# NUC472 USB Disk IAP

Example Code Introduction for 32-bit NuMicro® Family

## Information

| | |
|---|---|
| Application | This code use USB Disk to do IAP |
| BSP Version | NUC442/472 Series BSP CMSIS v3.02.001 |
| Hardware | NuTiny-EVB-NUC472-LQFP176 v2.0 |

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# 1 Function Description

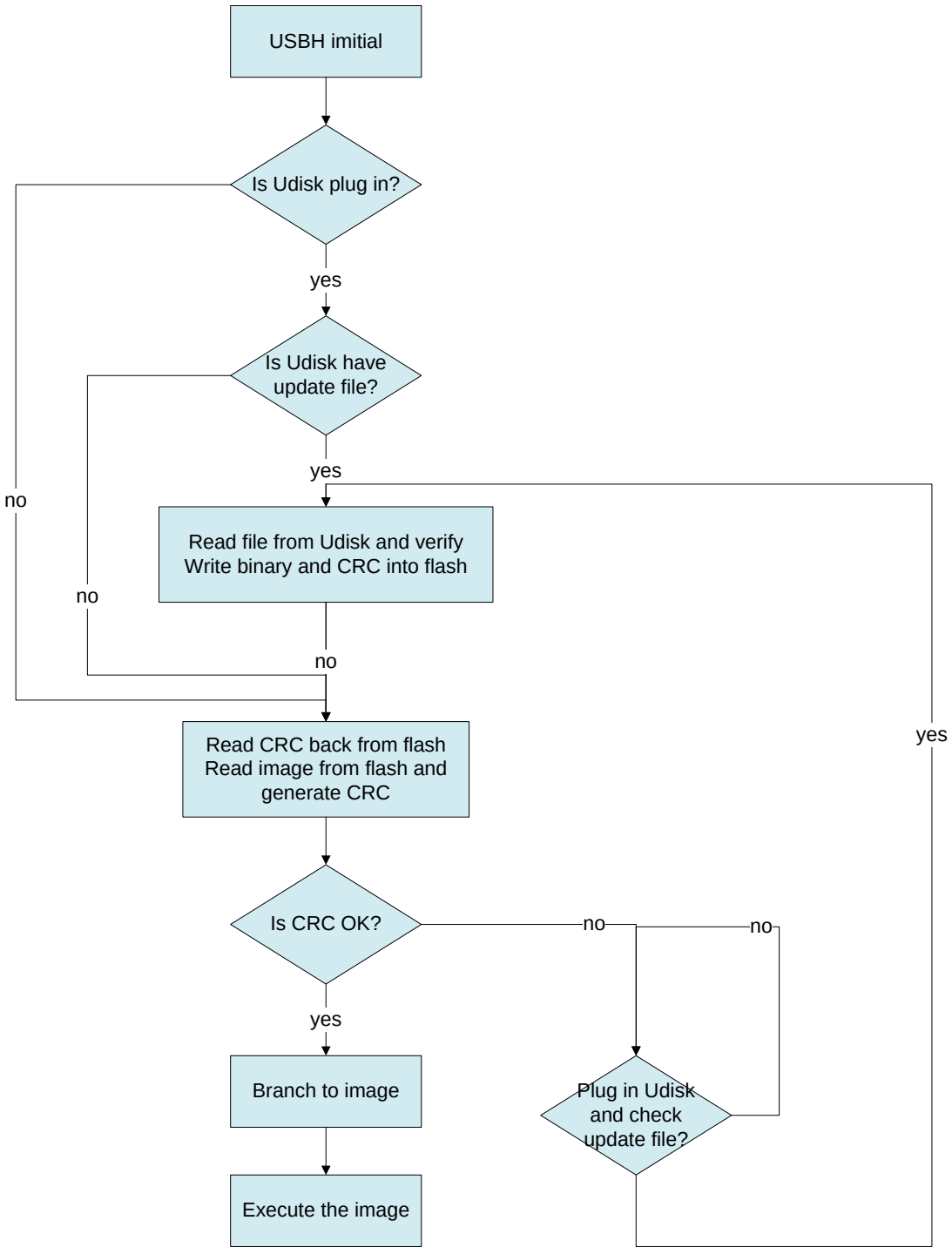
## 1.1 Introduction

This example code check the USB disk have new update image or not. If the disk has new update file, write the update file to flash and execute it.

## 1.2 Principle

This sample code will detect whether the U disk has an updateable file. If yes, the updateable file (the test file named led.bin) is read from the U disk and the check code ‘crc’ is generated. The test program file size ‘fsize’ is written to the FMC_IAP_PROGARM_ADDR address. The test program binary is written to the FMC_IAP_PROGARM_ADDR+4 address, and the check code ‘crc’ is written to the FMC_IAP_PROGARM_ADDR+fsize+4 address.

When the test program is updated successfully or there is no update file, this sample will read the test file size ‘fsize’ and ‘crc’ code from FMC_IAP_PROGARM_ADDR and FMC_IAP_PROGARM_ADDR+fsize+4. Read image from FMC_IAP_PROGARM_ADDR+4 address to generate CRC and compare with the ‘crc’ code. If check is successfully, then executed it. Otherwise, continues to detect whether the U disk has an updateable file.




