# 指南

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PDA, . . .

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Æ®¸¦ ó¸®ÇÒ Ðö ÀÖ¾î¾ß ÇÑ´Ù´Â °ÍÀ» ÀǹÌÇϸç °á·ÐÀû Æ®·£½ºÆ÷Æ® ·¹À̾î·Î TCP/IP . . .
TCP/IP, uC/OS, Xinu[8], pSOS[14], VxWorks[17], IOS[20].
Xinu, uC/OS, etc.

pSOS, VxWorks, Nucleus[18], LynxOS[47], VRTX[16], QNX[15], etc.

IOS, Enterprise OS[21], etc.

1.2 等等
TCP/IP は、インターネットの通信規格として多くの業界で広く使用されています。TCP/IP の cornerstone は、TCP (Transmission Control Protocol) と IP (Internet Protocol) と呼ばれる 2 つのプロトコルで構成されています。TCP は、データの正確な送受信とドロップのない通信を実現するプロトコルであり、IP はネットワークでのパケット転送を担当するプロトコルです。TCP/IP は、ネットワークの互換性を高め、各地点を通じてデータを通信できるようにするための標準的な制御フレームを定義します。
1.3 コンピュータの接続

PCは、様々なネットワークに接続できます。最常见的は、TCP/IP、PPP、X.25、HDLC、

Gnu/Linux、MacOS、Windowsのいずれもが利用可能です。PCは、PCのネットワークに接続できます。
FDDI [48] 1999 [49].

1999 19 9 19 [49].
WindRiver® QNX® EE Times®

1400% [50].

1.4

1.5
2. Xinu

Xinu, Purdue University, Douglas E. Comer, [1, 8]. Xinu embodies the TCP/IP concepts. Xinu uses the TCP/IP protocol to establish a network. Xinu uses I/O to set up a network. Xinu uses the CPU to set up a network.
2.1.2 uC/OS and uC/OS-II

uC/OS is a real-time multitasking kernel developed by Jean J. Labrosse [1, 9]. It is based on the concept of a preemptive multitasking system. uC/OS-II is the second generation of uC/OS, developed by the Cygnus Software. It supports a wider range of CPUs, including Intel, Motorola, ARM, SPARC, Hitachi SH, 32-bit CPUs, Zilog Z80, 8-bit CPUs, TI DSPs, etc. It supports various programming languages such as C, C++, and assembler. uC/OS and uC/OS-II are designed for a variety of applications, including embedded systems, real-time systems, and networking applications.

2.1.3 eCOS

eCOS is an open-source embedded operating system developed by RedHat and Cygnus [1, 11]. It is designed for embedded systems and provides a full suite of services, including a GUI, file system, and interprocess communication. eCOS supports a wide range of CPUs, including ARM, SH, and PowerPC. It is designed for use in a variety of applications, including control systems, communication systems, and multimedia applications.
Embedded Application

- ISO C Library
- Native C API
- Internal Kernel API
- Kernel
  - pluggable schedulers
  - memory allocation
  - synchronization
  - timers
  - interrupt and DSR support
  - threads
- HAL
  - timers
  - general state manipulation
  - interrupts
  - init arch/cpu/platform
  - exceptions
  - thread state manipulation

Multithreaded Debug Support

GDB Stubs

ROM Monitor

Hardware

2.2

1 eCOS
2.2.1 pSOS+

pSOS+ is a fault tolerant, real-time operating system developed by WindRiver Systems, Inc. and Integrated Systems, Inc. [13, 14]. It is designed for critical applications requiring high availability and fault tolerance. The system supports a prioritized round-robin scheduling algorithm, allowing for efficient management of tasks with varying priorities. It is compatible with x86 processors and provides a fault-tolerant architecture, ensuring reliability in mission-critical environments. The system also supports prioritized FIFO queues, enabling efficient data handling and processing.

