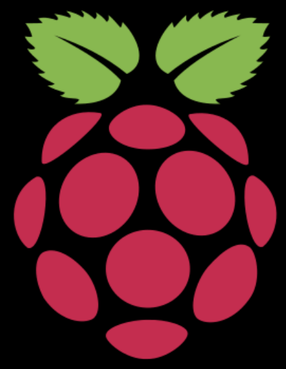


Projeto 04

Controle por Notificação – Teoria

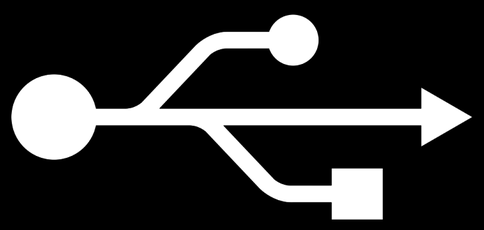
Jan K. S. – janks@puc-rio.br

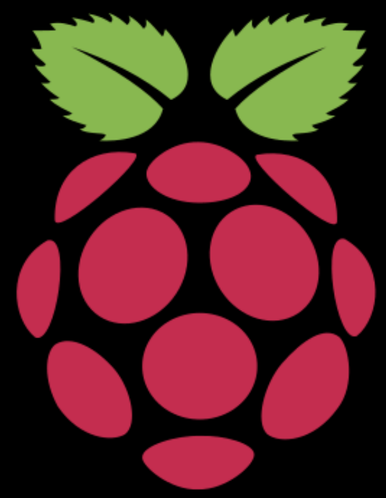
ENG1419 – Programação de Microcontroladores

Hardware

Webcam

USB





Comunicação via USB com o Sistema Operacional do Raspberry

comando

comando

Envio de Comandos para Programas que Controlam a Webcam

man.cx/fswebcam

Manpages

Manpage: go

Available in

(1)

Contents

NAME

fswebcam – Small and simple webcam for *nix.

SYNOPSIS

fswebcam [*<options>*] *<filename>* [[*<options>*] *<filename>* ...]

DESCRIPTION

fswebcam is a small and simple webcam app for *nix. It can capture images from a number of different sources and perform simple manipulation on the captured image. The image can be saved as one or more PNG or JPEG files.

The PNG or JPEG image can be sent to stdio using the filename "–". The output filename is formatted by **strftime**.

CONFIGURATION

Configuration File

Config files use the long version of options without the "––" prefix.
Comments start with a # symbol at the beginning of the line.

General Options

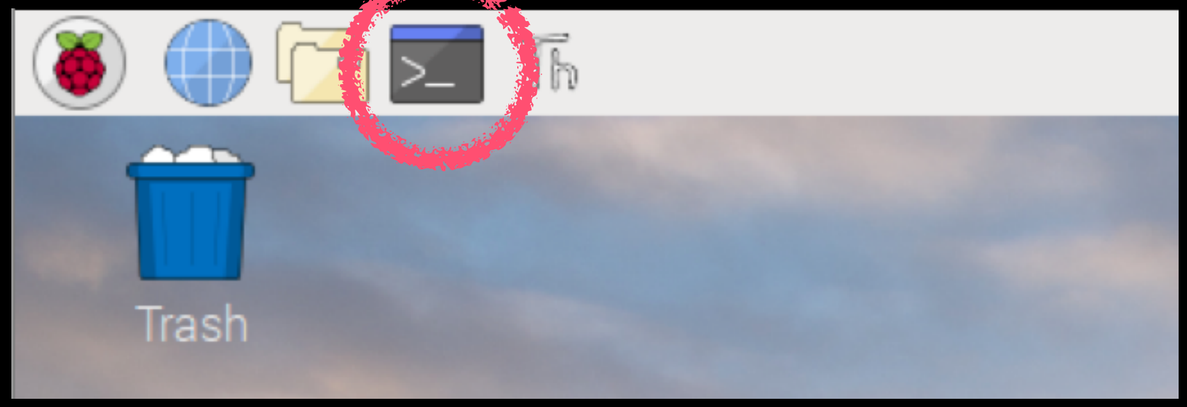
–?, ––help

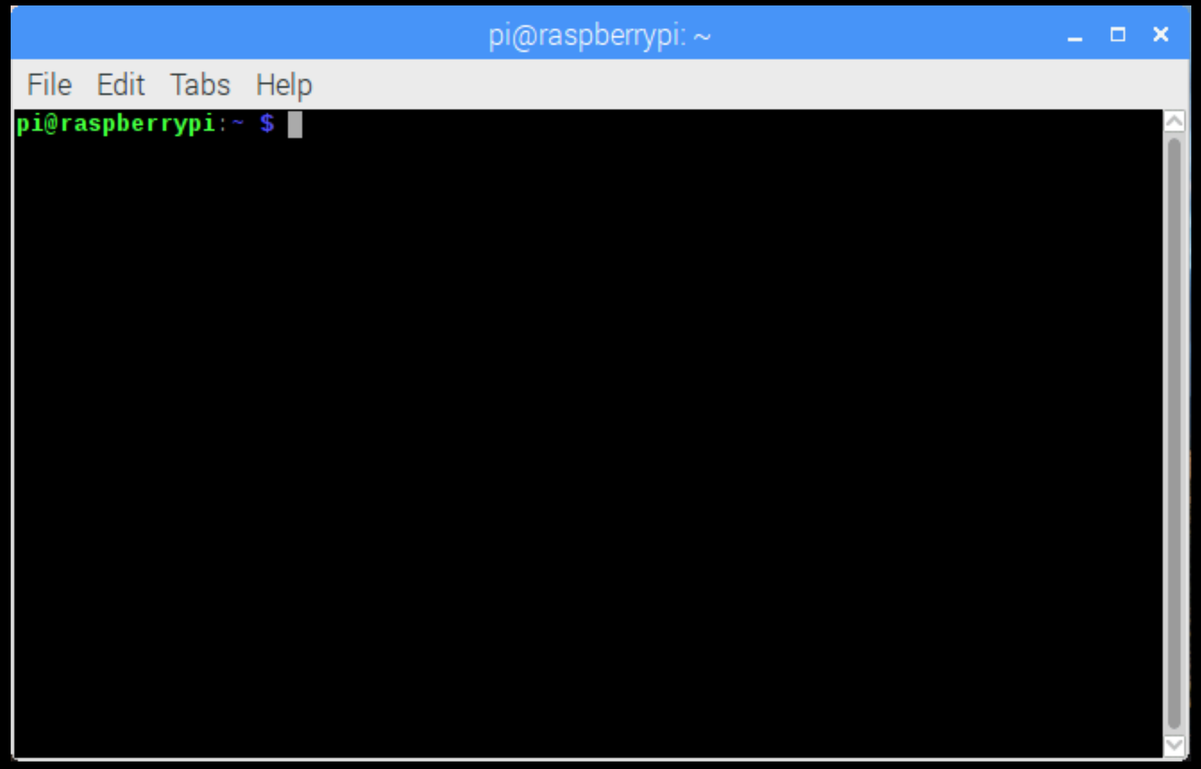
Show a usage summary.

–c, ––config

Load options from a file. You can load more than one config file, and can mix them with command–line arguments.

Aplicativo FSWebcam



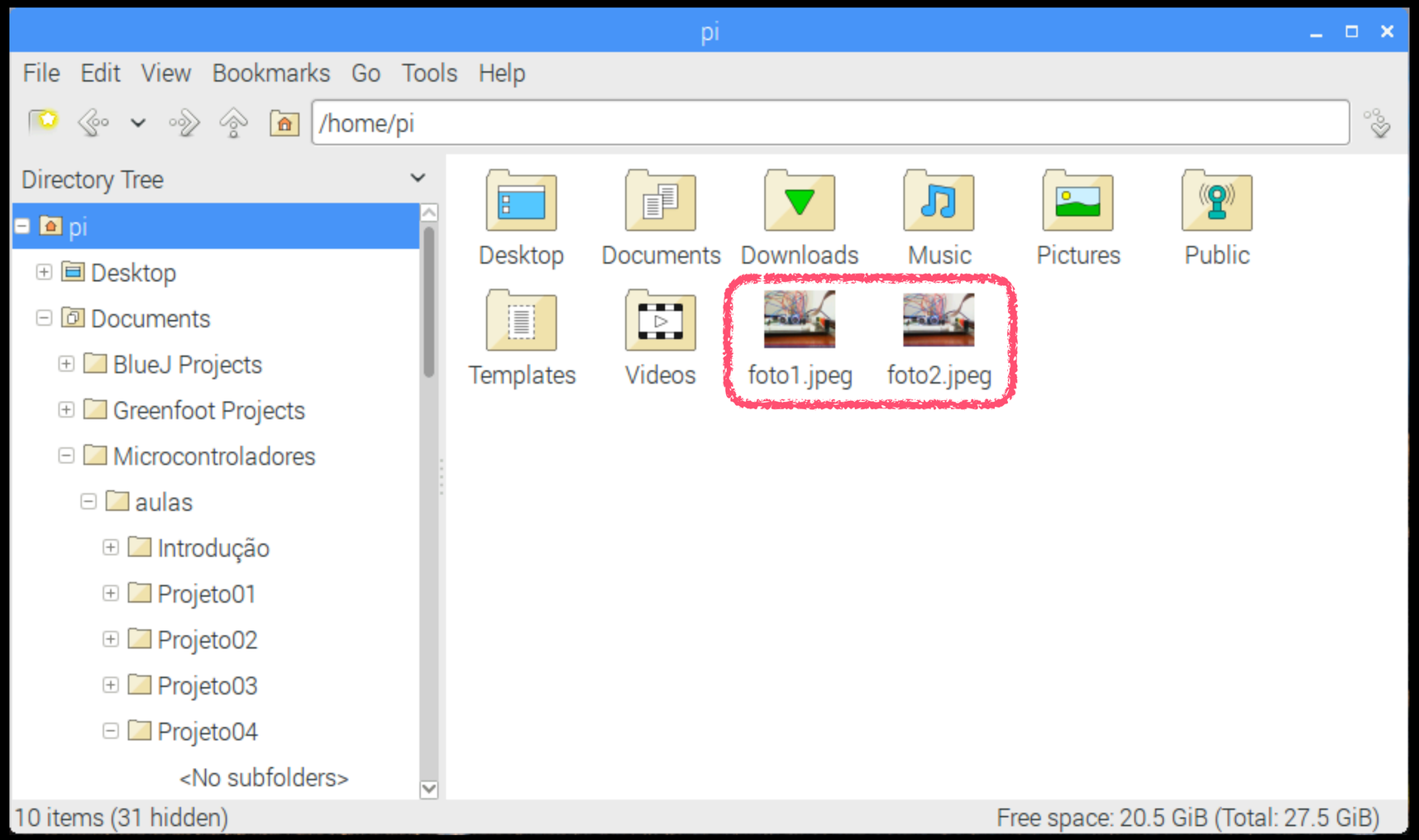


Aplicativo Terminal

```
aula@raspberrypi ~ $ fswebcam foto1.jpeg
--- Opening /dev/video0...
Trying source module v4l2...
/dev/video0 opened.
No input was specified, using the first.
Adjusting resolution from 384x288 to 352x288.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Writing JPEG image to 'foto1.jpeg'.
```

```
aula@raspberrypi ~ $ fswebcam --resolution 640x480 foto2.jpeg
--- Opening /dev/video0...
Trying source module v4l2...
/dev/video0 opened.
No input was specified, using the first.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Writing JPEG image to 'foto2.jpeg'.
```

