

## Getting Started with MangoPi Board

The following are the steps to be followed to set up the RISCv64 MangoPi board. You need a microSD card for loading the boot images and USB-UART bridge device for connecting it to Host Computer's Serial Terminal Application.

### Prepare the Repo

Get the latest repo with all the latest BSP: <https://github.com/RT-Thread/rt-thread> this is the repo I used. (My case I have saved the repo at the location: /rtsmart/rthread-smart/userapps )

Also update the toolchain to latest using the command from the tools folder.

```
~/rtsmart/rthread-smart/tools$ python3 get_toolchain.py riscv64
```

Also make sure that the environment is set correctly. `source ./smart-env.sh riscv64` must be executed at the correct folder.

### Build the BSP

Build the BSP for the board: Now build the right BSP for your allwinner board. Navigate to the folder , in my case `rtsmart/rthread-smart/userapps/rt-thread/bsp/allwinner/d1s`

```
/rtsmart/rthread-smart/userapps/rt-thread/bsp/allwinner/d1s$ scons --menuconfig
```

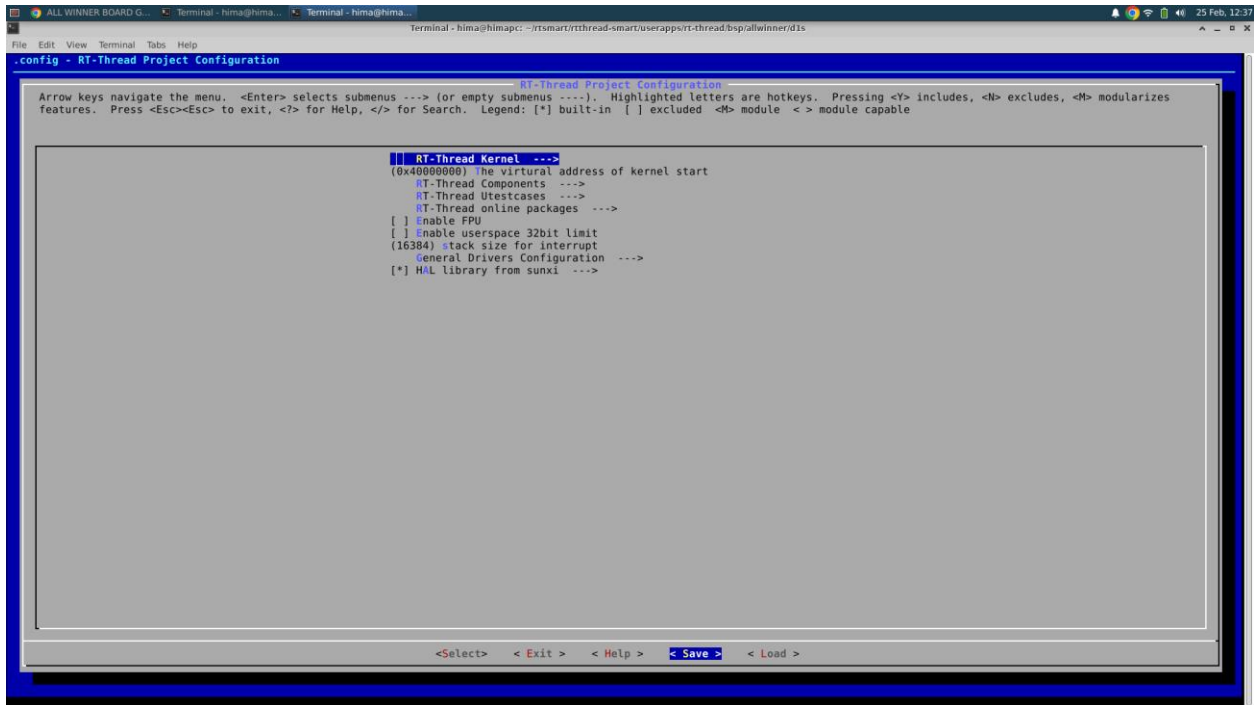


Figure 1: Menuconfig Save

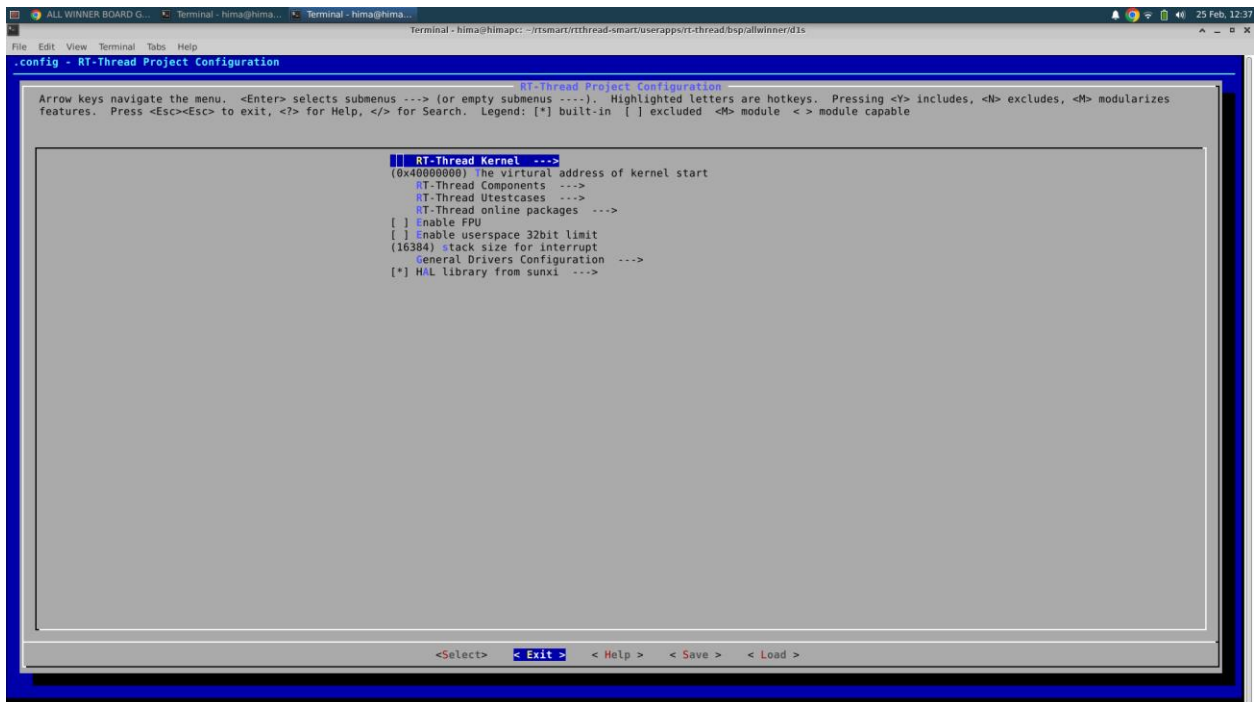


Figure 2: Menuconfig Exit

Execute `scons` after that,

```
~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s$ scon
```

```
.....
```

```
.....
```

```
scons: done building targets.
```

