Lab 5. Let's Catch a Train

In this lab, we will design and build a chatbot to help users plan their train journeys. We will use a Transport data API to obtain information about trains, their arrival and departure timings at stations, and so on, and to serve the information, build a chatbot to interact with users in natural language. We will then explore how the chatbot can be exposed to the SMS platform. We will learn to use the services of a communications API provider called Twilio. We will also learn how to plug in toolkits such as API.AI to understand user utterances and manage the conversation in an SMS chatbot.

First, let's take a look at the Transport API and the data that it has to offer. Based on the data that is available, we will then brainstorm and design some sample conversational tasks. We will then build a simple one-way SMS bot that can send timely notifications to users. And build on that to develop a two-way chatbot that sends train information to users based on their requests in natural language. We will explore how to build and integrate API.AI agents into our chatbot to understand language and drive the conversation.

By the end of this lab, you will be able to:

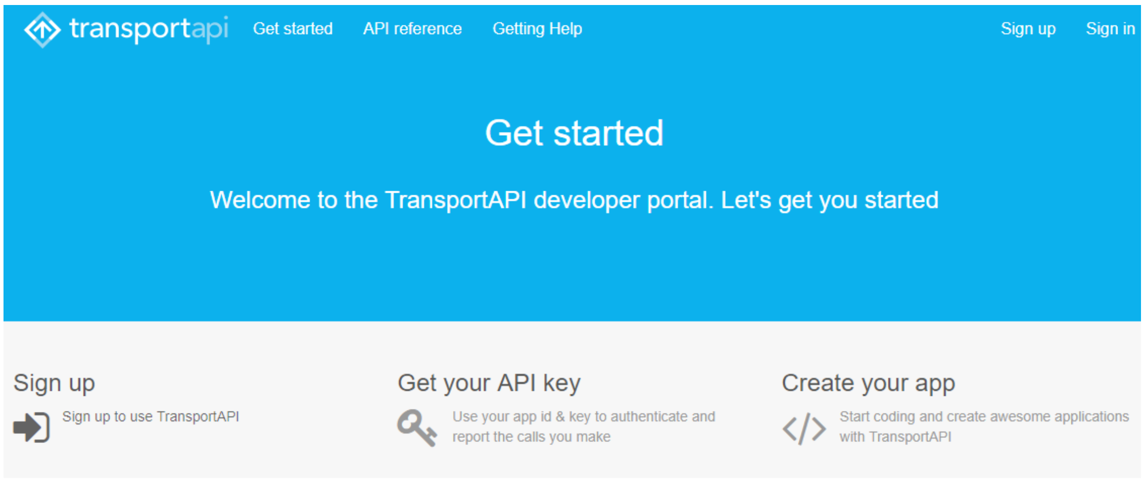
- Design conversational tasks based on data
- Create backend task modules using Transport API
- Build SMS bots using Twilio
- Integrate a Dialogflow agent to understand user utterances

Exploring Transport API

To get started, let's have a look at the data source that we are going to use in this lab. Transport API is a data service for all public transport services in the UK. If you are in a different country, you would be able to find something similar to your country. But you can still play around with this service. Transport API is a data platform for transport data providing information on live arrivals and departures, timetables, journey planning, fares, performance indicators, and commuters tweet mapping. Data is served using RESTful web services.

Creating a developer account

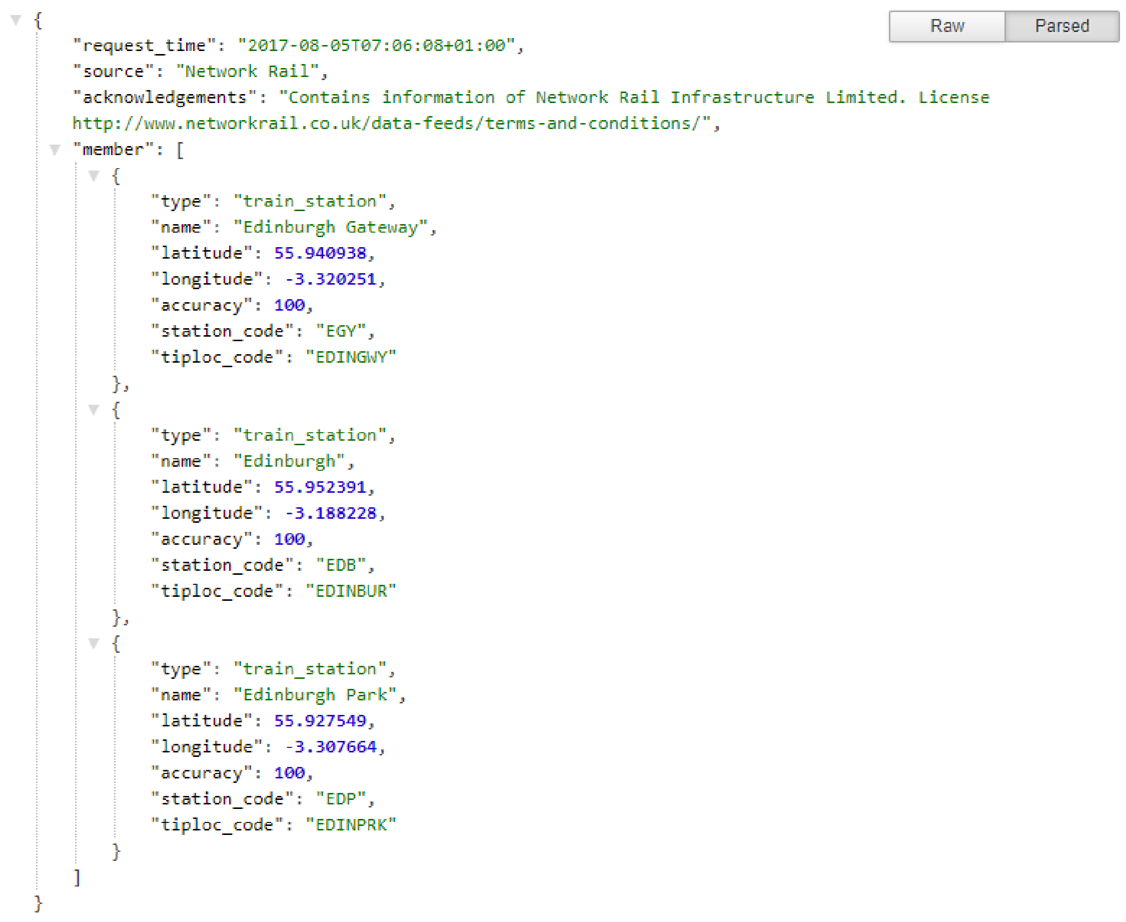
1. To get started, create a developer account at https://developer.transportapi.com and get an app key and app ID:


transportapi
Get started
API reference
Getting Help
Sign up
Sign in
Get started
Welcome to the TransportAPI developer portal. Let's get you started
Sign up
Sign up to use TransportAPI
Get your API key
Use your app id & key to authenticate and report the calls you make
Create your app
Start coding and create awesome applications with TransportAPI

2. Let's try the following sample request. Replace `YOUR_APP_ID` and `YOUR_APP_KEY` with your app ID and key. Execute the following `GET` request from a web browser. At this request, we are trying to retrieve information concerning Euston train station, in London:

```
http://transportapi.com/v3/uk/places.json?query=euston&type=train_station&app_id=
YOUR_APP_ID&app_key=YOUR_APP_KEY
```

The preceding request will return a JSON response with information such as the full name of the station, its latitude and longitude coordinates, and station code:



```
{
    "request_time": "2017-08-05T07:06:08+01:00",
    "source": "Network Rail",
    "acknowledgements": "Contains information of Network Rail Infrastructure Limited. License
    http://www.networkrail.co.uk/data-feeds/terms-and-conditions/",
    "member": [
        {
            "type": "train_station",
            "name": "Edinburgh Gateway",
            "latitude": 55.940938,
            "longitude": -3.320251,
            "accuracy": 100,
            "station_code": "EGY",
            "tiploc_code": "EDINGWY"
        },
        {
            "type": "train_station",
            "name": "Edinburgh",
            "latitude": 55.952391,
            "longitude": -3.188228,
            "accuracy": 100,
            "station_code": "EDB",
            "tiploc_code": "EDINBUR"
        },
        {
            "type": "train_station",
            "name": "Edinburgh Park",
            "latitude": 55.927549,
            "longitude": -3.307664,
            "accuracy": 100,
            "station_code": "EDP",
            "tiploc_code": "EDINPRK"
        }
    ]
}
```

Exploring the dataset

Transport API provides data regarding trains, buses, the tube (subway), and many other forms of transport. To build our chatbot, let's begin with just the trains' data. In this section, let's take a look at the different kinds of data available about trains. For all requests, the base URL is `http://transportapi.com/v3/uk/` .