Comandos no Terminal para Captura de Fotos



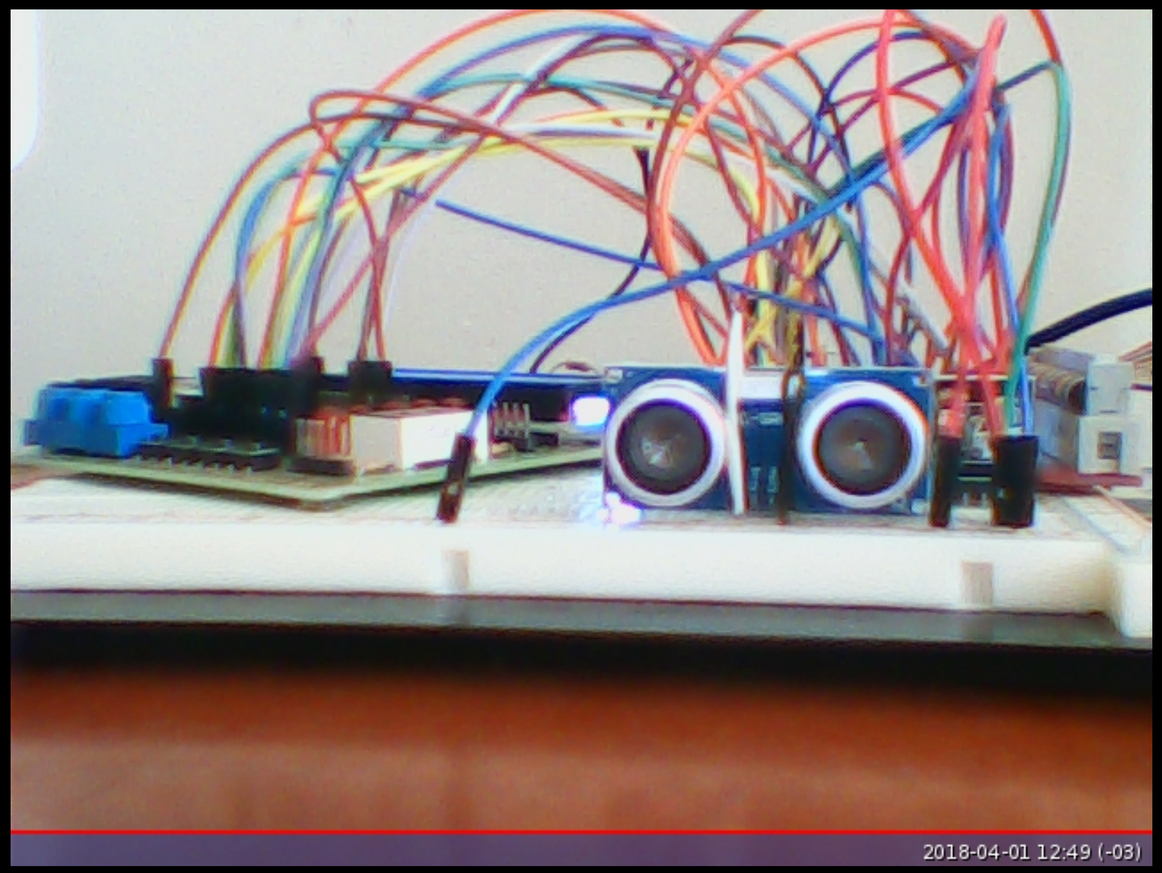
Arquivos Gerados no File Manager

foto1.jpeg

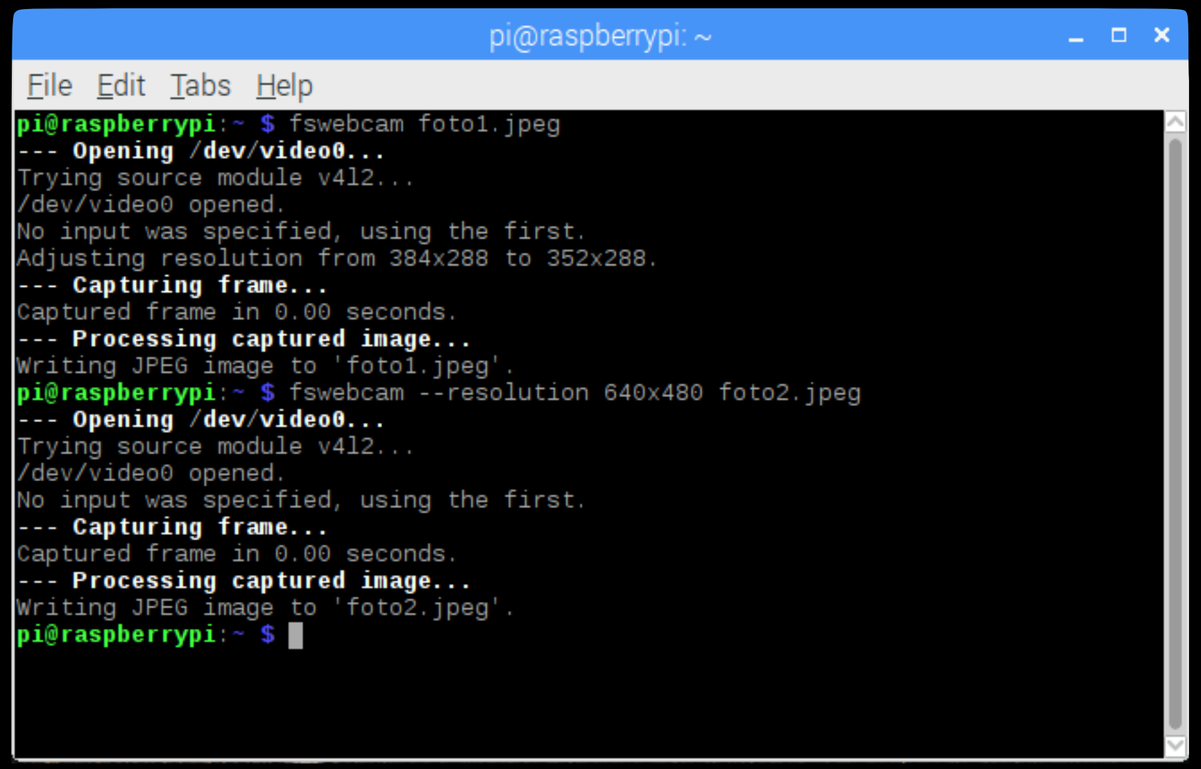
resolução padrão (352 × 288)

foto2.jpeg

resolução 640x480



Comparação entre Diferentes Resoluções



Chamada de Comandos do Terminal em Python

As imagens são geradas na mesma pasta
do arquivo com o código Python.

```
>>> from os import system
>>> comando = "fswebcam foto1.jpeg"
>>> system(comando)
>>> system("fswebcam --resolution 640x480 foto2.jpeg")
```

Chamada de Comandos para Tirar uma Foto

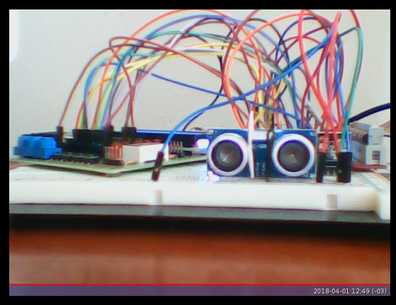


foto-15:25:37.jpeg

```
>>> from os import system
>>> from datetime import datetime
>>> agora = datetime.now()
>>> hora = agora.strftime("%H:%M:%S")
>>> nome_do_arquivo = "foto_" + hora + ".jpeg"
>>> comando = "fswebcam " + nome_do_arquivo
>>> comando
'fswebcam foto-15:25:37.jpeg'
>>> system(comando)
```

Nome da Foto com Data e Hora

=

+

Microfone da Câmera Web

man.cx/arecord

Manpages

Manpage: go

Available in

(1)

Contents

NAME

arecord, aplay – command–line sound recorder and player for ALSA soundcard driver

SYNOPSIS

arecord [*flags*] [filename]
aplay [*flags*] [filename [filename]] ...

DESCRIPTION

arecord is a command–line soundfile recorder for the ALSA soundcard driver. It supports several file formats and multiple soundcards with multiple devices. If recording with interleaved mode samples the file is automatically split before the 2GB filesize.

aplay is much the same, only it plays instead of recording. For supported soundfile formats, the sampling rate, bit depth, and so forth can be automatically determined from the soundfile header.

If filename is not specified, the standard output or input is used. The **aplay** utility accepts multiple filenames.

OPTIONS

–h, ––help

Help: show syntax.

––version

Print current version.

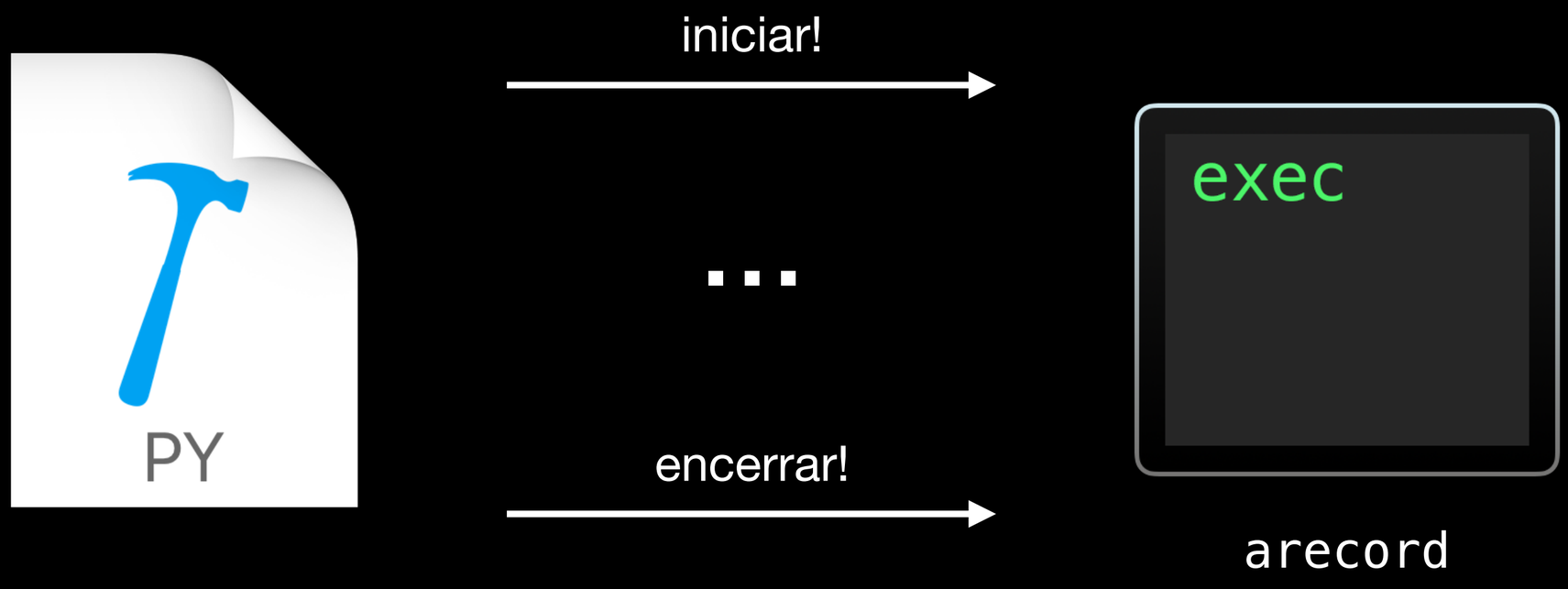
Aplicativo ARecord

audio1.wav
(baixa qualidade)

audio2.wav
(qualidade de CD)

```
>>> from os import system
>>> system("arecord --duration 3 audio1.wav")
>>> system("arecord --duration 3 --format cd audio2.wav")
```

Gravação de 3 Segundos de Áudio



Interrupção da Gravação de Áudio

```
>>> from subprocess import Popen
>>> aplicativo = None
>>> def iniciar_gravacao():
...     global aplicativo
...     # limite máximo de 30 segundos, caso não parem a gravação
...     comando = ["arecord", "--duration", "30", "audio.wav"]
...     aplicativo = Popen(comando) # executa em plano de fundo
...
>>> def parar_gravacao():
...     global aplicativo
...     if aplicativo != None:
...         aplicativo.terminate()
...         aplicativo = None
...
>>> iniciar_gravacao()
>>> ...
>>> parar_gravacao() ⟶ WAV audio.wav
```

Interrupção da Gravação de Áudio

audio.wav
516 kB

audio.mp3
47.8 kB

audio.ogg
28.9 kB

Conversão do Formato WAV para MP3 e para OGG

man.cx/lame

Manpages

Manpage: go

NAME

lame – create mp3 audio files

SYNOPSIS

lame [options] <infile> <outfile>

DESCRIPTION

LAME is a program which can be used to create compressed audio files. (Lame ain't an MP3 encoder). These audio files can be played back by popular MP3 players such as mpg123 or madplay. To read from stdin, use "–" for <infile>. To write to stdout, use "–" for <outfile>.

