

SiYuan – FPGA Setting User Guide

XJTU –IAIRCAG

Version 1.0, July 1, 2025

Release Information

Version	Date	Changes
1.0	July 1, 2025	First Release

Table 1: Release History

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Chapter 1

Required Hardware

1.1 FPGA Board

Currently, SiYuan can run Linux on the Xilinx VC707 FPGA Board and the Genesys 2 Kintex-7 FPGA Development Board.

The Xilinx VC707 FPGA is shown in Figure 1.1 below:

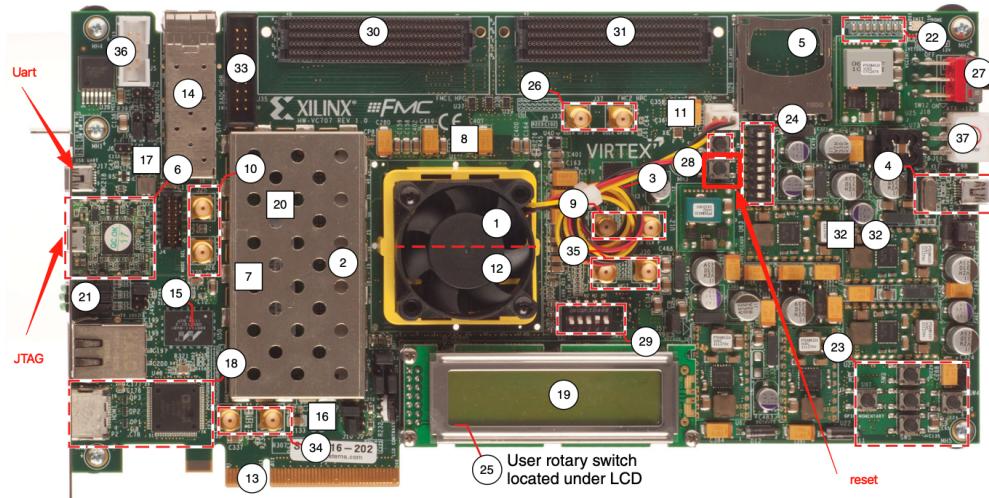


Figure 1.1: Xilinx VC707 Board

The Genesys 2 Kintex-7 FPGA Development Board is shown in Figure 1.2 below:

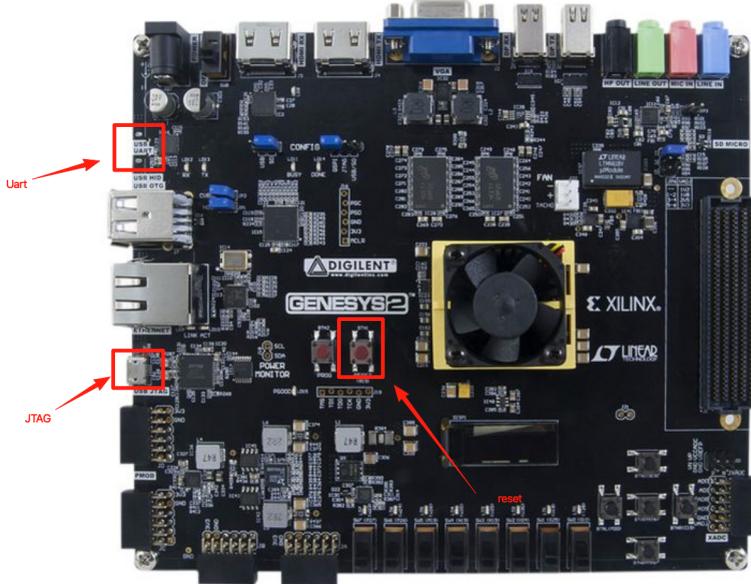


Figure 1.2: Genesys 2 FPGA Board

1.2 SD Card

Please select a suitable SD card according to the FPGA used. We recommend using an SD card with a capacity of 16GB or more.

1.3 Uart Cable

To display the interaction information generated during the operation of SiYuan, a USB-to-UART cable is required. Different FPGAs have different UART interfaces, so please select the appropriate cable according to the FPGA Board.

This cable is usually included when purchasing the FPGA.

1.4 JTAG Cable

The JTAG cable is used to program the bitstream into the FPGA board. It is usually included when purchasing the FPGA.

Chapter 2

Board Setup

2.1 Set Boot Mode

VC707 and Genesys2 have two boot modes. One is to program the bitstream (.bit file) into the FPGA through the JTAG port to start, and the other is to first use the JTAG port to program the .mcs file into the FLASH on the FPGA, and then start the FPGA. The following describes the FPGA board configuration in these two different boot modes.

For the method of programming the .bit file, the boot configuration of VC707 and Genesys2 are shown in Figure 2.1 and Figure 2.2.

