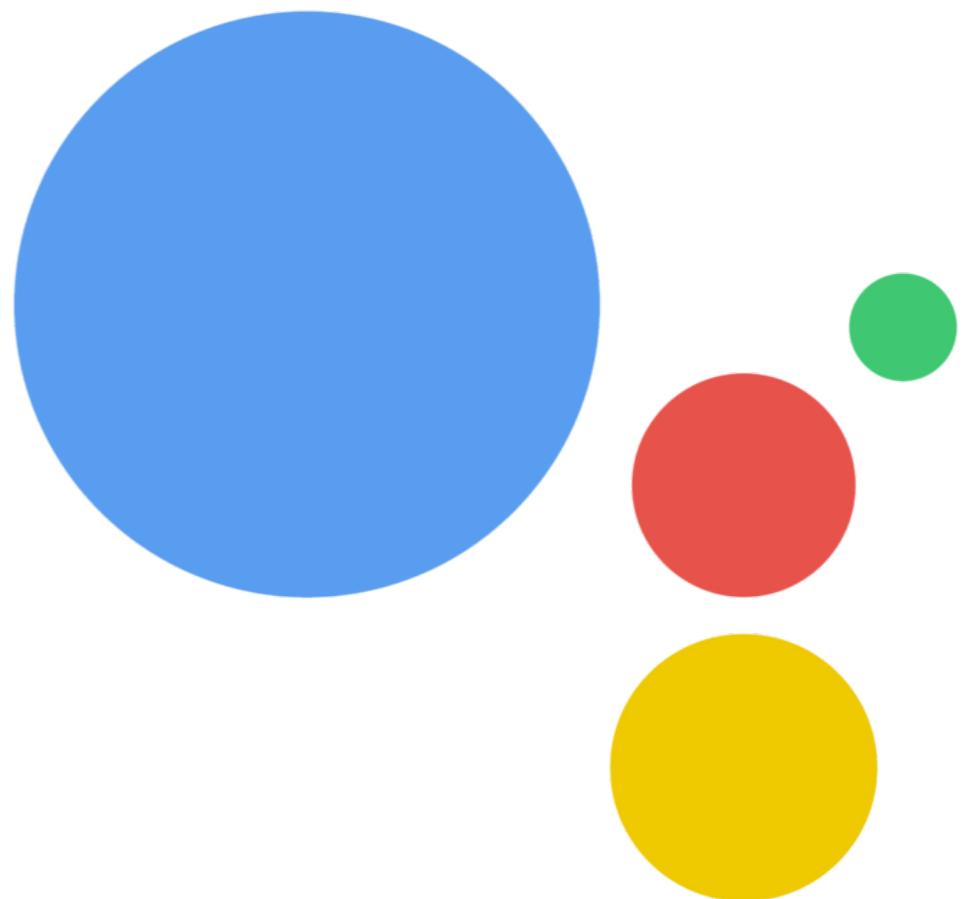


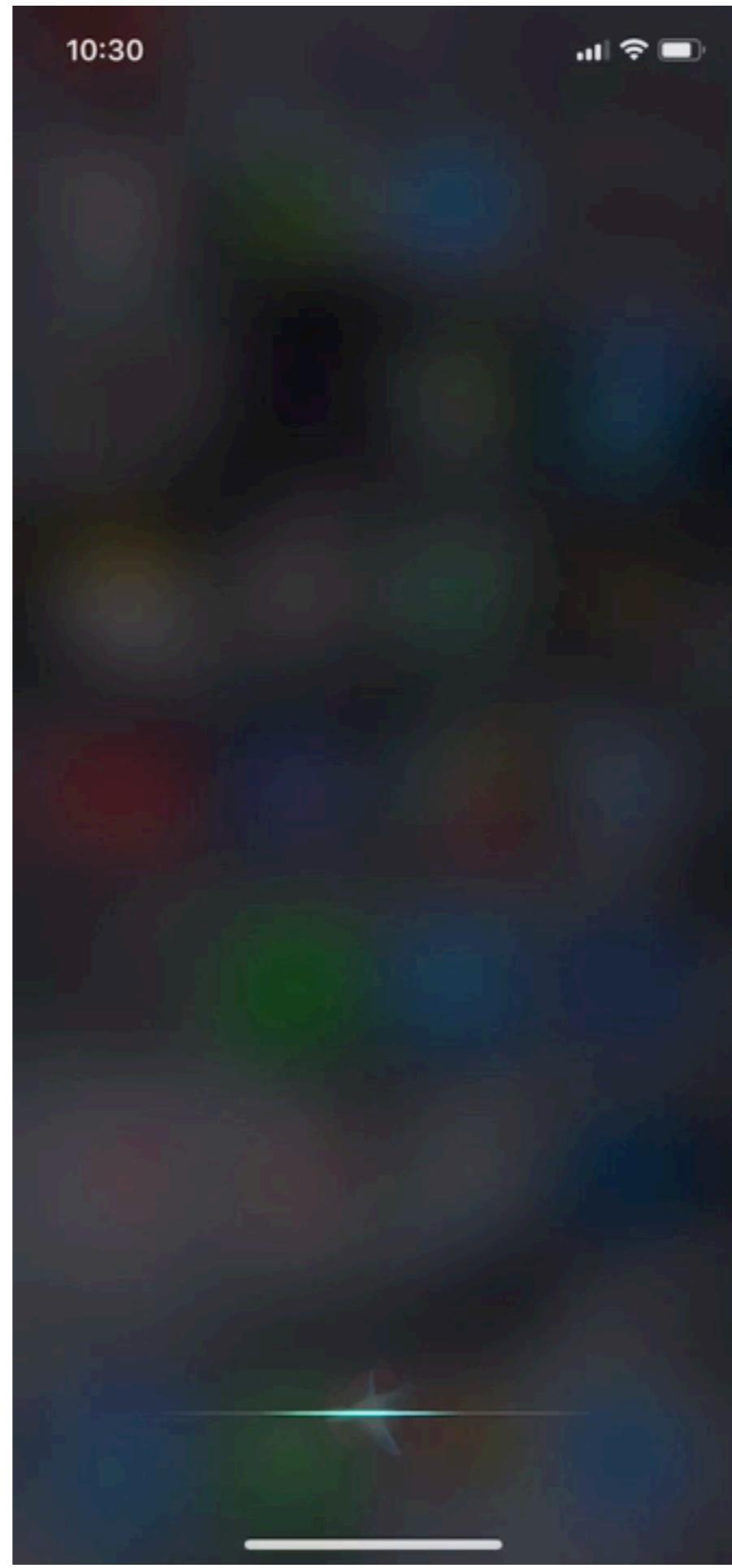
BUILD YOUR OWN VOICE ASSISTANT

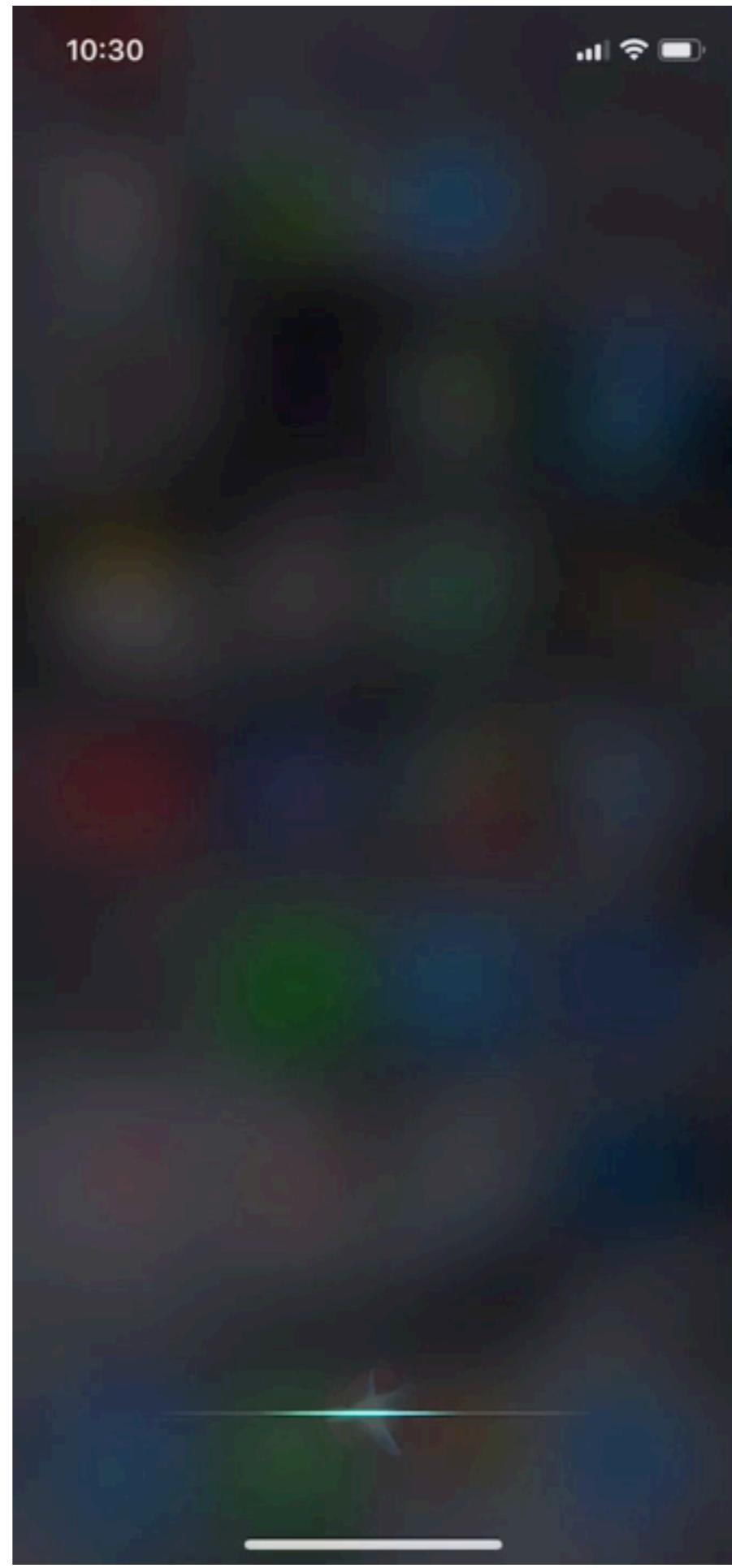
@JARREDOLSON

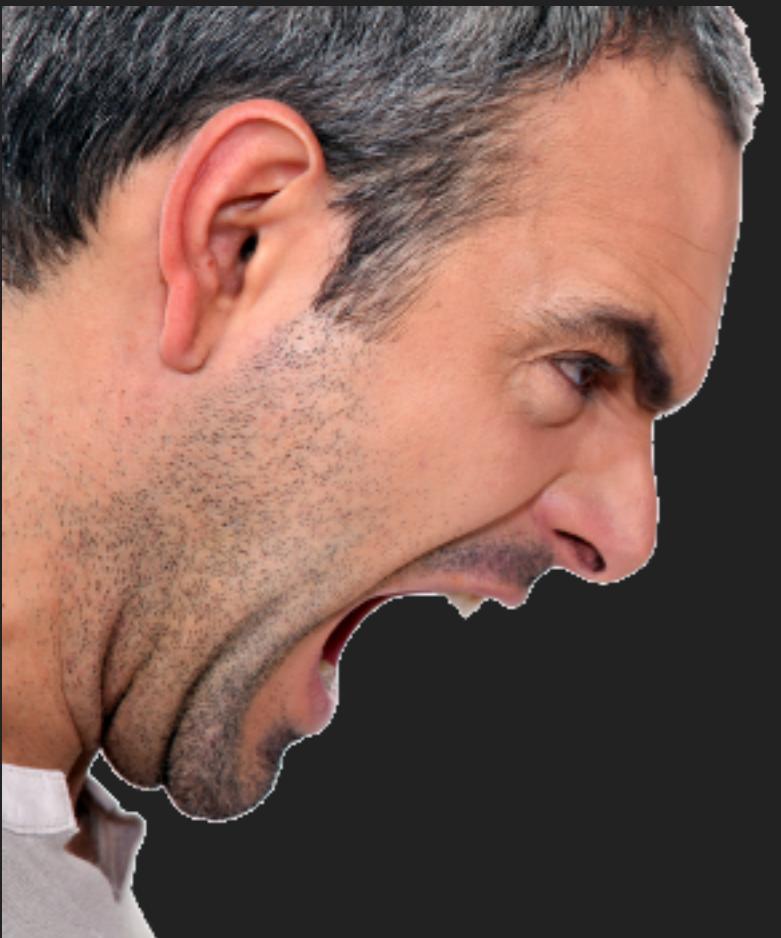


amazon alexa



























- ▶ Transcribe the audio into text



- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)

