下载：https://bochs.sourceforge.io/

建议下载2.6.11,下文一开始安装的2.7,但运行时有无法解决的错误。大致安装过程一致。

linux

提前安装依赖

```
sudo apt-get install build-essential
sudo apt-get install xorg-dev
sudo apt-get install libgtk2.0-dev
```

接下来进行配置，以防万一全部配置上

```
./configure --with-x11 --with-wx --enable-debugger --enable-disasm --enable-all-optimizations --enable-readline --enable-long-phy-address --enable-ltdl-install --enable-idle-hack --enable-plugins --enable-a20-pin --enable-x86-64 --enable-smp --enable-cpu-level=6 --enable-large-ramfile --enable-repeat-speedups --enable-fast-function-calls  --enable-handlers-chaining  --enable-trace-linking --enable-configurable-msrs --enable-show-ips --enable-cpp --enable-debugger-gui --enable-iodebug --enable-logging --enable-assert-checks --enable-fpu --enable-vmx=2 --enable-svm --enable-3dnow --enable-alignment-check  --enable-monitor-mwait --enable-avx  --enable-evex --enable-x86-debugger --enable-pci --enable-usb --enable-voodoo
```

进入root用户，之后的操作都在root下进行。

```
su root
```

开始编译

```
make
```

开始处理错误

- 错误1 `No rule to make target 'parser.cc' , needed by 'parser.o'  Stop.`

  ```
  make[1]: Entering directory '/home/eliot/Desktop/SoftwarePackages/bochs-2.7/bx_debug'
  make[1]: *** No rule to make target 'parser.cc', needed by 'parser.o'.  Stop.
  make[1]: Leaving directory '/home/eliot/Desktop/SoftwarePackages/bochs-2.7/bx_debug'
  make: *** [Makefile:327: bx_debug/libdebug.a] Error 2
  ```

  进入`bx_debug`文件夹下：

  ```
  root@eliot-VirtualBox:/home/eliot/Desktop/SoftwarePackages/bochs-2.7/bx_debug# ls
  dbg_breakpoints.cpp  dbg_main.cpp  debug.h  lexer.l    linux.o   Makefile.in            parser.cpp  parser.y     symbols.o
  dbg_breakpoints.o    dbg_main.o    lexer.c  linux.cpp  Makefile  make-syscalls-linux.pl  parser.h    symbols.cpp  syscalls-linux.h
  ```

  可以看到是后缀名的缘故，因此

  ```
  cp parser.cpp parser.cc
  ```

- 错误2 `config.h  osdep.h cpu/decoder/decoder.h`

  ```
  make[1]: Entering directory '/home/eliot/Desktop/SoftwarePackages/bochs-2.7/bx_debug'
  g++ -g -O2 -D_FILE_OFFSET_BITS=64 -D_LARGE_FILES -pthread     -c -o parser.o parser.cc
  In file included from parser.y:8:
  debug.h:25:10: fatal error: config.h: No such file or directory
     25 | #include "config.h"
        |          ^~~~~~~~~~~
  ```

然而这个文件确实存在于主目录下，因此

```
"config.h"--->"../config.h"
```

类似的

```
In file included from parser.y:8:
debug.h:26:10: fatal error: osdep.h: No such file or directory
   26 | #include "osdep.h"
      |          ^~~~~~~~~~
```

```
In file included from parser.y:8:
debug.h:34:10: fatal error: cpu/decoder/decoder.h: No such file or di
   34 | #include "cpu/decoder/decoder.h"
      |          ^~~~~~~~~~~~~~~~~~~~~~~
compilation terminated.
```

