

*****Draft*****

Rp2040 FreeRTOS

Using VSCode

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

02/04/22

*****Draft*****

Added the lifting folder

lifting/

├─ CMakeLists.txt

├─ LIFTING-Files

| └─ lifting.c

└─ lifting.h

/home/devel/rp2040-freertos-project/build

cmake ..

/home/devel/rp2040-freertos-project/build/lifting

make clean ; make

ls -la

total 28

drwxr-xr-x 3 devel devel 4096 Jan 17 16:27 .

drwxr-xr-x 9 devel devel 4096 Jan 17 16:27 ..

drwxr-xr-x 3 devel devel 4096 Jan 17 16:27 CMakeFiles

-rw-r--r-- 1 devel devel 1138 Jan 17 16:27 cmake_install.cmake

-rw-r--r-- 1 devel devel 2298 Jan 17 16:27 liblifting.a

-rw-r--r-- 1 devel devel 6255 Jan 17 16:27 Makefile

<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@github.com:rp2040-freertos-project.git
```

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

```
cd rp2040-freertos-project
```

~~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
```

```
cd ../
```

Note: Given that .bashrc had the line from when the pico-examples was used. The pico-sdk is not required in this project. See the lines above that were not required.

```
export PICO_SDK_PATH=/opt/pico-sdk
```

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

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

```
mkdir build
```

```
cd build/
```

```
cmake ..
```

```
make
```

```
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 D tree rp2040-freertos-project

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

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 `make 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

```

Appendix D tree rp2040-freertos-project

```

├─ build
|   ├─ CMakeCache.txt
|   ├─ CMakeFiles
|   |   └─ 3.18.4
|   |       └─ CMakeASMCompiler.cmake
|   |       └─ CMakeCCompiler.cmake
|   |       └─ CMakeCXXCompiler.cmake
|   |       └─ CMakeSystem.cmake
|   |       └─ CompilerIdASM
|   |       └─ CompilerIdC
|   |           └─ CMakeCCompilerId.c
|   |           └─ CMakeCCompilerId.o
|   |               └─ tmp

```

```
| | | └─ CompilerIdCXX
| | |   └─ CMakeCXXCompilerId.cpp
| | |   └─ CMakeCXXCompilerId.o
| | |   └─ tmp
| | └─ cmake.check_cache
| | └─ CMakeDirectoryInformation.cmake
| | └─ CMakeError.log
| | └─ CMakeOutput.log
| | └─ CMakeRuleHashes.txt
| | └─ Makefile2
| | └─ Makefile.cmake
| | └─ progress.marks
| | └─ TargetDirectories.txt
| └─ cmake_install.cmake
| └─ elf2uf2
| | └─ boot_uf2_headers
| | | └─ CMakeFiles
| | | | └─ CMakeDirectoryInformation.cmake
| | | | └─ progress.marks
| | | └─ cmake_install.cmake
| | └─ Makefile
| | └─ CMakeCache.txt
| | └─ CMakeFiles
| | | └─ 3.18.4
| | | | └─ CMakeCCompiler.cmake
| | | | └─ CMakeCXXCompiler.cmake
| | | | └─ CMakeDetermineCompilerABI_C.bin
| | | | └─ CMakeDetermineCompilerABI_CXX.bin
| | | └─ CMakeSystem.cmake
```

```

| | | | └─ CompilerIdC
| | | | | └─ a.out
| | | | | └─ CMakeCCompilerId.c
| | | | | └─ tmp
| | | | └─ CompilerIdCXX
| | | | └─ a.out
| | | | └─ CMakeCXXCompilerId.cpp
| | | | └─ tmp
| | | └─ cmake.check_cache
| | | └─ CMakeDirectoryInformation.cmake
| | | └─ CMakeOutput.log
| | | └─ CMakeTmp
| | | └─ elf2uf2.dir
| | | | └─ build.make
| | | | └─ cmake_clean.cmake
| | | | └─ CXX.includecache
| | | | └─ DependInfo.cmake
| | | | └─ depend.internal
| | | | └─ depend.make
| | | | └─ flags.make
| | | | └─ link.txt
| | | | └─ main.cpp.o
| | | | └─ progress.make
| | | └─ Makefile2
| | | └─ Makefile.cmake
| | | └─ progress.marks
| | | └─ TargetDirectories.txt
| | └─ cmake_install.cmake
| └─ elf2uf2

```

```
| | └─ Makefile
| └─ freertos
| | └─ CMakeFiles
| | | └─ CMakeDirectoryInformation.cmake
| | | └─ freertos.dir
| | | | └─ build.make
| | | | └─ C.includecache
| | | | └─ cmake_clean.cmake
| | | | └─ cmake_clean_target.cmake
| | | | └─ DependInfo.cmake
| | | | └─ depend.internal
| | | | └─ depend.make
| | | | └─ flags.make
| | | | └─ FreeRTOS-Kernel
| | | | | └─ event_groups.c.obj
| | | | | └─ list.c.obj
| | | | | └─ portable
| | | | | | └─ GCC
| | | | | | | └─ ARM_CM0
| | | | | | | └─ port.c.obj
| | | | | | └─ MemMang
| | | | | | └─ heap_3.c.obj
| | | | | └─ queue.c.obj
| | | | | └─ stream_buffer.c.obj
| | | | | └─ tasks.c.obj
| | | | | └─ timers.c.obj
| | | | └─ link.txt
| | | └─ progress.make
| | └─ progress.marks
```

```
| | └─ cmake_install.cmake
| | └─ libfreertos.a
| | └─ Makefile
| └─ generated
| | └─ pico_base
| |   └─ pico
| |     └─ config_autogen.h
| |       └─ version.h
| └─ Makefile
| └─ pico-sdk
| | └─ CMakeFiles
| |   └─ CMakeDirectoryInformation.cmake
| |     └─ progress.marks
| |   └─ cmake_install.cmake
| |   └─ docs
| |     └─ CMakeFiles
| |       └─ CMakeDirectoryInformation.cmake
| |         └─ progress.marks
| |       └─ cmake_install.cmake
| |       └─ Makefile
| |   └─ Makefile
| |   └─ src
| |     └─ CMakeFiles
| |       └─ CMakeDirectoryInformation.cmake
| |         └─ progress.marks
| |       └─ cmake_install.cmake
| |       └─ common
| |         └─ boot_picoboot
| |         └─ CMakeFiles
```

```
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ boot_uf2
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_base
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_binary_info
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_bit_ops
| | | | | | | └─ CMakeFiles
```

```
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_divider
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_stdlib
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_sync
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_time
| | | | | | | └─ CMakeFiles
| | | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | | └─ progress.marks
| | | | | | | └─ cmake_install.cmake
| | | | | | | └─ Makefile
| | | | | | | └─ pico_usb_reset_interface
```

```
| | | | | └─ CMakeFiles
| | | | | | └─ CMakeDirectoryInformation.cmake
| | | | | | └─ progress.marks
| | | | | └─ cmake_install.cmake
| | | | └─ Makefile
| | | └─ pico_util
| | | └─ CMakeFiles
| | | | └─ CMakeDirectoryInformation.cmake
| | | | └─ progress.marks
| | | | └─ cmake_install.cmake
| | | └─ Makefile
| | └─ Makefile
| | └─ rp2040
| | | └─ CMakeFiles
| | | | └─ CMakeDirectoryInformation.cmake
| | | | └─ progress.marks
| | | | └─ cmake_install.cmake
| | | | └─ hardware_regs
| | | | └─ CMakeFiles
| | | | | └─ CMakeDirectoryInformation.cmake
| | | | | └─ progress.marks
| | | | | └─ cmake_install.cmake
| | | | └─ Makefile
| | | └─ hardware_structs
| | | └─ CMakeFiles
| | | | └─ CMakeDirectoryInformation.cmake
| | | | └─ progress.marks
| | | | └─ cmake_install.cmake
| | | └─ Makefile
```



```

|   |   |   |   └─ Makefile
|   |   |   └─ rp2_common
|   |   |       └─ boot_stage2
|   |   |           └─ bs2_default.bin
|   |   |           └─ bs2_default.dis
|   |   |           └─ bs2_default.elf
|   |   |           └─ bs2_default.elf.map
|   |   |           └─ bs2_default_padded_checksummed.S
|   |   |           └─ CMakeFiles
|   |   |               └─ bs2_default_bin.dir
|   |   |                   └─ build.make
|   |   |                   └─ cmake_clean.cmake
|   |   |                   └─ DependInfo.cmake
|   |   |                       └─ progress.make
|   |   |               └─ bs2_default.dir
|   |   |                   └─ ASM.includecache
|   |   |                   └─ build.make
|   |   |                   └─ cmake_clean.cmake
|   |   |                   └─ compile_time_choice.S.obj
|   |   |                   └─ DependInfo.cmake
|   |   |                   └─ depend.internal
|   |   |                   └─ depend.make
|   |   |                   └─ flags.make
|   |   |                   └─ link.txt
|   |   |                       └─ progress.make
|   |   |               └─ bs2_default_padded_checksummed_asm.dir
|   |   |                   └─ build.make
|   |   |                   └─ cmake_clean.cmake
|   |   |                   └─ DependInfo.cmake

```

							└─ depend.internal
							└─ depend.make
							└─ progress.make
						└─	CMakeDirectoryInformation.cmake
						└─	progress.marks
					└─		cmake_install.cmake
					└─		Makefile
				└─			CMakeFiles
					└─		CMakeDirectoryInformation.cmake
					└─		progress.marks
				└─			cmake_install.cmake
				└─			cmsis
					└─		CMakeFiles
						└─	CMakeDirectoryInformation.cmake
						└─	progress.marks
					└─		cmake_install.cmake
					└─		Makefile
				└─			hardware_adc
					└─		CMakeFiles
						└─	CMakeDirectoryInformation.cmake
						└─	progress.marks
					└─		cmake_install.cmake
					└─		Makefile
				└─			hardware_base
					└─		CMakeFiles
						└─	CMakeDirectoryInformation.cmake
						└─	progress.marks
					└─		cmake_install.cmake
					└─		Makefile

				└─ hardware_claim
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_clocks
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_divider
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_dma
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_exception
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake

				└─ Makefile
				└─ hardware_flash
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_gpio
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_i2c
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_interp
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks
				└─ cmake_install.cmake
				└─ Makefile
				└─ hardware_irq
				└─ CMakeFiles
				└─ CMakeDirectoryInformation.cmake
				└─ progress.marks

					└─ cmake_install.cmake
					└─ Makefile
					└─ hardware_pio
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ hardware_pll
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ hardware_pwm
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ hardware_resets
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ hardware_rtc
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake

					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
				└─	hardware_spi
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
				└─	hardware_sync
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
				└─	hardware_timer
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
				└─	hardware_uart
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
				└─	hardware_vreg
					└─ CMakeFiles

						└─ CMakeDirectoryInformation.cmake
						└─ progress.marks
						└─ cmake_install.cmake
						└─ Makefile
						└─ hardware_watchdog
						└─ CMakeFiles
						└─ CMakeDirectoryInformation.cmake
						└─ progress.marks
						└─ cmake_install.cmake
						└─ Makefile
						└─ hardware_xosc
						└─ CMakeFiles
						└─ CMakeDirectoryInformation.cmake
						└─ progress.marks
						└─ cmake_install.cmake
						└─ Makefile
						└─ Makefile
						└─ pico_bit_ops
						└─ CMakeFiles
						└─ CMakeDirectoryInformation.cmake
						└─ progress.marks
						└─ cmake_install.cmake
						└─ Makefile
						└─ pico_bootrom
						└─ CMakeFiles
						└─ CMakeDirectoryInformation.cmake
						└─ progress.marks
						└─ cmake_install.cmake
						└─ Makefile

			└─ pico_bootsel_via_double_reset
			└─ CMakeFiles
			└─ CMakeDirectoryInformation.cmake
			└─ progress.marks
			└─ cmake_install.cmake
			└─ Makefile
			└─ pico_cxx_options
			└─ CMakeFiles
			└─ CMakeDirectoryInformation.cmake
			└─ progress.marks
			└─ cmake_install.cmake
			└─ Makefile
			└─ pico_divider
			└─ CMakeFiles
			└─ CMakeDirectoryInformation.cmake
			└─ progress.marks
			└─ cmake_install.cmake
			└─ Makefile
			└─ pico_double
			└─ CMakeFiles
			└─ CMakeDirectoryInformation.cmake
			└─ progress.marks
			└─ cmake_install.cmake
			└─ Makefile
			└─ pico_fix
			└─ CMakeFiles
			└─ CMakeDirectoryInformation.cmake
			└─ progress.marks
			└─ cmake_install.cmake

					└─ Makefile
					└─ rp2040_usb_device_enumeration
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_float
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_int64_ops
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_malloc
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_mem_ops
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks

					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_multicore
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_platform
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_printf
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_runtime
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_standard_link
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake

					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_stdio
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_stdio_semihosting
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_stdio_uart
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_stdio_usb
					└─ CMakeFiles
					└─ CMakeDirectoryInformation.cmake
					└─ progress.marks
					└─ cmake_install.cmake
					└─ Makefile
					└─ pico_stdlib
					└─ CMakeFiles

```

|   |   |   |   |   |   └─ CMakeDirectoryInformation.cmake
|   |   |   |   |   |   └─ progress.marks
|   |   |   |   |   |   └─ cmake_install.cmake
|   |   |   |   |   |   └─ Makefile
|   |   |   |   |   |   └─ pico_unique_id
|   |   |   |   |   |   └─ CMakeFiles
|   |   |   |   |   |   └─ CMakeDirectoryInformation.cmake
|   |   |   |   |   |   └─ progress.marks
|   |   |   |   |   |   └─ cmake_install.cmake
|   |   |   |   |   |   └─ Makefile
|   |   |   |   |   |   └─ tinyusb
|   |   |   |   |   |   └─ CMakeFiles
|   |   |   |   |   |   └─ CMakeDirectoryInformation.cmake
|   |   |   |   |   |   └─ progress.marks
|   |   |   |   |   |   └─ cmake_install.cmake
|   |   |   |   |   |   └─ Makefile
|   |   |   |   |   └─ tools
|   |   |   |   |   └─ CMakeFiles
|   |   |   |   |   └─ CMakeDirectoryInformation.cmake
|   |   |   |   |   └─ progress.marks
|   |   |   |   |   └─ cmake_install.cmake
|   |   |   |   |   └─ Makefile
|   |   └─ ProjectFiles
|   |   └─ blink.bin
|   |   └─ blink.dis
|   |   └─ blink.elf
|   |   └─ blink.elf.map
|   |   └─ blink.hex
|   |   └─ blink.uf2