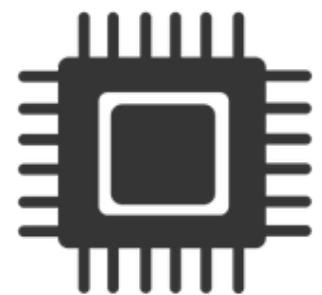
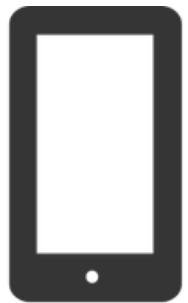


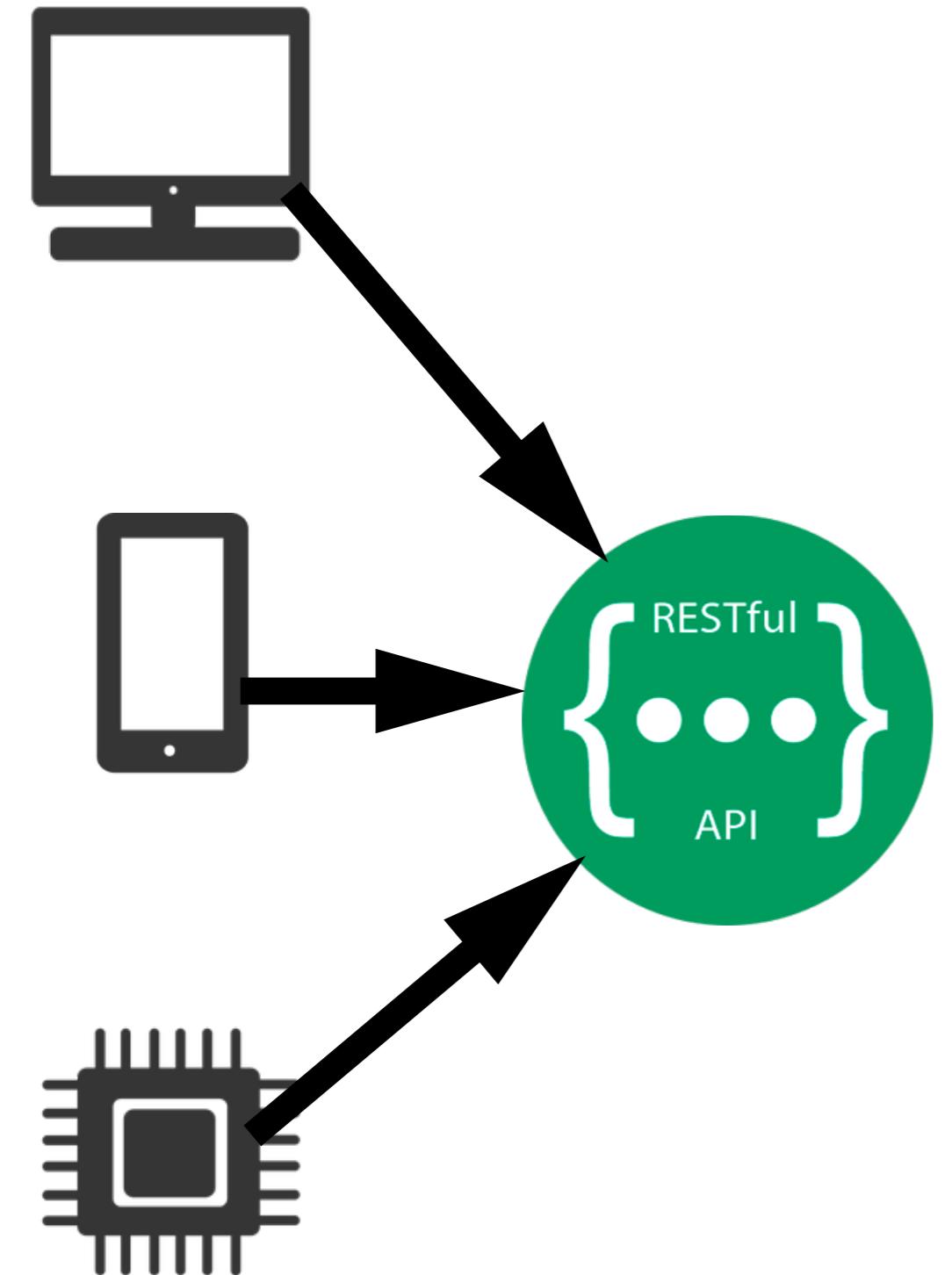
- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action

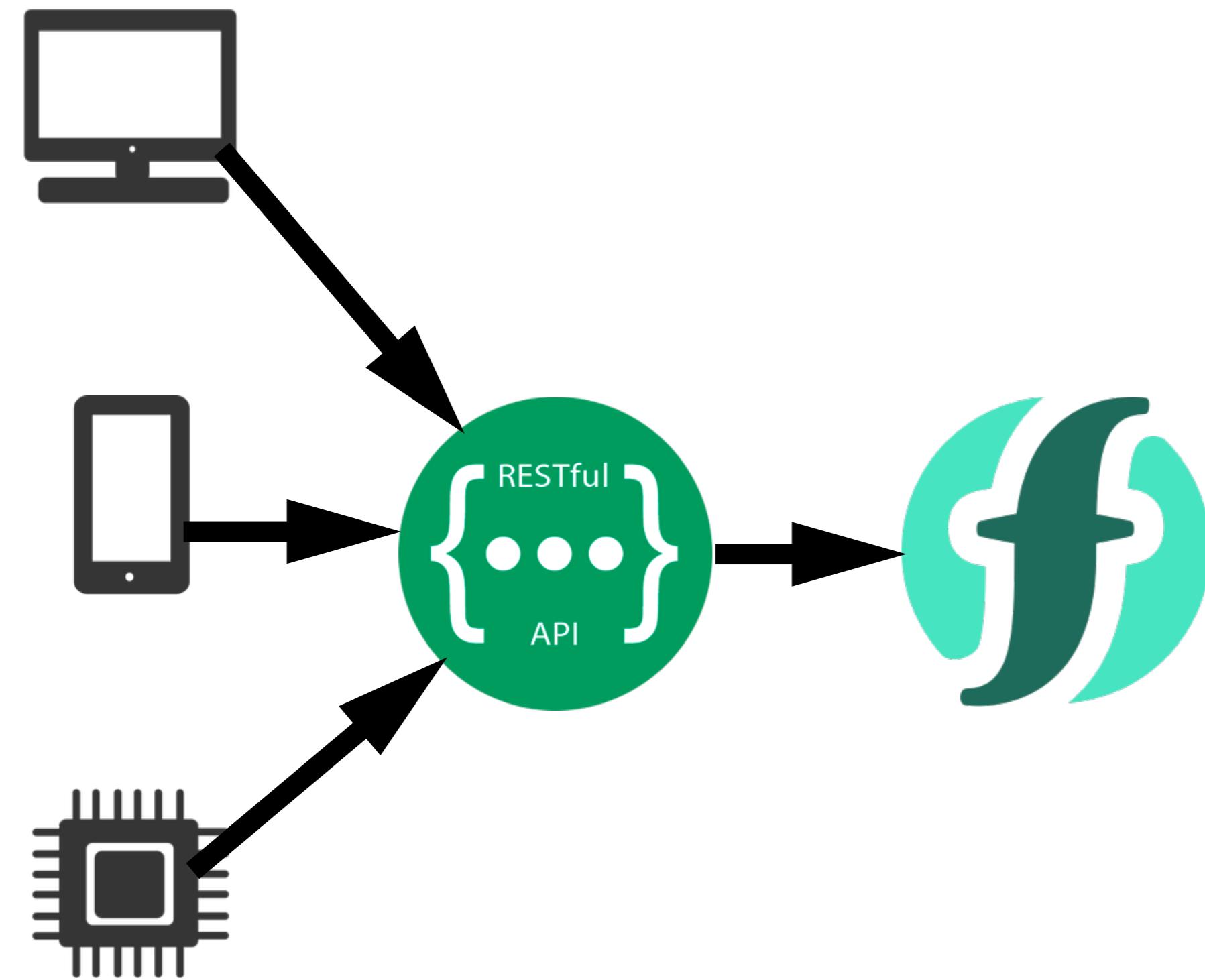


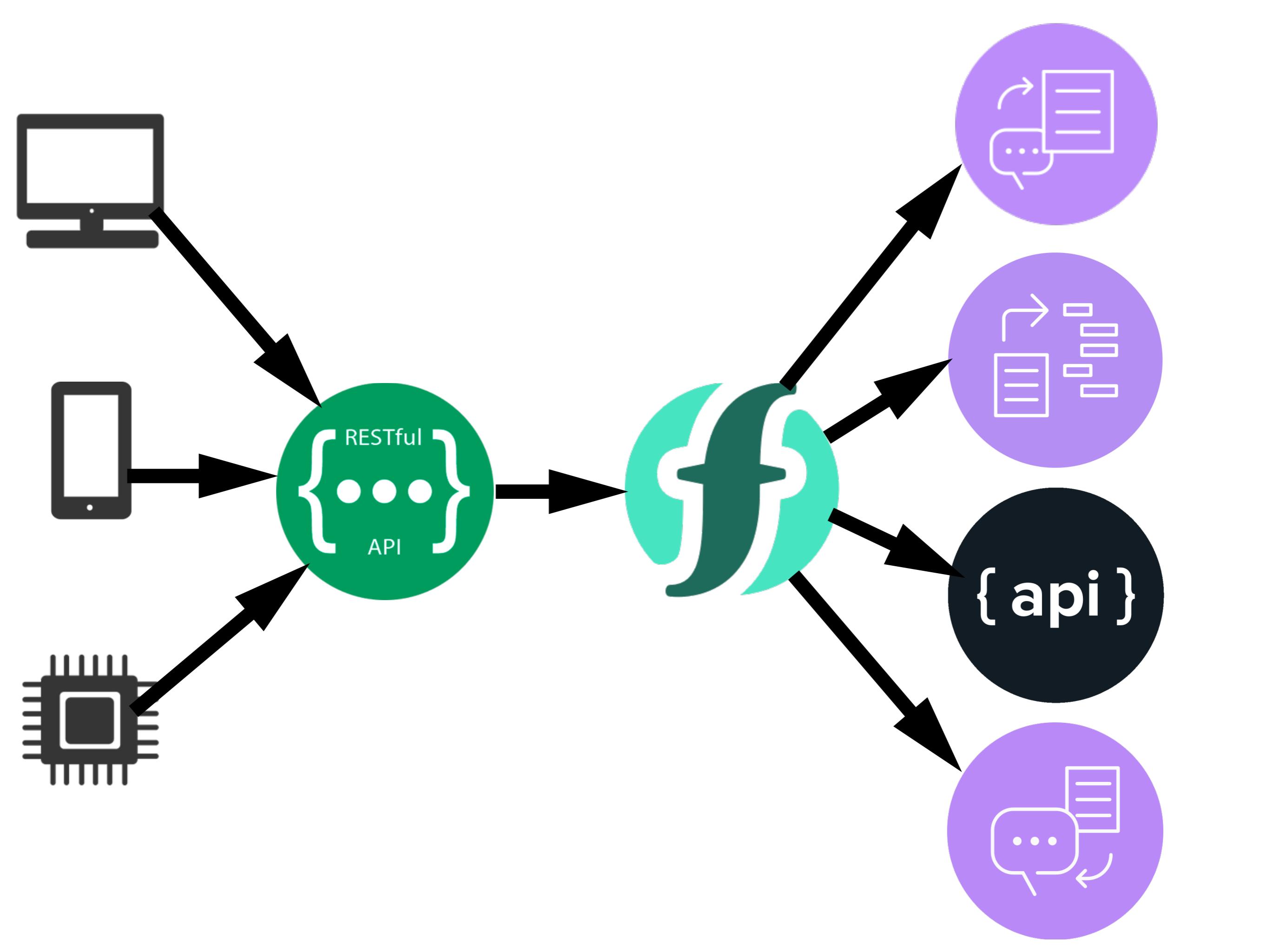
- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action
- ▶ Respond with audio and data

