

操作系统实验课期末作业

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一些说明&体会&心得:

这个文档可能不太正式……（因为某些原因，我尝试了用英文写了，如果不行的话，请及时告知）

我写的这个 OS 叫做 `ericOS`. (`eric is my English name`)

这个 OS，没有特定参考哪本书写的，大部分的功能都是学了理论之后，自己实现的。

这个东西，很难写一个详细的文档，一来，是这个 OS 还不完善，写了文档也没意义，二来，时间没那么充裕。

当然了，在自己尝试独立写一个 OS 的过程中，碰到很多的问题，但收获也挺多，了解了很多东西。

对程序的运行，OS 的运行等有了一个比较清晰的思路。

对其它方面的帮助也挺大，如一个 C++ 的 `helloWorld` 为什么会那么大，而且不同机器上的大小不一样，等等…

其实有兴趣，然后能抽出时间来做东西，都会有很大收获。

其它的说明见下文。

——林俊浩

（这个放在里，是因为下面的都是英文的）

*****ericOS-Intro-Document*****

Welcome to the introduction of ericOS.

---by Eric

*****some requirements*****

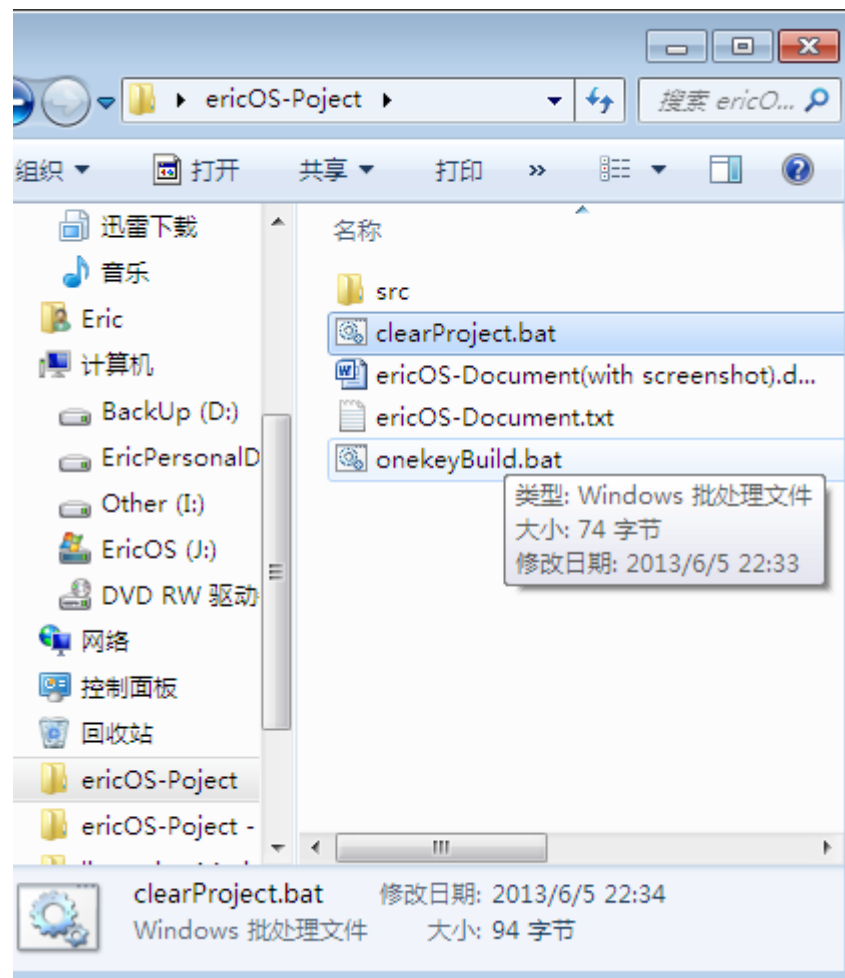
Building & testing environment: win7(32-bit) or windows XP3 (32-bit)

Software requirement : VMare Player

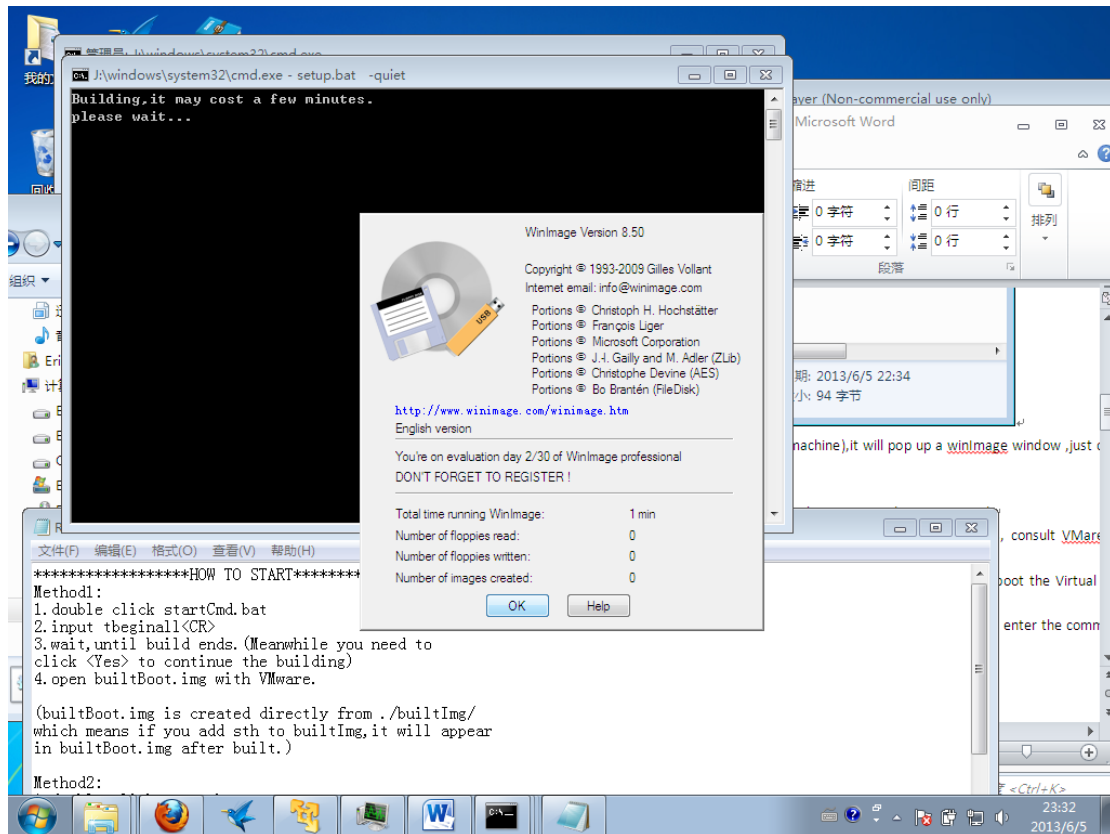
Nothing more is required.