OPTIONS

Input options:

–r Assume the input file is raw pcm. Sampling rate and mono/stereo/jstereo must be specified on the command line. For each stereo sample, LAME expects the input data to be ordered left channel first, then right channel. By default, LAME expects them to be signed integers with a bitwidth of 16 and stored in little-endian. Without **–r,** LAME will perform several *fseek()'s* on the input file looking for WAV and AIFF headers.

Might not be available on your release.

–x Swap bytes in the input file (or output file when using **––decode).**

Available in

(1)

Contents

man.cx/opusenc

Manpages

Manpage: lame go

Available in

(1)

Contents

NAME

opusenc – encode audio into the Opus format

SYNOPSIS

opusenc [**-h**] [**-V**] [**--help-picture**] [**--quiet**] [**--bitrate** *kbit/sec*] [**--vbr**] [**--cvbr**] [**--hard-cbr**] [**--comp** *complexity*] [**--framesize** *2.5, 5, 10, 20, 40, 60*] [**--expect-loss** *pct*] [**--downmix-mono**] [**--downmix-stereo**] [**--max-delay** *ms*] [**--title** *'track title'*] [**--artist** *author*] [**--album** *'album title'*] [**--genre** *genre*] [**--date** *YYYY-MM-DD*] [**--comment** *tag=value*] [**--picture** *filename|specification*] [**--padding** *n*] [**--discard-comments**] [**--discard-pictures**] [**--raw**] [**--raw-bits** *bits/sample*] [**--raw-rate** *Hz*] [**--raw-chan** *N*] [**--raw-endianness** *flag*] [**--ignorelength**] [**--serial** *serial number*] [**--save-range** *file*] [**--set-ctl-int** *ctl=value*] *input.wav output.opus*

DESCRIPTION

opusenc reads audio data in Wave, AIFF, FLAC, Ogg/FLAC, or raw PCM format and encodes it into an Ogg Opus stream. If the input file is "-" audio data is read from stdin. Likewise, if the output file is "-" the Ogg Opus stream is written to stdout.

Unless quieted **opusenc** displays fancy statistics about the encoding progress.

OPTIONS

General options

-h, --help

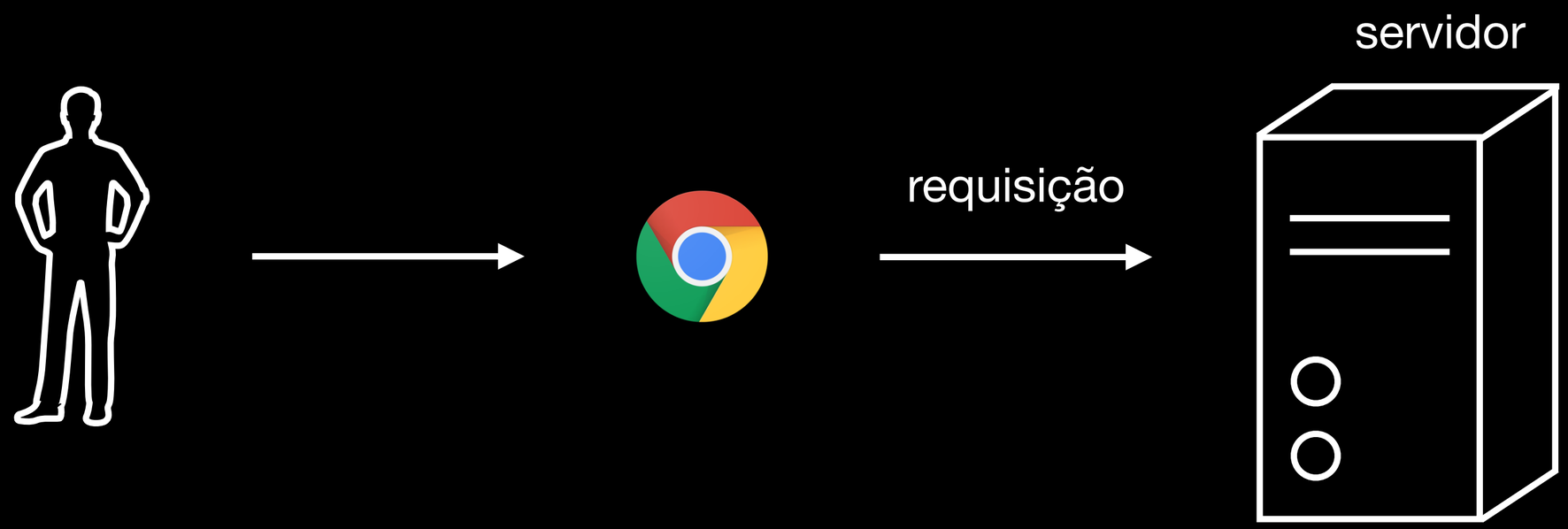
Show command help

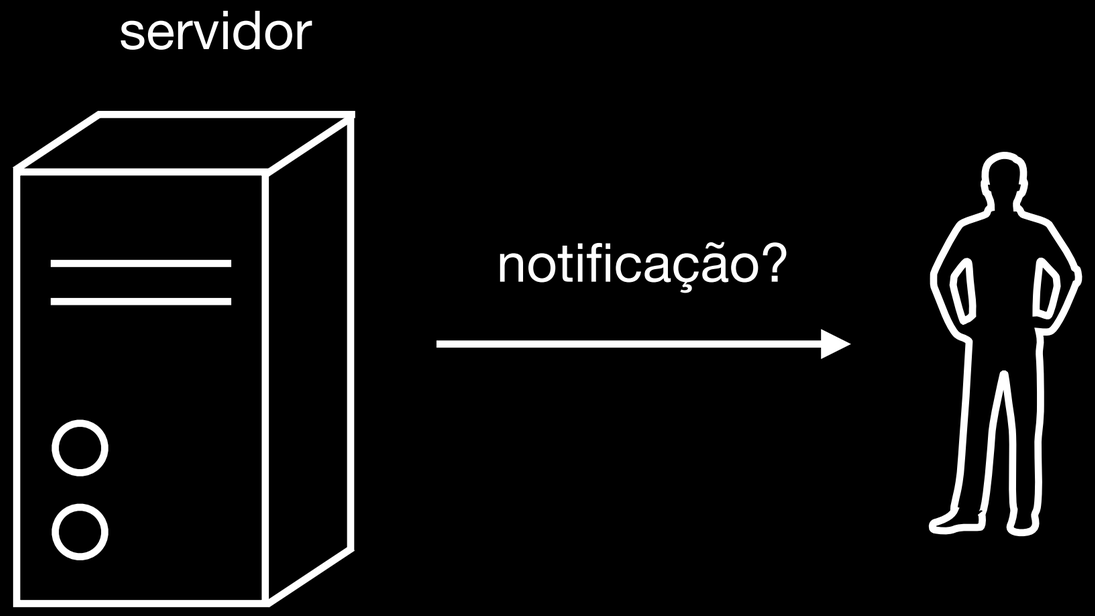
Aplicativos Lame e OpusEnc


```
>>> from os import system
>>> system("lame audio.wav audio.mp3")
>>> system("opusenc audio.wav audio.ogg")
```

