RISC-V 32 비트 FE310 소개서

최신 CPU 아키텍쳐 RISC-V 이해 및 소개

RISC-V 32 비트 FE310 소개서

개발 환경

커널연구회 (www.kernel.bz)

정재준 (rgbi3307@nate.com)

목차

Table of Contents

● RISC-V 32 비트 FE310 소개서 1

● 목차 2

● RISC-V 32 비트 FE310 보드 소개 3

● RISC-V 개발환경 설정 5

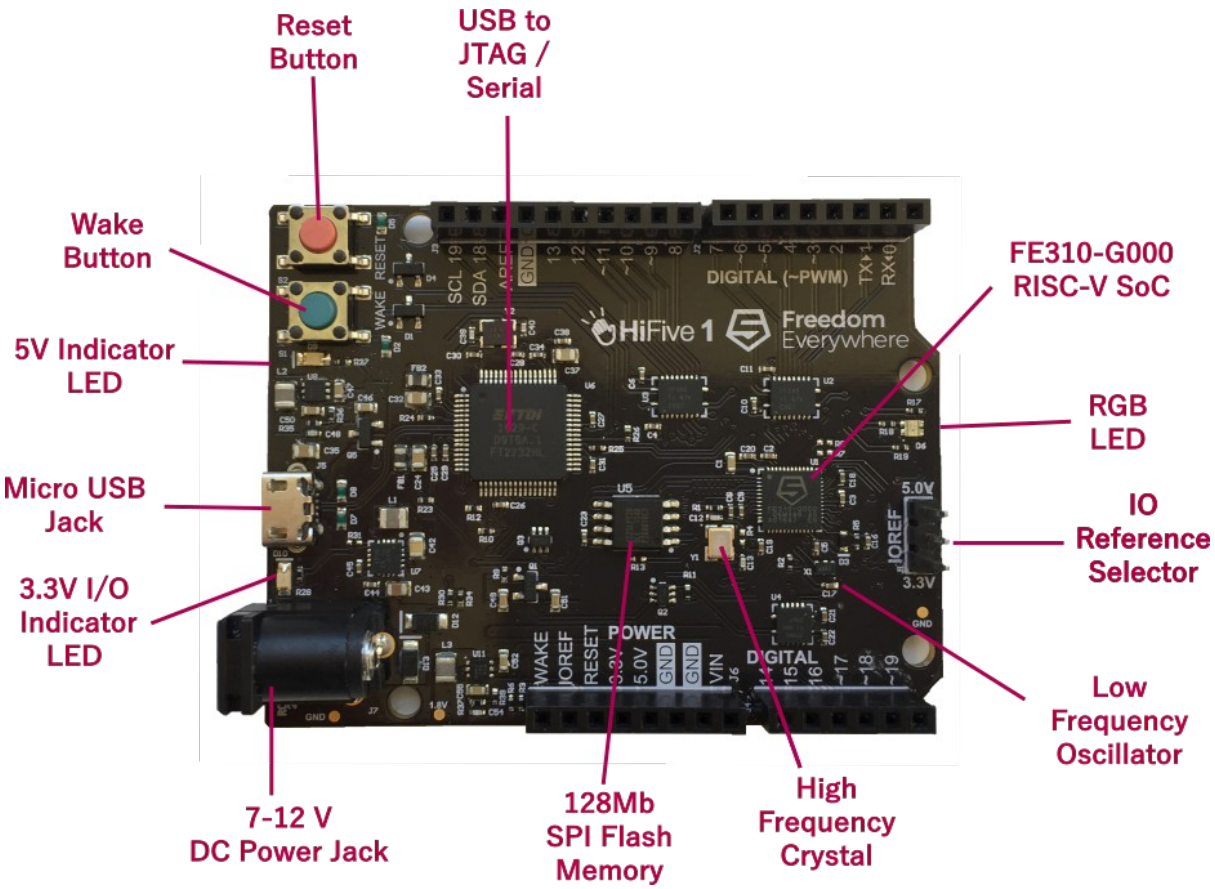
컴파일러 설정 및 업로드 6

RISC-V 32 비트 FE310 보드 소개

RISC-V 보드: https://www.sifive.com/boards

RISC-V 32 비트 HiFive1(FE310): https://www.sifive.com/boards/hifive1

실습보드(RISC-V 32bits, HiFive1, FE310)



FE310 기능 테이블

FE310-G000 Feature Summary Table		
Feature	**Description**	**Available in QFN48**
RISC-V Core	1x E31 RISC-V Core with machine mode only, 16 KiB 2-way instruction cache, and a 16 KiB data tightly integrated memory (DTIM).	✓
Interrupts	Software and timer interrupts, 51 peripheral interrupts connected to the PLIC with 7 levels of priority.	✓
UART 0	Universal Asynchronous/Synchronous Transmitters for serial communication.	✓
UART 1	Universal Asynchronous/Synchronous Transmitters for serial communication.	
QSPI 0	Serial Peripheral Interface. QSPI 0 has Execute in Place mode enabled by default and 1 chip select signal.	✓
QSPI 1	Serial Peripheral Interface. QSPI 1 has 4 chip select signals.	✓ (3 CS lines) (2 DQ lines)
QSPI 2	Serial Peripheral Interface. QSPI 2 has 1 chip select signal.	
PWM 0	8-bit Pulse-width modulator with 4 comparators	✓
PWM 1	16-bit PWM with 4 comparators	✓
PWM 2	16-bit PWM with 4 comparators	✓
GPIO	32 GPIO pins with SPI, UART, PWM pin aliases	✓ (19 pins)
Always On Domain	Supports low-power operation and wakeup	✓

