

ZedBoard run Linux using SD Card

URL:

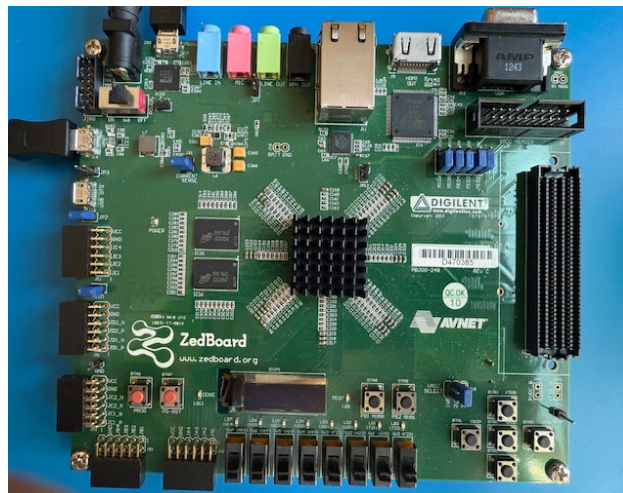
<https://digilent.com/reference/programmable-logic/zedboard/start?redirect=1>

Additional Resources

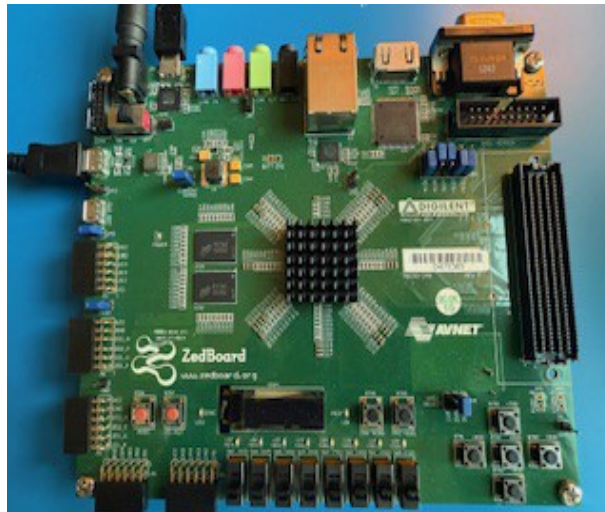
- [Zedboard LED Demo](#)
- [FPGA Package Pins to FMC](#)
- [Out-Of-Box Demo](#) [zip](#)
 - This zip file contains **out** of box (OOB) SD card image and source the hardware project and boot files are provided.
- [Zedboard_linux_Design](#) [zedboard_linux_design.zip](#)
- [Zedboard_linux_Design_14_2](#) [zedboard_linux_design_14_2.zip](#)
- Petalinux Documentation [Link](#)
 - The Petalinux tools provide a quick solution for getting Linux run the Downloads section of their site.
- [ZedBoard Mechanical Drawings](#)
- Additional technical documentation can be found through [Avnet's](#)
- [REACH Certificate of Compliance](#)

