

FQA 3 – Hardware



3.1 – Selecting Hardware

Selecting appropriate hardware to run your 9front system on is important, as it can mean the difference between success and failure of a project. Fortunately, most common PC hardware is at least minimally functional in Plan 9 (excluding certain exotic audio, VGA, and WiFi devices). Nowadays, thanks to `9boot(8)`, `realemu(8)`, and the VESA driver, it is at least very likely that your PC will boot. In addition, most popular virtualization platforms are reasonably well supported.

Check *FQA 3.2 – Known Working Hardware* as well as the various supported hardware pages on the Bell Labs Plan 9 wiki to help determine if your hardware or VM is supported.

3.2 – Known Working Hardware

This list adds to the various supported hardware pages on the Plan 9 from Bell Labs wiki. **Note:** NONE of these lists are all-inclusive. Some drivers listed on the Bell Labs wiki have not been tested by 9front developers. The following list consists of hardware, 1.) that we have actually used, or 2.) about which we have received reliable reports from users.

Some drivers and their options are also documented in `plan9.ini(8)`.

Read: *FQA 1.3.1.2 – New Hardware Support* for information about hardware drivers that are new in 9front.

3.2.0 – Input Devices

3.2.0.1 – Mice

Almost any PS/2 or USB mouse is going to work. The following are preferred for use with Plan 9.

3.2.0.1.1 – IBM/Lenovo

N700 Wireless/Bluetooth, 3 button Mouse and Laser Pointer

Part Number: 888015450

DPI: 1200

"Just works" with USB receiver. No additional driver required.



ScrollPoint Optical Mouse, 3 button, USB/PS2

Part Number: 31P7405

DPI: 800



3.2.0.2 – Keyboards

Almost any AT, PS/2, or USB keyboard is going to work. The following are preferred for use with Plan 9.

3.2.0.2.1 – IBM/Lenovo

IBM Model M 1391401

Part Number: 1391401

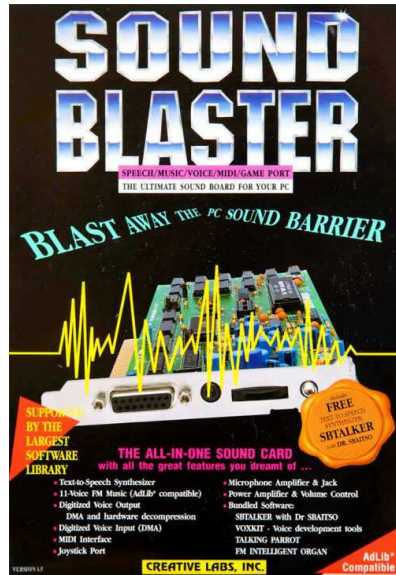


IBM UltraNav SK-8835

Part Number: SK-8835



3.2.1 – Audio Audio support is much improved in 9front, with added support for AC97, Intel HDA, and (ha!) Soundblaster 16.



AMD FCH Azalia Controller

vid/did: 1022/780d

Intel 888 Microsoft UAA bus for HD audio

vid/did: 8086/284b

Intel 82801CA/CAM AC97

vid/did: 8086/2485

Intel 82801 DB DBM/DA AC 97

vid/did: 8086/24c5

Intel 486486 82801IB/IR/IH HD Audio

vid/did: 8086/293e

Intel HD NM10/ICH7

vid/did: 8086/27d8

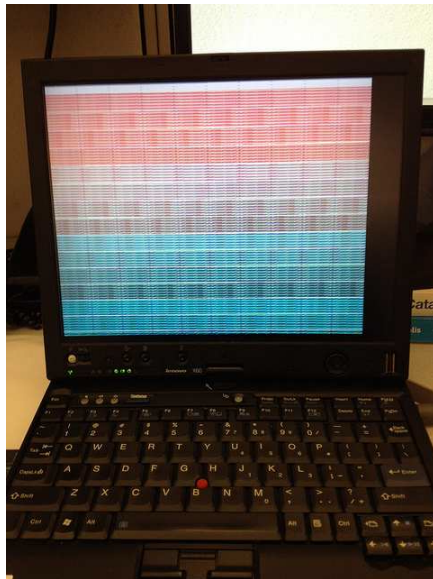
Intel HD 6 Series/C200 Series

vid/did: 8086/1c20

Intel HD 7 Series/C210 Series

vid/did: 8086/1e20

3.2.2 – Graphics Many video cards for which there exists no native VGA driver can be made to work with the generic VESA driver. Examples are provided below.



3.2.2.1 – AGP

NVidia GeForce FX 5200 128MB VGA output

vid/did: 10de/0322

monitor=vesa vgasize=1600x1200x32

monitor=dellst2210 vgasize=1920x1080x32

NVidia GeForce FX 5700

vid/did: 10de/0341

monitor=vesa vgasize=1600x1200x32

monitor=dellst2210 vgasize=1920x1080x32

3.2.2.2 – Integrated

ATI Mobility Radeon 7500 128MB DVI/VGA output

vid/did: 1002/4c57
monitor=vesa vgasize=1024x768x32

ATI Mobility Radeon FireGL V3200/X600

vid/did: 1002/3154
monitor=vesa vgasize=1600x1200x32

ATI RS880

monitor=vesa vgasize=1280x1024x32

ATI X1300

Intel Mobile 945GM/GMS/GME, 943/940GML Express

vid/did: 8086/27a6
monitor=vesa vgasize=1400x1050x32
monitor=x60t vgasize=1400x1050x32

Intel X3100/GM965/PM965/GL960

vid/did: 8086/2a03
monitor=vesa vgasize=1680x1050x32

Intel Mobile Intel 4 Series 4500MHD

vid/did: 8086/2a42, 8086/2a43
monitor=vesa vgasize=1440x900x32
monitor=x301 vgasize=1440x900x32

Intel HD 3rd Gen Core processor Graphics Controller

vid/did: 8086/0166
monitor=vesa vgasize=1366x768x32
monitor=x230 vgasize=1366x768x32

NVidia GeForce FX Go5200 64M

vid/did: 10de/0324
monitor=cinema vgasize=1152x768x32

S3 SuperSavage IX/C 16MB

vid/did: 5333/8c2e
monitor=t23 vgasize=1024x768x32
monitor=vesa vgasize=1024x768x32

3.2.2.3 – PCI Express

NVidia GeForce 6200 AGB

vid/did: 10de/0220

NVidia GeForce 6200 LE

vid/did: 10de/0163
monitor=e228wfp vgasize=1680x1050x32

NVidia GeForce 8400 GS

vid/did: 10de/0422
monitor=vesa vgasize=1680x1050x32

NVidia GeForce 8600 GT

vid/did: 10de/0402
monitor=vesa vgasize=1600x1200x32

NVidia GeForce GTX 550

vid/did: 10de/0bee
monitor=vesa vgasize=1600x1200x32

3.2.3 – Networking

3.2.3.1 – Ethernet

Ethernet is well supported across many vendors and chipsets. 9front introduces a "medium-to-low quality" driver for Broadcom BCM57xx cards, previously unsupported by Plan 9.