```

```

|      └─ CMakeFiles
|
|      |   └─ blink.dir
|
|      |   |   └─ ASM.includecache
|
|      |   |   └─ build.make
|
|      |   |   └─ C.includecache
|
|      |   |   └─ cmake_clean.cmake
|
|      |   |   └─ CXX.includecache
|
|      |   |   └─ DependInfo.cmake
|
|      |   |   └─ depend.internal
|
|      |   |   └─ depend.make
|
|      |   |   └─ flags.make
|
|      |   |   └─ link.txt
|
|      |   |   └─ main.c.obj
|
|      |   |   └─ opt
|
|      |   |   |   └─ pico-sdk
|
|      |   |   |       └─ src
|
|      |   |   |           └─ common
|
|      |   |   |               |   └─ pico_sync
|
|      |   |   |                   |   |   └─ critical_section.c.obj
|
|      |   |   |                   |   |   └─ lock_core.c.obj
|
|      |   |   |                   |   |   └─ mutex.c.obj
|
|      |   |   |                   |   |   └─ sem.c.obj
|
|      |   |   |                   |   └─ pico_time
|
|      |   |   |                   |   |   └─ time.c.obj
|
|      |   |   |                   |   |   └─ timeout_helper.c.obj
|
|      |   |   |                   |   └─ pico_util
|
|      |   |   |                       |   └─ datetime.c.obj
|
|      |   |   |                       |   └─ pheap.c.obj
|
|      |   |   |                       |   └─ queue.c.obj

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				└─ rp2_common
				└─ hardware_claim
				└─ claim.c.obj
				└─ hardware_clocks
				└─ clocks.c.obj
				└─ hardware_divider
				└─ divider.S.obj
				└─ hardware_gpio
				└─ gpio.c.obj
				└─ hardware_irq
				└─ irq.c.obj
				└─ irq_handler_chain.S.obj
				└─ hardware_pll
				└─ pll.c.obj
				└─ hardware_sync
				└─ sync.c.obj
				└─ hardware_timer
				└─ timer.c.obj
				└─ hardware_uart
				└─ uart.c.obj
				└─ hardware_vreg
				└─ vreg.c.obj
				└─ hardware_watchdog
				└─ watchdog.c.obj
				└─ hardware_xosc
				└─ xosc.c.obj
				└─ pico_bit_ops
				└─ bit_ops_aeabi.S.obj
				└─ pico_bootrom

					└─ bootrom.c.obj
					└─ pico_divider
					└─ divider.S.obj
					└─ pico_double
					└─ double_aeabi.S.obj
					└─ double_init_rom.c.obj
					└─ double_math.c.obj
					└─ double_v1_rom_shim.S.obj
					└─ pico_float
					└─ float_aeabi.S.obj
					└─ float_init_rom.c.obj
					└─ float_math.c.obj
					└─ float_v1_rom_shim.S.obj
					└─ pico_int64_ops
					└─ pico_int64_ops_aeabi.S.obj
					└─ pico_malloc
					└─ pico_malloc.c.obj
					└─ pico_mem_ops
					└─ mem_ops_aeabi.S.obj
					└─ pico_platform
					└─ platform.c.obj
					└─ pico_printf
					└─ printf.c.obj
					└─ pico_runtime
					└─ runtime.c.obj
					└─ pico_standard_link
					└─ binary_info.c.obj
					└─ crt0.S.obj
					└─ new_delete.cpp.obj

```

|         |   |   |           |─ pico_stdio
|         |   |   |           |   └─ stdio.c.obj
|         |   |   |           |─ pico_stdio_uart
|         |   |   |           |   └─ stdio_uart.c.obj
|         |   |   |           └─ pico_stdlib
|         |   |   |               └─ stdlib.c.obj
|         |   |   └─ progress.make
|         |   └─ CMakeDirectoryInformation.cmake
|         |   └─ ELF2UF2Build-complete
|         |   └─ ELF2UF2Build.dir
|         |   |   └─ build.make
|         |   |   └─ cmake_clean.cmake
|         |   |   └─ DependInfo.cmake
|         |   |   └─ depend.internal
|         |   |   └─ depend.make
|         |   |   └─ Labels.json
|         |   |   └─ Labels.txt
|         |   |   └─ progress.make
|         |   └─ progress.marks
|         └─ cmake_install.cmake
|         └─ elf2uf2
|         |   └─ src
|         |   |   └─ ELF2UF2Build-stamp
|         |   |   |   └─ ELF2UF2Build-configure
|         |   |   |   └─ ELF2UF2Build-done
|         |   |   |   └─ ELF2UF2Build-download
|         |   |   |   └─ ELF2UF2Build-install
|         |   |   |   └─ ELF2UF2Build-mkdir
|         |   |   |   └─ ELF2UF2Build-patch

```



```
|      | |      └─ ELF2UF2Build-update
|      | └─ tmp
|      | └─ ELF2UF2Build-cfgcmd.txt
|      | └─ ELF2UF2Build-cfgcmd.txt.in
|      └─ Makefile
└─ CMakeLists.txt

└─ doc
|   └─ pico-freeRtos.odt
|   └─ pico-freeRtos.pdf
└─ freertos
|   └─ CMakeLists.txt
|   └─ FreeRTOSConfig.h
|   └─ FreeRTOS-Kernel
|       └─ croutine.c
|       └─ event_groups.c
|       └─ GitHub-FreeRTOS-Kernel-Home.url
|       └─ History.txt
|       └─ include
|           └─ atomic.h
|           └─ croutine.h
|           └─ deprecated_definitions.h
|           └─ event_groups.h
|           └─ FreeRTOS.h
|           └─ list.h
|           └─ message_buffer.h
|           └─ mpu_prototypes.h
|           └─ mpu_wrappers.h
|           └─ portable.h
|           └─ projdefs.h
```

- | | └─ queue.h
- | | └─ semphr.h
- | | └─ stack_macros.h
- | | └─ StackMacros.h
- | | └─ stdint.readme
- | | └─ stream_buffer.h
- | | └─ task.h
- | | └─ timers.h
- | └─ LICENSE.md
- | └─ list.c
- | └─ portable
- | | └─ ARMClang
- | | | └─ Use-the-GCC-ports.txt
- | | └─ ARMv8M
- | | | └─ copy_files.py
- | | | └─ non_secure
- | | | | └─ portable
- | | | | | └─ GCC
- | | | | | | └─ ARM_CM23
- | | | | | | | └─ portasm.c
- | | | | | | | └─ portmacro.h
- | | | | | | └─ ARM_CM23_NTZ
- | | | | | | | └─ portasm.c
- | | | | | | | └─ portmacro.h
- | | | | | | └─ ARM_CM33
- | | | | | | | └─ portasm.c
- | | | | | | | └─ portmacro.h
- | | | | | | └─ ARM_CM33_NTZ
- | | | | | └─ portasm.c

```

|         | | | | | |         └─ portmacro.h
|         | | | | |         └─ IAR
|         | | | | |         └─ ARM_CM23
|         | | | | |         | └─ portasm.s
|         | | | | |         | └─ portmacro.h
|         | | | | |         └─ ARM_CM23_NTZ
|         | | | | |         | └─ portasm.s
|         | | | | |         | └─ portmacro.h
|         | | | | |         └─ ARM_CM33
|         | | | | |         | └─ portasm.s
|         | | | | |         | └─ portmacro.h
|         | | | | |         └─ ARM_CM33_NTZ
|         | | | | |         └─ portasm.s
|         | | | | |         └─ portmacro.h
|         | | | | └─ portasm.h
|         | | | └─ port.c
|         | | └─ ReadMe.txt
|         | └─ ReadMe.txt
|         └─ secure
|         | └─ context
|         | | └─ portable
|         | | | └─ GCC
|         | | | | └─ ARM_CM23
|         | | | | | └─ secure_context_port.c
|         | | | | | └─ ARM_CM33
|         | | | | | └─ secure_context_port.c
|         | | | | └─ IAR
|         | | | └─ ARM_CM23
|         | | └─ secure_context_port_asm.s

```

```

|      |      |      |      |      └─ ARM_CM33
|      |      |      |      |      └─ secure_context_port_asm.s
|      |      |      |      |      └─ secure_context.c
|      |      |      |      |      └─ secure_context.h
|      |      |      |      |      └─ heap
|      |      |      |      |      └─ secure_heap.c
|      |      |      |      |      └─ secure_heap.h
|      |      |      |      |      └─ init
|      |      |      |      |      └─ secure_init.c
|      |      |      |      |      └─ secure_init.h
|      |      |      |      |      └─ macros
|      |      |      |      |      └─ secure_port_macros.h
|      |      |      |      |      └─ ReadMe.txt
|      |      |      |      |      └─ BCC
|      |      |      |      |      └─ 16BitDOS
|      |      |      |      |      └─ common
|      |      |      |      |      └─ portasm.h
|      |      |      |      |      └─ portcomn.c
|      |      |      |      |      └─ Flsh186
|      |      |      |      |      └─ port.c
|      |      |      |      |      └─ prtmacro.h
|      |      |      |      |      └─ PC
|      |      |      |      |      └─ port.c
|      |      |      |      |      └─ prtmacro.h
|      |      |      |      |      └─ CCS
|      |      |      |      |      └─ ARM_CM3
|      |      |      |      |      └─ portasm.asm
|      |      |      |      |      └─ port.c
|      |      |      |      |      └─ prtmacro.h

```

```

|   |   | └─ ARM_CM4F
|   |   |   | └─ portasm.asm
|   |   |   | └─ port.c
|   |   |   | └─ portmacro.h
|   |   | └─ ARM_Cortex-R4
|   |   |   | └─ portASM.asm
|   |   |   | └─ port.c
|   |   |   | └─ portmacro.h
|   |   | └─ MSP430X
|   |   |   | └─ data_model.h
|   |   |   | └─ port.c
|   |   |   | └─ portext.asm
|   |   |   | └─ portmacro.h
|   |   └─ CodeWarrior
|   |       | └─ ColdFire_V1
|   |       |   | └─ portasm.S
|   |       |   | └─ port.c
|   |       |   | └─ portmacro.h
|   |       | └─ ColdFire_V2
|   |       |   | └─ portasm.S
|   |       |   | └─ port.c
|   |       |   | └─ portmacro.h
|   |       | └─ HCS12
|   |       |   | └─ port.c
|   |       |   | └─ portmacro.h
|   |       └─ Common
|   |           | └─ mpu_wrappers.c
|   |           └─ GCC
|   |               | └─ ARM7_AT91FR40008

```

					└─ port.c
					└─ portISR.c
					└─ portmacro.h
					└─ ARM7_AT91SAM7S
					└─ AT91SAM7X256.h
					└─ ioat91sam7x256.h
					└─ lib_AT91SAM7X256.c
					└─ lib_AT91SAM7X256.h
					└─ port.c
					└─ portISR.c
					└─ portmacro.h
					└─ ARM7_LPC2000
					└─ port.c
					└─ portISR.c
					└─ portmacro.h
					└─ ARM7_LPC23xx
					└─ port.c
					└─ portISR.c
					└─ portmacro.h
					└─ ARM_CA53_64_BIT
					└─ portASM.S
					└─ port.c
					└─ portmacro.h
					└─ ARM_CA53_64_BIT_SRE
					└─ portASM.S
					└─ port.c
					└─ portmacro.h
					└─ ARM_CA9
					└─ portASM.S

```

|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ARM_CM0
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ARM_CM23
|      |  |  |  |  └─ non_secure
|      |  |  |  |  |  └─ portasm.c
|      |  |  |  |  |  └─ portasm.h
|      |  |  |  |  |  └─ port.c
|      |  |  |  |  |  └─ portmacro.h
|      |  |  |  |  └─ secure
|      |  |  |  |  |  └─ secure_context.c
|      |  |  |  |  |  └─ secure_context.h
|      |  |  |  |  |  └─ secure_context_port.c
|      |  |  |  |  |  └─ secure_heap.c
|      |  |  |  |  |  └─ secure_heap.h
|      |  |  |  |  |  └─ secure_init.c
|      |  |  |  |  |  └─ secure_init.h
|      |  |  |  |  |  └─ secure_port_macros.h
|      |  |  |  └─ ARM_CM23_NTZ
|      |  |  |  |  └─ non_secure
|      |  |  |  |  |  └─ portasm.c
|      |  |  |  |  |  └─ portasm.h
|      |  |  |  |  |  └─ port.c
|      |  |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ARM_CM3
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h

```

			└─ ARM_CM33
			└─ non_secure
			└─ portasm.c
			└─ portasm.h
			└─ port.c
			└─ portmacro.h
			└─ secure
			└─ secure_context.c
			└─ secure_context.h
			└─ secure_context_port.c
			└─ secure_heap.c
			└─ secure_heap.h
			└─ secure_init.c
			└─ secure_init.h
			└─ secure_port_macros.h
			└─ ARM_CM33_NTZ
			└─ non_secure
			└─ portasm.c
			└─ portasm.h
			└─ port.c
			└─ portmacro.h
			└─ ARM_CM3_MPU
			└─ port.c
			└─ portmacro.h
			└─ ARM_CM4F
			└─ port.c
			└─ portmacro.h
			└─ ARM_CM4_MPU
			└─ port.c

				└─ portmacro.h
			└─	ARM_CM7
			└─	r0p1
				└─ port.c
				└─ portmacro.h
			└─	ReadMe.txt
			└─	ARM_CR5
			└─	portASM.S
			└─	port.c
			└─	portmacro.h
			└─	ARM_CRx_No_GIC
			└─	portASM.S
			└─	port.c
			└─	portmacro.h
			└─	ATMega323
			└─	port.c
			└─	portmacro.h
			└─	AVR32_UC3
			└─	exception.S
			└─	port.c
			└─	portmacro.h
			└─	AVR_AVRDx
			└─	README.md
			└─	AVR_Mega0
			└─	README.md
			└─	ColdFire_V2
			└─	portasm.S
			└─	port.c
			└─	portmacro.h

				└─ CORTUS_APS3
				└─ port.c
				└─ portmacro.h
				└─ H8S2329
				└─ port.c
				└─ portmacro.h
				└─ HCS12
				└─ port.c
				└─ portmacro.h
				└─ IA32_flat
				└─ ISR_Support.h
				└─ portASM.S
				└─ port.c
				└─ portmacro.h
				└─ MCF5235
				└─ readme.md
				└─ MicroBlaze
				└─ portasm.s
				└─ port.c
				└─ portmacro.h
				└─ MicroBlazeV8
				└─ portasm.S
				└─ port.c
				└─ port_exceptions.c
				└─ portmacro.h
				└─ MicroBlazeV9
				└─ portasm.S
				└─ port.c
				└─ port_exceptions.c