Instructions are in ZedBoardProjectGuide.pdf

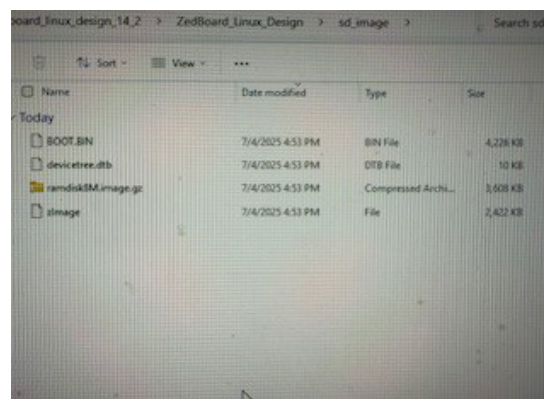
Zedboard out of the box



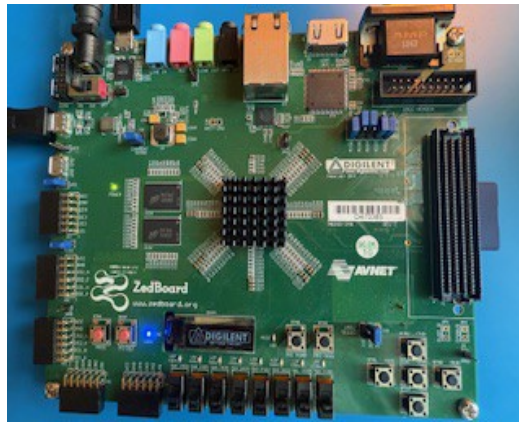
Jumper move
















Copy files to SD Card



Put SD Card to Zedboard



Connect Ethernet to Laptop

- >  Monitors
- ▼  Network adapters
 -  Intel(R) Wi-Fi 6E AX211 160MHz
 -  Realtek USB FE Family Controller
 -  WAN Miniport (IKEv2)
 -  WAN Miniport (IP)
 -  WAN Miniport (IPv6)
 -  WAN Miniport (L2TP)
 -  WAN Miniport (Network Monitor)
 -  WAN Miniport (PPPOE)
 -  WAN Miniport (PPTP)
 -  WAN Miniport (SSTP)
- >  Neural processors

Connect Putty to ZedBoard, powerup to see Linux run

U-Boot 2012.04.01 (Jan 07 2013 - 13:42:00)

DRAM: 512 MiB

WARNING: Caches not enabled

MMC: SDHCI: 0

Using default environment

In: serial

Out: serial

Err: serial

Net: zynq_gem

Hit any key to stop autoboot: 0

Copying Linux from SD to RAM...

Device: SDHCI

Manufacturer ID: 12

OEM: 3456

Name: F0F0F

Tran Speed: 25000000

Rd Block Len: 512
SD version 2.0
High Capacity: Yes
Capacity: 3.7 GiB
Bus Width: 4-bit
reading zImage

2479640 bytes read
reading devicetree.dtb

9648 bytes read
reading ramdisk8M.image.gz

3694108 bytes read

Starting application at 0x00008000 ...