3.2.3.1.1 – Integrated

Broadcom BCM5751M NetXtreme Gigabit

vid/did: 14e4/167d
tested 100/1000 mbps

Broadcom BCM5755/5780 NetXtreme Gigabit

vid/did: 14e4/167b
tested 100/1000 mbps

Broadcom BCM5782 NetXtreme Gigabit

vid/did: 14e4/1696

Intel 82540EP Gigabit

vid/did: 8086/101e
tested 100/1000 mbps

Intel 82562ET

tested 10/100 mbps

Intel 82566MM Gigabit

vid/did: 8086/1049
tested 100/1000 mbps

Intel 82567LM 82567LM-2 Gigabit

vid/did: 8086/10f5
tested 100/1000 mbps

Intel 82573L Gigabit

vid/did: 8086/109a
tested: 100/1000 mbps

Intel 82579LM Gigabit

vid/did: 8086/1502
tested: 100/1000 mbps

Intel 82801CAM PRO/100 VE

vid/did: 8086/1031
tested 10/100 mbps

Realtek RTL8139

vid/did: 10ec/8139
tested 10/100/1000 mbps

Realtek RTL8169/RTL8101E/RTL8102E

vid/did: 10ec/8136
tested 10/100/1000 mbps

3.2.3.1.2 – USB

Beceem Communications CLEAR Stick

vid/did 198f:8160
This is a WiMAX device that appears as a USB CDC Ethernet device
Works with nusb/ether

RNDIS

Android phones should work
Works with nusb/ether

3.2.3.1.3 – PCMCIA

3Com 3c589c

Set the following in `plan9.ini`: `irq=3 port=0x300`

3.2.3.2 – WiFi

9front adds support for several WiFi adapters from Ralink and Intel, as well as support for WPA and WPA2.

Read: `wpa(8)`, and `plan9.ini(8)`

3.2.3.2.1 – Bridge (external)

logear GWU627

802.11n
connect ethernet port to GWU627
HTTP management interface requires Javascript. Managed to program it using Inferno's charon browser, which supports ecma-script 1.0.

Vonets VAP11G

802.11g
connect ethernet port to VAP11G
Requires a proprietary Windows program (ships with the device) to program its settings before using it for the first time.

3.2.3.2.2 – Mini-PCI

Actiontec 800MIP

802.11b
often branded Lucent WaveLAN
ether0=type=wavelanpci ssid=MESH station=T42 irq=11

Ralink RT2860 802.11b

3.2.3.2.3 – Mini-PCI Express

Intel Centrino Advanced-N 6205 Taylor Peak (iwl-6005)

vid/did: 8086/0085
802.11g
ether0=type=iwl essid=MESH

Intel Centrino Ultimate-N (iwl-6000)

802.11g
ether0=type=iwl essid=MESH

Intel Centrino Wireless-N 100

802.11g
ether0=type=iwl essid=MESH

Intel Centrino Wireless-N 2230

802.11g
ether0=type=iwl essid=MESH

Intel PRO Wireless 3945ABG (wpi-3945abg)

802.11g
ether0=type=wpi essid=MESH

Intel WiFi Link 1000/4965/5100/5300/5350 AGN

802.11g
ether0=type=iwl essid=MESH

Ralink RT3090

802.11g

3.2.3.2.4 – PCI

Ralink RT3090

802.11b

3.2.3.2.5 – PCMCIA

Linksys WPC11

802.11b
Prism 2.5
ISL37300P
RevA

Lucent WaveLAN PC24E-H-FC

802.11b
ether0=type=wavelan essid=MESH crypt=off station=x61 irq=11

3.2.4 – Tablet Digitizers

Support for Wacom serial tablets was added in 2012. The touchscreen digitizers in some Lenovo ThinkPads (notably, the X230) also seem to function without need of any drivers (presumably, controlled by the BIOS).

3.2.4.1 – Serial

3.2.4.1.1 – Integrated

Wacom WACF004

ThinkPad X4* series tablets

To enable the tablet's serial port in `plan9.ini`:

```
uart2=type=isa port=0x200 irq=5
```

To turn on the tablet:

```
aux/wacom; aux/tablet &
```

Wacom WACF008

ThinkPad X6* series tablets

To enable the tablet's serial port in `plan9.ini`:

```
uart2=type=isa port=0x200 irq=5
```

To turn on the tablet:

```
aux/wacom; aux/tablet &
```

3.2.5 – Laptops



3.2.5.1 – Acer

Aspire 5100 (donated by some poor kid)

cpu: 1795MHz AuthenticAMD AMD-K8, works

ethernet: rtl8139 100Mbps, works

keyboard and touchpad, works

graphics: RS482M ATI RADEON Xpress Series,

monitor=vesa vgasize=1024x768x32 (native resolution not in VESA BIOS); radeon driver untested

wifi: Atheros AR5005G, does not work

audio: SB450 High Definition Audio Controller

3.2.5.2 – IBM/Lenovo

3.2.5.2.1 – **ThinkPad** ThinkPads are the best supported laptops in 9front because ThinkPads are what the developers use.



380D

2635-3AU

```
cpu: cpu0: 152MHz GenuineIntel P55C MMX (AX 00000543 CX 00000000 DX 008001BF)
graphics: Neomagic MagicGraph 128ZV
monitor=vga vgasize=800x600x16
```

ethernet: 3Com 3C589 PCMCIA, works



G50

nnnn-~~nnn~~

cpu: 2394MHz GenuineIntel P6, cpuid: AX 00040651 CX 77DAFBBF DX BFEFBFF
graphics: Intel Corporation Haswell-ULT Integrated Graphics Controller,
realemu(8) monitor=vesa vgasize=1366x768x32
ethernet: Realtek Semiconductor Co., Ltd. RTL8111/8168/8411 PCI Express Gigabit
Ethernet Controller, works
audio: Intel Corporation Haswell-ULT HD Audio Controller, works
usb: Intel Corporation 8 Series USB EHCI #1, works

R400

7439-1DG

cpu: 2527MHz GenuineIntel Core 2/Xeon, cpuid: AX 0x10676 CX 0x8E3FD DX
0xBFEBFF
graphics: Mobile Intel GM45 Express/4500MHD,
realemu(8) monitor=vesa vgasize=1440x900x32
ethernet: Intel 82567LM 82567LM-2 Gigabit (10/100/1000), works
wifi: Intel Wifi Link 5100 AGN Mini-PCI Express, works
disk controller: Intel ICH9M/ME ICH9M/ME AHCI, works
dvd: MATSHITADVD-RAM UJ870A SB04 HE34 068E34 068597, works
audio: Intel 486486 82801B/IR/IH HD Audio, works
usb: works
mp: mp + sata, ethernet works with *acpi=1