**WHAT EXACTLY ARE
WE GOING TO BUILD?**

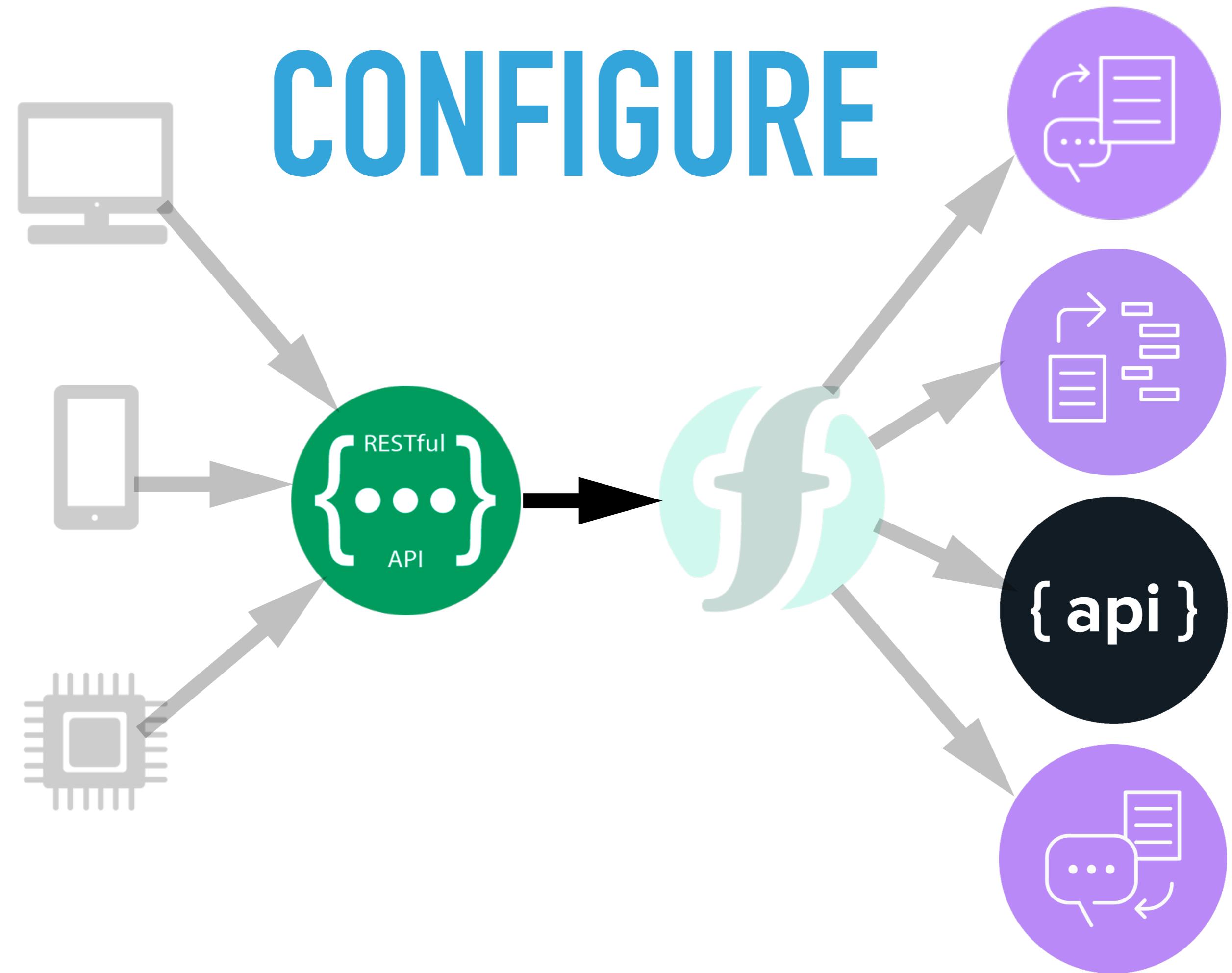




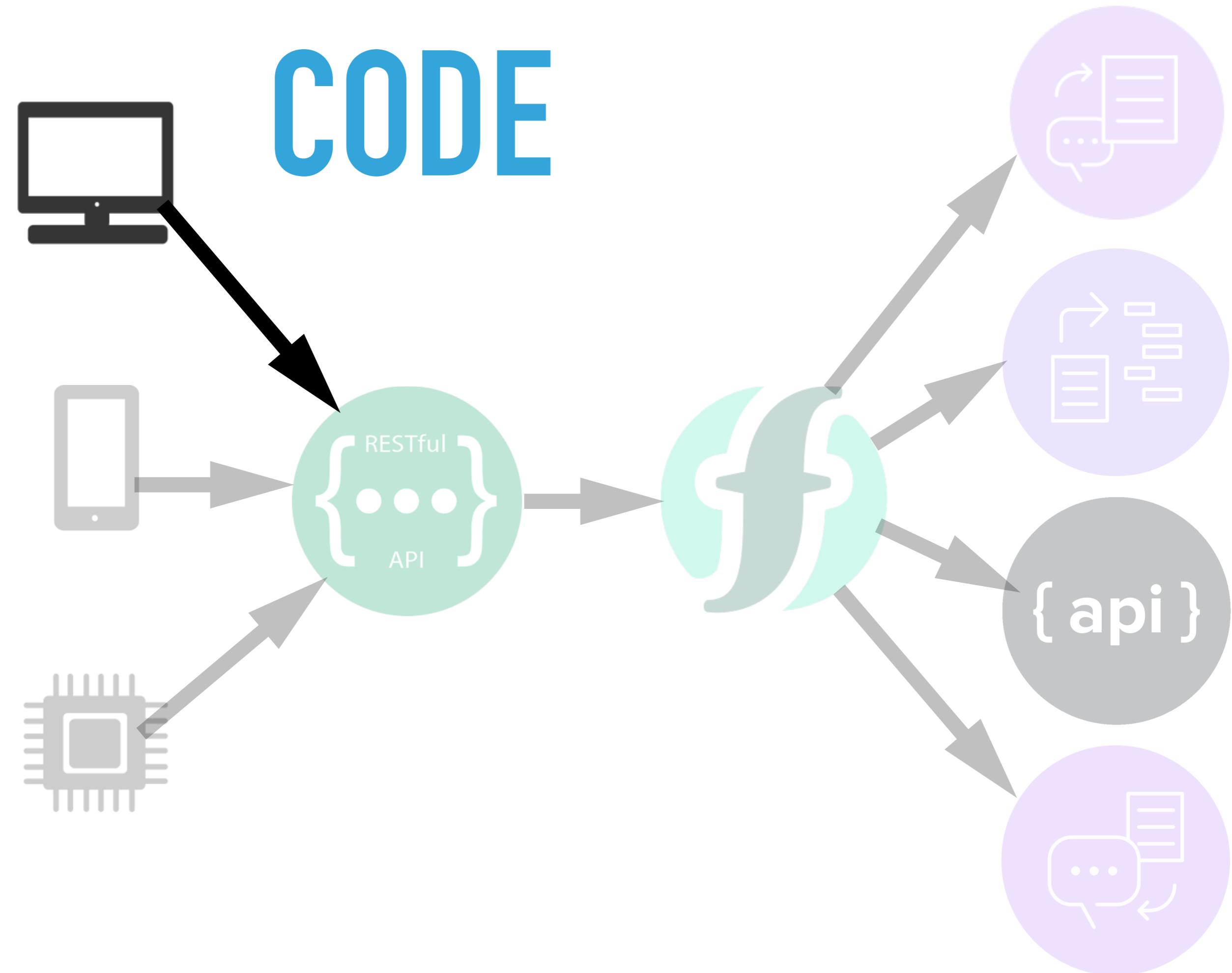




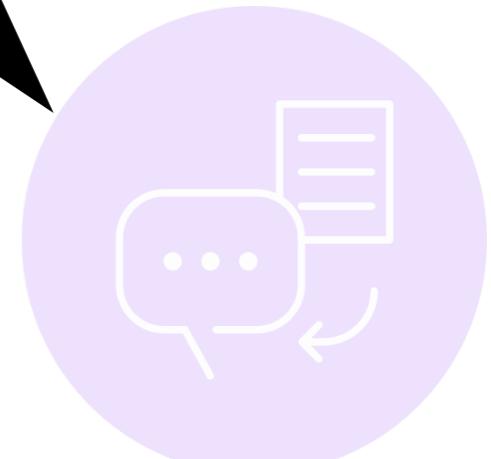
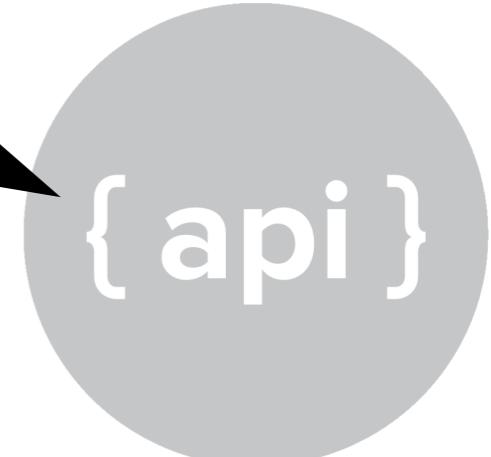
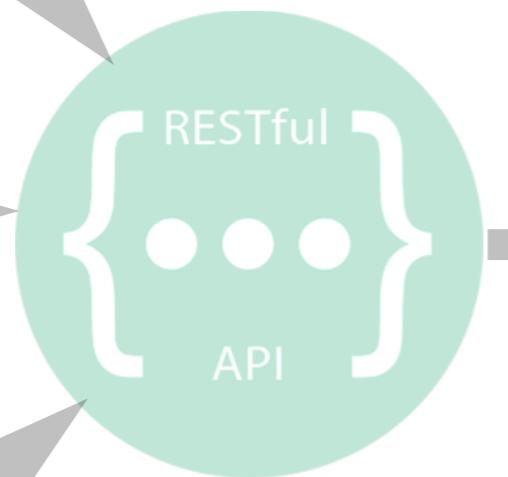
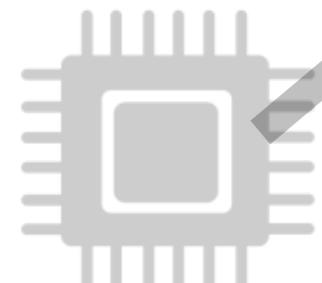
CONFIGURE



CODE



CODE



**WHAT IS A CLOUD
FUNCTION?**

STATELESS COMPUTE CONTAINERS THAT
ARE EVENT-TRIGGERED, MAY ONLY LAST
FOR ONE INVOCATION, AND FULLY
MANAGED BY A 3RD PARTY

Mike Roberts

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Getting Started with IBM Cloud Functions

IBM Cloud Functions (based on Apache OpenWhisk) is a Function-as-a-Service (FaaS) platform which executes functions in response to incoming events and [costs nothing](#) when not in use. [Learn more](#)

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New on GitHub:

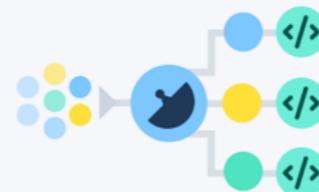
Try [Composer](#) for IBM Cloud Functions: build complex applications and workflows, 100% serverless. Available now as a Tech Preview from IBM Research.

Save costs, scale and integrate.



Cost-Effective Computing

Pay for what time you use down to one-tenth of a second.



Automatically Scale

Run your action thousands of times in a fraction of a second, or once a week. Action instances scale to meet demand exactly, then disappear.



Easy Integration

Trigger your actions from events in your favorite services, or directly via REST API.

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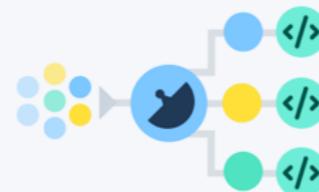
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Create

**Create Action**

Actions contain your function code and are invoked by events or REST API calls.

**Create Sequence**

Sequences invoke Actions in a linear order, passing parameters from one to the next.

**Create Trigger**

Triggers receive events from outside IBM Cloud Functions and invoke all connected Actions.