Uncompressing Linux... done, booting the kernel.

```
[ 0.000000] Booting Linux on physical CPU 0
[ 0.000000] Linux version 3.3.0-digilent-12.07-zed-beta (tinghui.wang@DIGILEN
T_LINUX) (gcc version 4.6.1 (Sourcery CodeBench Lite 2011.09-50) ) #2 SMP PREEMP
T Thu Jul 12 21:01:42 PDT 2012
[ 0.000000] CPU: ARMv7 Processor [413fc090] revision 0 (ARMv7), cr=18c5387d
[ 0.000000] CPU: PIPT / VIPT nonaliasing data cache, VIPT aliasing instructio
n cache
[ 0.000000] Machine: Xilinx Zynq Platform, model: Xilinx Zynq ZED
[ 0.000000] bootconsole [earlycon0] enabled
[ 0.000000] Memory policy: ECC disabled, Data cache writealloc
[ 0.000000] BUG: mapping for 0xf8f00000 at 0xfe00c000 out of vmalloc space
[ 0.000000] BUG: mapping for 0xe0000000 at 0xfe000000 out of vmalloc space
[ 0.000000] BUG: mapping for 0xffff1000 at 0xfe200000 out of vmalloc space
[ 0.000000] PERCPU: Embedded 7 pages/cpu @c148b000 s5696 r8192 d14784 u32768
[ 0.000000] Built 1 zonelists in Zone order, mobility grouping on. Total pag
es: 125824
[ 0.000000] Kernel command line: console=ttyPS0,115200 root=/dev/ram rw initr
d=0x800000,8M earlyprintk rootwait devtmpfs.mount=1
[ 0.000000] PID hash table entries: 2048 (order: 1, 8192 bytes)
[ 0.000000] Dentry cache hash table entries: 65536 (order: 6, 262144 bytes)
[ 0.000000] Inode-cache hash table entries: 32768 (order: 5, 131072 bytes)
[ 0.000000] Memory: 240MB 256MB = 496MB total
[ 0.000000] Memory: 489848k/489848k available, 34440k reserved, 0K highmem
[ 0.000000] Virtual kernel memory layout:
[ 0.000000]   vector : 0xffff0000 - 0xffff1000   ( 4 kB)
[ 0.000000]   fixmap : 0xfff00000 - 0xfffe0000   ( 896 kB)
[ 0.000000]   vmalloc : 0xe0800000 - 0xfd000000   ( 456 MB)
[ 0.000000]   lowmem  : 0xc0000000 - 0xe0000000   ( 512 MB)
[ 0.000000]   pkmap   : 0xbfe00000 - 0xc0000000   ( 2 MB)
[ 0.000000]   modules : 0xbf000000 - 0xbfe00000   ( 14 MB)
[ 0.000000]   .text : 0xc0008000 - 0xc042f040   (4253 kB)
[ 0.000000]   .init : 0xc0430000 - 0xc0456640   ( 154 kB)
[ 0.000000]   .data : 0xc0458000 - 0xc0485dc0   ( 184 kB)
```

```

[ 0.000000] .bss : 0xc0485de4 - 0xc049d734 ( 95 kB)
[ 0.000000] Preemptible hierarchical RCU implementation.
[ 0.000000] Verbose stalled-CPU detection is disabled.
[ 0.000000] NR_IRQS:128
[ 0.000000] xlnx,ps7-ttc-1.00.a #0 at 0xe0800000, irq=43
[ 0.000000] Console: colour dummy device 80x30
[ 0.000000] Calibrating delay loop... 1332.01 BogoMIPS (lpj=6660096)
[ 0.090000] pid_max: default: 32768 minimum: 301
[ 0.090000] Mount-cache hash table entries: 512
[ 0.090000] CPU: Testing write buffer coherency: ok
[ 0.100000] CPU0: thread -1, cpu 0, socket 0, mpidr 80000000
[ 0.100000] smp_twd: clock not found: -2
[ 0.110000] Calibrating local timer... 333.57MHz.
[ 0.170000] hw perfevents: enabled with ARMv7 Cortex-A9 PMU driver, 7 counter
s available
[ 0.170000] Setting up static identity map for 0x2f8d48 - 0x2f8d7c
[ 0.270000] CPU1: Booted secondary processor
[ 0.360000] CPU1: thread -1, cpu 1, socket 0, mpidr 80000001
[ 0.360000] Brought up 2 CPUs
[ 0.360000] SMP: Total of 2 processors activated (2664.03 BogoMIPS).
[ 0.370000] devtmpfs: initialized
[ 0.370000] -----[ cut here ]-----
[ 0.380000] WARNING: at arch/arm/mm/dma-mapping.c:198 consistent_init+0x70/0x
104()
[ 0.380000] Modules linked in:
[ 0.390000] [<c0012920>] (unwind_backtrace+0x0/0xe0) from [<c001e924>] (warn_
slowpath_common+0x4c/0x64)
[ 0.400000] [<c001e924>] (warn_slowpath_common+0x4c/0x64) from [<c001e954>] (
warn_slowpath_null+0x18/0x1c)
[ 0.410000] [<c001e954>] (warn_slowpath_null+0x18/0x1c) from [<c04345a8>] (co
nsistent_init+0x70/0x104)
[ 0.420000] [<c04345a8>] (consistent_init+0x70/0x104) from [<c000858c>] (do_o
ne_initcall+0x90/0x160)
[ 0.420000] [<c000858c>] (do_one_initcall+0x90/0x160) from [<c043085c>] (kern
el_init+0x84/0x128)
[ 0.430000] [<c043085c>] (kernel_init+0x84/0x128) from [<c000dfcc>] (kernel_t
hread_exit+0x0/0x8)
[ 0.440000] ---[ end trace 1b75b31a2719ed1c ]---
[ 0.450000] -----[ cut here ]-----
[ 0.450000] WARNING: at arch/arm/mm/dma-mapping.c:198 consistent_init+0x70/0x
104()
[ 0.460000] Modules linked in:
[ 0.460000] [<c0012920>] (unwind_backtrace+0x0/0xe0) from [<c001e924>] (warn_
slowpath_common+0x4c/0x64)
[ 0.470000] [<c001e924>] (warn_slowpath_common+0x4c/0x64) from [<c001e954>] (
warn_slowpath_null+0x18/0x1c)
[ 0.480000] [<c001e954>] (warn_slowpath_null+0x18/0x1c) from [<c04345a8>] (co
nsistent_init+0x70/0x104)