Conversão de WAV para MP3 e para OGG em Python

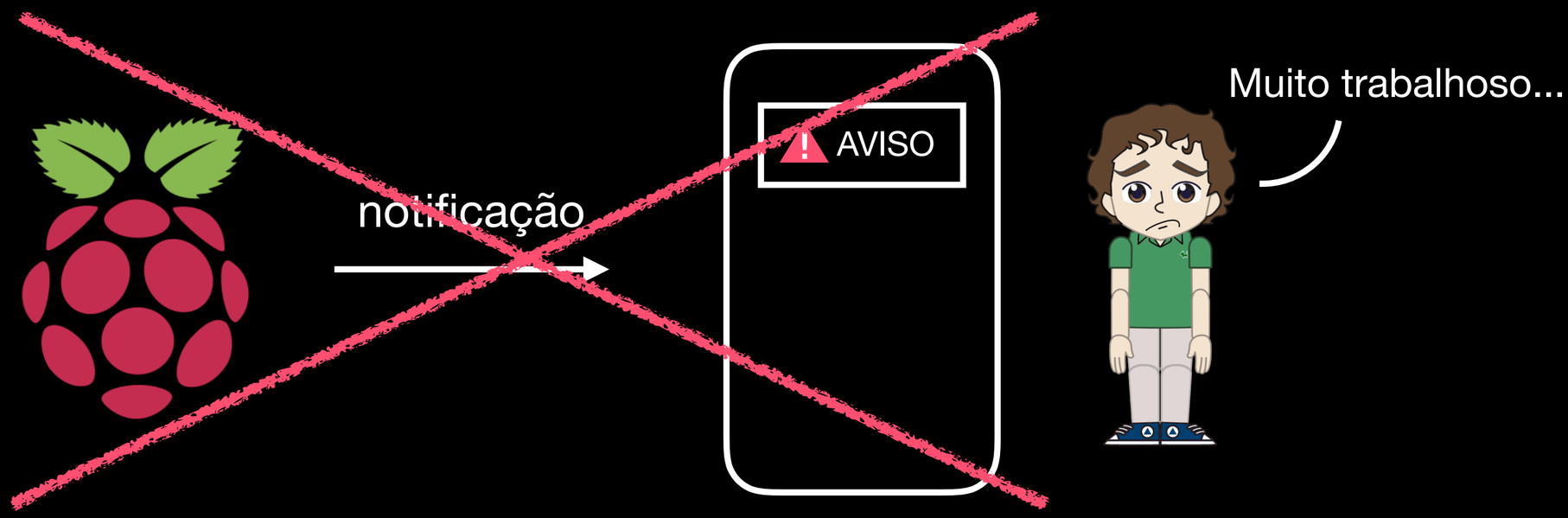
Software

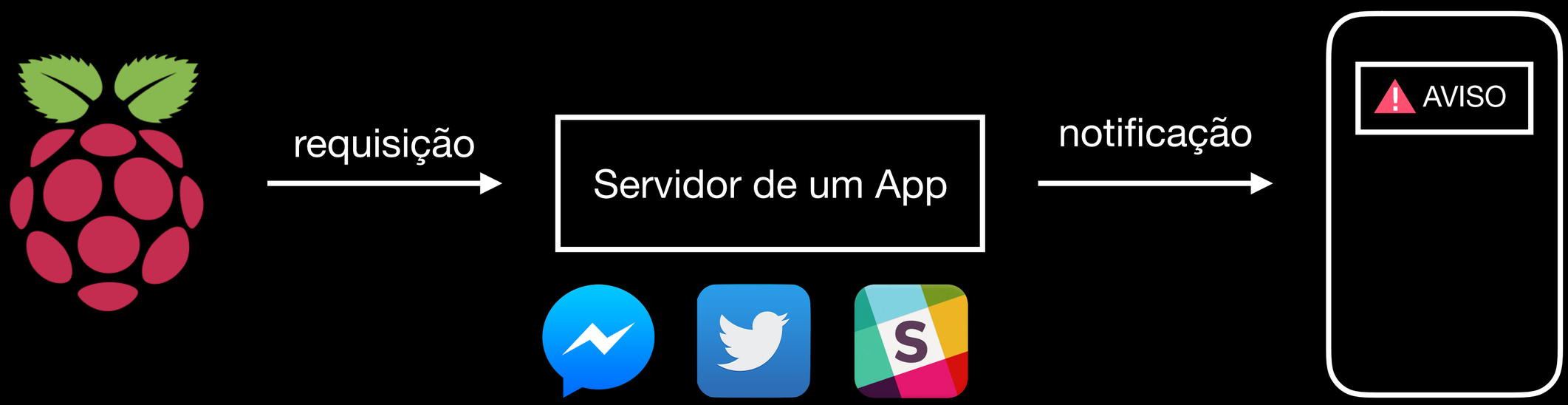




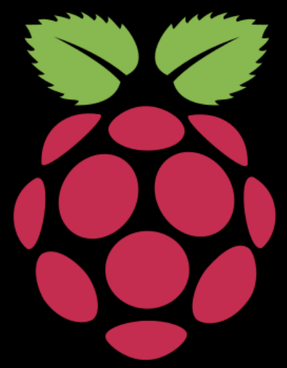
Requisição x Notificação

Notificação em Smartphones via Apps





Notificações com um Servidor Intermediário



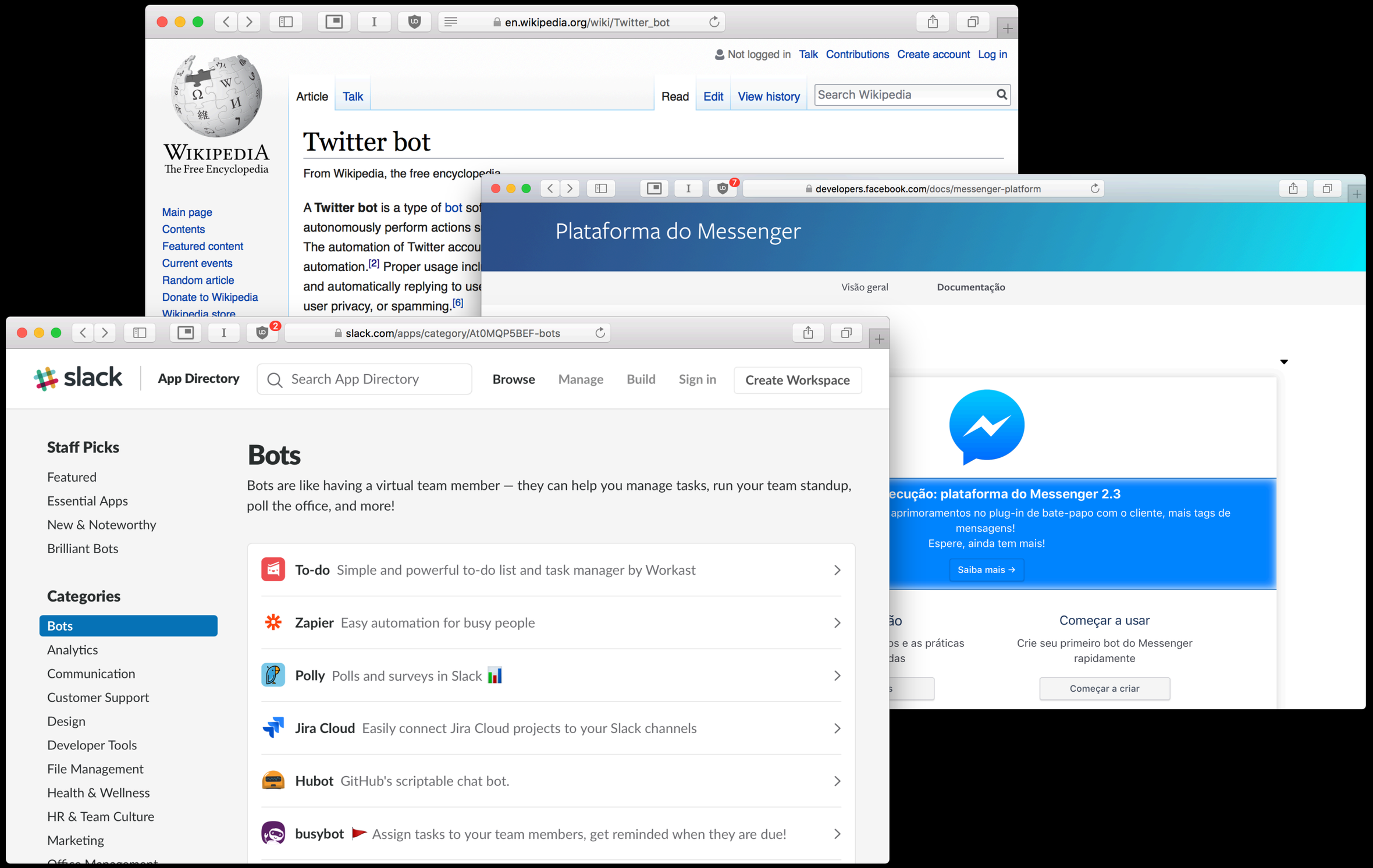
"bot"