[Cancel](#)

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Action Name

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Enclosing Package ⓘ

(Default Package)

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```
1+ /**
2 * 
3 * main() will be invoked when you Run This Action
4 * 
5 * @param Cloud Functions actions accept a single parameter, which must be a JSON object.
6 * 
7 * @return The output of this action, which must be a JSON object.
8 * 
9 */
10+ function main(params) {
11    return { message: 'Hello World' };
12}
```

[Code](#)[Parameters](#)[Runtime](#)[Endpoints](#)[Connected Triggers](#)[Enclosing Sequences](#)[Actions /](#)

speechToText

Code  Node.js 8

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Code
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 speechToText**Web Action**[Reset](#) [!\[\]\(19912475863c8d57d179115820c2fa90_img.jpg\)](#) [Save !\[\]\(c5d7e91b8386f469eab2d1ba779c491a_img.jpg\)](#)

- Enable as Web Action Allow your Cloud Functions actions to handle HTTP events. Learn more about [Web Actions](#).
- Raw HTTP handling When enabled your Action receives requests in plain text instead of a JSON body

REST API**HTTP METHOD** **URL**POST https://openwhisk.ng.bluemix.net/api/v1/namespaces/jarred.128_dev/actions/speechToText**Fully Qualified Name**URL /jarred.128_dev/speechToText

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 speechToText**Web Action**[Reset](#) [Save](#)

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Fully Qualified Name

URL /jarred.128_dev/speechToText

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NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT
speechToText	Node.js 8	Enabled ✓	256 MB	60 s

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NAME	RUNTIME	WEB ACTION	MEMORY	TIMEOUT
speechToText	Node.js 8	Enabled ✓	256 MB	60 s



Create API for Cloud Functions



Create a Cloud Functions API

Create an API that wraps a set of OpenWhisk actions. After creating your API, you can easily Secure, Manage, and Socialize it.

[Create a Cloud Functions API](#)

Secure your API

Apply API security and rate limiting policies to protect your API

[Learn more](#)

Manage Traffic

View API usage statistics and check out response logs

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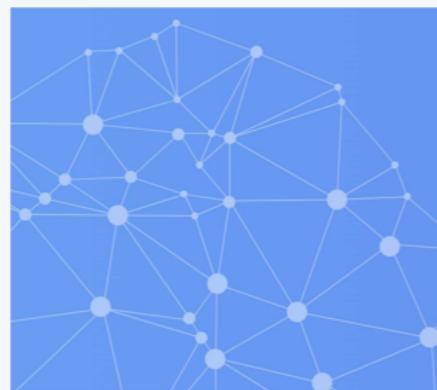
Socialize & Share

Share your API with developers both within and outside IBM Cloud

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Create API for Cloud Functions

API Info



API definition file

Optionally import a YAML or JSON format OpenAPI definition file. Imported settings will replace all existing settings.

API definition file ▾

API Basics *

First, specify a descriptive name for this API.

Next, accept the default domain for this API or select a custom domain. As a prerequisite, you will need to register a custom domain with IBM Cloud. This can be done from your organization settings page. For more information, please reference [the documentation](#).

Finally, specify a base path for this API.

API name *

VoiceAssistant

Domain for API

Default domain

Base path for API *

/api

Operations *

Create API operations that invoke OpenWhisk actions.

Create operation +

PATH	VERB	PACKAGE	ACTION
<i>To create an operation that invokes an OpenWhisk action, click Create Operation</i>			

Security and Rate Limiting ⓘ

Application authentication

You can require consuming applications to authenticate using API key and secret or API key alone.



Require applications to authenticate via API key

Method

API key

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Create API for Cloud Functions

API Info

API definition

Optionally import
Imported settings

API Basics *

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Next, accept the
domain. As a pre
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Finally, specify a

Create operation

Path *

/speechToText

Verb

POST

Package containing action

Default

Action

speechToText

Response content type

application/json

Cancel

Save

Security and Rate Limiting ⓘ

Application authentication

You can require consuming applications to authenticate using API
key and secret or API key alone.



Require applications to authenticate via API key

Method

API URL

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Create API opera

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Path *

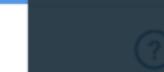
Verb

Package containing action

Action

Response content type

Cancel **Save**



operation +

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Require applications to authenticate via API key

Method

API ID

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Application authentication

You can require consuming applications to authenticate using API
key and secret or API key alone.



Require applications to authenticate via API key

Method

API v1

Getting Started

Actions

Triggers

Monitor

APIs

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dev

Create API for Cloud Functions

API Info



API definition file

Optionally import a YAML or JSON format OpenAPI definition file. Imported settings will replace all existing settings.

API definition file ▾

API Basics *

First, specify a descriptive name for this API.

Next, accept the default domain for this API or select a custom domain. As a prerequisite, you will need to register a custom domain with IBM Cloud. This can be done from your organization settings page. For more information, please reference [the documentation](#).

Finally, specify a base path for this API.

API name *

VoiceAssistant

Domain for API

Default domain

Base path for API *

/api

Operations *

Create API operations that invoke OpenWhisk actions.

Create operation +

PATH	VERB	PACKAGE	ACTION	
/speechToText	POST	default	speechToText	⋮

Security and Rate Limiting ⓘ

Application authentication

You can require consuming applications to authenticate using API key and secret or API key alone.



Require applications to authenticate via API key

Method

API key

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dev**Rate limiting**

When rate limiting is enabled, API calls falling outside of the limit will be rejected and response code 429 will be returned. Given that rate limiting is on a per-key basis, application authentication must be enabled.

The leaky bucket algorithm is used to prevent sudden bursts of invocations of your API. For example, if you set your limit as 10 calls per minute, users will be restricted to 1 call every 6 seconds ($60/10 = 6$).

OAuth user authentication

You can control access to your API through the OAuth 2.0 standard. First require an end user to log in via IBM Cloud App ID, Facebook, GitHub, or Google. Then include the corresponding OAuth token in the Authorization header of each API request. The authenticity of the token will be validated with the specified token provider. If the token is invalid, the request will be rejected and response code 401 will be returned.

CORS

Enabling cross-origin resource sharing (CORS) will allow embedded scripts in a web page to call the API across domain boundaries.

Location of API key and secret

Header

Parameter name of API key

X-IBM-Client-ID

Parameter name of API secret

X-IBM-Client-Secret

 Limit API call rate on a per-key basis

Maximum calls

1000

Unit of time

Second

 Require users to authenticate via OAuth social login

Provider

IBM Cloud App ID

App ID service

Create an App ID service

[Create](#)
[Edit](#) Enable CORS so that browser-based applications can call this API[Cancel](#)[Save](#)

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dev**Rate limiting**

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App ID service

Create an App ID service

[Create](#)
[Edit](#) Enable CORS so that browser-based applications can call this API

Cancel

Save

All Cloud Functions APIs

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dev

Summary

Definition

Sharing

API Explorer



VoiceAssistant

Expose Managed API

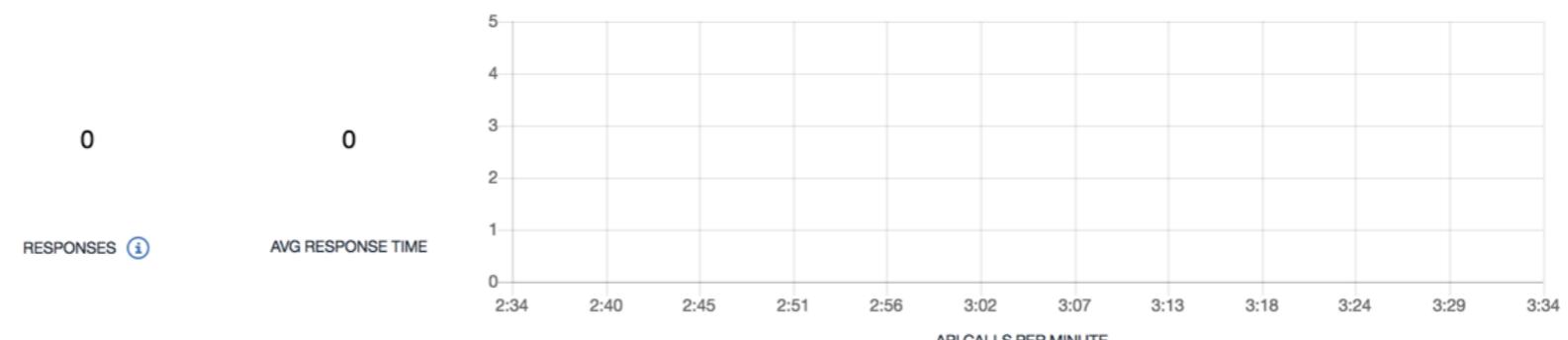


API name	Operations	Route
VoiceAssistant	1	https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad...

Rate Limit
NoneSecurity
CORS enabledSharing
Not shared with Cloud Foundry organization

Analytics and Logging

Last updated: 3:34 PM



Response log

Search responses

PATH	OPERATION	CODE	DATE/TIME	RESPONSE TIME	KEY
No API invocations logged within the past hour					

All Cloud Functions APIs

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dev

Summary

Definition

Sharing

API Explorer



VoiceAssistant

Expose Managed API



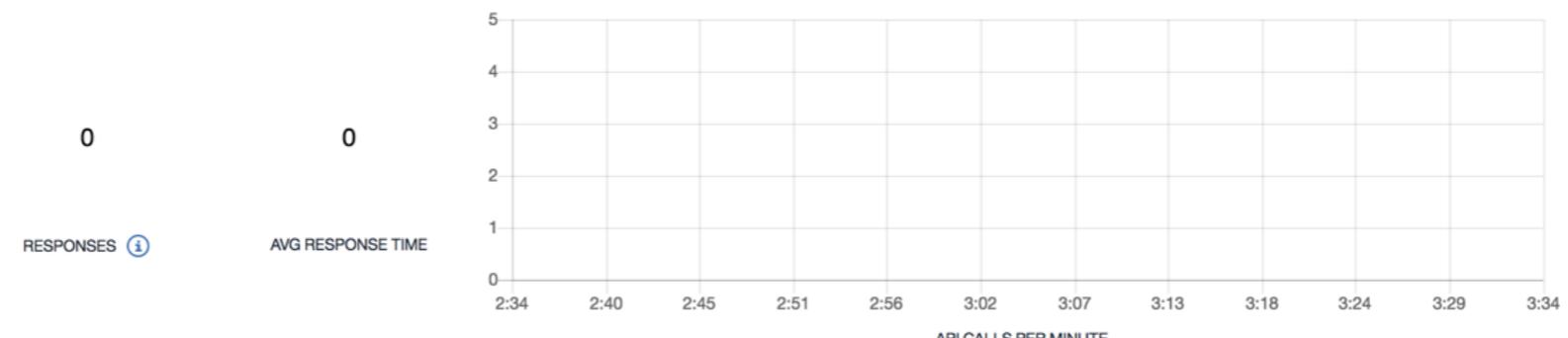
API name	Operations
VoiceAssistant	1

Route

<https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad...>Rate Limit
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[https://service.us.apiconnect.ibmcloud.com/
gws/apigateway/api/
b9295e6c011185a1acafeb26d61e15ad49b5
d48325f7ce16ed84996227602ce5/api](https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api)

```
jarredolson:~$ curl -X POST https://service.us.apiconnect.ibmcloud.com/gws/apigateway/  
api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api/speechToText  
{  
  "message": "Hello World"  
}jarredolson:~$ █
```





FRONT END

Speech to Text Example



Log

voice-assistant-code > 01_speechToText.html

01_speechToText.html

html body script

```

1  <!DOCTYPE html>
2
3  <html>
4    <head>
5      <script src="https://code.jquery.com/jquery-3.2.1.min.js"
6           integrity="sha256-hwg4gsxgFZhOsEEamd0YGbf13FyQuiTwLAQgxVSNg4=" crossorigin="anonymous"></script>
7
8      <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
9      <title>Speech to Text Example</title>
10     <script src="lib/recorder.js"></script>
11     <style type='text/css'>
12       audio {
13         display: block;
14       }
15     </style>
16   </head>
17   <body>
18
19   <h1>Speech to Text Example</h1>
20
21   
22
23   <audio id="playback"></audio>
24
25   <h2>Log</h2>
26   <pre id="log"></pre>
27
28   <script>
29     var recorder;
30
31     $(document).on('click', '#record_button', function () {
32       recorder.start();
33       setTimeout(function () {
34         recorder.stop();
35       }, 4000);
36     });
37
38     doInit();
39     function doInit() {
40       if (!Recorder.isRecordingSupported()) {
41         return screenLogger("Recording features are not supported in your browser.");
42       }
43       recorder = new Recorder({
44         monitorGain: 0,
45         numberOfChannels: 2,
46         wavBitDepth: 16,
47         encoderPath: "lib/waveWorker.min.js"
48       });
49       recorder.addEventListener("start", function (e) {
50         disableRecordButton();
51       });
52       recorder.addEventListener("stop", function (e) {
53         disableRecordButton();
54       });
55       recorder.addEventListener("streamError", function (e) {
56         screenLogger('Error encountered: ' + e.error.name);
57       });
58       recorder.addEventListener("streamReady", function (e) {
59         enableRecordButton();
60       });
61       recorder.addEventListener("dataAvailable", function (e) {
62
63
64         var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
65         $.ajax({
66           url: "https://fcm.googleapis.com/connect/thecloud.com/us/voice/assistant/v1/01/0205c6c011105e1acfb26d61a15ed40b5d40225f7cc15ed94006227692cc5/01/0speechToText",
67           method: "POST",
68           headers: {
69             "Content-Type": "application/json",
70             "Authorization": "key=AIzaSyBzXWVJLjDwvIYUOOGHkPmCqMnZGKoIw"
71           },
72           data: JSON.stringify({
73             "text": "Hello, how can I help you today?"
74           })
75         }).done(function (response) {
76           console.log(response);
77         });
78       });
79     }
80   </script>
81 
```

1: Project Structure Favorites

Art Build Database Maven Projects

Event Log 29:18 LF UTF-8



01_speechToText.html x

html body script

