

*****Draft*****

Rp2040 FreeRTOS

Using VSCode

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

01/17/22

*****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:develone/rp2040-freertos-project.git
```

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

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

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

```
cd pico-sdk
```

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

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

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

```
mkdir build
```

```
cd build/
```

```
cmake ..
```

```
cd freertos/
```

```
make clean; make
```

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

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

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

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

Appendix 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](https://github.com/develone/rp2040-freertos-project)

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

remote: Enumerating objects: 14, done.

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

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

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

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

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

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

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

remote: Enumerating objects: 160684, done.

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

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

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

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

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

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

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

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

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

remote: Enumerating objects: 46, done.

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

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

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

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

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

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

remote: Enumerating objects: 36, done.

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

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

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

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

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

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

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

Appendix B Results of `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
```

[illegible]


```
graph TD
    CMakeFiles --> bs2_default_bin_dir[bs2_default_bin.dir]
    bs2_default_bin_dir --> build_make[build.make]
    bs2_default_bin_dir --> cmake_clean_cmake[cmake_clean.cmake]
    bs2_default_bin_dir --> DependInfo_cmake[DependInfo.cmake]
    bs2_default_bin_dir --> progress_make[progress.make]
    CMakeFiles --> bs2_default_dir[bs2_default.dir]
    bs2_default_dir --> ASM_includecache[ASM.includecache]
    bs2_default_dir --> build_make2[build.make]
    bs2_default_dir --> cmake_clean_cmake2[cmake_clean.cmake]
    bs2_default_dir --> compile_time_choice_S_obj[compile_time_choice.S.obj]
    bs2_default_dir --> DependInfo_cmake2[DependInfo.cmake]
    bs2_default_dir --> depend_internal[depend.internal]
    bs2_default_dir --> depend_make[depend.make]
    bs2_default_dir --> flags_make[flags.make]
    bs2_default_dir --> link_txt[link.txt]
    bs2_default_dir --> progress_make2[progress.make]
    CMakeFiles --> bs2_default_padded_checksummed_asm_dir[bs2_default_padded_checksummed_asm.dir]
    bs2_default_padded_checksummed_asm_dir --> build_make3[build.make]
    bs2_default_padded_checksummed_asm_dir --> cmake_clean_cmake3[cmake_clean.cmake]
    bs2_default_padded_checksummed_asm_dir --> DependInfo_cmake3[DependInfo.cmake]
    bs2_default_padded_checksummed_asm_dir --> depend_internal2[depend.internal]
    bs2_default_padded_checksummed_asm_dir --> depend_make2[depend.make]
    bs2_default_padded_checksummed_asm_dir --> progress_make3[progress.make]
    CMakeFiles --> CMakeDirectoryInformation_cmake[CMakeDirectoryInformation.cmake]
    CMakeFiles --> progress_marks[progress.marks]
    CMakeFiles --> cmake_install_cmake[cmake_install.cmake]
    CMakeFiles --> Makefile[Makefile]
```

					└─ 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

```

[illegible]

					└─ 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
```

[illegible]

```

|      |      |      |      |— 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
|      |      |      |      └— portmacro.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

[illegible]

```

|      |  |  └─ 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
|      |  |      └─ ISR_Support.inc
|      |  |      └─ portasm.src
|      |  |      └─ port.c
|      |  |      └─ portmacro.h
|      |  └─ Rowley
|      |  |  └─ ARM7
|      |  |  |  └─ readme.txt
|      |  |  └─ MSP430F449
```

				└─ portasm.h
				└─ port.c
				└─ portext.asm
				└─ portmacro.h
				└─ RVDS
				└─ ARM7_LPC21xx
				└─ portASM.s
				└─ port.c
				└─ portmacro.h
				└─ portmacro.inc
				└─ ARM_CA9
				└─ portASM.s
				└─ port.c
				└─ portmacro.h
				└─ portmacro.inc
				└─ ARM_CM0
				└─ port.c
				└─ portmacro.h
				└─ ARM_CM3
				└─ port.c
				└─ portmacro.h
				└─ ARM_CM4F
				└─ port.c
				└─ portmacro.h
				└─ ARM_CM4_MPU
				└─ port.c
				└─ portmacro.h
				└─ ARM_CM7
				└─ r0p1

