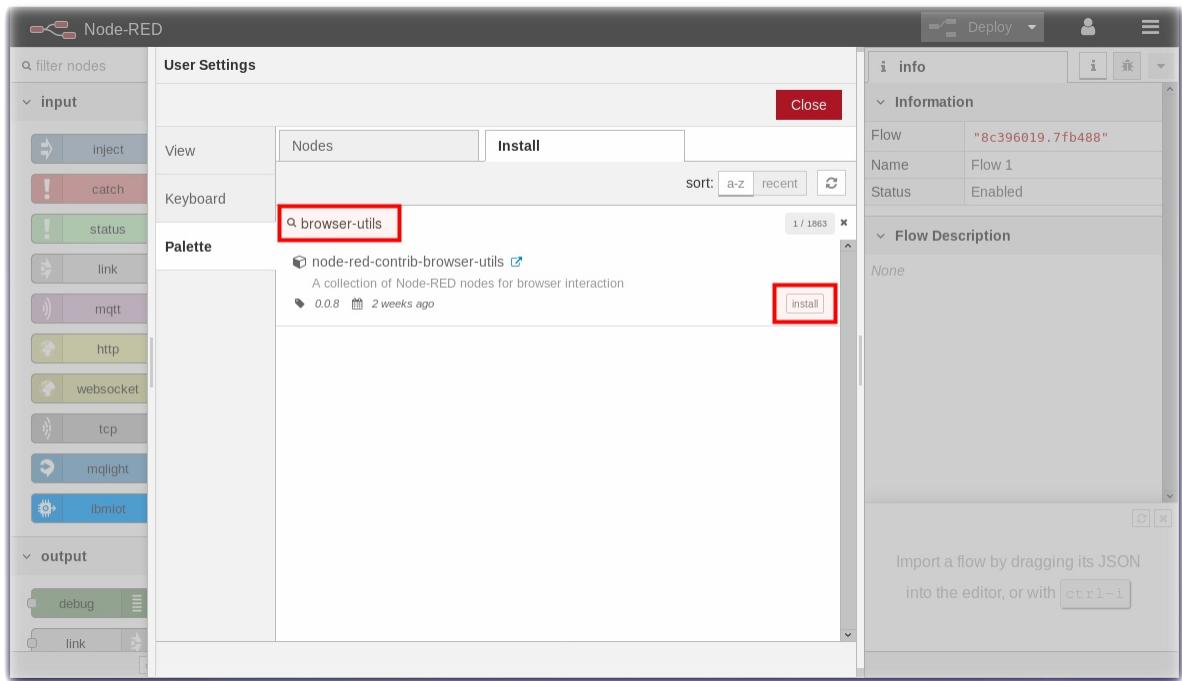
Step 6 - Install Additional Node-RED Nodes

The Universal Translator needs a microphone to record your message and the ability to play audio of the translation. Luckily, there are nodes that can be added to the Node-RED palette that add these capabilities.