```
1  <!DOCTYPE html>
2
3  <html>
4  <head>
5      <script src="https://code.jquery.com/jquery-3.2.1.min.js"
6          integrity="sha256-hwg4gsxgFZhOsEEamOYGBf13FyQuiTwI&QgxVSNg4=" crossorigin="a
7
8      <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
9      <title>Speech to Text Example</title>
10     <script src="lib/recorder.js"></script>
11     <style type='text/css'>
12         audio {
13             display: block;
14         }
15     </style>
16 </head>
17 <body>
18
19     <h1>Speech to Text Example</h1>
20
21     
22
23     <audio id="playback"></audio>
24
25     <h2>Log</h2>
26     <pre id="log"></pre>
27
28 <script>
29     var recorder;
30
31     $(document).on('click', '#record_button', function () {
32         recorder.start();
33         setTimeout(function () {
34             recorder.stop();
35         }, 5000);
36     });
37
38     recorder = new Recorder(recorder);
39
40     recorder.onstart = function () {
41         $('#record_button').text('Recording...').attr('disabled', true);
42     };
43
44     recorder.onstop = function () {
45         $('#record_button').text('Record').attr('disabled', false);
46     };
47
48     recorder.ondataavailable = function (blob) {
49         var url = URL.createObjectURL(blob);
50         var audioElement = document.createElement('audio');
51         audioElement.src = url;
52         document.getElementById('playback').appendChild(audioElement);
53     };
54
55     recorder.onend = function () {
56         $('#log').append('File recorded successfully');
57     };
58
59     recorder.onerror = function (err) {
60         console.error(err);
61     };
62
63     recorder.onwarning = function (err) {
64         console.warn(err);
65     };
66
67     recorder.start();
68
69     $('#log').append('File recorded successfully');
70
71     recorder.stop();
72
73     recorder.end();
74
75     recorder.destroy();
76
77     recorder = null;
78
79     recorder = new Recorder();
80
81     recorder.onstart = function () {
82         $('#record_button').text('Recording...').attr('disabled', true);
83     };
84
85     recorder.onstop = function () {
86         $('#record_button').text('Record').attr('disabled', false);
87     };
88
89     recorder.ondataavailable = function (blob) {
90         var url = URL.createObjectURL(blob);
91         var audioElement = document.createElement('audio');
92         audioElement.src = url;
93         document.getElementById('playback').appendChild(audioElement);
94     };
95
96     recorder.onend = function () {
97         $('#log').append('File recorded successfully');
98     };
99
100    recorder.onerror = function (err) {
101        console.error(err);
102    };
103
104    recorder.onwarning = function (err) {
105        console.warn(err);
106    };
107
108    recorder.start();
109
110    recorder.stop();
111
112    recorder.end();
113
114    recorder.destroy();
115
116    recorder = null;
```

voice-assistant-code > 01_speechToText.html

1: Project

Structure

01_speechToText.html x

html body script

```
1 <!DOCTYPE html>
2
3 <html>
4   <head>
5     <script src="https://code.jquery.com/jquery-3.2.1.min.js"
6           integrity="sha256-hwg4gsXgFZb3ErdnkEeQFmS/DEAECJ/E4Q8vIu&gt;" crossorigin="a
7
8     <meta http-equiv="Content-Type" content="text/html; charset=utf-8">
9     <title>Speech to Text Example</title>
10    <script src="lib/recorder.js"></script>
11    <style type='text/css'>
12      audio {
13        display: block;
14      }
15    </style>
16  </head>
17  <body>
18
19    <h1>Speech to Text Example</h1>
20
21    
22
23    <audio id="playback"></audio>
24
25    <h2>Log</h2>
26    <pre id="log"></pre>
27
28  <script>
29    var recorder;
30
31    $(document).on('click', '#record_button', function () {
32      recorder.start();
33      setTimeout(function () {
34        recorder.stop();
35      }, 5000);
36    });
37
38    recorder.onstart = function () {
39      $('#log').append('Recording started');
40    };
41
42    recorder.onstop = function () {
43      $('#log').append('Recording stopped');
44    };
45
46    recorder.onerror = function (err) {
47      $('#log').append('Error: ' + err.message);
48    };
49
50    recorder.onresult = function (blob) {
51      var url = URL.createObjectURL(blob);
52      $('#playback').attr('src', url);
53    };
54
55  </script>
56
```

```
23     <audio id="playback"></audio>
24
25     <h2>Log</h2>
26     <pre id="log"></pre>
27
28     <script>
29         var recorder;
30
31         $(document).on('click', '#record_button', function () {
32             recorder.start();
33             setTimeout(function () {
34                 recorder.stop();
35             }, 4000);
36         });
37
38         doInit();
39         function doInit() {
40             if (!Recorder.isRecordingSupported()) {
41                 return screenLogger("Recording features are not supported in your browser.");
42             }
43             recorder = new Recorder({
44                 monitorGain: 0,
45                 numberOfChannels: 2,
46                 wavBitDepth: 16,
47                 encoderPath: "lib/waveWorker.min.js"
48             });
49             recorder.addEventListener("start", function (e) {
50                 disableRecordButton();
51             });
52             recorder.addEventListener("stop", function (e) {
53                 disableRecordButton();
54             });
55             recorder.addEventListener("streamError", function (e) {
56                 screenLogger('Error encountered: ' + e.error.name);
57             });
58             recorder.addEventListener("streamReady", function (e) {
59                 enableRecordButton();
60             });
61         }
62     </script>
```

```
23     <audio id="playback"></audio>
24
25     <h2>Log</h2>
26     <pre id="log"></pre>
27
28     <script>
29         var recorder;
30
31         $(document).on('click', '#record_button', function () {
32             recorder.start();
33             setTimeout(function () {
34                 recorder.stop();
35             }, 4000);
36         });
37
38         doInit();
39         function doInit() {
40             if (!navigator.mediaDevices) {
41                 return screenLogger("Recording features are not supported in your browser.");
42             }
43             recorder = new Recorder({
44                 monitorGain: 0,
45                 numberOfChannels: 2,
46                 wavBitDepth: 16, 
47                 encoderPath: "lib/waveWorker.min.js"
48             });
49             recorder.addEventListener("start", function (e) {
50                 disableRecordButton();
51             });
52             recorder.addEventListener("stop", function (e) {
53                 disableRecordButton();
54             });
55             recorder.addEventListener("streamError", function (e) {
56                 screenLogger('Error encountered: ' + e.error.name);
57             });
58             recorder.addEventListener("streamReady", function (e) {
59                 enableRecordButton();
60             });
61         }
62     </script>
```

```
52     recorder.addEventListener("stop", function (e) {
53         disableRecordButton();
54     });
55     recorder.addEventListener("streamError", function (e) {
56         screenLogger('Error encountered: ' + e.error.name);
57     });
58     recorder.addEventListener("streamReady", function (e) {
59         enableRecordButton();
60     });
61     recorder.addEventListener("dataAvailable", function (e) {
62
63
64         var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
65         $.ajax({
66             url: 'https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e',
67             type: 'POST',
68             data: dataBlob,
69             processData: false,
70             headers: {
71                 'Content-Type': 'audio/wav'
72             },
73             success: function (data, textStatus, jqXHR) {
74                 screenLogger(JSON.stringify(data, null, 2));
75                 doInit();
76             },
77             error: function (jqXHR, textStatus, errorThrown) {
78                 screenLogger(jqXHR);
79                 doInit();
80             }
81         });
82
83
84     });
85     recorder.initStream();
86
87
88     function disableRecordButton() {
89         $('#record_button').css('opacity', '0.4');
90     }
91 }
```

```
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
```

```
    type: 'POST',
    data: dataBlob,
    processData: false,
    headers: {
        'Content-Type': 'audio/wav'
    },
    success: function (data, textStatus, jqXHR) {
        screenLogger(JSON.stringify(data, null, 2));
        doInit();
    },
    error: function (jqXHR, textStatus, errorThrown) {
        screenLogger(jqXHR);
        doInit();
    }
});

});

recorder.initStream();

}

function disableRecordButton() {
    $('#record_button').css('opacity', '0.4');
}

function enableRecordButton() {
    $('#record_button').css('opacity', '1.0');
}

function screenLogger(text, data) {
    log.innerHTML += "\n" + text + " " + (data || '');
}
```

```
</script>
</body>
</html>
```



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AUDIO INTO TEXT**

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Establish unparalleled network performance to and from your resources to IBM Cloud platform. Support for 10GbE

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IBM Cloud offers domain registration services complete with dedicated support staff, knowledgeable custom

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VPN access is designed to allow users to remotely manage all servers and services associated with the

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**Conversation**

Add a natural language interface to your application to automate interactions with your end users. Common

[Lite](#) [IBM](#)**Discovery**

Add a cognitive search and content analytics engine to applications.

[Lite](#) [IBM](#)**Knowledge Studio**

Build custom models to teach Watson the language of your domain.

[IBM](#)**Language Translator**

Translate text from one language to another for specific domains.

[Lite](#) [IBM](#)**Natural Language Classifier**

Natural Language Classifier performs natural language classification on question texts. A user would be able

[IBM](#)**Natural Language Understanding**

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and

[Lite](#) [IBM](#)**Personality Insights**

The Watson Personality Insights derives insights from transactional and social media data to identify

[Lite](#) [IBM](#)**Speech to Text**

Low-latency, streaming transcription

[Lite](#) [IBM](#)**Text to Speech**

Synthesizes natural-sounding speech from text.

[Lite](#) [IBM](#)**Tone Analyzer**

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, socia

[Lite](#) [IBM](#)**Visual Recognition**

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

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Lite IBM

**Discovery**

Add a cognitive search and content analytics engine to applications.

Lite IBM

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Build custom models to teach Watson the language of your domain.

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Translate text from one language to another for specific domains.

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IBM

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**Personality Insights**

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Lite IBM

**Speech to Text**

Low-latency, streaming transcription

Lite IBM

**Text to Speech**

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Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, socia

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**Visual Recognition**

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

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Speech to Text

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:

[Lite](#) [IBM](#)[View Docs](#)

AUTHOR IBM
PUBLISHED 12/12/2017
TYPE Service
LOCATION Sydney, Germany, United Kingdom, US South

Service name:

Speech to Text-di

Choose a region/location to deploy in:

US South

Choose an organization:

jarred.128

Choose a space:

dev

Features

- **Available Languages**

English (US), English (UK), Japanese, Arabic (MSA, Broadband model only), Mandarin, Portuguese (Brazil), Spanish, French (Broadband model only)

- **Mobile SDKs (BETA)**

Mobile SDKs are now available to enable native interaction on iOS and Android devices.

- **SoftBank**

A localized version of this Watson service is available in Japan. Visit the following link for details: <http://www.softbank.jp/biz/watson>

- **Metadata**

Receive a metadata object in the JSON response that includes confidence score (per word), start/end time (per word), and alternate hypotheses / N-Best (per phrase). A new option for returning word alternatives per (sequential) time intervals is now available.

- **Keyword Spotting (BETA)**

Optional ability to search for one or more keywords in the audio stream. The returned metadata includes the beginning time, end time and confidence score for each instance of the keyword found. Keyword Spotting is currently available at no additional charge.

Pricing Plans

Monthly prices shown are for country or region: United States

PLAN	FEATURES	PRICING
✓ Lite	First hundred minutes are free	Free

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Speech to Text

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Speech to Text

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Speech to Text-di

Location: US South Org: jarred.128 Space: dev



Getting started tutorial

Last Updated: 2017-11-04 | [Edit in GitHub](#)

The IBM® Speech to Text service transcribes audio to text to enable speech transcription capabilities for applications. This cURL-based tutorial can help you get started quickly with the service. The examples show you how to call the service's sessionless `POST /v1/recognize` method to request a transcription.

Before you begin

- Create an instance of the service:
 - If you're seeing this, you created your service instance. Now get your credentials.
 - Create a project from a service:
 - ① Go to the Watson Developer Console [Services](#) page.
 - ② Select Speech to Text, click **Add Services**, and either sign up for a free IBM Cloud account or log in.
 - ③ Type **speech-tutorial** as the project name and click **Create Project**.
 - Copy the credentials to authenticate to your service instance:
 - From the service dashboard (what you're looking at):
 - ① Click the **Service credentials** tab.
 - ② Click **View credentials** under **Actions**.
 - ③ Copy the **username**, **password**, and **url** values.
 - From your **speech-tutorial** project in the Developer Console, copy the **username**, **password**, and **url** values for "speech_to_text" from the **Credentials** section.
 - Make sure you have cURL:
 - The examples use cURL to call methods of the HTTP interface. Install the version for your operating system from [curl.haxx.se](#). Install the version that supports the Secure Sockets Layer (SSL) protocol. Make sure to include the installed binary file on your **PATH** environment variable.

If you use IBM Cloud Dedicated, you create a service instance from the [Speech to Text](#) page in the Catalog. For details about how to find your service credentials, see [Service credentials for Watson services](#).





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Location: US South Org: jarred.128 Space: dev



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Service credentials

Credentials are provided in JSON format. The JSON snippet lists credentials, such as the API key and secret, as well as connection information for the service.

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Click New credentials to create a set of credentials for this instance



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Service credentials

Credentials are provided in JSON format. The JSON

Service credentials

Add new credential

Name:

Credentials-1

Add Inline Configuration Parameters (Optional): ⓘ

Provide service-specific configuration parameters in a valid JSON object

Choose File...**Cancel****Add**[View More](#)**New credential** +

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Service credentials

Credentials are provided in JSON format. The JSON

Service credentials

Add new credential

Name:

Credentials-1

X

Add Inline Configuration Parameters (Optional): ⓘ

Provide service-specific configuration parameters in a valid JSON object

Choose File...**Cancel****Add**[View More](#)**New credential** +

⋮



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10 ▾ Items per page | 1-1 of 1 items

1 of 1 pages < 1 >

 KEY NAME

DATE CREATED

ACTIONS

 Credentials-1

Dec 27, 2017 - 07:46:15

View credentials ▾