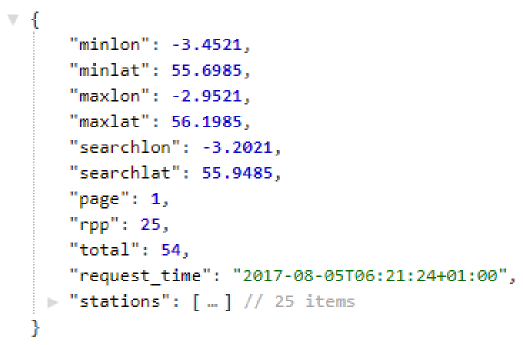
Train stations near you

This endpoint provides a list of train stations near a given location. The search location should be provided as a latLon coordinate, as follows:

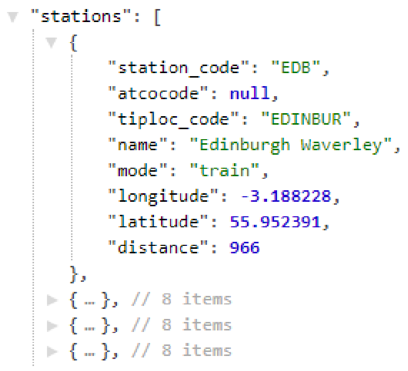
```
http://transportapi.com/v3/uk/train/stations/near.json?
lat=55.9485&lon=-3.2021&app_id=YOUR_APP_ID&app_key=YOUR_APP_KEY
```

Response

The response we get is a list of stations near the given latLon coordinates. For each station, we get its name, location, and station code:



```
▼ {
      "minlon": -3.4521,
      "minlat": 55.6985,
      "maxlon": -2.9521,
      "maxlat": 56.1985,
      "searchlon": -3.2021,
      "searchlat": 55.9485,
      "page": 1,
      "rpp": 25,
      "total": 54,
      "request_time": "2017-08-05T06:21:24+01:00",
  ▶   "stations": [ … ] // 25 items
  }
```



```
▼ "stations": [
  ▼ {
        "station_code": "EDB",
        "atcocode": null,
        "tiploc_code": "EDINBUR",
        "name": "Edinburgh Waverley",
        "mode": "train",
        "longitude": -3.188228,
        "latitude": 55.952391,
        "distance": 966
    },
  ▶ { … }, // 8 items
  ▶ { … }, // 8 items
  ▶ { … }, // 8 items
```

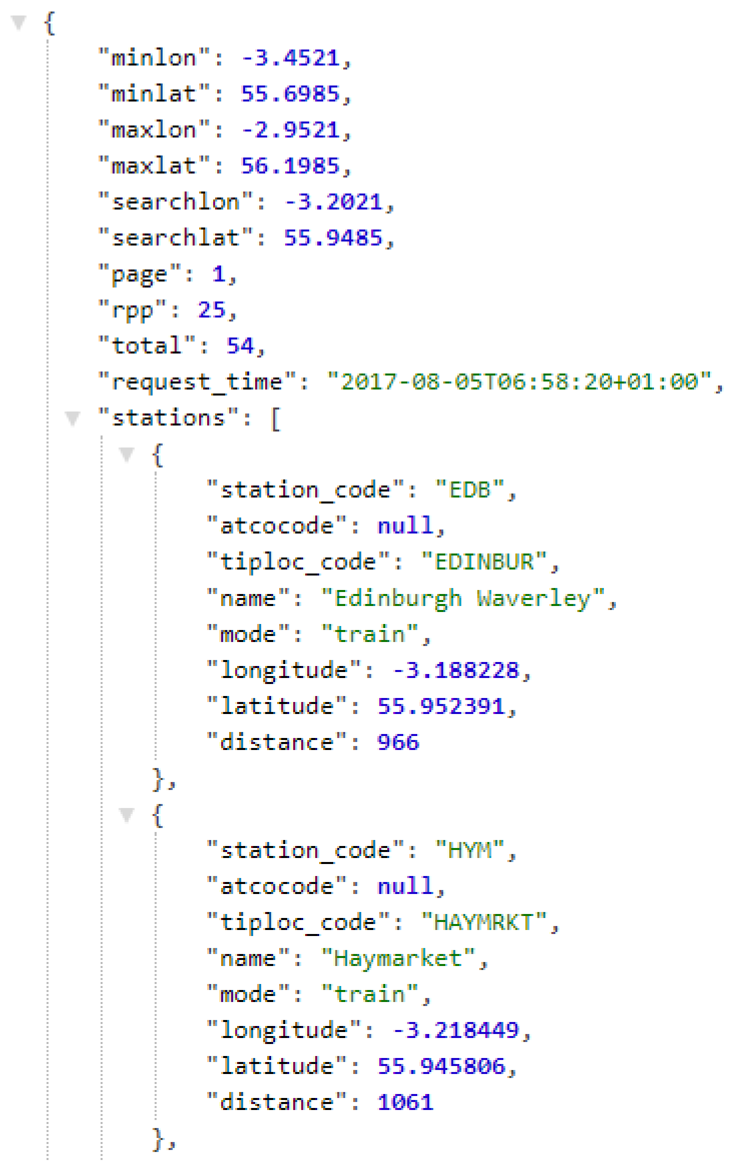
Trains in the area

Train stations can also be searched by providing a bounding box. The top-left and bottom-right coordinates of the box need to be provided. This is particularly useful if you need a list of all stations with city limits or something similar. Let's try this using the bounding box coordinates for Edinburgh:

```
http://transportapi.com/v3/uk/train/stations/bbox.json?
minlon=-3.4521&minlat=55.6985&maxlon=-2.9521&maxlat=56.1985&app_id=YOUR_APP_ID&app_key=
```

Response

The response we get is as follows:



```
{
    "minlon": -3.4521,
    "minlat": 55.6985,
    "maxlon": -2.9521,
    "maxlat": 56.1985,
    "searchlon": -3.2021,
    "searchlat": 55.9485,
    "page": 1,
    "rpp": 25,
    "total": 54,
    "request_time": "2017-08-05T06:58:20+01:00",
    "stations": [
        {
            "station_code": "EDB",
            "atcocode": null,
            "tiploc_code": "EDINBUR",
            "name": "Edinburgh Waverley",
            "mode": "train",
            "longitude": -3.188228,
            "latitude": 55.952391,
            "distance": 966
        },
        {
            "station_code": "HYM",
            "atcocode": null,
            "tiploc_code": "HAYMRKT",
            "name": "Haymarket",
            "mode": "train",
            "longitude": -3.218449,
            "latitude": 55.945806,
            "distance": 1061
        },
```

