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西南林业大学
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(二〇一七届)

题 目： 一个简单操作系统的实现 —

RongOS

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一个简单操作系统的实现 — RongOS

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摘 要：操作系统管理着计算机的硬件和软件资源，它是向上层应用软件提供服务（接口）的核心系统软件，这些服务包括进程管理，内存管理，文件系统，网络通信，安全机制等。操作系统的设计与实现则是软件工业的基础与内核。为此，在国务院提出的《中国制造 2025》中专门强调了操作系统的开发。但长期以来，操作系统核心开发技术都掌握在外国人手中，技术受制，对于我们的软件工业来说很不利。本文拟从零开始设计开发一个简单的操作系统，包括 `boot loader`，中断，内存管理，图形接口，多任务，以及在这个系统上的几个小应用等。尽管这个系统很简单，但它为自主开发操作系统做了一个小小的尝试。

关键词：操作系统，开发，自主

The implement of a simple OS — RongOS

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Abstract: Operating system manages the sources of hardware and software, it lie in the core of the system software and provide service(interface) to upper application. These service including process management, memory management, file system, network communication, security mechanism etc. The design and implement of operating system is the foundation and core of software industry. Therefore, «Made in China 2025» emphasize the development of operating system that put forward by The State Council. For a long time, however, the kernel development technology grasped in the hand of foreigner, it's bad for our software industry cause of limited technology. So this article will design and develop a simple operating system, including boot loader, interrupt, memory management, graphic interface, multitasking, and some little application depend on this system. In spite of the simple of this system, it's a small trying for autonomous development operating system.

Key words: operating system, development, autonomous

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1 Chapter — Preliminary Works

1.1 Development Environment

Operating System: Debian 4.11.0-1-amd64

Debug System: QEMU emulator version 2.8.1(Debian 1:2.8+dfsg-7)

Emacs version: GNU Emacs 25.2.2

1.2 Tools

Some tools used to develop RongOS, see tools.¹.

1.3 Install

Debian System: there is a small tutorial.²

QEMU, for my x86_64 architecture:

```
$ sudo apt-get install qemu-system-x86_64
```

Note that the tools is exe formate, so on Debian system, you need to install wine:

```
$ sudo apt-get update
```

```
$ sudo apt-get install wine
```

Maybe you also need to add i386 architecture cause of AMD64 on your machine to use these tools:

```
$ sudo dpkg --add-architecture i386
```

```
$ sudo apt-get update
```

¹<https://github.com/Puqiyuan/RongOS/tree/master/Tools>

²http://cs2.swfc.edu.cn/~wx672/lecture_notes/linux/install.html

2 Chapter — Boot Loader

2.1 Chose Disk

There are many ways to boot a operating system, from hard disk, USB, floppy disk etc. I chose floppy disk, although it is out of date. For my purpose is that develop a simple operating system, pay my attention on how to development. The structure of floppy disk is simple and for my simple operating system it's enough.

2.2 The Structure of Floppy Disk

This picture show the inside of floppy disk:

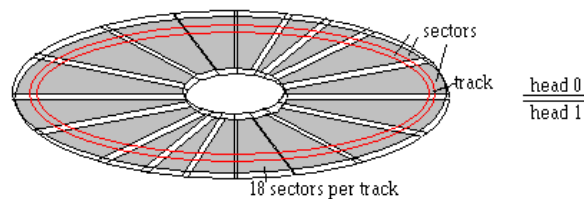


图 2-1 Floppy Disk Structure 1

2.3 The Source Codes and Comments of Boot Loader

```
1          CYLS equ 10
2
3  org 0x7c00
4          jmp entry
5  db 0x90
6  db "RONGBOOT"
7  dw 512
8  db 1
```



```
9   dw 1
10  db 2
11  dw 224
12  dw 2880
13  db 0xf0
14  dw 9
15  dw 18
16  dw 2
17  dd 0
18  dd 2880
19  db 0,0,0x29
20  dd 0xffffffff
21  db "RONGBOOTOS "
22  db "FAT12  "
23  resb 18
24
25
26  entry:
27      mov ax, 0
28      mov ss, ax
29      mov sp, 0x7c00
30      mov ds, ax
31
32      mov si, msg_init
33      jmp init
34
35
36  init:
37      mov al, [si]
38      add si, 1
39      cmp al, 0
```

```
40         je load
41         mov ah, 0x0e
42         mov bx, 15
43         int 0x10
44         jmp init
45
46
47 msg_init:
48     db 0x0a
49     db 0x0d
50     db "Copyright: GPL"
51     db 0x0a
52     db 0x0d
53     db "Author: Qiyuan Pu"
54     db 0x0a
55     db 0x0d
56     db "https://github.com/Puqiyuan/RongOS"
57     db 0x0a
58     db 0x0d
59     db "IPL is loading, please waiting..."
60     db 0x0a
61     db 0x0d
62     db "....."
63
64
65 load:
66
67     mov ax, 0
68
69     mov ax, 0x0820
70     mov es, ax
```

```
71         mov ch, 0
72         mov dh, 0
73         mov cl, 2
74
75     readloop:
76         mov si, 0
77
78     retry:
79         mov ah, 0x02
80         mov al, 1
81         mov bx, 0
82         mov dl, 0x00
83         int 0x13
84         jnc next
85         add si, 1
86         cmp si, 5
87         jae error
88         mov ah, 0x00
89         mov dl, 0x00
90         int 0x13
91         jmp retry
92
93     next:
94         mov ax, es
95         add ax, 0x0020
96         mov es, ax
97         add cl, 1
98         cmp cl, 18
99         jbe readloop
100        mov cl, 1
101        add dh, 1
```

```
102         cmp dh, 2
103         jb readloop
104         mov dh, 0
105         add ch, 1
106         cmp ch, CYLS
107         jb readloop
108         jmp correct
109
110
111     fin:
112         hlt
113         jmp fin
114
115
116     error:
117         mov si, msg
118
119
120     correct:
121         mov si, msg_corr
122
123
124     putloop:
125         mov al, [si]
126         add si, 1
127         cmp al, 0
128         mov [0x0ff0], ch
129         je 0xc200
130         mov ah, 0x0e
131         mov bx, 15
132         int 0x10
```

```
133         jmp putloop
134
135
136 msg_corr:
137     db 0x0a
138     db 0x0d
139     db 0x0a
140     db 0x0d
141     db "OK: IPL loaded"
142     db 0x0a
143     db 0x0d
144     db 0
145
146
147 msg:
148     db 0x0a
149     db "IPL load error"
150     db 0x0a
151     db 0
152     resb 0x7dfe-$
153
154
155     db 0x55, 0xaa
```

参考文献

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指导教师简介

指导教师简介（约百余字）

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首先我想感谢我的老师，王晓林。大学期间，他给了我很多指导，包括专业方面和上大学的意义等。很多时候，他对学生的要求看起来都是不近情理的，但正是通过这个“痛苦”的过程，我锻炼了坚强的意志，和战胜困难的信心。谢谢你，王老师。我最想感谢的是我的女友，她容忍我在完成这个设计时的很多个夜晚不陪她，给我支持，鼓励我，不抱怨。所以我愿意把这个简单操作系统命名为 **RongOS**, 蓉便是她名字的最后两个字。谢谢你，我最亲爱的。