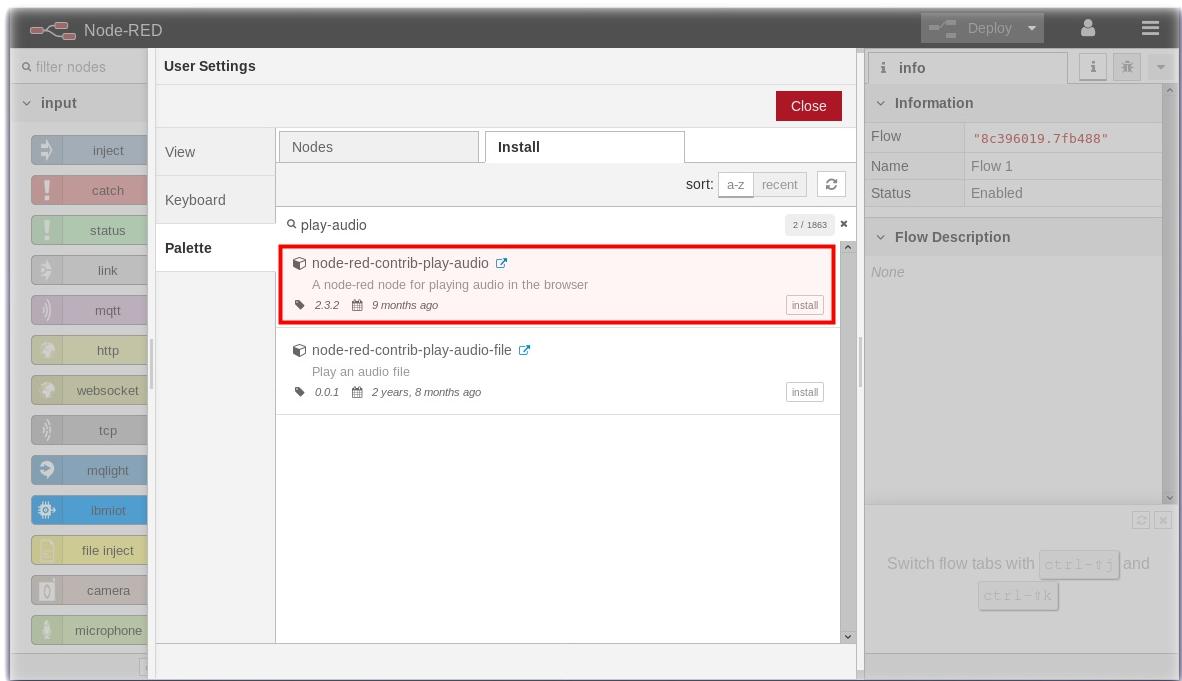
- Click on the Node-RED Menu and select **Manage palette**



- Turn to the **Install** tab
- Search for **browser-utils**, find the *node-red-contrib-browser-utils* node and press the **Install** button.



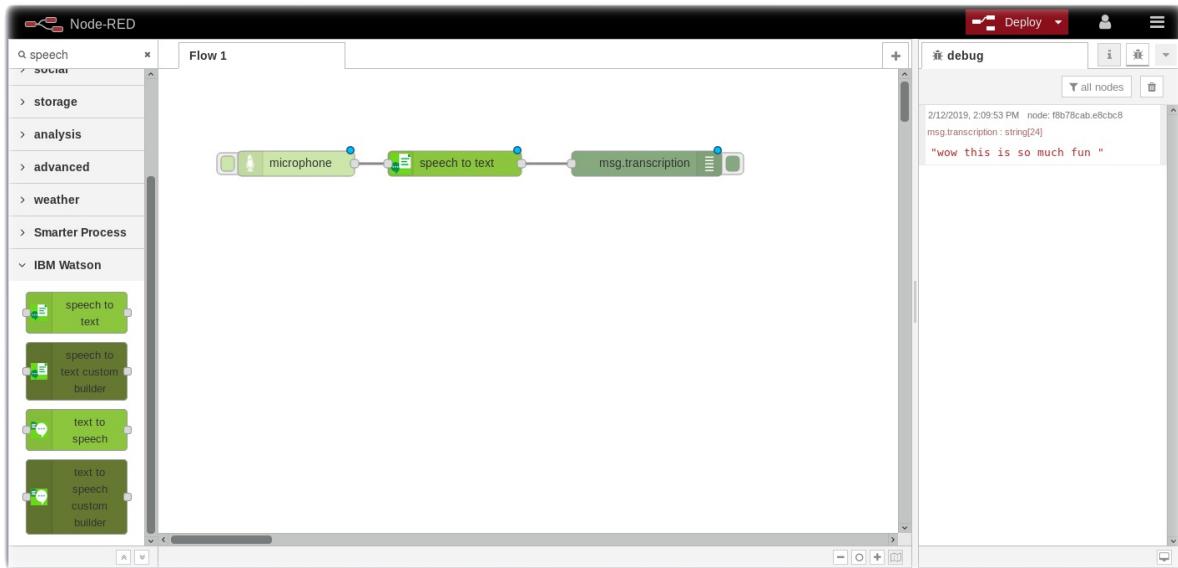
- Search for **play-audio**, find the *node-red-contrib-play-audio* node and press the **Install** button.