```

```

[ 0.490000] [<c04345a8>] (consistent_init+0x70/0x104) from [<c000858c>] (do_one_initcall+0x90/0x160)
[ 0.500000] [<c000858c>] (do_one_initcall+0x90/0x160) from [<c043085c>] (kernel_init+0x84/0x128)
[ 0.510000] [<c043085c>] (kernel_init+0x84/0x128) from [<c000dfcc>] (kernel_thread_exit+0x0/0x8)
[ 0.520000] ---[ end trace 1b75b31a2719ed1d ]---
[ 0.520000] NET: Registered protocol family 16
[ 0.540000] L310 cache controller enabled
[ 0.540000] l2x0: 8 ways, CACHE_ID 0x410000c8, AUX_CTRL 0x72360000, Cache size: 524288 B
[ 0.550000] registering platform device 'pl330' id 0
[ 0.550000] registering platform device 'arm-pmu' id 0
[ 0.560000]
[ 0.560000] #####
[ 0.560000] # #
[ 0.570000] # Board ZED Init #
[ 0.570000] # #
[ 0.580000] #####
[ 0.580000]
[ 0.590000] hw-breakpoint: found 5 (+1 reserved) breakpoint and 1 watchpoint registers.
[ 0.590000] hw-breakpoint: maximum watchpoint size is 4 bytes.
[ 0.620000] xsler xsler.0: at 0xF8000000 mapped to 0xE0808000
[ 0.640000] bio: create slab <bio-0> at 0
[ 0.640000] gpiochip_add: registered GPIOs 0 to 245 on device: xgpiops
[ 0.640000] xgpiops e000a000.ps7-gpio: gpio at 0xe000a000 mapped to 0xe080a000
0
[ 0.650000] SCSI subsystem initialized
[ 0.660000] usbcore: registered new interface driver usbfs
[ 0.660000] usbcore: registered new interface driver hub
[ 0.670000] usbcore: registered new device driver usb
[ 0.670000] Advanced Linux Sound Architecture Driver Version 1.0.24.
[ 0.680000] Switching to clocksource xttcpsstimer1
[ 0.690000] NET: Registered protocol family 2
[ 0.690000] IP route cache hash table entries: 4096 (order: 2, 16384 bytes)
[ 0.700000] TCP established hash table entries: 16384 (order: 5, 131072 bytes)
)
[ 0.700000] TCP bind hash table entries: 16384 (order: 5, 196608 bytes)
[ 0.710000] TCP: Hash tables configured (established 16384 bind 16384)
[ 0.720000] TCP reno registered
[ 0.720000] UDP hash table entries: 256 (order: 1, 8192 bytes)
[ 0.730000] UDP-Lite hash table entries: 256 (order: 1, 8192 bytes)
[ 0.730000] NET: Registered protocol family 1
[ 0.740000] Trying to unpack rootfs image as initramfs...
[ 0.740000] rootfs image is not initramfs (no cpio magic); looks like an initrd
[ 0.780000] Freeing initrd memory: 8192K
[ 0.780000] xscugtimer xscugtimer.0: ioremap fe00c200 to e080c200 with size 400
[ 0.790000] pl330 dev 0 probe success