For the method of programming the .mcs file, the boot configuration of VC707 and Genesys2 are shown in Figure 2.3 and Figure 2.4.

2.2 Prepare SD Card

Please download the bbl.bin file from the release of the github repository and use the following command to configure your SD card. Please confirm the device name of your SD card and replace it in the command below.

```
1 sudo sgdisk --clear --new=1:2048:67583 --new=2 --typecode  
=1:3000 --typecode=2:8300 /dev/sdb
```

Listing 2.1: Prepare SD Card

Then use the following to download the bbl.bin into your SD card.

```
1 sudo dd if=bbl.bin of=/dev/sdb1 status=progress oflag=sync  
bs=1M
```

Listing 2.2: Prepare SD Card

After programming, insert the SD card into the designated slot on the FPGA.

Note: The programming method described above should be performed under the Linux system. If using the Windows system for programming, please use special software for programming SD cards.

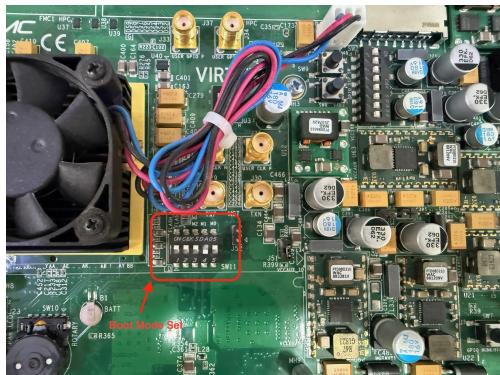


Figure 2.1: VC707 Boot Mode



Figure 2.2: Genesys2 Boot Mode



Figure 2.3: VC707 Boot Mode

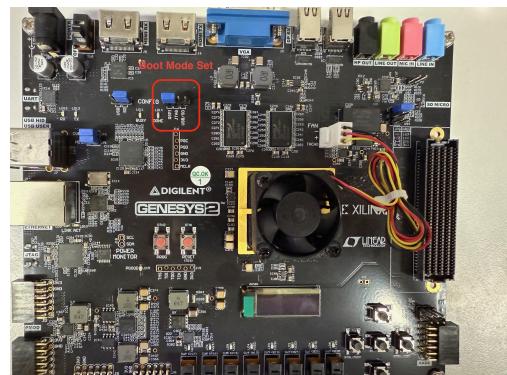


Figure 2.4: Genesys2 Boot Mode

Chapter 3

FPGA Power On

Please ensure that the FPGA's boot mode is set correctly according to the method described in Chapter 2.

3.1 Boot from .bit

If using the method of directly programming the bitstream to start, please click "Program Device" as shown in Figure 3.1 below and select the corresponding bitstream file.

3.2 Boot from .mcs

If you choose to program the .mcs file, please follow the steps to start the FPGA.

1. Click "Add Configuration Memory Device", as shown in Figure 3.2.
2. Select the corresponding Flash model according to Table 4.1.
3. Click OK to "Do you want to program the configuration memory device now?"
4. Select the appropriate .mcs file in the "configuration file" column.

5. Select OK.

Programming will take approximately five minutes. Then click "Boot from configuration memory device" as shown in the Figure 3.3 to start.

Table 3.1: Flash Model for FPGA Boards

Board	Part	Family	Type	Density
VC707	mt28gu01gaax1e-bpi-x16	g18	bpi	1024
Genesys2	s25fl256xxxxxx0-spi-x1_x2_x4	s25flxxxx	spi	256