```

|      |      |      |      └─ portmacro.h
|      |      |      └─ MSP430F449
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ NiosII
|      |      |      └─ port_asm.S
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ PPC405_Xilinx
|      |      |      └─ FPU_Macros.h
|      |      |      └─ portasm.S
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ PPC440_Xilinx
|      |      |      └─ FPU_Macros.h
|      |      |      └─ portasm.S
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ RISC-V
|      |      |      └─ chip_specific_extensions
|      |      |      |      └─ Pulpino_Vega_RV32M1RM
|      |      |      |      |      └─ freertos_risc_v_chip_specific_extensions.h
|      |      |      |      └─ readme.txt
|      |      |      |      └─ RISCV_MTIME_CLINT_no_extensions
|      |      |      |      |      └─ freertos_risc_v_chip_specific_extensions.h
|      |      |      |      └─ RV32I_CLINT_no_extensions
|      |      |      |      |      └─ freertos_risc_v_chip_specific_extensions.h
|      |      |      └─ Documentation.url
|      |      |      └─ portASM.S

```

					└─ port.c
					└─ portmacro.h
					└─ readme.txt
					└─ RL78
					└─ isr_support.h
					└─ portasm.S
					└─ port.c
					└─ portmacro.h
					└─ RX100
					└─ port.c
					└─ portmacro.h
					└─ readme.txt
					└─ RX200
					└─ port.c
					└─ portmacro.h
					└─ RX600
					└─ port.c
					└─ portmacro.h
					└─ readme.txt
					└─ RX600v2
					└─ port.c
					└─ portmacro.h
					└─ readme.txt
					└─ RX700v3_DPFPU
					└─ port.c
					└─ portmacro.h
					└─ readme.txt
					└─ STR75x
					└─ port.c

					└─ portISR.c
					└─ portmacro.h
				└─	TriCore_1782
					└─ port.c
					└─ portmacro.h
					└─ porttrap.c
				└─	IAR
					└─ 78K0R
					└─ ISR_Support.h
					└─ portasm.s26
					└─ port.c
					└─ portmacro.h
				└─	ARM_CA5_No_GIC
					└─ portASM.h
					└─ portASM.s
					└─ port.c
					└─ portmacro.h
				└─	ARM_CA9
					└─ portASM.h
					└─ portASM.s
					└─ port.c
					└─ portmacro.h
				└─	ARM_CM0
					└─ portasm.s
					└─ port.c
					└─ portmacro.h
				└─	ARM_CM23
					└─ non_secure
					└─ portasm.h

```

|      | | | | |  └─ portasm.s
|      | | | | |  └─ port.c
|      | | | | |  └─ portmacro.h
|      | | | |   └─ secure
|      | | | |     └─ secure_context.c
|      | | | |     └─ secure_context.h
|      | | | |     └─ secure_context_port_asm.s
|      | | | |     └─ secure_heap.c
|      | | | |     └─ secure_heap.h
|      | | | |     └─ secure_init.c
|      | | | |     └─ secure_init.h
|      | | | |     └─ secure_port_macros.h
|      | | | └─ ARM_CM23_NTZ
|      | | |   └─ non_secure
|      | | |     └─ portasm.h
|      | | |     └─ portasm.s
|      | | |     └─ port.c
|      | | |     └─ portmacro.h
|      | | | └─ ARM_CM3
|      | | |   └─ portasm.s
|      | | |   └─ port.c
|      | | |   └─ portmacro.h
|      | | | └─ ARM_CM33
|      | | |   └─ non_secure
|      | | | | |  └─ portasm.h
|      | | | | |  └─ portasm.s
|      | | | | |  └─ port.c
|      | | | | |  └─ portmacro.h
|      | | | |   └─ secure

```

					└─ secure_context.c
					└─ secure_context.h
					└─ secure_context_port_asm.s
					└─ secure_heap.c
					└─ secure_heap.h
					└─ secure_init.c
					└─ secure_init.h
					└─ secure_port_macros.h
				└─ ARM_CM33_NTZ	
				└─ non_secure	
					└─ portasm.h
					└─ portasm.s
					└─ port.c
					└─ portmacro.h
				└─ ARM_CM4F	
					└─ portasm.s
					└─ port.c
					└─ portmacro.h
				└─ ARM_CM4F_MPU	
					└─ portasm.s
					└─ port.c
					└─ portmacro.h
				└─ ARM_CM7	
					└─ r0p1
					└─ portasm.s
					└─ port.c
					└─ portmacro.h
				└─ ReadMe.txt	
				└─ ARM_CRx_No_GIC	

```

|      |  |  |  |  └─ portASM.s
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ATmega323
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  |  └─ portmacro.s90
|      |  |  |  └─ AtmelSAM7S64
|      |  |  |  |  └─ AT91SAM7S64.h
|      |  |  |  |  └─ AT91SAM7S64_inc.h
|      |  |  |  |  └─ AT91SAM7X128.h
|      |  |  |  |  └─ AT91SAM7X128_inc.h
|      |  |  |  |  └─ AT91SAM7X256.h
|      |  |  |  |  └─ AT91SAM7X256_inc.h
|      |  |  |  |  └─ ISR_Support.h
|      |  |  |  |  └─ lib_AT91SAM7S64.h
|      |  |  |  |  └─ lib_AT91SAM7X128.h
|      |  |  |  |  └─ lib_AT91SAM7X256.h
|      |  |  |  |  └─ portasm.s79
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ AtmelSAM9XE
|      |  |  |  |  └─ ISR_Support.h
|      |  |  |  |  └─ portasm.s79
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ AVR32_UC3
|      |  |  |  |  └─ exception.s82
|      |  |  |  |  └─ port.c

```


					└─ portmacro.h
					└─ read.c
					└─ write.c
				└─	AVR_AVRDx
					└─ port.c
					└─ porthardware.h
					└─ portmacro.h
					└─ portmacro.s90
				└─	AVR_Mega0
					└─ port.c
					└─ porthardware.h
					└─ portmacro.h
					└─ portmacro.s90
				└─	LPC2000
					└─ ISR_Support.h
					└─ portasm.s79
					└─ port.c
					└─ portmacro.h
				└─	MSP430
					└─ portasm.h
					└─ port.c
					└─ portext.s43
					└─ portmacro.h
				└─	MSP430X
					└─ data_model.h
					└─ port.c
					└─ portext.s43
					└─ portmacro.h
				└─	RISC-V

```

|   |   | └─ chip_specific_extensions
|   |   |   |   └─ readme.txt
|   |   |   └─ RV32I_CLINT_no_extensions
|   |   |       └─ freertos_risc_v_chip_specific_extensions.h
|   |   |   └─ Documentation.url
|   |   |   └─ portASM.s
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   |   └─ readme.txt
|   |   └─ RL78
|   |   |   └─ ISR_Support.h
|   |   |   └─ portasm.s87
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   └─ RX100
|   |   |   └─ port_asm.s
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   |   └─ readme.txt
|   |   └─ RX600
|   |   |   └─ port_asm.s
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   |   └─ readme.txt
|   |   └─ RX700v3_DPFPU
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   |   └─ readme.txt
|   |   └─ Rxv2
```

- | | | | └─ port_asm.s
- | | | | └─ port.c
- | | | | └─ portmacro.h
- | | | | └─ readme.txt
- | | | └─ STR71x
- | | | | └─ ISR_Support.h
- | | | | └─ portasm.s79
- | | | | └─ port.c
- | | | | └─ portmacro.h
- | | | └─ STR75x
- | | | | └─ ISR_Support.h
- | | | | └─ portasm.s79
- | | | | └─ port.c
- | | | | └─ portmacro.h
- | | | └─ STR91x
- | | | | └─ ISR_Support.h
- | | | | └─ portasm.s79
- | | | | └─ port.c
- | | | | └─ portmacro.h
- | | | └─ V850ES
- | | | └─ ISR_Support.h
- | | | └─ portasm_Fx3.s85
- | | | └─ portasm_Hx2.s85
- | | | └─ portasm.s85
- | | | └─ port.c
- | | | └─ portmacro.h
- | | └─ Keil
- | | └─ See-also-the-RVDS-directory.txt
- | | └─ MemMang

```

|   |   |   └─ heap_1.c
|   |   |   └─ heap_2.c
|   |   |   └─ heap_3.c
|   |   |   └─ heap_4.c
|   |   |   └─ heap_5.c
|   |   |   └─ ReadMe.url
|   |   └─ MikroC
|   |   └─ ARM_CM4F
|   |       └─ port.c
|   |       └─ portmacro.h
|   └─ MPLAB
|   |   └─ PIC18F
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   |   └─ stdio.h
|   |   └─ PIC24_dsPIC
|   |   |   └─ portasm_dsPIC.S
|   |   |   └─ portasm_PIC24.S
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   └─ PIC32MEC14xx
|   |   |   └─ ISR_Support.h
|   |   |   └─ port_asm.S
|   |   |   └─ port.c
|   |   |   └─ portmacro.h
|   |   └─ PIC32MX
|   |   |   └─ ISR_Support.h
|   |   |   └─ port_asm.S
|   |   |   └─ port.c

```

```

|      |      |      |      └─ portmacro.h
|      |      |      └─ PIC32MZ
|      |      |      └─ ISR_Support.h
|      |      |      └─ port_asm.S
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      └─ MSVC-MingW
|      |      └─ port.c
|      |      └─ portmacro.h
|      |      └─ oWatcom
|      |      └─ 16BitDOS
|      |      └─ common
|      |      |      └─ portasm.h
|      |      |      └─ portcomn.c
|      |      └─ Flsh186
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      └─ PC
|      |      └─ port.c
|      |      └─ portmacro.h
|      |      └─ Paradigm
|      |      └─ Tern_EE
|      |      └─ large_untested
|      |      |      └─ portasm.h
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      └─ small
|      |      └─ portasm.h
|      |      └─ port.c

```

```
|      |      |      └─ portmacro.h
|      |      └─ readme.txt
|      |      └─ Renesas
|      |      └─ RX100
|      |      |      └─ port_asm.src
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ readme.txt
|      |      └─ RX200
|      |      |      └─ port_asm.src
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ readme.txt
|      |      └─ RX600
|      |      |      └─ port_asm.src
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ readme.txt
|      |      └─ RX600v2
|      |      |      └─ port_asm.src
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ readme.txt
|      |      └─ RX700v3_DPFPU
|      |      |      └─ port_asm.src
|      |      |      └─ port.c
|      |      |      └─ portmacro.h
|      |      |      └─ readme.txt
|      |      └─ SH2A_FPU
```

[illegible]

```

|   |   |   └─ ARM_CM4F
|   |   |   |   └─ port.c
|   |   |   |   └─ portmacro.h
|   |   |   └─ ARM_CM4_MPU
|   |   |   |   └─ port.c
|   |   |   |   └─ portmacro.h
|   |   |   └─ ARM_CM7
|   |   |       └─ r0p1
|   |   |   |   └─ port.c
|   |   |   |   └─ portmacro.h
|   |   |       └─ ReadMe.txt
|   |   └─ SDCC
|   |       └─ Cygnal
|   |           └─ port.c
|   |           └─ portmacro.h
|   └─ Softune
|       └─ MB91460
|           |   └─ port.c
|           |   └─ portmacro.h
|           |   └─ __STD_LIB_sbrk.c
|           └─ MB96340
|               └─ port.c
|               └─ portmacro.h
|               └─ __STD_LIB_sbrk.c
|   └─ Tasking
|       └─ ARM_CM4F
|           └─ port_asm.asm
|           └─ port.c
|           └─ portmacro.h

```



```
|      |  └─ ThirdParty
|      |  |  └─ CDK
|      |  |  |  └─ T-HEAD_CK802
|      |  |  |  |  └─ portasm.S
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  └─ Community-Supported-Ports
|      |  |  |  └─ LICENSE
|      |  |  |  └─ README.md
|      |  |  └─ GCC
|      |  |  |  └─ ARC_EM_HS
|      |  |  |  |  └─ arc_freertos_exceptions.c
|      |  |  |  |  └─ arc_freertos_exceptions.h
|      |  |  |  |  └─ arc_support.s
|      |  |  |  |  └─ freertos_tls.c
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ARC_v1
|      |  |  |  |  └─ arc_freertos_exceptions.c
|      |  |  |  |  └─ arc_freertos_exceptions.h
|      |  |  |  |  └─ arc_support.s
|      |  |  |  |  └─ port.c
|      |  |  |  |  └─ portmacro.h
|      |  |  |  └─ ARM_CM33_TFM
|      |  |  |  |  └─ os_wrapper_freertos.c
|      |  |  |  |  └─ README.md
|      |  |  └─ ATmega
|      |  |  |  └─ port.c
|      |  |  |  └─ portmacro.h
```

```

|         |         |         |         |         └─ readme.md
|         |         |         |         └─ Posix
|         |         |         |         └─ FreeRTOS-simulator-for-Linux.url
|         |         |         |         └─ port.c
|         |         |         |         └─ portmacro.h
|         |         |         |         └─ utils
|         |         |         |         └─ wait_for_event.c
|         |         |         |         └─ wait_for_event.h
|         |         |         └─ RISC-V
|         |         |         └─ README-for-info-on-official-MIT-license-port.txt
|         |         |         └─ RP2040
|         |         |         └─ CMakeLists.txt
|         |         |         └─ FreeRTOS_Kernel_import.cmake
|         |         |         └─ idle_task_static_memory.c
|         |         |         └─ include
|         |         |         |         └─ freertos_sdk_config.h
|         |         |         |         └─ portmacro.h
|         |         |         |         └─ rp2040_config.h
|         |         |         └─ library.cmake
|         |         |         └─ LICENSE.md
|         |         |         └─ pico_sdk_import.cmake
|         |         |         └─ port.c
|         |         |         └─ README.md
|         |         └─ Xtensa_ESP32
|         |         └─ FreeRTOS-openocd.c
|         |         └─ include
|         |         |         └─ portbenchmark.h
|         |         |         └─ portmacro.h
|         |         |         └─ xt_asm_utils.h

```

						└─ xtensa_api.h
						└─ xtensa_config.h
						└─ xtensa_context.h
						└─ xtensa_rtos.h
						└─ xtensa_timer.h
						└─ portasm.S
						└─ port.c
						└─ portmux_impl.h
						└─ portmux_impl.inc.h
						└─ xtensa_context.S
						└─ xtensa_init.c
						└─ xtensa_intr_asm.S
						└─ xtensa_intr.c
						└─ xtensa_loadstore_handler.S
						└─ xtensa_overlay_os_hook.c
						└─ xtensa_vector_defaults.S
						└─ xtensa_vectors.S
						└─ KnownIssues.md
						└─ Partner-Supported-Ports
						└─ GCC
						└─ AVR_AVRDx
						└─ port.c
						└─ porthardware.h
						└─ portmacro.h
						└─ AVR_Mega0
						└─ port.c
						└─ porthardware.h
						└─ portmacro.h
						└─ LICENSE

