

ARM

Projekt za STM32H7 vgrajen sistem

CubeIDE

1.del

STM32H750B-DK Discovery razvojni sistem

- Arm® Cortex® core-based microcontroller with 128 Kbytes (STM32H750XBH6) of Flash memory and 1 Mbyte of RAM, in TFBGA240+25 package
- 4.3" RGB interface LCD with touch panel connector
- Ethernet compliant with IEEE-802.3-2002, and POE
- USB OTG FS with Micro-AB connector
- SAI audio codec
- One ST-MEMS digital microphone
- 2 x 512-Mbit Quad-SPI NOR Flash memory
- 128-Mbit SDRAM
- 4-Gbyte on-board eMMC
- 1 user and reset push-button
- Fanout daughterboard
- 2 x FDCANs
- Board connectors:
 - USB FS Micro-AB connectors
 - ST-LINK Micro-B USB connector
 - USB power Micro-B connector
 - Ethernet RJ45
 - Stereo headset jack including analog microphone input
 - Audio header for external speakers
 - Arduino™ Uno V3 expansion connectors
 - STMod+

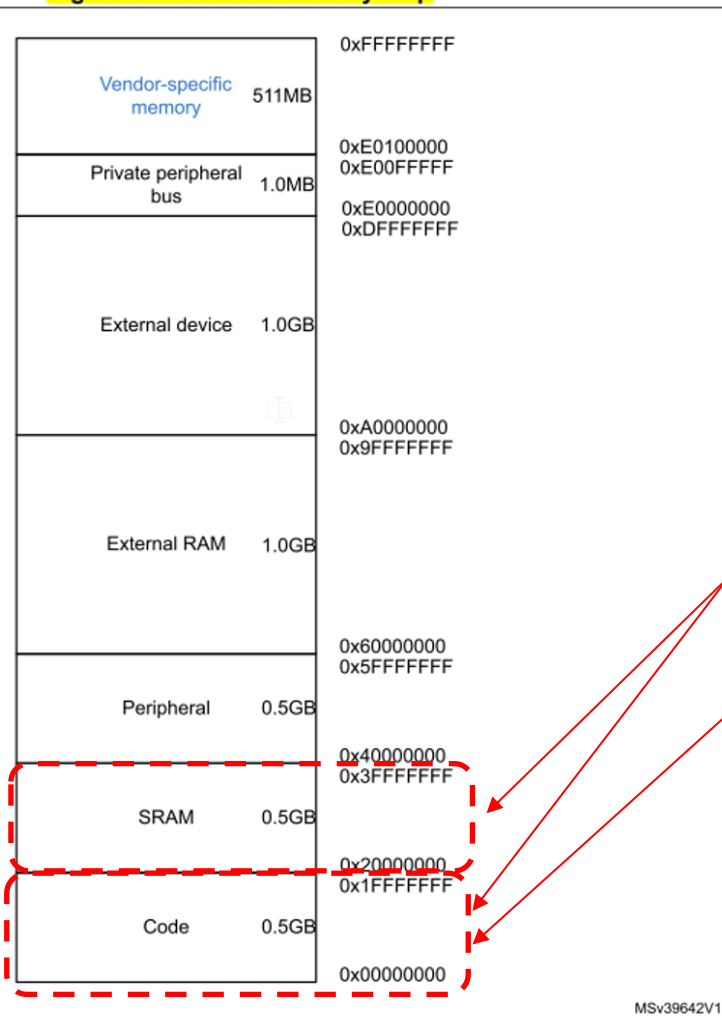


<https://www.st.com/en/evaluation-tools/stm32h750b-dk.html>



STM32H750XB – Naslovni prostor

Figure 8. Processor memory map



Razpored dejanskih pomnilnikov opišemo v povezovalni skripti (angl. Linker script – datoteka v projektu s končnico .ld)

Primer opisa razporeda dejanskih pomnilnikov za ploščo STM32H750B-DK:

MEMORY

```
{  
  FLASH (rx) : ORIGIN = 0x08000000, LENGTH = 128K  
  DTCMRAM (xrw) : ORIGIN = 0x20000000, LENGTH = 128K  
  RAM_D1 (xrw) : ORIGIN = 0x24000000, LENGTH = 512K  
  RAM_D2 (xrw) : ORIGIN = 0x30000000, LENGTH = 288K  
  RAM_D3 (xrw) : ORIGIN = 0x38000000, LENGTH = 64K  
  ITCMRAM (xrw) : ORIGIN = 0x00000000, LENGTH = 64K  
}
```