Check for and sd.bin file which gets generated. This is the image we are going to store in the SD Card and boot the mangopi board

### **Preparing SD Card**

Connect the SD Card to your system. Find out the entry corresponding to your SD Card from /dev folder. For me the name was sdb.

Format the sdb disk using fdisk command.

```
:~$ sudo fdisk /dev/sdb
```

```
Welcome to fdisk (util-linux 2.34).
```

```
Changes will remain in memory only, until you decide to write them.
```

```
Be careful before using the write command.
```

```
Command (m for help): o
```

```
Created a new DOS disklabel with disk identifier 0xbf06dddf.
```

```
Command (m for help): n
```

```
Partition type
```

```
  p  primary (0 primary, 0 extended, 4 free)
```

```
  e  extended (container for logical partitions)
```

```
Select (default p): p
```

```
Partition number (1-4, default 1): 1
```

```
First sector (2048-125542399, default 2048): 16384
```

```
Last sector, +/-sectors or +/-size{K,M,G,T,P} (16384-125542399, default 125542399):
```

```
Created a new partition 1 of type 'Linux' and of size 59,9 GiB.
```

```
Partition #1 contains a vfat signature.
```

```
Do you want to remove the signature? [Y]es/[N]o: Yes
```

```
The signature will be removed by a write command.
```

```
Command (m for help): q
```

You can use *gparted* command to cross verify the partition.