*****HOW TO BUILD & START*****

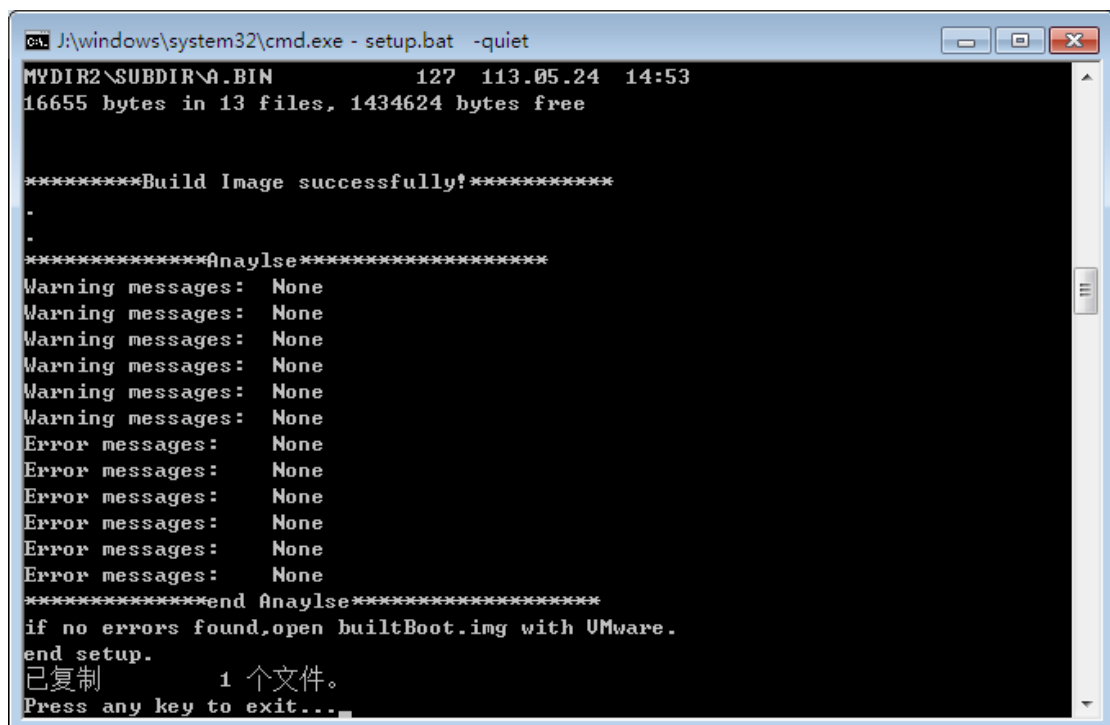
- 1.unzip ericOS-Project
- 2.enter .\ericOS-Project
- 3.run or double-click onekeyBuild.bat



- 4.after a few seconds(based on your machine),it will pop up a winImage window ,just click "OK" button.