```

|   |   |   └─ README.md
|   |   |   └─ README.md
|   |   |   └─ XCC
|   |   |       └─ Xtensa
|   |   |           └─ Makefile
|   |   |           └─ portasm.S
|   |   |           └─ portbenchmark.h
|   |   |           └─ port.c
|   |   |           └─ portclib.c
|   |   |           └─ portmacro.h
|   |   |           └─ porttrace.h
|   |   |           └─ readme_xtensa.txt
|   |   |           └─ xtensa_api.h
|   |   |           └─ xtensa_config.h
|   |   |           └─ xtensa_context.h
|   |   |           └─ xtensa_context.S
|   |   |           └─ xtensa_init.c
|   |   |           └─ xtensa_intr_asm.S
|   |   |           └─ xtensa_intr.c
|   |   |           └─ xtensa_overlay_os_hook.c
|   |   |           └─ xtensa_rtos.h
|   |   |           └─ xtensa_timer.h
|   |   |           └─ xtensa_vectors.S
|   |   └─ WizC
|   |       └─ PIC18
|   |           └─ addFreeRTOS.h
|   |           └─ Drivers
|   |           |   └─ Tick
|   |           |       └─ isrTick.c

```

```
|      |      |      └─ Tick.c
|      |      └─ Install.bat
|      |      └─ port.c
|      |      └─ portmacro.h
|      └─ queue.c
|      └─ Quick_Start_Guide.url
|      └─ README.md
|      └─ stream_buffer.c
|      └─ tasks.c
|      └─ timers.c
└─ pico-sdk
|   └─ cmake
|   |   └─ pico_pre_load_platform.cmake
|   |   └─ pico_pre_load_toolchain.cmake
|   |   └─ pico_utils.cmake
|   |   └─ Platform
|   |       └─ PICO.cmake
|   |       └─ preload
|   |           └─ platforms
|   |               └─ host.cmake
|   |               └─ pico
|   |                   └─ pico.cmake
|   |                   └─ rp2040.cmake
|   |                       └─ toolchains
|   |                           └─ find_compiler.cmake
|   |                           └─ pico_arm_clang_arm.cmake
|   |                           └─ pico_arm_clang.cmake
|   |                           └─ pico_arm_gcc.cmake
|   └─ CMakeLists.txt
```

- | |─ CONTRIBUTING.md
- | |─ docs
- | | |─ CMakeLists.txt
- | | |─ Doxyfile.in
- | | |─ DoxygenLayout.xml
- | | |─ examples.md
- | | |─ footer.html
- | | |─ header.html
- | | |─ index.h
- | | |─ logo-mobile.svg
- | | |─ logo.svg
- | | |─ main.css
- | | |─ main.js
- | | |─ mainpage.md
- | | |─ normalise.css
- | | |─ pico.jpg
- | | |─ rp2040.png
- | | |─ search.svg
- | | |─ styles.css
- | | |─ weblinks_page.md
- | |─ external
- | | |─ pico_sdk_import.cmake
- | |─ lib
- | | |─ tinycb
- | | | |─ CODE_OF_CONDUCT.rst
- | | | |─ CONTRIBUTORS.rst
- | | | |─ docs
- | | | | |─ assets
- | | | | | |─ logo.svg

```
| | | | └─ stack.svg
| | | | └─ conf.py
| | | | └─ contributing
| | | | └─ code_of_conduct.rst -> ../../CODE_OF_CONDUCT.rst
| | | | └─ index.rst
| | | | └─ porting.rst
| | | | └─ structure.rst
| | | | └─ index.rst
| | | | └─ info
| | | | └─ changelog.rst
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| | | | └─ index.rst
| | | | └─ uses.rst
| | | | └─ reference
| | | | └─ concurrency.rst
| | | | └─ getting_started.rst
| | | | └─ index.rst
| | | | └─ supported.rst
| | | | └─ requirements.txt
| | | └─ examples
| | | | └─ device
| | | | | └─ 99-tinyusb.rules
| | | | | └─ audio_4_channel_mic
| | | | | | └─ CMakeLists.txt
| | | | | | └─ Makefile
| | | | | | └─ src
| | | | | | | └─ main.c
| | | | | | | └─ plot_audio_samples.py
| | | | | | | └─ tusb_config.h
```

```

├── usb_descriptors.c
├── audio_test
├── CMakeLists.txt
├── Makefile
├── src
│   ├── main.c
│   ├── plot_audio_samples.py
│   ├── tusb_config.h
│   └── usb_descriptors.c
├── board_test
├── CMakeLists.txt
├── Makefile
├── sdkconfig.defaults
├── src
│   ├── CMakeLists.txt
│   ├── main.c
│   └── tusb_config.h
├── cdc_dual_ports
├── CMakeLists.txt
├── Makefile
├── src
│   ├── main.c
│   ├── tusb_config.h
│   └── usb_descriptors.c
├── cdc_msc
├── CMakeLists.txt
├── Makefile
├── src
│   ├── main.c

```



```

| | | | | └─ msc_disk.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | └─ cdc_msc_freertos
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | | └─ sdkconfig.defaults
| | | | └─ src
| | | | | └─ CMakeLists.txt
| | | | | └─ FreeRTOSConfig
| | | | | └─ FreeRTOSConfig.h
| | | | | └─ freertos_hook.c
| | | | | └─ main.c
| | | | | └─ msc_disk.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | └─ CMakeLists.txt
| | | | └─ dfu
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | └─ src
| | | | | └─ main.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | └─ dfu_runtime
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | └─ src
| | | | | └─ main.c

```

```

| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | | └─ dynamic_configuration
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | | └─ src
| | | | | └─ main.c
| | | | | └─ msc_disk.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | | └─ hid_boot_interface
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | | └─ src
| | | | | └─ main.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | | └─ usb_descriptors.h
| | | | | └─ hid_composite
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | | └─ src
| | | | | └─ main.c
| | | | | └─ tusb_config.h
| | | | | └─ usb_descriptors.c
| | | | | └─ usb_descriptors.h
| | | | | └─ hid_composite_freertos
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile

```

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| | | | | └─ sdkconfig.defaults
| | | | | └─ src
| | | | |   └─ CMakeLists.txt
| | | | |   └─ FreeRTOSConfig
| | | | |     └─ FreeRTOSConfig.h
| | | | |   └─ freertos_hook.c
| | | | |   └─ main.c
| | | | |   └─ tusb_config.h
| | | | |   └─ usb_descriptors.c
| | | | |     └─ usb_descriptors.h
| | | | | └─ hid_generic_inout
| | | | | └─ boards.js
| | | | | └─ CMakeLists.txt
| | | | | └─ hid_test.js
| | | | | └─ hid_test.py
| | | | | └─ Makefile
| | | | |   └─ src
| | | | |     └─ main.c
| | | | |     └─ tusb_config.h
| | | | |     └─ usb_descriptors.c
| | | | | └─ hid_multiple_interface
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | |   └─ src
| | | | |     └─ main.c
| | | | |     └─ tusb_config.h
| | | | |     └─ usb_descriptors.c
| | | | | └─ midi_test
| | | | | └─ CMakeLists.txt

```

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| | | | └─ Makefile
| | | | └─ src
| | | |   └─ main.c
| | | |   └─ tusb_config.h
| | | |   └─ usb_descriptors.c
| | | └─ msc_dual_lun
| | | | └─ CMakeLists.txt
| | | | └─ Makefile
| | | | └─ src
| | | |   └─ main.c
| | | |   └─ msc_disk_dual.c
| | | |   └─ tusb_config.h
| | | |   └─ usb_descriptors.c
| | | └─ net_lwip_webserver
| | | | └─ CMakeLists.txt
| | | | └─ Makefile
| | | | └─ src
| | | |   └─ arch
| | | |   | └─ cc.h
| | | |   └─ lwipopts.h
| | | |   └─ main.c
| | | |   └─ tusb_config.h
| | | |   └─ usb_descriptors.c
| | | └─ uac2_headset
| | | | └─ CMakeLists.txt
| | | | └─ Makefile
| | | | └─ src
| | | |   └─ main.c
| | | |   └─ tusb_config.h

```

```

├── usb_descriptors.c
├── usb_descriptors.h
├── usbtmc
├── CMakeLists.txt
├── Makefile
├── src
├── main.c
├── main.h
├── tusb_config.h
├── usb_descriptors.c
├── usbtmc_app.c
├── usbtmc_app.h
├── visaQuery.py
├── video_capture
├── CMakeLists.txt
├── Makefile
├── src
├── images.h
├── main.c
├── tusb_config.h
├── usb_descriptors.c
├── usb_descriptors.h
├── webusb_serial
├── CMakeLists.txt
├── Makefile
├── src
├── main.c
├── tusb_config.h
├── usb_descriptors.c

```

```

| | | | └─ usb_descriptors.h
| | | └─ host
| | | | └─ cdc_msc_hid
| | | | | └─ CMakeLists.txt
| | | | | └─ Makefile
| | | | └─ src
| | | | | └─ hid_app.c
| | | | | └─ main.c
| | | | | └─ msc_app.c
| | | | └─ tusb_config.h
| | | └─ CMakeLists.txt
| | └─ hid_controller
| | | └─ CMakeLists.txt
| | | └─ Makefile
| | | └─ src
| | | | └─ hid_app.c
| | | | └─ main.c
| | | └─ tusb_config.h
| | └─ make.mk
| | └─ rules.mk
| └─ hw
| | └─ bsp
| | | └─ ansi_escape.h
| | | └─ board.c
| | | └─ board.h
| | | └─ board_mcu.h
| | | └─ d5035_01
| | | | └─ board.mk
| | | | └─ d5035_01.c

```

					└─ same51j19a_flash.ld
					└─ da14695_dk_usb
					└─ board.mk
					└─ da14695_dk_usb.c
					└─ da1469x.ld
					└─ gcc_startup_da1469x.S
					└─ product_header.dump
					└─ syscfg
					└─ syscfg.h
					└─ da1469x_dk_pro
					└─ board.mk
					└─ da1469x-dk-pro.c
					└─ da1469x.ld
					└─ gcc_startup_da1469x.S
					└─ product_header.dump
					└─ syscfg
					└─ syscfg.h
					└─ ea4088qs
					└─ board.mk
					└─ ea4088qs.c
					└─ lpc4088.ld
					└─ ea4357
					└─ board.mk
					└─ ea4357.c
					└─ lpc4357.ld
					└─ pca9532.c
					└─ pca9532.h
					└─ esp32s2
					└─ boards

```

| | | | | | | | └─ adafruit_feather_esp32s2
| | | | | | | | └─ board.cmake
| | | | | | | | └─ board.h
| | | | | | | | └─ adafruit_magtag_29gray
| | | | | | | | └─ board.cmake
| | | | | | | | └─ board.h
| | | | | | | | └─ adafruit_metro_esp32s2
| | | | | | | | └─ board.cmake
| | | | | | | | └─ board.h
| | | | | | | | └─ CMakeLists.txt
| | | | | | | | └─ esp32s2.c
| | | | | | | | └─ espressif_kaluga_1
| | | | | | | | └─ board.cmake
| | | | | | | | └─ board.h
| | | | | | | | └─ espressif_saola_1
| | | | | | | | └─ board.cmake
| | | | | | | | └─ board.h
| | | | | | | | └─ components
| | | | | | | | └─ led_strip
| | | | | | | | └─ CMakeLists.txt
| | | | | | | | └─ include
| | | | | | | | | └─ led_strip.h
| | | | | | | | └─ src
| | | | | | | | └─ led_strip_rmt_ws2812.c
| | | | | | | | └─ family.cmake
| | | | | | | | └─ family.mk
| | | | | | | | └─ esp32s3
| | | | | | | | └─ boards
| | | | | | | | └─ CMakeLists.txt

```



```

| | | | | | └─ esp32s3.c
| | | | | | └─ espressif_addax_1
| | | | | | └─ board.cmake
| | | | | | └─ board.h
| | | | | └─ components
| | | | | └─ led_strip
| | | | | └─ CMakeLists.txt
| | | | | └─ include
| | | | | | └─ led_strip.h
| | | | | └─ src
| | | | | └─ led_strip_rmt_ws2812.c
| | | | └─ family.cmake
| | | | └─ family.mk
| | | └─ family_support.cmake
| | | └─ fom_u
| | | └─ boards
| | | └─ fom_u
| | | └─ board.h
| | | └─ board.mk
| | | └─ crt0-vexriscv.S
| | | └─ dfu.py
| | | └─ family.mk
| | | └─ fom_u.c
| | | └─ fom_u.ld
| | | └─ include
| | | └─ csr.h
| | | └─ hw
| | | └─ common.h
| | | └─ irq.h

```

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| | | | | └─ output_format.ld
| | | | | └─ regions.ld
| | | | | └─ frdm_k32l2b
| | | | | └─ board.h
| | | | | └─ board.mk
| | | | | └─ frdm_k32l2b.c
| | | | | └─ frdm_kl25z
| | | | | └─ board.mk
| | | | | └─ frdm_kl25z.c
| | | | | └─ gd32vf103
| | | | | └─ boards
| | | | | | └─ sipeed_longan_nano
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | └─ family.c
| | | | | | └─ family.mk
| | | | | | └─ system_gd32vf103.c
| | | | | └─ imxrt
| | | | | └─ boards
| | | | | | └─ mimxrt1010_evk
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | | └─ evkmimxrt1010_flexspi_nor_config.c
| | | | | | | └─ evkmimxrt1010_flexspi_nor_config.h
| | | | | | └─ mimxrt1015_evk
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | | └─ evkmimxrt1015_flexspi_nor_config.c
| | | | | | | └─ evkmimxrt1015_flexspi_nor_config.h