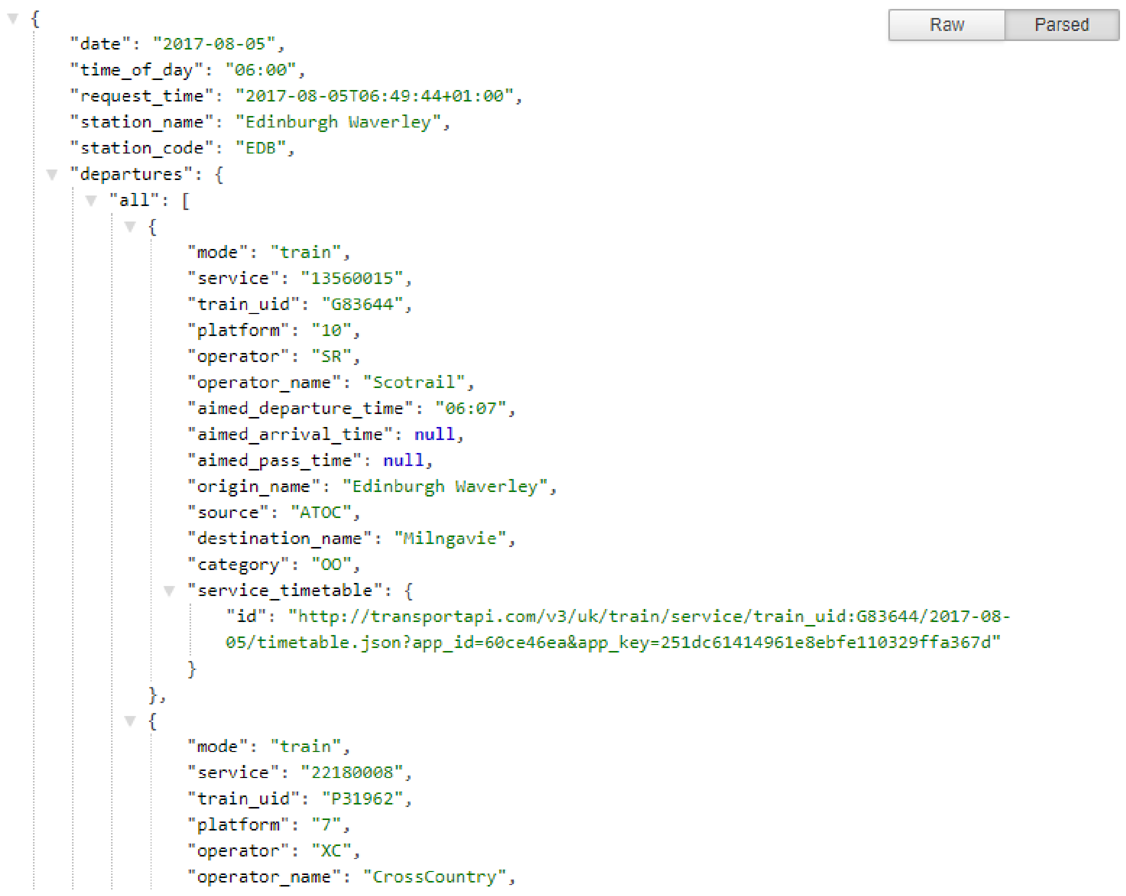
Live departures

The live status of trains arriving and departing a given station can be obtained using the following endpoint. Let's try it out for Edinburgh Waverley station, whose station code is `EDB`:

```
http://transportapi.com/v3/uk/train/station/EDB/live.json?
&app_id=YOUR_APP_ID&app_key=YOUR_APP_KEY
```

Response

Here is its response:



```
{
    "date": "2017-08-05",
    "time_of_day": "06:00",
    "request_time": "2017-08-05T06:49:44+01:00",
    "station_name": "Edinburgh Waverley",
    "station_code": "EDB",
    "departures": {
        "all": [
            {
                "mode": "train",
                "service": "13560015",
                "train_uid": "G83644",
                "platform": "10",
                "operator": "SR",
                "operator_name": "Scotrail",
                "aimed_departure_time": "06:07",
                "aimed_arrival_time": null,
                "aimed_pass_time": null,
                "origin_name": "Edinburgh Waverley",
                "source": "ATOC",
                "destination_name": "Milngavie",
                "category": "OO",
                "service_timetable": {
                    "id": "http://transportapi.com/v3/uk/train/service/train_uid:G83644/2017-08-
                    05/timetable.json?app_id=60ce46ea&app_key=251dc61414961e8ebfe110329ffa367d"
                }
            },
            {
                "mode": "train",
                "service": "22180008",
                "train_uid": "P31962",
                "platform": "7",
                "operator": "XC",
                "operator_name": "CrossCountry",
```

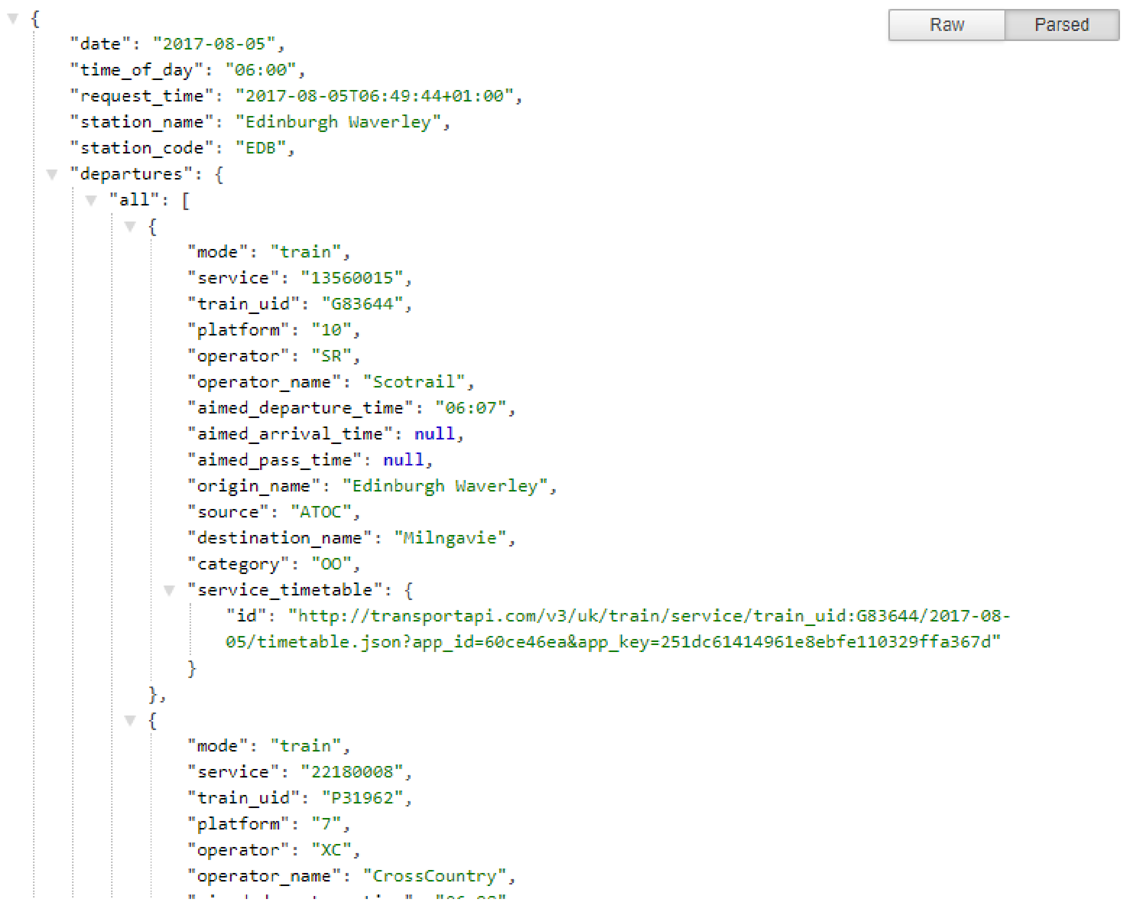
Station timetables

Timetables of trains arriving and departing from a given station on a given date and time can be obtained using the following endpoint. Let's get all the trains departing Edinburgh Waverley (`EDB`) station on `2017-08-05` at `06:00` :

```
http://transportapi.com/v3/uk/train/station/EDB/2017-08-05/06:00/timetable.json?
app_id=YOUR_APP_ID&app_key=YOUR_APP_KEY
```

Response

And here is the response:



```
{
    "date": "2017-08-05",
    "time_of_day": "06:00",
    "request_time": "2017-08-05T06:49:44+01:00",
    "station_name": "Edinburgh Waverley",
    "station_code": "EDB",
    "departures": {
        "all": [
            {
                "mode": "train",
                "service": "13560015",
                "train_uid": "G83644",
                "platform": "10",
                "operator": "SR",
                "operator_name": "Scotrail",
                "aimed_departure_time": "06:07",
                "aimed_arrival_time": null,
                "aimed_pass_time": null,
                "origin_name": "Edinburgh Waverley",
                "source": "ATOC",
                "destination_name": "Milngavie",
                "category": "OO",
                "service_timetable": {
                    "id": "http://transportapi.com/v3/uk/train/service/train_uid:G83644/2017-08-
                    05/timetable.json?app_id=60ce46ea&app_key=251dc61414961e8ebfe110329ffa367d"
                }
            },
            {
                "mode": "train",
                "service": "22180008",
                "train_uid": "P31962",
                "platform": "7",
                "operator": "XC",
                "operator_name": "CrossCountry",
```

Service timetables

Timetables for each train service can be also be obtained. This data lets you see the arrival and departure times of a given train service at the various stations it calls at on a given date and time. Let's try an example out with service number, `23587103`, on `2017-08-05` at `06:00`:

```
http://transportapi.com/v3/uk/train/service/23587103/2017-08-05/06:00/timetable.json?
app_id=YOUR_APP_ID&app_key=YOUR_APP_KEY
```

Response

The response we get for the service timetable is as follows:

```
{
    "service": "23587103",
    "train_uid": "G82394",
    "headcode": "",
    "toc": {
        "atoc_code": "SR"
    },
    "train_status": "P",
    "origin_name": "Markinch",
    "destination_name": "Edinburgh Waverley",
    "stop_of_interest": null,
    "date": "2017-08-05",
    "time_of_day": "06:00",
    "mode": "train",
    "request_time": "2017-08-05T06:46:22+01:00",
    "category": "OO",
    "operator": "SR",
    "operator_name": "Scotrail",
    "stops": [
        {
            "station_code": "MNC",
            "tiploc_code": "MKIN",
            "station_name": "Markinch",
            "stop_type": "LO",
            "platform": "1",
            "aimed_departure_date": "2017-08-05",
            "aimed_departure_time": "06:19",
            "aimed_arrival_date": null,
            "aimed_arrival_time": null,
            "aimed_pass_date": null,
            "aimed_pass_time": null
        },
        {
            "station_code": "GLT",
            "tiploc_code": "GLNRTHS",
            "station_name": "Glenrothes With Thornton",
```

Conversational design

Now that we have a good idea of the data we have in our hands, let's brainstorm the conversational tasks for our chatbot.