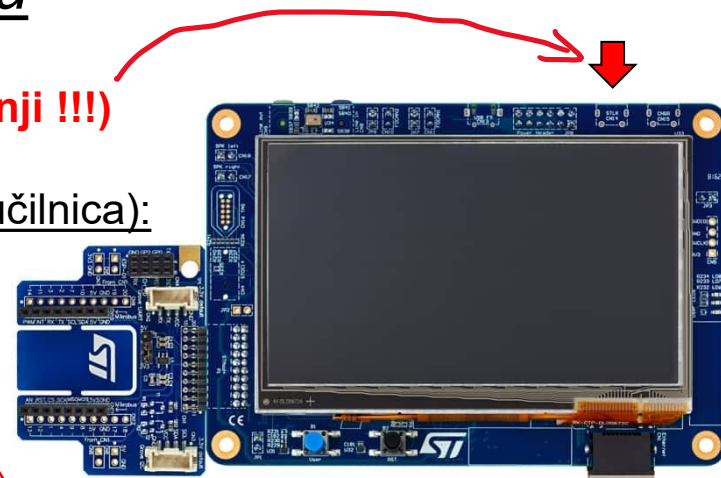
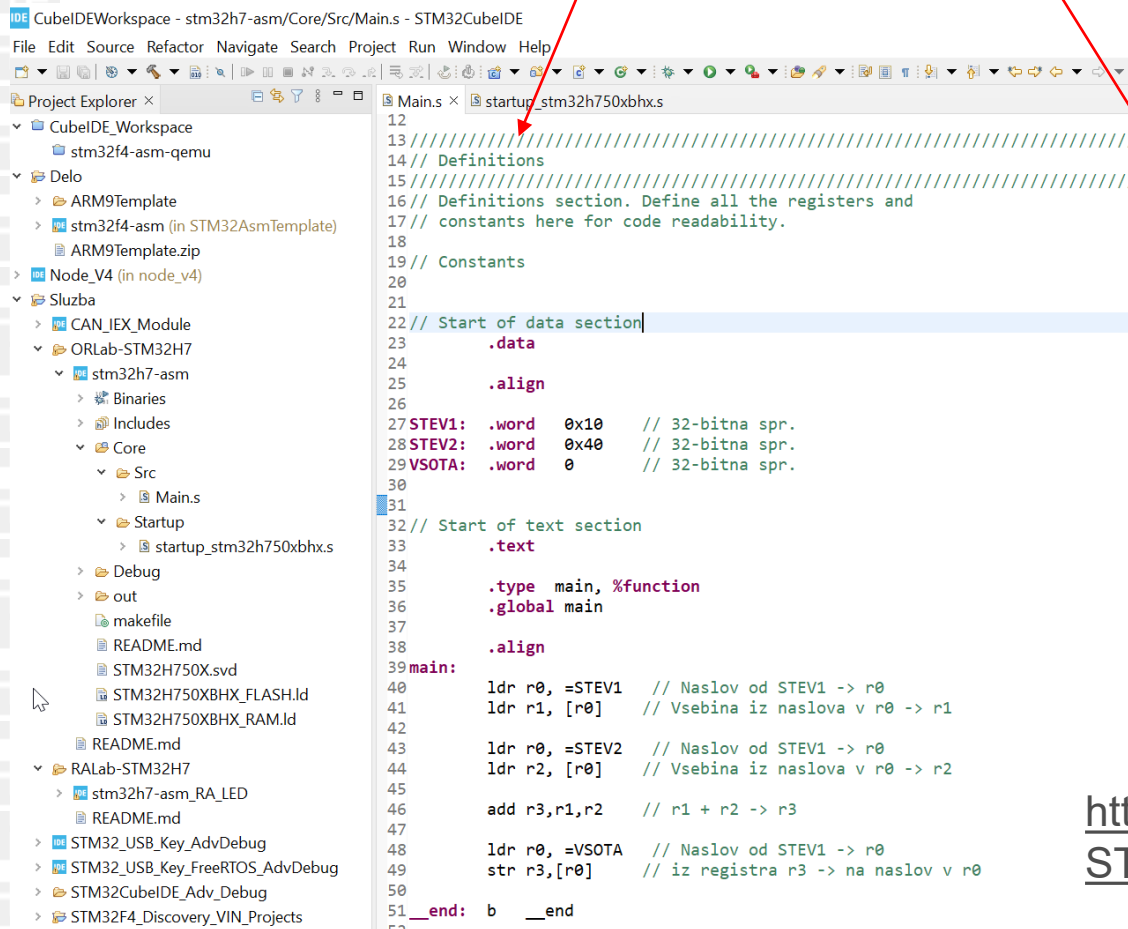
Delo na STM32H7 razvojnem sistemu

Priključitev :

- **Mikro USB** priključek na **daljši stranici** (nad LCD, srednji !!!)