## 1.3 Demo Result

```
APROM load image...

USB initial
g_disk_lun = 0
detect USBD device plug in...
rc=0 FR_OK
```

```
USB storage have new update image.

led.bin open ok

load led.bin to FMC_IAP_PROGARM_ADDR
0x74 0x b 0x 0 0x 0 0x30 0x10 0x 0 0x20 read bytes:2048
0x20 0xfa 0x 3 0xf3 0x19 0x43 0x90 0x40 read bytes:888

file data count:2932, write data count:2936, crcSum 40953

load finish. execute the image crc 40953,40953

Application OK, UART0 LOG PB10 LED TEST

Application is running

Application is running
```

# 2 Code Description

Initial USBH Mass storage class:

```
    USBH_Open();
    APP_DBGMSG("\nUSB initial\n");
#ifdef USBH_CLK_FROM_PLL2_DUAL_ROLE
    // Configure OTG function as Dual Role
    SYS_UnlockReg();
    SYS->USBPHY = 0x102;
#endif
    USBH_MassInit();
    Delay(0x500000);
    FMC_Open();
    while (1)
    {
        /* USBH_ProcessHubEvents() must be executed at main loop */
        if (USBH_ProcessHubEvents())    //Check USB device status Change for plug-in and
unplug
         …
    }
```

Branch to and execute the new application:

```
void BranchTo(uint32_t u32Address) __attribute__((section(".ARM.__at_0x2000")));
void BranchTo(uint32_t u32Address)
{
    FUNC_PTR *func;
    FMC->ISPCMD = FMC_ISPCMD_VECMAP;
    FMC->ISPADDR = u32Address;
    FMC->ISPTRG = FMC_ISPTRG_ISPGO_Msk;
    __ISB();

    while (FMC->ISPTRG & FMC_ISPTRG_ISPGO_Msk) ;

    func = (FUNC_PTR *)(*(uint32_t *)(u32Address + 4));
    __set_SP(*(uint32_t *)u32Address);
    func();

    while (1);
}
```

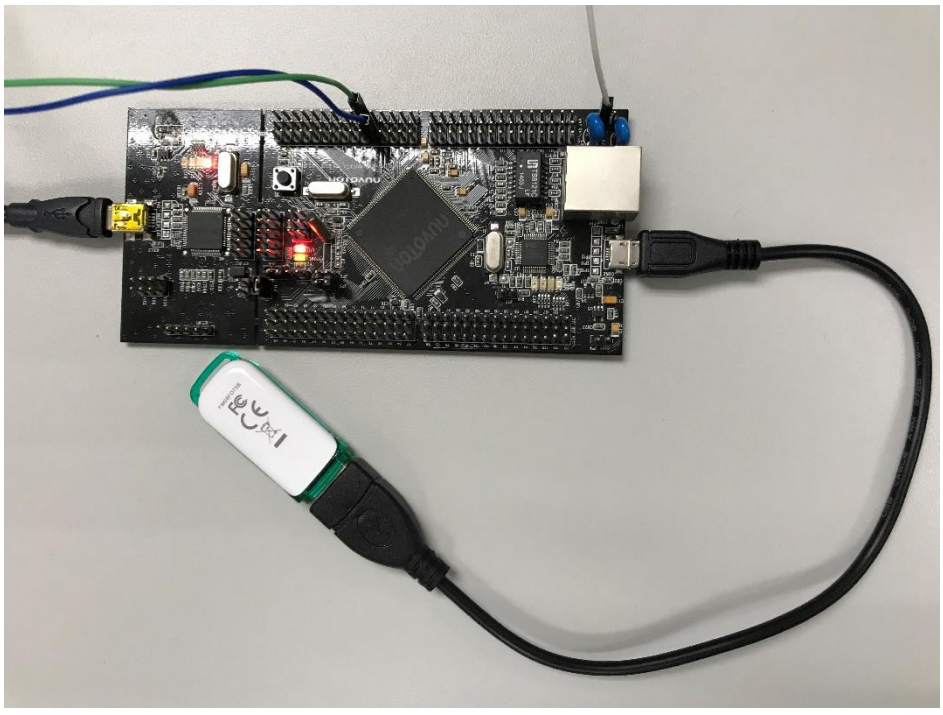
# 3 Software and Hardware Environment

## Software Environment

- BSP version
  - NUC442/472 Series BSP CMSIS v3.02.001
- IDE version
  - Keil uVersion 5.15

## Hardware Environment

- Circuit components
  - NuTiny-EVB-NUC472-LQFP176 v2.0
- Diagram



| | | |
|---|---|---|
| UART0_RX/PG.2 | ← | UART_TX |
| UART0_TX/PG.1 | → | UART_RX |
| NUC472 | | |

# 4 Directory Information

- EC_NUC472_UDisk_IAP_V1.00
  - Library — Sample code header and source files
    - CMSIS — Cortex® Microcontroller Software Interface Standard (CMSIS) by Arm® Corp.
    - Device — CMSIS compliant device header file
    - StdDriver — All peripheral driver header and source files
    - UsbHostLib — USB Host library source code
  - SampleCode
    - ExampleCode — Source file of example code
  - ThirdParty
    - FATFS — A generic FAT file system module for small embedded systems. Its official website is: http://elm-chan.org/fsw/ff/00index_e.html.

# 5 How to Execute Example Code

1. Browsing into sample code folder by Directory Information (section 4) and double click NUC472_UDisk_IAP.uvproj.
2. Enter Keil compile mode
   a. Build
   b. Download
   c. Start/Stop debug session
3. Enter debug mode
   a. Run

# 6 Revision History

| Date | Revision | Description |
|---|---|---|
| June. 28, 2019 | 1.00 | 1. Initially issued. |

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