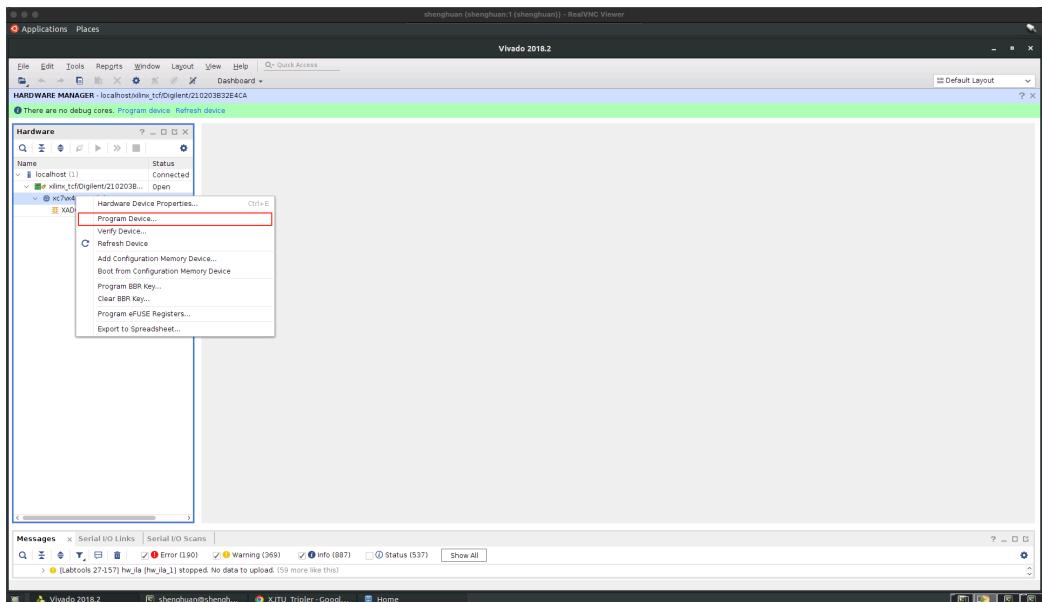


Figure 3.1: Program Devide

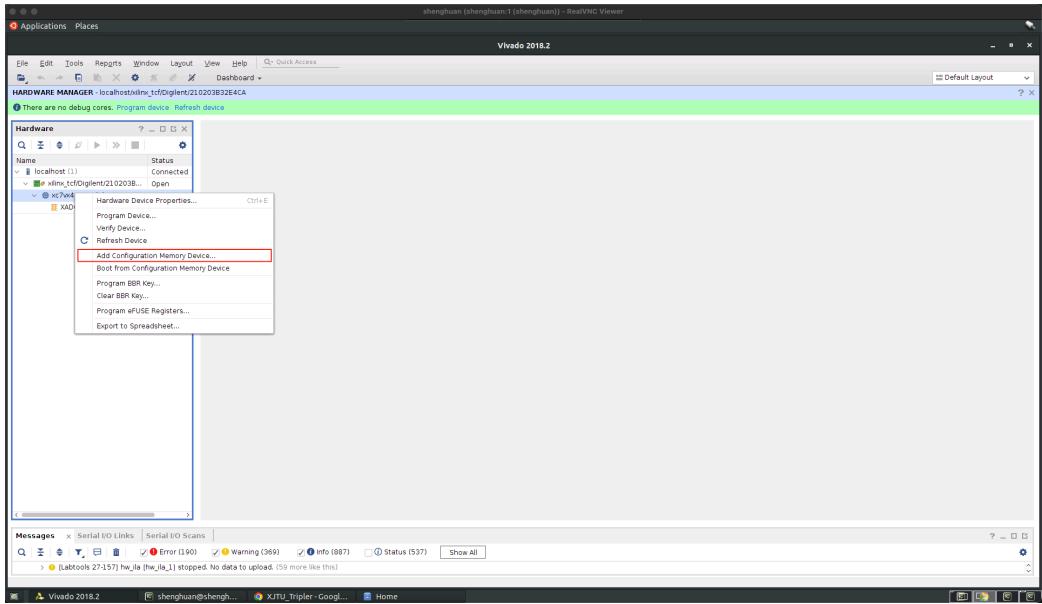


Figure 3.2: Add Configuration Memory Device

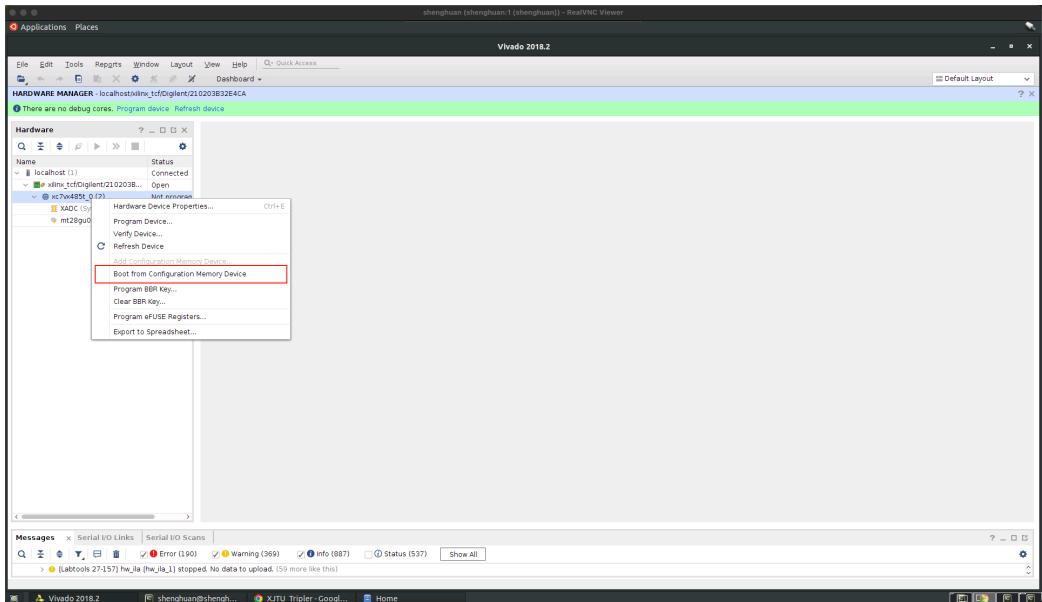


Figure 3.3: Program Devide

Chapter 4

Linux Boot and run

Using a program such as Minicom or Screen on Linux, or Teraterm on Windows, open a terminal connection from the host computer to the VC707/Genesys2 FPGA Board . Set the following parameters.

Table 4.1: Uart parameters

Speed	115200
Parity	None
Data bits	8
Stop bits	1
Hardware Flow	None

Linux will proceed to boot with tty output and keyboard input over the terminal connection. Log in with root and no password required.

The terminal log at the end of this Chapter demonstrates a session comprising Linux boot, login and program execution.

4.1 Linux Run Log

. shh+
. yMMMMMM+
. yMMMMMM+
. yMMMMMM+`
. yMMMMMdooooo smMMMN+`
-yMMMMMMMy +sss.-MMMMMN+`
-hMMMMMMMy +ooo.-MMMMMMMNNo `
-hMMMMMMMMMy osssymMMMMMMMMMNNo
NMMMMMMMMMMMMy .mMMMMMMMMMMMMMMMs.
NMMMMMMMMMMMMy .mMMMMMMMMMMMMMMMs.
-dMMMMMMMMMMMMMMMMMMMMMMMMMMMhhhhhhy:
-osssss+. '+ss+- :dMMN+:+dMMMMMMMMMMMMMMMhhhhhhy:
:osssssssssss+ssssso` :hy` :NMMMMMMMMMMMMMMMhhhhhhy:
:osssssssssssssssssss- sMMMMMMMMMMMMMMMNhhhhhhy:
:ossssssydMDssssssss/. .odMMMMMMMMMMMMMMMMNNhhhhhhy/
:osssssshMMMMNyssssssss+. -hMMMMMMMMMMMMMMMNhh-:hhhhhhy/
:ossssssyddyymMMyydmssssssss+. -hMMMMMMMhhhhmmhyoh` .hoyhhhhhhy/`
.ossssssydMMMDyyyyMMMMdssssssss+ -ydNmhhhhhhho` -sh` .hs` .shhhhhhhy.
.ossssssydMMMDyyyyMMMMdssssssss+ `..` ..`-----/shhhhhh` .hhh` .hhy` .hhhhhhy/
:ossssssyddyymMMyydmds++ssss+. ``.``.``.----:shhhhs` .oyhy+..yhhhhhhy/
:osssssshMMMMNy- `+s+. `.-.``.----:oyhhhhhhy:...:ohhhhhy:
:ossssssydMDso` `.` `-----:shhhhhy:...:yhhhhhhy:
:osssssssss+. `.` `-----/syyo:-:shhhhhy:
-osssssssss: `.` `-----:shhy:
-osssssss+. `.` `-----/yyyyy/-:..
-osss/. `.` `-----oMsomm-----`
..` `-----oMdhhNd-----`
..` `-----oMs+++++`
..` `-----+d:-----`
..` `-----`
..` `-----`
..` `-----`
..` `-----`