MMU

<table>
<thead>
<tr>
<th>Processor</th>
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<tbody>
<tr>
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2.2.2 QNX

QNX is QNX Software Systems Ltd. [13, 15]. QNX provides IPC, CPU, memory management, fault-tolerant, TCP/IP, and MMU. QNX supports 32 priority levels, prioritized FIFO, prioritized round-robin, adaptive and static scheduling. QNX supports 2000 priority levels. QNX supports TCP/IP, 4KB memory management, and MMU. QNX supports 3 levels of priority.
2.2.3 VRTX

2.2.4 VxWorks

privilege

VxVMI

Priority 256

POSIX

wind proprietary MMU VxVMI

8KB VxVMI

VM, Tornado Tcl

Tc

VxSim

VxWorks

VxMP

TCP/IP

5 VxWorks

VxWorks
2.2.5 Nucleus PLUS

Nucleus® Accelerated Technology Inc. Nucleus PLUS is [18]. Nucleus NET is TCP/IP. Nucleus PLUS is ANSI C. Nucleus NET is TCP/IP. Nucleus PLUS is telnet, ftp, web. Nucleus NET TCP/IP 60KB.
2.2.6 OS-9

OS-9 \[\text{Microware}[19]\]. OS-9 \[\text{CPU}, \text{CRC} \]
\[\text{Nucleus PLUS}\]. MMU \[\text{CSS} \].

2.2.6 OS-9

OS-9 \[\text{Microware}[19]\]. OS-9 \[\text{CPU}, \text{CRC} \]
\[\text{Nucleus PLUS}\]. MMU \[\text{CSS} \].

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OS-9 \[\text{Microware}[19]\]. OS-9 \[\text{CPU}, \text{CRC} \]
\[\text{Nucleus PLUS}\]. MMU \[\text{CSS} \].
6 OS-9

2.3 システムの展開

Cisco, 3ComのOSの間で通信を管理するため、OSは様々なネットワーク Tutorをサポートし、異なったネットワーク層を有するネットワークを介在する。CiscoのIOSと3ComのEnterprise OSは、ユーザー向けのOSとして使われる。
### 2.4 Supported CPUs and Languages

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<th>Supported Languages</th>
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</tr>
<tr>
<td>eCOS</td>
<td>ARM, MIPS, SPARC, PowerPC</td>
<td>Assembly, C, C++</td>
</tr>
<tr>
<td>pSOS+</td>
<td>68k, ARM, M Core, ColdFire, i960, MIPS, PowerPC, SH, SPARC, x86</td>
<td>Assembly, C, C++, Java, Fortran, ADA</td>
</tr>
<tr>
<td>QNX</td>
<td>MIPS, PowerPC, x86</td>
<td>Assembly, C, C++</td>
</tr>
<tr>
<td>VRTX</td>
<td>68k, ARM, PowerPC, x86, M Core</td>
<td>Assembly, C, C++, Java</td>
</tr>
<tr>
<td>VxWorks</td>
<td>PowerPC, 68k, ColdFire, M Core, x86, ARM, MIPS, SH, SPARC</td>
<td>Assembly, C, C++, Java, Fortran, ADA</td>
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<td>Nucleus PLUS</td>
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<td>eCOS</td>
<td>Unknown</td>
<td>No</td>
</tr>
<tr>
<td>pSOS+</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>QNX</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>VRTX</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>VxWorks</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nucleus PLUS</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>OS-9</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Name</td>
<td>Debuggers supported</td>
<td>Approx. installed base</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Xinu</td>
<td>Post-Mortem Debugger</td>
<td>Unknown</td>
</tr>
<tr>
<td>uC/OS - I, II</td>
<td>Unknown</td>
<td>2,000</td>
</tr>
<tr>
<td>eCOS</td>
<td>GNU GDB</td>
<td>Unknown</td>
</tr>
<tr>
<td>pSOS+</td>
<td>Cross compiler and source level debugger included</td>
<td>7,000</td>
</tr>
<tr>
<td>QNX</td>
<td>CodeWarrior IDE for QNX Neutrino, GNU GDB, Watcom C/C++</td>
<td>One million</td>
</tr>
<tr>
<td>VRTX</td>
<td>XRAY debugger</td>
<td>50,000</td>
</tr>
<tr>
<td>VxWorks</td>
<td>GNU GDB, Tornado,</td>
<td>Unknown - Very Large</td>
</tr>
<tr>
<td>Nucleus PLUS</td>
<td>Nucleus UDB, SDS, EST VisionCLICK, MetaWare, SSI, CodeWarrior</td>
<td>2,300</td>
</tr>
<tr>
<td>OS-9</td>
<td>Hawk, CodeWarrior</td>
<td>Three million</td>
</tr>
</tbody>
</table>
3. 小型嵌入式计算机的存储器和处理能力