Step 7 - Build a Speech to Text Flow

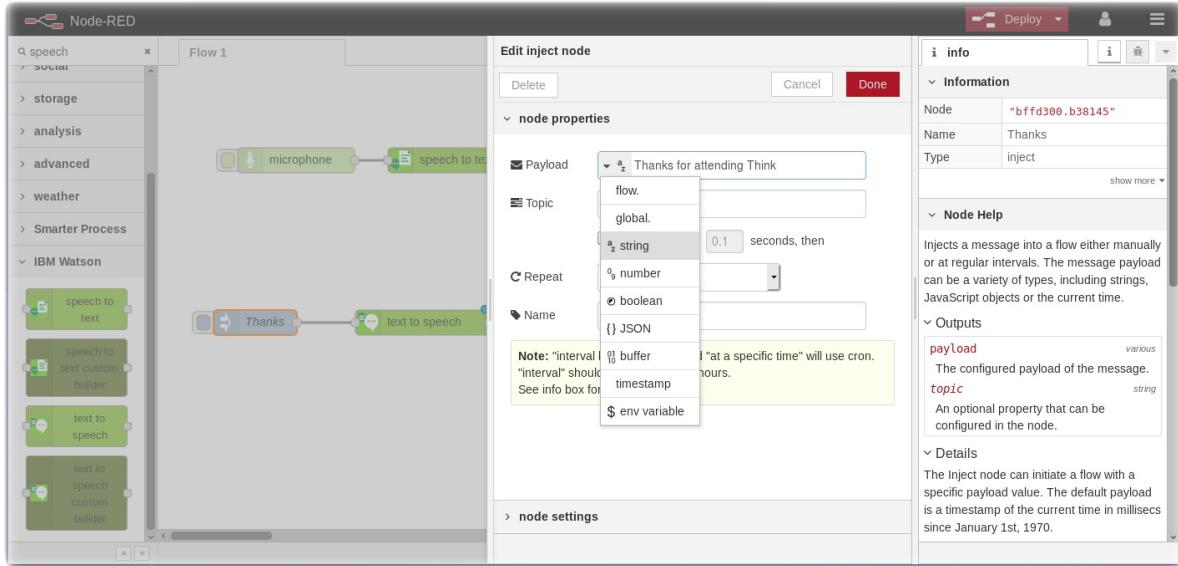
Node-RED allows you to drag and drop Nodes from the left palette onto your flow canvas and wire them together to create programs.

- Grab a *microphone* node and drag it to your flow.
- Grab a *Speech to Text* node and drag it to your flow. Double-click on the node and select US English.
- Grag a *Debug* node and drag it to your flow.
- Double-click on the Debug node and have it output msg.transcription
- Wire the nodes together as shown in the screenshot.
- Press the red **Deploy** button.
- Press the *microphone* tab and allow your browser access to the microphone on the laptop.
- Record a message!



