

# 2018/11/22 CMOSアニーリングマシン

2018年11月22日 10:09

24人

10時5分～

日立 山岡さん

- ・ 日立CMOSイジング計算機、富士通デジタルアニーラ は古典コンピュータ
- ・ 基本単位 古典ビット
- ・ 用途 最適化
- ・ 日立は、半導体で最適化に特化したものを作ろうとして作った
- ・ 日立
  - ・ 室温
  - ・ 計算速度は量子アニーリングよりは遅い
  - ・ 動作電力は0.05W、D-waveは15000W
  - ・ 2015年に65nmプロセスで20480スピノンを開発
- ・ その後、第二世代としてFPGAでアニーリングを開発中
- ・ Q：第一世代（CMOS）と第二世代（FPGA）、今後はFPGAのみ？
- ・ 問題が大きくなると100倍の高速化
- ・ さらに高速化を目指し、シミュレーティッドアニーリング（SQA）をハードウェアに取り込もうとしている。第二世代の中にSQAをFPGAで実装

Q: メルカリ 永山（量子コン研究者）：半導体でどうやって実現している？

<https://r4d.mercari.com/member/10/>

A：スピンの向きを同時にフリップしている。従来は1ビットずつ順番にフリップするイメージ

10時30分～

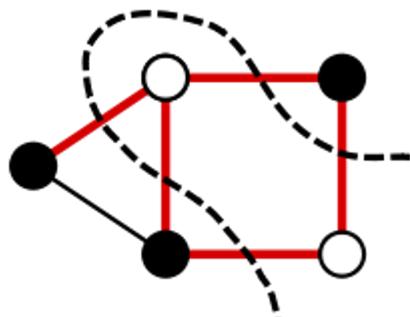
日立 吉村さん

<https://annealing-cloud.com/knowledge/1.html>





[https://ja.wikipedia.org/wiki/カット\\_\(グラフ理論\)](https://ja.wikipedia.org/wiki/カット_(グラフ理論))



貼り付け元 <[https://ja.wikipedia.org/wiki/%E3%82%AB%E3%83%83%E3%83%88\\_\(%E3%82%B0%E3%83%A9%E3%83%95%E7%90%86%E8%AB%96\)](https://ja.wikipedia.org/wiki/%E3%82%AB%E3%83%83%E3%83%88_(%E3%82%B0%E3%83%A9%E3%83%95%E7%90%86%E8%AB%96))>

Annealing Cloud Web  
Experience the CMOS Annealing Machine

# イジングエディタ

イジングエディタではCMOSアニーリングが実行できます。なお、このイジングエディタを使用する場合は、以下の手順を参考してください。

## 使い方

- 3から+3までの間で任意の値を選択できます。
- 「実行」ボタンを押すとCMOSアニーリングが実行されます。
- 最初からやり直す場合は「リセット」ボタンを押します。

▶ 実行

ステータス: 成功

🔧 値を設定

-3 -2 -1 0 +1 +2

パラメーターを設定

アニーリング回数

About ▾

Documents ▾

Play ▾

Sup

マシンのパラメータやスケジュールを設定してアニーリングを実行できます。詳しい説明は[チュートリアル](#)をご覧下  
ると、使用者はAnnealing Cloud Webの[使用約款](#)に同意したものとみなされます。

択し「INPUT」タブにてイジング模型のグラフに外部磁場係数や相互作用係数を設定します。

ニーリングマシンが最適化を行い「OUTPUT」タブに結果が表示されます。

ト」ボタンを押してください。

(実行時間: 279095206 nsec)