```
graph TD
    Root[.] --- PortC[port.c]
    Root --- PortMacroH[portmacro.h]
    Root --- ReadMe[ReadMe.txt]
    Root --- SDCC[SDCC]
    Root --- Cygna[Cygna]
    Root --- PortC2[port.c]
    Root --- PortMacroH2[portmacro.h]
    Root --- Softune[Softune]
    Root --- MB91460[MB91460]
    Root --- PortC3[port.c]
    Root --- PortMacroH3[portmacro.h]
    Root --- STD_LIB_sbrk_c[__STD_LIB_sbrk.c]
    Root --- MB96340[MB96340]
    Root --- PortC4[port.c]
    Root --- PortMacroH4[portmacro.h]
    Root --- STD_LIB_sbrk_c2[__STD_LIB_sbrk.c]
    Root --- Tasking[Tasking]
    Root --- ARM_CM4F[ARM_CM4F]
    Root --- port_asm_asm[port_asm.asm]
    Root --- PortC5[port.c]
    Root --- PortMacroH5[portmacro.h]
    Root --- ThirdParty[ThirdParty]
    Root --- CDK[CDK]
    Root --- T-HEAD_CK802[T-HEAD_CK802]
    Root --- portasm_S[portasm.S]
    Root --- PortC6[port.c]
    Root --- PortMacroH6[portmacro.h]
    Root --- Community-Supported-Ports[Community-Supported-Ports]
    Root --- LICENSE[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
- | | └─ tinyusb
- | | └─ 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
| | | | └─ contributors.rst -> ../../CONTRIBUTORS.rst
| | | | └─ 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
| | | | | └─ 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
| | | | | └─ 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  
|      |      |      ├── fomu  
|      |      |      ├── boards  
|      |      |      │      └─ fomu  
|      |      |      ├── board.h  
|      |      |      │      └─ board.mk  
|      |      |      ├── crt0-vexriscv.S  
|      |      |      ├── dfu.py  
|      |      |      ├── family.mk  
|      |      |      ├── fomu.c  
|      |      |      ├── fomu.ld  
|      |      |      ├── include  
|      |      |      ├── csr.h  
|      |      |      ├── hw  
|      |      |      │      └─ common.h  
|      |      |      │      └─ irq.h  
|      |      |      ├── 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

```

```

| | | | | | | |— evkbimxrt1050_flexspi_nor_config.c
| | | | | | | |— evkbimxrt1050_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
| | | | | | | |— lpcxpresso1549
| | | | | | | |— 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
```

[illegible]

```

| | | | | └─ 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	

[illegible]

						└─ 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
| | | | | yml_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
| | | | └─ include
| | | | | └─ pico
| | | | | └─ stdio
| | | | | └─ driver.h
| | | | └─ stdio.h
| | | └─ LICENSE
| | | └─ stdio.c

```

```
| | | └─ pico_stdio_semihosting
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ stdio_semihosting.h
| | | | └─ stdio_semihosting.c
| | | └─ pico_stdio_uart
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | └─ stdio_uart.h
| | | | └─ stdio_uart.c
| | | └─ pico_stdio_usb
| | | | └─ CMakeLists.txt
| | | | └─ include
| | | | | └─ pico
| | | | | | └─ stdio_usb
| | | | | | └─ reset_interface.h
| | | | | | └─ stdio_usb.h
| | | | | └─ tusb_config.h
| | | | └─ reset_interface.c
| | | | └─ stdio_usb.c
| | | | └─ 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