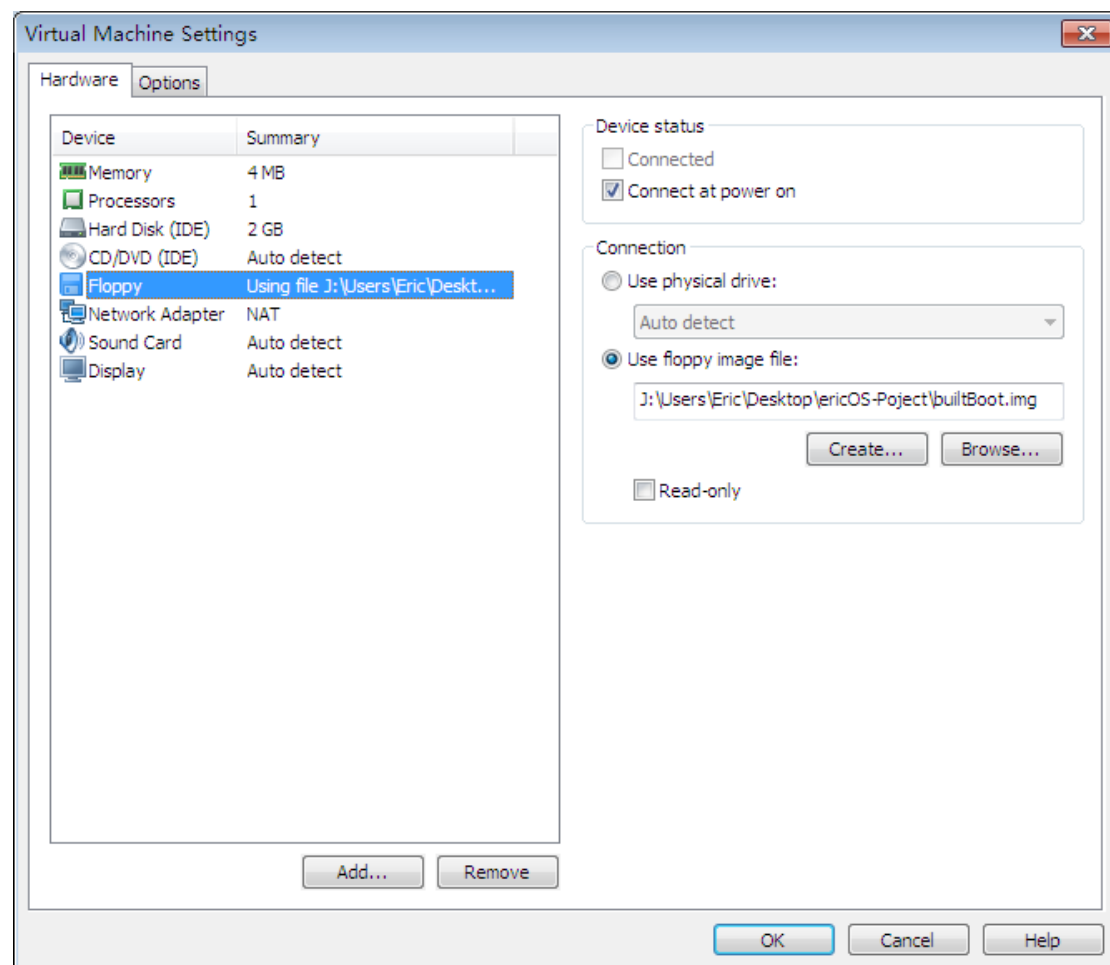


After click the <OK>

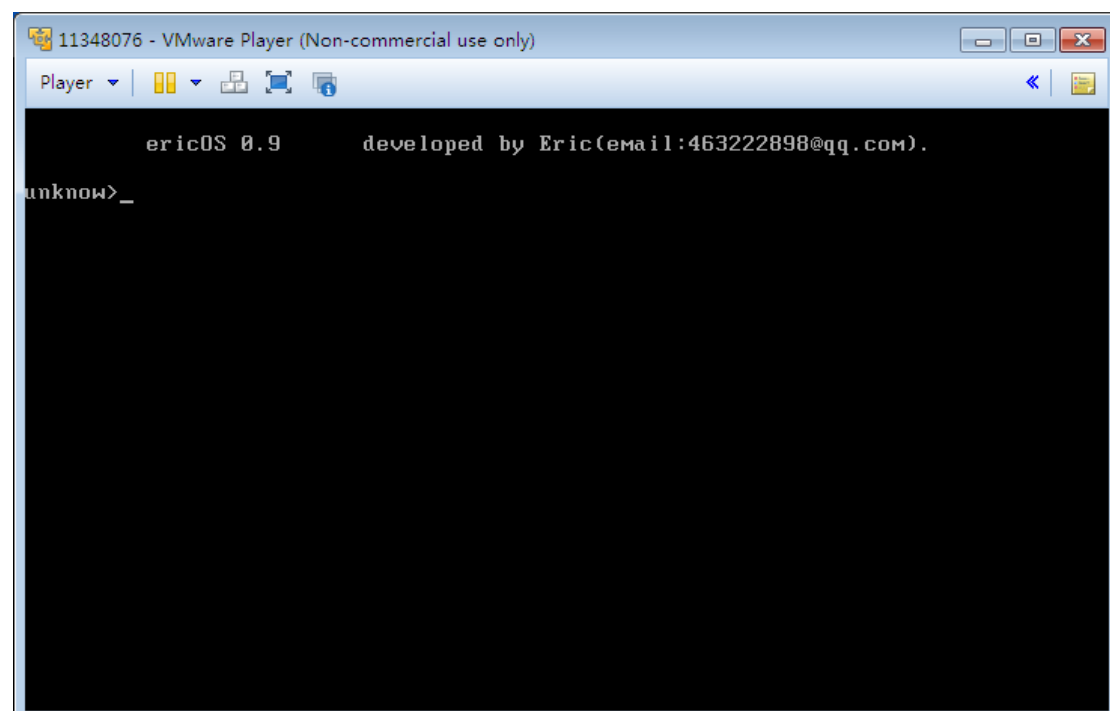


- 5.If nothing goes wrong, you will find builtBoot.img in .\ericOS-Project\
- 6.Open VMare Player, create a new Virtual Machine(if any problems, consult VMare Player's Help) ,
and just set .\ericOS-Project\builtBoot.img as floppy image file, and boot the Virtual Machine

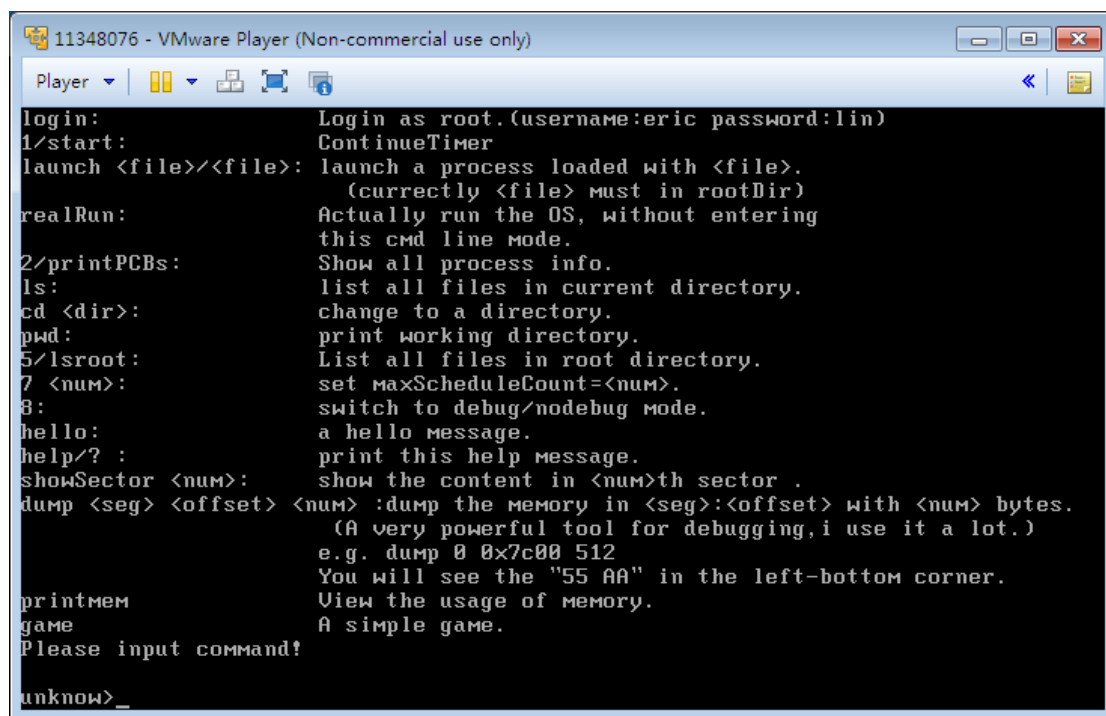
with it.