小型嵌入式计算机的存储器和处理能力广泛应用于各种工业控制、智能家居和嵌入式系统中。它们通常具有低功耗、小型化和高性能的特点。小型嵌入式计算机的存储器容量通常在100K到4MB之间，而处理器可能采用32位或64位的架构。

3.1 小型嵌入式计算机的存储器容量

小型嵌入式计算机的存储器容量如下表所示:

<table>
<thead>
<tr>
<th></th>
<th>Tiny</th>
<th>Midrange</th>
<th>High-end</th>
<th>Embedded PC</th>
<th>Embedded Server</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flash</td>
<td>100K ~ 4MB</td>
<td>2 ~ 8MB</td>
<td>8 ~ 32MB</td>
<td>16 ~ 64MB</td>
<td>64+ MB or disk</td>
</tr>
<tr>
<td>RAM</td>
<td>500K ~ 2MB</td>
<td>2 ~ 4MB</td>
<td>4 ~ 16MB</td>
<td>16+ MB</td>
<td>64+ MB</td>
</tr>
</tbody>
</table>

5. 小型嵌入式计算机的存储器和处理能力
3.2 トポロジーと配置

100KB 1000KB 5000KB TCP/IP 1 0 10 100 1000 10000

128 256KB TCP/IP 100 200KB 800KB

128 256KB TCP/IP 100 200KB 800KB

128 256KB TCP/IP 100 200KB 800KB

128 256KB TCP/IP 100 200KB 800KB

[24]
3.3  

2.3.3  The Soft and Hard Real-Time Systems  Xiu, Xu  [25].  IEEE  published  an  article  titled  “The  soft  and hard real-time systems” in  [25].  The  article  described  the  characteristics  of  soft  and  hard  real-time  systems.  The  soft  real-time systems  are  systems  that  have  a  guaranteed  response  time  under  normal  conditions.  The  hard  real-time systems  are  systems  that  have  a  guaranteed  response  time  under  all  conditions.  The  article  also  discussed  the  advantages  and  disadvantages  of  soft  and  hard  real-time systems.  The  article  concluded  that  soft  real-time systems  are  more  suitable  for  systems  that  require  high  reliability  and  low  response  time,  while  hard  real-time systems  are  more  suitable  for  systems  that  require  high  reliability  and  high  response  time.  

2.3.3  The Soft and Hard Real-Time Systems  Xiu, Xu  [25].  IEEE  published  an  article  titled  “The  soft  and hard real-time systems” in  [25].  The  article  described  the  characteristics  of  soft  and  hard  real-time  systems.  The  soft  real-time systems  are  systems  that  have  a  guaranteed  response  time  under  normal  conditions.  The  hard  real-time systems  are  systems  that  have  a  guaranteed  response  time  under  all  conditions.  The  article  also  discussed  the  advantages  and  disadvantages  of  soft  and  hard  real-time systems.  The  article  concluded  that  soft  real-time systems  are  more  suitable  for  systems  that  require  high  reliability  and  low  response  time,  while  hard  real-time systems  are  more  suitable  for  systems  that  require  high  reliability  and  high  response  time.  