<http://www.pulp-platform.org>

```
[ 0.000000] OF: fdt: Ignoring memory range 0x80000000 - 0x80200000
[ 0.000000] Linux version 4.20.0-rc2 (shenghuan@shenghuan) (gcc version 8.2.0 (GCC)) #2 SMP Tue May
[ 0.000000] printk: bootconsole [early0] enabled
[ 0.000000] initrd not found or empty - disabling initrd
[ 0.000000] Zone ranges:
[ 0.000000]   DMA32    [mem 0x000000080200000-0x00000009ffffffff]
```

```

[ 0.000000] Normal [mem 0x00000000a0000000-0x000009ffffffff]
[ 0.000000] Movable zone start for each node
[ 0.000000] Early memory node ranges
[ 0.000000] node 0: [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000] Initmem setup node 0 [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000] software IO TLB: mapped [mem 0x9b8fd000-0x9f8fd000] (64MB)
[ 0.000000] elf_hwcap is 0x112d
[ 0.000000] percpu: Embedded 15 pages/cpu @(<ptrval>) s24088 r8192 d29160 u61440
[ 0.000000] Built 1 zonelists, mobility grouping on. Total pages: 128775
[ 0.000000] Kernel command line:
[ 0.000000] Dentry cache hash table entries: 65536 (order: 7, 524288 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 6, 262144 bytes)
[ 0.000000] Sorting __ex_table...
[ 0.000000] Memory: 435196K/522240K available (3626K kernel code, 201K rwdta, 1019K rodata, 7455K i
[ 0.000000] SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
[ 0.000000] rcu: Hierarchical RCU implementation.
[ 0.000000] rcu: RCU event tracing is enabled.
[ 0.000000] rcu: RCU restricting CPUs from NR_CPUS=8 to nr_cpu_ids=1.
[ 0.000000] rcu: RCU calculated value of scheduler-enlistment delay is 10 jiffies.
[ 0.000000] rcu: Adjusting geometry for rcu_fanout_leaf=16, nr_cpu_ids=1
[ 0.000000] NR_IRQS: 0, nr_irqs: 0, preallocated irqs: 0
[ 0.000000] plic: mapped 3 interrupts to 1 (out of 2) handlers.
[ 0.000000] clocksource: riscv_clocksource: mask: 0xfffffffffffffff max_cycles: 0x6eb3e4560, max_id
[ 0.000000] printk: console [hvc0] enabled
[ 0.000000] printk: console [hvc0] enabled
[ 0.010000] printk: bootconsole [early0] disabled
[ 0.010000] printk: bootconsole [early0] disabled
[ 0.020000] Calibrating delay loop (skipped), value calculated using timer frequency.. 30.00 BogoMIP
[ 0.030000] pid_max: default: 32768 minimum: 301
[ 0.040000] Mount-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.060000] Mountpoint-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.140000] rcu: Hierarchical SRCU implementation.
[ 0.170000] smp: Bringing up secondary CPUs ...
[ 0.180000] smp: Brought up 1 node, 1 CPU
[ 0.200000] devtmpfs: initialized
[ 0.270000] clocksource: jiffies: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns: 191126044627
[ 0.280000] futex hash table entries: 256 (order: 2, 16384 bytes)
[ 0.300000] random: get_random_u32 called from bucket_table_alloc+0x76/0x17e with crng_init=0
[ 0.310000] NET: Registered protocol family 16
[ 0.750000] usbcore: registered new interface driver usbf
[ 0.760000] usbcore: registered new interface driver hub
[ 0.770000] usbcore: registered new device driver usb
[ 0.820000] clocksource: Switched to clocksource riscv_clocksource
[ 0.890000] NET: Registered protocol family 2
[ 0.940000] tcp_listen_portaddr_hash hash table entries: 256 (order: 0, 4096 bytes)
[ 0.960000] TCP established hash table entries: 4096 (order: 3, 32768 bytes)
[ 0.970000] TCP bind hash table entries: 4096 (order: 4, 65536 bytes)
[ 0.990000] TCP: Hash tables configured (established 4096 bind 4096)
[ 1.010000] UDP hash table entries: 256 (order: 1, 8192 bytes)
[ 1.020000] UDP-Lite hash table entries: 256 (order: 1, 8192 bytes)
[ 1.040000] NET: Registered protocol family 1
[ 1.080000] RPC: Registered named UNIX socket transport module.
[ 1.090000] RPC: Registered udp transport module.
[ 1.100000] RPC: Registered tcp transport module.
[ 1.110000] RPC: Registered tcp NFSv4.1 backchannel transport module.
[ 40.040000] workingset: timestamp_bits=62 max_order=17 bucket_order=0
[ 40.830000] NFS: Registering the id_resolver key type