T23

2647-HSU

cpu: Intel Mobile Pentium III-M 866 MHz, 1.2 GHz
graphics: S3 SuperSavage IX/C 16MB, VGA 1024x768x32,
realemu(8) monitor=vesa vgasize=1024x768x32
ethernet: Intel 82801CAM PRO/100 VE or Intel 82562ET (10/100), works
wifi: Actiontec 800MIP (branded Lucent WaveLAN) Mini-PCI, works
audio: AC97, works

T42

2373-BK4

cpu: Intel Pentium M (Dothan) 1.7 GHz
graphics: ATI Mobility Radeon 7500 32MB,
realemu(8) monitor=vesa vgasize=1024x768x32
ethernet: Intel Gigabit Ethernet (10/100/1000), works
wifi: IBM 11a/b/g Mini-PCI, does not work; replaced with Actiontec 800MIP
(branded Lucent WaveLAN) Mini-PCI, works
disk controller: 82801DBM (ICH4-M), IDE DMA works
audio: AC97, works

T43p

2669-A92

cpu: Intel Pentium M (Dothan) 2.0 GHz (cpuid: AX 0x06D8 CX 0x0180 DX
0xAFE9FBFF)
graphics: ATI Mobility Radeon FireGL V3200/X600,
realemu(8) monitor=vesa vgasize=1600x1200x32 with internal LCD
ethernet: Broadcom BCM5751M (10/100/1000), works
wifi: replaced with Vonets VAP11G, works
disk controller: Intel 82801FBM SATA AHCI (ICH6-M): untested
usb: works
scram works with *acpi=1
mouse button 2 works with trackpad disabled in BIOS

T60p

2007-94U

cpu: Intel Core Duo (Yonah) 2.16GHz (cpuid: AX 0x06E8 CX 0xC1A9 DX
0xBF9E9FBFF)
graphics: ATI MOBILITY FireGL V5200
realemu(8) monitor=vesa vgasize=1600x1200x32 with internal LCD
audio: Intel BA101897 IDT High Definition, untested
ethernet: Intel 82573L Intel PRO/1000 PL (10/100/1000), works
wifi: Intel PRO Wireless 3945ABG (wpi-3945abg), may work now with wpi driver
disk controller: Intel 82801GB/GBM PATA100, 82801GBM/GHM AHCI, works
usb: works
mp: mp + sata, ethernet, usb works with *acpi=

mouse button 2 works with trackpad disabled in BIOS

T61

7659-CTO

cpu: Intel Core 2 Duo (Merom) 2.0 GHz FSB, 2-4MB L2 Cache CPU
graphics: Intel GMA X3100,
realemu(8) monitor=vesa vgasize=1280x800x32 with internal LCD;
monitor=vesa vgasize=1680x1050x32 with VGA or Mini Doc DVI output
and external monitor
ethernet: Intel 82566MM (10/100/1000), works
wifi: Intel Wireless WiFi Link 4965 AGN Mini-PCI Express, should work with iwlm
driver
disk controller: Intel 82801HBM/HEM PATA, Intel 82801HBM SATA AHCI (ICH8-M):
IDE DMA works, SATA works
usb: works
mp: mp + sata, ethernet, usb works with *acpi=
mouse button 2 works with trackpad disabled in BIOS

7661-12U

cpu: Intel Core 2 Duo (Merom) 2.0 GHz FSB, 2-4MB L2 Cache CPU
graphics: Intel GMA X3100,
realemu(8) monitor=vesa vgasize=1280x800x32 with internal LCD;
monitor=vesa vgasize=1680x1050x32 with VGA or Mini Doc DVI output
and external monitor
ethernet: Intel 82566MM (10/100/1000), works
wifi: Intel PRO Wireless 3945ABG (wpi-3945abg), may work now with wpi driver;
replaced with Wavelan PC24E-H-FC PCMCIA, works
disk controller: Intel 82801HBM/HEM PATA, Intel 82801HBM SATA AHCI (ICH8-M):
IDE DMA works, SATA works
usb: works
mp: mp + sata, ethernet, usb works with *acpi=
mouse button 2 works with trackpad disabled in BIOS

T400

6475-EC7

cpu: 2261MHz GenuineIntel Core 2/Xeon (cpuid: AX 0x10676 CX 0x8E3FD DX
0xBFEBFBFF)
graphics: Intel Corporation Mobile 4 Series,
realemu(8) monitor=vesa vgasize=1440x900x32 with internal LCD
ethernet: i82567: 1000Mbps, works
wifi: Intel WiFi Link 5100 AGN Mini-PCI Express, works
disk controller: Intel ICH9M/ME AHCI, works
audio: Intel HDA, should work

T410i

2518-4QG

cpu: Intel(R) Core(TM) i5 CPU M 430 @ 2.27GHz
graphics: Intel Graphics Media Accelerator HD,
realemu(8) monitor=vesa vgasize=1280x800x32 with internal LCD
ethernet: Intel 82577LM Gigabit, works
wifi: unknown, reportedly works
audio: unknown, reportedly works

T420s

4171-53U

cpu: Intel® Core™ i5-2540M (2.6GHz, 3MB L3, 1333MHz FSB) (cpuid: AX 000206A7
CX 17BAE3FF DX BFEBFBFF)
graphics: Intel HD Graphics 3000 (integrated Sandy Bridge GPU),
realemu(8) monitor=vesa vgasize=1600x900x32
ethernet: Intel 82579LM Gigabit, works
audio: Intel HD 6 Series/C200 Series, works
wifi: Intel Centrino Advanced-N 6205 Taylor Peak, etheriwl (firmware: iwn-6005),
works



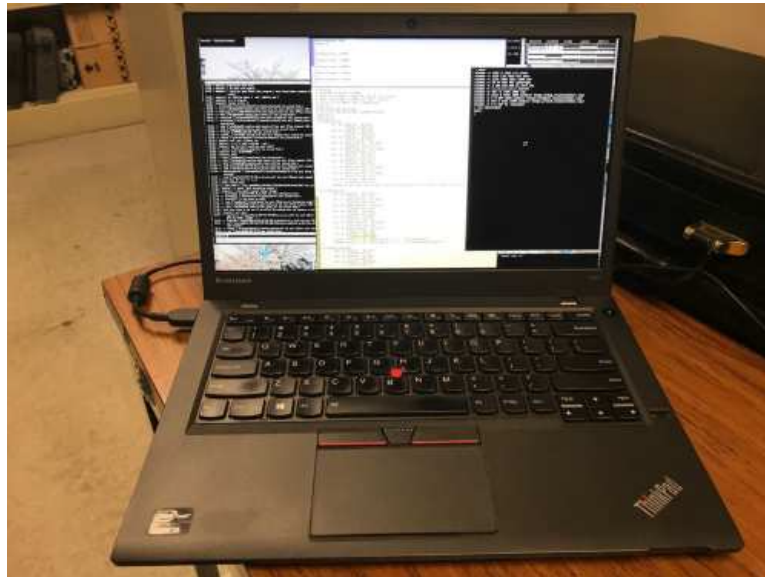
T430s

2353-ABU

T431s

20AA-000BUS

cpu: 1796MHz GenuineIntel P6 (cpuid: AX 000306A9 CX 77BAE3BF DX BFEBFBFF)
graphics: Intel 3rd Gen Core processor Graphics Controller,
realemu(8) monitor=vesa vgasize=1920x1080x32 with third party Samsung internal LCD
audio: 7 Series/C210 Series HDA Controller, works
ethernet: Intel 82579LM (10/100/1000), works
wifi: Intel Centrino Advanced-N 6235, works
disk controller: Intel 7 Series Chipset Family 6-port SATA Controller [AHCI mode], works
usb: works
scram works with *acpi=
mouse button 2 works with trackpad disabled in BIOS