- Nearest station
- Next train
- Time of arrival
- Later trains from a station
- How do I get from A to B?

Let's start with a simple one: getting to the nearest station.

Nearest station

In order to get to the nearest station for a user, we need his/her location. This could be in the form of postcode or latLon coordinates. Platforms such as Facebook Messenger allow users to share location in the form of latLon coordinates. However, since we are going to be using the SMS platform, let's use the postcode route. The conversation for this task could go in one of the following ways:

```
User : Where is my nearest station?
Bot: Can you give me your postcode?
User : EH12 9QR
Bot: Great. Your nearest station is South Gyle.
```

```
User: What is the nearest station to EH12 9QR?
Bot: The nearest station is South Gyle.
```

Next train

In order to get information on the next train, the conversation could go the following ways:

```
User : When is the next train to Glasgow?
Bot : From which station?
User : Edinburgh Park
Bot : The next train to Glasgow Central is at 10:00.
```

```
User : Next train
Bot : From?
User : Edinburgh Park
Bot : Finding next train from Edinburgh Park. Going to?
User :  Glasgow
Bot : Next train to Glasgow Central is at 10:00.
```

Time of arrival

Sometimes users may want to know the time of arrival of the train in context at a specific station. To get information on the time of arrival, the conversation could go as follows:

```
User : What time does the train arrive at Glasgow Central?
Bot : The train will arrive in Glasgow Central at 11:00.
```

Many more conversations are possible in the domain of travel. All the preceding tasks are reactive, where the bot responds to users' requests. In contrast, proactive tasks can be designed by having the bot initiate conversations. For instance, the bot can send train times and delays/cancelled information to the user at set times during the day:

```
Bot : The 15:00 train to Edinburgh Waverley is delayed to 15:30.
User : Is there an earlier train to Haymarket?
...
```

Conversational tasks such as a list of later trains and planning your route are more complex than the preceding tasks. As we proceed, we will see how to build a chatbot that can handle a few of the mentioned tasks.

Building a simple SMS bot

Let's now build the SMS platform interface for the chatbot. To bear with the complexity, let us do this in two steps. First, let us build a bot to simply send SMS text messages to a mobile number. This could be a message concerning the status of a train arriving at a station or the next train to a certain destination from a given station. Second, we will build a two-way chatbot that can receive messages from users and respond to them appropriately. To do this, we will use a service called Twilio. Twilio is a developer platform for communications enabling developers to add messaging, voice, and video capabilities to their software. We will explore how we can build notification bots and chatbots using Twilio's messaging infrastructure.

Getting started

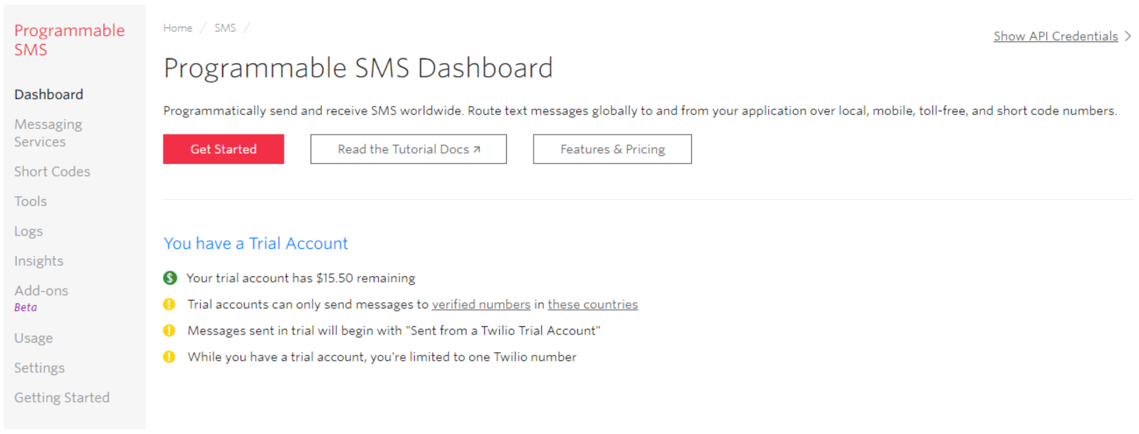
To get started with Twilio, perform the following steps:

1. Go to www.twilio.com, click `Sign Up` and register yourself for a free trial account.
2. Once you have registered, go over to the console page at www.twilio.com/console.
3. Copy the `ACCOUNT SID` and `Account Key`. We will be using them for our projects.

Setting up the dashboard

Let us build a bot that sends the notification to a user's mobile number. Twilio has four main products: `Programmable Chat`, `Programmable SMS`, `Programmable Voice`, and `Programmable Video`. To build a notification sender, we need to use the `Programmable SMS` service. Here are the steps:

1. On the console dashboard, select `Programmable SMS`.
2. On the `Programmable SMS Dashboard`, click `Get Started`:



Programmatically send and receive SMS worldwide. Route text messages globally to and from your application over local, mobile, toll-free, and short code numbers.

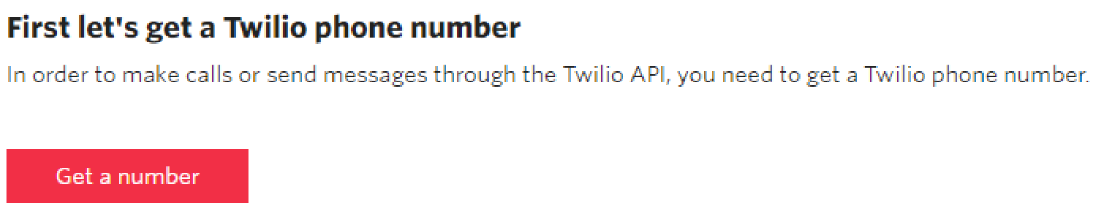
Your trial account has $15.50 remaining

Trial accounts can only send messages to verified numbers in these countries

Messages sent in trial will begin with "Sent from a Twilio Trial Account"

While you have a trial account, you're limited to one Twilio number

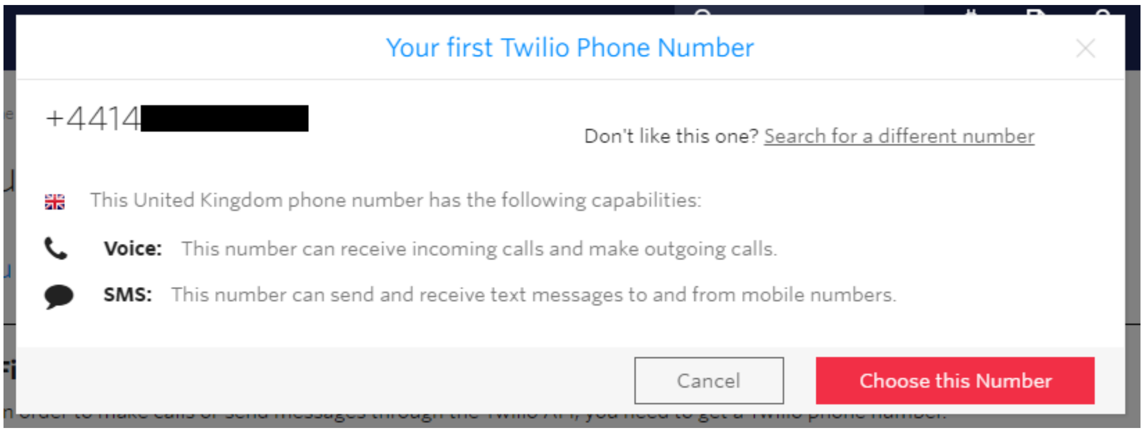
3. In order to send SMS messages, you need a phone number. Click `Get a number` to get one:



First let's get a Twilio phone number

In order to make calls or send messages through the Twilio API, you need to get a Twilio phone number.

