

# mrubyの組み込みかた

佐原 具幸 (tsahara@iij.ad.jp)

株式会社インターネットイニシアティブ

はじめに

2012/11頃の話です

# mrubyとは?

mruby is the lightweight implementation of the Ruby language...

<https://github.com/mruby/mruby>

[google://mruby/](https://www.google.com/search?q=mruby)

# mrubyを使ったルータ



CPU: ARM 32bit  
Memory: 128MB  
FlashROM: 32MB  
OS: NetBSD

SA-W1 ([www.sacm.jp/#saw1](http://www.sacm.jp/#saw1))



# なぜmrubyを使ったのか

## コンフィグ

```
interface.ge1.ipv4.address : 192.168.0.1/24
interface.wlan0.service    : enable
interface.wlan0.ssid       : guest
interface.wlan0.security   : wpa-psk-aes
route.ipv4.0.destination   : default
route.ipv4.0.gateway       : 100.100.0.1
dhcp.server.0.interface    : wlan0
dhcp.server.0.pool.address : 192.168.0.4/24
dhcp.server.0.pool.count   : 100
```

mruby!

パース/検証/評価/反映



# mrubyを動かす

|          |           |                   |
|----------|-----------|-------------------|
| CPU      | ARM 32bit | ← そこそこふつう         |
| Memory   | 128MB     | ← まあまあある          |
| FlashROM | 32MB      | ← やや厳しめ           |
| OS       | NetBSD    | ← いちおうUnix        |
|          |           | ≡ ふつうの PC (ただし貧弱) |

∴ 動かすだけなら難しくない

# やったこと

- ファームウェアへの組み入れ



# Of course it runs NetBSD



The screenshot shows the NetBSD Project website in a web browser window. The browser's address bar displays "www.netbsd.org". The website's header features the NetBSD logo, the project name "The NetBSD Project", and the slogan "Of course it runs NetBSD". A navigation menu includes links for Home, News & Media, About, Documentation, Support, Community, Developers, Ports, and Packages. The main content area is divided into several sections: a "Get NetBSD" section with a download icon and text about downloading NetBSD 6.1; a "Get Support" section with a question mark icon and text about browsing documentation and getting support; a "Tune in" section with a people icon and text about getting in contact with other users; a "Contribute" section with a wrench icon and text about getting started contributing; a central "Welcome to NetBSD®" section featuring a "20 YEARS" banner (1993-2013) and text about the operating system's features and availability; a "Latest News" section on the right with a list of recent releases and security advisories; and a "Our Platinum Donor" section at the bottom right.

The NetBSD Project  
"Of course it runs NetBSD"

Home News & Media About Documentation Support Community Developers Ports Packages

**Get NetBSD**  
Download NetBSD 6.1 now from one of our mirrors, or obtain a copy on CD.

**Get Support**  
Browse the documentation, get community support, hire a consultant, or check out latest security information.

**Tune in**  
Get in contact with other NetBSD users and share your experience and technical knowledge.

**Contribute**  
Get started contributing and help to improve

**20 YEARS**  
1993 2013

**Welcome to NetBSD®**  
NetBSD is a free, fast, secure, and highly portable Unix-like Open Source operating system. It is available for a wide range of platforms, from large-scale servers and powerful desktop systems to handheld and embedded devices. Its clean design and advanced features make it excellent for use in both production and research environments, and the source code is freely available under a business-friendly license. NetBSD is developed and supported by a large and vivid international community. Many applications are readily available through pkgsrc, the NetBSD Packages Collection.  
» [Learn more](#)

» **Latest release: NetBSD 6.1**  
NetBSD 6.1, the first feature update of the NetBSD 6 release branch, was released on May 18, 2013. It represents a selected subset of fixes deemed important for security or stability reasons. » [Full 6.1 Release Notes](#)

A list of download sites providing FTP, AnonCVS, and other services may be found at the [NetBSD mirror sites](#) page. We encourage users who wish to