7.If everything is OK, you shall see some string like: ericOS... and enter the command line:
unknow>_



8. Just play freely with ericOS, for help, simply type ?<ENTER>



```
11348076 - VMware Player (Non-commercial use only)
Player
login: Login as root.(username:eric password:lin)
1/start: ContinueTimer
launch <file>/<file>: launch a process loaded with <file>.
                    (currently <file> must in rootDir)
realRun: Actually run the OS, without entering
          this cmd line mode.
2/printPCBs: Show all process info.
ls: list all files in current directory.
cd <dir>: change to a directory.
pwd: print working directory.
5/lsroot: List all files in root directory.
7 <num>: set maxScheduleCount=<num>.
8: switch to debug/nodebug mode.
hello: a hello message.
help/? : print this help message.
showSector <num>: show the content in <num>th sector .
dump <seg> <offset> <num> :dump the memory in <seg>:<offset> with <num> bytes.
                    (A very powerful tool for debugging,i use it a lot.)
                    e.g. dump 0 0x7c00 512
                    You will see the "55 AA" in the left-bottom corner.
printmem View the usage of memory.
game A simple game.
Please input command!
unknown_
```

(tips: if the building process can't run incorrectly, try to kill winimage.exe process or restart computer to try again.)

*****ABOUT THE COMMAND LINE*****

---Overview:

```
login: Login as root.(username:"eric" password:"lin")
1/start: ContinueTimer
launch <file>/<file>: launch a process loaded with <file>.
                    (currently <file> must in rootDir)
realRun: Actually run the OS, without entering
2/printPCBs: Show all process info.
ls: list all files in current directory.
cd <dir>: change to a directory.
pwd: print working directory.
5/lsroot: List all files in root directory.
7 <num>: set maxScheduleCount=<num>.
8: switch to debug/nodebug mode.
hello: a hello message.
help/? : print this help message.
showSector <num>: show the content in <num>th sector .
dump <seg> <offset> <num> :dump the memory in <seg>:<offset> with <num> bytes.
                    (A very powerful tool for debugging,i use it a lot.)
                    e.g. dump 0 0x7c00 512
                    You will see the "\"55 AA\" in the left-bottom corner.
```

printmem: View the usage of memory.
game: A simple game.

---Useful function base on these cmds:

To login: login.(attention:the one and only one valid user:pass pair is eric:lin.)

To launch a process:simply type the fileName.(the length of fileName should <11,and not conflict with built-in cmd)

To list all files in current directory: ls

To print working directory:pwd

To play games:game

To view the current state of memory allocation

To dump the memory :dump <seg> <offset> <num>

To actually run the OS:realRun //however, please launch the some in advance, like your shell program, or like the test program a.bin

To get the overview of cmd:help

*****Abou the architecture of ericOS*****

It's currently split into 4 parts: filesystem,shell,io,process,memory.

---filesystem: it's a simple FAT12 filesystem.It's implemented by C code, base on my understanding about the FAT12 structure.

---memory: it use Buddy System to manange the memory. And the rang that it can manage is 0x10000 ~ 0x8ffff (linear address), i.e. a half of one mega bytes(0.5MB). Again, it is implemented by myself.

---io: Input and Output, i just use BIOS int10 to do the job.And use C to enhance the function provided by BIOS.

---process: use one struct PCB in C to describe one process.

To implement the scheduling, i use ASM to save or restore cpu registers.

Actually, timer INT will save the necessary registers in

current PCB first, then the control flow will enter actualSchdule() implemented by C, where you can determine which process will be exected next i.e. to adapt some suitable schedule algorithm.

---shell: actually this shell is used to debug, not the shell we normally talk about. It just a platform to test new function, to do some experiments or to debug your OS kernel. Of course, technically speaking, it is part of kernel. However, when you want to release the OS kernel, this shell should be removed. (Actually this part,i means shell, was originated from the frustration that when i run a newly built ericOS with some unkown error in VMware Player, the Virtaul Machine just cashed without giving me more helpful message, especially when you just start writting an OS from scratch.)

*****Others*****

All of C codes and most of ASM codes are written by myself(Eric).

Eric's email: 463222898@qq.com

---by Eric

Appendix: About how to use cmd.

type the following command in shell.

Exmple1: (about process schedule and filesystem)

login

eric

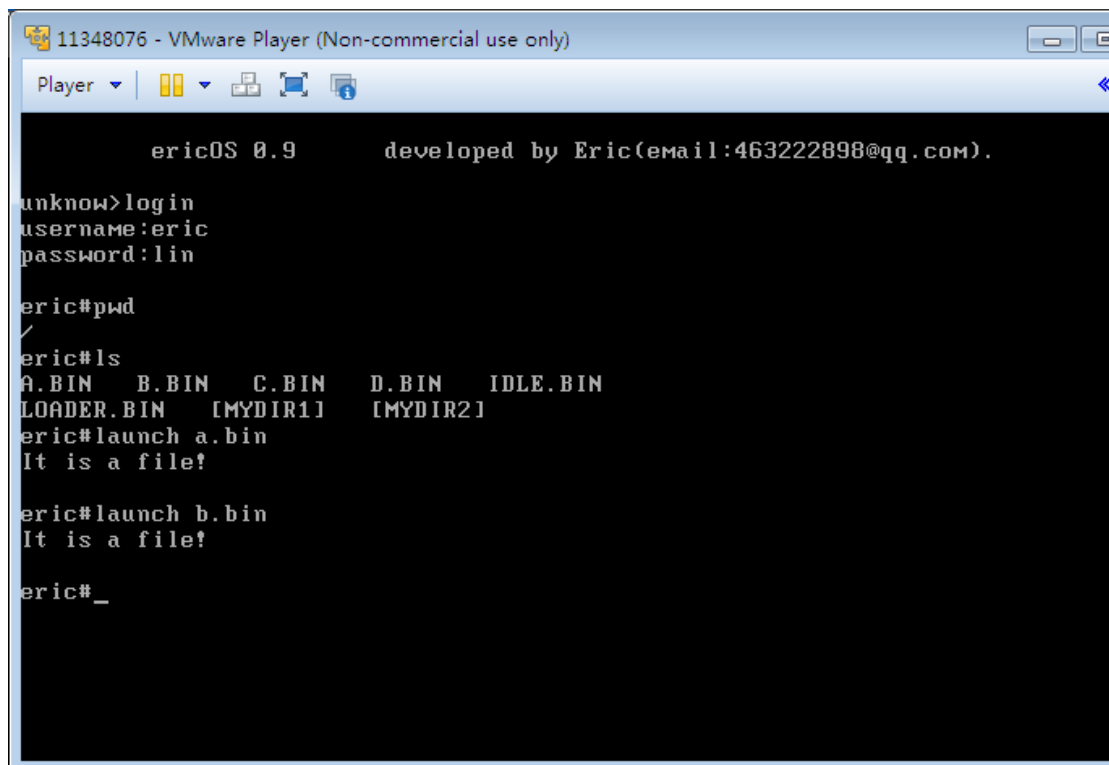
lin

pwd

ls

launch a.bin

launch b.bin



```
11348076 - VMware Player (Non-commercial use only)
Player
ericOS 0.9      developed by Eric(email:463222898@qq.com).

unknow>login
username:eric
password:lin

eric#pwd
/
eric#ls
A.BIN  B.BIN  C.BIN  D.BIN  IDLE.BIN
LOADER.BIN  [MYDIR1]  [MYDIR2]
eric#launch a.bin
It is a file!

eric#launch b.bin
It is a file!

eric#_
```