4. This will provide you with a number. You can choose to accept it by clicking `Choose this Number`. If not, pick another one. Make sure that the number has SMS capability:



Your first Twilio Phone Number

+4414[redacted]

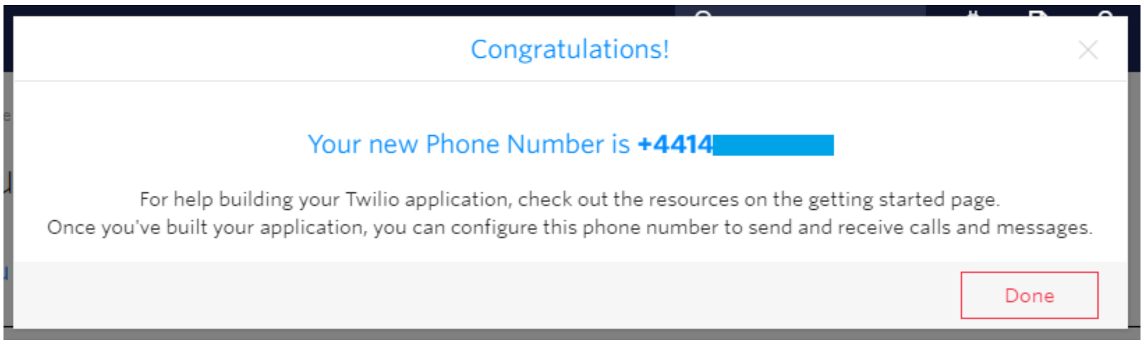
Don't like this one? Search for a different number

This United Kingdom phone number has the following capabilities:

Voice: This number can receive incoming calls and make outgoing calls.

SMS: This number can send and receive text messages to and from mobile numbers.

5. You will receive an acknowledgment that you have been allocated the number:



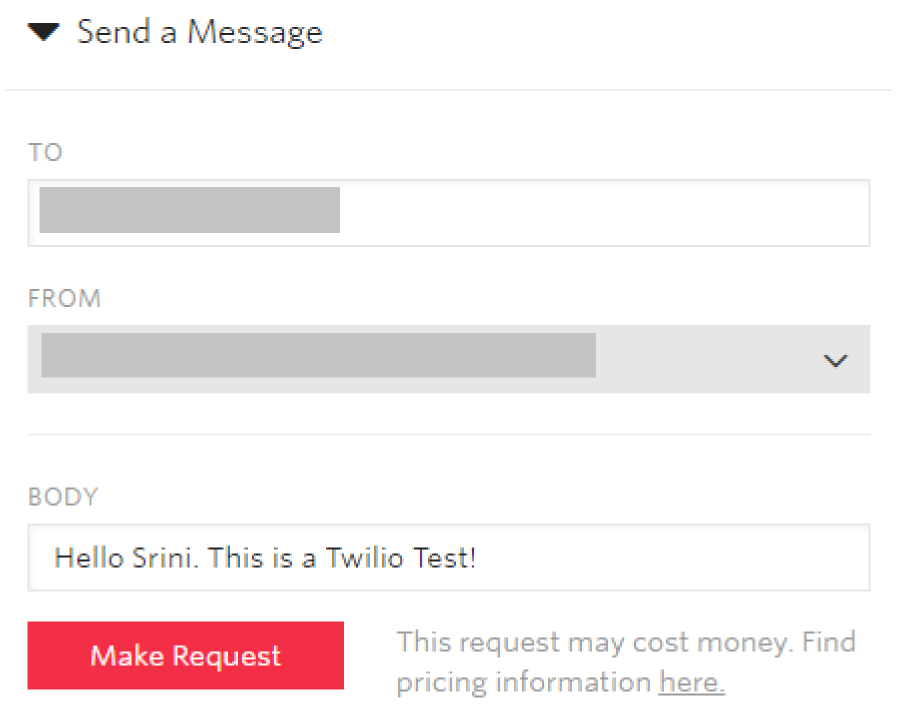
Congratulations!

Your new Phone Number is **+4414**[redacted]

For help building your Twilio application, check out the resources on the getting started page.
Once you've built your application, you can configure this phone number to send and receive calls and messages.

Click `Done` .

6. Are you seeing the `Send a Message` window? Why don't you send yourself a message? Send a test message to your registered cellphone number (the number that you used to verify the account):


Send a Message

TO

[redacted]

FROM

[redacted]

BODY

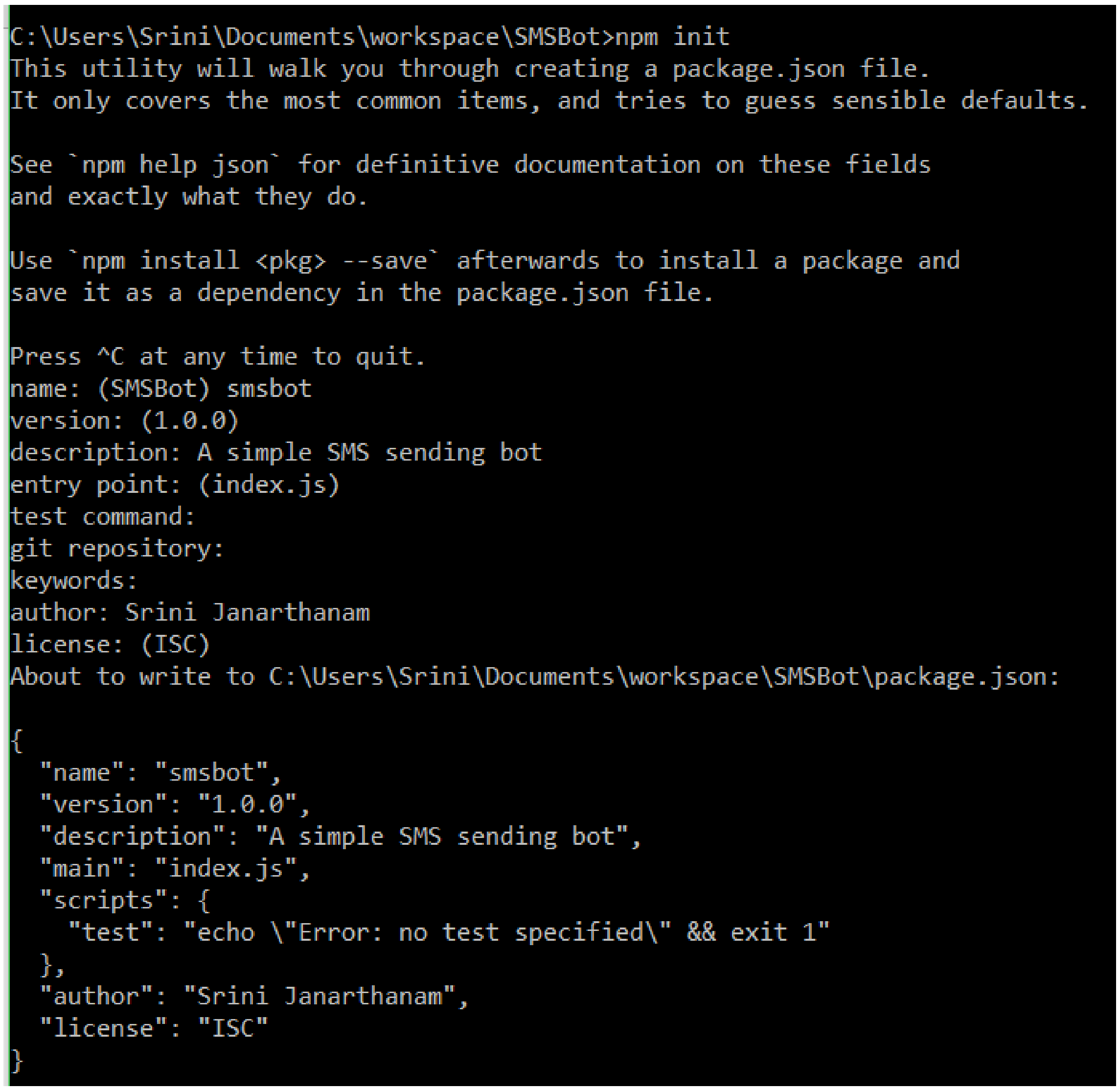
Hello Srini. This is a Twilio Test!

7. Check your cellphone to see whether you have received your test message. Click **`Yes`** to inform Twilio that you have received your message.