```

[0.800000] msgmni has been set to 972
[0.800000] io scheduler noop registered
[0.800000] io scheduler deadline registered
[0.800000] io scheduler cfq registered (default)
[0.810000] e0001 console [ttyPS0] enabled, bootconsole disabled
[0.820000] console [ttyPS0] enabled, bootconsole disabled
[0.820000] xdevcfg f8007000.ps7-dev-cfg: ioremap f8007000 to e0810000 with size 1000
[0.840000] [drm] Initialized drm 1.1.0 20060810
[0.850000] brd: module loaded
[0.860000] loop: module loaded
[0.860000] xqspips e000d000.ps7-qspi: at 0xE000D000 mapped to 0xE0812000, irq=51
[0.870000] GEM: BASEADDRESS hw: e000b000 virt: e0814000
[0.880000] XEMACPS mii bus: probed
[0.880000] eth0, pdev->id -1, baseaddr 0xe000b000, irq 54
[0.890000] ehci_hcd: USB 2.0 'Enhanced' Host Controller (EHCI) Driver
[0.890000] usb_hcd_xusbps_probe: No OTG assigned!
[0.900000] usb_hcd_xusbps_probe: OTG now assigned!
[0.900000] xusbps-ehci xusbps-ehci.0: Xilinx PS USB EHCI Host Controller
[0.910000] xusbps-ehci xusbps-ehci.0: new USB bus registered, assigned bus number 1
[0.960000] xusbps-ehci xusbps-ehci.0: irq 53, io mem 0x00000000
[0.980000] xusbps-ehci xusbps-ehci.0: USB 2.0 started, EHCI 1.00
[0.980000] hub 1-0:1.0: USB hub found
[0.990000] hub 1-0:1.0: 1 port detected
[0.990000] Initializing USB Mass Storage driver...
[0.990000] usbcore: registered new interface driver usb-storage
[1.000000] USB Mass Storage support registered.
[1.010000] Xilinx PS USB Device Controller driver (Apr 01, 2011)
[1.010000] mousedev: PS/2 mouse device common for all mice
[1.020000] Linux video capture interface: v2.00
[1.020000] gspca_main: v2.14.0 registered
[1.030000] usbcore: registered new interface driver uvcvideo
[1.030000] USB Video Class driver (1.1.1)
[1.040000] sdhci: Secure Digital Host Controller Interface driver
[1.040000] sdhci: Copyright(c) Pierre Ossman
[1.050000] sdhci-pltfm: SDHCI platform and OF driver helper
[1.060000] usbcore: registered new interface driver usbhid
[1.060000] usbhid: USB HID core driver
[1.070000] ALSA device list:
[1.070000] No soundcards found.
[1.070000] adv7511 0-0039: Failed to add route DAI IN->TMDS
[1.080000] TCP cubic registered
[1.080000] NET: Registered protocol family 17
[1.090000] VFP support v0.3: implementor 41 architecture 3 part 30 variant 9 rev 4
[1.090000] Registering SWP/SWPB emulation handler
[1.100000] registered taskstats version 1
[1.100000] asoc: adv7511 <-> 75c00000.axi-spdif-tx mapping ok
[1.110000] axi-spdif 75c00000.axi-spdif-tx: Failed to set DAI format: -22
[1.110000] drivers/rtc/hctosys.c: unable to open rtc device (rtc0)
[1.120000] RAMDISK: gzip image found at block 0

```
[ 1.130000] No connectors reported connected with modes
[ 1.130000] [drm] Cannot find any crtc or sizes - going 1024x768
[ 1.150000] drivers/gpu/drm/analog/analog_drm_fbdev.c:analog_drm_fbdev_probe[241]
[ 1.170000] Console: switching to colour frame buffer device 128x48
[ 1.180000] fb0: frame buffer device
[ 1.190000] drm: registered panic notifier
[ 1.190000] [drm] Initialized analog_drm 1.0.0 20110530 on minor 0
[ 1.440000] EXT4-fs (ram0): couldn't mount as ext3 due to feature incompatibilities
[ 1.500000] EXT4-fs (ram0): mounting ext2 file system using the ext4 subsystem
[ 1.500000] EXT4-fs (ram0): warning: mounting unchecked fs, running e2fsck is recommended
[ 1.510000] EXT4-fs (ram0): mounted filesystem without journal. Opts: (null)
[ 1.520000] VFS: Mounted root (ext2 filesystem) on device 1:0.
[ 1.520000] devtmpfs: mounted
[ 1.530000] Freeing init memory: 152K
```

Starting rcS...

++ Mounting filesystem

++ Setting up mdev

++ Configure static IP 192.168.1.10

```
[ 1.740000] GEM: lp->tx_bd ffdfb000 lp->tx_bd_dma 19bdf000 lp->tx_skb d8435480
```

```
[ 1.750000] GEM: lp->rx_bd ffdfc000 lp->rx_bd_dma 19be0000 lp->rx_skb d8435580
```

```
[ 1.750000] GEM: MAC 0x00350a00, 0x00002201, 00:0a:35:00:01:22
```

```
[ 1.760000] GEM: phydev d8c06e00, phydev->phy_id 0x1410dd1, phydev->addr 0x0
```

```
[ 1.770000] eth0, phy_addr 0x0, phy_id 0x01410dd1
```

```
[ 1.770000] eth0, attach [Marvell 88E1510] phy driver
```

++ Starting telnet daemon

++ Starting http daemon

++ Starting ftp daemon

++ Starting dropbear (ssh) daemon

++ Starting OLED Display

```
[ 1.820000] pmodoled-gpio-spi [zed_oled] SPI Probing
```

++ Exporting LEDs & SWs

rcS Complete

zynq> ls

```
bin      lib      lost+found  proc      sys      var
```

```
dev      licenses  mnt        root      tmp
```

```
etc      linuxrc   opt       /sbin     usr
```

zynq> ifconfig

```
eth0    Link encap:Ethernet HWaddr 00:0A:35:00:01:22
```

```
inet addr:192.168.1.10 Bcast:192.168.1.255 Mask:255.255.255.0
```

```
UP BROADCAST MULTICAST MTU:1500 Metric:1
```

```
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
```

```
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
```

```
collisions:0 txqueuelen:1000
```

```
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
```

```
Interrupt:54 Base address:0xb000
```

zynq> [806.790000] eth0: link up (100/FULL)

zynq> ifconfig


```
eth0    Link encap:Ethernet HWaddr 00:0A:35:00:01:22
        inet addr:192.168.1.10 Bcast:192.168.1.255 Mask:255.255.255.0
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:19 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:2304 (2.2 KiB) TX bytes:0 (0.0 B)
        Interrupt:54 Base address:0xb000
```