printPCBs

```
11348076 - VMware Player (Non-commercial use only)
Player
eric#ls
A.BIN  B.BIN  C.BIN  D.BIN  IDLE.BIN
LOADER.BIN  [MYDIR1]  [MYDIR2]
eric#launch a.bin
It is a file!

eric#launch b.bin
It is a file!

eric#printPCBs
PID:1 IM:idle.bin status:0 nextID:3
AX=0000 BX=0001 CX=0002 DX=0003 CS=1000 DS=1000 ES=1000 SS=1000
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1000 IP=0100 Flags=3202

PID:3 IM:b.bin status:0 nextID:2
AX=0000 BX=0001 CX=0002 DX=0003 CS=1040 DS=1040 ES=1040 SS=1040
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1040 IP=0100 Flags=3202

PID:2 IM:a.bin status:0 nextID:1
AX=0000 BX=0001 CX=0002 DX=0003 CS=1020 DS=1020 ES=1020 SS=1020
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1020 IP=0100 Flags=3202
eric#_
```

```
ls
cd mydir1
pwd
ls
launch c.bin
cd ..
cd mydir2
```

```
11348076 - VMware Player (Non-commercial use only)
Player
AX=0000 BX=0001 CX=0002 DX=0003 CS=1020 DS=1020 ES=1020 SS=1020
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1020 IP=0100 Flags=3202

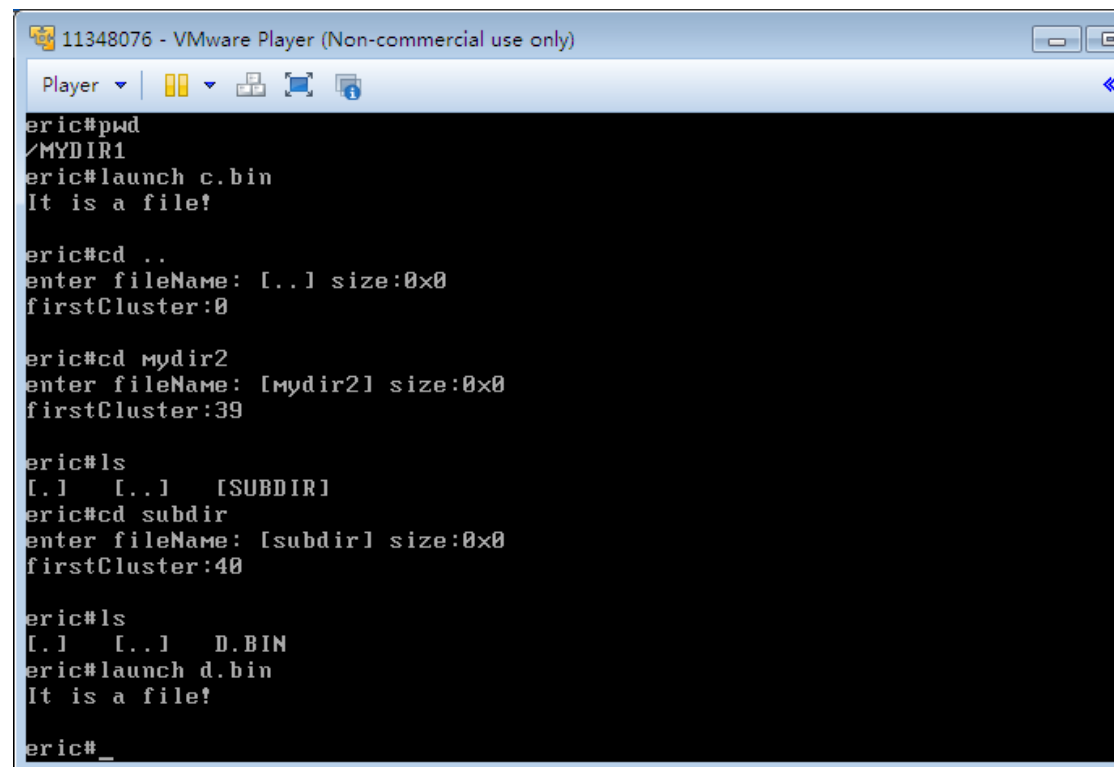
eric#ls
A.BIN  B.BIN  C.BIN  D.BIN  IDLE.BIN
LOADER.BIN  [MYDIR1]  [MYDIR2]
eric#cd mydir1
enter fileName: [mydir1] size:0x0
firstCluster:37

eric#pwd
/MYDIR1
eric#launch c.bin
It is a file!

eric#cd ..
enter fileName: [...] size:0x0
firstCluster:0

eric#cd mydir2
enter fileName: [mydir2] size:0x0
firstCluster:39
eric#_
```

```
ls
cd subdir
ls
launch d.bin
```



```
11348076 - VMware Player (Non-commercial use only)
Player
eric#pwd
/MyDIR1
eric#launch c.bin
It is a file!

eric#cd ..
enter fileName: [...] size:0x0
firstCluster:0

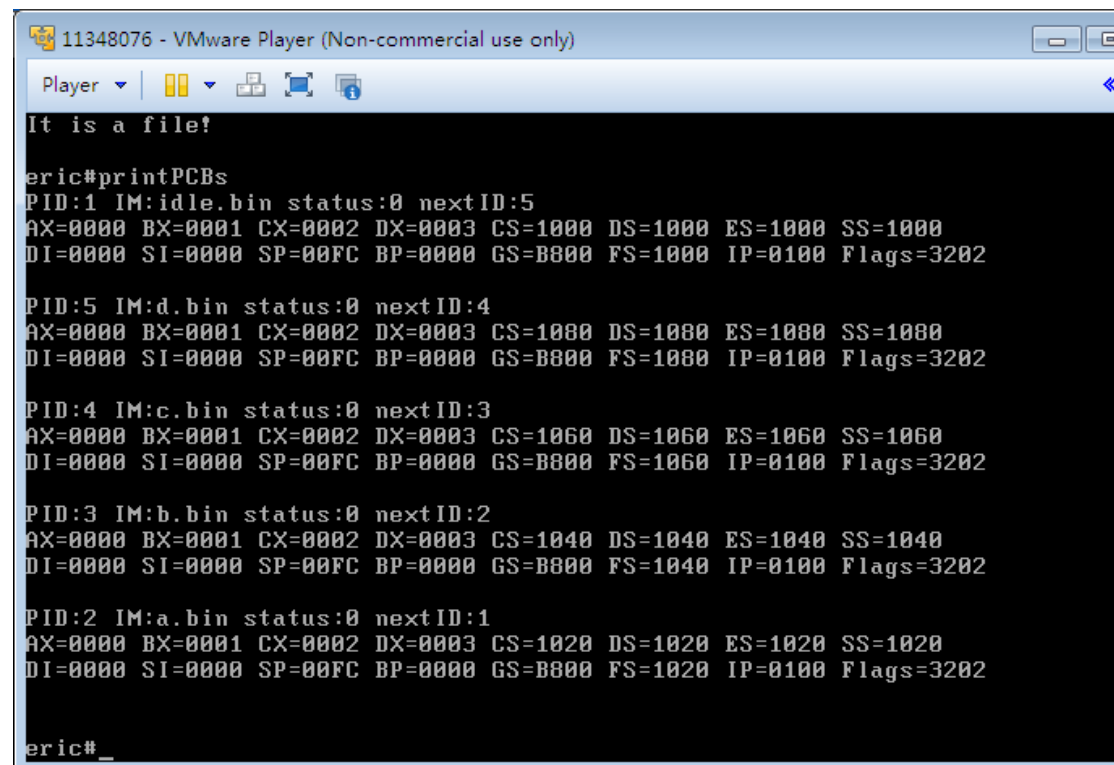
eric#cd mydir2
enter fileName: [mydir2] size:0x0
firstCluster:39

eric#ls
[.] [..] [SUBDIR]
eric#cd subdir
enter fileName: [subdir] size:0x0
firstCluster:40

eric#ls
[.] [..] D.BIN
eric#launch d.bin
It is a file!

eric#_
```