[ 40.840000] Key type id_resolver registered
[ 40.850000] Key type id_legacy registered
[ 40.860000] nfs4filelayout_init: NFSv4 File Layout Driver Registering...
[ 41.330000] io scheduler noop registered
[ 41.340000] io scheduler deadline registered

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[ 41.360000] io scheduler cfq registered (default)
[ 41.370000] io scheduler mq-deadline registered
[ 41.380000] io scheduler kyber registered
[ 44.510000] Serial: 8250/16550 driver, 4 ports, IRQ sharing disabled
[ 44.600000] 10000000 uart: ttyS0 at MMIO 0x10000000 (irq = 1, base_baud = 3125000) is a TI16750
[ 0.000000] OF: fdt: Ignoring memory range 0x80000000 - 0x80200000
[ 0.000000] OF: fdt: Ignoring memory range 0x80000000 - 0x80200000
[ 0.000000] Linux version 4.20.0-rc2 (shenghuan@shenghuan) (gcc version 8.2.0 (GCC)) #2 SMP Tue May
[ 0.000000] Linux version 4.20.0-rc2 (shenghuan@shenghuan) (gcc version 8.2.0 (GCC)) #2 SMP Tue May
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[ 0.000000]   DMA32    [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000]   DMA32    [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000]   Normal   [mem 0x00000000a0000000-0x000009ffffffff]
[ 0.000000]   Normal   [mem 0x00000000a0000000-0x000009ffffffff]
[ 0.000000] Movable zone start for each node
[ 0.000000] Movable zone start for each node
[ 0.000000] Early memory node ranges
[ 0.000000] Early memory node ranges
[ 0.000000]   node 0: [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000]   node 0: [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000] Initmem setup node 0 [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000] Initmem setup node 0 [mem 0x0000000080200000-0x000000009fffffff]
[ 0.000000] software IO TLB: mapped [mem 0x9b8fd000-0x9f8fd000] (64MB)
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[ 0.000000] elf_hwcap is 0x112d
[ 0.000000] elf_hwcap is 0x112d
[ 0.000000] percpu: Embedded 15 pages/cpu @(__ptrval__)
[ 0.000000] percpu: Embedded 15 pages/cpu @(__ptrval__)
[ 0.000000] Built 1 zonelists, mobility grouping on. Total pages: 128775
[ 0.000000] Built 1 zonelists, mobility grouping on. Total pages: 128775
[ 0.000000] Kernel command line:
[ 0.000000] Kernel command line:
[ 0.000000] Dentry cache hash table entries: 65536 (order: 7, 524288 bytes)
[ 0.000000] Dentry cache hash table entries: 65536 (order: 7, 524288 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 6, 262144 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 6, 262144 bytes)
[ 0.000000] Sorting __ex_table...
[ 0.000000] Sorting __ex_table...
[ 0.000000] Memory: 435196K/522240K available (3626K kernel code, 201K rwdta, 1019K rodata, 7455K i
[ 0.000000] Memory: 435196K/522240K available (3626K kernel code, 201K rwdta, 1019K rodata, 7455K i
[ 0.000000] SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
[ 0.000000] SLUB: HWalign=64, Order=0-3, MinObjects=0, CPUs=1, Nodes=1
[ 0.000000] rcu: Hierarchical RCU implementation.
[ 0.000000] rcu: Hierarchical RCU implementation.
[ 0.000000] rcu: RCU event tracing is enabled.
[ 0.000000] rcu: RCU event tracing is enabled.
[ 0.000000] rcu: RCU restricting CPUs from NR_CPUS=8 to nr_cpu_ids=1.
[ 0.000000] rcu: RCU restricting CPUs from NR_CPUS=8 to nr_cpu_ids=1.
[ 0.000000] rcu: RCU calculated value of scheduler-enlistment delay is 10 jiffies.
[ 0.000000] rcu: RCU calculated value of scheduler-enlistment delay is 10 jiffies.
[ 0.000000] rcu: Adjusting geometry for rcu_fanout_leaf=16, nr_cpu_ids=1
[ 0.000000] rcu: Adjusting geometry for rcu_fanout_leaf=16, nr_cpu_ids=1
[ 0.000000] NR_IRQS: 0, nr_irqs: 0, preallocated irqs: 0
[ 0.000000] NR_IRQS: 0, nr_irqs: 0, preallocated irqs: 0
[ 0.000000] plic: mapped 3 interrupts to 1 (out of 2) handlers.
[ 0.000000] plic: mapped 3 interrupts to 1 (out of 2) handlers.
[ 0.000000] clocksource: riscv_clocksource: mask: 0xffffffffffff max_cycles: 0x6eb3e4560, max_id