requisição

Servidor de um App

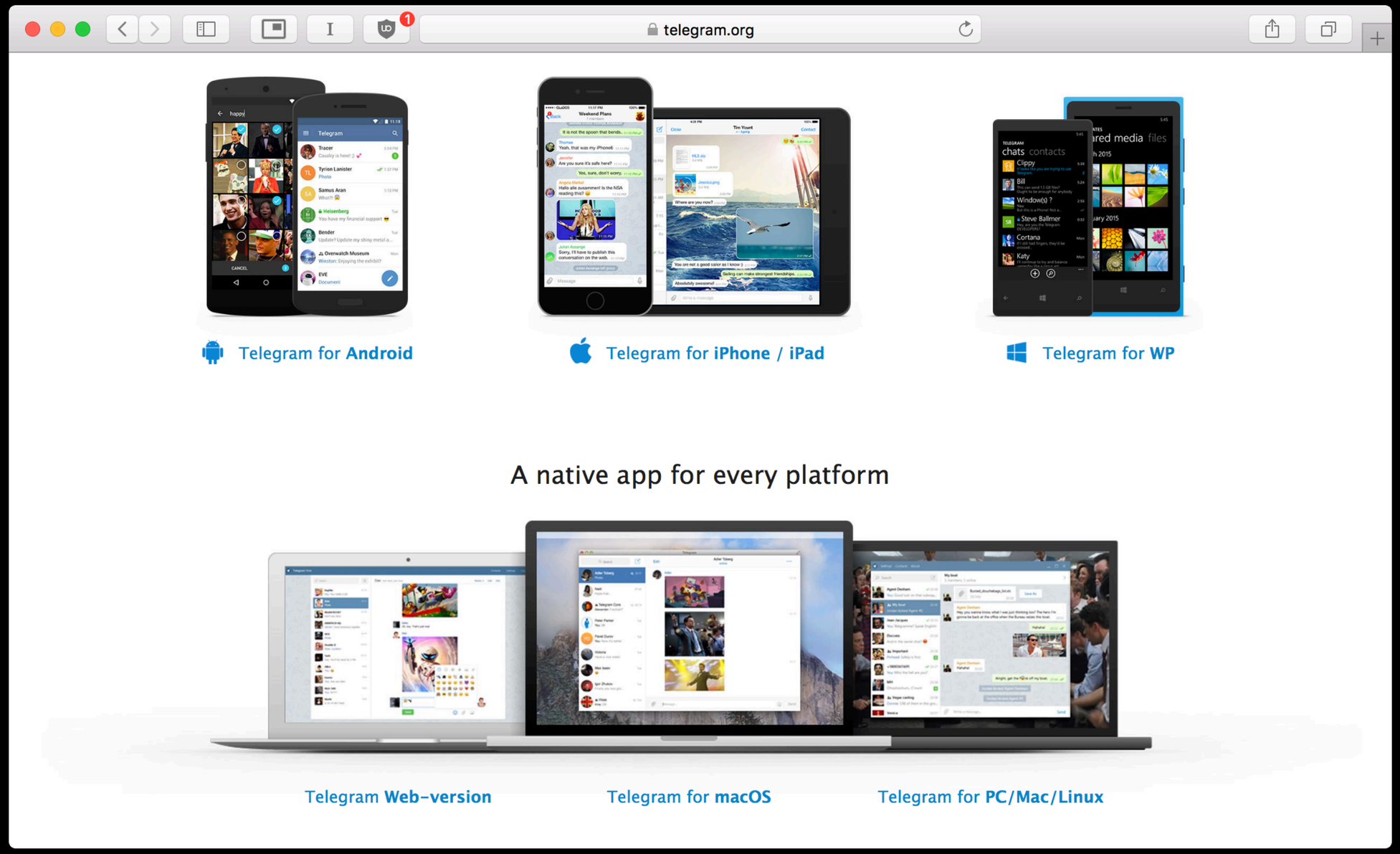
objetivo do Projeto 04

Notificações via Bots

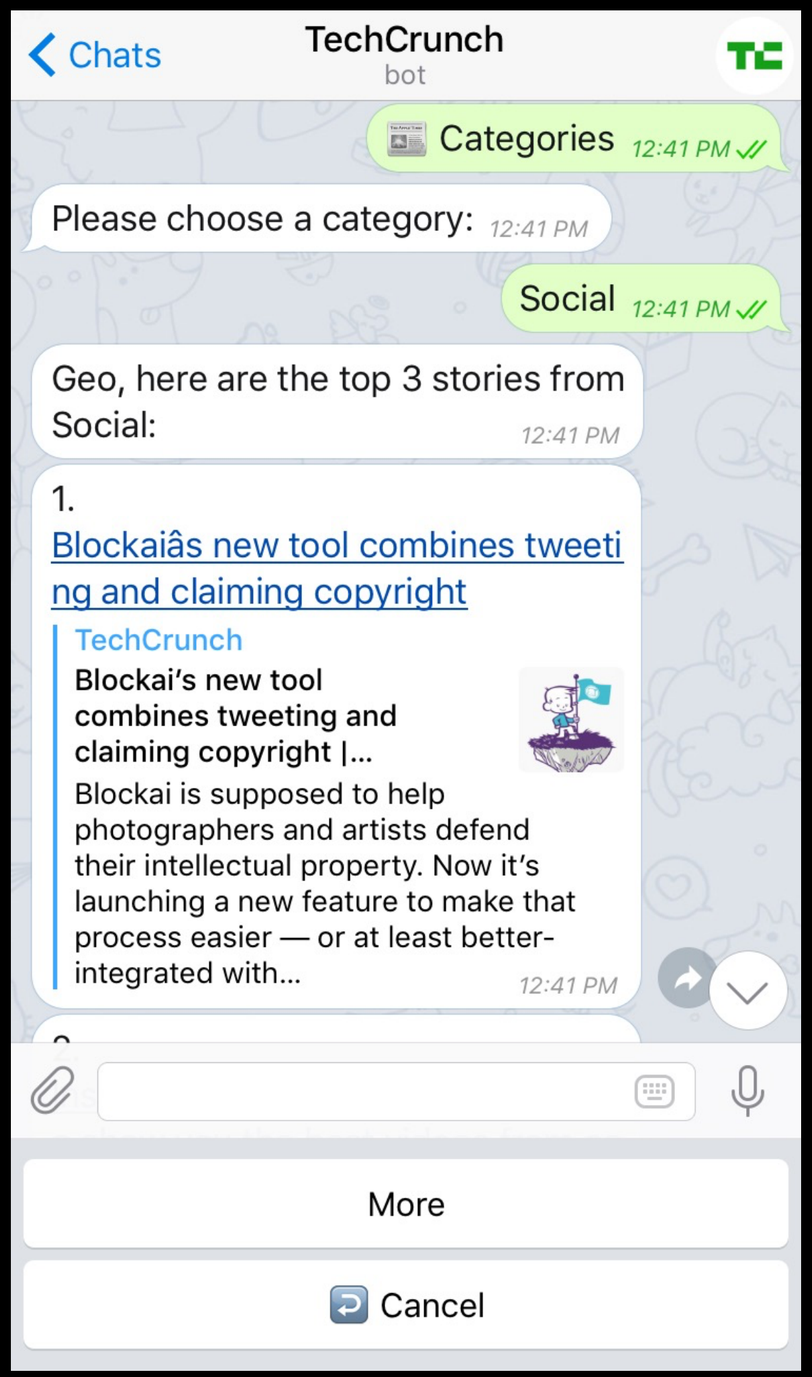


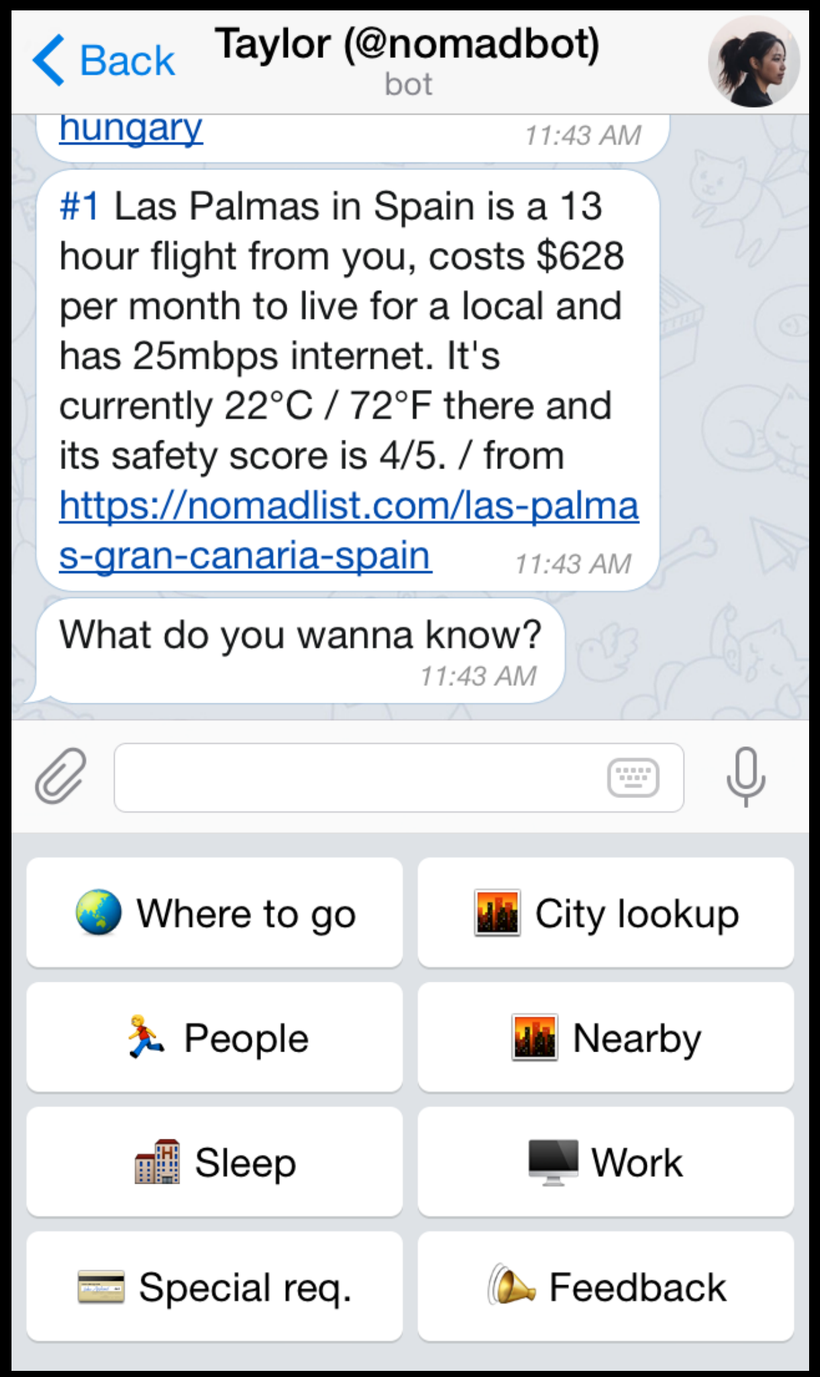
Exemplos de Comunicação entre Bots e Apps

Telegram



Plataformas do Telegram

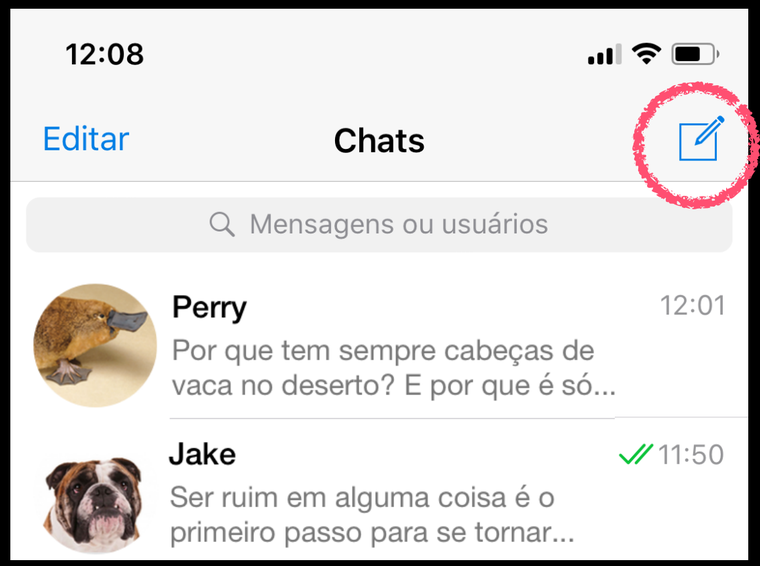


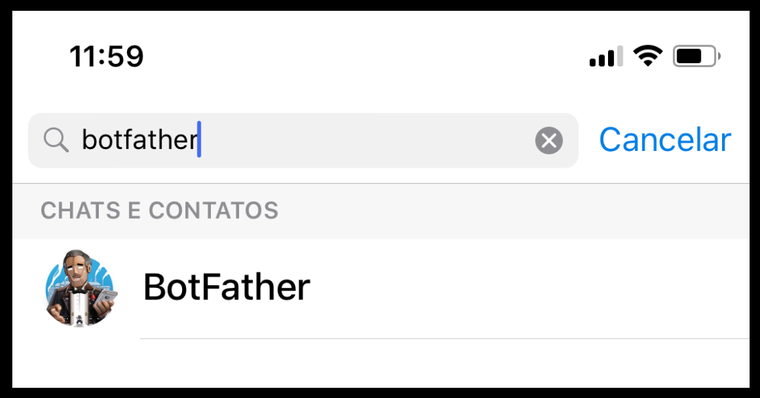


Exemplos de Conversas com Bots

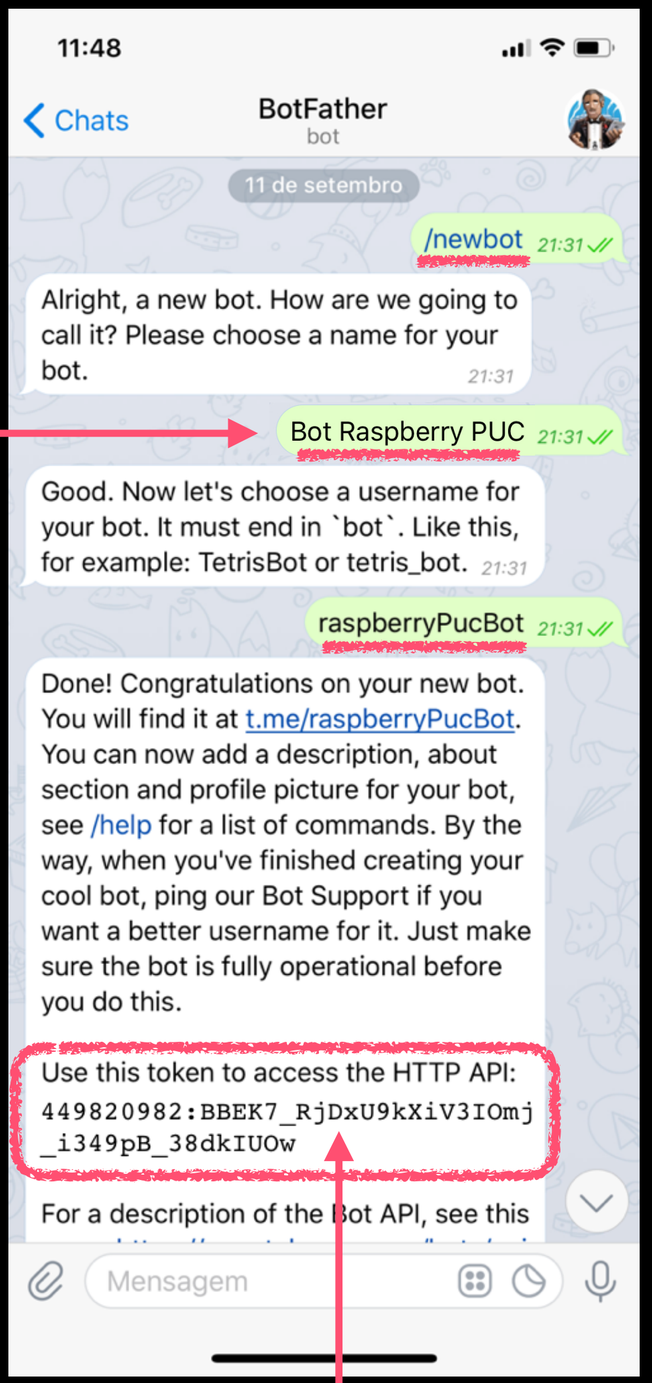
BotFather is the one bot to rule them all.
Use it to create new bot accounts and manage your existing bots.

