

## 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

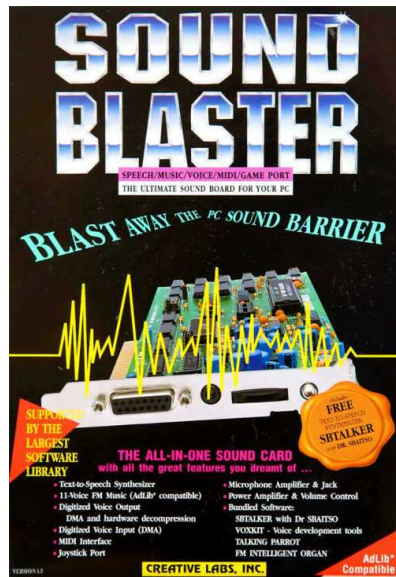


#### IBM UltraNav SK-8835

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

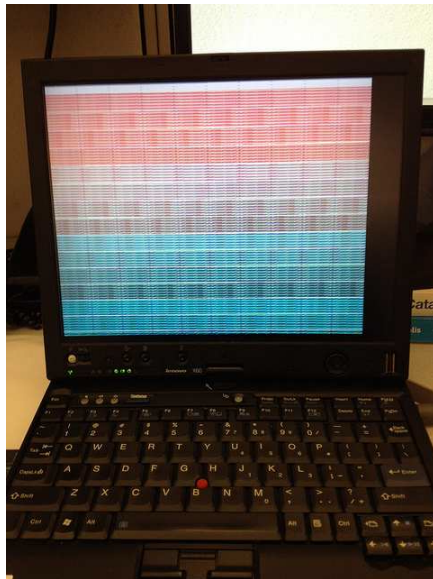
**Intel HD 6 Series/C200 Series**

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 BFEBFBFF  
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  
0xBFEBFBFF  
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 82801IB/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