X41 tablet

cpu: Intel Pentium M (Dothan) 1.6GHz LV (778) L2 2 MB cache
graphics: Intel GMA900,
realemu(8) monitor=vesa vgasize=1024x768x32
tablet: WACF004, works
ethernet: BCM5751M (10/100/1000), works
wifi: Intel PRO/Wireless 2915ABG Mini-PCI, does not work

X60s

1704-GL5

coreboot

cpu cpu0: 1663MHz GenuineIntel P6 (cpuid: AX 0x06E8 CX 0xC1A9 DX
0xBFE9FBFF)

graphics: Intel 945GM,

realemu(8) monitor=vesa vgasize=1024x768x16

ethernet: Intel 82573L Intel PRO/1000 PL, works

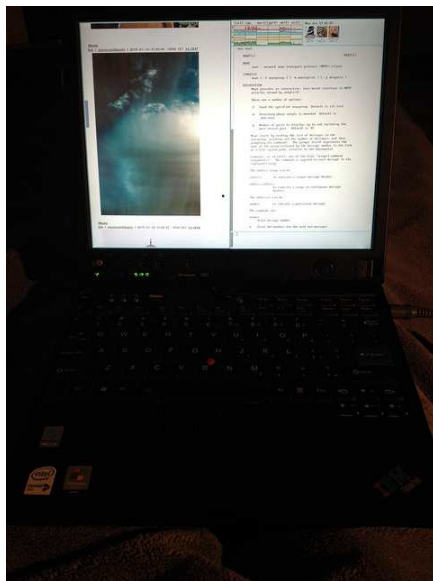
audio: Intel HDA, untested

wifi: Ralink RT3090, works

X60 Tablet

6363-CTO

cpu: Intel Core Duo (Yonah) L2400 LV 1.66 GHz (2MB Cache) cpu0: 1663MHz GenuineIntel P6 (AX 000006EC CX 0000C1A9 DX BFE9FBFF)
lcd: replaced with HV121P01-100 (1400x1050)
graphics: Intel Graphics Media Accelerator 950,
realemu(8) monitor=x60t vgasize=1400x1050x32;
monitor=vesa vgasize=1280x1024x32 (native 1400x1050 resolution not in VESA BIOS)
tablet: WACF008, works
ethernet: Intel 82573L (10/100/1000), works
audio: Intel HD Audio with AD1981HD codec, speaker and green lineout work with
echo pin 5,3 >/dev/audioctl
wifi: Intel WiFi Link 5100 AGN, works — flashed with custom BIOS to remove WiFi
card whitelist
disk controller: Intel 82801GBM/GHM (ICH7-M Family) SATA Controller [AHCI
mode], untested
mp: mp + sata, ethernet works with *acpi



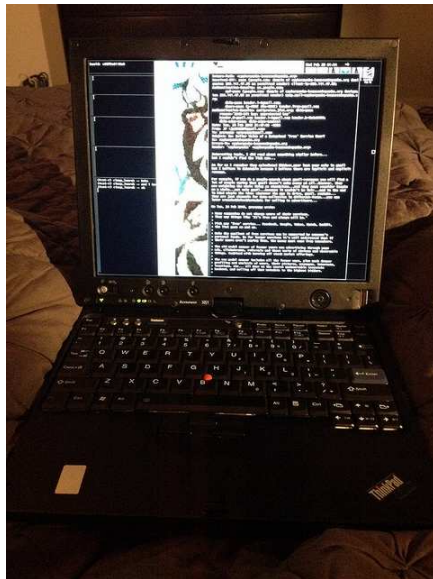
X61s

cpu: Intel Core 2 Duo
graphics: Intel GM965/GL960,
realemu(8) monitor=vesa vgasize=1024x768x32
ethernet: Intel 82566MM (10/100/1000), works
wifi: Intel PRO/Wireless 4965 AG or AGN '[Kedron]' Mini-PCI Express, untested,
should work with iw1 driver
disk controller: Intel 82801HBM SATA (ICH8-M): IDE DMA works, SATA works
mp: mp + sata, ethernet works with *acpi=

X61 Tablet

7767-01U

cpu: Intel Core 2 Duo CPU L7700 (1.80 GHz)
lcd: replaced with HV121P01-100 (1400x1050)
graphics: Intel GMA X3100,
realemu(8) monitor=x60t vgasize=1400x1050x32;
monitor=vesa vgasize=1280x1024x32 (native 1400x1050 resolution not
in VESA BIOS)
tablet: WACF008, works
ethernet: Intel 82566MM (10/100/1000), works
audio: Intel HDA, works
wifi: Intel Centrino Advanced-N 6205 Taylor Peak (iwl-6005), works — flashed
with custom BIOS to remove WiFi card whitelist
disk controller: Intel 82801HBM SATA (ICH8-M): IDE DMA works, SATA works mp:
mp + sata, ethernet works with *acpi=



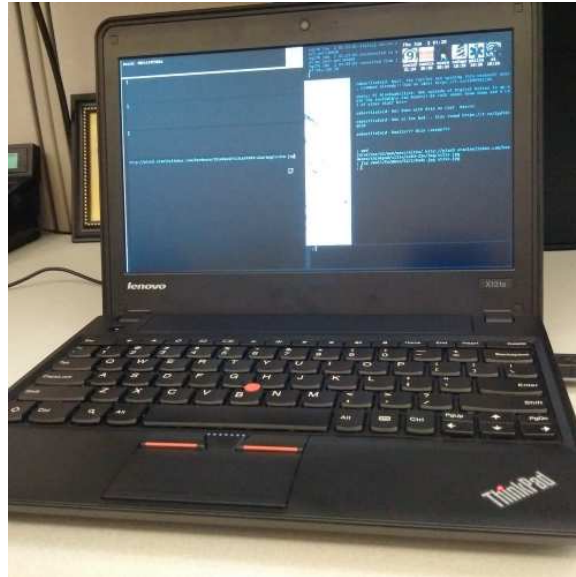
X131e

3368-2FU

cpu: 1397MHz GenuineIntel P6 (cpuid: AX 0x206A7 CX 0x15BAE3BF DX 0xBFEBF-
BFF)
graphics: Intel HD Graphics 3000,
realemu(8) monitor=vesa vgasize=1366x768x32
ethernet: Realtek RTL8167 PCIe Gigabit Ethernet: works
audio: Intel HDA, works