```

```
| | | | | └─ mimxrt1020_evk  
| | | | | | | └─ board.h  
| | | | | | | └─ board.mk  
| | | | | | | └─ evkmimxrt1020_flexspi_nor_config.c  
| | | | | | |   └─ evkmimxrt1020_flexspi_nor_config.h  
| | | | | | └─ mimxrt1050-evkb  
| | | | | | | └─ board.h  
| | | | | | | └─ board.mk  
| | | | | | | └─ evkbmimxrt1050_flexspi_nor_config.c  
| | | | | | |   └─ evkbmimxrt1050_flexspi_nor_config.h  
| | | | | | └─ mimxrt1060-evk  
| | | | | | | └─ board.h  
| | | | | | | └─ board.mk  
| | | | | | | └─ evkmimxrt1060_flexspi_nor_config.c  
| | | | | | |   └─ evkmimxrt1060_flexspi_nor_config.h  
| | | | | | └─ mimxrt1064-evk  
| | | | | | | └─ board.h  
| | | | | | | └─ board.mk  
| | | | | | | └─ evkmimxrt1064_flexspi_nor_config.c  
| | | | | | |   └─ evkmimxrt1064_flexspi_nor_config.h  
| | | | | |   └─ teensy_40  
| | | | | |     └─ board.h  
| | | | | |     └─ board.mk  
| | | | | |       └─ teensy40_flexspi_nor_config.c  
| | | | | |         └─ teensy40_flexspi_nor_config.h  
| | | | | |   └─ family.c  
| | | | | |     └─ family.mk  
| | | | | └─ lpc15  
| | | | └─ boards
```

						└─	lpcpresso1549
						└─	board.h
						└─	board.mk
						└─	lpc1549.ld
						└─	family.c
						└─	family.mk
						└─	lpc18
						└─	boards
						└─	lpcpresso18s37
						└─	board.h
						└─	board.mk
						└─	lpc1837.ld
						└─	mcb1800
						└─	board.h
						└─	board.mk
						└─	lpc1857.ld
						└─	family.c
						└─	family.mk
						└─	lpc54
						└─	boards
						└─	lpcpresso54114
						└─	board.h
						└─	board.mk
						└─	lpcpresso54628
						└─	board.h
						└─	board.mk
						└─	family.c
						└─	family.mk
						└─	lpc55

```

| | | | | └─ boards
| | | | | | | └─ double_m33_express
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ LPC55S69_cm33_core0_uf2.ld
| | | | | | | └─ lpcpresso55s28
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | └─ lpcpresso55s69
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | └─ mcu_link
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | └─ family.c
| | | | | | | └─ family.mk
| | | | | | └─ lpcpresso11u37
| | | | | | | └─ board.mk
| | | | | | | └─ lpc11u37.ld
| | | | | | | └─ lpcpresso11u37.c
| | | | | | | └─ lpcpresso11u68
| | | | | | | | └─ board.mk
| | | | | | | | └─ lpc11u68.ld
| | | | | | | | └─ lpcpresso11u68.c
| | | | | | | └─ lpcpresso1347
| | | | | | | | └─ board.mk
| | | | | | | | └─ lpc1347.ld
| | | | | | | | └─ lpcpresso1347.c
| | | | | | | └─ lpcpresso1769

```

```

| | | | └─ board.mk
| | | | └─ lpc1769.ld
| | | | └─ lpcpresso1769.c
| | | └─ lpcpresso51u68
| | | | └─ board.mk
| | | | └─ lpcpresso51u68.c
| | | └─ mbed1768
| | | | └─ board.mk
| | | | └─ lpc1768.ld
| | | | └─ mbed1768.c
| | | └─ mm32
| | | | └─ boards
| | | | | └─ mm32f327x_mb39
| | | | | | └─ board.mk
| | | | | | └─ flash.ld
| | | | | | └─ mm32f327x_mb39.c
| | | | └─ family.mk
| | | └─ msp430
| | | | └─ boards
| | | | | └─ msp_exp430f5529lp
| | | | | └─ board.h
| | | | └─ family.c
| | | | └─ family.mk
| | | └─ ngx4330
| | | | └─ board.mk
| | | | └─ ngx4330.c
| | | | └─ ngx4330.ld
| | | └─ nrf
| | | | └─ boards

```

							└─ adafruit_clue
							└─ board.h
							└─ board.mk
							└─ nrf52840_s140_v6.ld
							└─ arduino_nano33_ble
							└─ arduino_nano33_ble.ld
							└─ board.h
							└─ board.mk
							└─ circuitplayground_bluefruit
							└─ board.h
							└─ board.mk
							└─ nrf52840_s140_v6.ld
							└─ feather_nrf52840_express
							└─ board.h
							└─ board.mk
							└─ nrf52840_s140_v6.ld
							└─ feather_nrf52840_sense
							└─ board.h
							└─ board.mk
							└─ nrf52840_s140_v6.ld
							└─ itsybitsy_nrf52840
							└─ board.h
							└─ board.mk
							└─ nrf52840_s140_v6.ld
							└─ nrf52840_mdk_dongle
							└─ board.h
							└─ board.mk
							└─ nrf52840_mdk_dongle.ld
							└─ pca10056

```

├── board.h
├── board.mk
├── pca10059
├── board.h
├── board.mk
├── pca10059.ld
├── pca10100
├── board.h
├── board.mk
├── raytac_mdbt50q_rx
├── board.h
├── board.mk
├── family.c
├── family.mk
├── nutiny_nuc121s
├── board.mk
├── nuc121_flash.ld
├── nutiny_nuc121.c
├── nutiny_nuc125s
├── board.mk
├── nuc125_flash.ld
├── nutiny_nuc125.c
├── nutiny_nuc126v
├── board.mk
├── nuc126_flash.ld
├── nutiny_nuc126.c
├── nutiny_sdk_nuc120
├── board.mk
├── nuc120_flash.ld

```



```

| | | | └─ nutiny_sdk_nuc120.c
| | | | └─ nutiny_sdk_nuc505
| | | | └─ board.mk
| | | | └─ nuc505_flashtoram.ld
| | | | └─ nutiny_sdk_nuc505.c
| | | └─ rp2040
| | | | └─ board.h
| | | | └─ boards
| | | | | └─ adafruit_feather_rp2040
| | | | | | └─ board.cmake
| | | | | | └─ adafruit_itsybitsy_rp2040
| | | | | | └─ board.cmake
| | | | | | └─ adafruit_qtpy_rp2040
| | | | | | └─ board.cmake
| | | | | | └─ pico_sdk
| | | | | | └─ board.cmake
| | | | | | └─ raspberry_pi_pico
| | | | | | └─ board.cmake
| | | | └─ family.c
| | | | └─ family.cmake
| | | | └─ family.mk
| | | | └─ pico_sdk_import.cmake
| | | └─ rx
| | | | └─ boards
| | | | | └─ gr_citrus
| | | | | | └─ board.mk
| | | | | | └─ gr_citrus.c
| | | | | | └─ hwinit.c
| | | | | | └─ r5f5631fd.ld

```

```

| | | | | └─ rx65n_target
| | | | | └─ board.mk
| | | | | └─ r5f565ne.ld
| | | | | └─ rx65n_target.c
| | | | └─ family.mk
| | | └─ samd11
| | | └─ boards
| | | └─ luna_d11
| | | └─ board.h
| | | └─ board.mk
| | | └─ samd11d14am_flash.ld
| | | └─ samd11_xplained
| | | └─ board.h
| | | └─ board.mk
| | | └─ samd11d14am_flash.ld
| | | └─ family.c
| | | └─ family.mk
| | | └─ samd21
| | | └─ boards
| | | └─ atsamd21_xpro
| | | └─ board.h
| | | └─ board.mk
| | | └─ samd21j18a_flash.ld
| | | └─ circuitplayground_express
| | | └─ board.h
| | | └─ board.mk
| | | └─ circuitplayground_express.ld
| | | └─ curiosity_nano
| | | └─ board.h

```

```
| | | | | | | | board.mk
| | | | | | | | samd21g17a_flash.ld
| | | | | | | | feather_m0_express
| | | | | | | | board.h
| | | | | | | | board.mk
| | | | | | | | feather_m0_express.ld
| | | | | | | | itsybitsy_m0
| | | | | | | | board.h
| | | | | | | | board.mk
| | | | | | | | itsybitsy_m0.ld
| | | | | | | | luna_d21
| | | | | | | | board.h
| | | | | | | | board.mk
| | | | | | | | samd21g18a_flash.ld
| | | | | | | | metro_m0_express
| | | | | | | | board.h
| | | | | | | | board.mk
| | | | | | | | metro_m0_express.ld
| | | | | | | | seeeduino_xiao
| | | | | | | | board.h
| | | | | | | | board.mk
| | | | | | | | seeeduino_xiao.ld
| | | | | | | | family.c
| | | | | | | | family.mk
| | | | | | | | samd51
| | | | | | | | boards
| | | | | | | | feather_m4_express
| | | | | | | | board.h
| | | | | | | | board.mk
```

							└─ feather_m4_express.ld
							└─ itsybitsy_m4
							└─ board.h
							└─ board.mk
							└─ itsybitsy_m4.ld
							└─ metro_m4_express
							└─ board.h
							└─ board.mk
							└─ metro_m4_express.ld
							└─ pybadge
							└─ board.h
							└─ board.mk
							└─ pybadge.ld
							└─ pyportal
							└─ board.h
							└─ board.mk
							└─ pyportal.ld
							└─ family.c
							└─ family.mk
							└─ same54xplainedpro
							└─ board.mk
							└─ same54p20a_flash.ld
							└─ same54p20a_sram.ld
							└─ same54xplainedpro.c
							└─ same70_qmtech
							└─ board.mk
							└─ hpl_pmc_config.h
							└─ hpl_usart_config.h
							└─ hpl_xdmac_config.h

```

| | | | | └─ peripheral_clk_config.h
| | | | | └─ same70_qmtech.c
| | | | | └─ same70_xplained
| | | | | └─ board.mk
| | | | | └─ hpl_pmc_config.h
| | | | | └─ hpl_usart_config.h
| | | | | └─ hpl_xdmac_config.h
| | | | | └─ peripheral_clk_config.h
| | | | | └─ same70_xplained.c
| | | | | └─ samg55xplained
| | | | | └─ board.mk
| | | | | └─ hpl_usart_config.h
| | | | | └─ peripheral_clk_config.h
| | | | | └─ samg55j19_flash.ld
| | | | | └─ samg55xplained.c
| | | | | └─ saml2x
| | | | | └─ boards
| | | | | | └─ atsaml21_xpro
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | | └─ saml21j18b_flash.ld
| | | | | | └─ saml22_feather
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | | └─ saml22_feather.ld
| | | | | | └─ sensorwatch_m0
| | | | | | └─ board.h
| | | | | | └─ board.mk
| | | | | | └─ sensorwatch_m0.ld

```

```

| | | | | └─ family.c
| | | | | └─ family.mk
| | | | | └─ sltb009a
| | | | | └─ board.mk
| | | | | └─ sltb009a.c
| | | | | └─ spresense
| | | | | └─ board.mk
| | | | | └─ board_spresense.c
| | | | | └─ stm32f0
| | | | | └─ boards
| | | | | | └─ stm32f070rbnucleo
| | | | | | | └─ board.h
| | | | | | | └─ board.mk
| | | | | | | └─ stm32F070rbtx_flash.ld
| | | | | | | └─ stm32f072disco
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ STM32F072RBTx_FLASH.ld
| | | | | | | └─ stm32f072eval
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ STM32F072VBTx_FLASH.ld
| | | | | | └─ family.c
| | | | | | └─ family.mk
| | | | | | └─ stm32f0xx_hal_conf.h
| | | | | | └─ stm32f1
| | | | | | └─ boards
| | | | | | | └─ stm32f103_bluepill
| | | | | | | | └─ board.h

```

```

| | | | | | | | | board.mk
| | | | | | | | | STM32F103X8_FLASH.ld
| | | | | | | | | stm32f103_mini_2
| | | | | | | | | board.h
| | | | | | | | | board.mk
| | | | | | | | | STM32F103XC_FLASH.ld
| | | | | | | | | family.c
| | | | | | | | | family.mk
| | | | | | | | | stm32f1xx_hal_conf.h
| | | | | | | | | stm32f207nucleo
| | | | | | | | | board.mk
| | | | | | | | | stm32f207nucleo.c
| | | | | | | | | STM32F207ZGTx_FLASH.ld
| | | | | | | | | stm32f2xx_hal_conf.h
| | | | | | | | | stm32f303disco
| | | | | | | | | board.mk
| | | | | | | | | stm32f303disco.c
| | | | | | | | | STM32F303VCTx_FLASH.ld
| | | | | | | | | stm32f3xx_hal_conf.h
| | | | | | | | | stm32f4
| | | | | | | | | boards
| | | | | | | | | feather_stm32f405
| | | | | | | | | board.h
| | | | | | | | | board.mk
| | | | | | | | | STM32F405RGTx_FLASH.ld
| | | | | | | | | stm32f4xx_hal_conf.h
| | | | | | | | | pyboardv11
| | | | | | | | | board.h
| | | | | | | | | board.mk

```

								└─ STM32F405RGTx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f401blackpill
								└─ board.h
								└─ board.mk
								└─ STM32F401VCTx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f407disco
								└─ board.h
								└─ board.mk
								└─ STM32F407VGTx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f411blackpill
								└─ board.h
								└─ board.mk
								└─ STM32F411CEUx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f411disco
								└─ board.h
								└─ board.mk
								└─ STM32F411VETx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f412disco
								└─ board.h
								└─ board.mk
								└─ STM32F412ZGTx_FLASH.ld
								└─ stm32f4xx_hal_conf.h
								└─ stm32f412nucleo
								└─ board.h


```

| | | | | | └─ board.mk
| | | | | | └─ STM32F412ZGTx_FLASH.ld
| | | | | | └─ stm32f4xx_hal_conf.h
| | | | | └─ family.c
| | | | └─ family.mk
| | | └─ stm32f7
| | └─ boards
| | └─ stlinkv3mini
| | └─ board.h
| | └─ board.mk
| | └─ STM32F723xE_FLASH.ld
| | └─ stm32f7xx_hal_conf.h
| | └─ stm32f723disco
| | └─ board.h
| | └─ board.mk
| | └─ STM32F723xE_FLASH.ld
| | └─ stm32f7xx_hal_conf.h
| | └─ stm32f746disco
| | └─ board.h
| | └─ board.mk
| | └─ STM32F746ZGTx_FLASH.ld
| | └─ stm32f7xx_hal_conf.h
| | └─ stm32f746nucleo
| | └─ board.h
| | └─ board.mk
| | └─ STM32F746ZGTx_FLASH.ld
| | └─ stm32f7xx_hal_conf.h
| | └─ stm32f767nucleo
| | └─ board.h