3.4  

3.4.1  

portability
3.4.2 "Portability" and "Modularity"

Wind River, Inc. VxWorks is a RISC platform that is 98% of CISC, while 80% of C is used in [26]. The "portability" is that it is used on different RISC platforms. The "modularity" is also a benefit of RISC platforms.
3.4.3 GBps

Gbps\[26\]. pSOSystem\[26\] CISC\[26\] 68k\[26\] ROM\[26\] RAM\[26\] pSOSystem\[26\] VxWorks\[26\] I/O\[26\] tightly-coupled VxMP
3.4.4 Some loosely-coupled LAN, bus, pSOS+m, pSOSystem

3.4.5 FIFO, character device, random and sequential block device, file system, internet device, NFS, X-Windows, ISDN
vertical application

PC

pSOSystem

OS-9

mpeg decoder

POSIX

C

POSIX.1

POSIX

POSIX(Portable Operating System Interface) [27]. POSIX
POSIX® has been widely adopted for hard real-time systems. POSIX® latency is the time required for a message to travel from the sender to the receiver. These values are in seconds. [28]. POSIX 1003.1B is a more robust version of POSIX 1003.1. TRON(The Real-time Operating system Nucleus)[12] uses POSIX.3/POSIX.3B. However, the levels of latency vary depending on the implementation. The cost of POSIX interfaces is higher than those of other languages such as C, C++, Fortran, and ADA. The implementation of driver interfaces is also more complex than that of other languages.
3.4.8 C, C++, Fortran, ADA
4. パッドの置き方 いわゆる パッドの 置き方 は

4.1 パッドの 置き方

4.1.1 パッドの 置き方

Alpha, ARM, i386, Motorola 68k, PowerPC, MIPS, S390, SPARC, SPARC64
Motorola DragonBall, ColdFire, MC68360, MC68EN302
ETRAX, Intel i960, Hitachi SH
Crusoe
Intel IA-64
[29, 30, 31]
2.2.17  86,597,632 bytes  18,829,312 bytes  21.74%

PowerPC  2,531,328 bytes  2.92%  100%  97%

VxWorks  97%

4.1.2  modular  configuration tool

Loadable Module Support

Networking Support

Floppy, IDE, SCSI, RAM disk Support

File System Support
Kernel Debugger Support

Etc.

4.1.3 Alpha, i386, PowerPC, S390, SPARC, SPARC64 tightly-coupled symmetric multiprocessing. i386 2.2.17 16 402,183 bytes 393KB tightly-coupled VxMP. VxMP IPC tightly-coupled System V IPC.

4.1.5 12,000 [32, 33]. 1,000 1,000 DB, 500 200 10
4.1.6 \[ /\text{POSIX} \]

The POSIX standard defines a \[ /\text{POSIX} \] library that provides a vertical application interface [34]. The POSIX library is widely used on many platforms to ensure compatibility and portability.

4.1.7 \[ \text{vertical application} \]

The vertical application interface is supported by various programming languages, including C, C++, Fortran, ADA, assembly, Java, Forth, Prolog, Dylan, Eiffel, Modula-2, 100, and many more. This allows developers to build applications that can run on different platforms.

4.1.8 \[ \text{gdb} \]

The gdb debugger is a popular tool that is used to debug applications written in various languages. It is widely used in the development process to help developers identify and fix issues in their code.

[RCS] is another version control system that is often used in conjunction with \[ /\text{POSIX} \] to manage changes to code over time.
gprof supports a variety of operating systems, including OS/2, IRIX, HP-UX, Solaris, AIX, and more. It can be wrapped to use with IDEs that support GUIs. It provides debug wrappers for these IDEs and a text-only IDE [35].

4.1.9  ?????????????????

1. ?????????????
2. ?????????????
3. ?????????????
4. ?????????????
5. ?????????????
6. ?????????????
7. ?????????????
8. Open Source Initiative [36].

1. 
2. 
3. 

GPL, LGPL, BSD, MIT, Artistic [35, 37].