6283-22U

cpu: 1397MHz GenuineIntel P6 (cpuid: AX 0x206A7 CX 0x15BAE3BF DX 0xBFEBFBFF)
graphics: Intel HD Graphics 3000,
realemu(8) monitor=vesa vgasize=1366x768x32
ethernet: Realtek RTL8167 PCIe Gigabit Ethernet: works
wifi: Intel Centrino Advanced-N 6205: works
audio: Intel HDA, works



X200

7455-A54

cpu: Intel Core 2 Duo
graphics: Mobile Intel GMA 4500MHD,
realemu(8) monitor=vesa vgasize=1280x800x32
ethernet: Intel 82567LF Gigabit (10/100/1000), works
wifi: Intel WiFi Link 5150, works
disk controller: Intel ICH9M/ME ICH9M/ME AHCI, works
audio: Intel 486486 82801IB/IR/IH HD Audio, works
usb: works

X200s

7466-3SG

cpu: 1862MHz GenuineIntel Core 2/Xeon (cpuid: AX 0x10676 CX 0x8E3FD DX 0xBFEBFBFF)
graphics: Mobile Intel GM45 Express/4500,
realemu(8) monitor=vesa vgasize=1280x800x32
ethernet: Intel 82567LM 82567LM-2 Gigabit (10/100/1000), works
wifi: Intel WiFi Link 5300 AGN Mini-PCI Express, works

disk controller: Intel ICH9M/ME ICH9M/ME AHCI, works
audio: Intel 486486 82801B/IR/IH HD Audio, works
usb: works
mp: mp + sata, ethernet works with *acpi=1

X201

3323-DBG

cpu: 2661MHz GenuineIntel P6
graphics: Mobile Intel GMA 5700MHD,
realemu(8) monitor=vesa vgasize=1280x800x32
ethernet: Intel Corporation 82577LM Intel 82577LM Gigabit, works
wifi: Intel Centrino Ultimate-N 6300 AGN, works
disk controller: Intel Corporation PCH (Ibex Peak) SATA AHCI, works
audio: Intel HDA, works
ssd: INTEL SSDSC2BW180A3L, works
usb: works

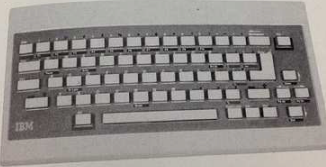
X220

4291-4CG

cpu: 2791MHz GenuineIntel P6 (cpuid: AX 0x206A7 CX 0x17BAE3FF DX 0xBFEBF-
BFF)
graphics: Intel HD 3000,
realemu(8) monitor=vesa vgasize=1366x768x32
ethernet: Intel 82579 (10/100/1000), works
audio: Intel HDA, works
wifi: Intel Centrino Advanced-N 6205, works
disk controller: works
ssd: INTEL SSDSA2BW160G3, works
usb: works

boards "better" than other manufacturers. Of course, it wasn't always that way. One particularly unpleasant keyboard experience caused Ikeda-san to concentrate on getting the keyboard "right" on the first ThinkPad notebook.

Ikeda recalled, "Because of my PCjr experience, I knew that you couldn't make any keyboard compromises. It couldn't have a smaller layout. It had to have the same tactile feel. The inverted-T cursor area could not invade the keyboard space and, therefore, invade the area designated for the Shift key. You needed to provide separate Home, End, Page Up, and Page Down keys. It really had to be right! And because my reputation had recovered from having developed the 'chiclet' keyboard for the IBM PCjr, I was not going to take any chances. I would not accept any compromises with the keyboard going into this new portable."

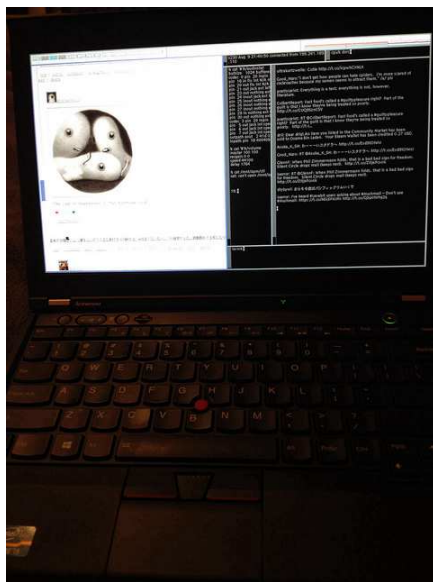


The IBM chiclet keyboard.

X230

2306-CTO

cpu: Intel Core i5-3320M (2.60 GHz, 3MB L3, 1600MHz FSB), cpuid: AX 0x306A9
CX 0x77BAE3FF DX 0xBFEBFBFF
graphics: Intel HD 3rd Gen Core processor Graphics Controller,
realemu(8) monitor=x230 vgasize=1366x768x32;
monitor=vesa vgasize=1366x768x32
ethernet: Intel 82579LM Gigabit (10/100/1000), works
wifi: Intel Centrino Advanced-N 6205 Taylor Peak, etheriwl (firmware: iwn-6005),
works
disk controller: Intel 7 Series Chipset Family 6-port SATA Controller AHCI mode,
ahci, works
usb: Intel 7 Series/C210 Series Chipset Family USB Enhanced Host Controller #1,
ehci, works
audio: Intel 7 Series/C210 Series Chipset Family High Definition Audio Controller,
works
efi: works



X230 Tablet

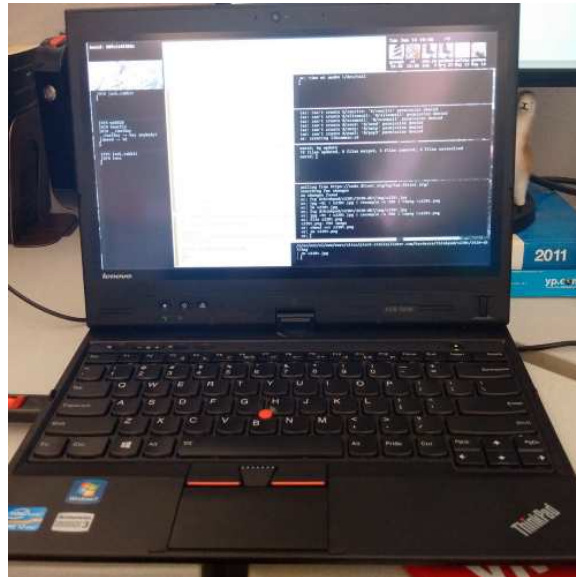
3434-CTO

cpu: Intel Core i5-3320M (Ivy Bridge), 2.6 GHz, 3 MB Shared L3 Cache, 2C/4T, 35
W TDP, 22 nm (cpuid: AX 0x306A9 CX 0x77BAE3FF DX 0xBFEBFBFF)
graphics: Intel HD 4000,
realemu(8) monitor=vesa vgasize=1366x768x32
tablet: USB, untested
ethernet: Intel 82579 (10/100/1000), works
audio: Intel HDA, works
wifi: Intel 802.11b/g/n, might work
disk controller: works
ssd: SAMSUNG SSD 830 Series CXM03B1Q S0XYNEAC774074 128GB, works
usb: disable USB3 in BIOS, works