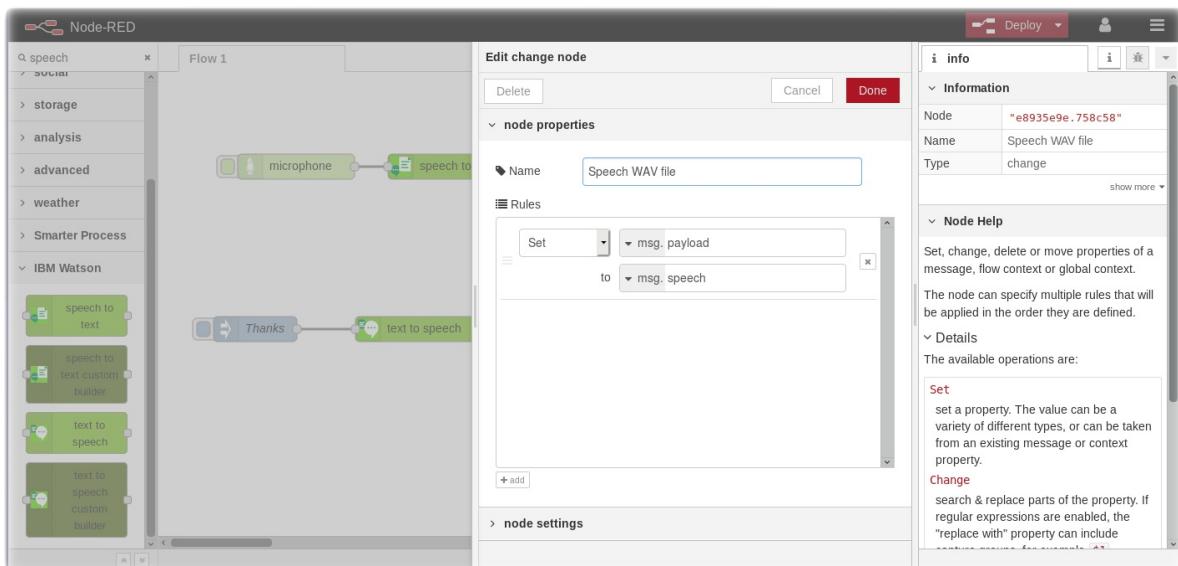
Step 8 - Build a Text to Speech Flow

- Grab an *Inject* node and drag it to your flow.
- Double-click on the Inject node and change the payload type to a string and type a message.

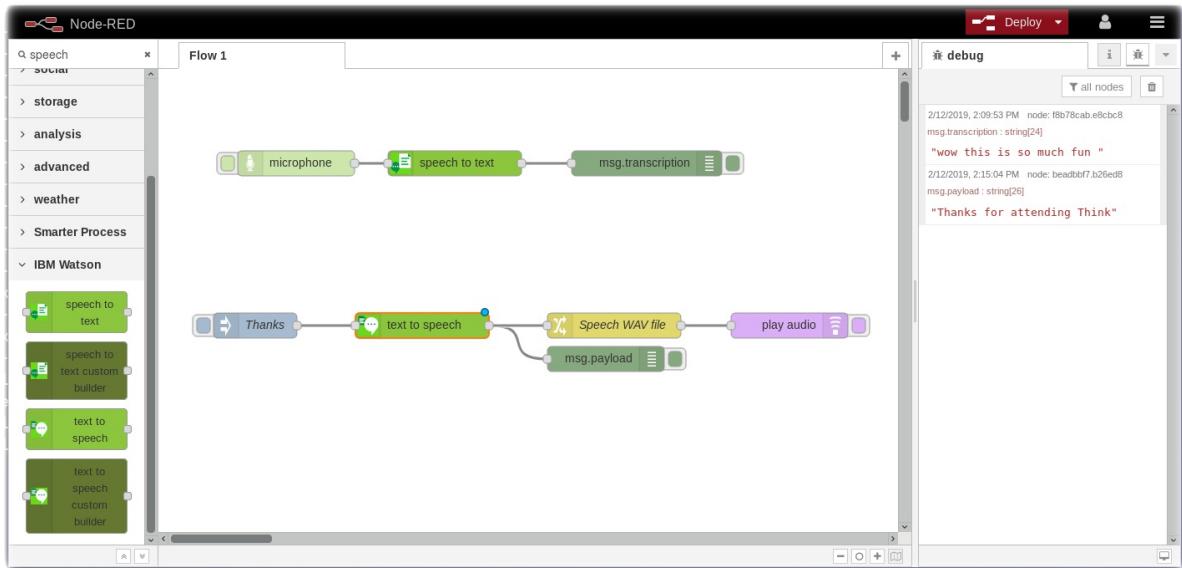


- Grab a *Text to Speech* node and drag it to your flow. Double-click on it and select US English.
- Grab a *Switch* node and drag it to your flow.