元に戻す

やり直す

リセット

INPUT

OUTPUT

+2

+3

エネルギー



-5



下さい。

ト



▼ 詳細設定

Wikipediaと同じ

11：10 F2Fパートナーズ 杉野さん

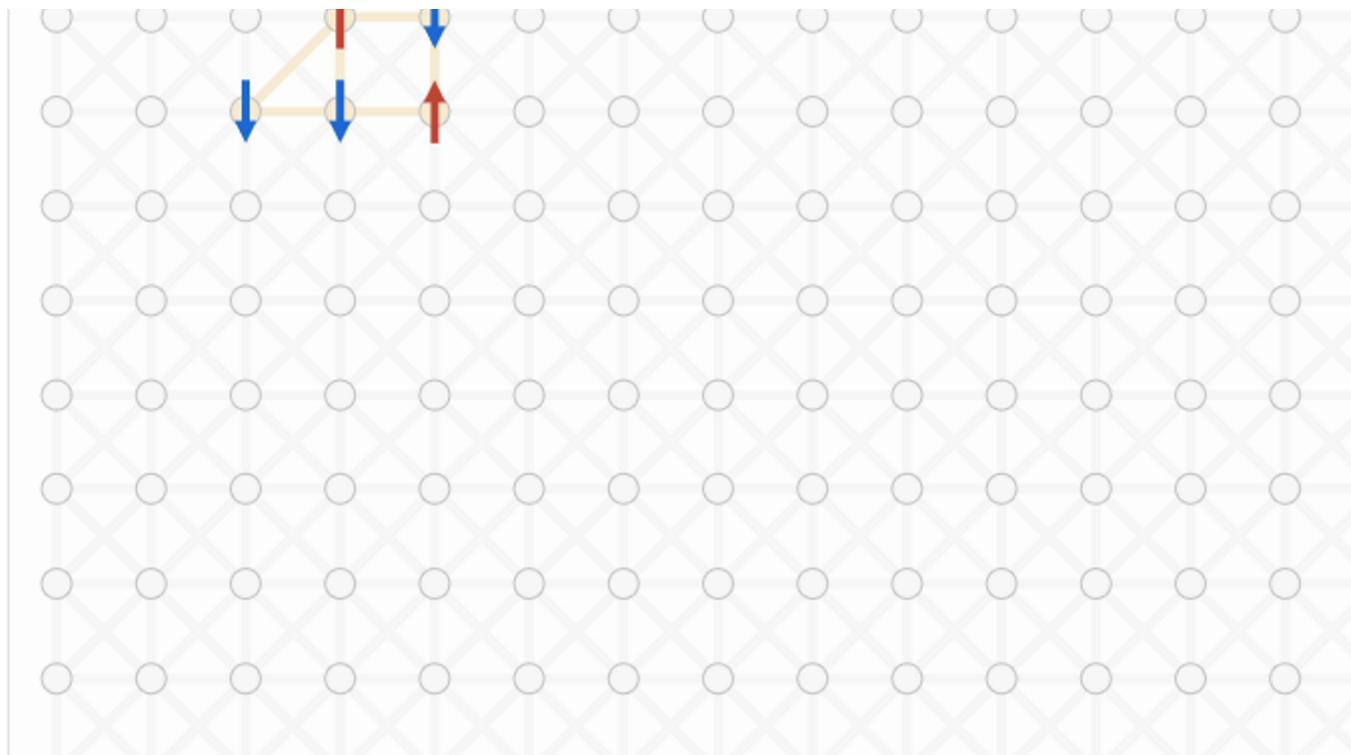
Q:さくらインターネット：回路設計をSQAでやりたい

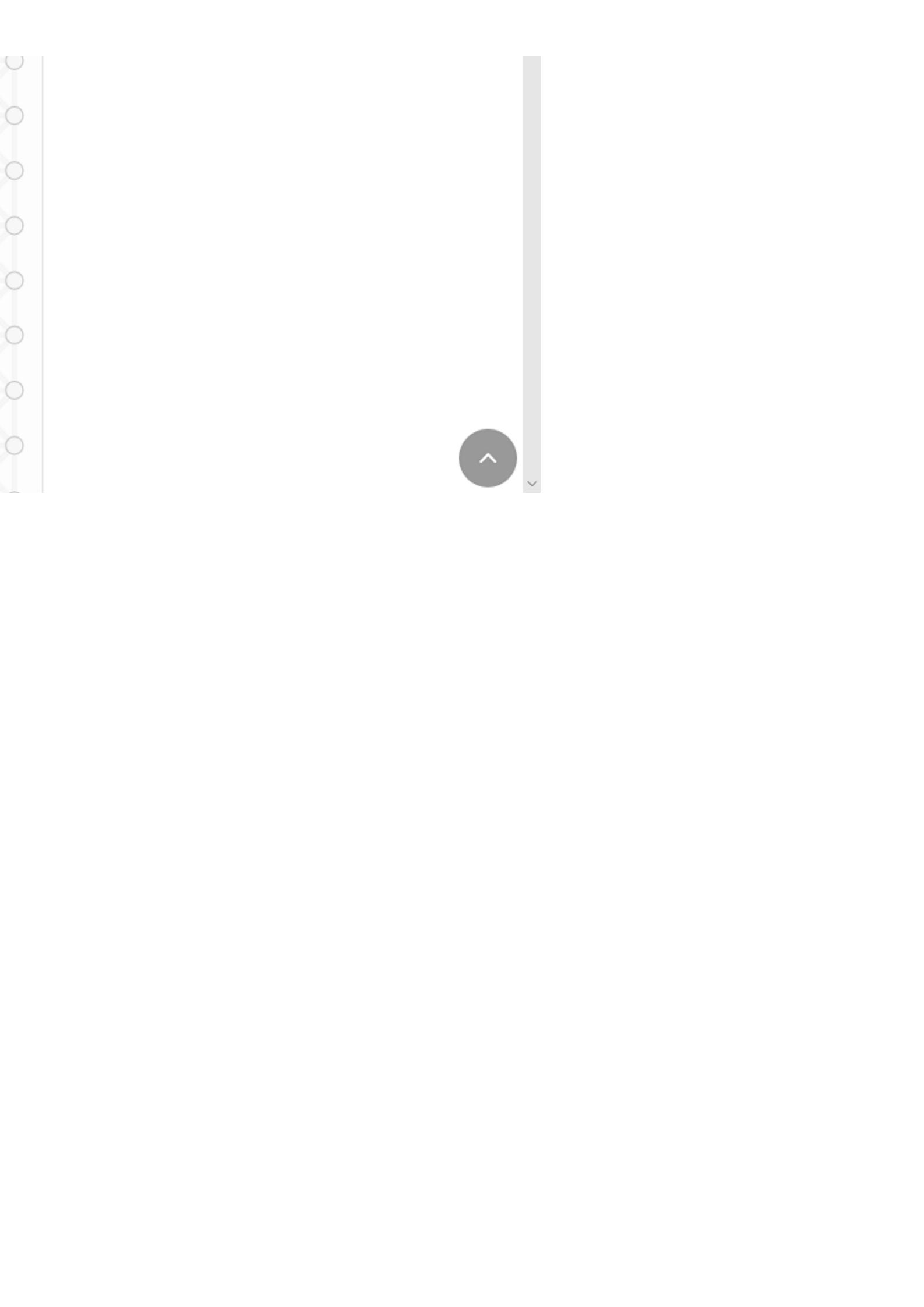
Q:産業機械メーカー

Q:ITメディアニュース

午後

10





```
is07@ik1-317-18943: ~
```

```
PS C:\Users\momota\Documents\OpenSSH-Win64> ssh 153.126.163.197
momota@153.126.163.197's password:
Permission denied, please try again.
momota@153.126.163.197's password:
PS C:\Users\momota\Documents\OpenSSH-Win64>
PS C:\Users\momota\Documents\OpenSSH-Win64>
PS C:\Users\momota\Documents\OpenSSH-Win64>
PS C:\Users\momota\Documents\OpenSSH-Win64> ssh is07@153.126.163.197
is07@153.126.163.197's password:
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-38-generic)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage
```

```
* Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security.
  https://ubuntu.com/livepatch
```

```
SAKURA Internet [Virtual Private Server SERVICE]
```

```
Last login: Tue Nov 20 15:38:07 2018 from 106.128.160.11
is07@ik1-317-18943: ~
DEMO.txt  isingsim*  MEMO.pdf  TIPS.pdf
is07@ik1-317-18943: ~$ ll
total 7024
drwx----- 4 is07 is07 4096 Nov 20 15:38 /
drwxr-xr-x 35 root root 4096 Nov 20 14:41 ../
-rw----- 1 is07 is07 14 Nov 20 15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20 14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:37 .bashrc
drwx----- 2 is07 is07 4096 Nov 20 15:38 .cache/
-rw-r--r-- 1 is07 is07 2140062 Oct 29 2014 DEMO.txt
drwx----- 3 is07 is07 4096 Nov 20 15:38 .gnupg/
-rwx----- 1 is07 is07 4098144 Nov 7 10:54 isingsim*
-rw-r--r-- 1 is07 is07 584011 Nov 7 11:51 MEMO.pdf
-rw-r--r-- 1 is07 is07 807 Nov 20 14:37 .profile
-rw-r--r-- 1 is07 is07 331737 Nov 20 14:59 TIPS.pdf
is07@ik1-317-18943: ~$ less DEMO.txt
is07@ik1-317-18943: ~$
```

```
PS C:\Users\momota\Documents\OpenSSH-Win64> ssh is07@153.126.163.197
is07@153.126.163.197's password:
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-38-generic x86_64)
```

\* Documentation: <https://help.ubuntu.com>

.163.197 is07@

3.126.163.197

eric x86\_64)