X230 Tablet

3434-DB7

cpu: Intel(R) Core(TM) i7-3520M CPU @ 2.90GHz (cpuid: AX 000306A9 CX 77BAE3FF DX BFEFBFF)
graphics: Intel HD 4000,
realemu(8) monitor=vesa vgasize=1366x768x32
tablet: USB, untested
ethernet: Intel 82579 (10/100/1000), works
audio: Intel HDA, works
wifi: Intel Centrino Advanced-N 6205, works
disk controller: works
ssd: LITEONIT LCS-128M6S DC72205 S0C41178Z1ZSVB159894 128GB, works
usb: disable USB3 in BIOS, works



X240

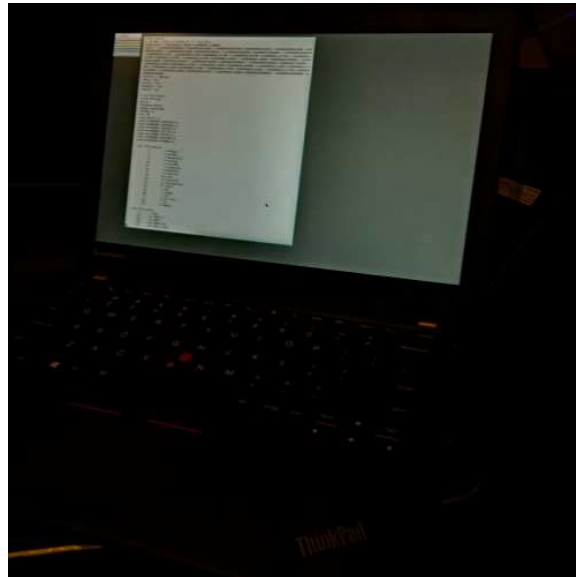
20AL-CTO

wifi: Intel Wireless-N 7260, does not work, but may not be hard to add to existing etheriwil driver

X250

20CM-CTO

cpu: Intel(R) Core(TM) i5-5200U CPU @ 2.20GHz, cpuid: AX 000306D4 CX 77FAF-BBF DX BFEBFBFF
graphics: Intel Corporation Broadwell-U Integrated Graphics,
realemu(8) monitor=vesa vgasize=1920x1080x32
ethernet: Intel Corporation Ethernet Connection (3) I218-LM (10/100/1000), works
wifi: Intel Wireless-N 7265, does not work, but may not be hard to add to existing etheriwl driver
disk controller: Intel Corporation Wildcat Point-LP SATA Controller [AHCI Mode], works
usb: Intel Corporation Wildcat Point-LP USB EHCI Controller, works
audio: Intel Corporation Broadwell-U Audio Controller, untested



X260

nnnn-~~nnn~~

cpu: 2496MHz GenuineIntel P6, cpuid: AX 000406E3 CX 77FAFBFF DX BFEBFBFF
graphics: Intel Corporation HD Graphics 520,
realemu(8) monitor=vesa vgasize=1920x1080x32
ethernet: Intel Corporation Ethernet Connection I219-LM (10/100/1000), works
wifi: Intel Corporation Centrino Advanced-N 6235, works with etheriwl driver
disk controller: Intel Corporation Sunrise Point-LP SATA Controller [AHCI mode], works
usb: Intel Corporation Sunrise Point-LP USB 3.0 xHCI Controller, works
audio: Intel Corporation Sunrise Point-LP HD Audio, works

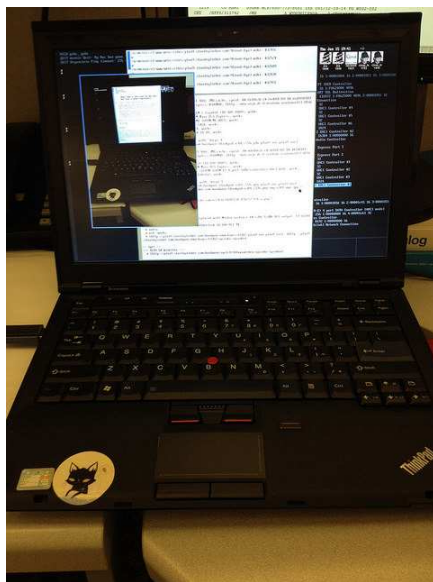
X301

2776-P4U

cpu: Intel Core 2 Duo SU9400 1.4GHz 3MB cache, cpuid: AX 0x1067A CX 0x408E3FD DX 0xBFEBFBFF
graphics: Mobile Intel GM45 Express/4500MHD,
realemu(8) monitor=x301 vgasize=1440x900x32;
monitor=vesa vgasize=1440x900x32
ethernet: Intel 82567LM 82567LM-2 Gigabit (10/100/1000), works
wifi: Intel WiFi Link 5100 AGN Mini-PCI Express, works
disk controller: Intel ICH9M/ME ICH9M/ME AHCI, works
ssd: Samsung MMCRE64G8MPP-0VA 64GB, works
dvd: Matsushita DVD-RAM UJ-844, works
audio: Intel HD 486486 82801IB/IR/IH, works
usb: works
mp: mp + sata, ethernet works with *acpi=1

2776-P6U

cpu: Intel Core 2 Duo SU9400 1.4GHz 3MB cache, cpuid: AX 00010676 CX 0008E3FD DX BFEBFBFF
graphics: Mobile Intel GM45 Express/4500MHD,
realemu(8) monitor=x301 vgasize=1440x900x32;
monitor=vesa vgasize=1440x900x32
ethernet: Intel 82567LM Gigabit (10/100/1000), works
wifi: Intel WiFi Link 5100 AGN Mini-PCI Express, works
disk controller: 82801IBM/IEM (ICH9M/ICH9M-E) 4 port SATA Controller AHCI mode, works
audio: Intel HD 82801I (ICH9 Family), works
usb: works
mp: mp + sata, ethernet works with *acpi=1



Yoga 370

20JH-002AUS

cpu: 2712MHz GenuineIntel P6, cpuid: AX 000806E9 CX 77FAFBFF DX BFEBFBFF
graphics: Intel Corporation Skylake Gaussian Mixture Model,
realemu(8) monitor=vesa vgasize=1920x1080x32
ethernet: Intel I219-LM Gigabit (10/100/1000), works with dongle
wifi: Intel 8265, does not work
audio: does not seem to work