The returned audio transcription from the Text to Speech node will be returned as a raw buffer containing the audio on msg.speech. The play-audio node expects the buffer to be passed in on msg.payload so the Switch node will reassign the values. Double-click on the Switch node and assign the msg.payload to msg.speech



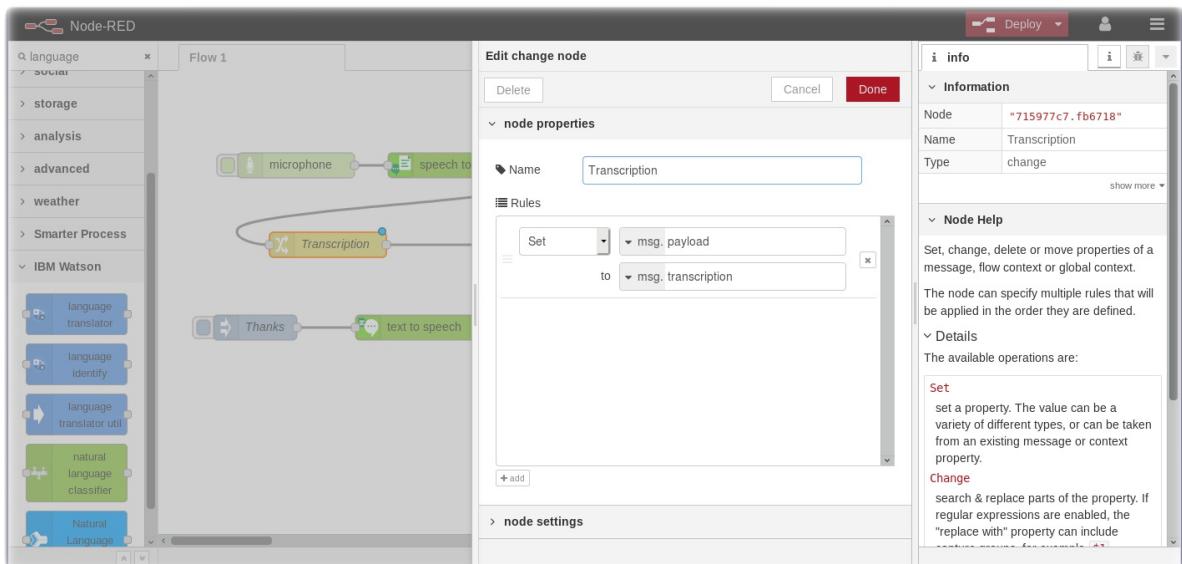
- Grab a *play-audio* node and drag it to your flow.
- Wire the nodes together as shown in the screenshot.
- Press the red **Deploy** button.
- Press the *inject* tab
- The audio of the message will play



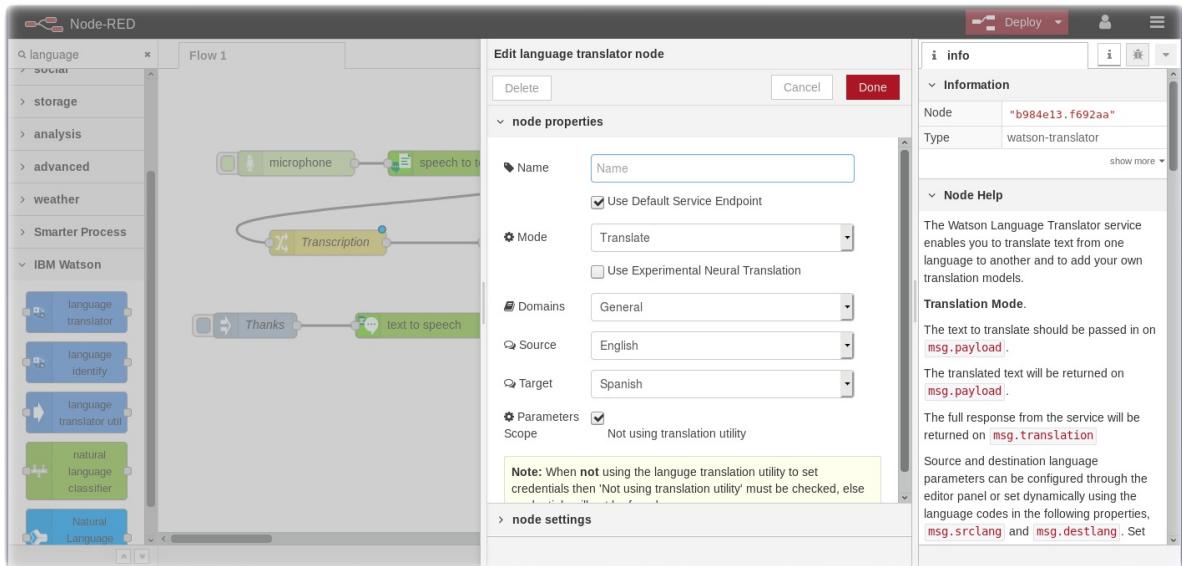
Step 9 - Build a Language Translator flow

Our Universal Translator will use the recorded transcript as the input to the language translator node and then send the foreign language to the Text to Speech node.