都需要更改一下头文件目录即可。

- 错误3 `error: 'XRRQueryExtension' was not declared in this scope; did you mean 'XQueryExtension'?`

```
x.cpp: In member function 'virtual void bx_x_gui_c::specific_init(int, char**, unsigned int)':
x.cpp:928:7: error: 'XRRQueryExtension' was not declared in this scope; did you mean 'XQueryExtension'?
  928 |   if (XRRQueryExtension(dpy, &event_base, &error_base)) {
      |       ^~~~~~~~~~~~~~~~~
      |       XQueryExtension
x.cpp:930:5: error: 'Rotation' was not declared in this scope
  930 |     Rotation original_rotation;
      |     ^~~~~~~~
x.cpp:932:5: error: 'XRRScreenSize' was not declared in this scope
  932 |     XRRScreenSize *xrrs = XRRSizes(dpy, 0, &num_sizes);
      |     ^~~~~~~~~~~~~
x.cpp:932:20: error: 'xrrs' was not declared in this scope
  932 |     XRRScreenSize *xrrs = XRRSizes(dpy, 0, &num_sizes);
      |                    ^~~~
x.cpp:932:27: error: 'XRRSizes' was not declared in this scope
  932 |     XRRScreenSize *xrrs = XRRSizes(dpy, 0, &num_sizes);
      |                           ^~~~~~~~
x.cpp:933:5: error: 'XRRScreenConfiguration' was not declared in this scope
  933 |     XRRScreenConfiguration *conf = XRRGetScreenInfo(dpy, root);
      |     ^~~~~~~~~~~~~~~~~~~~~~
x.cpp:933:29: error: 'conf' was not declared in this scope
  933 |     XRRScreenConfiguration *conf = XRRGetScreenInfo(dpy, root);
      |                             ^~~~
x.cpp:933:36: error: 'XRRGetScreenInfo' was not declared in this scope
  933 |     XRRScreenConfiguration *conf = XRRGetScreenInfo(dpy, root);
      |                                    ^~~~~~~~~~~~~~~~
x.cpp:934:5: error: 'SizeID' was not declared in this scope
  934 |     SizeID original_size_id = XRRConfigCurrentConfiguration(conf, &original_rotation);
      |     ^~~~~~
x.cpp:935:25: error: 'original_size_id' was not declared in this scope
  935 |     x11_max_xres = xrrs[original_size_id].width;
      |                         ^~~~~~~~~~~~~~~
```

更改 `gui/x.cpp`,在首行添加`#include <X11/extensions/Xrandr.h>`

- 错误4 `No rule to make target 'misc/bximage.cc', needed by 'misc/bximage.o'`

```
cp misc/bximage.cpp misc/bximage.cc
cp iodev/hdimage/hdimage.cpp iodev/hdimage/hdimage.cc
cp iodev/hdimage/vmware3.cpp iodev/hdimage/vmware3.cc
cp iodev/hdimage/vmware4.cpp iodev/hdimage/vmware4.cc
cp iodev/hdimage/vpc-img.cpp iodev/hdimage/vpc-img.cc
cp iodev/hdimage/vbox.cpp iodev/hdimage/vbox.cc
```

- 错误5 `error: invalid use of ‘this’ in non-member function  383 | #  define BX_CPU_THIS_PTR  this->`

修改 `bx_debug/dbg_main.cc`

```
-Bit32u index = BX_ITLB_INDEX_OF(laddr);//改成下面一行
+  Bit32u index = BX_CPU(dbg_cpu)->ITLB.get_index_of(laddr);
......
-  index = BX_DTLB_INDEX_OF(laddr, 0);
+  index = BX_CPU(dbg_cpu)->DTLB.get_index_of(laddr);
```

之后继续`make`

```
echo done
done
```

进行安装`make install`

运行`bochs`

```
eliot@eliot-VirtualBox:~/Desktop/SoftwarePackages/bochs-2.7$ bochs
00000000000i[      ] LTDL_LIBRARY_PATH not set. using compile time default '/usr/local/lib/bochs/plugins'
========================================================================
                       Bochs x86 Emulator 2.7
             Built from SVN snapshot on August  1, 2021
               Timestamp: Sun Aug  1 10:07:00 CEST 2021
========================================================================
00000000000i[      ] BXSHARE not set. using compile time default '/usr/local/share/bochs'
00000000000i[      ] lt_dlhandle is 0x564107cf9370
00000000000i[PLUGIN] loaded plugin libbx_speaker.so
00000000000i[      ] lt_dlhandle is 0x564107cfa2e0
00000000000i[PLUGIN] loaded plugin libbx_biosdev.so
00000000000i[      ] lt_dlhandle is 0x564107cfabe0
00000000000i[PLUGIN] loaded plugin libbx_serial.so
00000000000i[      ] lt_dlhandle is 0x564107cfee40
00000000000i[PLUGIN] loaded plugin libbx_parallel.so
00000000000i[      ] lt_dlhandle is 0x564107d00a90
00000000000i[PLUGIN] loaded plugin libbx_unmapped.so
00000000000i[      ] lt_dlhandle is 0x564107d012d0
00000000000i[PLUGIN] loaded plugin libbx_iodebug.so
00000000000i[      ] lt_dlhandle is 0x564107d01ae0
00000000000i[PLUGIN] loaded plugin libbx_extfpuirq.so
00000000000i[      ] reading configuration from .bochsrc
00000000000e[      ] .bochsrc:759: ataX-master/slave CHS set to 0/0/0 - autodetection enabled
00000000000p[      ] >>PANIC<< .bochsrc:955: Bochs is not compiled with lowlevel sound support
00000000000e[SIM   ] notify called, but no bxevent_callback function is registered
00000000000e[SIM   ] notify called, but no bxevent_callback function is registered
========================================================================
Bochs is exiting with the following message:
[      ] .bochsrc:955: Bochs is not compiled with lowlevel sound support
========================================================================
00000000000i[SIM   ] quit_sim called with exit code 1
```