```

```

| | | | | | | | └─ board.mk
| | | | | | | | └─ STM32F767ZITx_FLASH.ld
| | | | | | | | └─ stm32f7xx_hal_conf.h
| | | | | | | | └─ stm32f769disco
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ STM32F769ZITx_FLASH.ld
| | | | | | | | └─ stm32f7xx_hal_conf.h
| | | | | | | | └─ family.c
| | | | | | | | └─ family.mk
| | | | | | | | └─ stm32h7
| | | | | | | | └─ boards
| | | | | | | | └─ stm32h743eval
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ stm32h743xx_flash.ld
| | | | | | | | └─ stm32h743nucleo
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ stm32h743xx_flash.ld
| | | | | | | | └─ stm32h745disco
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ waveshare_openh743i
| | | | | | | | └─ board.h
| | | | | | | | └─ board.mk
| | | | | | | | └─ STM32H743IITX_FLASH.ld
| | | | | | | | └─ family.c
| | | | | | | | └─ family.mk

```

```

| | | | └─ stm32h7xx_hal_conf.h
| | | | └─ stm32l0538disco
| | | | └─ board.mk
| | | | └─ stm32l0538disco.c
| | | | └─ STM32L053C8Tx_FLASH.ld
| | | | └─ stm32l0xx_hal_conf.h
| | | | └─ stm32l476disco
| | | | └─ board.mk
| | | | └─ stm32l476disco.c
| | | | └─ STM32L476VGTx_FLASH.ld
| | | | └─ stm32l4xx_hal_conf.h
| | | └─ stm32l4r5nucleo
| | | └─ board.mk
| | | └─ stm32l4r5nucleo.c
| | | └─ STM32L4RXxI_FLASH.ld
| | | └─ stm32l4xx_hal_conf.h
| | └─ mcu
| | └─ dialog
| | | └─ da1469x
| | | | └─ da1469x.ld
| | | | └─ include
| | | | | └─ hal
| | | | | └─ hal_gpio.h
| | | | | └─ mcu
| | | | | └─ da1469x_clock.h
| | | | | └─ da1469x_hal.h
| | | | | └─ mcu.h
| | | | └─ SDK_10.0.8.105
| | | └─ sdk

```

```

└─ bsp
└─ arm_license.txt
└─ include
└─ cmsis_compiler.h
└─ cmsis_gcc.h
└─ cmsis_version.h
└─ core_cm0.h
└─ core_cm33.h
└─ DA1469xAB.h
└─ mpu_armv8.h
└─ system_ARMCM0.h
└─ system_DA1469x.h
└─ src
└─ da1469x_clock.c
└─ hal_gpio.c
└─ hal_system.c
└─ hal_system_start.c
└─ system_da1469x.c
└─ README.md
└─ gd
└─ nuclei-sdk
└─ microchip
└─ mindmotion
└─ mm32sdk
└─ nordic
└─ nrf5x
└─ s140_nrf52_6.1.1_API
└─ include
└─ ble_err.h

```

						└─ ble_gap.h
						└─ ble_gattc.h
						└─ ble_gatt.h
						└─ ble_gatts.h
						└─ ble.h
						└─ ble_hci.h
						└─ ble_l2cap.h
						└─ ble_ranges.h
						└─ ble_types.h
						└─ nrf52
						└─ nrf_mbr.h
						└─ nrf_error.h
						└─ nrf_error_sdm.h
						└─ nrf_error_soc.h
						└─ nrf_nvic.h
						└─ nrf_sdm.h
						└─ nrf_soc.h
						└─ nrf_svc.h
						└─ nrfx
						└─ nrfx_config.h
						└─ nrfx_glue.h
						└─ nrfx_log.h
						└─ nuvoton
						└─ nxp
						└─ lpcopen
						└─ mcux-sdk
						└─ nxp_sdk
						└─ renesas
						└─ rx

```

├── silabs
│   └── cmsis-dfp-efm32gg12b
├── sony
│   └── cxd56
│       ├── mkspk
│       │   ├── clefia.c
│       │   ├── clefia.h
│       │   ├── elf32.h
│       │   ├── Makefile
│       │   ├── mkspk.c
│       │   └── mkspk.h
│       ├── spresense-exported-sdk
│       └── tools
│           ├── flash_writer.py
│           ├── __pycache__
│           │   └── xmodem.cpython-36.pyc
│           └── xmodem.py
├── st
│   ├── cmsis_device_f0
│   ├── cmsis_device_f1
│   ├── cmsis_device_f2
│   ├── cmsis_device_f3
│   ├── cmsis_device_f4
│   ├── cmsis_device_f7
│   ├── cmsis_device_g0
│   ├── cmsis_device_g4
│   ├── cmsis_device_h7
│   ├── cmsis_device_l0
│   └── cmsis_device_l1

```

```

| | | | |└─ cmsis_device_l4
| | | | |└─ cmsis_device_l5
| | | | |└─ stm32f0xx_hal_driver
| | | | |└─ stm32f1xx_hal_driver
| | | | |└─ stm32f2xx_hal_driver
| | | | |└─ stm32f3xx_hal_driver
| | | | |└─ stm32f4xx_hal_driver
| | | | |└─ stm32f7xx_hal_driver
| | | | |└─ stm32g0xx_hal_driver
| | | | |└─ stm32g4xx_hal_driver
| | | | |└─ stm32h7xx_hal_driver
| | | | |└─ stm32l0xx_hal_driver
| | | | |└─ stm32l1xx_hal_driver
| | | | |└─ stm32l4xx_hal_driver
| | | | |└─ stm32l5xx_hal_driver
| | | |└─ ti
| | └─ lib
| | | └─ CMSIS_5
| | | └─ fatfs
| | | | └─ 00readme.txt
| | | | └─ ccsbcs.c
| | | | └─ diskio.c
| | | | └─ diskio.h
| | | | └─ ff.c
| | | | └─ ffconf.h
| | | | └─ ff.h
| | | |└─ integer.h
| | | └─ FreeRTOS-Kernel
| | └─ lwip

```

```

| | | | └─ networking
| | | | | └─ dhserver.c
| | | | | └─ dhserver.h
| | | | | └─ dnserver.c
| | | | | └─ dnserver.h
| | | | | └─ ndis.h
| | | | | └─ rndis_protocol.h
| | | | | └─ rndis_reports.c
| | | | └─ sct_neopixel
| | | └─ SEGGER_RTT
| | | | └─ License.txt
| | | | └─ README.txt
| | | | └─ RTT
| | | | | └─ SEGGER_RTT_ASM_ARMv7M.S
| | | | | └─ SEGGER_RTT.c
| | | | | └─ SEGGER_RTT_Conf.h
| | | | | └─ SEGGER_RTT.h
| | | | | └─ SEGGER_RTT_printf.c
| | | | └─ Syscalls
| | | | | └─ SEGGER_RTT_Syscalls_GCC.c
| | | | | └─ SEGGER_RTT_Syscalls_IAR.c
| | | | | └─ SEGGER_RTT_Syscalls_KEIL.c
| | | | | └─ SEGGER_RTT_Syscalls_SES.c
| | └─ LICENSE
| | └─ pkg.yml
| | └─ README.rst
| | └─ repository.yml
| | └─ src
| | | └─ class

```



```
| | | | └─ audio
| | | | | └─ audio_device.c
| | | | | └─ audio_device.h
| | | | └─ audio.h
| | | | └─ bth
| | | | | └─ bth_device.c
| | | | | └─ bth_device.h
| | | | └─ cdc
| | | | | └─ cdc_device.c
| | | | | └─ cdc_device.h
| | | | └─ cdc.h
| | | | | └─ cdc_host.c
| | | | | └─ cdc_host.h
| | | | | └─ cdc_rndis.h
| | | | | └─ cdc_rndis_host.c
| | | | | └─ cdc_rndis_host.h
| | | | └─ dfu
| | | | | └─ dfu_device.c
| | | | | └─ dfu_device.h
| | | | └─ dfu.h
| | | | | └─ dfu_rt_device.c
| | | | | └─ dfu_rt_device.h
| | | | └─ hid
| | | | | └─ hid_device.c
| | | | | └─ hid_device.h
| | | | └─ hid.h
| | | | | └─ hid_host.c
| | | | | └─ hid_host.h
| | | | └─ midi
```

```
| | | | └─ midi_device.c
| | | | └─ midi_device.h
| | | | └─ midi.h
| | | └─ msc
| | | | └─ msc_device.c
| | | | └─ msc_device.h
| | | | └─ msc.h
| | | | └─ msc_host.c
| | | | └─ msc_host.h
| | | └─ net
| | | | └─ ecm_rndis_device.c
| | | | └─ ncm_device.c
| | | | └─ ncm.h
| | | | └─ net_device.h
| | | └─ usbtmc
| | | | └─ usbtmc_device.c
| | | | └─ usbtmc_device.h
| | | | └─ usbtmc.h
| | | └─ vendor
| | | | └─ vendor_device.c
| | | | └─ vendor_device.h
| | | | └─ vendor_host.c
| | | | └─ vendor_host.h
| | | └─ video
| | | | └─ video_device.c
| | | | └─ video_device.h
| | | | └─ video.h
| | | └─ common
| | | └─ tusb_common.h
```

				└─ tusb_compiler.h
				└─ tusb_error.h
				└─ tusb_fifo.c
				└─ tusb_fifo.h
				└─ tusb_timeout.h
				└─ tusb_types.h
				└─ tusb_verify.h
			└─ device	
				└─ dcd_attr.h
				└─ dcd.h
				└─ usbd.c
				└─ usbd_control.c
				└─ usbd.h
				└─ usbd_pvt.h
			└─ host	
				└─ hcd_attr.h
				└─ hcd.h
				└─ hub.c
				└─ hub.h
				└─ usbh.c
				└─ usbh_classdriver.h
				└─ usbh_control.c
				└─ usbh.h
			└─ osal	
				└─ osal_freertos.h
				└─ osal.h
				└─ osal_mynewt.h
				└─ osal_none.h
				└─ osal_pico.h

```
| | | | └─ osal_rtthread.h
| | | | └─ portable
| | | | └─ dialog
| | | | | └─ da146xx
| | | | | └─ dcd_da146xx.c
| | | | └─ ehci
| | | | | └─ ehci_api.h
| | | | | └─ ehci.c
| | | | | └─ ehci.h
| | | | └─ espressif
| | | | | └─ esp32sx
| | | | | └─ dcd_esp32sx.c
| | | | └─ microchip
| | | | | └─ samd
| | | | | └─ dcd_samd.c
| | | | | └─ samg
| | | | | └─ dcd_samg.c
| | | | | └─ samx7x
| | | | | └─ common_usb_regs.h
| | | | | └─ dcd_samx7x.c
| | | | └─ mindmotion
| | | | | └─ mm32
| | | | | └─ dcd_mm32f327x_otg.c
| | | | └─ nordic
| | | | | └─ nrf5x
| | | | | └─ dcd_nrf5x.c
| | | | └─ nuvoton
| | | | | └─ nuc120
| | | | | └─ dcd_nuc120.c
```

```

| | | | └─ nuc121
| | | | └─ dcd_nuc121.c
| | | | └─ nuc505
| | | | └─ dcd_nuc505.c
| | | └─ nxp
| | | | └─ khci
| | | | └─ dcd_khci.c
| | | | └─ lpc17_40
| | | | └─ dcd_lpc17_40.c
| | | | └─ dcd_lpc17_40.h
| | | | └─ hcd_lpc17_40.c
| | | | └─ lpc_ip3511
| | | | └─ dcd_lpc_ip3511.c
| | | └─ transdimension
| | | └─ common_transdimension.h
| | | └─ dcd_transdimension.c
| | | └─ hcd_transdimension.c
| | | └─ ohci
| | | | └─ ohci.c
| | | | └─ ohci.h
| | | └─ raspberrypi
| | | | └─ rp2040
| | | | └─ dcd_rp2040.c
| | | | └─ hcd_rp2040.c
| | | | └─ rp2040_usb.c
| | | | └─ rp2040_usb.h
| | | └─ renesas
| | | | └─ usba
| | | | └─ dcd_usba.c

```

```

| | | | └─ silabs
| | | | └─ efm32
| | | | └─ dcd_efm32.c
| | | | └─ sony
| | | | └─ cxd56
| | | | └─ dcd_cxd56.c
| | | | └─ st
| | | | └─ stm32_fsdev
| | | | └─ dcd_stm32_fsdev.c
| | | | └─ dcd_stm32_fsdev_pvt_st.h
| | | | └─ synopsys
| | | | └─ dcd_synopsys.c
| | | | └─ synopsys_common.h
| | | | └─ template
| | | | └─ dcd_template.c
| | | | └─ ti
| | | | └─ msp430x5xx
| | | | └─ dcd_msp430x5xx.c
| | | | └─ valentyusb
| | | | └─ eptri
| | | | └─ dcd_eptri.c
| | | | └─ dcd_eptri.h
| | | └─ tusb.c
| | | └─ tusb.h
| | | └─ tusb_option.h
| | └─ test
| | └─ ceedling
| | └─ project.yml
| | └─ test

```

```

| | | | | device
| | | | | msc
| | | | |   └─ test_msc_device.c
| | | | |   └─ usbd
| | | | |       └─ test_usbd.c
| | | | | support
| | | | |   └─ tusb_config.h
| | | | |   └─ test_fifo.c
| | | | |   └─ vendor
| | | | |       └─ ceedling
| | | | |           └─ bin
| | | | |               └─ ceedling
| | | | |           └─ docs
| | | | |               └─ CeedlingPacket.md
| | | | |               └─ CException.md
| | | | |               └─ CMock_Summary.md
| | | | |               └─ ThrowTheSwitchCodingStandard.md
| | | | |               └─
UnityAssertionsCheatSheetSuitableforPrintingandPossiblyFraming.pdf
| | | | |           └─ UnityAssertionsReference.md
| | | | |           └─ UnityConfigurationGuide.md
| | | | |           └─ UnityGettingStartedGuide.md
| | | | |           └─ UnityHelperScriptsGuide.md
| | | | |   └─ lib
| | | | |       └─ ceedling
| | | | |           └─ build_invoker_utils.rb
| | | | |           └─ cacheinator_helper.rb
| | | | |           └─ cacheinator.rb
| | | | |           └─ cmock_builder.rb