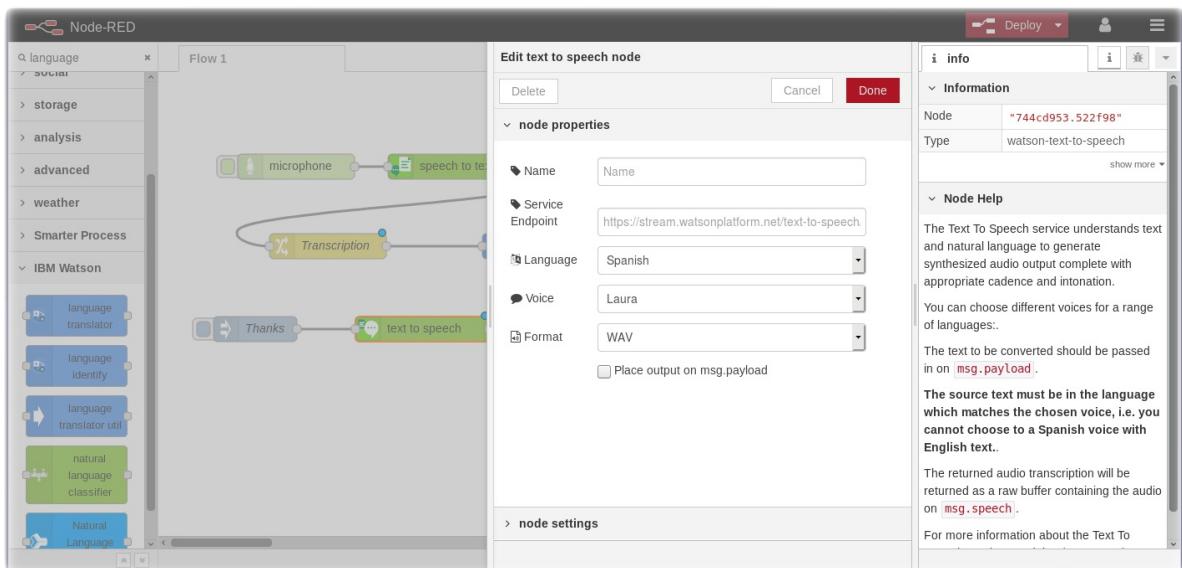
- Grab another *Switch* node and drag it to your flow.
- Double-click on the Switch node and assign msg.transcription to msg.payload



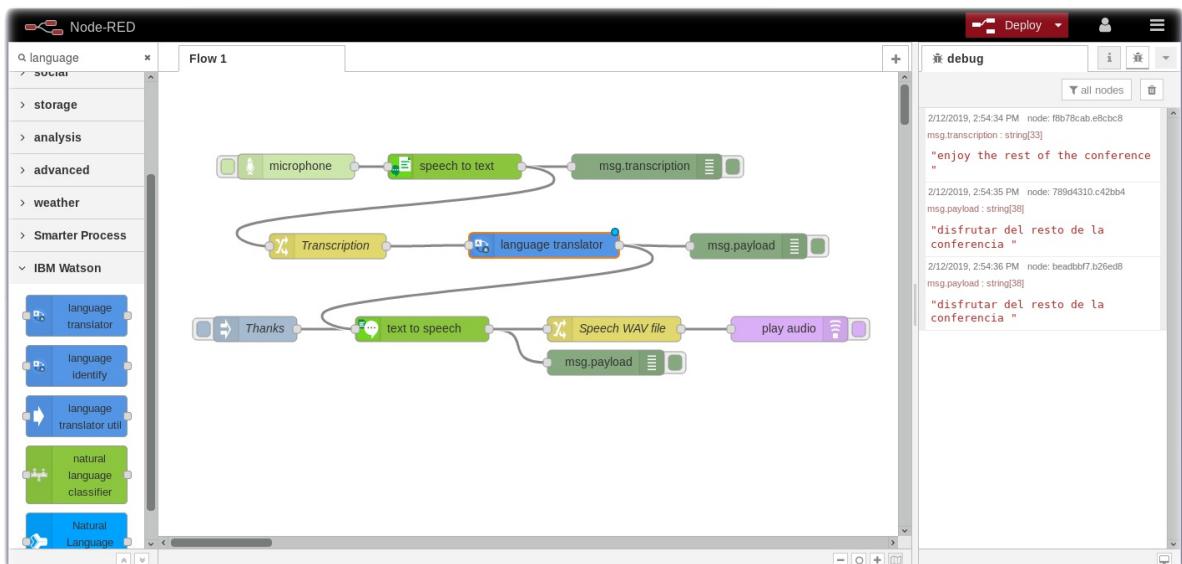
- Grab a *language translator* node and drag it to your flow.
- Double-click on the Language Translator node and select English as the Source and Spanish as the Target.