Activate at:

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ory  
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\* Management: <https://landscape.canonical.com>

\* Support: <https://ubuntu.com/advantage>

\* Canonical Livepatch is available for installation.

- Reduce system reboots and improve kernel security. Activate at:  
<https://ubuntu.com/livepatch>

SAKURA Internet [Virtual Private Server SERVICE]

```
Last login: Tue Nov 20 15:38:07 2018 from 106.128.160.118
is07@ik1-317-18943:~$ ls
DEMO.txt isingsim* MEMO.pdf TIPS.pdf
is07@ik1-317-18943:~$ ll
total 7024
drwx----- 4 is07 is07 4096 Nov 20 15:38 ./
drwxr-xr-x 35 root root 4096 Nov 20 14:41 ../
-rw----- 1 is07 is07 14 Nov 20 15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20 14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:37 .bashrc
drwx----- 2 is07 is07 4096 Nov 20 15:38 .cache/
-rw-r--r-- 1 is07 is07 2140062 Oct 29 2014 DEMO.txt
drwx----- 3 is07 is07 4096 Nov 20 15:38 .gnupg/
-rwx----- 1 is07 is07 4098144 Nov 7 10:54 isingsim*
-rw-r--r-- 1 is07 is07 584011 Nov 7 11:51 MEMO.pdf
-rw-r--r-- 1 is07 is07 807 Nov 20 14:37 .profile
-rw-r--r-- 1 is07 is07 331737 Nov 20 14:59 TIPS.pdf
is07@ik1-317-18943:~$ less DEMO.txt
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$
```

日立 林真人さん

※プリント

日立 奥山さん

- ・事例紹介
  - ・画像ノイズ削除





- ・4色問題

- ・州ごとに4個のスピンを用意
- ・4個のスピンは1つだけ+1、残り3つは-1
  - ・ $A + B + C + D = 2$
  - ・ $(A + \dots + D - 2)^2$  の最小化問題
- ・隣り合う州は異なる色で塗る
  - ・ $\sigma_1$  と  $\sigma_2$  は同時に +1 にならない
  - ・ $(1 + \sigma_1)(1 + \sigma_2)$  の最小化問題
- ・ネットワークの堅牢性確保問題（頂点カバー問題）
- ・省略

- ・式からイジングモデルへの変換は、理論的に完ぺきに可能

- ・pyqubo

## Hands-on

### DEMO.txtが問題サンプル

### 最小実行

```
is07@ik1-317-18943:~$ ./isingsim --chip fy13 --coeff DEMO.txt
./isingsim --chip fy13 --coeff DEMO.txt
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000 MHz
IsingChipFY13: rand1Clock = 200.000000 MHz
IsingChipFY13: rand2Clock = 200.000000 MHz
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO.txt
initial_energy = 144
final_energy,-49696,seed,100,clock,36000
is07@ik1-317-18943:~$
```