```

```

[ 0.000000] clocksource: riscv_clocksource: mask: 0xfffffffffffffff max_cycles: 0x6eb3e4560, max_id
[ 0.000000] printk: console [hvc0] enabled
[ 0.000000] printk: console [hvc0] enabled
[ 0.010000] printk: bootconsole [early0] disabled
[ 0.010000] printk: bootconsole [early0] disabled
[ 0.020000] Calibrating delay loop (skipped), value calculated using timer frequency.. 30.00 BogoMIP
[ 0.020000] Calibrating delay loop (skipped), value calculated using timer frequency.. 30.00 BogoMIP
[ 0.030000] pid_max: default: 32768 minimum: 301
[ 0.030000] pid_max: default: 32768 minimum: 301
[ 0.040000] Mount-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.040000] Mount-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.060000] Mountpoint-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.060000] Mountpoint-cache hash table entries: 1024 (order: 1, 8192 bytes)
[ 0.140000] rcu: Hierarchical SRCU implementation.
[ 0.140000] rcu: Hierarchical SRCU implementation.
[ 0.170000] smp: Bringing up secondary CPUs ...
[ 0.170000] smp: Bringing up secondary CPUs ...
[ 0.180000] smp: Brought up 1 node, 1 CPU
[ 0.180000] smp: Brought up 1 node, 1 CPU
[ 0.200000] devtmpfs: initialized
[ 0.200000] devtmpfs: initialized
[ 0.270000] clocksource: jiffies: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns: 191126044627
[ 0.270000] clocksource: jiffies: mask: 0xffffffff max_cycles: 0xffffffff, max_idle_ns: 191126044627
[ 0.280000] futex hash table entries: 256 (order: 2, 16384 bytes)
[ 0.280000] futex hash table entries: 256 (order: 2, 16384 bytes)
[ 0.300000] random: get_random_u32 called from bucket_table_alloc+0x76/0x17e with crng_init=0
[ 0.300000] random: get_random_u32 called from bucket_table_alloc+0x76/0x17e with crng_init=0
[ 0.310000] NET: Registered protocol family 16
[ 0.310000] NET: Registered protocol family 16
[ 0.750000] usbcore: registered new interface driver usbf
[ 0.750000] usbcore: registered new interface driver usbf
[ 0.760000] usbcore: registered new interface driver hub
[ 0.760000] usbcore: registered new interface driver hub
[ 0.770000] usbcore: registered new device driver usb
[ 0.770000] usbcore: registered new device driver usb
[ 0.820000] clocksource: Switched to clocksource riscv_clocksource
[ 0.820000] clocksource: Switched to clocksource riscv_clocksource
[ 0.890000] NET: Registered protocol family 2
[ 0.890000] NET: Registered protocol family 2
[ 0.940000] tcp_listen_portaddr_hash hash table entries: 256 (order: 0, 4096 bytes)
[ 0.940000] tcp_listen_portaddr_hash hash table entries: 256 (order: 0, 4096 bytes)
[ 0.960000] TCP established hash table entries: 4096 (order: 3, 32768 bytes)
[ 0.960000] TCP established hash table entries: 4096 (order: 3, 32768 bytes)
[ 0.970000] TCP bind hash table entries: 4096 (order: 4, 65536 bytes)
[ 0.970000] TCP bind hash table entries: 4096 (order: 4, 65536 bytes)
[ 0.990000] TCP: Hash tables configured (established 4096 bind 4096)
[ 0.990000] TCP: Hash tables configured (established 4096 bind 4096)
[ 1.010000] UDP hash table entries: 256 (order: 1, 8192 bytes)
[ 1.010000] UDP hash table entries: 256 (order: 1, 8192 bytes)
[ 1.020000] UDP-Lite hash table entries: 256 (order: 1, 8192 bytes)
[ 1.020000] UDP-Lite hash table entries: 256 (order: 1, 8192 bytes)
[ 1.040000] NET: Registered protocol family 1
[ 1.040000] NET: Registered protocol family 1
[ 1.080000] RPC: Registered named UNIX socket transport module.
[ 1.080000] RPC: Registered named UNIX socket transport module.
[ 1.090000] RPC: Registered udp transport module.
[ 1.090000] RPC: Registered udp transport module.
[ 1.100000] RPC: Registered tcp transport module.
[ 1.100000] RPC: Registered tcp transport module.
[ 1.110000] RPC: Registered tcp NFSv4.1 backchannel transport module.
[ 1.110000] RPC: Registered tcp NFSv4.1 backchannel transport module.
[ 40.040000] workingset: timestamp_bits=62 max_order=17 bucket_order=0