```

						└─ configurator_builder.rb
						└─ configurator_plugins.rb
						└─ configurator.rb
						└─ configurator_setup.rb
						└─ configurator_validator.rb
						└─ constants.rb
						└─ defaults.rb
						└─ dependinator.rb
						└─ erb_wrapper.rb
						└─ file_finder_helper.rb
						└─ file_finder.rb
						└─ file_path_utils.rb
						└─ file_system_utils.rb
						└─ file_system_wrapper.rb
						└─ file_wrapper.rb
						└─ flaginator.rb
						└─ generator_helper.rb
						└─ generator.rb
						└─ generator_test_results.rb
						└─ generator_test_results_sanity_checker.rb
						└─ generator_test_runner.rb
						└─ loginator.rb
						└─ makefile.rb
						└─ objects.yml
						└─ par_map.rb
						└─ plugin_builder.rb
						└─ plugin_manager_helper.rb
						└─ plugin_manager.rb
						└─ plugin.rb

						└─ plugin_reportinator_helper.rb
						└─ plugin_reportinator.rb
						└─ preprocessor_extractor.rb
						└─ preprocessor_file_handler.rb
						└─ preprocessor_helper.rb
						└─ preprocessor_includes_handler.rb
						└─ preprocessor.rb
						└─ project_config_manager.rb
						└─ project_file_loader.rb
						└─ rakefile.rb
						└─ rake_utils.rb
						└─ rake_wrapper.rb
						└─ release_invoker_helper.rb
						└─ release_invoker.rb
						└─ reportinator.rb
						└─ rules_cmock.rake
						└─ rules_preprocess.rake
						└─ rules_release_deep_dependencies.rake
						└─ rules_release.rake
						└─ rules_tests_deep_dependencies.rake
						└─ rules_tests.rake
						└─ setupinator.rb
						└─ streaminator_helper.rb
						└─ streaminator.rb
						└─ stream_wrapper.rb
						└─ system_utils.rb
						└─ system_wrapper.rb
						└─ target_loader.rb
						└─ task_invoker.rb

							└─ tasks_base.rake
							└─ tasks_filesystem.rake
							└─ tasks_release_deep_dependencies.rake
							└─ tasks_release.rake
							└─ tasks_tests_deep_dependencies.rake
							└─ tasks_tests.rake
							└─ tasks_vendor.rake
							└─ test_includes_extractor.rb
							└─ test_invoker_helper.rb
							└─ test_invoker.rb
							└─ tool_executor_helper.rb
							└─ tool_executor.rb
							└─ verbosinator.rb
							└─ version.rb
							└─ version.rb.erb
							└─ yaml_wrapper.rb
							└─ ceedling.rb
							└─ plugins
							└─ beep
							└─ lib
							└─ beep.rb
							└─ README.md
							└─ bullseye
							└─ assets
							└─ template.erb
							└─ bullseye.rake
							└─ config
							└─ defaults.yml
							└─ lib

```

├── bullseye.rb
├── readme.txt
├── colour_report
├── lib
│   └── colour_report.rb
├── command_hooks
│   └── lib
│       └── command_hooks.rb
├── README.md
├── fake_function_framework
├── examples
│   └── fff_example
│       ├── project.yml
│       ├── rakefile.rb
│       ├── src
│       │   ├── bar.c
│       │   ├── bar.h
│       │   ├── custom_types.h
│       │   ├── display.c
│       │   ├── display.h
│       │   ├── event_processor.c
│       │   ├── event_processor.h
│       │   ├── foo.c
│       │   ├── foo.h
│       │   └── subfolder
│       └── zzz.c
│           └── zzz.h
└── test
    └── test_event_processor.c

```

						└─ test_foo.c
						└─ lib
						└─ fake_function_framework.rb
						└─ fff_mock_generator.rb
						└─ Rakefile
						└─ README.md
						└─ spec
						└─ fff_mock_header_generator_spec.rb
						└─ fff_mock_source_generator_spec.rb
						└─ header_generator.rb
						└─ spec_helper.rb
						└─ src
						└─ fff_unity_helper.h
						└─ gcov
						└─ assets
						└─ template.erb
						└─ config
						└─ defaults.yml
						└─ gcov.rake
						└─ lib
						└─ gcov_constants.rb
						└─ gcov.rb
						└─ README.md
						└─ junit_tests_report
						└─ lib
						└─ junit_tests_report.rb
						└─ README.md
						└─ module_generator
						└─ config

```
| | | | └─ module_generator.yml
| | | | └─ lib
| | | | └─ module_generator.rb
| | | | └─ module_generator.rake
| | | └─ raw_output_report
| | | └─ lib
| | | └─ raw_output_report.rb
| | | └─ stdout_gtestlike_tests_report
| | | └─ assets
| | | | └─ template.erb
| | | | └─ template.erb copy
| | | └─ config
| | | | └─ stdout_gtestlike_tests_report.yml
| | | └─ lib
| | | └─ stdout_gtestlike_tests_report.rb
| | | └─ stdout_ide_tests_report
| | | └─ config
| | | | └─ stdout_ide_tests_report.yml
| | | └─ lib
| | | └─ stdout_ide_tests_report.rb
| | | └─ stdout_pretty_tests_report
| | | └─ assets
| | | | └─ template.erb
| | | └─ config
| | | | └─ stdout_pretty_tests_report.yml
| | | └─ lib
| | | └─ stdout_pretty_tests_report.rb
| | | └─ subprojects
| | | └─ config
```

```

├── defaults.yml
├── lib
├── subprojects.rb
├── README.md
├── subprojects.rake
├── teamcity_tests_report
├── config
├── teamcity_tests_report.yml
├── lib
├── teamcity_tests_report.rb
├── warnings_report
├── lib
├── warnings_report.rb
├── xml_tests_report
├── lib
├── xml_tests_report.rb
├── README.md
├── vendor
├── c_exception
├── lib
├── CException.c
├── CException.h
├── release
├── build.info
├── version.info
├── cmock
├── config
├── production_environment.rb
├── test_environment.rb

```

```

|   |   |   |   |   └─ lib
|   |   |   |   |   └─ cmock_config.rb
|   |   |   |   |   └─ cmock_file_writer.rb
|   |   |   |   |   └─ cmock_generator_plugin_array.rb
|   |   |   |   |   └─ cmock_generator_plugin_callback.rb
|   |   |   |   |   └─ cmock_generator_plugin_cexception.rb
|   |   |   |   |   └─
cmock_generator_plugin_expect_any_args.rb
|   |   |   |   |   └─ cmock_generator_plugin_expect.rb
|   |   |   |   |   └─ cmock_generator_plugin_ignore_arg.rb
|   |   |   |   |   └─ cmock_generator_plugin_ignore.rb
|   |   |   |   |   └─
cmock_generator_plugin_return_thru_ptr.rb
|   |   |   |   |   └─ cmock_generator.rb
|   |   |   |   |   └─ cmock_generator_utils.rb
|   |   |   |   |   └─ cmock_header_parser.rb
|   |   |   |   |   └─ cmock_plugin_manager.rb
|   |   |   |   |   └─ cmock.rb
|   |   |   |   |   └─ cmock_unityhelper_parser.rb
|   |   |   |   |   └─ release
|   |   |   |   |   └─ build.info
|   |   |   |   |   └─ version.info
|   |   |   |   |   └─ src
|   |   |   |   |   └─ cmock.c
|   |   |   |   |   └─ cmock.h
|   |   |   |   |   └─ cmock_internals.h
|   |   |   |   |   └─ meson.build
|   |   |   |   |   └─ deep_merge
|   |   |   |   |   └─ lib
|   |   |   |   |   └─ deep_merge.rb
```

```

├─ diy
│   └─ lib
│       └─ diy
│           └─ factory.rb
│           └─ diy.rb
└─ unity
    └─ auto
        └─ colour_prompt.rb
        └─ colour_reporter.rb
        └─ generate_config.yml
        └─ generate_module.rb
        └─ generate_test_runner.rb
        └─ parse_output.rb
        └─ run_test.erb
        └─ stylize_as_junit.rb
        └─ test_file_filter.rb
        └─ type_sanitizer.rb
        └─ unity_test_summary.py
        └─ unity_test_summary.rb
        └─ unity_to_junit.py
└─ release
    └─ build.info
    └─ version.info
└─ src
    └─ CMakeLists.txt
    └─ meson.build
    └─ unity.c
    └─ unity.h
    └─ unity_internals.h

```



```
| | └─ tools
| |   | └─ build_board.py
| |   | └─ build_esp32sx.py
| |   | └─ build_family.py
| |   | └─ iar_gen.py
| |   | └─ iar_template.ipcf
| |   | └─ top.mk
| |   | └─ uf2
| |   | └─ usb_drivers
| |   |   └─ tinyusb_win_usbser.inf
| |   └─ version.yml
| └─ LICENSE.TXT
| └─ pico_sdk_init.cmake
| └─ pico_sdk_version.cmake
| └─ README.md
| └─ src
|   | └─ boards
|   |   | └─ generic_board.cmake
|   |   | └─ include
|   |   |   └─ boards
|   |   |       └─ adafruit_feather_rp2040.h
|   |   |       └─ adafruit_itsybitsy_rp2040.h
|   |   |       └─ adafruit_qtpy_rp2040.h
|   |   |       └─ adafruit_trinkey_qt2040.h
|   |   |       └─ arduino_nano_rp2040_connect.h
|   |   |       └─ melopero_shake_rp2040.h
|   |   |       └─ none.h
|   |   |       └─ pico.h
|   |   |       └─ pimoroni_interstate75.h
```

```

|   |   |   └─ pimoroni_keybow2040.h
|   |   |   └─ pimoroni_pga2040.h
|   |   |   └─ pimoroni_picolipo_16mb.h
|   |   |   └─ pimoroni_picolipo_4mb.h
|   |   |   └─ pimoroni_picosystem.h
|   |   |   └─ pimoroni_plasma2040.h
|   |   |   └─ pimoroni_tiny2040.h
|   |   |   └─ pybstick26_rp2040.h
|   |   |   └─ sparkfun_micromod.h
|   |   |   └─ sparkfun_promicro.h
|   |   |   └─ sparkfun_thingplus.h
|   |   |   └─ vgaboard.h
|   |   |   └─ waveshare_rp2040_lcd_0.96.h
|   |   |   └─ waveshare_rp2040_plus_16mb.h
|   |   |   └─ waveshare_rp2040_plus_4mb.h
|   |   |   └─ waveshare_rp2040_zero.h
|   |   └─ board_setup.cmake
|   |   └─ CMakeLists.txt
|   |   └─ common
|   |   |   └─ boot_picoboot
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   |   └─ boot
|   |   |   |   |   |   └─ picoboot.h
|   |   |   └─ boot_uf2
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   |   └─ boot
|   |   |   |   |   |   └─ uf2.h

```

```

|   |   |   └─ CMakeLists.txt
|   |   |   └─ pico_base
|   |   |       │   └─ CMakeLists.txt
|   |   |       │   └─ generate_config_header.cmake
|   |   |       └─ include
|   |   |           │   └─ pico
|   |   |               │   └─ assert.h
|   |   |               │   └─ config.h
|   |   |               │   └─ error.h
|   |   |               │   └─ types.h
|   |   |               └─ version.h.in
|   |   |                   └─ pico.h
|   |   └─ pico_binary_info
|   |       │   └─ CMakeLists.txt
|   |       └─ include
|   |           │   └─ pico
|   |               │   └─ binary_info
|   |               │       │   └─ code.h
|   |               │       │   └─ defs.h
|   |               │       └─ structure.h
|   |               └─ binary_info.h
|   └─ pico_bit_ops
|       │   └─ CMakeLists.txt
|       └─ include
|           │   └─ pico
|               └─ bit_ops.h
└─ pico_divider
    │   └─ CMakeLists.txt
    └─ include

```

```

|   |   |   |   └─ pico
|   |   |   |   └─ divider.h
|   |   |   └─ pico_stdlib
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   └─ pico
|   |   |   |   └─ stdlib.h
|   |   |   └─ pico_sync
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ critical_section.c
|   |   |   |   └─ include
|   |   |   |   |   └─ pico
|   |   |   |   |   └─ critical_section.h
|   |   |   |   |   └─ lock_core.h
|   |   |   |   |   └─ mutex.h
|   |   |   |   |   └─ sem.h
|   |   |   |   |   └─ sync.h
|   |   |   |   └─ lock_core.c
|   |   |   |   └─ mutex.c
|   |   |   |   └─ sem.c
|   |   |   └─ pico_time
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   |   └─ pico
|   |   |   |   |   └─ time.h
|   |   |   |   |   └─ timeout_helper.h
|   |   |   |   └─ time.c
|   |   |   |   └─ timeout_helper.c
|   |   |   └─ pico_usb_reset_interface

```

```

|   |   |   |   |   |─ CMakeLists.txt
|   |   |   |   |   └─ include
|   |   |   |   |       └─ pico
|   |   |   |   |           └─ usb_reset_interface.h
|   |   |   |   |─ pico_util
|   |   |   |   |─ CMakeLists.txt
|   |   |   |   |─ datetime.c
|   |   |   |   |─ doc.h
|   |   |   |   |─ include
|   |   |   |   |   └─ pico
|   |   |   |   |       └─ util
|   |   |   |   |           └─ datetime.h
|   |   |   |   |           └─ pheap.h
|   |   |   |   |           └─ queue.h
|   |   |   |   |─ pheap.c
|   |   |   |   |─ queue.c
|   |   |   |   └─ README.md
|   |   |─ host
|   |   |─ boot_stage2.c
|   |   |─ CMakeLists.txt
|   |   |─ hardware_divider
|   |   |─ CMakeLists.txt
|   |   |─ divider.c
|   |   |─ include
|   |   |   └─ hardware
|   |   |       └─ divider.h
|   |   |─ hardware_gpio
|   |   |─ CMakeLists.txt
|   |   |─ gpio.c

```

```
| | | | └─ include
| | | |     └─ hardware
| | | |         └─ gpio.h
| | | └─ hardware_sync
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ sync.h
| | | | └─ sync_core0_only.c
| | | └─ hardware_timer
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ timer.h
| | | | └─ timer.c
| | | └─ hardware_uart
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ uart.h
| | | | └─ uart.c
| | | └─ pico_bit_ops
| | | | └─ bit_ops.c
| | | | └─ CMakeLists.txt
| | | └─ pico_divider
| | | | └─ CMakeLists.txt
| | | | └─ divider.c
| | | └─ pico_multicore
| | | | └─ CMakeLists.txt
```

```
| | | | └─ include
| | | |     └─ pico
| | | |         └─ multicore.h
| | | └─ pico_platform
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | | | └─ platform_defs.h
| | | | | | └─ pico
| | | | | |     └─ platform.h
| | | | └─ platform_base.c
| | | └─ pico_printf
| | | | └─ CMakeLists.txt
| | | └─ pico_stdio
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | | └─ stdio.h
| | | | └─ stdio.c
| | | └─ pico_stdlib
| | | | └─ CMakeLists.txt
| | | | └─ stdlib.c
| | | └─ README.md
| | └─ host.cmake
| | └─ rp2040
| | | └─ CMakeLists.txt
| | | └─ hardware_regs
| | | | └─ CMakeLists.txt
| | | | └─ include
```

