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Uma Introdução ao Mongoose OS no ESP8266

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github.com/fkuhne/tdc17

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Agenda

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- Introdução
- Arquitetura
- Instalação
- Codificação e Compilação
- Exemplo: Hello World
- Exemplo: Blink com configuração remota
- Exemplo: Cliente MQTT
- Referências

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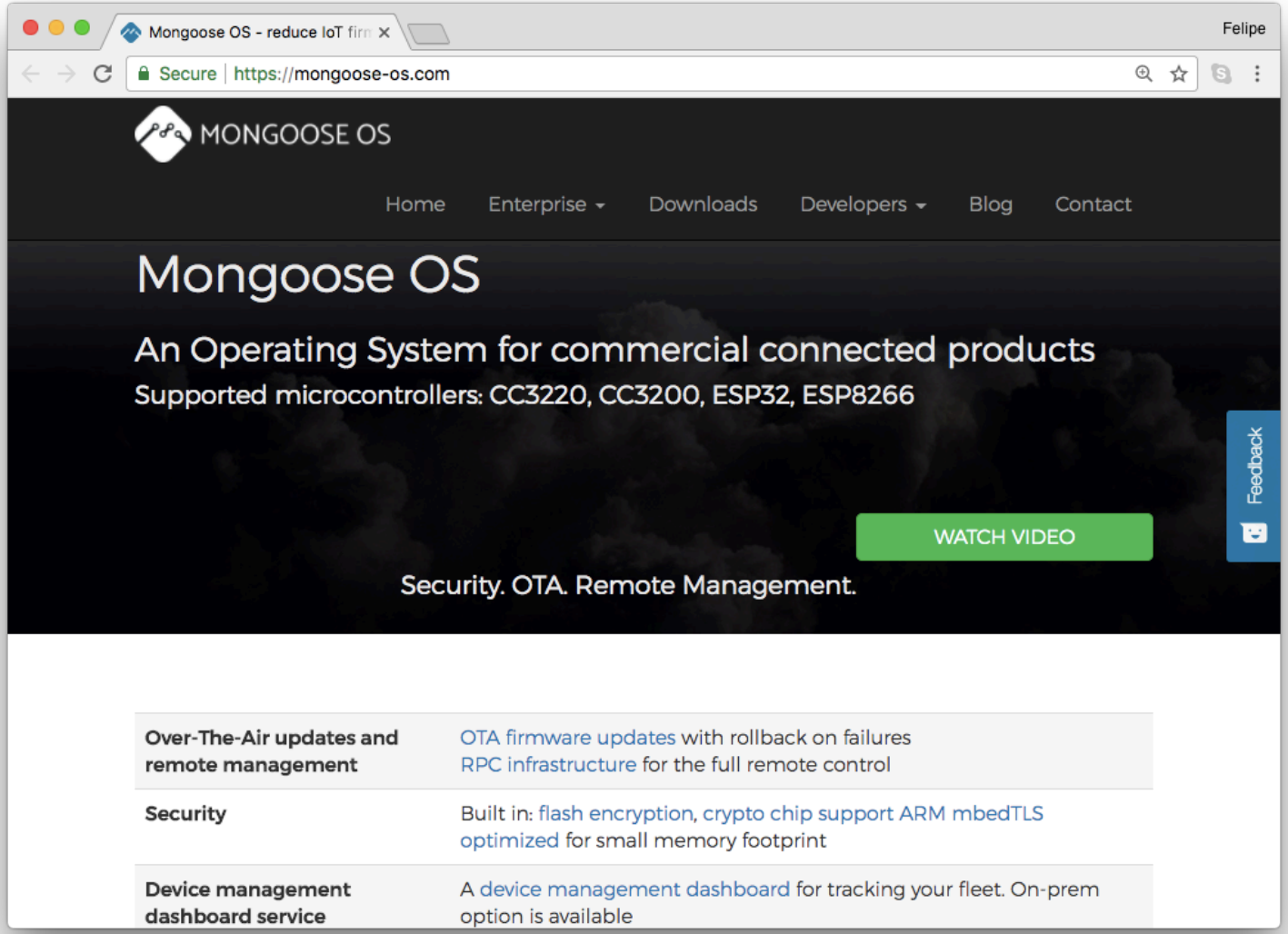
Introdução


Mongoose OS - reduce IoT firm
Felipe
Secure | https://mongoose-os.com
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Mongoose OS
An Operating System for commercial connected products
Supported microcontrollers: CC3220, CC3200, ESP32, ESP8266
WATCH VIDEO
Feedback
Security. OTA. Remote Management.
Over-The-Air updates and remote management
OTA firmware updates with rollback on failures
RPC infrastructure for the full remote control
Security
Built in: flash encryption, crypto chip support ARM mbedTLS optimized for small memory footprint
Device management dashboard service
A device management dashboard for tracking your fleet. On-prem option is available