```
{  
  "url": "https://stream.watsonplatform.net/speech-to-text/api",  
  "username": "751cffdf-  
  "password": "aM5  
}
```



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<input type="checkbox"/>	KEY NAME	DATE CREATED	ACTIONS
--------------------------	----------	--------------	---------

<input type="checkbox"/>	Credentials-1	Dec 27, 2017 - 07:46:15	View credentials ▾
--------------------------	---------------	-------------------------	------------------------------------

☒

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  "username": "751cffdf-  
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```

ⓘ

<

SERVER SIDE

Code

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Enclosing Sequences

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 speechToTextCode  Node.js 8Reset  Save 

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 const stream = require('stream');
3
4
5 * function main(params) {
6
7 *     return new Promise(function (resolve, reject) {
8 *         var speech_to_text = new SpeechToTextV1({
9 *             username: params.SPEECH_TO_TEXT_USERNAME,
10 *             password: params.SPEECH_TO_TEXT_PASSWORD
11 *         });
12 *         // Get audio file from request
13 *         const data = params.__ow_body;
14 *
15 *         // Create Stream from audio file
16 *         var bufferStream = new stream.PassThrough();
17 *         bufferStream.end(new Buffer(params.__ow_body, 'base64'));
18 *         const audio = bufferStream;
19 *
20 *         // Request parameters for Watson Speech to Text
21 *         // https://www.ibm.com/watson/developercloud/speech-to-text/api/v1/#recognize_sessionless_nonmp12
22 *         var speechToTextParams = {
23 *             audio: audio,
24 *             content_type: 'audio/wav',
25 *             timestamps: true
26 *         };
27 *         // Call Watson Speech to Text
28 *         speech_to_text.recognize(speechToTextParams, function (error, response) {
29 *             if (error) {
30 *                 reject({error: error});
31 *             } else {
32 *                 resolve(response);
33 *             }
34 *         });
35 *     });
36 }
```



speechToText

Code i Node.js 8

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 const stream = require('stream');
3
4
5 function main(params) {
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7   return new Promise(function (resolve, reject) {
8     var speech_to_text = new SpeechToTextV1({
9       username: params.SPEECH_TO_TEXT_USERNAME,
10      password: params.SPEECH_TO_TEXT_PASSWORD
11    });
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13    const data = params.__ow_body;
14
15    // Create Stream from audio file
16    var bufferStream = new stream.PassThrough();
17    bufferStream.end(new Buffer(params.__ow_body, 'base64'));
18    const audio = bufferStream;
19
20    // Request parameters for Watson Speech to Text
21    // https://www.ibm.com/watson/developercloud/speech-to-text/api/v1/#recognize_sessionless_no
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34 -        });
35 -    });
36 }
```

Code

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32 *                 resolve(response);
33 *             }
34 *         });
35 *     });
36 }
```

Code

Parameters

Runtime

Endpoints

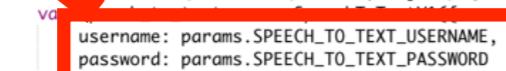
Connected Triggers

Enclosing Sequences

Actions /

 speechToTextCode  Node.js 8

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 const stream = require('stream');
3
4
5 function main(params) {
6
7     return new Promise(function (resolve, reject) {
8         var options = {
9             username: params.SPEECH_TO_TEXT_USERNAME,
10            password: params.SPEECH_TO_TEXT_PASSWORD
11        };
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36    });
}
```

Reset  Save 

```
username: params.SPEECH_TO_TEXT_USERNAME,
password: params.SPEECH_TO_TEXT_PASSWORD
```

Code

Parameters

Runtime

Endpoints

Connected Triggers

Enclosing Sequences

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 speechToTextParameters iAdd  Reset  Save 

Parameter Name

Parameter Value

SPEECH_TO_TEXT_USERNAME

751cffdf- -5fa3be0b346e

x

SPEECH_TO_TEXT_PASSWORD

aM5

x

FRONT END

```
var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
$.ajax({
  url: 'https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api/speechToText',
  type: 'POST',
  data: dataBlob,
  processData: false,
  headers: {
    'Content-Type': 'audio/wav'
  },
  success: function (data, textStatus, jqXHR) {
    screenLogger(JSON.stringify(data, null, 2));
    doInit();
  },
  error: function (jqXHR, textStatus, errorThrown) {
    screenLogger(jqXHR);
    doInit();
  }
});
```

<https://github.com/chris-rudmin/opus-recorder>

Speech to Text Example



Log



Speech to Text Example



Log





- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action
- ▶ Respond with audio and data

NATURAL LANGUAGE PROCESSING (NLP)



All Categories

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Add a cognitive search and content analytics engine to applications.

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**Language Translator**

Translate text from one language to another for specific domains.

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**Natural Language Classifier**

Natural Language Classifier performs natural language classification on question texts. A user would be able

IBM

**Natural Language Understanding**

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and

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**Personality Insights**

The Watson Personality Insights derives insights from transactional and social media data to identify

Lite IBM

**Speech to Text**

Low-latency, streaming transcription

Lite IBM

**Text to Speech**

Synthesizes natural-sounding speech from text.

Lite IBM

**Tone Analyzer**

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, socia

Lite IBM

**Visual Recognition**

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

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Discovery

Add a cognitive search and content analytics engine to applications.

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Knowledge Studio

Build custom models to teach Watson the language of your domain.

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Natural Language Understanding

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and

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Low-latency, streaming transcription

[Lite](#)[IBM](#)

Text to Speech

Synthesizes natural-sounding speech from text.

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Visual Recognition

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

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Natural Language Understanding

Analyze text to extract meta-data from content such as concepts, entities, keywords, categories, sentiment, emotion, relations, semantic roles, using natural language understanding. With custom annotation models developed using Watson Knowledge Studio, identify industry/domain specific entities and relations in unstructured text.

[Lite](#) [IBM](#)[View Docs](#)

AUTHOR	IBM
PUBLISHED	12/12/2017
TYPE	Service
LOCATION	Sydney, Germany, United Kingdom, US South

Service name:

Natural Language Understanding-ez

Choose a region/location to deploy in:

US South

Choose an organization:

jarred.128

Choose a space:

dev

Features

- Concepts
- Entities
- Keywords
- Categories
- Sentiment
- Emotion
- Relations
- and many more ...

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PLAN	FEATURES	PRICING
✓ Lite	30,000 NLU Items Per Month 1 Custom Model NOTE: A NLU item is based on the number of data units enriched and the number of enrichment features applied. A data unit is 10,000 characters or less. For example: extracting Entities and Sentiment from 15,000 characters of text is (2 Data Units * 2 Enrichment Features) = 4 NLU Items. A custom model refers to an annotation model developed with Watson Knowledge Studio. The Lite plan gets you started with 30,000 NLU Items per month at no cost. This plan also enables use of one custom model published through Watson Knowledge Studio.	Free

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Natural Language Understanding

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Pricing Plans

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Natural Language Understanding-vk



Location: US South Org: jarred.128 Space: dev

Getting started tutorial

Last Updated: 2017-11-03 | [Edit in GitHub](#)

In this short tutorial, we introduce Natural Language Understanding by analyzing some sample text for sentiment.

Before you begin

- Create an instance of the service:
 - If you're seeing this, you created your service instance. Now get your credentials.
 - Create a project from a service:
 - ① Go to the Watson Developer Console [Services](#) page.
 - ② Select Natural Language Understanding, click **Add Services**, and either sign up for a free IBM Cloud account or log in.
 - ③ Type **sentiment-tutorial** as the project name and click **Create Project**.
- Copy the credentials to authenticate to your service instance:
 - From the service dashboard (what you're looking at):
 - ① Click the **Service credentials** tab.
 - ② Click **View credentials** under **Actions**.
 - ③ Copy the **username**, **password**, and **url** values.
 - From your **sentiment-tutorial** project in the Developer Console, copy the **username**, **password**, and **url** values for "natural_language_understanding" from the **Credentials** section.
- Make sure you have cURL:
 - The examples use cURL to call methods of the HTTP interface. Install the version for your operating system from [curl.haxx.se](#). Install the version that supports the Secure Sockets Layer (SSL) protocol. Make sure to include the installed binary file on your **PATH** environment variable.

If you use IBM Cloud Dedicated, create your service instance from the [Natural Language Understanding](#) page in the Catalog. For details about how to find your service credentials, see [Service credentials for Watson services](#).



[Step 1: Analyze sample content for sentiment](#)



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- Create an instance of the service:
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 - ③ Type **sentiment-tutorial** as the project name and click **Create Project**.
 - Copy the credentials to authenticate to your service instance:
 - From the service dashboard (what you're looking at):
 - ① Click the **Service credentials** tab.
 - ② Click **View credentials** under **Actions**.
 - ③ Copy the `username`, `password`, and `url` values.
 - From your **sentiment-tutorial** project in the Developer Console, copy the `username`, `password`, and `url` values for "natural_language_understanding" from the **Credentials** section.
 - Make sure you have cURL:
 - The examples use cURL to call methods of the HTTP interface. Install the version for your operating system from [curl.haxx.se](#). Install the version that supports the Secure Sockets Layer (SSL) protocol. Make sure to include the installed binary file on your `PATH` environment variable.

If you use IBM Cloud Dedicated, create your service instance from the [Natural Language Understanding](#) page in the Catalog. For details about how to find your service credentials, see [Service credentials for Watson services](#).



[Step 1: Analyze sample content for sentiment](#)



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Service credentials

Credentials are provided in JSON format. The JSON snippet lists credentials, such as the API key and secret, as well as connection information for the service.

[View More](#)

Service credentials

[New credential +](#)

Click New credentials to create a set of credentials for this instance





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Natural Language Understanding-vk

Location: US South Org: jarred.128 Space:

Add new credential

Name:

Credentials-1

[View More](#)Add Inline Configuration Parameters (Optional): [i](#)

Provide service-specific configuration parameters in a valid JSON object

[Choose File...](#)[Cancel](#)[Add](#)[New credential +](#)

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Natural Language Understanding-vk

Location: US South Org: jarred.128 Space:

Add new credential

Name:

Credentials-1

[View More](#)**Add Inline Configuration Parameters (Optional):** ⓘ

Provide service-specific configuration parameters in a valid JSON object

[Choose File...](#)[Cancel](#)[Add](#)[New credential +](#)



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Location: US South Org: jarred.128 Space: dev

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[View More](#)

Service credentials

[New credential +](#)

10 ▾ Items per page | 1-1 of 1 items

1 of 1 pages < 1 >

<input type="checkbox"/> KEY NAME	DATE CREATED	ACTIONS
-----------------------------------	--------------	---------

<input type="checkbox"/> Credentials-1	Dec 27, 2017 - 11:00:40	View credentials ▾
--	-------------------------	------------------------------------



```
{  
  "url": "https://gateway.watsonplatform.net/natural-language-understanding/api",  
  "username": "45878e6d-[REDACTED]-40d3dae4db0a",  
  "password": "ZGS [REDACTED]"  
}
```



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⋮

Service credentials

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Service credentials

[New credential +](#)

⋮

10 ▾ Items per page | 1-1 of 1 items

1 of 1 pages < 1 >

<input type="checkbox"/>	KEY NAME	DATE CREATED	ACTIONS
--------------------------	----------	--------------	---------

<input type="checkbox"/>	Credentials-1	Dec 27, 2017 - 11:00:40	View credentials ▲ 
--------------------------	---------------	-------------------------	--