Simple Message Sender

Now that we have set up the account and got a phone number, let's move ahead to create a bot to send notifications. To do this, perform the following steps:

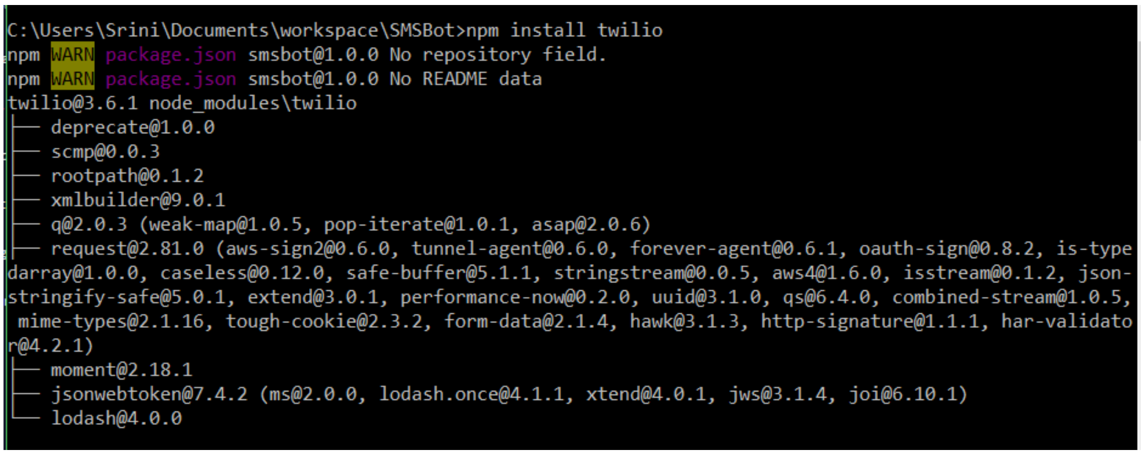
1. Open the console window and create a directory called `SMSBot` .
2. In the `SMSBot` directory, create a new Node.js project using the `npm init` command, as shown here:



```
C:\Users\Srini\Documents\workspace\SMSBot>npm init
This utility will walk you through creating a package.json file.
It only covers the most common items, and tries to guess sensible defaults.

See `npm help json` for definitive documentation on these fields
and exactly what they do.

Use `npm install <pkg> --save` afterwards to install a package and
save it as a dependency in the package.json file.

Press ^C at any time to quit.
name: (SMSBot) smsbot
version: (1.0.0)
description: A simple SMS sending bot
entry point: (index.js)
test command:
git repository:
keywords:
author: Srini Janarthanam
license: (ISC)
About to write to C:\Users\Srini\Documents\workspace\SMSBot\package.json:

{
  "name": "smsbot",
  "version": "1.0.0",
  "description": "A simple SMS sending bot",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "author": "Srini Janarthanam",
  "license": "ISC"
}
```

Check the directory to see the files that have been generated. You will see a file called `package.json` with meta information concerning the project.

3. We need to install the Twilio Node.js library to build our SMS bot. On the console, execute the `npm install twilio --save` command:



```
C:\Users\Srini\Documents\workspace\SMSBot>npm install twilio
npm WARN package.json smsbot@1.0.0 No repository field.
npm WARN package.json smsbot@1.0.0 No README data
twilio@3.6.1 node_modules\twilio
├── deprecate@1.0.0
├── scmp@0.0.3
├── rootpath@0.1.2
├── xmlbuilder@9.0.1
├── q@2.0.3 (weak-map@1.0.5, pop-iterate@1.0.1, asap@2.0.6)
├── request@2.81.0 (aws-sign2@0.6.0, tunnel-agent@0.6.0, forever-agent@0.6.1, oauth-sign@0.8.2, is-type
darray@1.0.0, caseless@0.12.0, safe-buffer@5.1.1, stringstream@0.0.5, aws4@1.6.0, isstream@0.1.2, json-
stringify-safe@5.0.1, extend@3.0.1, performance-now@0.2.0, uuid@3.1.0, qs@6.4.0, combined-stream@1.0.5,
 mime-types@2.1.16, tough-cookie@2.3.2, form-data@2.1.4, hawk@3.1.3, http-signature@1.1.1, har-validato
r@4.2.1)
├── moment@2.18.1
├── jsonwebtoken@7.4.2 (ms@2.0.0, lodash.once@4.1.1, xtend@4.0.1, jws@3.1.4, joi@6.10.1)
└── lodash@4.0.0
```

4. Let's create a new JS file called `index.js`. Add the following code to the file:

```
//Index.js - SMSBot

//Add your Account SID
varaccountSid='your_account_sid';
//Add your Auth Token here
varauthToken='your_auth_token';vartwilio=require('twilio');varclient=newtwilio(accountSi

//Create a message with to and from numbers
client.messages.create({body:'Srini says
hello',to:'+447888999999',from:'+447888999990'}).then((message)=>console.log(message.sid
```

In the preceding code, the `to` number must be a verified number of trial accounts. You cannot send messages to other numbers unless you upgrade your account. The `from` number is the Twilio number that you had obtained previously.

5. Save the file and execute it using the `node index.js` command. This should send the text message to your verified phone number.

My train notifier

Imagine a scenario where a user commutes to work every day from Edinburgh Waverley to Glasgow Queen Street. And they struggle to figure out the trains and timings as they prepare to leave every morning. Wouldn't it be great if we could provide a service that sends a list of trains from their station to their destination at some point during their morning routine?

Using the preceding Simple Message Sender module, let's build a bot that will send a list of trains from a certain station to a certain destination station. Let's add a module to get the list of trains from a given station to a certain destination:

1. Install the request library using `npm install request --save`.
2. Create a function to send SMS notifications:

```
function sendSMS(msg, userPhoneNumber){
    var twilio = require('twilio');
    var client = new twilio(accountSid, authToken);
    //Create a message with to and from numbers
    client.messages.create({
        body: msg,
        to: userPhoneNumber,
        from: '+4414XXXXXXXX' //YOUR_NUMBER
    })
    .then((message) => console.log(message.sid));
}
```

3. Create a function to get all trains departing from a given station:

```
 function getTrains(sourceStation, sourceStationCode,
                                destinationStation,
                                userPhoneNumber){
    var request = require('request');
    var url = 'http://transportapi.com/v3/uk/train/station/' +
               sourceStationCode   + '/live.json?
               app_id=YOUR_APP_ID&app_key=YOUR_APP_KEY';

    request(url, function (error, response, body) {
       if (response){
            var json = JSON.parse(body);
            if (json.departures){
                //console.log('Departures:',
                //JSON.stringify(json.departures));

                var dep =
                getTrainsToDestination(destinationStation,
                json.departures.all);

                var summary = summarize(destinationStation,
                                        sourceStation, dep);

                console.log('Summary: ' + summary);
                sendSMS(summary, userPhoneNumber);

            } else {
                console.log('No Departures found!');
            }
        } else {
            console.log('error:', error); // Print the error if one
                                          // occurred
        }
    });
}
```

4. Create a function to retrieve all trains going to a certain destination station:

```
function getTrainsToDestination(destination, allDepartures){
    var d = [];

    if (allDepartures){
        for (var i=0; i < allDepartures.length; i++){
            var service = allDepartures[i];
            if (service.destination_name == destination){
                d.push(service)
            }
        }
    }
    return d;
}
```

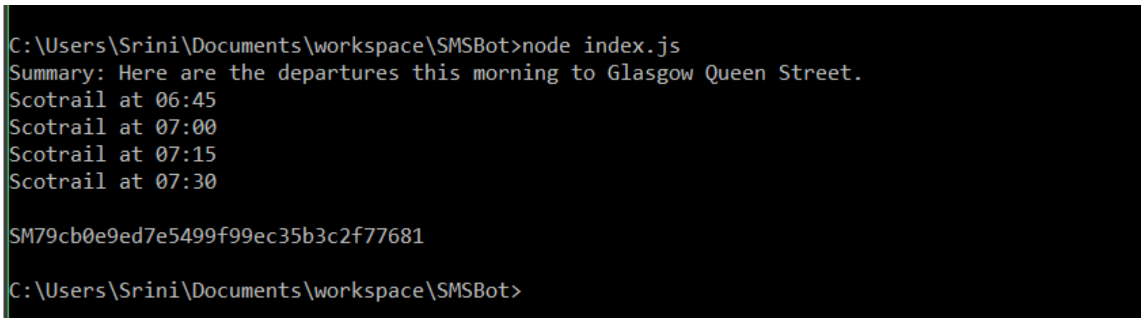
5. Create a function to call the preceding functions to send the user a notification of all trains heading to a certain destination station from the user's preferred station:

```
function summarize(destinationStation, sourceStation, departures){

    var out = '';
    if (departures.length > 0){
        out = 'Here are the departures this morning to ' +
               destinationStation
                                 + ".\n";
        for (var i=0; i< departures.length; i++){
            var service = departures[i];
            var serviceSummary = service.operator_name
                                 + " at " +

            service.expected_departure_time;
            out += serviceSummary + "\n"
        }
    } else {
        out = 'There are no trains to ' + destinationStation +
                                              ' from ' +
                                        sourceStation;
    }
    return out;
}
```