Gave my laptop Static IP address **192.168.1.2**

Ping

```
zynq> ping 192.168.1.2
PING 192.168.1.2 (192.168.1.2): 56 data bytes
^C
--- 192.168.1.2 ping statistics ---
56 packets transmitted, 0 packets received, 100% packet loss
```

Can not ping from Zedboard

```
zynq> uname -a
Linux (none) 3.3.0-digilent-12.07-zed-beta #2 SMP PREEMPT Thu Jul 12 21:01:42 PDT 2012 armv7l
GNU/Linux
```

ZedBoard Filesystem does not have gcc

At Ubuntu I made a hello.c file compiled and ran it

```
jabeen@Nice2behere:/home/ZedBoardFileSystem$ sudo touch hello.c
[sudo] password for jabeen:
```

```
jabeen@Nice2behere:/home/ZedBoardFileSystem$ vi hello.c
```

```
jabeen@Nice2behere:/home/ZedBoardFileSystem$ cat hello.c
#include <stdio.h>
```

```
int main()
{
    printf("Hello World\n");
    return 0;
}
```

```
jabeen@Nice2behere:/home/ZedBoardFileSystem$ sudo gcc -o hello hello.c
jabeen@Nice2behere:/home/ZedBoardFileSystem$ ls
hello hello.c ramdisk8M.image
jabeen@Nice2behere:/home/ZedBoardFileSystem$ ./hello
```

Hello World

Ubuntu does not have knowledge of Zedboard

```
jabeen@Nice2behere:/home/ZedBoardFileSystem$ ifconfig
eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 172.20.232.68 netmask 255.255.240.0 broadcast 172.20.239.255
    inet6 fe80::215:5dff:fe48:6fac prefixlen 64 scopeid 0x20<link>
    ether 00:15:5d:48:6f:ac txqueuelen 1000 (Ethernet)
    RX packets 41444 bytes 14514211 (14.5 MB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 2929 bytes 210038 (210.0 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1000 (Local Loopback)
    RX packets 112 bytes 11216 (11.2 KB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 112 bytes 11216 (11.2 KB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

PC Ethernet 2 (192.168.1.2) is connected to ZedBoard's Ethernet (192.168.1.10)

PS C:\Users\nahid> ping -t 192.168.1.10

Pinging 192.168.1.10 with 32 bytes of data:
Reply from 192.168.1.10: bytes=32 time=1ms TTL=64
Reply from 192.168.1.10: bytes=32 time=1ms TTL=64
Reply from 192.168.1.10: bytes=32 time=1ms TTL=64

Copied hello and hello.c to Windows filesystem and ftp to Zedboard, user is zynq

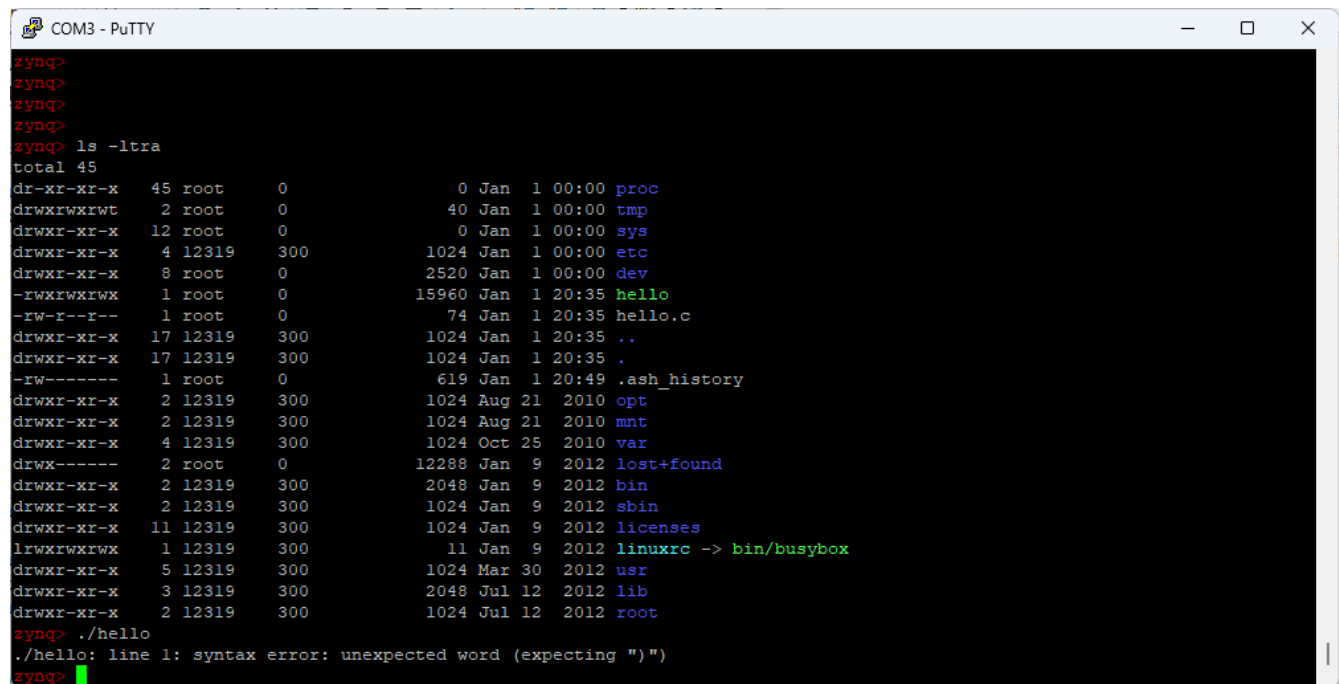
```
PS C:\Users\nahid\MadeinUbuntuForZedBoard> ftp 192.168.1.10
Connected to 192.168.1.10.
220 Operation successful
500 Unknown command
User (192.168.1.10:(none)): zynq
230 Operation successful
ftp> put hello
200 Operation successful
150 Ok to send data
226 Operation successful
ftp: 15960 bytes sent in 0.01Seconds 1995.00Kbytes/sec.
ftp> put hello.c
```

200 Operation successful
150 Ok to send data
226 Operation successful
ftp: 74 bytes sent in 0.00Seconds 74.00Kbytes/sec.
Ftp>

At ZedBoard tried to run hello

zynq> chmod 777 hello

ZedBoard did not like it.