**Latest News**  
NetBSD 6.1 Released  
18 May 2013  
NetBSD 6.0.2 Released  
18 May 2013  
Updated Security Advisory: NetBSD-SA2013-003 RNG Bug May Result in Weak Cryptographic Keys (REVISED)  
29 Mar 2013  
NetBSD is 20 years old today!  
21 Mar 2013  
» [Archive](#)  
» [The NetBSD Blog](#)

**Our Platinum Donor**



# ソフトウェアの組み込み

NetBSD

OpenSSL →

← KAME

NTPD →

← Quagga

mruby →

← 独自ソフトウェア

ファームウェア



# ソースコードの取得

```
% wget http://www.openssl.org/  
source/openssl-1.0.1e.tar.gz
```

mrubyの安定版  
はありません。



```
% wget http://www.mruby.org/  
source/mruby-1.0.0.tar.gz
```



# やったこと

- 安定版リリースの作成 ←New!
- フォームウェアへの組み入れ

# mruby on github

The screenshot shows the GitHub repository page for mruby/mruby. The browser address bar displays the URL `https://github.com/mruby/mruby`. The repository is public and has 1,956 stars and 298 forks. The main navigation bar includes links for Code, Network, Pull Requests (8), Issues (33), Wiki, and Graphs. Below the navigation bar, there are buttons for cloning the repository in Mac, ZIP, HTTP, SSH, and Git Read-Only formats. The SSH URL is `git@github.com:mruby/mruby.git`. The repository is currently on the master branch. The commit history shows a merge of the master branch from github.com:mruby/mruby, authored by matz 4 days ago. The latest commit is 5c6d281866. The commit history table lists several commits with their dates and descriptions.

| Commit     | Author         | Date         | Description                                       |
|------------|----------------|--------------|---------------------------------------------------|
| 5c6d281866 | matz           | 4 days ago   | Merge branch 'master' of github.com:mruby/mruby   |
|            | monaka         | 2 months ago | Add fib39.rb to benchmark/                        |
|            | mimaki         | a year ago   | add mruby sources                                 |
|            | bovi           | 24 days ago  | [doc] Add minimal build configuration             |
|            | bovi           | a month ago  | ArduinoDue Target Cosmetic Change                 |
|            | matz           | 4 days ago   | small refactoring over word boxing                |
|            | carsonmcdonald | 4 days ago   | Test for raise when yield is called on root fiber |
|            | monaka         | 24 days ago  | Move comments from hash.c to hash.rb.             |

# iiij/mruby

The screenshot shows the GitHub repository page for `iiij/mruby`. The repository is a fork of `mruby/mruby`. The page includes a navigation bar with links to Explore, Gist, Blog, and Help. The repository name `iiij / mruby` is displayed, along with the text "forked from mruby/mruby". The repository has 42 stars, 297 forks, and 25 issues. The "Code" tab is selected, showing the repository description: "mruby with unix-dependent features — Read more". Below the description are buttons for "Clone in Mac", "ZIP", "HTTP", "SSH", and "Git Read-Only". The SSH URL is `git@github.com:iiij/mruby.git`. The repository has 18 branches and 1000+ commits. The commit history is shown, with the latest commit `c93edd10cd` by `tsahara-iiij` 4 hours ago. The commit history includes a merge of branch 'master' into iiij, a merge of branch 'iij' of `https://github.com/iiij/mruby` into iiij [sogabe], a merge of branch 'master' into iiij [tsahara-iiij], and several other commits.

iiij/mruby · GitHub

GitHub, Inc. [US] <https://github.com/iiij/mruby>

This repository Search or type a command

Explore Gist Blog Help

tsahara-iiij

Pull Request Unwatch Unstar 42 Fork 297

Code Network Pull Requests 0 Issues 25 Wiki Graphs Settings

mruby with unix-dependent features — [Read more](#)