6. And set the variables and call the main module:

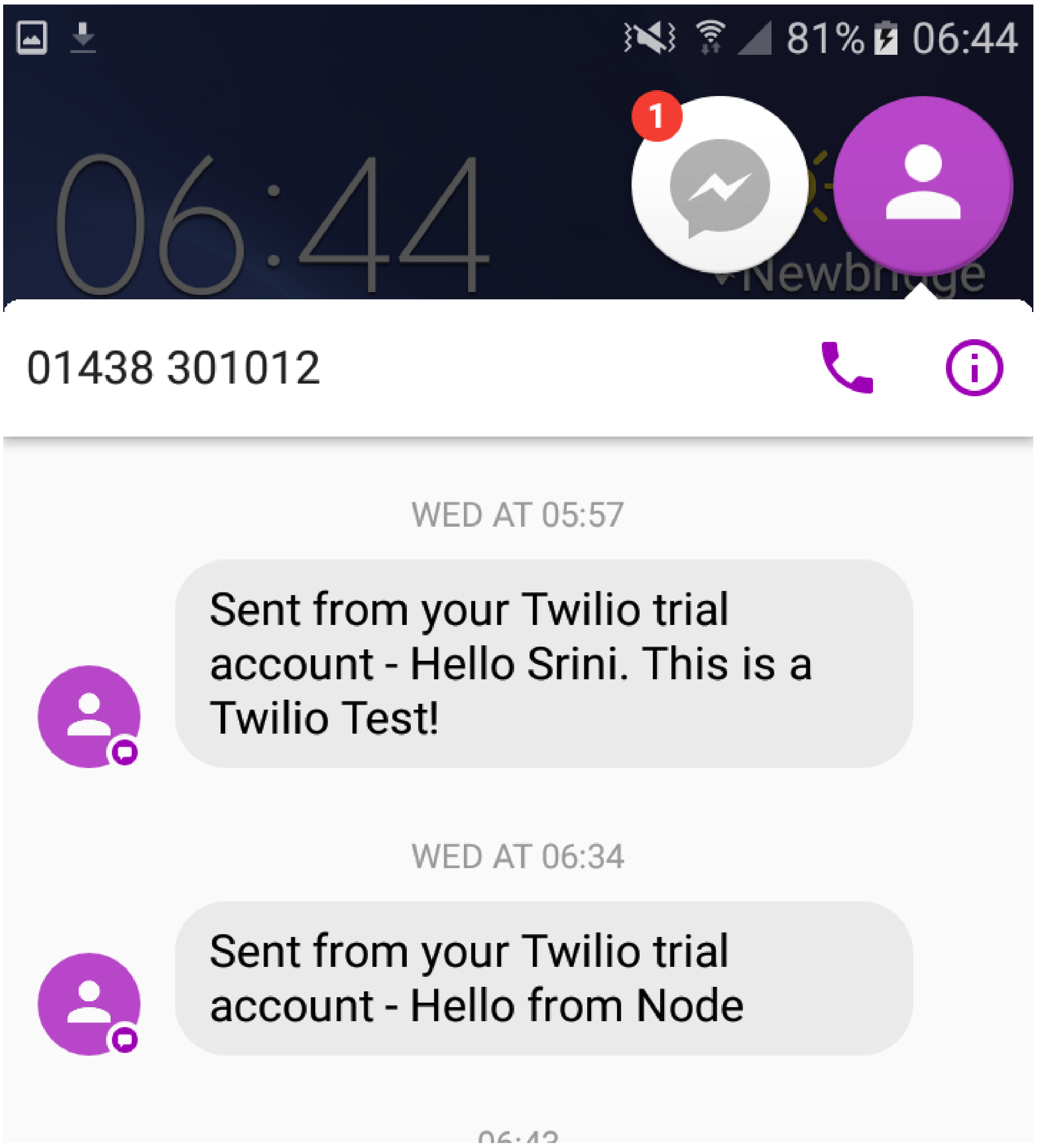
```
//Index.js

//Add your Account SID
varaccountSid='your_account_sid';
//Add your Auth Token here
varauthToken='your_auth_token';

var destinationStation = 'Glasgow Queen Street';
var userPhoneNumber = '+447888999999';
var sourceStationCode = 'EDB';
var sourceStation = 'Edinburgh Waverley';

getTrains(sourceStation, sourceStationCode, destinationStation, userPhoneNumber);
```

7. Run it on the `node index.js` console to see whether it works. It should print the summary of trains to the destination station on the console and also send it as an SMS notification message to you:



```
C:\Users\Srini\Documents\workspace\SMSBot>node index.js
Summary: Here are the departures this morning to Glasgow Queen Street.
Scotrail at 06:45
Scotrail at 07:00
Scotrail at 07:15
Scotrail at 07:30

SM79cb0e9ed7e5499f99ec35b3c2f77681

C:\Users\Srini\Documents\workspace\SMSBot>
```

8. Check your cellphone to see whether the message has arrived:



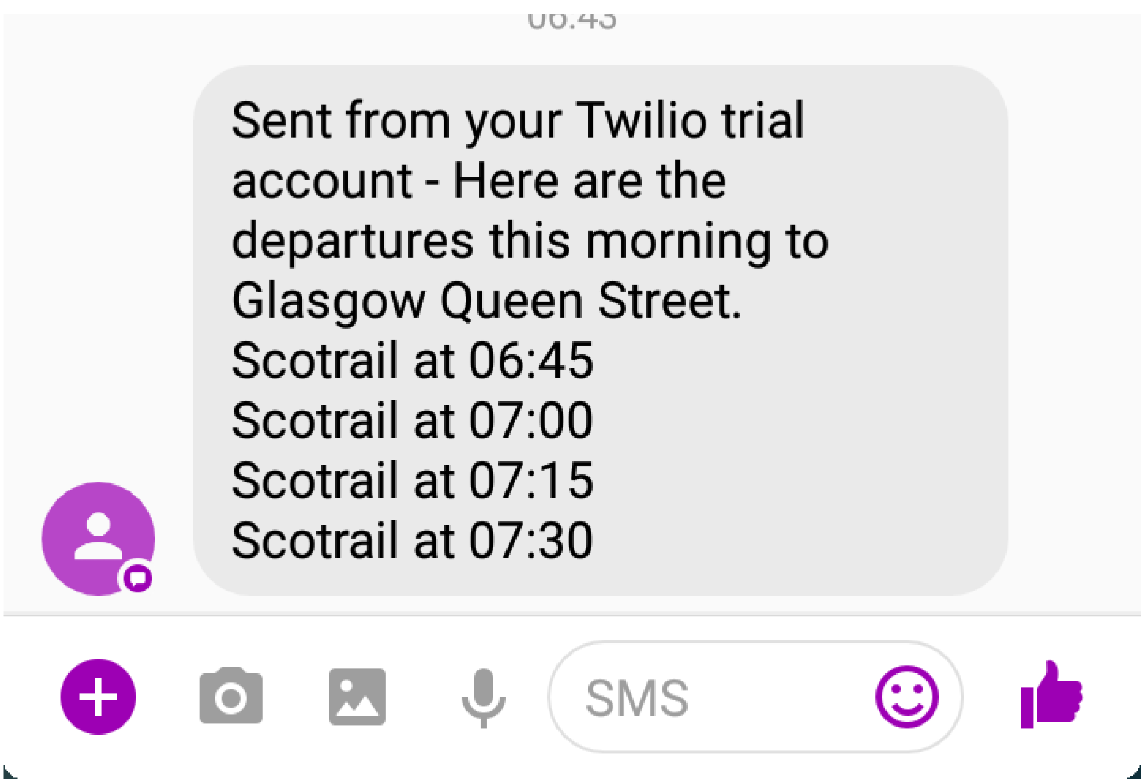
01438 301012

WED AT 05:57

Sent from your Twilio trial account - Hello Srini. This is a Twilio Test!

