

\*\*\*\*\*Draft\*\*\*\*\*

Rp2040 FreeRTOS

Using VSCode

This project provides an example of generating a library for the pico

01/17/22

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<https://learnembeddedsystems.co.uk/freertos-on-rp2040-boards-pi-pico-etc-using-vscode>

<https://www.youtube.com/watch?v=jCZxStjzGA8>

```
git clone --recurse-submodules https://github.com/LearnEmbeddedSystems/rp2040-freertos-project
```

After forking the above project

```
git clone --recurse-submodules git clone --recurse-submodules  
git@github.com:develone/rp2040-freertos-project.git
```

```
git clone --recurse-submodules git@github.com:develone/rp2040-freertos-project.git
```

For this project the pico-sdk is required at same level as freertos

```
git clone https://github.com/raspberrypi/pico-sdk
```

```
cd pico-sdk
```

```
git submodule update --init
```

```
/home/devel/rp2040-freertos-project
```

```
CMakeLists.txt doc freertos pico-sdk pico_sdk_import.cmake ProjectFiles
```

```
mkdir build
```

```
cd build/
```

```
cmake ..
```

```
cd freertos/
```

```
make clean; make
```

```
export PATH=~/.local/openocd/bin:$PATH
```

```
cd rp2040-freertos-project/build/ProjectFiles
```

```
rp2040-freertos-project/build/ProjectFiles
```

```
openocd -f interface/raspberrypi-swd.cfg -f target/rp2040.cfg -c "program
ProjectFiles/blink.elf verify reset exit"
```

Appendix C Results devel@pi4-23:~/rp2040-freertos-project/build/ProjectFiles \$  
make clean; make

Appendix B Results of make clean; make for freertos.

Appendix A Results of git clone --recurse-submodules  
git@[github.com/develone/rp2040-freertos-project](https://github.com/develone/rp2040-freertos-project)

Cloning into 'rp2040-freertos-project'...

remote: Enumerating objects: 14, done.

remote: Counting objects: 100% (14/14), done.

remote: Compressing objects: 100% (12/12), done.

remote: Total 14 (delta 2), reused 13 (delta 1), pack-reused 0

Receiving objects: 100% (14/14), done.

Resolving deltas: 100% (2/2), done.

Submodule 'freertos/FreeRTOS-Kernel' (<https://github.com/FreeRTOS/FreeRTOS-Kernel>) registered for path 'freertos/FreeRTOS-Kernel'

Cloning into '/home/devel/rp2040-freertos-project/freertos/FreeRTOS-Kernel'...

remote: Enumerating objects: 160684, done.

remote: Counting objects: 100% (94/94), done.

remote: Compressing objects: 100% (73/73), done.

remote: Total 160684 (delta 41), reused 50 (delta 21), pack-reused 160590

Receiving objects: 100% (160684/160684), 108.59 MiB | 9.38 MiB/s, done.

Resolving deltas: 100% (115585/115585), done.

Submodule path 'freertos/FreeRTOS-Kernel': checked out  
'990643ebe8c990dd3672a52079d274e7685df980'

Submodule 'ThirdParty/FreeRTOS-Kernel-Community-Supported-Ports'  
(<https://github.com/FreeRTOS/FreeRTOS-Kernel-Community-Supported-Ports>)  
registered for path 'freertos/FreeRTOS-Kernel/portable/ThirdParty/Community-Supported-Ports'

Submodule 'ThirdParty/FreeRTOS-Kernel-Partner-Supported-Ports'  
(<https://github.com/FreeRTOS/FreeRTOS-Kernel-Partner-Supported-Ports>) registered  
for path 'freertos/FreeRTOS-Kernel/portable/ThirdParty/Partner-Supported-Ports'

Cloning into  
'/home/devel/rp2040-freertos-project/freertos/FreeRTOS-Kernel/portable/  
ThirdParty/Community-Supported-Ports'...

remote: Enumerating objects: 46, done.

remote: Counting objects: 100% (46/46), done.

remote: Compressing objects: 100% (38/38), done.

remote: Total 46 (delta 7), reused 40 (delta 5), pack-reused 0

Receiving objects: 100% (46/46), 34.18 KiB | 2.85 MiB/s, done.

Resolving deltas: 100% (7/7), done.

Cloning into  
'/home/devel/rp2040-freertos-project/freertos/FreeRTOS-Kernel/portable/  
ThirdParty/Partner-Supported-Ports'...

remote: Enumerating objects: 36, done.

remote: Counting objects: 100% (36/36), done.

remote: Compressing objects: 100% (27/27), done.

remote: Total 36 (delta 13), reused 28 (delta 9), pack-reused 0

Receiving objects: 100% (36/36), 17.62 KiB | 1.76 MiB/s, done.

Resolving deltas: 100% (13/13), done.

Submodule path 'freertos/FreeRTOS-Kernel/portable/ThirdParty/Community-Supported-Ports': checked out 'f0618d9e2f4c5b0a3e472a2673a090e8ef836258'

Submodule path 'freertos/FreeRTOS-Kernel/portable/ThirdParty/Partner-Supported-Ports': checked out '3f9c99a682c5c796bb7eb89fd9c4385688fce27a'

Appendix B Results of `maka clean; make` for freertos.