printPCBs



```
11348076 - VMware Player (Non-commercial use only)
Player
It is a file!

eric#printPCBs
PID:1 IM:idle.bin status:0 nextID:5
AX=0000 BX=0001 CX=0002 DX=0003 CS=1000 DS=1000 ES=1000 SS=1000
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1000 IP=0100 Flags=3202

PID:5 IM:d.bin status:0 nextID:4
AX=0000 BX=0001 CX=0002 DX=0003 CS=1000 DS=1000 ES=1000 SS=1000
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1000 IP=0100 Flags=3202

PID:4 IM:c.bin status:0 nextID:3
AX=0000 BX=0001 CX=0002 DX=0003 CS=1060 DS=1060 ES=1060 SS=1060
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1060 IP=0100 Flags=3202

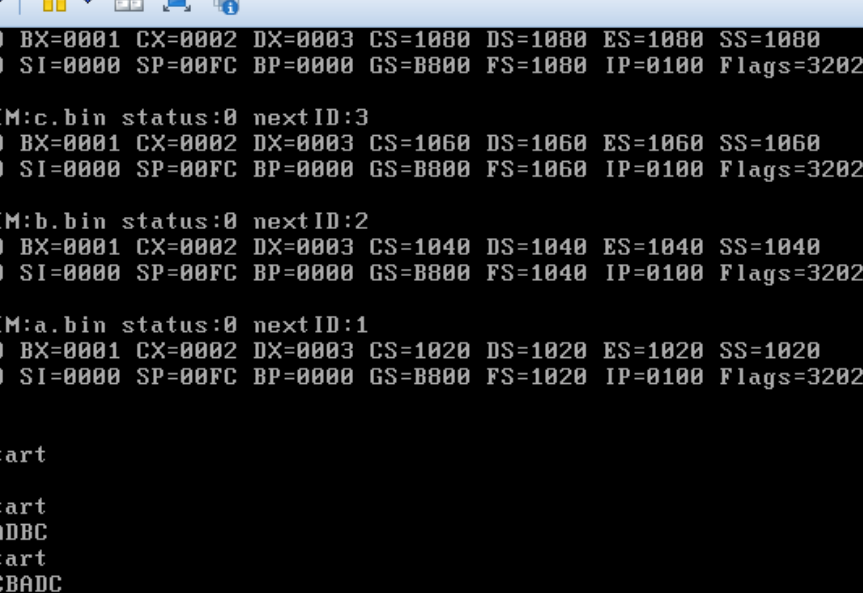
PID:3 IM:b.bin status:0 nextID:2
AX=0000 BX=0001 CX=0002 DX=0003 CS=1040 DS=1040 ES=1040 SS=1040
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1040 IP=0100 Flags=3202

PID:2 IM:a.bin status:0 nextID:1
AX=0000 BX=0001 CX=0002 DX=0003 CS=1020 DS=1020 ES=1020 SS=1020
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1020 IP=0100 Flags=3202

eric#_
```

Start

Start



11348076 - VMware Player (Non-commercial use only)

Player ▾ | [Icons: Settings, Full Screen, Help]

```
AX=0000 BX=0001 CX=0002 DX=0003 CS=1000 DS=1080 ES=1080 SS=1080
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1080 IP=0100 Flags=3202

PID:4 IM:c.bin status:0 nextID:3
AX=0000 BX=0001 CX=0002 DX=0003 CS=1060 DS=1060 ES=1060 SS=1060
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1060 IP=0100 Flags=3202

PID:3 IM:b.bin status:0 nextID:2
AX=0000 BX=0001 CX=0002 DX=0003 CS=1040 DS=1040 ES=1040 SS=1040
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1040 IP=0100 Flags=3202

PID:2 IM:a.bin status:0 nextID:1
AX=0000 BX=0001 CX=0002 DX=0003 CS=1020 DS=1020 ES=1020 SS=1020
DI=0000 SI=0000 SP=00FC BP=0000 GS=B800 FS=1020 IP=0100 Flags=3202

eric#start
DCB
eric#start
ACADBCADBC
eric#start
DABCDACBADC
eric#start
BDACBDACBA
eric#_
```

realRun

[illegible]

Exmaple2: (about the memory management)

a.bin

printmem

b.bin

printmem

```
11348076 - VMware Player (Non-commercial use only)
Player
ericOS 0.9    developed by Eric(email:463222898@qq.com).

unknow>a.bin
It is a file!
start run....
A
unknow>printmem
begin
;****9*;****9*;    10 :    11 :    12 :    13 :    14 :    15 :
    16 :    17 :    18 :
available MemHolePool count:106
end

unknow>b.bin
It is a file!
start run....
BABABABABABA
unknow>printmem
begin
;****9*;****9*;    9 :    11 :    12 :    13 :    14 :    15
    :    16 :    17 :    18 :
available MemHolePool count:104
end

unknow>_
```

//(you could see another ****9**** is occupied by sth. 9 represent the $2^9=0.5\text{Kb}$
dump 0 0x7c00 512 //dump the memory 0:0x7c00 with 512 bytes.