WED AT 06:34

Sent from your Twilio trial account - Hello from Node


Sent from your Twilio trial account - Here are the departures this morning to Glasgow Queen Street.
Scotrail at 06:45
Scotrail at 07:00
Scotrail at 07:15
Scotrail at 07:30

9. Congratulations! You have just created an SMS bot.

Scheduling tasks

Now that we have a bot that sends SMS notification, let us try our hand at setting it to run automatically on a daily or hourly basis. This feature will be useful to create proactive bots that initiate conversation with users at certain times of the day. To do this, follow these steps:

1. Create a `bin` directory.
2. Move the `index.js` file into the `bin` directory. Rename it as `sendTrainNotification.js`.
3. Add as the first line of code, the following shebang:

```
#!/usr/bin/env node
```

4. Go back to the project directory. We are now going to push this app into Heroku cloud.
5. Create a Git repository, add files, and commit:

```
git init
git add .
git commit -m "initial commit"
```

6. Create a Heroku app:

```
heroku create sms-notification-bot
```

7. Push the app to Heroku:

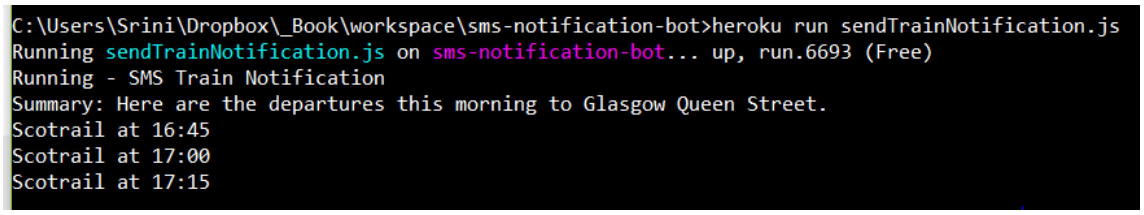
```
git push heroku master
```

We now have an app running at `https://sms-notification-bot.herokuapp.com`.

8. Run the app locally:

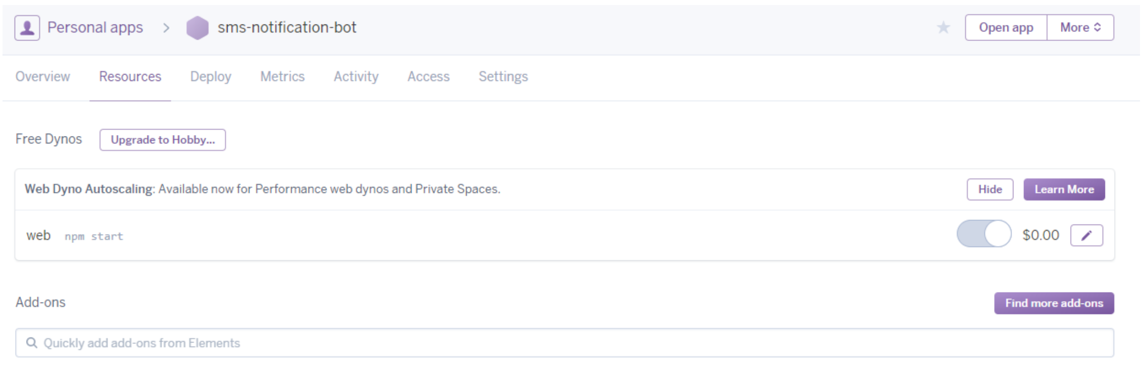
```
heroku run sendTrainNotification.js
```

This should run the web app and send an SMS with train summaries to the user's phone:

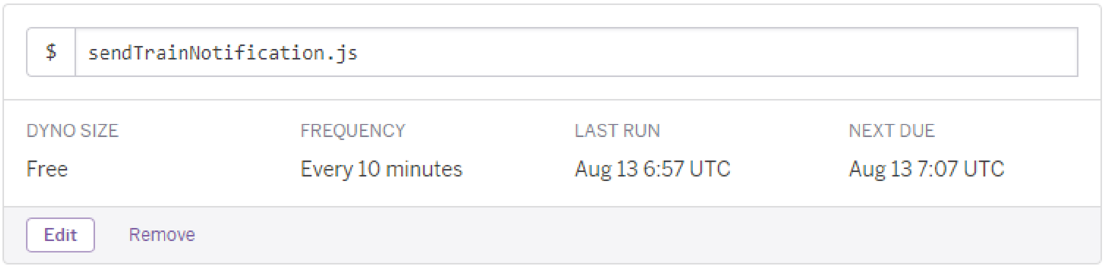


```
C:\Users\Srini\Dropbox\_Book\workspace\sms-notification-bot>heroku run sendTrainNotification.js
Running sendTrainNotification.js on sms-notification-bot... up, run.6693 (Free)
Running - SMS Train Notification
Summary: Here are the departures this morning to Glasgow Queen Street.
Scotrail at 16:45
Scotrail at 17:00
Scotrail at 17:15
```

9. Now, we need to schedule the task. To do this, we need to set it up on the Heroku resources page of the app. Go to `https://dashboard.heroku.com/apps/sms-notification-bot/resources` on your browser:



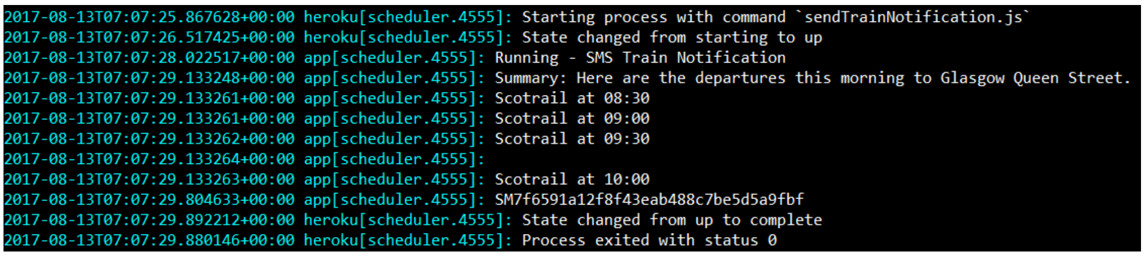
10. Type `Scheduler` in the **`Add-ons`** search box and choose **`Heroku Scheduler`**.
11. Once added, click **`Heroku Scheduler`**. This will take you to https://scheduler.heroku.com/dashboard.
12. Click **`Add new job`**.
13. In the textbox with **`$`**, type the name of the task to run (that is, `sendTrainNotification.js`). Choose **`Frequency`** (**`Daily`**, **`Hourly`**, or **`Every 10 minutes`**) and click **`SAVE`**:



```
$ sendTrainNotification.js
```

DYNO SIZE	FREQUENCY	LAST RUN	NEXT DUE
Free	Every 10 minutes	Aug 13 6:57 UTC	Aug 13 7:07 UTC

14. Check logs on the console of Heroku logs. You should notice that the task will be running at regular set intervals and SMS are being sent to the user:



```
2017-08-13T07:07:25.867628+00:00 heroku[scheduler.4555]: Starting process with command `sendTrainNotification.js`
2017-08-13T07:07:26.517425+00:00 heroku[scheduler.4555]: State changed from starting to up
2017-08-13T07:07:28.022517+00:00 app[scheduler.4555]: Running - SMS Train Notification
2017-08-13T07:07:29.133248+00:00 app[scheduler.4555]: Summary: Here are the departures this morning to Glasgow Queen Street.
2017-08-13T07:07:29.133261+00:00 app[scheduler.4555]: Scotrail at 08:30
2017-08-13T07:07:29.133261+00:00 app[scheduler.4555]: Scotrail at 09:00
2017-08-13T07:07:29.133262+00:00 app[scheduler.4555]: Scotrail at 09:30
2017-08-13T07:07:29.133264+00:00 app[scheduler.4555]:
2017-08-13T07:07:29.133263+00:00 app[scheduler.4555]: Scotrail at 10:00
2017-08-13T07:07:29.804633+00:00 app[scheduler.4555]: SM7f6591a12f8f43eab488c7be5d5a9fbf
2017-08-13T07:07:29.892212+00:00 heroku[scheduler.4555]: State changed from up to complete
2017-08-13T07:07:29.880146+00:00 heroku[scheduler.4555]: Process exited with status 0
```

Congratulations! You have now built a proactive SMS bot.

Summary

Brilliant! I hope you had a great time exploring and building a transport chatbot providing useful information on trains to users. Besides building the chatbot, we also explored the use of Twilio communication APIs to expose the chatbot over the SMS platform. I hope you tried to chat with your bot over SMS and realized how easy it is to get useful information without internet data. We did explore a few conversational tasks and also got to implement a couple. However, you could move on to more complex tasks, such as journey planning, based on the chatbot model that we built in this lab.