Criação de Bots no Telegram via BotFather





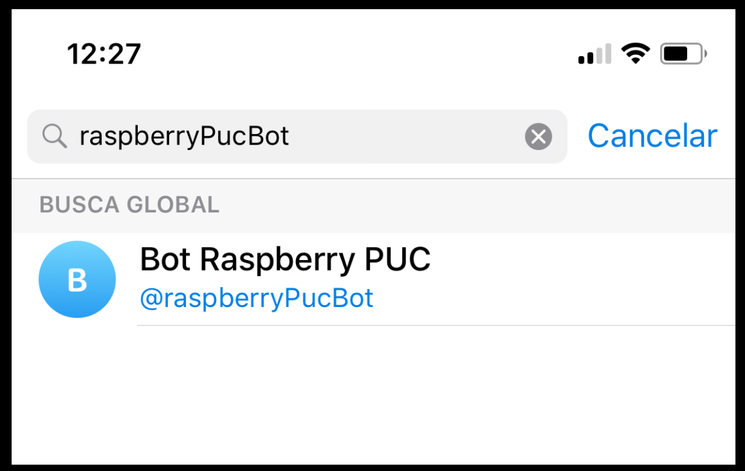
invente um nome seu!



anote esta chave!

Criação de Bots no Telegram via BotFather

pesquise o nome
do SEU bot!



Conversa com o Seu Bot

core.telegram.org/bots/api

Go up

sendMessage

Use this method to send text messages. On success, the sent Message is returned.

Parameters	Type	Required	Description
chat_id	Integer or String	Yes	Unique identifier for the target chat or username of the target channel (in the format `@channelusername`)
text	String	Yes	Text of the message to be sent
parse_mode	String	Optional	Send *Markdown* or *HTML*, if you want Telegram apps to show bold, italic, fixed-width text or inline URLs in your bot's message.
disable_web_page_preview	Boolean	Optional	Disables link previews for links in this message
disable_notification	Boolean	Optional	Sends the message silently. Users will receive a notification with no sound.
reply_to_message_id	Integer	Optional	If the message is a reply, ID of the original message
reply_markup	InlineKeyboardMarkup or ReplyKeyboardMarkup or ReplyKeyboardRemove or ForceReply	Optional	Additional interface options. A JSON-serialized object for an inline keyboard, custom reply keyboard, instructions to remove reply keyboard or to force a reply from the user.

Muita coisa para entender!

Métodos Cheios de Detalhes do Telegram

docs.python-requests.org

Requests 3.0 development is underway, and your financial help is appreciated!

Fork me on GitHub

Star 31,429

Requests is an elegant and simple HTTP library for Python, built for human beings.

Sponsored by **Linode** and other wonderful organizations.

Requests Stickers!

Stay Informed

Receive updates on new releases and upcoming projects.

Requests: HTTP for Humans

Release v2.18.4. (Installation)

license Apache 2.0 | wheel yes | python 2.6, 2.7, 3.4, 3.5, 3.6 | codecov 90% | Say Thanks!

Requests is the only *Non-GMO* HTTP library for Python, safe for human consumption.

> Note:
>
> The use of **Python 3** is *highly* preferred over Python 2. Consider upgrading your applications and infrastructure if you find yourself *still* using Python 2 in production today. If you are using Python 3, congratulations — you are indeed a person of excellent taste.
> —*Kenneth Reitz*

Behold, the power of Requests:

```
>>> r = requests.get('https://api.github.com/user', auth=('user', 'pass'))
>>> r.status_code
200
>>> r.headers['content-type']
'application/json; charset=utf8'
>>> r.encoding
'utf-8'
```

v: master

Biblioteca para Requisições HTTP

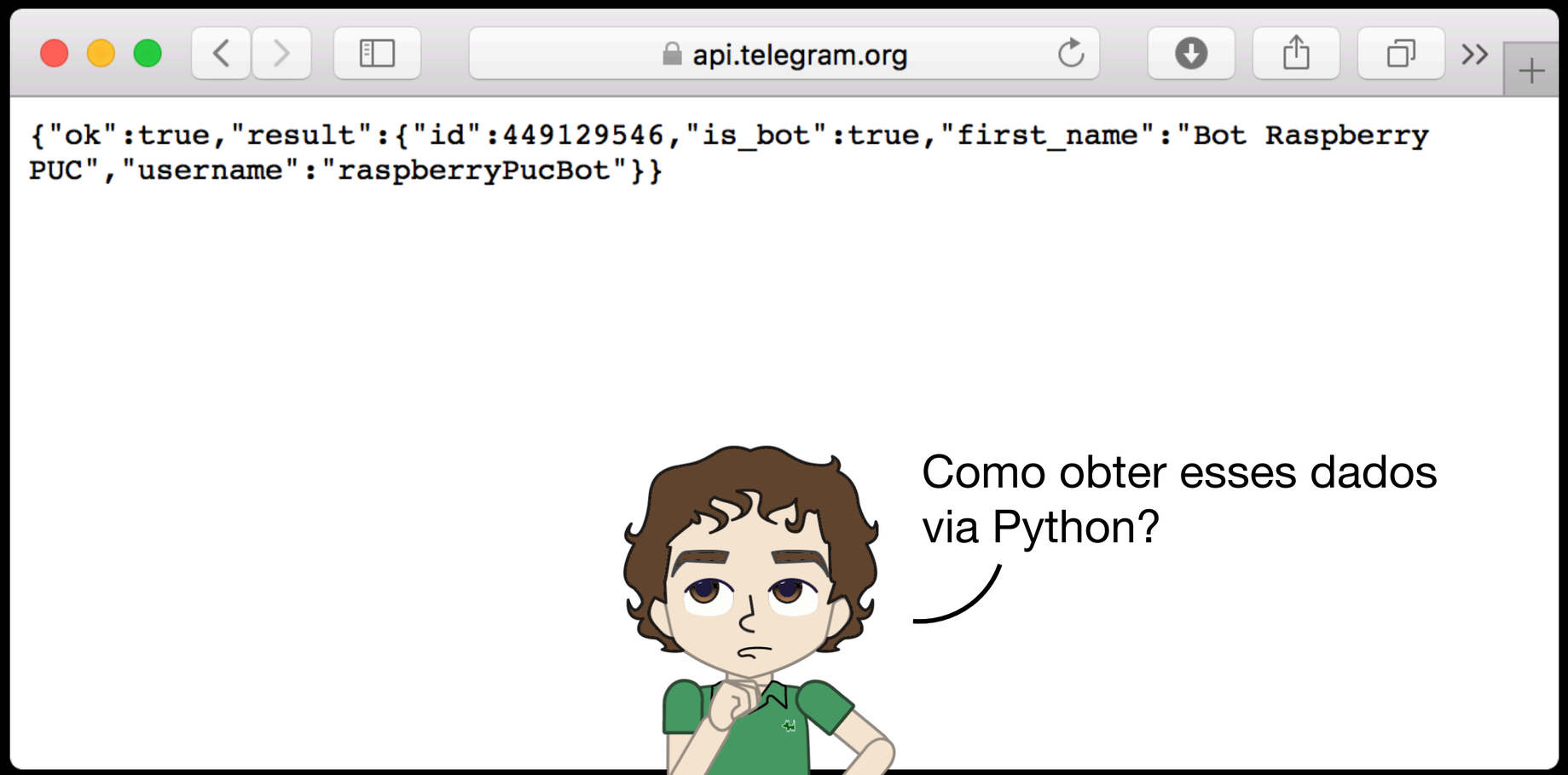
endereço web do comando
+ dados opcionais

resposta

Servidor de um App

Requisição Web a um Servidor

api.telegram.org/botSUA_CHAVE_SECRETA/getMe



Endereço para Informações sobre o Bot do Telegram

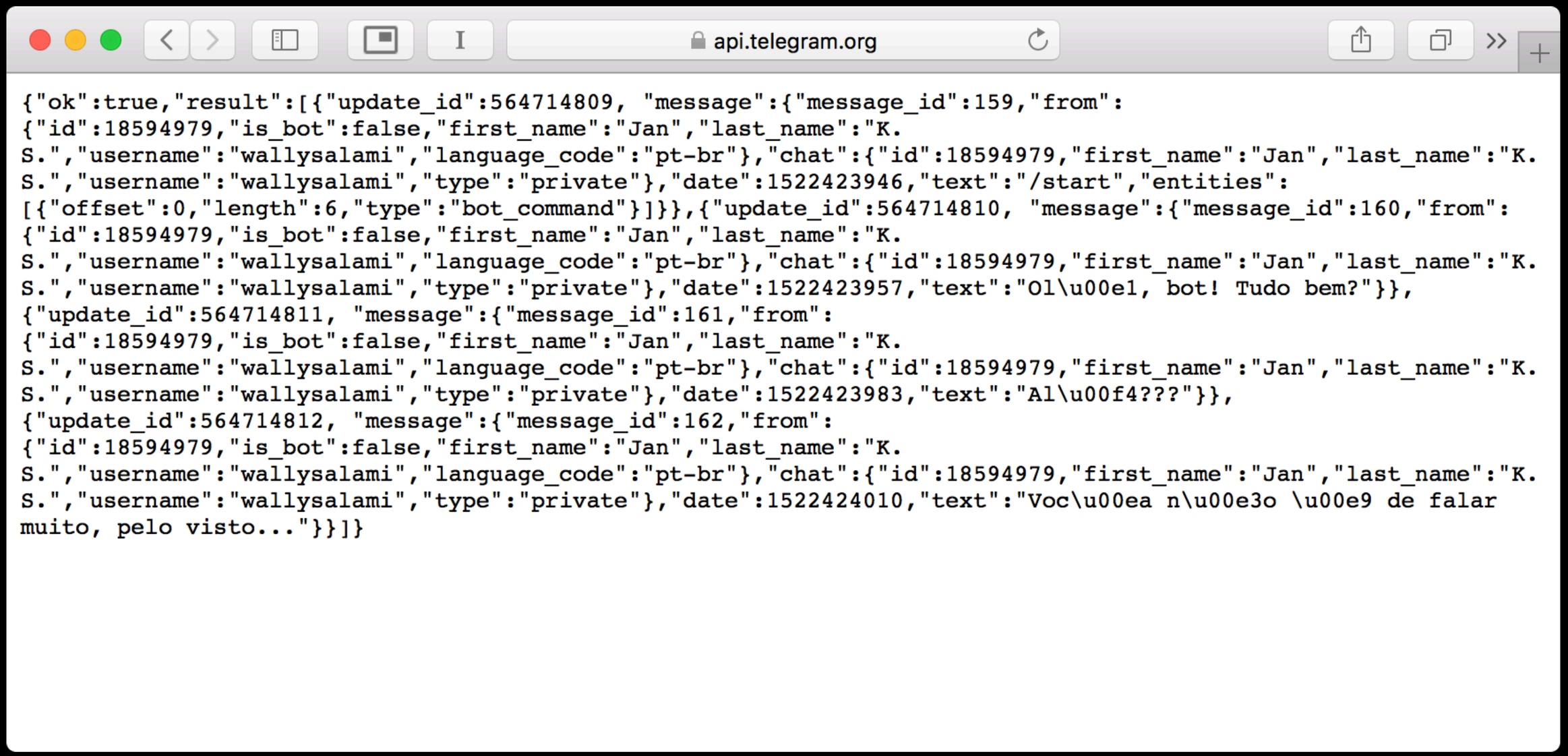
```
>>> chave = "COLOQUE A SUA CHAVE AQUI!"
>>> endereco_base = "https://api.telegram.org/bot" + chave
```