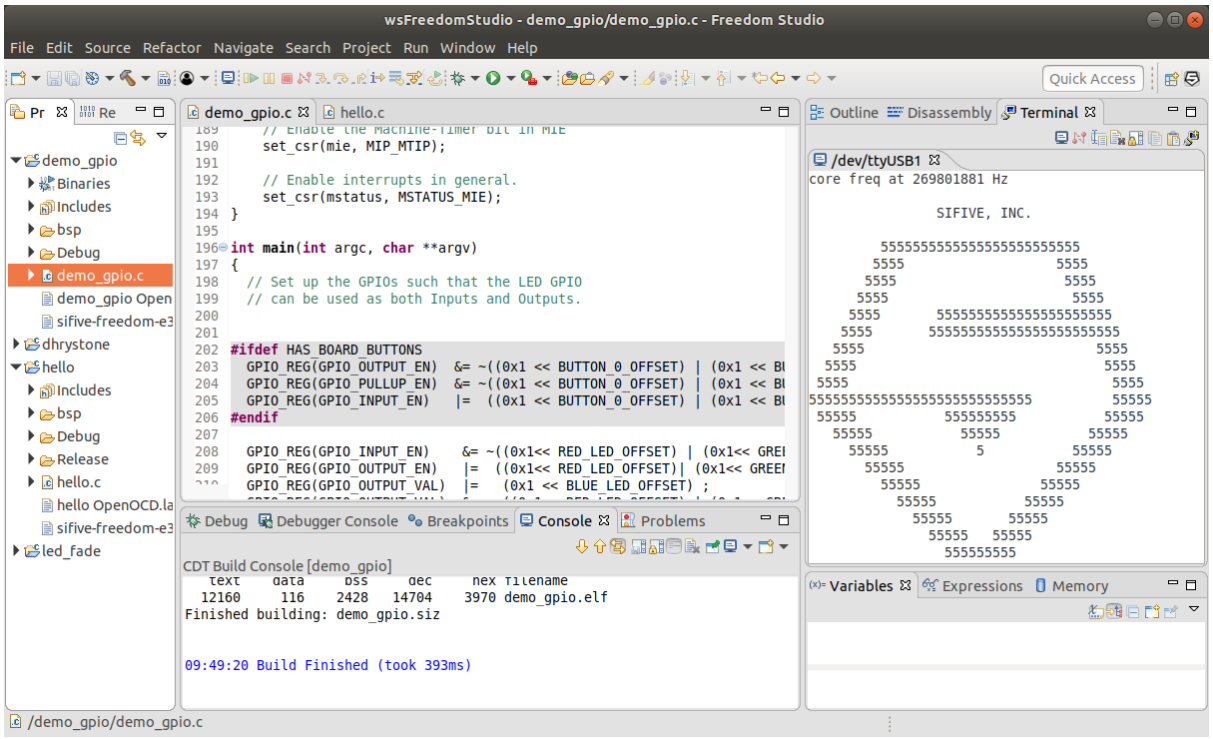
RISC-V 개발환경 설정

Freedom Studio 다운로드 및 설치

https://www.sifive.com/boards

OpenOCD 소스 다운로드(디버그, 옵로드):

https://github.com/gnu-mcu-eclipse/openocd/releases/tag/v0.10.0-11-20190118



hifive1-getting-started-v1.pdf 매뉴얼 6 장:

Freedom E SDK 다운로드(옵션):

git clone --recursive https://github.com/sifive/freedom-e-sdk.git

컴파일러 설정 및 업로드

컴파일러 경로 설정:

~/.bashrc

```
export
PATH=$PATH:/home/jungjaejoon/Projects/SDK/riscv/FreedomStudio/SiFive/
riscv64-unknown-elf-gcc-8.1.0-2018.12.0-x86_64-linux-ubuntu14/bin/:/home/
jungjaejoon/Projects/SDK/riscv/tools/gnu-mcu-eclipse/openocd/0.10.0-11-
20190118-1134/bin/
```

RISC-V 32 비트 HiFive1(FE310) 컴파일러 옵션들

riscv64-unknown-elf-gcc -O2 -fno-builtin-printf -DNO_INIT -g -march=rv32imac -mabi=ilp32 -mcmodel=medany

RISC-V 32 비트 HiFive1(FE310) 업로드 옵션들

```
#!/bin/bash
#openocd -f bsp/env/freedom-e300-hifive1/openocd.cfg & \
openocd -f $1/sifive-freedom-e300-hifive1.cfg & \
riscv64-unknown-elf-gdb hello/Debug/hello.elf --batch -ex "set remotetimeout 240" -ex "target
extended-remote localhost:3333" -ex "monitor reset halt" -ex "monitor flash protect 0 64 last off" -
ex "load" -ex "monitor resume" -ex "monitor shutdown" -ex "quit" && \
echo "Successfully uploaded 'hello' to freedom-e300-hifive1."
```