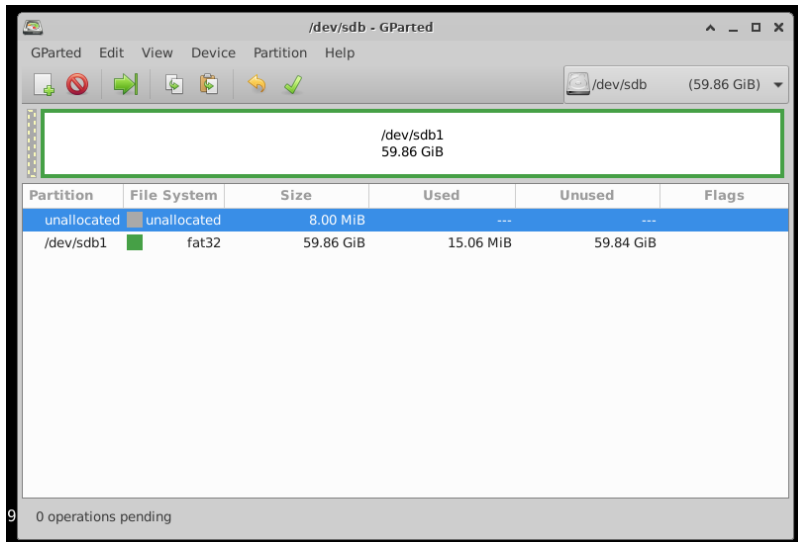


Figure 3 Gparted showing the SDCard Partition

Now flash the sd.bin and boot image, boot0\_sdcard\_sun20iw1p1\_d1s.bin onto the SDCard. Use the following two commands from the right folder.

```
sudo dd if=boot0_sdcard_sun20iw1p1_d1s.bin of=/dev/sdb bs=1024 seek=8  
sudo dd if=sd.bin of=/dev/sdb bs=1024 seek=56
```

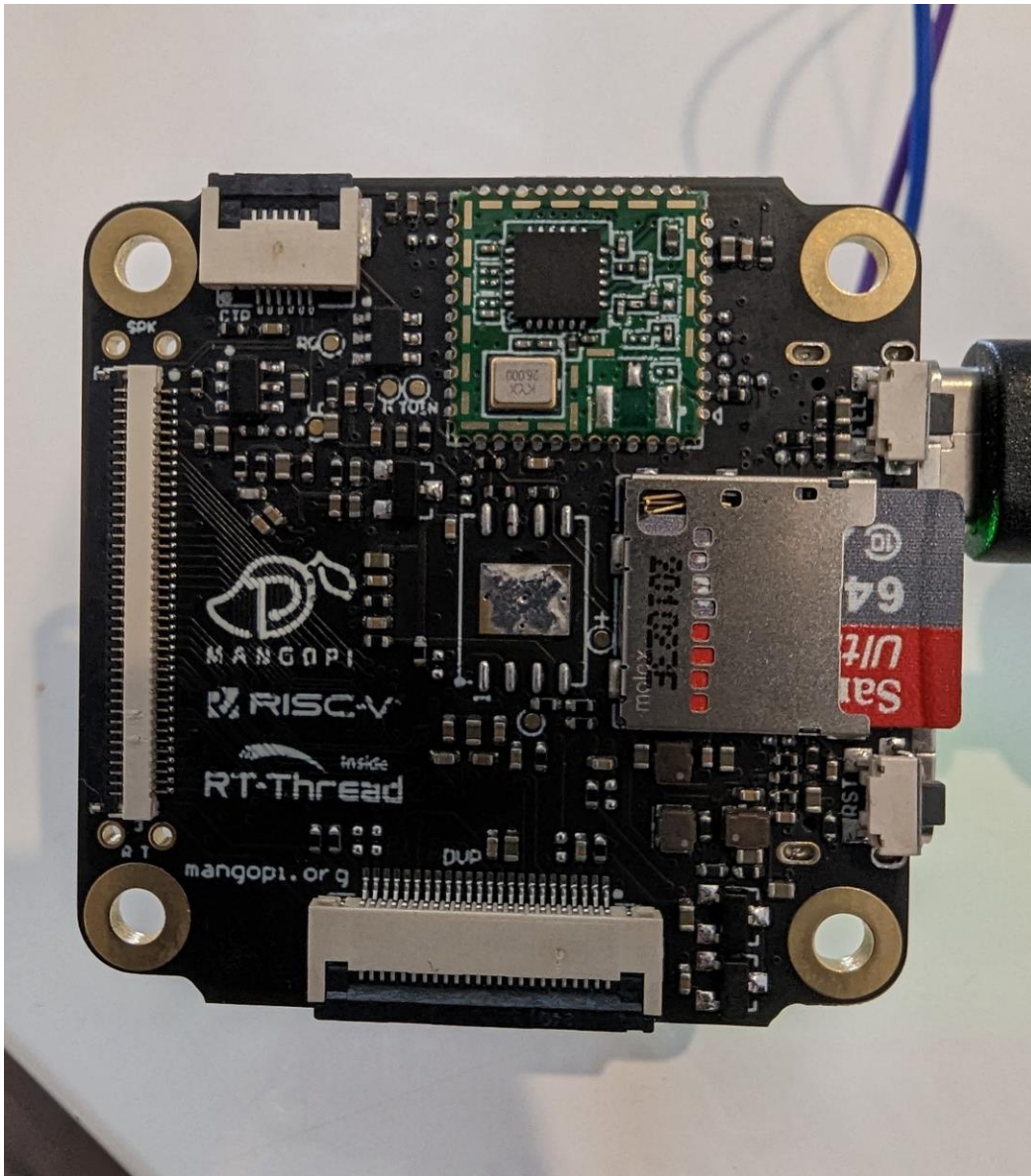
Command logs are followed.

```
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s/tools$ sudo dd  
if=boot0_sdcard_sun20iw1p1_d1s.bin of=/dev/sdb bs=1024 seek=8  
48+0 records in  
48+0 records out  
49152 bytes (49 kB, 48 KiB) copied, 0,0181441 s, 2,7 MB/s  
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s/tools$  
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s/tools$  
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s/tools$ cd ..  
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s$ sudo dd  
if=sd.bin of=/dev/sdb bs=1024 seek=56  
772+0 records in  
772+0 records out  
790528 bytes (791 kB, 772 KiB) copied, 0,152477 s, 5,2 MB/s  
hima@himapc:~/rtsmart/rtthread-smart/userapps/rt-thread/bsp/allwinner/d1s$
```