Poseben začetni projekt (github) in info za STM32H7 (e-učilnica):

- **dodajanje vsebine (Main.s):**



----- Razvojni sistem STM32H750-DK -----

- STM32H750B-DK Discovery kit with STM32H750XB MCU
- ORLab-STM32H7 - GitHub repozitorij
- User Manual Discovery kit stm32h750xb Uploaded 11/11/22, 10.15
- DataSheet_stm32h750xb Uploaded 11/11/22, 10.16
- Reference Manual rm0433-stm32h750xb Uploaded 11/11/22, 10.17
- Programming_Manual_pm0253-stm32h750xb Uploaded 11/11/22, 10.17
- Errata_es0396-stm32h750xb Uploaded 11/11/22, 10.19

<https://github.com/LAPSyLAB/ORLab-STM32H7/tree/main/stm32h7-asm>

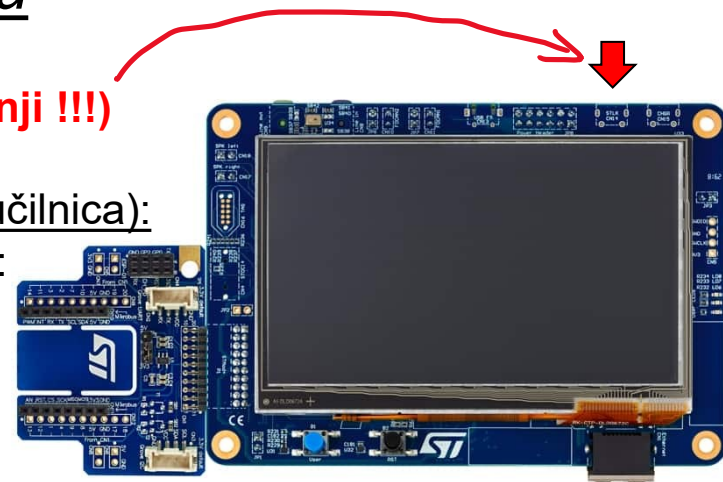
Delo na STM32H7 razvojnem sistemu

Priključitev :

- **Mikro USB** prikllop na **daljši stranici (nad LCD, srednji !!!)**

Poseben začetni projekt (github) in info za STM32H7 (e-učilnica):

- **začetne nastavitve** ([startup_stm32h750xbhx.s](#)) :
 - Pustimo default nastavitve:
 - 64MHz frekvenca urinega signala
 - (višja poveča porabo!)
 - izklop predpomnilnikov
 - **inicializacija sklada** oz. SP – kazalca na sklad
- **dodajanje vsebine** ([Main.s](#)):
 - podatki/operandi:
 - dodamo v .data sekcijo, končamo z .align
 - program (dodamo v .text sekcijo) :
 - **dodamo** od oznake **main:** naprej
 - na koncu programa je **mrtva zanka** (**__end:** b __end)
 - **podprograme** dodamo za mrtvo zanko



Posebnosti v kodi (.data sekciija)

V pravem vgrajenem sistemu:

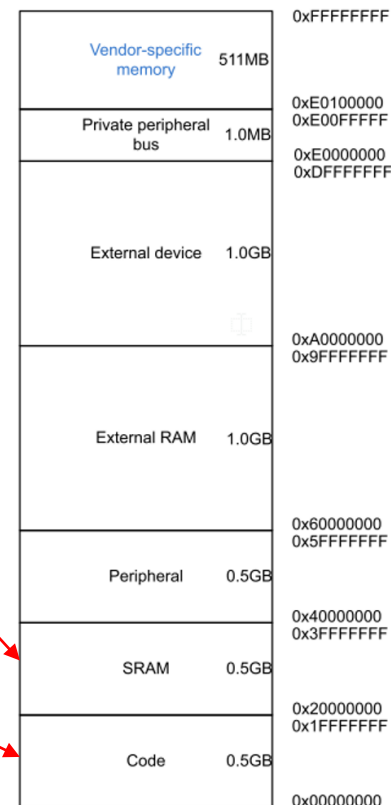
- so spremenljivke običajno shranjene v SRAM pomnilniku
 - sekcija .data
- program (ukazi) v Flash pomnilniku
 - sekcija .text

Primer v kodi – Vsota dveh števil

```
1      .data      RA
2
3  @spremenljivke
4  STEV1: .word   0x40
5  STEV2: .word   0x10
6  REZ:   .word   0
7
8      .text
9      .org 0x20
10
11     .align
12     .global _start
13 _start:
14
15     ldr r0,=STEV1 @ adr  r0,STEV1
16     ldr r1,[r0]
17
18     ldr r0,=STEV2 @ adr  r0,STEV2
19     ldr r2,[r0]
20
21     add r3,r1,r2
22
23     ldr r0,=REZ @ adr  r0,REZ
24     str r3,[r0]
25
26 end:    b      end
```

CPULator ARMv7 System Simulator - Example

Figure 8. Processor memory map



ldr r0,=vrednost_32b

ldr r0,=127
↓
mov r0,#127

ldr r0,=0x12345678
↓
ldr r0,temp
temp: .word 0x12345678

Vrednost 0x12345678 se kot konstanta shrani v Flash takoj za kodo, zato se lahko prebere z naslova temp (ker je relativno blizu PCja)

RFI