因此删去默认的`.bochsrc`中的`955`行。

再次运行

```
eliot@eliot-VirtualBox:~/Desktop/SoftwarePackages/bochs-2.7$ bochs
00000000000i[      ] LTDL_LIBRARY_PATH not set. using compile time default '/usr/local/lib/bochs/plugins'
========================================================================
                       Bochs x86 Emulator 2.7
             Built from SVN snapshot on August  1, 2021
               Timestamp: Sun Aug  1 10:07:00 CEST 2021
========================================================================
00000000000i[      ] BXSHARE not set. using compile time default '/usr/local/share/bochs'
00000000000i[      ] lt_dlhandle is 0x5616ac58f370
00000000000i[PLUGIN] loaded plugin libbx_speaker.so
00000000000i[      ] lt_dlhandle is 0x5616ac5902e0
00000000000i[PLUGIN] loaded plugin libbx_biosdev.so
00000000000i[      ] lt_dlhandle is 0x5616ac590be0
00000000000i[PLUGIN] loaded plugin libbx_serial.so
00000000000i[      ] lt_dlhandle is 0x5616ac594e40
00000000000i[PLUGIN] loaded plugin libbx_parallel.so
00000000000i[      ] lt_dlhandle is 0x5616ac596a90
00000000000i[PLUGIN] loaded plugin libbx_unmapped.so
00000000000i[      ] lt_dlhandle is 0x5616ac5972d0
00000000000i[PLUGIN] loaded plugin libbx_iodebug.so
00000000000i[      ] lt_dlhandle is 0x5616ac597ae0
00000000000i[PLUGIN] loaded plugin libbx_extfpuirq.so
00000000000i[      ] reading configuration from .bochsrc
00000000000e[      ] .bochsrc:759: ataX-master/slave CHS set to 0/0/0 - autodetection enabled
00000000000e[      ] .bochsrc:967: wrong value for parameter 'mode'
00000000000e[PCSPK ] .bochsrc:967: unknown parameter for speaker ignored.
00000000000e[      ] .bochsrc:967: unknown parameter 'volume'
00000000000e[PCSPK ] .bochsrc:967: unknown parameter for speaker ignored.
00000000000i[      ] lt_dlhandle is 0x5616ac5984a0
00000000000i[PLUGIN] loaded plugin libbx_textconfig.so
------------------------------
Bochs Configuration: Main Menu
------------------------------

This is the Bochs Configuration Interface, where you can describe the
machine that you want to simulate.  Bochs has already searched for a
configuration file (typically called bochsrc.txt) and loaded it if it
could be found.  When you are satisfied with the configuration, go
ahead and start the simulation.

You can also start bochs with the -q option to skip these menus.

1. Restore factory default configuration
2. Read options from...
3. Edit options
4. Save options to...
5. Restore the Bochs state from...
6. Begin simulation
7. Quit now
```

安装成功!

测试

首先创建一个软盘

```
$ bximage
```

然后选择创建软盘，其余的默认即可

```
========================================================================
                            bximage
  Disk Image Creation / Conversion / Resize and Commit Tool for Bochs
         $Id: bximage.cc 13481 2018-03-30 21:04:04Z vruppert $
========================================================================

1. Create new floppy or hard disk image
2. Convert hard disk image to other format (mode)
3. Resize hard disk image
4. Commit 'undoable' redolog to base image
5. Disk image info

0. Quit

Please choose one [0] 1

Create image

Do you want to create a floppy disk image or a hard disk image?
Please type hd or fd. [hd] fd

Choose the size of floppy disk image to create.
Please type 160k, 180k, 320k, 360k, 720k, 1.2M, 1.44M, 1.68M, 1.72M, or 2.88M.
 [1.44M]

What should be the name of the image?
[a.img]

Creating floppy image 'a.img' with 2880 sectors

The following line should appear in your bochsrc:
  floppya: image="a.img", status=inserted
```

编写一段boot代码

```
org 07C00h                    ; 告诉编译器程序加载到07C00处
       mov ax, cs
       mov ds, ax
       mov es, ax
       call DispStr                      ; 调用显示字符串例程
       jmp $               ; 无限循环
DispStr:
       mov ax, BootMessage
       mov bp, ax                     ; es:bp = 串地址
       mov cx, 16                     ; cx = 串长度
       mov ax, 01301h             ; ah = 13, al = 01h
       mov bx, 000Ch               ; 页号为0(bh = 0) 黑底红字 (bl = 0Ch,高亮)
       mov dl, 0
       int 10h                          ; 10h号中断
       ret
BootMessage:  db "Hello,OS world!"
times 510-($-$$)   db   0            ; 填充剩下的空间，使生成的二进制代码恰好为512字节
dw 0xaa55
```