Final energyが0に小さければ良い

↓ 試行回数を3600から100にするとFinalEnergyが低くない

```
is07@ik1-317-18943:~$ ./isingsim --chip fy13 --coeff DEMO.txt --duration 100
```





```
./isingsim --chip fy13 --coeff DEMO.txt --duration 100
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000 MHz
IsingChipFY13: rand1Clock = 200.000000 MHz
IsingChipFY13: rand2Clock = 200.000000 MHz
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO.txt
initial_energy = 144
final_energy,-36448,seed,100,clock,100
```

Fixstars 二木さん ふたつぎ

NECアニメラ  
内閣府

創薬

Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.

```
PS C:\Users\momota> ssh 153.126.163.197
The authenticity of host '153.126.163.197' (153.126.163.197) can't be established.
ECDSA key fingerprint is SHA256:YZNy+TQ43s6pPpUDUnkygL6EEIW6fzx08SQ...
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '153.126.163.197' (ECDSA) to the list of known hosts.
momota@153.126.163.197's password:
Permission denied, please try again.
momota@153.126.163.197's password:
Connection closed by 153.126.163.197 port 22
PS C:\Users\momota>
PS C:\Users\momota>
```

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necting

63.197'

oort 22



```
PS C:\Users\momota>
PS C:\Users\momota> cd C:\Users\momota\
\Documents\OpenSSH-Win64
PS C:\Users\momota\Documents\OpenSSH-Win64>
```

ディレクトリ: C:\Users\momota\Documents\OpenSSH-Win64

Mode	LastWriteTime	Length
----	-----	-----
-a---	2018/11/22 12:54	17
	FixHostFilePermissions.ps1	
-a---	2018/11/22 12:54	15
	FixUserFilePermissions.ps1	
-a---	2018/11/22 12:54	15
	sshd.ps1	
-a---	2018/11/22 12:54	162
	libcrypto.dll	
-a---	2018/11/22 12:54	63
	events.man	
-a---	2018/11/22 12:54	14
	OpenSSHUtils.psd1	
-a---	2018/11/22 12:54	42
	OpenSSHUtils.psm1	
-a---	2018/11/22 12:54	328
-a---	2018/11/22 12:54	345
	server.exe	
-a---	2018/11/22 12:54	398
-a---	2018/11/22 12:54	501
	add.exe	
-a---	2018/11/22 12:54	397
	agent.exe	
-a---	2018/11/22 12:54	647
	keygen.exe	
-a---	2018/11/22 12:54	544
	keyscan.exe	
-a---	2018/11/22 12:54	162
	shellhost.exe	

omota

enSSH-Win64>

cuments

length Name

---

399

712

505 install-

4200

326 openssh-

147

695

3328 scp.exe

5080 sftp-

3984 sftp.exe

784 ssh-

7848 ssh-

192 ssh-

1280 ssh-

2432 ssh-



```
-a---- 2018/11/22 12:54 883  
-a---- 2018/11/22 12:54 976  
-a---- 2018/11/22 12:54 21  
sshd_config_default  
-a---- 2018/11/22 12:54 15  
sshd.ps1
```

```
PS C:\Users\momota\Documents\OpenSSH\bin> ssh 153.126.163.197  
momota@153.126.163.197's password:  
Permission denied, please try again.  
momota@153.126.163.197's password:  
Permission denied, please try again.  
momota@153.126.163.197's password:  
momota@153.126.163.197: Permission denied (publickey,password).  
PS C:\Users\momota\Documents\OpenSSH\bin> ssh is07  
C:\Windows\System32\OpenSSH>  
Could not resolve hostname is07: $202$202$346$202$244$202$310$203z$203$315$225s$226$276$202$305$202$267  
PS C:\Users\momota\Documents\OpenSSH\bin>  
PS C:\Users\momota\Documents\OpenSSH\bin> ssh 153.126.163.197 is07@  
momota@153.126.163.197's password:  
Permission denied, please try again.  
momota@153.126.163.197's password:  
PS C:\Users\momota\Documents\OpenSSH\bin>  
PS C:\Users\momota\Documents\OpenSSH\bin>  
PS C:\Users\momota\Documents\OpenSSH\bin>  
PS C:\Users\momota\Documents\OpenSSH\bin> ssh is07@153.126.163.197  
is07@153.126.163.197's password:  
Welcome to Ubuntu 18.04.1 LTS (GNU/  
4.15.0-38-generic x86_64)
```

- \* Documentation: <https://help.ubuntu.com>
- \* Management: <https://landscape.canonical.com>
- \* Support: <https://ubuntu.com/advisor>

8736 ssh.exe

6408 sshd.exe

43

862 uninstall-

enSSH-Win64>

denied

enSSH-Win64>

%%%%ssh.exe:

427342024314

3X4203g4202

74201B

enSSH-Win64>

enSSH-Win64>

enSSH-Win64>

enSSH-Win64>

enSSH-Win64>

enSSH-Win64>

'Linux

.com

[canonical.com](http://canonical.com)

vantage



\* Canonical Livepatch is available for i  
- Reduce system reboots and improve  
security. Activate at:

<https://ubuntu.com/livepatch>

SAKURA Internet [Virtual Private Serve

```
Last login: Tue Nov 20 15:38:07 2018 fr  
106.128.160.118  
is07@ik1-317-18943:~$ ls  
DEMO.txt isingsim* MEMO.pdf TIPS.pdf  
is07@ik1-317-18943:~$ ll  
total 7024  
drwx----- 4 is07 is07 4096 Nov 20 11:11 .  
drwxr-xr-x 35 root root 4096 Nov 20 11:11 ..  
-rw----- 1 is07 is07 14 Nov 20 15:38 .bash_history  
-rw-r--r-- 1 is07 is07 220 Nov 20 14:37 .bash_logout  
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:37 .profile  
drwx----- 2 is07 is07 4096 Nov 20 11:11 .Xauthority  
-rw-r--r-- 1 is07 is07 2140062 Oct 29 11:11 .Xauthority.old  
drwx----- 3 is07 is07 4096 Nov 20 11:11 .Xresources  
-r-x----- 1 is07 is07 4098144 Nov 7 11:11 .Xresources.old  
-rw-r--r-- 1 is07 is07 584011 Nov 7 11:11 .Xresources.save  
-rw-r--r-- 1 is07 is07 807 Nov 20 14:38 .Xresources.save.old  
-rw-r--r-- 1 is07 is07 331737 Nov 20 14:38 .Xresources.old.old  
is07@ik1-317-18943:~$ less DEMO.txt  
is07@ik1-317-18943:~$  
is07@ik1-317-18943:~$ cd isingsim  
d: command not found  
is07@ik1-317-18943:~$ Connection res  
153.126.163.197 port 22  
PS C:\Users\momota\Documents\Open  
PS C:\Users\momota\Documents\Open  
ssh is07@153.126.163.197  
is07@153.126.163.197's password:  
Welcome to Ubuntu 18.04.1 LTS (GNU/  
4.15.0-38-generic x86_64)
```

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5:38 ./  
4:41 ../

:37 .bashrc  
5:38 .cache/  
2014 DEMO.txt  
5:38 .gnupg/  
0:54 isingsim\*  
1:51 MEMO.pdf  
37 .profile  
4:59 TIPS.pdf

set by

enSSH-Win64>  
enSSH-Win64>

'Linux



- \* Documentation: <https://help.ubuntu.com>
- \* Management: <https://landscape.canonical.com>
- \* Support: <https://ubuntu.com/advisor>

- \* Canonical Livepatch is available for i...
  - Reduce system reboots and improve security. Activate at:

<https://ubuntu.com/livepatch>

SAKURA Internet [Virtual Private Serve

Last login: Thu Nov 22 12:57:52 2018 from  
61.211.224.35

```
is07@ik1-317-18943:~$ ./isingsim --ch  
input/randgen_128x80x2_50_1.txt --dur  
energyhist history.txt --dump-spin spin.  
sched
```

```
unknown option: --use-exp-sched
./isingsim --chip int --coeff input/randg
50_1.txt --duration 1000 --energyhist hist
dump-spin spin.txt --use-exp-sched
seed = 100
```

Could not open coefficient file "input/rad  
128x80x2\_50\_1.txt"

```
# error: Could not open coefficient file  
is07@ik1-317-18943:~$ ./isingsim --ch  
DEMO.txt
```

```
./isingsim --chip fy13 --coeff DEMO.txt  
seed = 100
```

spin = 128 x 80 x 2

IsingChipFY13: interactClock = 100.000

IsingChipFY13: rand1Clock = 200.000

IsingChipFY13: rand2Clock = 200.000

IsingChipFY13: cellDelay = 100 psec

IsingChipFY13: randmode = 1

read coeff from: DEMO.txt

initial\_energy = 144

final\_energy,-49696,seed,100,clock,360

```
is07@ik1-317-18943:~$ ./isingsim --ch
```

[.com](#)  
[canonical.com](#)  
[vantage](#)

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ip int --coeff  
ation 1000 --  
.txt --use-exp-

gen\_128x80x2\_  
story.txt --

andgen\_

ip fy13 --coeff

0000 MHz  
0000 MHz  
0000 MHz  
:

00  
ip fy13 --coeff



```
DEMO.txt --duration 100
./isingsim --chip fy13 --coeff DEMO.txt
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock = 200.000000
IsingChipFY13: rand2Clock = 200.000000
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO.txt
initial_energy = 144
final_energy,-36448,seed,100,clock,100
is07@ik1-317-18943:~$ ./isingsim --ch
DEMO.txt --duration 100 --var1-seed 1
./isingsim --chip fy13 --coeff DEMO.txt
100 --var1-seed 123
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock = 200.000000
IsingChipFY13: rand2Clock = 200.000000
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO.txt
initial_energy = 144
final_energy,-37902,seed,100,clock,100
is07@ik1-317-18943:~$ ||
total 7288
drwx----- 4 is07 is07 4096 Nov 22 14:38 .bash_history
drwxr-xr-x 35 root root 4096 Nov 20 14:37 .bash_logout
-rw------- 1 is07 is07 14 Nov 20 15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20 14:37 .bash_logout
14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:38 .bash_history
drwx----- 2 is07 is07 4096 Nov 20 14:37 .bash_logout
-rw-r--r-- 1 is07 is07 2140062 Oct 29 14:38 .bash_history
drwx----- 3 is07 is07 4096 Nov 20 14:37 .bash_logout
-rw-rw-r-- 1 is07 is07 0 Nov 22 14:38 .bash_history
-rwx----- 1 is07 is07 4098144 Nov 7 14:38 .bash_logout
-rw-r--r-- 1 is07 is07 584011 Nov 7 14:38 .bash_logout
```