[ 11%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/event\_groups.c.obj

[ 22%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/list.c.obj

[ 33%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/queue.c.obj

[ 44%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/stream\_buffer.c.obj

[ 55%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/tasks.c.obj

[ 66%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/timers.c.obj

```
[ 77%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/portable/MemMang/heap_3.c.obj
```

```
[ 88%] Building C object  
freertos/CMakeFiles/freertos.dir/FreeRTOS-Kernel/portable/GCC/ARM_CM0/port.c.obj
```

```
[100%] Linking C static library libfreertos.a
```

```
[100%] Built target freertos
```

```
Appendix C Results devel@pi4-23:~/rp2040-freertos-project/build/ProjectFiles $  
make clean; make
```

```
Scanning dependencies of target ELF2UF2Build
```

```
[ 1%] Creating directories for 'ELF2UF2Build'
```

```
[ 2%] No download step for 'ELF2UF2Build'
```

```
[ 4%] No update step for 'ELF2UF2Build'
```

```
[ 5%] No patch step for 'ELF2UF2Build'
```

```
[ 7%] Performing configure step for 'ELF2UF2Build'
```

```
-- The C compiler identification is GNU 10.2.1
```

```
-- The CXX compiler identification is GNU 10.2.1
```

```
-- Detecting C compiler ABI info
```

```
-- Detecting C compiler ABI info - done
```

```
-- Check for working C compiler: /usr/bin/cc - skipped
```

```
-- Detecting C compile features
```

```
-- Detecting C compile features - done
```

```
-- Detecting CXX compiler ABI info
```

```
-- Detecting CXX compiler ABI info - done
```

```
-- Check for working CXX compiler: /usr/bin/c++ - skipped
```

```
-- Detecting CXX compile features
```

```
-- Detecting CXX compile features - done
```

```
-- Configuring done
```

```
-- Generating done
```

```
-- Build files have been written to:  
/home/devel/rp2040-freertos-project/build/elf2uf2
```

```
[ 8%] Performing build step for 'ELF2UF2Build'
```

Scanning dependencies of target elf2uf2

[ 50%] Building CXX object CMakeFiles/elf2uf2.dir/main.cpp.o

[100%] Linking CXX executable elf2uf2

[100%] Built target elf2uf2

[ 10%] No install step for 'ELF2UF2Build'

[ 11%] Completed 'ELF2UF2Build'

[ 11%] Built target ELF2UF2Build

Scanning dependencies of target bs2\_default

[ 13%] Building ASM object  
pico-sdk/src/rp2\_common/boot\_stage2/CMakeFiles/bs2\_default.dir/compile\_time\_choi  
ce.S.obj

[ 14%] Linking ASM executable bs2\_default.elf

[ 14%] Built target bs2\_default

Scanning dependencies of target bs2\_default\_padded\_checksummed\_asm

[ 16%] Generating bs2\_default.bin

[ 17%] Generating bs2\_default\_padded\_checksummed.S

[ 17%] Built target bs2\_default\_padded\_checksummed\_asm

[ 30%] Built target freertos

Scanning dependencies of target blink

[ 32%] Building C object ProjectFiles/CMakeFiles/blink.dir/main.c.obj

[ 33%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_stdlib/  
stdlib.c.obj

[ 35%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_gpio/  
gpio.c.obj

[ 36%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_claim/  
claim.c.obj

[ 38%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_platform/  
platform.c.obj

[ 39%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_sync/  
sync.c.obj

[ 41%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_uart/  
uart.c.obj

[ 42%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_divider/  
divider.S.obj

[ 44%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_time/time.c.obj

[ 45%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_time/  
timeout\_helper.c.obj

[ 47%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_timer/  
timer.c.obj

[ 48%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_sync/sem.c.obj

[ 50%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_sync/  
lock\_core.c.obj

[ 51%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_sync/mutex.c.obj

[ 52%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_sync/  
critical\_section.c.obj

[ 54%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_util/  
datetime.c.obj

[ 55%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_util/pheap.c.obj

[ 57%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/common/pico\_util/queue.c.obj

[ 58%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_runtime/  
runtime.c.obj

[ 60%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_clocks/  
clocks.c.obj

[ 61%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_irq/  
irq.c.obj

[ 63%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_irq/  
irq\_handler\_chain.S.obj

[ 64%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_pll/  
pll.c.obj

[ 66%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_vreg/  
vreg.c.obj

[ 67%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_watchdog/  
watchdog.c.obj

[ 69%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/hardware\_xosc/  
xosc.c.obj

[ 70%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_printf/  
printf.c.obj

[ 72%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_bit\_ops/  
bit\_ops\_aeabi.S.obj

[ 73%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_bootrom/  
bootrom.c.obj

[ 75%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_divider/  
divider.S.obj

[ 76%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_aeabi.S.obj

[ 77%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_init\_rom.c.obj

[ 79%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_math.c.obj

[ 80%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_double/  
double\_v1\_rom\_shim.S.obj

[ 82%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_int64\_ops/  
pico\_int64\_ops\_aeabi.S.obj

[ 83%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_float/  
float\_aeabi.S.obj

[ 85%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_float/  
float\_init\_rom.c.obj

[ 86%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_float/  
float\_math.c.obj

[ 88%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_float/  
float\_v1\_rom\_shim.S.obj

[ 89%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_malloc/  
pico\_malloc.c.obj

[ 91%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_mem\_ops/  
mem\_ops\_aeabi.S.obj

[ 92%] Building ASM object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link  
/crt0.S.obj

[ 94%] Building CXX object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link  
/new\_delete.cpp.obj

[ 95%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_standard\_link  
/binary\_info.c.obj

[ 97%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio/  
stdio.c.obj

[ 98%] Building C object  
ProjectFiles/CMakeFiles/blink.dir/opt/pico-sdk/src/rp2\_common/pico\_stdio\_uart/  
stdio\_uart.c.obj

[100%] Linking CXX executable blink.elf

[100%] Built target blink