```

```

[ 40.040000] workingset: timestamp_bits=62 max_order=17 bucket_order=0
[ 40.830000] NFS: Registering the id_resolver key type
[ 40.830000] NFS: Registering the id_resolver key type
[ 40.840000] Key type id_resolver registered
[ 40.840000] Key type id_resolver registered
[ 40.850000] Key type id_legacy registered
[ 40.850000] Key type id_legacy registered
[ 40.860000] nfs4filelayout_init: NFSv4 File Layout Driver Registering...
[ 40.860000] nfs4filelayout_init: NFSv4 File Layout Driver Registering...
[ 41.330000] io scheduler noop registered
[ 41.330000] io scheduler noop registered
[ 41.340000] io scheduler deadline registered
[ 41.340000] io scheduler deadline registered
[ 41.360000] io scheduler cfq registered (default)
[ 41.360000] io scheduler cfq registered (default)
[ 41.370000] io scheduler mq-deadline registered
[ 41.370000] io scheduler mq-deadline registered
[ 41.380000] io scheduler kyber registered
[ 41.380000] io scheduler kyber registered
[ 44.510000] Serial: 8250/16550 driver, 4 ports, IRQ sharing disabled
[ 44.510000] Serial: 8250/16550 driver, 4 ports, IRQ sharing disabled
[ 44.600000] 10000000 uart: ttyS0 at MMIO 0x10000000 (irq = 1, base_baud = 3125000) is a TI16750
[ 44.600000] 10000000 uart: ttyS0 at MMIO 0x10000000 (irq = 1, base_baud = 3125000) is a TI16750
[ 46.090000] printk: console [ttyS0] enabled
[ 46.090000] printk: console [ttyS0] enabled
[ 46.130000] MAJOR 253,MINOR 0
[ 46.130000] MAJOR 253,MINOR 0
[ 46.160000] probe hipu100 dma module begin
[ 46.160000] probe hipu100 dma module begin
[ 46.260000] npu_shmem: Allocated DMA memory: virt=(____ptrval____) phys=0x000000009a000000
[ 46.260000] npu_shmem: Allocated DMA memory: virt=(____ptrval____) phys=0x000000009a000000
[ 46.290000] probe hipu100 dma module done
[ 46.290000] probe hipu100 dma module done
[ 46.350000] xilinx_spi 20000000.xps-spi: at 0x20000000 mapped to 0x(____ptrval____), irq=2
[ 46.350000] xilinx_spi 20000000.xps-spi: at 0x20000000 mapped to 0x(____ptrval____), irq=2
[ 46.380000] ehci_hcd: USB 2.0 'Enhanced' Host Controller (EHCI) Driver
[ 46.380000] ehci_hcd: USB 2.0 'Enhanced' Host Controller (EHCI) Driver
[ 46.470000] mmc_spi spi0.0: SD/MMC host mmc0, no WP, no poweroff, cd polling
[ 46.470000] mmc_spi spi0.0: SD/MMC host mmc0, no WP, no poweroff, cd polling
[ 46.510000] usbcore: registered new interface driver usbhid
[ 46.510000] usbcore: registered new interface driver usbhid
[ 46.530000] usbhid: USB HID core driver
[ 46.530000] usbhid: USB HID core driver
[ 46.620000] NET: Registered protocol family 10
[ 46.620000] NET: Registered protocol family 10
[ 46.700000] Segment Routing with IPv6
[ 46.700000] Segment Routing with IPv6
[ 46.720000] sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
[ 46.720000] sit: IPv6, IPv4 and MPLS over IPv4 tunneling driver
[ 46.790000] NET: Registered protocol family 17
[ 46.790000] NET: Registered protocol family 17
[ 46.830000] Key type dns_resolver registered
[ 46.830000] Key type dns_resolver registered
[ 47.350000] Freeing unused kernel memory: 7452K
[ 47.350000] Freeing unused kernel memory: 7452K
[ 47.370000] This architecture does not have kernel memory protection.
[ 47.370000] This architecture does not have kernel memory protection.
[ 47.390000] Run /init as init process
[ 47.390000] Run /init as init process
[ 47.450000] mmc0: host does not support reading read-only switch, assuming write-enable
[ 47.450000] mmc0: host does not support reading read-only switch, assuming write-enable
[ 47.470000] mmc0: new SDXC card on SPI