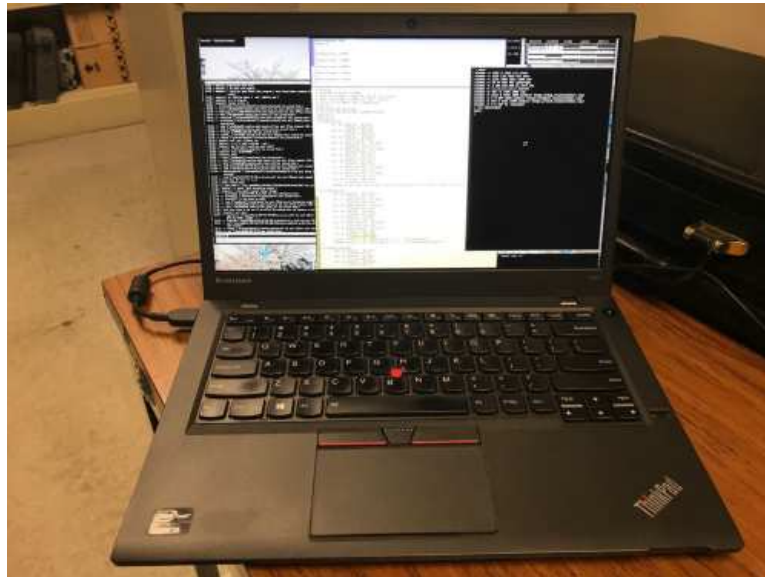
**T430s**

**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

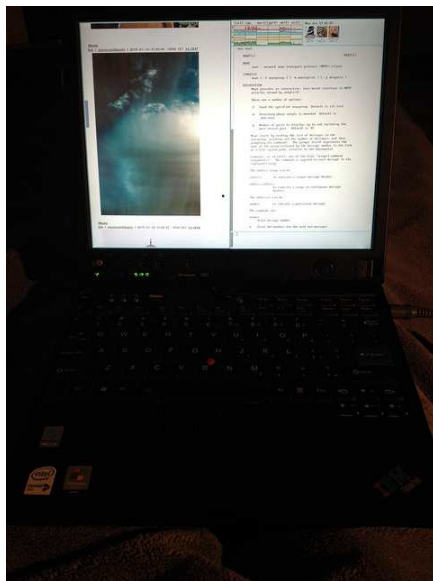
audio: Intel HDA, untested

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



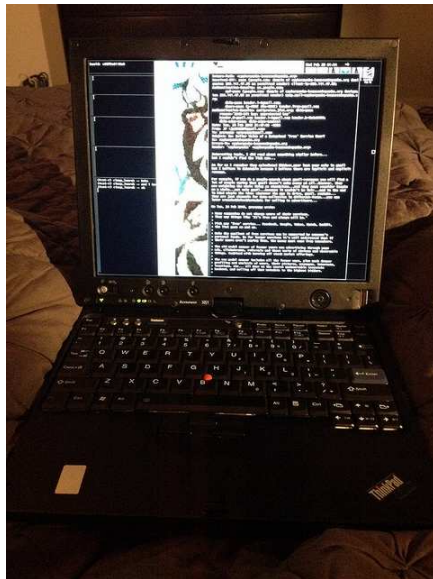
## X61s

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=



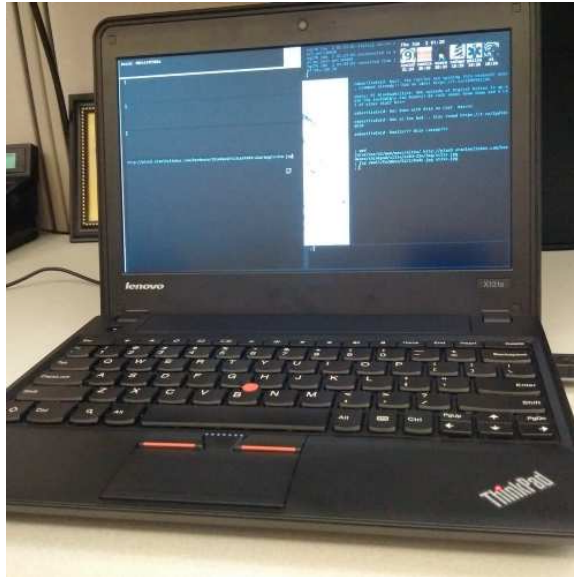
## X131e

### 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

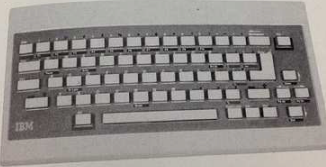
### 4291-4CG

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."

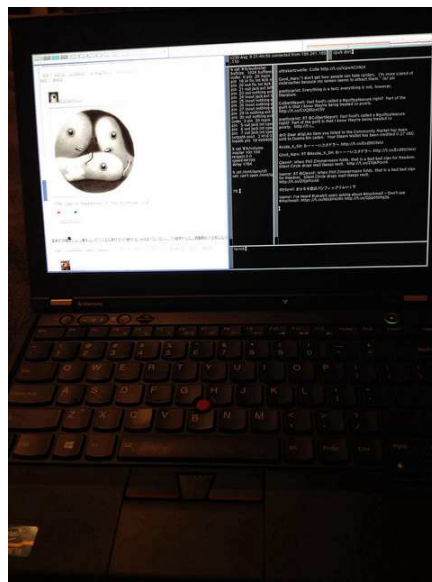


*The IBM chiclet keyboard.*

## 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

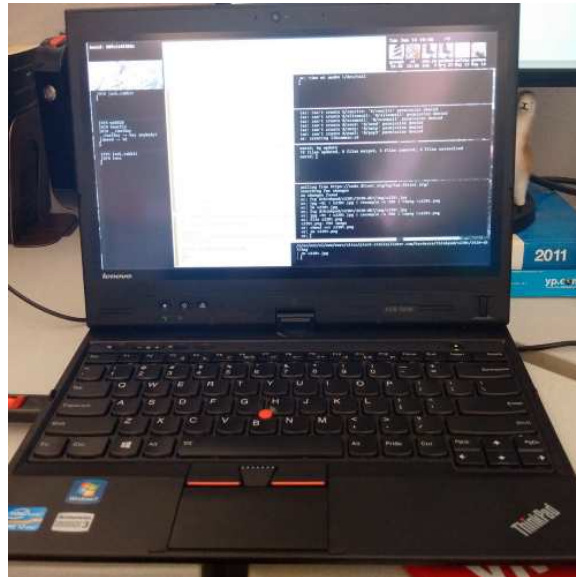
### 3434-CTO

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 BFEBFBFF)  
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