					└─ hardware
					└─ platform_defs.h
					└─ regs
					└─ adc.h
					└─ addressmap.h
					└─ busctrl.h
					└─ clocks.h
					└─ dma.h
					└─ dreq.h
					└─ i2c.h
					└─ intctrl.h
					└─ io_bank0.h
					└─ io_qspi.h
					└─ m0plus.h
					└─ pads_bank0.h
					└─ pads_qspi.h
					└─ pio.h
					└─ pll.h
					└─ psm.h
					└─ pwm.h
					└─ resets.h
					└─ rosc.h
					└─ rtc.h
					└─ sio.h
					└─ spi.h
					└─ ssi.h
					└─ syscfg.h
					└─ sysinfo.h
					└─ tbman.h


```
| | | | | | timer.h
| | | | | | uart.h
| | | | | | usb_device_dpram.h
| | | | | | usb.h
| | | | | | vreg_and_chip_reset.h
| | | | | | watchdog.h
| | | | | | xip.h
| | | | | | xosc.h
| | | | | └─ rp2040.svd
| | | | └─ hardware_structs
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | └─ hardware
| | | | └─ structs
| | | | └─ adc.h
| | | | └─ bus_ctrl.h
| | | | └─ clocks.h
| | | | └─ dma.h
| | | | └─ i2c.h
| | | | └─ interp.h
| | | | └─ iobank0.h
| | | | └─ ioqspi.h
| | | | └─ mpu.h
| | | | └─ padsbank0.h
| | | | └─ pads_qspi.h
| | | | └─ pio.h
| | | | └─ pll.h
| | | | └─ psm.h
| | | | └─ pwm.h
```

```

├── resets.h
├── rosc.h
├── rtc.h
├── scb.h
├── sio.h
├── spi.h
├── ssi.h
├── syscfg.h
├── systick.h
├── timer.h
├── uart.h
├── usb.h
├── vreg_and_chip_reset.h
├── watchdog.h
├── xip_ctrl.h
└── xosc.h

├── README.md
├── rp2040.cmake
├── rp2_common
├── boot_stage2
├── asminclude
├── boot2_helpers
├── exit_from_boot2.S
├── read_flash_sreg.S
├── wait_ssi_ready.S
├── boot2_at25sf128a.S
├── boot2_generic_03h.S
├── boot2_is25lp080.S
├── boot2_usb_blinky.S

```

```

|   |   |   |   |   |─ boot2_w25q080.S
|   |   |   |   |   |─ boot2_w25x10cl.S
|   |   |   |   |   |─ boot_stage2.ld
|   |   |   |   |   |─ CMakeLists.txt
|   |   |   |   |   |─ compile_time_choice.S
|   |   |   |   |   |─ doc.h
|   |   |   |   |   |─ include
|   |   |   |   |   |   |─ boot_stage2
|   |   |   |   |   |       |─ config.h
|   |   |   |   |   |   |─ pad_checksum
|   |   |   |   |   |─ CMakeLists.txt
|   |   |   |   |   |─ cmsis
|   |   |   |   |   |─ CMakeLists.txt
|   |   |   |   |   |─ include
|   |   |   |   |   |   |─ cmsis
|   |   |   |   |   |       |─ rename_exceptions.h
|   |   |   |   |   |   |─ stub
|   |   |   |   |   |       |─ CMSIS
|   |   |   |   |   |           |─ Core
|   |   |   |   |   |           |   |─ Include
|   |   |   |   |   |           |       |─ cmsis_armcc.h
|   |   |   |   |   |           |       |─ cmsis_armclang.h
|   |   |   |   |   |           |       |─ cmsis_armclang_ltm.h
|   |   |   |   |   |           |       |─ cmsis_compiler.h
|   |   |   |   |   |           |       |─ cmsis_gcc.h
|   |   |   |   |   |           |       |─ cmsis_iccarm.h
|   |   |   |   |   |           |       |─ cmsis_version.h
|   |   |   |   |   |           |       |─ core_cm0plus.h
|   |   |   |   |   |           |       |─ mpu_armv7.h

```

```

├── Device
│   ├── RaspberryPi
│   │   └── RP2040
│   │       ├── Include
│   │       │   ├── RP2040.h
│   │       │   └── system_RP2040.h
│   │       └── Source
│   │           └── system_RP2040.c
│   └── LICENSE.txt
├── hardware_adc
│   ├── adc.c
│   ├── CMakeLists.txt
│   ├── include
│   │   ├── hardware
│   │   └── adc.h
│   ├── hardware_base
│   │   ├── CMakeLists.txt
│   │   ├── include
│   │   │   ├── hardware
│   │   │   └── address_mapped.h
│   ├── hardware_claim
│   │   ├── claim.c
│   │   ├── CMakeLists.txt
│   │   ├── include
│   │   │   ├── hardware
│   │   │   └── claim.h
│   ├── hardware_clocks
│   │   ├── clocks.c
│   │   └── CMakeLists.txt

```

```

|   |   |   |   |   |— include
|   |   |   |   |   |   |— hardware
|   |   |   |   |   |       |— clocks.h
|   |   |   |   |   |— scripts
|   |   |   |   |       |— vcocalc.py
|   |   |   |— hardware_divider
|   |   |   |   |— CMakeLists.txt
|   |   |   |   |— divider.S
|   |   |   |   |— include
|   |   |   |       |— hardware
|   |   |   |       |— divider.h
|   |   |   |       |— divider_helper.S
|   |   |— hardware_dma
|   |   |   |— CMakeLists.txt
|   |   |   |— dma.c
|   |   |   |— include
|   |   |       |— hardware
|   |   |       |— dma.h
|   |   |— hardware_exception
|   |   |   |— CMakeLists.txt
|   |   |   |— exception.c
|   |   |   |— include
|   |   |       |— hardware
|   |   |       |— exception.h
|   |   |— hardware_flash
|   |   |   |— CMakeLists.txt
|   |   |   |— flash.c
|   |   |   |— include
|   |   |       |— hardware

```

```

|   |   |   |   └─ flash.h
|   |   |   └─ hardware_gpio
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ gpio.c
|   |   |   |   └─ include
|   |   |   |   └─ hardware
|   |   |   |   └─ gpio.h
|   |   |   └─ hardware_i2c
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ i2c.c
|   |   |   |   └─ include
|   |   |   |   └─ hardware
|   |   |   |   └─ i2c.h
|   |   |   └─ hardware_interp
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   |   └─ hardware
|   |   |   |   |   └─ interp.h
|   |   |   |   └─ interp.c
|   |   |   └─ hardware_irq
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |   |   └─ hardware
|   |   |   |   |   └─ irq.h
|   |   |   |   └─ irq.c
|   |   |   |   └─ irq_handler_chain.S
|   |   |   └─ hardware_pio
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include

```

```
| | | | | └─ hardware
| | | | |   └─ pio.h
| | | | |     └─ pio_instructions.h
| | | | | └─ pio.c
| | | | └─ hardware_pll
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |   └─ pll.h
| | | | | └─ pll.c
| | | | └─ hardware_pwm
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |   └─ pwm.h
| | | | └─ hardware_resets
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |   └─ resets.h
| | | | └─ hardware_rtc
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |   └─ rtc.h
| | | | | └─ rtc.c
| | | | └─ hardware_spi
| | | | └─ CMakeLists.txt
| | | | └─ include
```

```

| | | | | └─ hardware
| | | | |     └─ spi.h
| | | | └─ spi.c
| | | └─ hardware_sync
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ sync.h
| | | | └─ sync.c
| | | └─ hardware_timer
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ timer.h
| | | | └─ timer.c
| | | └─ hardware_uart
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ uart.h
| | | | └─ uart.c
| | | └─ hardware_vreg
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ hardware
| | | | |     └─ vreg.h
| | | | └─ vreg.c
| | | └─ hardware_watchdog
| | | | └─ CMakeLists.txt

```



```

|   |   |   |   └─ include
|   |   |   |   └─ hardware
|   |   |   |       └─ watchdog.h
|   |   |   |   └─ watchdog.c
|   |   |   └─ hardware_xosc
|   |   |   └─ CMakeLists.txt
|   |   |   └─ include
|   |   |   |   └─ hardware
|   |   |   |       └─ xosc.h
|   |   |   |   └─ xosc.c
|   |   |   └─ pico_bit_ops
|   |   |   |   └─ bit_ops_aeabi.S
|   |   |   |   └─ CMakeLists.txt
|   |   |   └─ pico_bootrom
|   |   |   |   └─ bootrom.c
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ include
|   |   |   |       └─ pico
|   |   |   |           └─ bootrom
|   |   |   |               └─ sf_table.h
|   |   |   |               └─ bootrom.h
|   |   |   └─ pico_bootsel_via_double_reset
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ pico_bootsel_via_double_reset.c
|   |   |   └─ pico_cxx_options
|   |   |   |   └─ CMakeLists.txt
|   |   |   |   └─ doc.h
|   |   |   └─ pico_divider
|   |   |   └─ CMakeLists.txt

```

```

|   |   |   |   └─ divider.S
|   |   |   └─ pico_double
|   |   |   └─ CMakeLists.txt
|   |   |   └─ double_aeabi.S
|   |   |   └─ double_init_rom.c
|   |   |   └─ double_math.c
|   |   |   └─ double_none.S
|   |   |   └─ double_v1_rom_shim.S
|   |   |   └─ include
|   |   |       └─ pico
|   |   |           └─ double.h
|   |   └─ pico_fix
|   |   └─ CMakeLists.txt
|   |   └─ rp2040_usb_device_enumeration
|   |   └─ CMakeLists.txt
|   |   └─ include
|   |   |   └─ pico
|   |   |       └─ fix
|   |   |           └─ rp2040_usb_device_enumeration.h
|   |   └─ rp2040_usb_device_enumeration.c
|   |   └─ pico_float
|   |   └─ CMakeLists.txt
|   |   └─ float_aeabi.S
|   |   └─ float_init_rom.c
|   |   └─ float_math.c
|   |   └─ float_none.S
|   |   └─ float_v1_rom_shim.S
|   |   └─ include
|   |       └─ pico

```

```
| | | |      └─ float.h
| | | └─ pico_int64_ops
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ int64_ops.h
| | | | └─ pico_int64_ops_aeabi.S
| | | └─ pico_malloc
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ malloc.h
| | | | └─ pico_malloc.c
| | | └─ pico_mem_ops
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ mem_ops.h
| | | | └─ mem_ops_aeabi.S
| | | | └─ mem_ops.c
| | | └─ pico_multicore
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ multicore.h
| | | | └─ multicore.c
| | | └─ pico_platform
| | | | └─ CMakeLists.txt
| | | | └─ include
```

```

| | | | | └─ pico
| | | | | └─ asm_helper.S
| | | | | └─ platform.h
| | | | └─ platform.c
| | | └─ pico_printf
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ printf.h
| | | | └─ printf.c
| | | | └─ printf_none.S
| | | └─ pico_runtime
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ runtime.h
| | | | └─ runtime.c
| | | └─ pico_standard_link
| | | | └─ binary_info.c
| | | | └─ CMakeLists.txt
| | | | └─ crt0.S
| | | | └─ doc.h
| | | | └─ memmap_blocked_ram.ld
| | | | └─ memmap_copy_to_ram.ld
| | | | └─ memmap_default.ld
| | | | └─ memmap_no_flash.ld
| | | | └─ new_delete.cpp
| | | └─ pico_stdio
| | | | └─ CMakeLists.txt

```

[illegible]

```
| | | | └─ stdio_usb_descriptors.c
| | | └─ pico_stdlib
| | | | └─ CMakeLists.txt
| | | | └─ stdlib.c
| | | └─ pico_unique_id
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ unique_id.h
| | | | └─ unique_id.c
| | | └─ README.md
| | | └─ tinyusb
| | | └─ CMakeLists.txt
| | | └─ doc.h
| | └─ rp2_common.cmake
| └─ test
| | └─ CMakeLists.txt
| | └─ cmsis_test
| | | └─ CMakeLists.txt
| | | └─ cmsis_test.c
| | └─ hardware_pwm_test
| | | └─ CMakeLists.txt
| | | └─ hardware_pwm_test.c
| | └─ kitchen_sink
| | | └─ CMakeLists.txt
| | | └─ kitchen_sink.c
| | └─ pico_divider_test
| | | └─ CMakeLists.txt
| | | └─ pico_divider_nesting_test.c
```

```

|   |   |   └─ pico_divider_test.c
|   |   └─ pico_float_test
|   |   |   └─ CMakeLists.txt
|   |   |   └─ llvm
|   |   |   |   └─ call_apsr.h
|   |   |   |   └─ call_apsr.S
|   |   |   |   └─ LICENSE.TXT
|   |   |   └─ pico_double_test.c
|   |   |   └─ pico_float_test.c
|   |   └─ pico_stdlib_test
|   |   |   └─ CMakeLists.txt
|   |   |   └─ pico_stdlib_test.c
|   |   └─ pico_test
|   |   |   └─ CMakeLists.txt
|   |   |   └─ include
|   |   |       └─ pico
|   |   |           └─ test.h
|   |   └─ pico_time_test
|   |       └─ CMakeLists.txt
|   |       └─ pico_time_test.c
|   └─ tools
|       └─ check_doxygen_groups.py
|       └─ CMakeLists.txt
|       └─ elf2uf2
|       |   └─ CMakeLists.txt
|       |   └─ elf.h
|       |   └─ main.cpp
|       └─ extract_configs.py
|       └─ FindELF2UF2.cmake

```

```

|       └─ FindPioasm.cmake
|       └─ pioasm
|           └─ ada_output.cpp
|           └─ CMakeLists.txt
|           └─ c_sdk_output.cpp
|           └─ gen
|               └─ lexer.cpp
|               └─ location.h
|               └─ parser.cpp
|                   └─ parser.hpp
|           └─ hex_output.cpp
|           └─ lexer.ll
|           └─ main.cpp
|           └─ output_format.h
|           └─ parser.yy
|           └─ pio_assembler.cpp
|           └─ pio_assembler.h
|           └─ pio_disassembler.cpp
|           └─ pio_disassembler.h
|           └─ pio_types.h
|           └─ python_output.cpp
└─ pico_sdk_import.cmake
└─ ProjectFiles
    └─ CMakeLists.txt
    └─ main.c
└─ tree.txt

```

1140 directories, 2551 files