Atenção ao "s"!

```
>>> from requests import get

>>> endereco = endereco_base + "/getMe"

>>> resposta = get(endereco)


>>> resposta
<Response [200]>

>>> resposta.text
'{"ok": true, "result": {"id":449820982, "is_bot": true,
"first_name": "Bot Raspberry PUC", "username": "raspberryPucBot"}}'

>>> dicionario_da_resposta = resposta.json()

>>> dicionario_da_resposta["ok"]
True

>>> dicionario_da_resposta["result"]
{'id': 449129546, 'is_bot': True, 'first_name': 'Bot Raspberry
PUC', 'username': 'raspberryPucBot'}

>>> dicionario_da_resposta["result"]["username"]
'raspberryPucBot'
```

Chamada GET para Informações sobre o Bot

api.telegram.org/botSUA_CHAVE_SECRETA/getUpdates



Endereço para Obter Atualizações das Conversas com o Bot

```
{
   "ok":true,
   "result":[
      {
         "update_id":564714809,
         "message":{
            ...
            "chat":{
               "id":314253469,
               "first_name":"Jan",
               "last_name":"K. S.",
               ...
            },
            "text":"/start"
         }
      },
      {
         "update_id":564714810,
         "message":{
            ...
            "chat":{
               "id":314253469,
               "first_name":"Jan",
               "last_name":"K. S.",
               ...
            },
            "text":"Olá, bot! Tudo bem?"
         }
      },
      ...
   ]
}
```


Campos Importantes nas Atualizações de Mensagens

{json}

KEEP CALM AND PERCORRE O JSON

```
>>> from requests import get
>>> endereco = endereco_base + "/getUpdates"
>>> resposta = get(endereco)
>>> dicionario_da_resposta = resposta.json()
>>> for atualizacao in dicionario_da_resposta["result"]:
...     print(atualizacao["message"]["text"])
...
'/start'
'Olá, bot! Tudo bem?'
'Alô?'
'Você não é de falar muito, não é?'
```

Leitura das Atualizações de Mensagens de Texto

Tipo de Requisição	Modifica dados no servidor?
GET	Não
POST	Sim

Requisição GET x Requisição POST

`api.telegram.org/botSUA_CHAVE_SECRETA/<comando>`

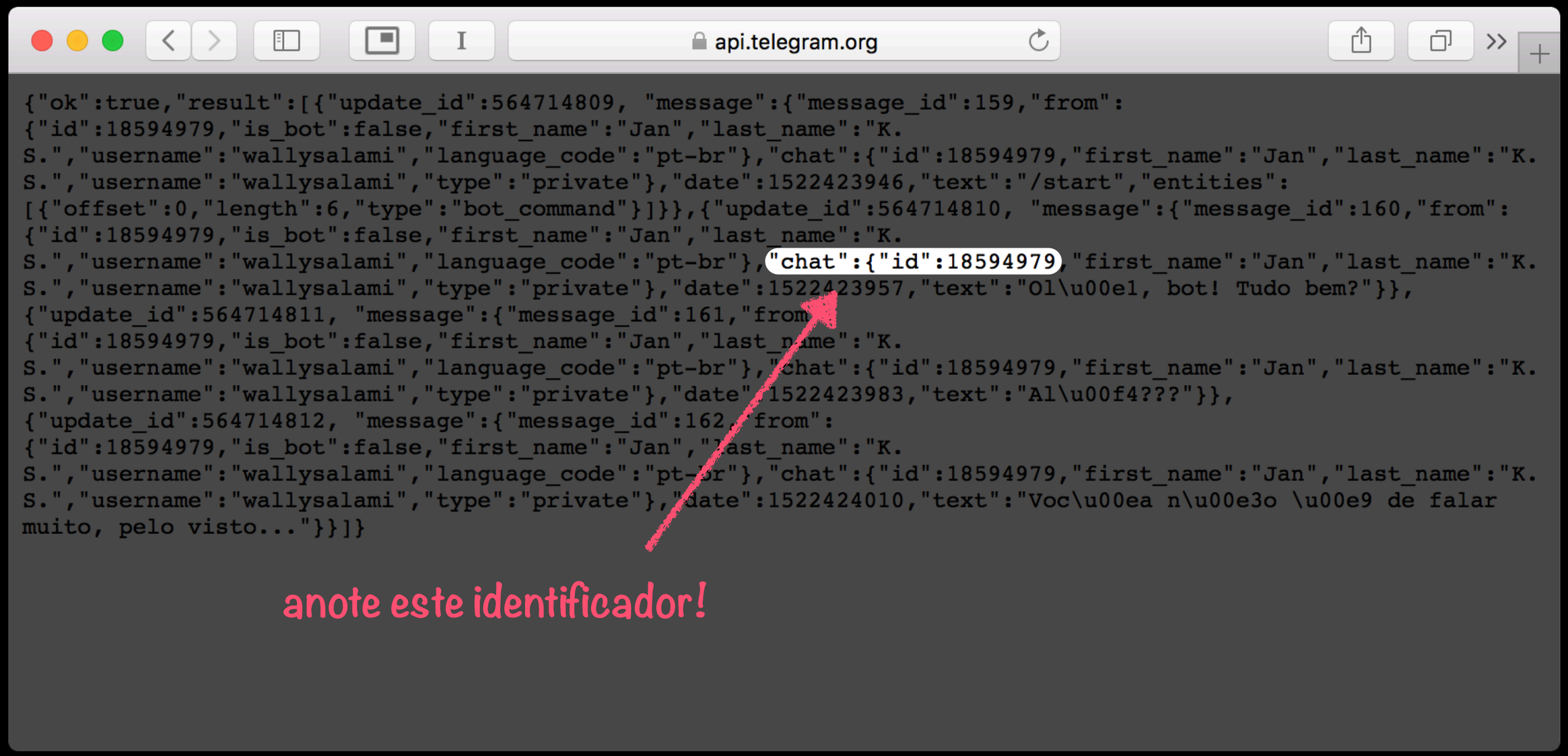
+

`dados extras`

	Comando	Dados Obrigatórios
GET	`getMe`	(nenhum)
GET	`getUpdates`	(nenhum)
POST	`sendMessage`	id do chat, texto
POST	`sendPhoto`	id do chat, arquivo
POST	`sendVoice`	id do chat, arquivo

Exemplos de Outros Comandos para Bots do Telegram

api.telegram.org/botSUA_CHAVE_SECRETA/getUpdates



Endereço para Obter Atualizações das Conversas com o Bot

```
>>> chave = "COLOQUE A SUA CHAVE AQUI!"
>>> id_da_conversa = "COLOQUE O ID DA SUA CONVERSA AQUI!"
>>> endereco_base = "https://api.telegram.org/bot" + chave
```

Atenção ao "s"!

Inclusão do Id do Chat na Configuração Inicial

```
>>> from requests import post
>>> endereco = endereco_base + "/sendMessage"
>>> dados = {"chat_id": id_da_conversa, "text": "Oi!"}
>>> resposta = post(endereco, json=dados)
>>> resposta.text
'{"ok":true,"result":{"message_id":291,"from":{"id":
449820982,"is_bot":true,"first_name":"Bot Raspberry
PUC","username":"raspberryPucBot"},"chat":{"id":
18594979,"first_name":"Jan","last_name":"K.
S.","username":"wallysalami","type":"private"},"date":
1535815441,"text":"Oi!"}}'
```

Chamada POST para Envio de Mensagens de Texto

Mensagem Enviada pelo Bot na Conversa

```
>>> from requests import post
>>> endereco = endereco_base + "/sendPhoto"
>>> dados = {"chat_id": id_da_conversa}
>>> arquivo = {"photo": open("foto.jpeg", "rb")}
>>> resposta = post(endereco, data=dados, files=arquivo)
```

Envio de Fotos

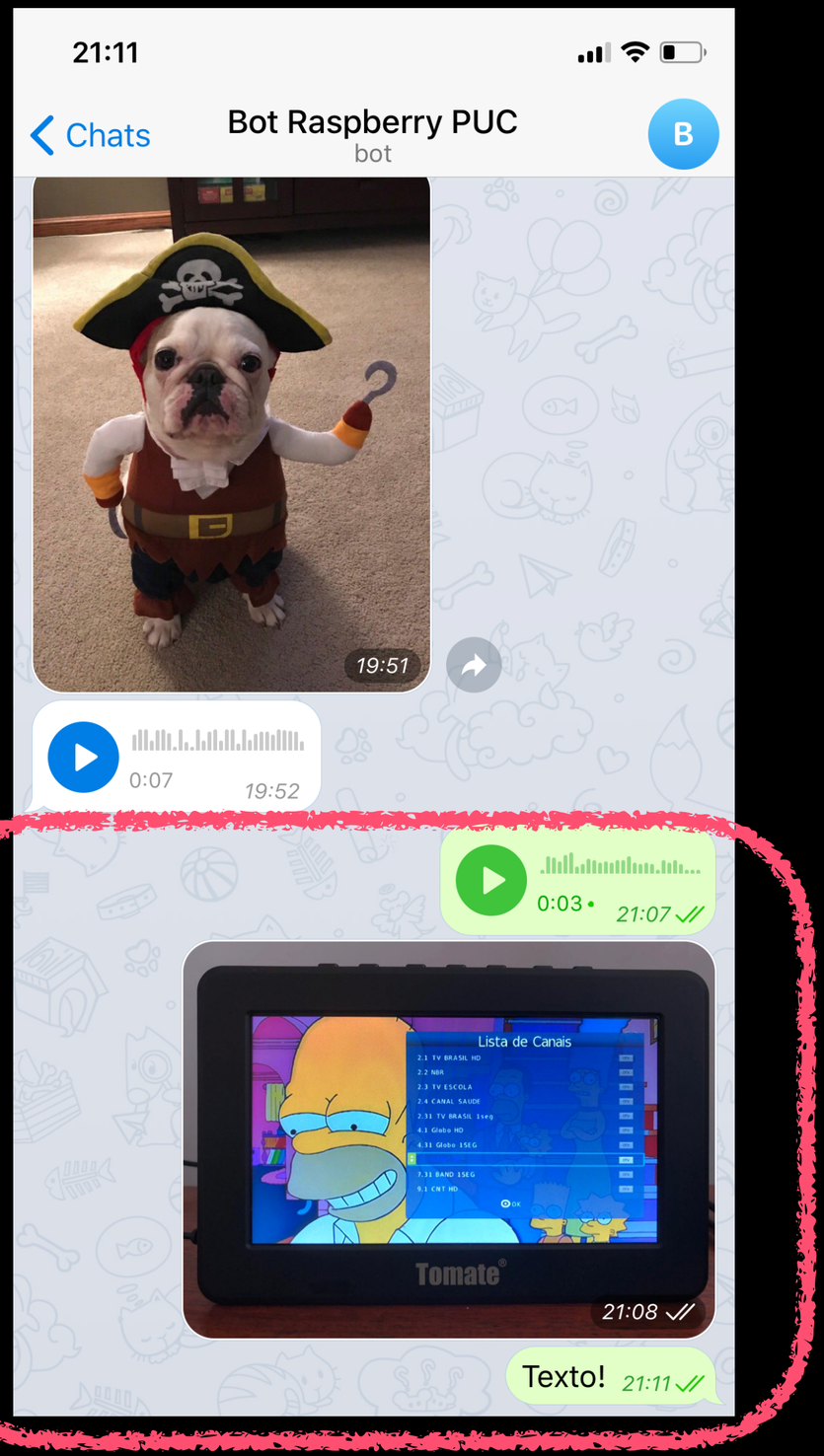
Foto Enviada pelo Bot na Conversa

Use sempre o formato OGG para enviar áudio via Telegram.

```
>>> from requests import post
>>> endereco = endereco_base + "/sendVoice"
>>> dados = {"chat_id": id_da_conversa}
>>> arquivo = {"voice": open("audio.ogg", "rb")}
>>> resposta = post(endereco, data=dados, files=arquivo)
```