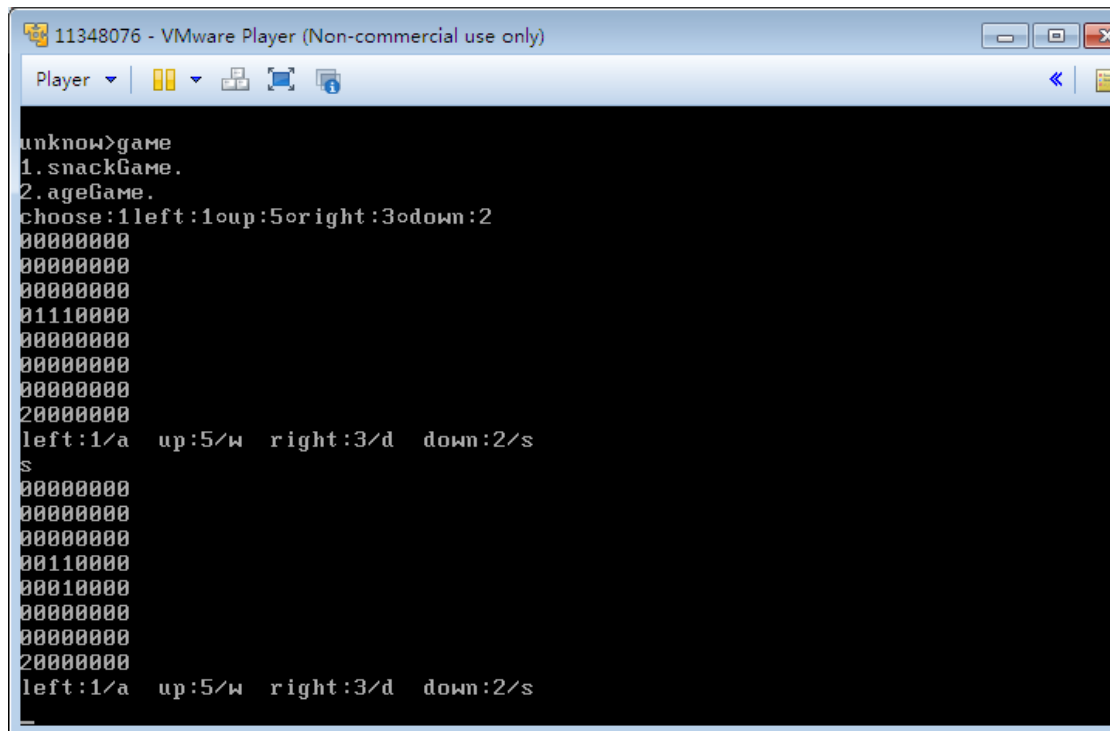
```
11348076 - VMware Player (Non-commercial use only)
Player
0000:7C90 16 4A B9 0B 00 F3 A6 83-F9 00 74 19 83 E7 E0 83
0000:7CA0 C7 20 BE 07 7D EB E5 83-06 04 7D 01 EB B9 B6 02
0000:7CB0 E8 7B 00 EB FE B8 0E 00-83 E7 E0 83 C7 1A 26 8B
0000:7CC0 0D 51 01 C1 83 C1 11 B8-00 90 8E C0 BB 00 01 89
0000:7CD0 C8 53 B1 01 E8 73 00 B4-0E B0 2E B3 0F CD 10 5B
0000:7CE0 58 E8 96 00 3D F8 0F 73-0F 50 BA 0E 00 01 D0 83
0000:7CF0 C0 11 03 1E 0B 7C EB D9-B6 01 E8 31 00 EA 00 01
0000:7D00 00 90 0D 00 13 00 00 4C-4F 41 44 45 52 20 42
0000:7D10 49 4E 00 42 6F 6F 74 69-6E 67 20 20 52 65 61 64
0000:7D20 79 2E 20 20 20 4E 6F 20-4C 4F 41 44 45 52 B8 09
0000:7D30 00 F6 E6 05 13 7D 89 C5-8C D8 8E C0 B9 09 00 B8
0000:7D40 01 13 BB 07 00 B2 00 CD-10 C3 55 09 E5 03 EC 02
0000:7D50 88 4E FE 53 8A 1E 18 7C-F6 F3 FE C4 88 E1 88 C6
0000:7D60 D0 E8 08 C5 00 E6 01 5B-8A 16 24 7C B4 02 8A 46
0000:7D70 FE CD 13 72 F7 83 C4 02-5D C3 06 53 50 B8 00 90
0000:7D80 2D 00 01 8E C0 58 C6 06-06 7D 00 BB 03 00 F7 E3
0000:7D90 BB 02 00 31 D2 F7 F3 83-FA 00 74 05 C6 06 06 7D
0000:7DA0 01 31 D2 8B 1E 0B 7C F7-F3 52 BB 00 00 83 C0 01
0000:7DB0 B1 02 E8 95 FF 5A 01 D3-26 8B 07 80 3E 06 7D 01
0000:7DC0 75 03 C1 E8 04 25 FF 0F-5B 07 C3 00 00 00 00 00
0000:7DD0 00 00 00 00 00 00 00-00 00 00 00 00 00 00
0000:7DE0 00 00 00 00 00 00 00-00 00 00 00 00 00 00
0000:7DF0 00 00 00 00 00 00 00-00 00 00 00 00 55 AA

unknow>_
```

Example3: (about a funny game:snack game)