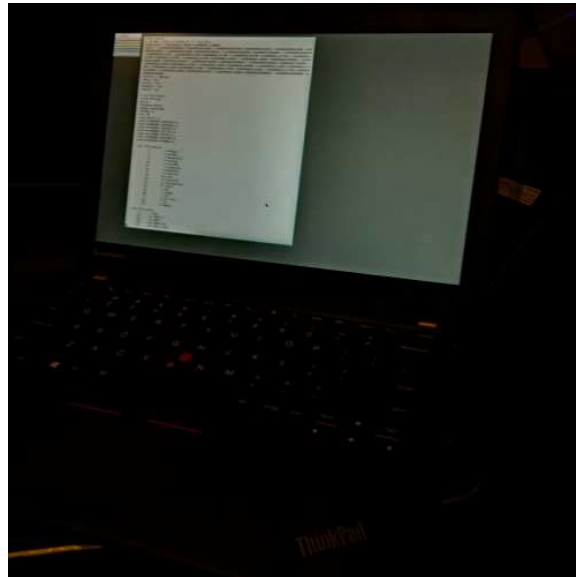
### 20AL-CTO

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

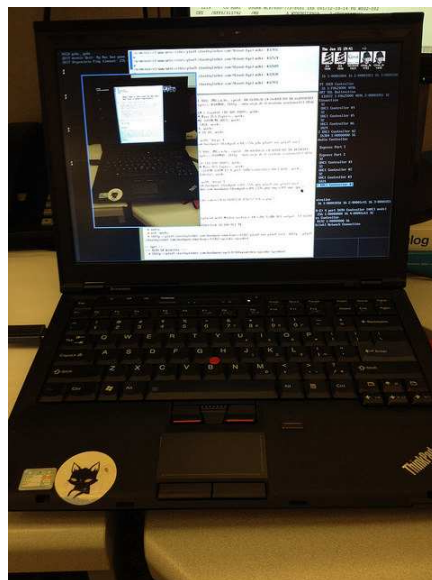
## X301

### 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

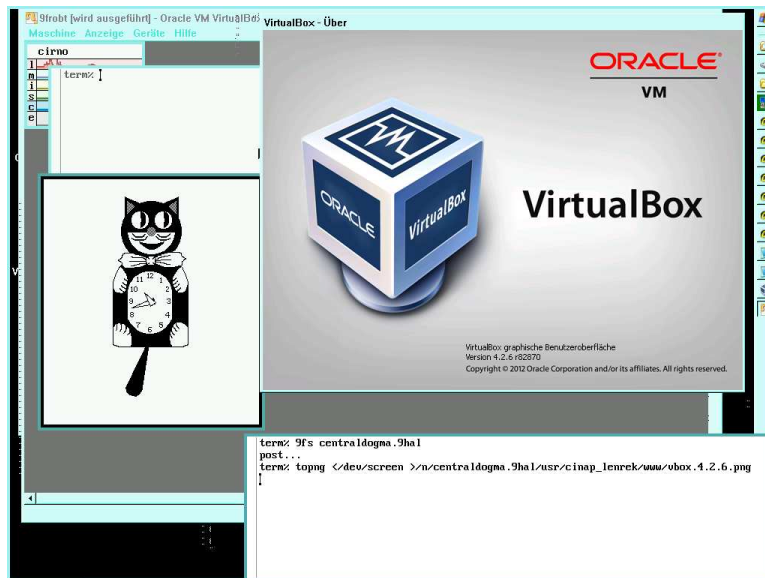
Attached to: NAT

-> 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`