4.2

40
monolithic, layered, virtual machine, client-server... [45]... layered
... monolithic... subsystem... 5... subsystem... [39].

Process Scheduler

Memory Manager

Virtual File System
Inter-Process Communication

Network Interface

subsystem

4.2.1

Architecture Specific Modules

Resource dependency
4.2.2 vertical application

vertical application, POSIX, MMU, MMU, MMU, MMU, [29].
4.2.3 

Resource dependency

Extended service

bin_exec

POSIX
4.2.4 Inter-Process Communication

IPC ¹²³⁴⁵⁶⁷⁸⁹ ¹¹²³⁴⁵⁶

File IPC
fic pipes

Net IPC
Domain Sockets

System V IPC
Message Queues
Shared Memory
Semaphores

Kernel IPC
Wait Queues
Signals

Resource dependency

11 IPC ¹²³⁴⁵⁶⁷⁸⁹

File IPC ¹²³⁴⁵⁶⁷⁸⁹ application ¹²³⁴⁵⁶⁷⁸⁹
System V IPC ¹²³⁴⁵⁶⁷⁸⁹ Net IPC ¹²³⁴⁵⁶⁷⁸⁹ vertical application ¹²³⁴⁵⁶⁷⁸⁹
Kernel IPC ¹²³⁴⁵⁶⁷⁸⁹
System V IPC ¹²³⁴⁵⁶⁷⁸⁹ IPC ¹²³⁴⁵⁶⁷⁸⁹ ¹²³⁴⁵⁶⁷⁸⁹ ¹²³⁴⁵⁶⁷⁸⁹ ¹²³⁴⁵⁶⁷⁸⁹.

4.2.5 ¹²³⁴⁵⁶⁷⁸⁹
4.3.1

12
vertical application

- **glibc** – GNU C Library
- **sglibc** – Small glibc
- **libc5** – Older GNU C Library
- **dietlibc** – To create small statically linked apps
- **Newlib** – C library intended for use on embedded systems

[glibc](https://en.wikipedia.org/wiki/GNU_C_Library)  GNU C Library

[sglibc](https://en.wikipedia.org/wiki/Small_glibc)  Small glibc

[libc5](https://en.wikipedia.org/wiki/GNU_C_Library)  Older GNU C Library

[dietlibc](https://en.wikipedia.org/wiki/Dietlibc)  To create small statically linked apps

[Newlib](https://en.wikipedia.org/wiki/Newlib)  C library intended for use on embedded systems
4.3.2 4.3.2 4.3.2

...
Network File System (NFS)

Initial Ramdisk

ROM File System (ROMFS)

RAM File System (RAMFS)

Compressed RAM File System (CRAMFS)

Journaling Flash File System (JFFS)
Minix

20KB ROMFS

4KB RAM. RAM File System 2.4

2.0KB. Compressed RAM File System RAMFS

1.0KB. RAM File System. RAMFS

2.4

2.2

Journaling Flash File System

Journaling Read-Write

Read-Write Read-Write

Read Only File System

CRAMFS

2.4

2.2

Journaling Flash File System

Journaling Read-Write

Read-Write Read-Write

Read Only File System

CRAMFS
5. 

5.1

13 Network Address Translation
Solve A World Shortage of IP Addresses

Satisfy Security Needs

Ease and Flexibility of Network Administration

5.1.1  ""
WAN interface : 10Base-T Ethernet 1 Port

LAN interface : 10/100Base-T Ethernet 4 Ports, Auto-Sensing

CPU : MPC850DE (have 2 Ethernet Controllers)

Memory : 2MB Flash, 16MB RAM

2 MII Transceivers

1 Switched Repeater (for HUB function)

MPC850DE is a PowerPC 

MC68360 QUICC is a PowerQUICC 

MPC860/850, MPC850, MPC850DE have  

105MIPS at 80MHz (maximum speed)

2KB instruction cache and 1KB data cache

Instruction and data MMUs

Two SCCs (Serial Communication Controller with Ethernet Support)

Two SMCs (Serial Management Channels)

Parallel interface port

PCMCIA interface

Background Debug Mode (BDM)[43] debug interface
3.3V operation

MPC860/850 PowerPC® is a 32-bit RISC microprocessor manufactured by Motorola.