- Grab a debug node and drag it to your flow.
- Double-click on the Text to Speech node and change the language to Spanish and select a voice.



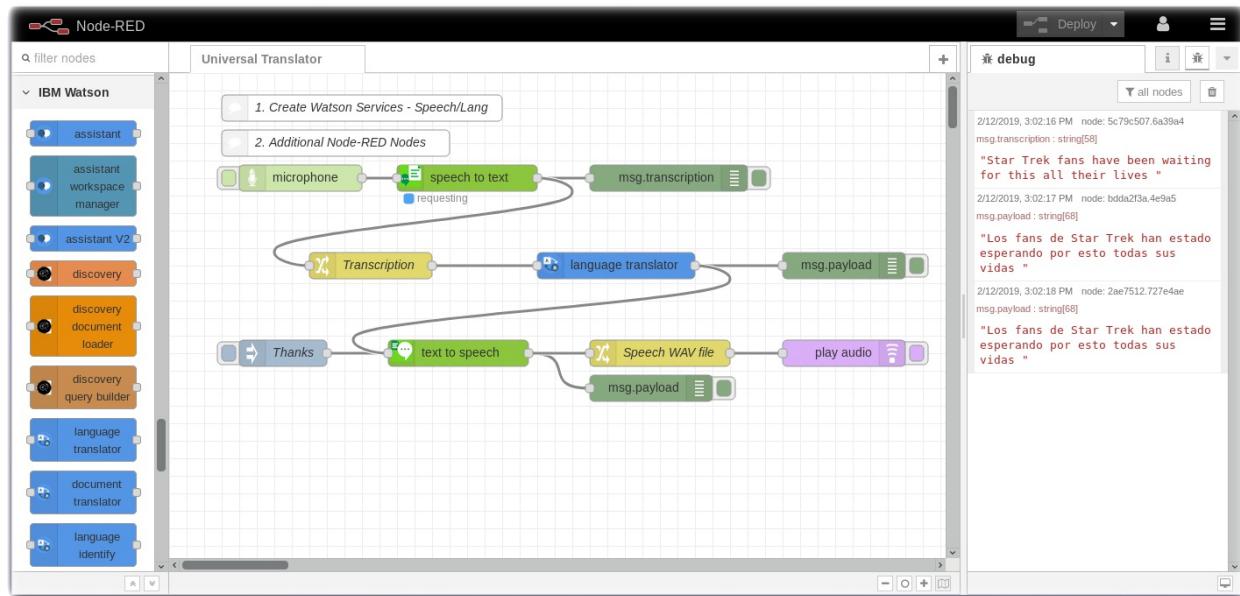
- Wire the nodes together as shown in the screenshot.



- Press the red **Deploy** button.
- Press the *microphone* tab and allow your
- Record a message!

Congratulations - You've built a Universal Translation

Experiment with translations between various languages



Get the Code

If you want to import the solution, get the [code here](#)

Finished

Congratulations! You have completed the creation of a Node-RED Starter application in IBM Cloud.