Clone in Mac ZIP HTTP SSH Git Read-Only `git@github.com:iiij/mruby.git` Read+Write access

branch: iiij Files Commits Branches 18 Tags

mruby / 1000+ commits

Merge branch 'master' into iiij

tsahara-iiij authored 4 hours ago latest commit `c93edd10cd`

|           |              |                                                                                                                    |
|-----------|--------------|--------------------------------------------------------------------------------------------------------------------|
| app       | 7 months ago | Merge branch 'iij' of <a href="https://github.com/iiij/mruby">https://github.com/iiij/mruby</a> into iiij [sogabe] |
| benchmark | 2 months ago | Merge branch 'master' into iiij [tsahara-iiij]                                                                     |
| bin       | a year ago   | add mruby sources [mimaki]                                                                                         |
| doc       | 20 days ago  | [doc] Add minimal build configuration [bovi]                                                                       |
| examples  | a month ago  | ArduinoDue Target Cosmetic Change [bovi]                                                                           |
| ext       | 5 months ago | Merge branch 'master' into mrbgems [akiray03]                                                                      |
| include   | 2 days ago   | Merge branch 'master' of <a href="https://github.com/mruby/mruby">github.com:mruby/mruby</a> [matz]                |



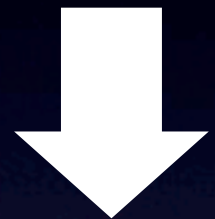
# ブランチ3本+ $\alpha$

| ブランチ   | 用途                   |
|--------|----------------------|
| master | = mruby/mruby        |
| ij     | 開発版                  |
| s1     | 安定版                  |
| その他    | pull-request用など、使い捨て |

mruby/mruby

master —●—●————●————→

iiij/mruby



daily, 自動

master —●—●————●————→



daily, 自動または手動

iiij —●—●—●——●——●——●——→



不定期, レビュー付き手動

s1 —●——●——●——→

# やったこと

- ~~安定版リリースの作成~~
- ファームウェアへの組み入れ



# インポート手順 1.

```
work=$HOME/mruby-import
```

```
% cd $work
```

```
% git checkout -b s1
```

# インポート手順 2.

```
% make
```

```
% make test
```

```
% ./test/posix/all.sh
```

# インポート手順 3.

```
usr=$NetBSD/usr.bin/mruby
```

```
% cp src/y.tab.c mrblib/mrblib.c $usr
```

```
% vi $usr/Makefile
```



# インポート手順 4.

```
dist=$NetBSD/dist/mruby
```

```
% make clean
```

```
% rm -r $dist/*
```

```
% cp -r * $dist
```

# インポート手順 5.

```
% cd $dist; svn add ...
```

```
% svn ci $dist $usr
```

# やったこと

- 安定版リリースの作成
- フォームウェアへの組み入れ



Bug, Bug, Bug!

# やったこと

- 不具合修正 ←New!
- ~~安定版リリースの作成~~
- ~~ファームウェアへの組み入れ~~

# 安定化

- デバッグ環境の整備:
  - バックトレース
  - “require” によるモジュール分割
  - 逆アセンブラ (app/mrbdump)
  - テストフレームワーク (mruby-mtest)
  - デバッガ (mruby-mdebug)



# やったこと

- ~~不具合修正~~
- ~~安定版リリースの作成~~
- ~~ファームウェアへの組み入れ~~

「え？ Ruby なのに  
\*\*\* が無いの？」

# やったこと

- 機能強化 ← New!
- ~~不具合修正~~
- ~~安定版リリースの作成~~
- ~~ファームウェアへの組み入れ~~



# 拡張

- Unix 依存の機能の追加
  - IO, File, Socket, Regexp, Errno, ...
- 既存モジュールの強化
  - Array, String, ...

# ij/mruby-\*

mruby-io

mruby-socket

mruby-regexp-pcre

mruby-errno

mruby-simple-random

mruby-env

mruby-require

mruby-pack

mruby-mock

mruby-syslog

mruby-mtest

mruby-tempfile

mruby-process

mruby-pcap

mruby-dir

(more...)

# 完成！

- 機能強化
- 不具合修正
- 安定版リリースの作成
- ファームウェアへの組み入れ





# 今後

- 組み込んだ mruby の活用
- 次の安定版 = s2 の作成