Introdução

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- SO para devices IoT a nível comercial
- Suporta alguns hardwares: STM32, ESP, Texas, Nordic
- Compatível com AWS, Google e outros serviços de núvem
- Open source (licença comercial disponível)
- Criptografia de mensagens (TLS) e do conteúdo da flash
- Inúmeros protocolos de comunicação (HTTP, WebSockets, MQTT, CoAP, …)
- JavaScript e C/C++
- Sistema de arquivos (POSIX API)
- Over-the-air update
- Sistema de gerenciamento remoto de dispositivos
- Sistema de chamadas remotas: RPC *(remote procedure calls)*

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Introdução

- Cesanta (Dublin)
- Criado a partir da biblioteca de rede Mongoose
  - Usada por NASA, Google, Broadcomm, Samsung, Bosch …
- https://cesanta.com/
- https://cesanta.com/download.html

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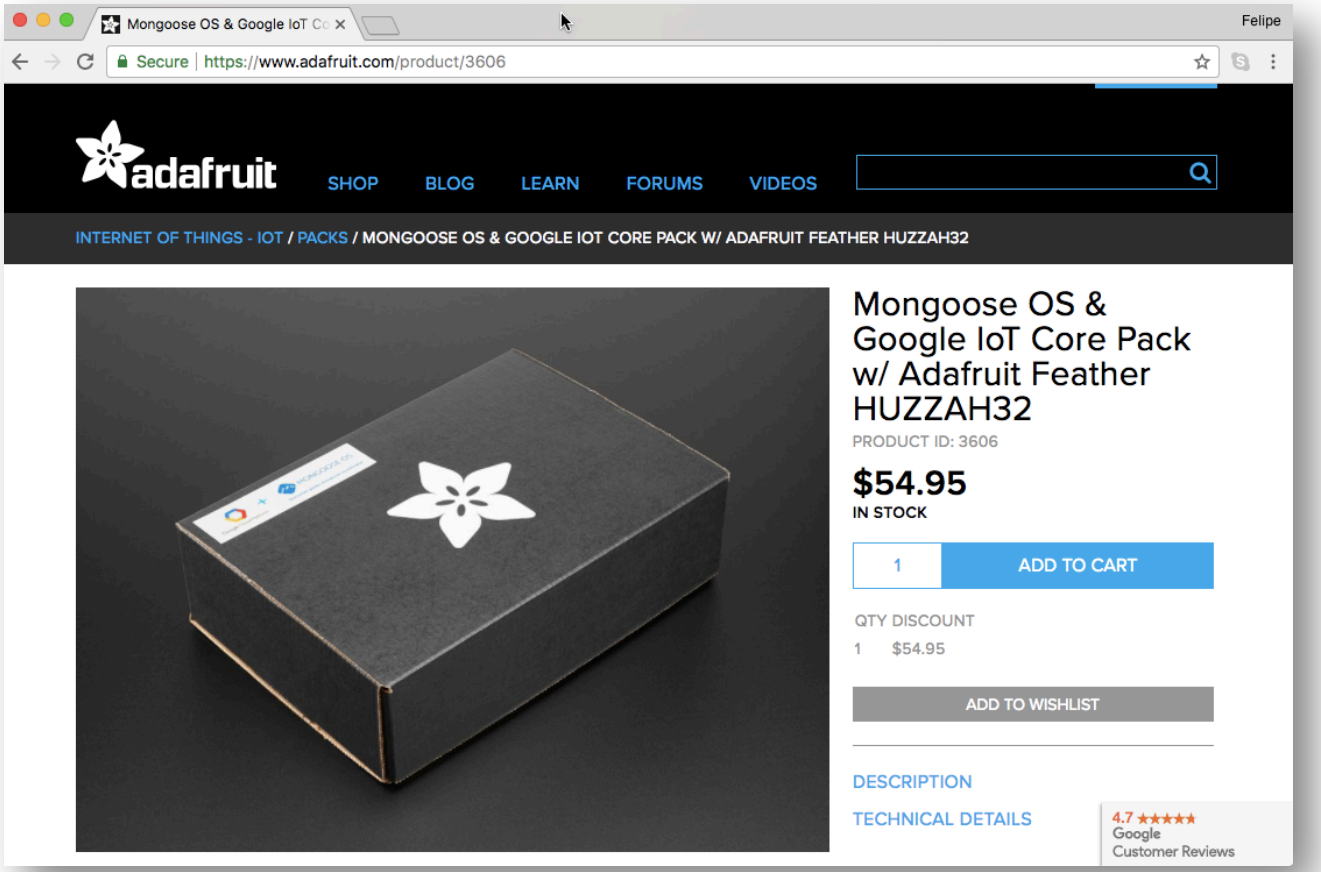
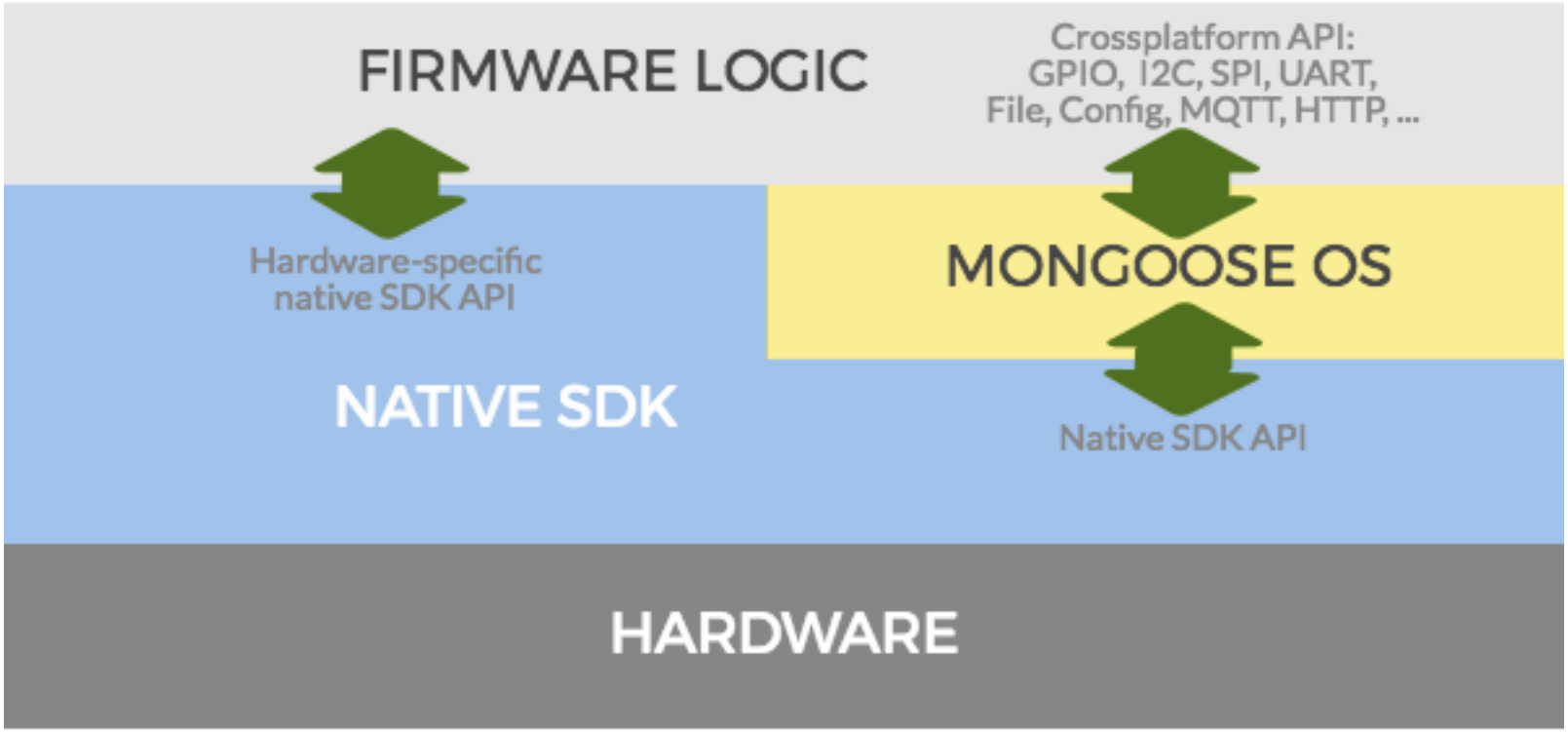
Introdução



- https://www.adafruit.com/product/3606
- https://www.youtube.com/watch?v=zHeWNwUR2Sc

Arquitetura



› https://mongoose-os.com/docs/book/intro.html

Instalação

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- https://mongoose-os.com/software.html

MacOS / Linux

```
curl -fsSL https://mongoose-os.com/downloads/mos/install.
~/.mos/bin/mos --help
~/.mos/bin/mos
```

For further steps, see Quick Start Guide.