--duration 100

0000 MHz

0000 MHz

0000 MHz

:

ip fy13 --coeff

23

--duration

0000 MHz

0000 MHz

0000 MHz

:

4:11 ./

4:41 ../

:37 .bashrc

5:38 .cache/

2014 DEMO.txt

5:38 .gnupg/

11 history.txt

0:54 isingsim\*

1:51 MEMO.pdf



```
-r-x----- 1 is07 is07 133256 Nov 22 1
probgen_complete*
-r-x----- 1 is07 is07 133256 Nov 22 1
probgen_lattice*
-rw-r--r-- 1 is07 is07 807 Nov 20 14:
-rw-r--r-- 1 is07 is07 331737 Nov 20 1
is07@ik1-317-18943:~$ cp * C:¥Users¥
¥Documents¥CMOS¥
> ^C
is07@ik1-317-18943:~$ cp * "C:¥Users¥
¥Documents¥CMOS¥"
> ^C
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$ cp * .
cp: 'DEMO.txt' and './DEMO.txt' are the same file
cp: 'history.txt' and './history.txt' are the same file
cp: 'isingsim' and './isingsim' are the same file
cp: 'MEMO.pdf' and './MEMO.pdf' are the same file
cp: 'probgen_complete' and './probgen_
the same file
cp: 'probgen_lattice' and './probgen_lattice'
same file
cp: 'TIPS.pdf' and './TIPS.pdf' are the same file
is07@ik1-317-18943:~$ ll
total 7292
drwx----- 4 is07 is07 4096 Nov 22 1
drwxr-xr-x 35 root root 4096 Nov 20 1
-rw----- 1 is07 is07 14 Nov 20
15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20
14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:
drwx----- 2 is07 is07 4096 Nov 20 1
-rw-r--r-- 1 is07 is07 2140062 Oct 29 1
drwx----- 3 is07 is07 4096 Nov 20 1
-rw-rw-r-- 1 is07 is07 0 Nov 22 14:
-r-x----- 1 is07 is07 4098144 Nov 7 1
-rw-r--r-- 1 is07 is07 584011 Nov 7 11
-r-x----- 1 is07 is07 133256 Nov 22 1
probgen_complete*
-rwx----- 1 is07 is07 138840 Nov 22 1
```

3:40

3:40

:37 .profile

4:59 TIPS.pdf

:momota

\$momota

same file

the same file

ame file

he same file

'complete' are

'actice' are the

ame file

4:11 ./

4:41 ../

:37 .bashrc

5:38 .cache/

2014 DEMO.txt

5:38 .gnupg/

11 history.txt

0:54 isingsim\*

1:51 MEMO.pdf

3:40

13:40



```
probgen_lattice*
-rw-r--r-- 1 is07 is07 807 Nov 20 14:
-rw-r--r-- 1 is07 is07 331737 Nov 20 1
is07@ik1-317-18943:~$ ./probgen_lattice
5 --range 10 --out hoge.txt
nx = 10, ny = 5, nz = 2
rmin = -10, rmax = 10
out_filename = hoge.txt
rand seed = 1542864237
is07@ik1-317-18943:~$ ||
total 7300
drwx----- 4 is07 is07 4096 Nov 22 1
drwxr-xr-x 35 root root 4096 Nov 20 1
-rw----- 1 is07 is07 14 Nov 20
15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20
14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:
drwx----- 2 is07 is07 4096 Nov 20 1
drwx----- 1 is07 is07 2140062 Oct 29 1
drwx----- 3 is07 is07 4096 Nov 20 1
-rw-rw-r-- 1 is07 is07 0 Nov 22 14:
-rw-rw-r-- 1 is07 is07 7304 Nov 22 1
-rwx----- 1 is07 is07 4098144 Nov 7 1
-rw-r--r-- 1 is07 is07 584011 Nov 7 11
-rwx----- 1 is07 is07 133256 Nov 22 1
probgen_complete*
-rwx----- 1 is07 is07 138840 Nov 22 1
probgen_lattice*
-rw-r--r-- 1 is07 is07 807 Nov 20 14:
-rw-r--r-- 1 is07 is07 331737 Nov 20 1
is07@ik1-317-18943:~$ less hoge.txt
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$ less DEMO.txt
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$ vi DEMO2.txt
is07@ik1-317-18943:~$ 11 lines, 104 c
written
is07@ik1-317-18943:~$ ./isingsim --ch
```

37 .profile  
4:59 TIPS.pdf  
ce --nx 10 --ny

4:23 ./  
4:41 ../

:37 .bashrc  
5:38 .cache/  
2014 DEMO.txt  
5:38 .gnupg/  
11 history.txt  
4:23 hoge.txt  
0:54 isingsim\*  
1:51 MEMO.pdf  
3:40