SD Card is now ready.

### Setting Up the Hardware

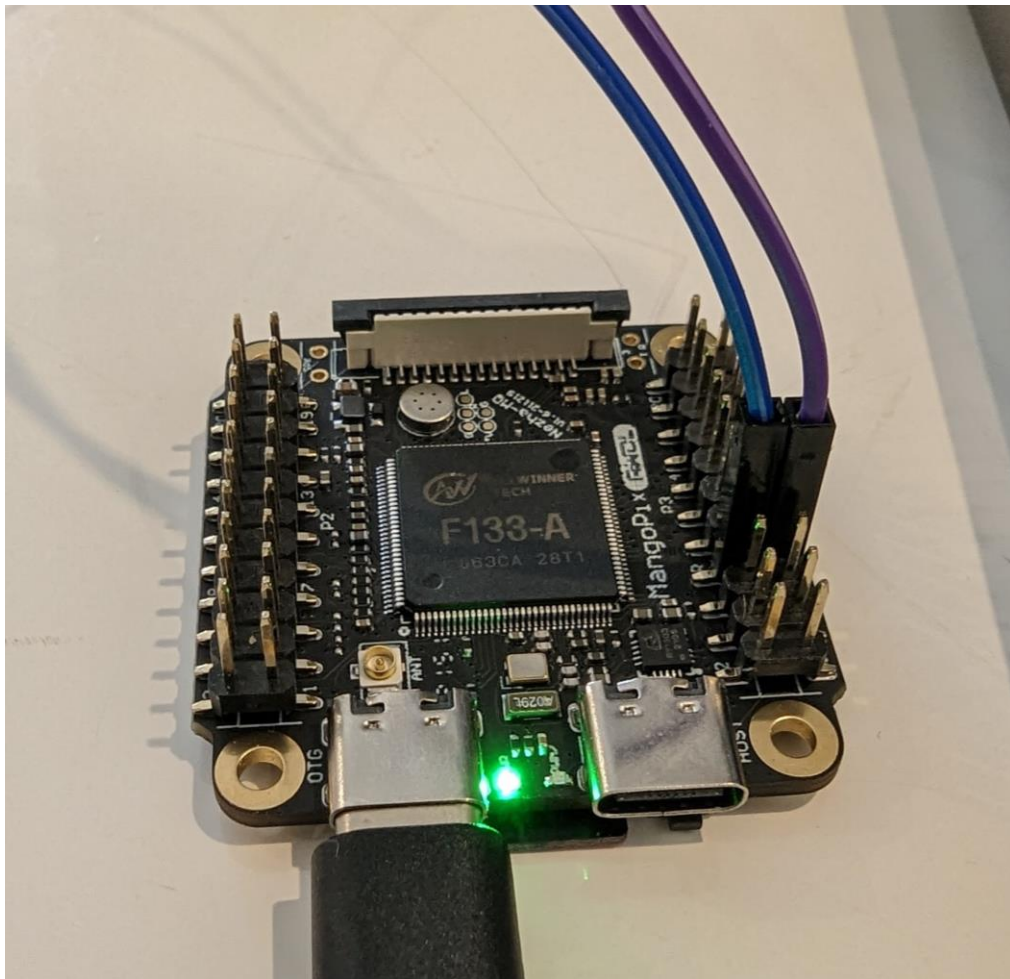
Plug the already prepared SD Card on to the Mangopi Board, on the microSD Card slot.