```

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[    47.470000] mmc0: new SDXC card on SPI
[    47.550000] mmcblk0: mmc0:0000 SD128 119 GiB
[    47.550000] mmcblk0: mmc0:0000 SD128 119 GiB
[    48.510000] mmcblk0: p1 p2
[    48.510000] mmcblk0: p1 p2
Starting logging: OK
Initializing random number generator... [    54.190000] random: dd: uninitialized urandom read (512 bytes read)
[    54.190000] random: dd: uninitialized urandom read (512 bytes read)
done.
ifconfig: SIOCSIFHWADDR: No such device
[    55.990000] random: ssh-keygen: uninitialized urandom read (32 bytes read)
[    55.990000] random: ssh-keygen: uninitialized urandom read (32 bytes read)
Starting sshd: [    56.650000] random: sshd: uninitialized urandom read (32 bytes read)
[    56.650000] random: sshd: uninitialized urandom read (32 bytes read)
OK
NFS preparation skipped, OK

Welcome to Buildroot
buildroot login: root
# cd ../
# ls
2048.elf      hello_world.elf  test.elf      README.md
init          opt             tetris        bin
lib           proc            tmp           coremark.riscv
lib64         root            usr           dev
linuxrc       run              var           media
sbin          etc              mnt           sys
# ./coremark.riscv
2K performance run parameters for coremark.
CoreMark Size      : 666
Total ticks        : 11994
Total time (secs) : 11
Iterations/Sec     : 36
Iterations         : 400
Compiler version   : GCC8.2.0
Compiler flags     : -O2 -static
Memory location   : Please put data memory location here
                   (e.g. code in flash, data on heap etc)
seedcrc          : 0xe9f5
[0]crclist       : 0xe714
[0]crcmatrix     : 0x1fd7
[0]crcstate      : 0x8e3a
[0]crcfinal      : 0x25b5
Correct operation validated. See README.md for run and reporting rules.

```