13:40

37 .profile  
4:59 TIPS.pdf

haracters

ip fy13 --coeff



```
DEMO2.txt
./isingsim --chip fy13 --coeff DEMO2.txt
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock   = 200.000000
IsingChipFY13: rand2Clock   = 200.000000
IsingChipFY13: cellDelay    = 100 psec
IsingChipFY13: randmode     = 1
read coeff from: DEMO2.txt
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ less DEMO2.txt
is07@ik1-317-18943:~$ ./isingsim --chip fy13 --coeff DEMO2.txt -dump-spin DEMO2.out
unknown option: -dump-spin
unknown option: DEMO2.out
./isingsim --chip fy13 --coeff DEMO2.txt -dump-spin DEMO2.out
DEMO2.out
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock   = 200.000000
IsingChipFY13: rand2Clock   = 200.000000
IsingChipFY13: cellDelay    = 100 psec
IsingChipFY13: randmode     = 1
read coeff from: DEMO2.txt
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ more DEMO2.out
more: stat of DEMO2.out failed: No such
directory
is07@ik1-317-18943:~$ ll
total 7304
drwx----- 4 is07 is07 4096 Nov 22 14:38 .
drwxr-xr-x 35 root root 4096 Nov 20 14:38 ..
-rw----- 1 is07 is07 14 Nov 20 15:38 .bash_history
-rw-r--r-- 1 is07 is07 220 Nov 20 14:37 .bash_logout
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:38 .cshrc
```

xt

0000 MHz

0000 MHz

0000 MHz

:

t

ip fy13 --coeff

xt -dump-spin

0000 MHz

0000 MHz

0000 MHz

:

out

h file or

4:50 ./

4:41 ../

:37 .bashrc



```
drwx----- 2 is07 is07 4096 Nov 20 19:15
-rw-rw-r-- 1 is07 is07 104 Nov 22 14:21
-rw-r--r-- 1 is07 is07 2140062 Oct 29 20:21
drwx----- 3 is07 is07 4096 Nov 20 19:15
-rw-rw-r-- 1 is07 is07 0 Nov 22 14:21
-rw-rw-r-- 1 is07 is07 7304 Nov 22 14:21
-r-x----- 1 is07 is07 4098144 Nov 7 11:11
-rw-r--r-- 1 is07 is07 584011 Nov 7 11:11
-r-x----- 1 is07 is07 133256 Nov 22 14:21
probgen_complete*
-rwx----- 1 is07 is07 138840 Nov 22 14:21
probgen_lattice*
-rw-r--r-- 1 is07 is07 807 Nov 20 14:21
-rw-r--r-- 1 is07 is07 331737 Nov 20 14:21
is07@ik1-317-18943:~$ ./isingsim --chip DEMO2.txt --dump-spin DEMO2.out
./isingsim --chip fy13 --coeff DEMO2.txt --seed 100 --spin 128x80x2
DEMO2.out
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock = 200.000000
IsingChipFY13: rand2Clock = 200.000000
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO2.txt
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ more DEMO2.out
is07@ik1-317-18943:~$ Connection refused
153.126.163.197 port 22
PS C:\Users\momota\Documents\OpenSSH\ssh is07@153.126.163.197
is07@153.126.163.197's password:
Welcome to Ubuntu 18.04.1 LTS (GNU/Linux 4.15.0-38-generic x86_64)
```

- \* Documentation: <https://help.ubuntu.com>
- \* Management: <https://landscape.canonical.com>
- \* Support: <https://ubuntu.com/advice>

5:38 .cache/  
.:50 DEMO2.txt  
2014 DEMO.txt  
5:38 .gnupg/  
11 history.txt  
4:23 hoge.txt  
0:54 isingsim\*  
1:51 MEMO.pdf  
3:40

13:40

37 .profile  
4:59 TIPS.pdf  
ip fy13 --coeff  
xt --dump-spin

0000 MHz  
0000 MHz  
0000 MHz  
:

out  
set by

enSSH-Win64>

/Linux

.com  
canonical.com  
vantage



\* Canonical Livepatch is available for i

- Reduce system reboots and improve security. Activate at:

<https://ubuntu.com/livepatch>

SAKURA Internet [Virtual Private Serve

```
Last login: Thu Nov 22 14:06:41 2018 fr  
61.211.224.35  
is07@ik1-317-18943:~$ ll  
total 7304  
drwx----- 4 is07 is07 4096 Nov 22 15:  
drwxr-xr-x 35 root root 4096 Nov 20 11:  
-rw----- 1 is07 is07 14 Nov 20  
15:38 .bash_history  
-rw-r--r-- 1 is07 is07 220 Nov 20  
14:37 .bash_logout  
-rw-r--r-- 1 is07 is07 3771 Nov 20 14:  
drwx----- 2 is07 is07 4096 Nov 20 11:  
-rw-rw-r-- 1 is07 is07 0 Nov 22 15:  
-rw-rw-r-- 1 is07 is07 104 Nov 22 14:  
-rw-r--r-- 1 is07 is07 2140062 Oct 29 2:  
drwx----- 3 is07 is07 4096 Nov 20 11:  
-rw-rw-r-- 1 is07 is07 0 Nov 22 14:  
-rw-rw-r-- 1 is07 is07 7304 Nov 22 11:  
-r-x----- 1 is07 is07 4098144 Nov 7 11:  
-rw-r--r-- 1 is07 is07 584011 Nov 7 11:  
-r-x----- 1 is07 is07 133256 Nov 22 11:  
probgen_complete*  
-rwx----- 1 is07 is07 138840 Nov 22 11:  
probgen_lattice*  
-rw-r--r-- 1 is07 is07 807 Nov 20 14:  
-rw-r--r-- 1 is07 is07 331737 Nov 20 11:  
is07@ik1-317-18943:~$ more DEMO2.t  
Ising Model v1.0  
| 1 -1 1  
| -1 1 1  
| -1 1 1  
| 1 -1 1  
| 1 -1 1
```

nstallation.  
e kernel

r SERVICE]

om

5:03 ./  
4:41 ../

:37 .bashrc  
5:38 .cache/  
03 DEMO2.out  
:50 DEMO2.txt  
2014 DEMO.txt  
5:38 .gnupg/  
11 history.txt  
4:23 hoge.txt  
0:54 isingsim\*  
1:51 MEMO.pdf  
3:40