```
{  
  "url": "https://gateway.watsonplatform.net/natural-language-understanding/api",  
  "username": "45878e6d-[REDACTED]-40d3dae4db0a",  
  "password": "ZGS [REDACTED]"  
}
```



<

SERVER SIDE

Code

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Enclosing Sequences

Actions /

 naturalLanguageUnderstandingCode  Node.js 8Change Input Invoke 

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 var NaturalLanguageUnderstandingV1 = require('watson-developer-cloud/natural-language-understanding/v1.js');
3 const stream = require('stream');
4
5
6 function main(params) {
7
8 return new Promise(function (resolve, reject) {
9     getTranscriptFromAudio(params)
10    .then(function (transcript) {
11        var naturalLanguageUnderstandingParams = {
12            'text': transcript,
13            'features': {
14                'keywords': {
15                    'limit': 2
16                },
17                'entities': {
18                    'limit': 2
19                }
20            }
21        };
22        var natural_language_understanding = new NaturalLanguageUnderstandingV1({
23            'username': params.NATURAL_LANGUAGE_UNDERSTANDING_USERNAME,
24            'password': params.NATURAL_LANGUAGE_UNDERSTANDING_PASSWORD,
25            'version_date': '2017-02-27'
26        });
27        // Call Natural Language Understanding
28        // https://www.ibm.com/watson/developercloud/natural-language-understanding/api/v1/#post-analyze
29        natural_language_understanding.analyze(naturalLanguageUnderstandingParams, function (err, response) {
30            if (err) {
31                reject({error: err});
32            } else {
33                resolve(response);
34            }
35        });
36    })
37    .catch(function (error) {
38        reject({error: error});
39    });
40}
41
42 }
```



naturalLanguageUnderstanding

Code Node.js 8

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 var NaturalLanguageUnderstandingV1 = require('watson-developer-cloud/natural-language-understanding/v1.js');
3 const stream = require('stream');
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6 function main(params) {
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9         getTranscriptFromAudio(params)
10        .then(function (transcript) {
11            var naturalLanguageUnderstandingParams = {
12                'text': transcript,
13                'features': {
14                    'keywords': {
15                        'limit': 2
16                    },
17                    'entities': {
18                        'limit': 2
19                    }
20                }
21            };
22            var natural_language_understanding = new NaturalLanguageUnderstandingV1({
23                'username': params.NATURAL_LANGUAGE_UNDERSTANDING_USERNAME,
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25                'version_date': '2017-02-27'
26            });
27            // Call Natural Language Understanding
28            // https://www.ibm.com/watson/developercloud/natural-language-understanding/api/v1/#post-analyze
29            natural_language_understanding.analyze(naturalLanguageUnderstandingParams, function (err, respon
30            if (err) {
```

```
const stream = require('stream');

function main(params) {

  return new Promise(function (resolve, reject) {
    getTranscriptFromAudio(params)
      .then(function (transcript) {
        var naturalLanguageUnderstandingParams = {
          'text': transcript,
          'features': {
            'keywords': {
              'limit': 2
            },
            'entities': {
              'limit': 2
            }
          }
        };
        var natural_language_understanding = new NaturalLanguageUnderstandingV1({
          'username': params.NATURAL_LANGUAGE_UNDERSTANDING_USERNAME,
          'password': params.NATURAL_LANGUAGE_UNDERSTANDING_PASSWORD,
          'version_date': '2017-02-27'
        });
        // Call Natural Language Understanding
        // https://www.ibm.com/watson/developercloud/natural-language-understanding/api/v1/#post-analyze
        natural_language_understanding.analyze(naturalLanguageUnderstandingParams, function (err, response) {
          if (err) {
            reject({error: err});
          } else {
            resolve(response);
          }
        });
      })
      .catch(function (error) {
        reject({error: error});
      });
  });
}
```

FRONT END

```
var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
$.ajax({
  url: 'https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api/naturalLanguageUnderstanding',
  type: 'POST',
  data: dataBlob,
  processData: false,
  headers: {
    'Content-Type': 'audio/wav'
  },
  success: function (data, textStatus, jqXHR) {
    screenLogger(JSON.stringify(data, null, 2));
    doInit();
  },
  error: function (jqXHR, textStatus, errorThrown) {
    screenLogger(jqXHR);
    doInit();
  }
});
```

<https://github.com/chris-rudmin/opus-recorder>

Natural Language Understanding Example



Log



Natural Language Understanding Example



Log



"WHO ARE DONALD TRUMP AND BARACK OBAMA"

Log

```
{  
  "usage": {  
    "text_units": 1,  
    "text_characters": 38,  
    "features": 2  
  },  
  "language": "en",  
  "keywords": [  
    {  
      "text": "Donald Trump",  
      "relevance": 0.952963  
    },  
    {  
      "text": "Barack Obama",  
      "relevance": 0.952136  
    }  
  "entities": [  
    {  
      "count": 1,  
      "text": "Donald Trump",  
      "relevance": 0.33,  
      "type": "Person",  
      "disambiguation": {  
        "subtype": [  
          "AwardNominee",  
          "AwardWinner",  
          "Celebrity",  
          "CompanyFounder",  
          "TVPersonality",  
          "TVProducer",  
          "FilmActor",  
          "TVActor"  
        ],  
        "name": "Donald Trump",  
        "dbpedia_resource": "http://dbpedia.org/resource/Donald_Trump"  
      }  
    },  
    {  
      "count": 1,  
      "text": "Barack Obama",  
      "relevance": 0.33,  
      "type": "Person",  
      "disambiguation": {  
        "subtype": [  
          "Politician",  
          "President",  
          "Appointer",  
          "AwardWinner",  
          "Celebrity",  
          "PoliticalAppointer",  
          "U.S.Congressperson",  
          "USPresident",  
          "TVActor"  
        ],  
        "name": "Barack Obama",  
        "dbpedia_resource": "http://dbpedia.org/resource/Barack_Obama"  
      }  
    }  
}
```

**"MAKE A
PHONE
CALL TO
JARRED
OLSON"**

Log

```
{  
  "usage": {  
    "text_units": 1,  
    "text_characters": 33,  
    "features": 2  
  },  
  "language": "en",  
  "keywords": [  
    {  
      "text": "Jared Olson",  
      "relevance": 0.918405  
    },  
    {  
      "text": "phone",  
      "relevance": 0.535628  
    }  
  "entities": [  
    {  
      "type": "Person",  
      "text": "Jared Olson",  
      "relevance": 0.33,  
      "count": 1  
    }  
}
```



- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action
- ▶ Respond with audio and data

TAKE ACTION

Weather forecast - OpenWeath x

Secure | https://openweathermap.org/city/5170691

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OpenWeatherMap Weather Maps API Price Partners Stations Widgets News About

Weather forecast

Home / Weather forecast

Your city name Current location

Current weather and forecasts in your city

Main Daily Hourly Chart Map

Weather in Sandusky, US

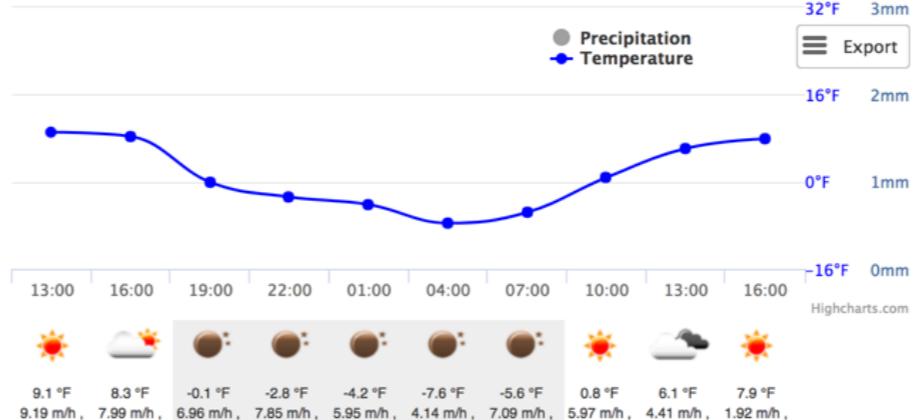
 5 °F

Clear sky
11:37 Dec 27 [Wrong data?](#)

Wind	Fresh Breeze, 8.1 m/h, West (260)
Cloudiness	Sky is clear
Pressure	1038 hpa
Humidity	60 %
Sunrise	07:56
Sunset	17:08
Geo coords	[41.45, -82.71]

Weather and forecasts in Sandusky, US

Precipitation Temperature Export



32°F 3mm
16°F 2mm
0°F 1mm
-16°F 0mm

Highcharts.com

13:00	16:00	19:00	22:00	01:00	04:00	07:00	10:00	13:00	16:00
9.1 °F 9.19 m/h, 1025.93	8.3 °F 7.99 m/h, 1026.01	-0.1 °F 6.96 m/h, 1026.4	-2.8 °F 7.85 m/h, 1026.72	-4.2 °F 5.95 m/h, 1026.5	-7.6 °F 4.14 m/h, 1026.62	-5.6 °F 7.09 m/h, 1027.7	0.8 °F 5.97 m/h, 1027.52	6.1 °F 4.41 m/h, 1025.51	7.9 °F 1.92 m/h, 1023.51

13 day weather forecast

Wed 27 Dec		9.1 °F	-4.2 °F	sky is clear
Today		9.19 m/h		clouds: 8 %, 1025.93 hpa
Thu 28 Dec		6.1 °F	5.6 °F	light snow
		4.41 m/h		clouds: 56 %, 1025.51 hpa
Fri 29 Dec		12.5 °F	11.3 °F	light snow
		11.36 m/h		

SERVER SIDE

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 takeActionCode  Node.js 8Change Input Invoke 

```
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2 var NaturalLanguageUnderstandingV1 = require('watson-developer-cloud/natural-language-understanding/v1.js');
3 const stream = require('stream');
4 var request = require('request');
5
6 function main(params) {
7
8    return new Promise(function (resolve, reject) {
9      getTranscriptFromAudio(params)
10     .then(function (transcript) {
11       doNaturalLanguageUnderstanding(params, transcript)
12         .then(function (location) => {
13           request.get(`http://api.openweathermap.org/data/2.5/weather?q=${location},us&units=imperial&appid=${params.WEATHER_APP_ID}`, function (err, data) {
14             resolve(JSON.parse(data.body));
15           });
16         })
17         .catch(function (error) => {
18           reject({error: error});
19         });
20     })
21     .catch(function (error) {
22       reject({error: error});
23     });
24   });
25 }
26
27 function doNaturalLanguageUnderstanding(params, transcript) {
28   return new Promise(function (resolve, reject) {
29     getTranscriptFromAudio(params)
30       .then(function (transcript) {
31         var naturalLanguageUnderstandingParams = {
32           'text': transcript,
33           'features': {
34             'keywords': {
35               'limit': 2
36             },
37             'entities': {
38               'limit': 2
39             }
40           }
41         };
42         var natural_language_understanding = new NaturalLanguageUnderstandingV1({
43           'username': params.NATURAL_LANGUAGE_UNDERSTANDING_USERNAME,
```

takeAction

e i Node.js 8

```
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          .then(function (location) => {
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              resolve(JSON.parse(data.body));
            });
          })
          .catch(function (error) => {
            reject({error: error});
          });
      })
      .catch(function (error) {
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  });
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        var naturalLanguageUnderstandingParams = {
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          'features': {
            'keywords': {
              'limit': 2
            },
            'entities': {
              'limit': 2
            }
          }
        };
        var natural_language_understanding = new NaturalLanguageUnderstandingV1({
          'version': '2017-02-27',
          'username': 'your username',
          'password': 'your password'
        });
        natural_language_understanding.analyze({  
  'text': transcript,  
  'features': {  
    'keywords': {  
      'limit': 2  
    },  
    'entities': {  
      'limit': 2  
    }  
  }  
}, function (error, response) {  
  if (error) {  
    reject(error);  
  } else {  
    resolve(response);  
  }  
});  
      })
      .catch(function (error) {
        reject({error: error});
      });
  });
}
```

FRONT END

```
var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
$.ajax({
  url: 'https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api/takeAction',
  type: 'POST',
  data: dataBlob,
  processData: false,
  headers: {
    'Content-Type': 'audio/wav'
  },
  success: function (data, textStatus, jqXHR) {
    screenLogger(JSON.stringify(data, null, 2));
    doInit();
  },
  error: function (jqXHR, textStatus, errorThrown) {
    screenLogger(jqXHR);
    doInit();
  }
});
```

<https://github.com/chris-rudmin/opus-recorder>

Take Action Example



Log



Take Action Example



Log



“WHAT IS THE WEATHER IN DETROIT”

Log

```
{  
  "name": "Detroit",  
  "dt": 1514391540,  
  "main": {  
    "temp_min": 3.2,  
    "pressure": 1037,  
    "humidity": 60,  
    "temp": 6.96,  
    "temp_max": 10.4  
  },  
  "sys": {  
    "country": "US",  
    "id": 1460,  
    "sunrise": 1514379644,  
    "message": 0.0053,  
    "sunset": 1514412422,  
    "type": 1  
  },  
  "wind": {  
    "speed": 11.41,  
    "deg": 270  
  },  
  "base": "stations",  
  "id": 4990729,  
  "coord": {  
    "lon": -83.06,  
    "lat": 42.35  
  },  
  "clouds": {  
    "all": 1  
  },  
  "weather": [  
    {  
      "id": 701,  
      "main": "Mist",  
      "description": "mist",  
      "icon": "50d"  
    }  
  ],  
  "visibility": 16093,  
  "cod": 200  
}
```

“WHAT IS THE WEATHER IN COLUMBUS”

Log