5.1.2 Access Control

NAT (Network Address Translation)

Virtual Server

Access Control

Special Internet Application

Exposed Host

DNS Cache

DHCP Client and Server
**Static Routing**

**PPPoE (PPP over Ethernet)**

<table>
<thead>
<tr>
<th>Virtual Server</th>
<th>LAN</th>
<th>WAN</th>
<th>Access Control</th>
<th>LAN</th>
<th>WAN</th>
<th>PPPoE</th>
<th>WAN</th>
<th>Special Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Application</th>
<th>NAT</th>
<th>LAN</th>
<th>WAN</th>
<th>DHCP</th>
<th>LAN</th>
<th>WAN</th>
<th>IP</th>
<th>DNS</th>
<th>DNS</th>
<th>DHCP</th>
<th>WAN</th>
<th>IP</th>
<th>WAN</th>
<th>PPPoE</th>
<th>WAN</th>
<th>ADSL</th>
<th>PPPoE</th>
<th>PC</th>
</tr>
</thead>
</table>

5.2

...
Linux Kernel or Application Codes

Development Platform

010101
101101
111010
0101

Binary for Target

Target

14 Cross

14 Cross

LED, 7-segment LED

LCD

RS-232
Proprietary or RGDB Protocol

Debugging Platform

RS-232

Target

Serial Port

RGDB Protocol

Debugging Port

PowerPC

BDM (Background Mode Debugger)

gdb

Abatron

BDI2000 for GDB

[44].

15
<table>
<thead>
<tr>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>powerpc-linux-gcc</td>
<td>GNU C and C++ compiler</td>
</tr>
<tr>
<td>powerpc-linux-g++</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-as</td>
<td>GNU assembler</td>
</tr>
<tr>
<td>powerpc-linux-gdb</td>
<td>GNU debugger</td>
</tr>
<tr>
<td>powerpc-linux-objdump</td>
<td>GNU object file tools</td>
</tr>
<tr>
<td>powerpc-linux-objcopy</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-strings</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-strip</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-size</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-ar</td>
<td>GNU library tools</td>
</tr>
<tr>
<td>powerpc-linux-nm</td>
<td></td>
</tr>
<tr>
<td>powerpc-linux-ranlib</td>
<td></td>
</tr>
<tr>
<td>gdbserver</td>
<td>PowerPC Binary that enables application debugging with remote gdb protocol</td>
</tr>
</tbody>
</table>

6 Cross

5.3

MPC850

MPC851
Inter-Process Communication

TCP/IP

PPP  MPC850  serial communication channel
MPC850DE serial management channel

AMD Intel read/write/erase

PPPoE

5.4
<table>
<thead>
<tr>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ash</td>
<td>Shell</td>
</tr>
<tr>
<td>busybox</td>
<td>Multi-function binary</td>
</tr>
<tr>
<td></td>
<td>Works as [., basename, cat, chgrp, chmod, cp, cut, date, df, dmesg, echo, false, free, grep, hostname, id, kill, killall, ln, ls, lsmod, mkdir, mount, mv, nslookup, ping, ps, rm, rmmod, sleep, sync, syslogd, test, touch, true, uname, update and uptime</td>
</tr>
<tr>
<td>tinylogin</td>
<td>Multi-function binary</td>
</tr>
<tr>
<td></td>
<td>Works as getty, login, passwd, sulogin</td>
</tr>
<tr>
<td>route</td>
<td>Show/manipulate the IP routing table</td>
</tr>
<tr>
<td>insmod</td>
<td>Install loadable kernel module</td>
</tr>
<tr>
<td>expr</td>
<td>Evaluate expressions</td>
</tr>
<tr>
<td>stty</td>
<td>Set the options for a terminal</td>
</tr>
<tr>
<td>make_scripts</td>
<td>Make configuration scripts from configuration DB file</td>
</tr>
<tr>
<td>flash_utils</td>
<td>Multi-function binary</td>
</tr>
<tr>
<td></td>
<td>Works as file2flash, flash2file, flash2img, flash_info, img2flash, tftp2flash</td>
</tr>
<tr>
<td>killall5</td>
<td>Send a signal to all processes</td>
</tr>
<tr>
<td>halt, reboot, poweroff</td>
<td>Stop the system</td>
</tr>
</tbody>
</table>
### Name