13:40

:37 .profile  
4:59 TIPS.pdf  
xt



```
| -1 1 1  
| -1 1 1  
| 1 1 1  
| 1 1 1  
| 1 1 1  
is07@ik1-317-18943:~$ vi DEMO2.txt  
is07@ik1-317-18943:~$ is07@ik1-317-18943:~$ ./isingsim --chip fy13 --coeff DEMO2.out  
DDEMO2.out  
unknown option: -dump-spin  
unknown option: DEMO2.out  
../isingsim --chip fy13 --coeff DEMO2.txt  
DEMO2.out  
seed = 100  
spin = 128 x 80 x 2  
IsingChipFY13: interactClock = 100.000000  
IsingChipFY13: rand1Clock = 200.000000  
IsingChipFY13: rand2Clock = 200.000000  
IsingChipFY13: cellDelay = 100 psec  
IsingChipFY13: randmode = 1  
read coeff from: DEMO2.txt  
IsingCell::setCoeff - dst not found(dst =  
9IsingCelllbE), src=[1,0,0](0x7fdc84273090  
0x7fdc84273090  
IsingCell::setCoeff - dst not found(dst =  
9IsingCelllbE), src=[1,0,0](0x7fdc84273090  
0x7fdc84273090  
IsingCell::setCoeff - dst not found(dst =  
9IsingCelllbE), src=[1,0,0](0x7fdc84273090  
0x7fdc84273090  
initial_energy = 0  
final_energy,0,seed,100,clock,36000  
is07@ik1-317-18943:~$ vi DEMO2.txt
```

```
is07@ik1-317-18943:~$ ./isingsim --chip fy13 --coeff DEMO2.out  
DDEMO2.out  
unknown option: -dump-spin  
unknown option: DEMO2.out  
../isingsim --chip fy13 --coeff DEMO2.out  
DEMO2.out  
seed = 100
```

18943:~  
.txt -dump-spin

xt -dump-spin

0000 MHz  
0000 MHz  
0000 MHz  
;

=  
090), dst=

=  
090), dst=

=  
090), dst=

ip fy13 --coeff

xt -dump-spin



```
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock   = 200.000000
IsingChipFY13: rand2Clock   = 200.000000
IsingChipFY13: cellDelay    = 100 psec
IsingChipFY13: randmode     = 1
read coeff from: DEMO2.txt
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7ff3305df090
0x7ff3305df090
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7ff3305df090
0x7ff3305df090
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ vi DEMO2.txt
is07@ik1-317-18943:~$ 11 lines, 105 c
written
is07@ik1-317-18943:~$ ./isingsim --ch
DEMO2.txt -dump-spin DEMO2.out
unknown option: -dump-spin
unknown option: DEMO2.out
./isingsim --chip fy13 --coeff DEMO2.tx
DEMO2.out
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock   = 200.000000
IsingChipFY13: rand2Clock   = 200.000000
IsingChipFY13: cellDelay    = 100 psec
IsingChipFY13: randmode     = 1
read coeff from: DEMO2.txt
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7f18caf50090
0x7f18caf50090
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7f18caf50090
0x7f18caf50090
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ vi DEMO2.txt
```

0000 MHz  
0000 MHz  
0000 MHz

>

=  
090), dst=

=  
090), dst=

haracters

ip fy13 --coeff

xt -dump-spin

0000 MHz  
0000 MHz  
0000 MHz

>

=  
090), dst=

=  
090), dst=



```
11 lines, 115 characters written
is07@ik1-317-18943:~$ ./isingsim --ch
DEMO2.txt -dump-spin DEMO2.out
unknown option: -dump-spin
unknown option: DEMO2.out
./isingsim --chip fy13 --coeff DEMO2.tx
DEMO2.out
seed = 100
spin = 128 x 80 x 2
IsingChipFY13: interactClock = 100.000000
IsingChipFY13: rand1Clock = 200.000000
IsingChipFY13: rand2Clock = 200.000000
IsingChipFY13: cellDelay = 100 psec
IsingChipFY13: randmode = 1
read coeff from: DEMO2.txt
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7ffaedefc0
0x7ffaedefc090
IsingCell::setCoeff - dst not found(dst =
9IsingCelllbE), src=[1,0,0](0x7ffaedefc0
0x7ffaedefc090
initial_energy = 0
final_energy,0,seed,100,clock,36000
is07@ik1-317-18943:~$ vi DEMO2.txt
is07@ik1-317-18943:~$
is07@ik1-317-18943:~$
```

ラップアップ

参加者  
ガチ  
にわか

次にできること  
ガチな議論  
勉強会  
エンドユーザー向けニーズ探りあい会、事例

ip fy13 --coeff

xt -dump-spin

0000 MHz

0000 MHz

0000 MHz

;

=

090), dst=

=

090), dst=