```
{  
  "name": "Columbus",  
  "dt": 1514392500,  
  "main": {  
    "temp_min": 42.8,  
    "pressure": 1030,  
    "humidity": 93,  
    "temp": 44.26,  
    "temp_max": 46.4  
  },  
  "sys": {  
    "country": "US",  
    "id": 772,  
    "sunrise": 1514378430,  
    "message": 0.0037,  
    "sunset": 1514414562,  
    "type": 1  
  },  
  "wind": {  
    "speed": 4.7,  
    "deg": 40  
  },  
  "base": "stations",  
  "id": 4188985,  
  "coord": {  
    "lon": -84.99,  
    "lat": 32.46  
  },  
  "clouds": {  
    "all": 90  
  },  
  "weather": [  
    {  
      "id": 701,  
      "main": "Mist",  
      "description": "mist",  
      "icon": "50d"  
    }  
  ],  
  "visibility": 16093,  
  "cod": 200  
}
```



- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action
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**RESPOND WITH
AUDIO AND DATA**



All Categories

Infrastructure

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Storage
Network
Security
Containers
VMware

Platform

Boilerplates
APIs
Application Services
Blockchain
Cloud Foundry Apps
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Watson >

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Filter

**Conversation**

Add a natural language interface to your application to automate interactions with your end users. Common

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**Discovery**

Add a cognitive search and content analytics engine to applications.

Lite IBM

**Knowledge Studio**

Build custom models to teach Watson the language of your domain.

IBM

**Language Translator**

Translate text from one language to another for specific domains.

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**Natural Language Classifier**

Natural Language Classifier performs natural language classification on question texts. A user would be able

IBM

**Natural Language Understanding**

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and

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**Personality Insights**

The Watson Personality Insights derives insights from transactional and social media data to identify

Lite IBM

**Speech to Text**

Low-latency, streaming transcription

Lite IBM

**Text to Speech**

Synthesizes natural-sounding speech from text.

Lite IBM

**Tone Analyzer**

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, socia

Lite IBM

**Visual Recognition**

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

IBM



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Integrate
Internet of Things
Mobile
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Security

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Build cognitive apps that help enhance, scale, and accelerate human expertise.

**Conversation**

Add a natural language interface to your application to automate interactions with your end users. Common

[Lite](#) [IBM](#)**Discovery**

Add a cognitive search and content analytics engine to applications.

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Natural Language Classifier performs natural language classification on question texts. A user would be able

[IBM](#)**Natural Language Understanding**

Analyze text to extract meta-data from content such as concepts, entities, emotion, relations, sentiment and

[Lite](#) [IBM](#)**Personality Insights**

The Watson Personality Insights derives insights from transactional and social media data to identify

[Lite](#) [IBM](#)**Speech to Text**

Low-latency, streaming transcription

[Lite](#) [IBM](#)**Text to Speech**

Synthesizes natural-sounding speech from text.

[Lite](#) [IBM](#)**Tone Analyzer**

Tone Analyzer uses linguistic analysis to detect three types of tones from communications: emotion, socia

[Lite](#) [IBM](#)**Visual Recognition**

Find meaning in visual content! Analyze images for scenes, objects, faces, and other content. Choose a

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Text to Speech

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:

[Lite](#)[IBM](#)[View Docs](#)

AUTHOR IBM
PUBLISHED 12/12/2017
TYPE Service
LOCATION Sydney, Germany, United Kingdom, US South

Service name:

Text to Speech-x0

Choose a region/location to deploy in:

US South

Choose an organization:

jarred.128

Choose a space:

dev

Features

- **English (US)**

2 female voices, 1 male voice (Watson's voice from Jeopardy)

- **French**

1 female voice

- **Italian**

1 female voice

- **Spanish (North American)**

1 female voice

- **Japanese**

1 female voice

- **TTS customization API (BETA)**

Allows customers to create custom dictionaries containing their own word pronunciations for up to 20K words. Customization is currently available at no additional charge.

- **English (UK)**

1 female voice

- **German**

1 female voice, 1 male voice

- **Spanish (Castilian)**

1 female voice, 1 male voice

- **Portuguese (Brazil)**

1 female voice

- **Mobile SDKs (BETA)**

Mobile SDKs are now available to enable native interaction on iOS and Android devices.

- **SoftBank**

A localized version of this Watson service is available in Japan. Visit the following link for details: <http://www.softbank.jp/biz/watson>

Pricing Plans

Monthly prices shown are for country or region: United States

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

Estimate Monthly Cost
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Watson /

Text to Speech-x0

Location: US South Org: jarred.128 Space: dev



Getting started tutorial

Last Updated: 2017-10-20 | [Edit in GitHub](#)

The IBM® Text to Speech service converts written text to natural-sounding speech to provide speech-synthesis capabilities for applications. This cURL-based tutorial can help you get started quickly with the service. The examples show you how to call the service's `POST` and `GET /v1/synthesize` methods to request an audio stream.

Before you begin

- Create an instance of the service:
 - If you're seeing this, you created your service instance. Now get your credentials.
 - Create a project from a service:
 - ① Go to the Watson Developer Console [Services](#) page.
 - ② Select Text to Speech, click **Add Services**, and either sign up for a free IBM Cloud account or log in.
 - ③ Type `text-to-speech-tutorial` as the project name and click **Create Project**.
 - Copy the credentials to authenticate to your service instance:
 - From the service dashboard (what you're looking at):
 - ① Click the **Service credentials** tab.
 - ② Click **View credentials** under **Actions**.
 - ③ Copy the `username`, `password`, and `url` values.
 - From your `text-to-speech-tutorial` project in the Developer Console, copy the `username`, `password`, and `url` values for "text_to_speech" from the **Credentials** section.
 - Make sure you have cURL:
 - The examples use cURL to call methods of the HTTP interface. Install the version for your operating system from [curl.haxx.se](#). Install the version that supports the Secure Sockets Layer (SSL) protocol. Make sure to include the installed binary file on your `PATH` environment variable.

If you use IBM Cloud Dedicated, create your service instance from the [Text to Speech](#) page in the Catalog. For details about how to find your service credentials, see [Service credentials for Watson services](#).





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Text to Speech-x0



Location: US South Org: jarred.128 Space: dev

Service credentials

Credentials are provided in JSON format. The JSON snippet lists credentials, such as the API key and secret, as well as connection information for the service.

[View More](#)

Service credentials

[New credential +](#)

Click New credentials to create a set of credentials for this instance



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[View More](#)**Service credentials****New credential** 

Click New credentials to create a set of credentials for this instance



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Add new credential X**Name:**

Credentials-1

[View More](#)**Add Inline Configuration Parameters (Optional):** 

Provide service-specific configuration parameters in a valid JSON object

Choose File...**Cancel****Add****New credential** 

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Location: US South Org: jarred.128

Space

Add new credential

Name:

Credentials-1

[View More](#)Add Inline Configuration Parameters (Optional): 

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[Choose File...](#)

Cancel

Add

[New credential +](#)



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Service credentials

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10 ▾ Items per page | 1-1 of 1 items

1 of 1 pages < 1 >

 KEY NAME

DATE CREATED

ACTIONS

 Credentials-1

Dec 27, 2017 - 12:11:18

View credentials ▾



```
{  
  "url": "https://stream.watsonplatform.net/text-to-speech/api",  
  "username": "382e7559-XXXXXXXXXX-46e9cf3b329f",  
  "password": "Rla! XXXXXXXXXX"  
}
```



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⋮

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⋮

10 ▾ Items per page | 1-1 of 1 items

1 of 1 pages < 1 >

<input type="checkbox"/>	KEY NAME	DATE CREATED	ACTIONS
<input type="checkbox"/>	Credentials-1	Dec 27, 2017 - 12:11:18	View credentials  

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  "password": "Rla! XXXXXXXXXX"  
}
```



SERVER SIDE

Code

Parameters

Runtime

Endpoints

Connected Triggers

Enclosing Sequences

Actions /

 respondWithDataCode  Node.js 8Change Input Invoke 

```
1 var SpeechToTextV1 = require('watson-developer-cloud/speech-to-text/v1');
2 var NaturalLanguageUnderstandingV1 = require('watson-developer-cloud/natural-language-understanding/v1.js');
3 var TextToSpeechV1 = require('watson-developer-cloud/text-to-speech/v1');
4 const stream = require('stream');
5 var request = require('request');
6
7+ function main(params) {
8
9+     return new Promise(function (resolve, reject) {
10         getTranscriptFromAudio(params)
11             .then(function (transcript) {
12                 doNaturalLanguageUnderstanding(params, transcript)
13                     .then((location) => {
14                         getWeatherData(params, location)
15                             .then((weatherData) => {
16                             var text_to_speech = new TextToSpeechV1({
17                                 username: params.TEXT_TO_SPEECH_USERNAME,
18                                 password: params.TEXT_TO_SPEECH_PASSWORD
19                             });
20
21                             const text = `The current forecast in ${location} is ${weatherData.weather[0].description}, with a high temperature of ${weatherData.main.temp_max} degrees`;
22                             var textToSpeechParams = {
23                                 text: text,
24                                 voice: 'en-US_AllisonVoice',
25                                 accept: 'audio/mp3'
26                             };
27
28                             //https://www.ibm.com/watson/developercloud/text-to-speech/api/v1/#synthesize_audio
29                             text_to_speech.synthesize(textToSpeechParams, function (error, data) {
30                                 if (error) {
31                                     reject({error: error});
32                                 }
33                                 const base64EncodedAudio = data.toString('base64');
34                                 const responseObject = {
35                                     text: text,
36                                     transcript: transcript,
37                                     base64EncodedAudio: base64EncodedAudio,
38                                 };
39                                 resolve(responseObject);
40                             });
41                         })
42                     .catch((error) => {
```

```
require('watson-developer-cloud/speech-to-text/v1');
understandingV1 = require('watson-developer-cloud/natural-language-understanding/v1.js');
require('watson-developer-cloud/text-to-speech/v1');
use('stream');
('request');

{

e(function (resolve, reject) {
FromAudio(params)
ction (transcript) {
uralLanguageUnderstanding(params, transcript)
then((location) => {
getWeatherData(params, location)
.then((weatherData) => {
  var text_to_speech = new TextToSpeechV1({
    username: params.TEXT_TO_SPEECH_USERNAME,
    password: params.TEXT_TO_SPEECH_PASSWORD
});

const text = `The current forecast in ${location} is ${weatherData.weather[0].description}, with a high temperature of ${weatherData.main.temp_max} degrees`;
var textToSpeechParams = {
  text: text,
  voice: 'en-US_AllisonVoice',
  accept: 'audio/mp3'
};

//https://www.ibm.com/watson/developercloud/text-to-speech/api/v1/#synthesize_audio
text_to_speech.synthesize(textToSpeechParams, function (error, data) {
  if (error) {
    reject({error: error});
  }
  const base64EncodedAudio = data.toString('base64');
  const responseObject = {
    text: text,
    transcript: transcript,
    base64EncodedAudio: base64EncodedAudio,
  };
  resolve(responseObject);
});
})
catch(error) -> s
```

FRONT END

```
var dataBlob = new Blob([e.detail], {type: 'audio/wav'});
$.ajax({
  url: 'https://service.us.apiconnect.ibmcloud.com/gws/apigateway/api/b9295e6c011185a1acafeb26d61e15ad49b5d48325f7ce16ed84996227602ce5/api/respondWithData',
  type: 'POST',
  data: dataBlob,
  processData: false,
  headers: {
    'Content-Type': 'audio/wav'
  },
  success: function (data, textStatus, jqXHR) {
    screenLogger(JSON.stringify(data, null, 2));

    $('#playback').attr("src", `data:audio/mpeg;base64,${data.base64EncodedAudio}`);
    $('#playback').trigger('play');

    doInit();
  },
  error: function (jqXHR, textStatus, errorThrown) {
    screenLogger(jqXHR);
    doInit();
  }
});
```

<https://github.com/chris-rudmin/opus-recorder>

Respond With Data Example



Log



Respond With Data Example



Log





- ▶ Transcribe the audio into text
- ▶ Do Natural Language Processing (NLP)
- ▶ Take action
- ▶ Respond with audio and data

SPEECH TO TEXT

- ▶ Videos
- ▶ Podcasts
- ▶ Voicemails
- ▶ Phone Calls
- ▶ Meeting Minutes
- ▶ Educational

NATURAL LANGUAGE PROCESSING

- ▶ Preprocess a Search Query
- ▶ Keyword Extraction
- ▶ Sentiment Analysis

TEXT TO SPEECH

- ▶ Translation
- ▶ Educational
- ▶ Visually Impaired

THANKS!

@JARREDOLSON