3.2.5.3 – Toshiba

3.2.5.3.1 – Satellite

M30-S309

cpu: 1397MHz GenuineIntel P6 (AX 00000695 CX 00000180 DX A7E9F9BF)
graphics: NVidia GeForce FX Go5200 64M,
monitor=cinema vgasize=1152x768x32
ethernet: Intel 82801DB PRO/100 VE (MOB) (i82557), works
disk controller: Intel 82801DBM (ICH4-M) IDE Controller, works
audio: Intel 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) AC'97 Audio Controller,
works
usb: Intel 82801DB/DBL/DBM (ICH4/ICH4-L/ICH4-M) USB UHCI Controller,
untested

3.2.6 – Desktops



3.2.6.1 – eMachines

T3302 cpu: AMD Sempron 3300+ 2GHz

chipset: VIA K8M800

graphics: VIA S3 UniChrome, replaced with NVidia GeoForce FX 5700 128MB DVI output, 1920x1080x32

ethernet: 3Com 3C905-TX Fast Etherlink 10/100 PCI TX

audio:

usb: works

3.2.6.2 – Igel

4210 LX Winestra

3.2.6.3 – Soekris

net6501-70

cpu: Intel Atom E680 1.6Ghz, both pc and pc64 work

ethernet: 4x Intel 82574L Gigabit Ethernet, works

usb: works

serial console: works, use `console=0 b19200` in `plan9.ini`. 9boot hangs without a serial cable attached; disable `uartputc` as a workaround

this machine does not have ACPI

3.2.6.4 – IBM/Lenovo

3.2.6.4.1 – ThinkCentre

M55

8810–D3U

cpu: Intel Core 2 Duo
graphics: Intel GMA 3000 internal (untested), replaced with NVidia GeForce 8400GS
DVI output, `realemu(8) monitor=vesa vgasize=1680x1050x32`
ethernet: Broadcom BCM5755 (10/100/1000), works
audio: Intel HDA, works
usb: works
mp: `mp + sata`, ethernet, usb works with `*acpi=`

3.3 – Virtual Machines

9front has been tested on several virtual machines. Details below.

Note: As a general rule it is a good idea to manually specify a unique MAC address for each virtual machine instance running on the network, to avoid collisions.

3.3.1 – Qemu

The following generic setup is tested with `qemu 1.5.0` and `2.0.50` running on Linux, using [FQA 3.3.3 – virtio](#) for disk and network. This same generic setup should work for most host operating systems.

3.3.1.1 – Installation

Create a sparse disk image:

```
qemu-img create -f qcow2 9front.qcow2.img 30G
```

Boot the 9front.iso:

```
qemu-system-x86_64 -cpu host -enable-kvm -m 1024 \  
-net nic,model=virtio,macaddr=52:54:00:00:EE:03 -net user \  
-device virtio-scsi-pci,id=scsi \  
-drive if=none,id=vd0,file=9front.qcow2.img \  
-device scsi-hd,drive=vd0 \  
-drive if=none,id=vd1,file=9front.iso \  
-device scsi-cd,drive=vd1,bootindex=0
```

Finally, see: [FQA 4.3 – Performing a simple install](#)

3.3.1.2 – Post-Installation Booting

```
qemu-system-x86_64 -cpu host -enable-kvm -m 1024 \  
-net nic,model=virtio,macaddr=52:54:00:00:EE:03 -net user \  
-device virtio-scsi-pci,id=scsi \  
-drive if=none,id=vd0,file=9front.qcow2.img \  
-device scsi-hd,drive=vd0
```

3.3.1.2.1 – Multiboot

Multiboot can be used to start the 9front kernel directly, skipping the bootloader step:

```
-qemu -kernel 9pc -initrd plan9.ini
```

3.3.1.4 – Networking

User networking is the default and works the same on every platform. More advanced options are particular to specific host operating systems; several are described below.

Note: On many operating systems ICMP is limited to the superuser. One consequence is that a VM running with guest networking cannot ping remote hosts.

3.3.1.4.1 – Linux VDE

Install vde2.

Setup a tap interface:

```
sudo tuncctl -u $USER -t tap0
```

Start a virtual switch connected to the tap interface:

```
vde_switch --tap tap0 -daemon
```

Connect the switch to the network of the host. Use DHCP:

```
slirpvde --dhcp --daemon
```

When booting 9front, add the following to the `qemu` command line arguments:

```
-net vde
```

3.3.1.4.2 – OpenBSD TAP

Tested: OpenBSD/amd64 6.0-STABLE, qemu-2.6.0

Note: Read over this first. Be careful not to clobber any system settings you may already have configured. If you don't understand something, read the relevant man pages until you do. Feel free to substitute arbitrary network values below.

```
# as root
pkg_add bzip2 plan9port qemu ssvnc wget
cp -f /usr/local/plan9/bin/rc /bin/      # for scripts
sysctl net.inet.ip.forwarding=1
echo 'net.inet.ip.forwarding=1' >>/etc/sysctl.conf
echo inet 192.168.54.1 255.255.255.0 NONE >/etc/hostname.vether0
ed /etc/pf.conf
/ext_if
a
int_if="vether0"

match out from $int_if:network to any nat-to ($ext_if:0)
.
w
q
pfctl -f /etc/pf.conf
echo link0 up >/etc/hostname.tap0
echo add vether0 add tap0 up >/etc/hostname.bridge0
sh /etc/netstart
>/etc/dhcpd.conf
ed /etc/dhcpd.conf
i
option domain-name "example.com";
option domain-name-servers 192.168.54.1;

subnet 192.168.54.0 netmask 255.255.255.0 {
    option routers 192.168.54.1;

    range 192.168.54.100 192.168.54.199;
}
.
w
q
rcctl enable dhcpd
rcctl start dhcpd
ed /var/unbound/etc/unbound.conf
/interface
a
    interface: 192.168.54.1
.
/access-control
a
    access-control: 192.168.54.0/24 allow
w
q
rcctl enable unbound
rcctl start unbound
echo 'permit setenv { -ENV PS1=$DOAS_PS1 SSH_AUTH_SOCK } :wheel' \
    >/etc/doas.conf

# as user who is in wheel group
mkdir -p $HOME/9 $HOME/bin
cd $HOME/9
qemu-img -f qcow2 9front.qcow2.img 30G
# adjust url for current iso
wget http://e9front.org/iso/9front-5561.df1dc1ff2475.iso.bz2
bunzip2 9front-5561.df1dc1ff2475.iso.bz2
mv 9front-5561.df1dc1ff2475.iso 9front.iso
cd $HOME/bin
```

```
wget http://eopenbsd.stanleylieber.com/rc/q9
chmod 775 q9
cd
# boot from iso (install)
doas -u root q9 -i
# boot from qcow image (after completing the install)
doas -u root q9
# connect to qemu via vnc
q9 -v
```

3.3.1.4.3 – Windows TAP

This is tested with the qemu for windows distribution. Download and run the installer from openvpn to install the windows TAP driver. Create a new TAP interface with the "Add a new TAP virtual ethernet adapter" from the openvpn start menu. Go to the network manager and rename that new TAP interface to something more sane like: "qemu-tap". Configure ip addresses or bridge that interface with the network manager.