- $> export PATH=$PATH:$HOME/.mos/bin
- $> mos

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Código

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```
$> mos init --arch esp8266
$> mos build
$> mos flash
$> mos console
```

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Hello World (main.c)

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```c
#include <stdio.h>
#include "mgos.h"
#include "mgos_gpio.h"

void timerCallback(void *args)
{
  printf("ping!\n");

  (void)args;
}

enum mgos_app_init_result mgos_app_init(void)
{
  mgos_set_timer(1000, true, timerCallback, NULL);

  return MGOS_APP_INIT_SUCCESS;
}
```

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Blink (main.c)

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```c
#include <stdio.h>
#include "mgos.h"
#include "mgos_gpio.h"

void timerCallback(void *args)
{
  printf("ping!\n");
  mgos_gpio_toggle(2);

  (void)args;
}

enum mgos_app_init_result mgos_app_init(void)
{
  mgos_gpio_set_mode(2, MGOS_GPIO_MODE_OUTPUT);

  mgos_set_timer(1000, true, timerCallback, NULL);

  return MGOS_APP_INIT_SUCCESS;
}
```

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Blink (mos.yml)

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```
26  config_schema:
27    - ["configBlink", "o", {title: "My app custom settings"}]
28    - ["configBlink.ledInterval", "i", 1000, {title: "LED interval in milisseconds"}]
29
```

```
13  enum mgos_app_init_result mgos_app_init(void)
14  {
15    mgos_gpio_set_mode(2, MGOS_GPIO_MODE_OUTPUT);
16
17    int ledInterval = mgos_sys_config_get_configBlink_ledInterval();
18    mgos_set_timer(ledInterval, true, timerCallback, NULL);
19
20    return MGOS_APP_INIT_SUCCESS;
21  }
```

- `$> mos config-get configBlink.ledInterval`
- `$> mos config-set configBlink.ledInterval=500`

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Cliente MQTT (main.c)

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```
30  enum mgos_app_init_result mgos_app_init(void)
31  {
32    mgos_gpio_set_mode(2, MGOS_GPIO_MODE_OUTPUT);
33    mgos_set_timer(1000, true, timerCallback, NULL);
34
35    mgos_mqtt_sub("my/subscription", mqttDataReceivedCallback, NULL);
36
37    return MGOS_APP_INIT_SUCCESS;
38  }
```

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Cliente MQTT (main.c)

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```
14  void timerCallback(void *args)
15  {
16    static int messageCounter = 1;
17    char msg[20] = {};
18
19    snprintf(msg, sizeof(msg), "MENSAGEM %d", messageCounter++);
20    printf("Enviando:  [%.*s] para o topico: [my/topic]\n", strlen(msg), msg);
21    fflush(0);
22
23    mgos_gpio_toggle(2);
24
25    mgos_mqtt_pub("my/topic", msg, strlen(msg), 2, 0);
26
27    (void)args;
28  }
```

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Cliente MQTT (main.c)

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```
4  static void mqttDataReceivedCallback(struct mg_connection *c, const char *topic,
5    int topic_len, const char *msg, int msg_len, void *userdata)
6  {
7    printf("Recebendo: [%.*s] no topico: [%.*s]\n", msg_len, msg, topic_len, topic);
8    fflush(0);
9
10   (void)c;
11   (void)userdata;
12 }
```

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Cliente MQTT (mos.yml)

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```
25  config_schema:
26     - ["wifi.sta.enable", true]
27     - ["wifi.sta.ssid", "TDC_Poa_Vip"]
28     - ["wifi.sta.pass", "spe@kersPOA"]
29     - ["mqtt.enable", true]
30     - ["mqtt.server", "iot.eclipse.org:1883"]
31     - ["mqtt.client_id", "esp8266-tdcpoa17"]
32
33
34  # List of libraries used by this app, in order of initialisation
35  libs:
36    - origin: https://github.com/mongoose-os-libs/rpc-service-config
37    - origin: https://github.com/mongoose-os-libs/rpc-service-fs
38    - origin: https://github.com/mongoose-os-libs/rpc-uart
39    - origin: https://github.com/mongoose-os-libs/wifi
40    - origin: https://github.com/mongoose-os-libs/mqtt
```

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Obrigado! ;)

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Referências

- https://mongoose-os.com
- https://mongoose-os.com/docs/reference/api.html
- https://mongoose-os.com/apps.html
- https://github.com/mongoose-os-apps
- https://github.com/mongoose-os-libs

- https://www.youtube.com/channel/UCZ9lQ7b-4bDbLOLpKwjpSAw

- https://github.com/mqtt/mqtt.github.io/wiki/public_brokers
- https://chrome.google.com/webstore/detail/mqttlens/hemojaaeigabkbcookmlgmdigohjobjm

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