Envio de Áudio

Áudio Enviado pelo Bot na Conversa



Recebimento de Outros Tipos de Mensagens

```
{
   "ok":true,
   "result":[
      {
         "update_id":564714813,
         "message":{
            "voice":{
               "file_id":"AwADAQADJAADQzTwRQGVIkswNsWHAg",
               ...
            },
            ...
         }
      },
      {
         "update_id":564714814,
         "message":{
             "photo":[
               {
                  "file_id":"AgADAQAD1qcxG0M08EXPZxFkkC7VB-drDDAABHNCNifaQdcHHhEBAAEC",
                  "file_size":1438,
                  ...
               },
               {
                  "file_id":"AgADAQAD1qcxG0M08EXPZxFkkC7VB-drDDAABAuIfKssEffgIBEBAAEC",
                  "file_size":117149,
                  ...
               },
               ...
            ]
         }
      },
      {
         "update_id":564714815,
         "message":{
            "text":"Texto!",
            ...
         }
      }
   ]
}
```


Dicionário (JSON) com as Atualizações de Mensagens

{json}

KEEP CALM AND PERCORRE O JSON

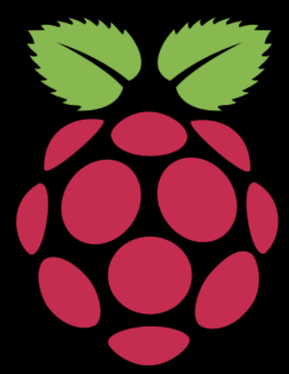
```
>>> from requests import get
>>> endereco = endereco_base + "/getUpdates"
>>> resposta = get(endereco)
>>> dicionario_da_resposta = resposta.json()
>>> for resultado in dicionario_da_resposta["result"]:
...     mensagem = resultado["message"]
...     if "text" in mensagem:
...         texto = mensagem["text"]
...     elif "voice" in mensagem:
...         id_do_arquivo = mensagem["voice"]["file_id"]
...     elif "photo" in mensagem:
...         foto_mais_resolucao = mensagem["photo"][-1]
...         id_do_arquivo = foto_mais_resolucao["file_id"]
```

Verificação dos Tipos das Mensagens

id_do_arquivo

download?

Download de um Arquivo pelo Id



"bot"

link para arquivo
com este id?

link do arquivo

baixar arquivo neste link

Download de um Arquivo pelo Id

```
>>> endereco = endereco_base + "/getFile"
>>> dados = {"file_id": id_do_arquivo}
>>> resposta = get(endereco, json=dados)
>>> dicionario = resposta.json()
>>> final_do_link = dicionario["result"]["file_path"]
>>> final_do_link
'photos/file_117.jpg'
>>> link_do_arquivo = "https://api.telegram.org/file/bot" +
chave + "/" + final_do_link

>>> from urllib.request import urlretrieve
>>> arquivo_de_destino = "meu_arquivo.jpg"
>>> urlretrieve(link_do_arquivo, arquivo_de_destino)
```

Download de um Arquivo de Chat

Busca Atualizações

```
update_id: 123000
text: "Olá!"
```

um tempo depois...

Busca Atualizações

```
update_id: 123000
text: "Olá!"
```

```
update_id: 123001
text: "Tudo bem?"
```

Como fazer para não vir a
mesma mensagem de novo?

Atualizações com Repetição

Busca Atualizações

```
update_id: 123000
text: "Olá!"
```

um tempo depois...

Busca Atualizações
a partir do id 123001

```
update_id: 123001
text: "Tudo bem?"
```

Atualizações a Partir de um Id

```
>>> proximo_id_de_update = 0
>>> while True:
...     endereco = endereco_base + "/getUpdates"
...     dados = {"offset": proximo_id_de_update}
...     resposta = get(endereco, json=dados)
...     dicionario_da_resposta = resposta.json()
...     for resultado in dicionario_da_resposta["result"]:
...         ...
...         proximo_id_de_update = resultado["update_id"] + 1
...     sleep(1)
```

Busca Contínua de Atualizações de Mensagens

Muita coisa...

Receitas para Telegram do Chef Jan K. S.

Download do Telegram

Resumo da Opera

Funcionalidade	Comandos
FSWebcam acessar documentação	`from os import system` `system("fswebcam --resolution 640x480 --skip 10 foto.jpg")`

ARecord
acessar documentação
	`from os import system • from subprocess import Popen`
	`system("arecord --duration 3 --format cd audio.wav")`
	`comando = ["arecord", "--duration", "30", "audio.wav"]`
	`aplicativo = Popen(comando) • aplicativo.terminate()`

Lame acessar documentação	`from os import system` `system("lame audio.wav audio.mp3")`
OpusEnc acessar documentação	`from os import system` `system("opusenc audio.wav audio.ogg")`

Telegram
acessar documentação
	`from requests import post, get`
	`base = "https://api.telegram.org/bot" + chave`
	`endereco = base + "/sendMessage"`
	`dados = {"chat_id": id_da_conversa, "text": "Olá!"}`
	`resposta = post(endereco, json=dados)`
	`print(resposta.text) • dicionario = resposta.json()`
	`endereco = base + "/sendPhoto" • endereco = base + "/sendVoice"`
	`arquivo = {"photo": open("foto.jpg", "rb")}`
	`resposta = post(endereco, data=data, files=arquivo)`
	`dados = {"offset": proximo_id_de_update}`
	`resposta = get(base + "/getUpdates", json=dados)`
	`from urllib.request import urlretrieve`
	`urlretrieve(endereco_do_arquivo, nome_do_arquivo_baixado)`

Resumo para o Projeto 04

Funcionalidade	Comandos

Datas e Horários
acessar documentação
	`from datetime import datetime, timedelta`
	`tempo = datetime(2018, 3, 28, 15, 35, 12) • datetime.now()`
	`intervalo = timedelta(months=4) • tempo2 = tempo + intervalo`
	`tempo2 > tempo • intervalo.seconds • tempo.strftime("%H:%M")`

Campainha
acessar documentação
	`from gpiozero import Buzzer • buzzer = Buzzer(16)`
	`buzzer.on() • buzzer.off() • buzzer.toggle()`
	`buzzer.is_active • buzzer.beep()`
	`buzzer.beep(n=4, on_time=0.5, off_time=2)`

Sensor de Distância
acessar documentação
	`from gpiozero import DistanceSensor`
	`sensor = DistanceSensor(trigger=17, echo=18)`
	`sensor.distance • sensor.threshold_distance`
	`s.when_in_range = funcao • s.when_out_of_range = funcao`

MongoDB
acessar documentação
	`from pymongo import MongoClient, ASCENDING, DESCENDING`
	`cliente = MongoClient("localhost", 27017)`
	`banco = cliente["nome"] • colecao = banco["nome"]`
	`dados = {"nome": "Jan K. S.", "idade": 32}`
	`colecao.insert(dados) • colecao.insert([dados1, dados2])`
	`busca = {"chave1": valor1, "chave2": {"$gt": valor2}}`
	`ordenacao = [ ["idade", DESCENDING] ]`
	`documento = colecao.find_one(busca, sort=ordenacao)`
	`documentos = list( colecao.find(busca, sort=ordenacao) )`

Resumo para o Projeto 03

Funcionalidade	Comandos

Emissor Infravermelho	`from py_irsend.irsend import *`
	`controles = list_remotes() • codigos = list_codes("mini")`
	`send_once("mini", ["KEY_1", "KEY_2"])`

Receptor Infravermelho	`from lirc import init, nextcode`
	`init("aula", blocking=False)`
	`codigo = nextcode() • codigo == ["KEY_1"]`

Servidor Flask
acessar documentação
	`from flask import Flask`
	`app = Flask(__name__)`
	
	`@app.route("/")`
	`def mostrar_inicio():`
	`  return "Bem-vindo!"`
	
	`@app.route("/contato")`
	`def mostrar_contato():`
	`  return "janks@puc-rio.br"`
	
	`@app.route("/numero/<int:x>")`
	`def mostrar_numero(x):`
	`  return "x = " + str(x)`
	
	`return redirect("/outrapagina")`
	
	`return render_template("index.html")`
	
	`app.run(port=5000, debug=False)`

HTML	`<p>Parágrafo</p>`
	`<img src="site.com/imagem">`
	`<a href="/pagina">Link</a>`
	
	`<ul>`
	`  <li>Item 1 da Lista</li>`
	`  <li>Item 2 da Lista</li>`
	`</ul>`

Ngrok	abrir Terminal → `ngrok http 5000`

Resumo para o Projeto 02

Funcionalidade	Comandos

LED
acessar documentação
	`from gpiozero import LED • led = LED(21)`
	`led.on() • led.off() • led.toggle() • led.is_lit`
	`led.blink() • led.blink(n=4, on_time=0.5, off_time=2)`

Botão
acessar documentação
	`from gpiozero import Button • botao = Button(11)`
	`botao.is_pressed • botao.wait_for_press()`
	`botao.when_pressed = funcao`
	`botao.when_released = funcao`
	`botao.when_held = funcao`

LCD
acessar documentação
	`from Adafruit_CharLCD import Adafruit_CharLCD`
	`lcd = Adafruit_CharLCD(2, 3, 4, 5, 6, 7, 16, 2)`
	`lcd.message("Texto 1\nTexto 2")`
	`lcd.clear()`

MPlayer	`from mplayer import Player • player = Player()`
	`player.loadfile("Musica.mp3") • player.loadlist("lista.txt")`
	`player.pause() • player.paused • player.quit()`
	`player.time_pos = 2 • player.length • player.pt_step(-1)`
	`player.metadata["Title"] • player.metadata["Artist"]`
	`player.volume = 70 • player.speed = 2`

Resumo para o Projeto 01

Funcionalidade	Comandos
Funções	`x = input("Digite um número: ") • print("Resultado: ", x)` `from time import sleep • sleep(0.5)`

Listas
acessar documentação
	`lista = [1, 2, 3] • lista2 = ["texto", [0, 0], 5]`
	`lista[0] • lista[1:3] • total_de_elementos = len(lista)`
	`lista.append(novo_elemento) • lista.remove(indice)`

Dicionários acessar documentação	`dicionario = {"chave 1": 42, "chave 2": [1, 2, 3]}` `dicionario["chave 1"] • dicionario["chave 3"] = "Olá!"`

Textos (Strings)
acessar documentação
	`texto = "olá!" • texto[0] • texto[1:4] • len(texto)`
	`texto + "\n" • texto + str(numero) • "x = %.2f" % numero`
	`2 + int("11") • 4 / float("23.5")`

Condicionais	`if x == 0 and z < 4:`
	`  y = 4`
	
	`if x not in [1, 2]:`
	`  y = 4`
	`else:`
	`  y = 0`
	
	`if x != 0:`
	`  y = 4`
	`elif x >= 0:`
	`  y = 3`
	`else:`
	`  y = 0`

Repetições	`for elem in lista:`
	`  ...`
	
	`for i in range(1, 4):`
	`  ...`
	
	`while x > 1:`
	`  ...`

Criação de Funções	`def funcao1(x):`
	`  return x + 2`
	
	`def funcao2(x, y, z):`
	`  ...`
	
	`x = 2`
	`def funcao3():`
	`  global x`