<table>
<thead>
<tr>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>dhcpd</td>
<td>DHCP daemon</td>
</tr>
<tr>
<td>pump</td>
<td>DHCP client for embedded purpose</td>
</tr>
<tr>
<td>ens</td>
<td>Embedded domain name server</td>
</tr>
<tr>
<td>inetd</td>
<td>Internet super server</td>
</tr>
<tr>
<td>ipchains</td>
<td>IP firewall administration</td>
</tr>
<tr>
<td>ipmasqadm</td>
<td>IP Masquerading additional modules administration</td>
</tr>
<tr>
<td>pppd, pppoe</td>
<td>Poin to Point Protocol daemon and PPPoE wrapper</td>
</tr>
<tr>
<td>telnetd</td>
<td>Telnet server</td>
</tr>
<tr>
<td>webs</td>
<td>GoAhead web server</td>
</tr>
</tbody>
</table>

8 8200KB 200KB
5.5 部分内容

5.5.1 内容

<table>
<thead>
<tr>
<th>Name</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ld-2.1.2.so</td>
<td>Portion of GNU C library</td>
</tr>
<tr>
<td>libc-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libcrypt-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libdl-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libnss_db-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libnss_dns-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libnss_files-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libutil-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libresolv-2.1.2.so</td>
<td></td>
</tr>
<tr>
<td>libgdbm.so.2.0.0</td>
<td>GNU database indexing library</td>
</tr>
<tr>
<td>libproc.so.2.0.0</td>
<td>procs system information library</td>
</tr>
</tbody>
</table>

9 末尾
5.5.2 磁盘文件系统

- ext2 文件系统
- minix 文件系统
- msdos 文件系统
- RAMFS 文件系统

1.1MB 文件系统。
5.5.3 

...
0xFFFF0000

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
<td>20</td>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td>31</td>
</tr>
</tbody>
</table>

End of Mem. Space

- 0 ~ 1: Boot Loader
- 2 ~ 29: Linux Kernel + Ramdisk Image
- 30: Factory Default Configuration File
- 31: Runtime Configuration File

\[ \text{Total Memory} = 3 \text{MB} + 2 \text{MB} + 4 \text{MB} = 9 \text{MB} \]

\[ \text{Total Memory} = 16 \text{MB} \]
15的 PC

ARM
MPC850
6. 

[Blank Page]
フィールド スコア オン チェック ザン
フィールド スコア オン チェック ザン
フィールド スコア オン チェック ザン
フィールド スコア オン チェック ザン
フィールド スコア オン チェック ザン
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フィールド スコア オン チェック ザン


    http://www.microware.com/Products/Software/OS9-overview.html


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    http://www.lineo.com/file_index/w/white_papers/index.html

    http://www.linuxdevices.com/articles/AT9844090738.html

[25] Rick Lehrbaum, “Real-time Linux – what is it, why do you want it, how do you do it?”, September 2000,
    http://www.linuxdevices.com/articles/AT9837719278.html


[29] uClinux, “Embedded Linux Microcontroller Project”,
    http://www.uclinux.org/.

    http://perso.wanadoo.es/xose/linux/linux_ports.html

[31] Linux on IA-64, “The Official Home Page of the IA-64 Linux Project”,
    http://www.linuxia64.org/.