*Figure 4:Micro-SD Card Installation*

Also connect a UART-USB Bridge, so that you can check the UART Commands from your PC. I am using the CP2102 USB to TTL interface board as UART-USB Bridge. Connect RX and TX of the bridge to TX and RX of MangoPi board respectively.

RX (CP2102) → TX (P3.7) MangoPi  
TX (CP2102) → RX(P3.8) MangoPi



*Figure 5:UART RX-TX Connection*

Now Open any Terminal Application and connect to you UART Device.  
Make sure that the Baud Rate is configured as 500000. The board boots up, when it is reset.

```

Domain0 Next Address      : 0x0000000040400000
Domain0 Next Arg1        : 0x0000000040200000
Domain0 Next Mode        : S-mode
Domain0 SysReset         : yes
-
Boot HART ID             : 0
Boot HART Domain         : root
Boot HART ISA            : rv64imafdcvsux
Boot HART Features       : scounteren,mcounteren,mcountinhibit,time
Boot HART PMP Count      : 16
Boot HART PMP Granularity : 2048
Boot HART PMP Address Bits : 38
Boot HART MHPM Count     : 0
Boot HART MIDELEG        : 0x0000000000000222
Boot HART MEDELEG        : 0x0000000000000bfff
CSR_MSTATUS:8000000a01806800
CSR_MEDELEG:bfff
CSR_MIDELEG:222
CSR_MIE:8
CSR_MIP:0
CSR_MSCRATCH:4003d000
CSR_MEPC:40400000
next_addr:40400000
CSR_MCAUSE:2
CSR_MSTATUS:c0638000
CSR_MHR:17f
CSR_MCOR:3
CSR_MHINT:610c
CSR_MCOUNTEREN:7
CSR_MCOUNTINHIBIT:7ffffff8
-
\ | /
- RT - Thread Smart Operating System
/ | \  5.0.0 build Feb 25 2023 12:36:58
2006 - 2022 Copyright by RT-Thread team
hal_sdc_create 0
card_detect insert
Initial card success, capacity :61300MB
sdmmc bytes per sector:200, sector count:77ba000
found part[0], Begin: 8388608, size: 59.876GB
found partition:sd0 of mbr at offset 000000000004000, size:0000000077b6000
hal_sdc_create 1
card_detect insert
Initial card failed!!
[E/drv-sdmmc] init sdmmc failed!
[E/drv-sdmmc] sdmmc_init failed!
[0/FAL] (fal_flash_init:47) Flash device | sdcard0 | addr: 0x00000000 | len: 0xf7400000 | blk_size: 0x00000200 | initialized finish.
----- FAL partition table -----
[I/FAL] | name | flash_dev | offset | length |
-----|-----|-----|-----|-----|
[I/FAL] | download | sdcard0 | 0x00800000 | 0x00800000 |
[I/FAL] | easyflash | sdcard0 | 0x01000000 | 0x00100000 |
[I/FAL] | filesystem | sdcard0 | 0x01100000 | 0x00c00000 |
-----|-----|-----|-----|-----|
[I/FAL] RT-Thread Flash Abstraction Layer initialize success.
Hello RISC-V
msh />Mount "sd0p0" on "/" success

```

Figure 6: Boot logs on the Serial Terminal