Now you should be able to run qemu on that interface:

```
qemu.exe -net nic -net tap,ifname="tap-qemu" ...
```

3.3.1.4.4 – Linux TAP

Contributed by joe9:

on the host:

```
sudo ip tuntap add dev tap0 mode tap user joe
sudo ip address add 10.0.0.1/24 dev tap0
```

start qemu using (do not need sudo for qemu):

```
SDL_VIDEO_X11_DGAMOUSE=0 qemu-system-x86_64 \
    -cpu host -enable-kvm -m 1024 \
    -netdev tap,id=eth,ifname=tap0,script=no,downscript=no \
    -device e1000,netdev=eth,mac=52:54:00:00:EE:03 \
    -device virtio-scsi-pci,id=scsi -drive \
    if=none,id=vd0,file=9front.qcow2.img \
    -device scsi-hd,drive=vd0 \
    -usb -usbdevice tablet -sdl \
    -ctrl-grab
```

on 9front: add the below line to /lib/ndb/local

```
sys=cirno ether=52540000ee03 ip=10.0.0.2 ipmask=255.255.255.0
    ipgw=10.0.0.1
    dns=10.0.0.1
    dom=cirno.9front
```

run: ip/ipconfig -N

Now, "ping 10.0.0.2" from linux host and "ip/ping 10.0.0.1" from qemu 9front should work.

check the communication between the vm and the linux host using (on the linux host):

```
sudo tcpdump -nS -vv -i tap0
```

Contributed by hiro:

If you want to enable internet access enable NAT forwarding on the linux host (as root).

To do this, first globally enable forwarding:

```
echo 1 > /proc/sys/net/ipv4/ip_forward
```

Enable Masquerading for everything coming from the VM's tap device (eth0 being your host's way to the internet):

```
iptables -t nat -A POSTROUTING -s 10.0.0.0/24 -o eth0 -j MASQUERADE
```

block everything else from being forwarded:

```
iptables -A FORWARD -m state --state RELATED,ESTABLISHED -j ACCEPT
iptables -A FORWARD -s 10.0.0.0/24 -i tap0 -j ACCEPT
iptables -P FORWARD DROP
```

3.3.1.5 – Audio

Run qemu with the flag `-soundhw sb16` and put the following line in `plan9.ini`:

```
audio0=type=sb16 port=0x220 irq=5 dma=5
```

Note: `irq` and `dma` values may vary.

3.3.1.6 – Graphics

Use `monitor=vesa`

Note: Some versions of QEMU running on OSX have exhibited graphical glitches when using a 16-bit color mode (for example: 1024x768x16. Try a 32-bit mode instead (for example: 1024x768x32).

3.3.2 – Virtualbox

Don't use Virtualbox. It tends to break between versions.



Read: <http://ewww.landley.net/notes-2015.html#25-06-2015>

If you can't be dissuaded, the following sections detail empirical observations re: Virtualbox.

3.3.2.1 – Ethernet The emulated "Intel PRO/1000 MT Server" ethernet controller is known to work.

3.3.2.2 – Audio

Put the following in `plan9.ini`:

```
audio0=type=sb16
```

3.3.2.3 – Graphics Use `monitor=vesa`

3.3.2.4 – Known Working Versions

4.3.14 r95030 on Windows 7

4.3.16 on Mac OS X

4.3.18 r96516 on Linux x86_64 kernel 3.14.22

4.3.18 on Windows 7:

just tried with vbox 4.3.18 on windows7. 9front boots fine in BIOS mode, but the PCnet nic dosnt work. reason is that vbox pllX pci irq routing is fucked so the ethernet doesnt get interrupts. if i boot with *nopcirouting=1, it works fine. theres a option to select the chipset so i tried ICH9 with IO-APIC enabled. normal mp mode fails because of broken mp tables, but works with *acpi=. also, it works with UEFI mode (which always uses ACPI). the usual intel mt server nic also works (thats what is usually recommended for working around the broken ethernet).

pci routing issue has been fixed in latest kernel, should be available in iso release after 3960.

4.3.20 r96996 on Mac OS X 10.6.8/10.9 and Ubuntu 14.04/14.10:

General -> Basic

Type: Other

Version: Other/Uknown

System -> Motherboard

Chipset: PIIX3

Pointing Device: PS/2 Mouse

Extended Features: Enable I/O APIC

System -> Processor

Extended Features: PAE/NX (not sure this matters)

System -> Acceleration

Enable VT-x/AMD-V

Enable Nested Paging

Display -> Video

Extended Features: Enable 3D Acceleration (not sure this matters)

Storage -> Attributes

Name: IDE

Type: PIIX4

Use Host I/O Cache

Audio ->

Enable Audio

Host Audio Driver: CoreAudio (Can be PulseAudio or otherwise for Linux, etc. Shouldn't be hard to set this)

Audio Controller: Soundblaster 16

Network -> Adapter 1

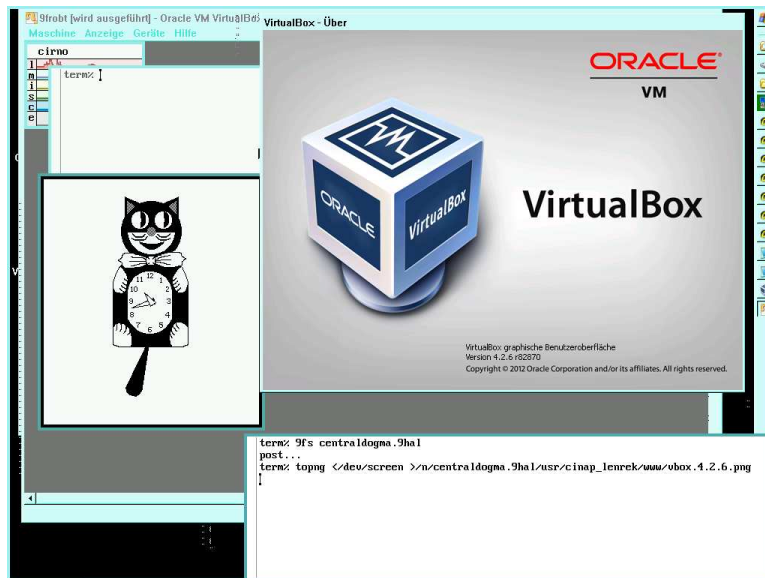
Attached to: NAT

-> Advanced

Adapter Type: Intel PRO/1000 MT Server

Promiscuous Mode: Deny (Not sure this matters)

Note: Enabling USB 2.0 Controll in 'Ports -> USB' works just fine in 9front, mounting under /shr flawlessly as long as the host has the Virtualbox Extension Pack running.



3.3.3 – Virtio

Current versions of qemu/kvm and virtualbox as of 3.1 support faster paravirtualized devices. Presently, 9front provides drivers for virtio hard disk and network.

The virtio-blk disk device should show up as: `/dev/sdF0`

The virtio-scsi disk device should show up as: `/dev/sd00`