Game

1

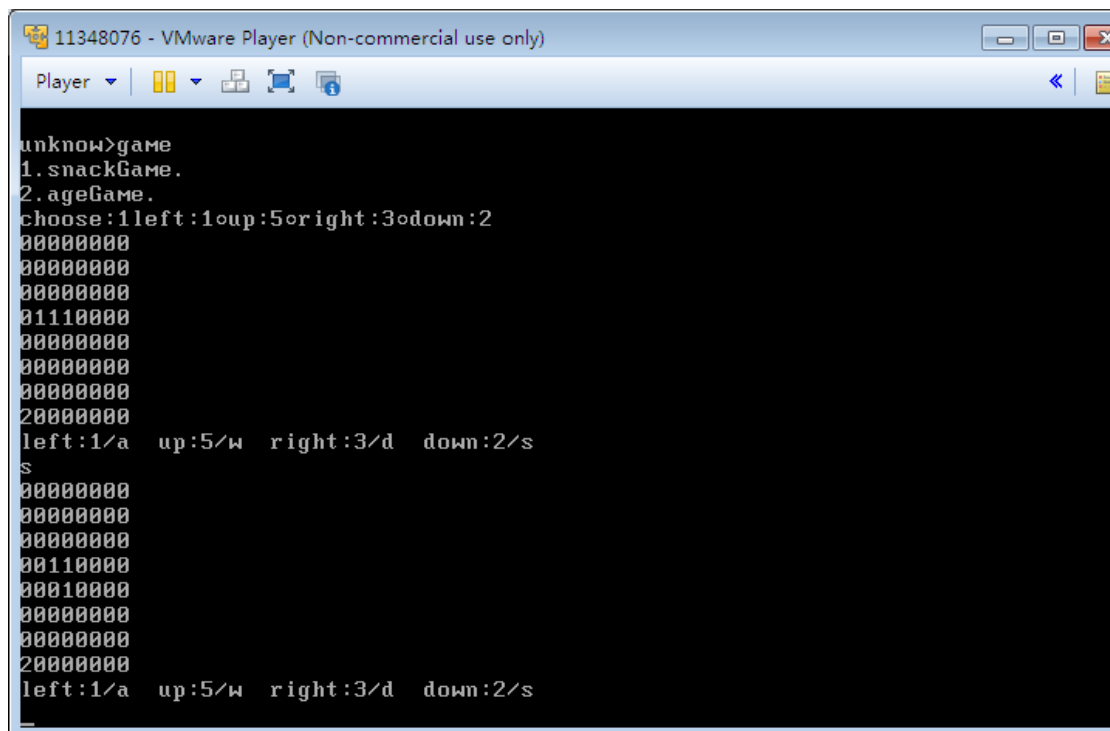


```
11348076 - VMware Player (Non-commercial use only)
Player
unknow>game
1.snackGame.
2.ageGame.
choose:1left:1oup:5oright:3odown:2
00000000
00000000
00000000
00110000
00000000
00000000
00000000
00000000
20000000
left:1/a up:5/w right:3/d down:2/s
s
00000000
00000000
00000000
00110000
00010000
00000000
00000000
20000000
left:1/a up:5/w right:3/d down:2/s
```

//playing:

Game

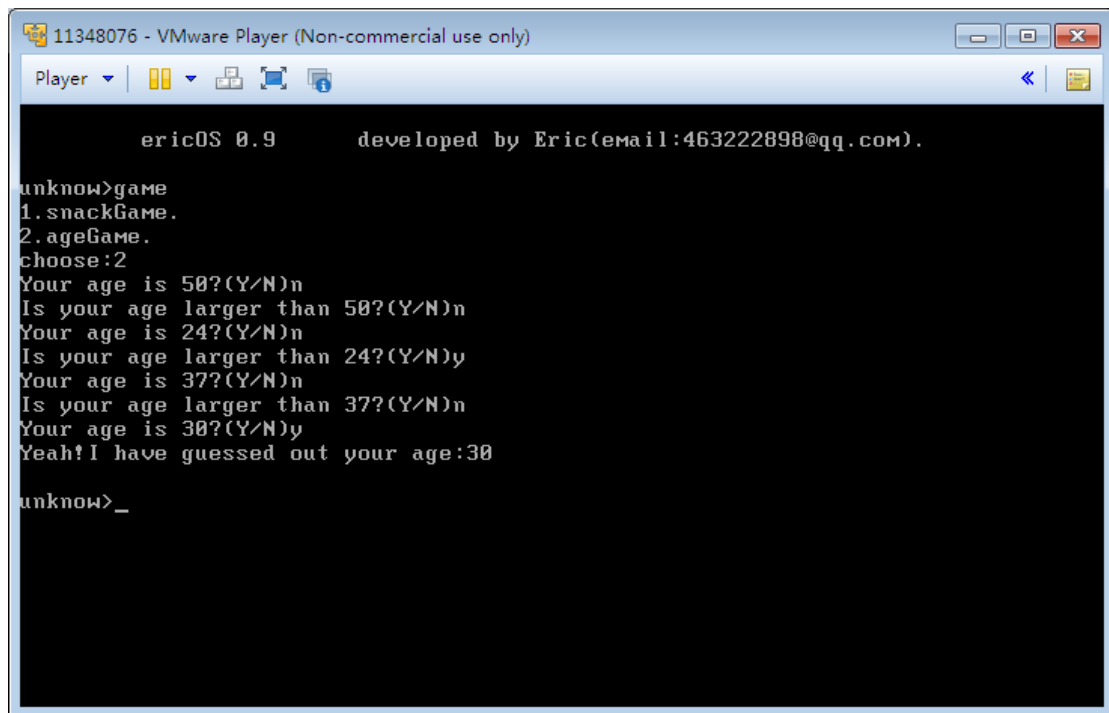
1



```
11348076 - VMware Player (Non-commercial use only)
Player
unknow>game
1.snackGame.
2.ageGame.
choose:1left:1oup:5oright:3odown:2
00000000
00000000
00000000
00110000
00000000
00000000
00000000
00000000
20000000
left:1/a up:5/w right:3/d down:2/s
s
00000000
00000000
00000000
00110000
00010000
00000000
00000000
20000000
left:1/a up:5/w right:3/d down:2/s
```

//another game (computer try to guess your age):

//suppose my age is 30



The screenshot shows a VMware Player window titled "11348076 - VMware Player (Non-commercial use only)". The window contains a terminal window with the following text:

```
ericOS 0.9      developed by Eric(email:463222898@qq.com).

unknow>game
1.snackGame.
2.ageGame.
choose:2
Your age is 50?(Y/N)n
Is your age larger than 50?(Y/N)n
Your age is 24?(Y/N)n
Is your age larger than 24?(Y/N)y
Your age is 37?(Y/N)n
Is your age larger than 37?(Y/N)n
Your age is 30?(Y/N)y
Yeah! I have guessed out your age:30

unknow>_
```