```
COM3 - PuTTY
zynq>
zynq>
zynq>
zynq>
zynq> ls -ltra
total 45
dr-xr-xr-x  45 root    0          0 Jan  1 00:00 proc
drwxrwxrwt  2 root    0          40 Jan  1 00:00 tmp
drwxr-xr-x  12 root    0          0 Jan  1 00:00 sys
drwxr-xr-x  4 12319  300       1024 Jan  1 00:00 etc
drwxr-xr-x  8 root    0       2520 Jan  1 00:00 dev
-rwxrwxrwx  1 root    0      15960 Jan  1 20:35 hello
-rw-r--r--  1 root    0         74 Jan  1 20:35 hello.c
drwxr-xr-x 17 12319  300       1024 Jan  1 20:35 ..
drwxr-xr-x 17 12319  300       1024 Jan  1 20:35 .
-rw-----  1 root    0         619 Jan  1 20:49 .ash_history
drwxr-xr-x  2 12319  300       1024 Aug 21 2010 opt
drwxr-xr-x  2 12319  300       1024 Aug 21 2010 mnt
drwxr-xr-x  4 12319  300       1024 Oct 25 2010 var
drwx-----  2 root    0     12288 Jan  9 2012 lost+found
drwxr-xr-x  2 12319  300       2048 Jan  9 2012 bin
drwxr-xr-x  2 12319  300       1024 Jan  9 2012 sbin
drwxr-xr-x 11 12319  300       1024 Jan  9 2012 licenses
lrwxrwxrwx  1 12319  300         11 Jan  9 2012 linuxrc -> bin/busybox
drwxr-xr-x  5 12319  300       1024 Mar 30 2012 usr
drwxr-xr-x  3 12319  300       2048 Jul 12 2012 lib
drwxr-xr-x  2 12319  300       1024 Jul 12 2012 root
zynq> ./hello
./hello: line 1: syntax error: unexpected word (expecting ")")
zynq>
```