下载`nasm`

```
$ sudo apt-get install nasm
```

编译写入

```
nasm boot.asm -o boot.bin && dd if=boot.bin of=a.img bs=512 count=1 conv=notrunc
```

写一个`bochs`配置文件,命名为`sample_bochsrc`

```
# how much memorythe emulated machine will have
megs: 32

# filename of ROMimages
romimage:file=/usr/local/share/bochs/BIOS-bochs-latest
vgaromimage:file=/usr/local/share/bochs/VGABIOS-lgpl-latest

# what disk imageswill be used
floppya:1_44=a.img, status=inserted

# choose the bootdisk.
boot: floppy

# where do we sendlog messages?
log: bochsout.txt

# disable themouse
mouse: enabled=0

# enable keymapping, using Us layout as default
keyboard:keymap=/usr/local/share/bochs/keymaps/x11-pc-us.map
```

启动`bochs`

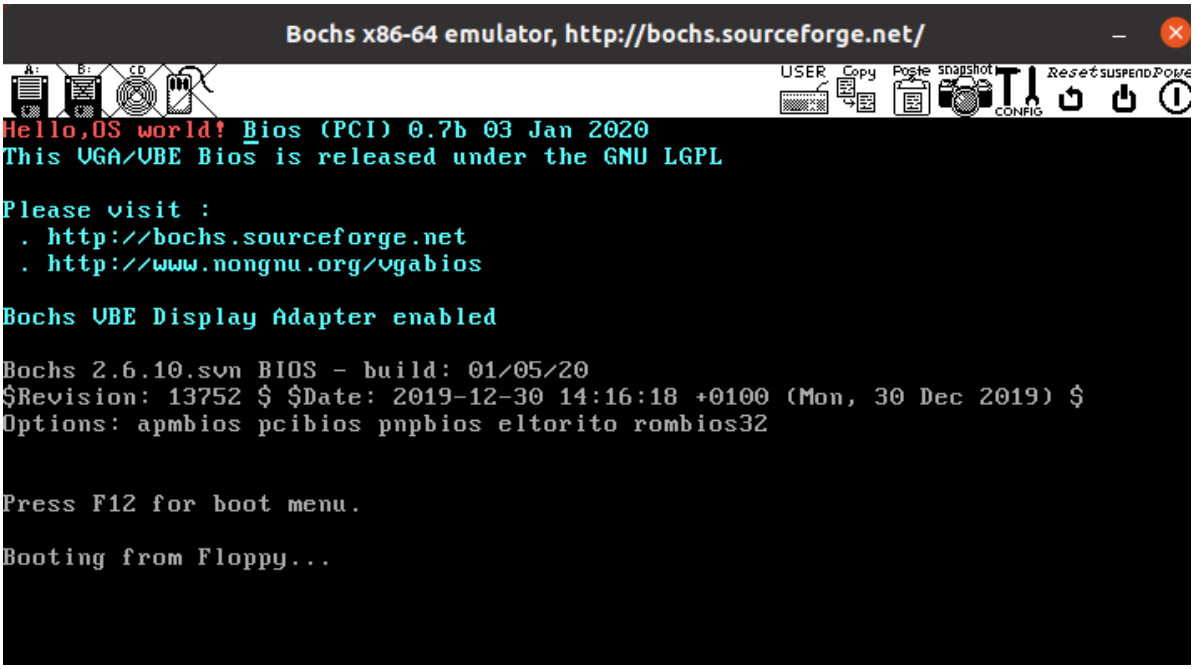
```
$ bochs -f sample_bochsrc
```

选择`6. Begin simulation`

接着按`c`运行

```
Please choose one: [6] 6
00000000000i[      ] lt_dlhandle is 0x561c6d3a2690
00000000000i[PLUGIN] loaded plugin libbx_x.so
00000000000i[      ] installing x module as the Bochs GUI
00000000000i[      ] using log file bochsout.txt
Next at t=0
(0) [0x0000fffffff0] f000:fff0 (unk. ctxt): jmpf 0xf000:e05b          ; ea5be000f0
<bochs:1> c
```

此时`bochs`界面便会出现我们想要的


Bochs x86-64 emulator, http://bochs.sourceforge.net/
A:
B:
CD
USER
Copy
Paste
snapshot
CONFIG
Reset
SUSPEND
Hello,OS world! Bios (PCI) 0.7b 03 Jan 2020
This VGA/VBE Bios is released under the GNU LGPL
Please visit :
. http://bochs.sourceforge.net
. http://www.nongnu.org/vgabios
Bochs VBE Display Adapter enabled
Bochs 2.6.10.svn BIOS - build: 01/05/20
$Revision: 13752 $ $Date: 2019-12-30 14:16:18 +0100 (Mon, 30 Dec 2019) $
Options: apmbios pcibios pnpbios eltorito rombios32
Press F12 for boot menu.
Booting from Floppy...