

Redmine

????????????????Redmine???????????

- ???????
- ?????
- ???

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- [Redmine?????](#)
 - [Ubuntu 20.04?Redmine4.2\(???Redmine5.0\)???????](#)
 - [Ubuntu 20.04/22.04/24.04?Redmine5.1???????](#)
 - [Redmine4.2\(Redmine 5.x\)?SSL??](#)
 - [Redmine4.2\(Redmine5.x\)?????????](#)
 - [Redmine4.2\(5.x\)?Gmail???????](#)
 - [Redmine4.2\(5.x\)?????????????](#)

Redmine?????

Ubuntu 20.04?Redmine4.2(???Redmine5.0) ????????

??????????

1. Redmine????????????????????????????????
2. Redmine????????????(Ruby/??????/Web??????)???????????
3. ???????Web??????????????????
4. Redmine??????????????

??????????

- ?Redmine??Ubuntu??????????????
- ???????????????????????

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- Ubuntu??????????????????????????????
- DNS????????????????????????????????
- ???????????
 - Apache?
 - MySQL
 - Ruby 2.7
- ??????????????aptitude?????????apt??????????????????????????

????

- ?????Redmine 4.2 / Redmine 5.0????????????????????
- ?Redmine??4.2????????
 - 5.x????????????????????????4.2????????????????????(2023?1???)????????????????????
 - ???Ubuntu22.04??????????Redmine????????5.x??????????????????Ubuntu?20.04??????????
- ???redmine??????????/home/www-data/redmine??????????????(/var/lib/redmine)????????????????????
- ???Ubuntu22.04???Ruby????????????????4.2??????????????????

??

????????????????????????

- ?????????????????

```
sudo aptitude update
```

- ????????????

```
sudo aptitude install build-essential zlib1g-dev libssl-dev libreadline-dev libyaml-dev libcurl4-openssl-dev libffi-dev mysql-server mysql-client apache2 apache2-dev libapr1-dev libaprutil1-dev imagemagick libmagick++-dev fonts-takao-pgothic subversion git ruby libruby ruby-dev libmysqlclient-dev
```

apache????????????????

```
sudo aptitude install libapache2-mod-passenger
```

ruby???????(gem)????????????????

```
sudo gem install bundler racc mysql2
```

?3 gems installed????????????????

??????mysql????????

mysql_secure_installation????????

????????????????

<https://barrel.reisalin.com/books/bbf94/page/mysql-secure-installation>

mysql?DB????????

```
sudo mysql -u root -p
```

??????mysql?root??????mysql??????

```
CREATE DATABASE redmine character set utf8mb4;
```

DB "redmine" ??????

```
CREATE USER 'redmine'@'localhost' IDENTIFIED BY 'password';
```

??? "redmine"????????

??'password'????????

```
GRANT ALL ON redmine.* TO 'redmine'@'localhost';
```

```
flush privileges;
```

```
exit
```

Redmine??????????

- ?????????

```
sudo mkdir -p /home/www-data/redmine
```

????????????

- ?????

```
sudo chown -R www-data:www-data /home/www-data
```

- Redmine 4.2???

```
sudo -u www-data svn co https://svn.redmine.org/redmine/branches/4.2-stable /home/www-data/redmine
```

- ???* Redmine 5.0???

```
sudo -u www-data svn co https://svn.redmine.org/redmine/branches/5.0-stable /home/www-data/redmine
```

Redmine????????????

- ?????????????????????

```
sudo cp -pi /home/www-data/redmine/config/database.yml.example /home/www-  
data/redmine/config/database.yml
```

```
/home/www-data/redmine/config/database.yml
```

????????????????????????????

database.yml ????

```
production:  
  adapter: mysql2  
  database: redmine  
  host: localhost  
  username: redmine  
  # root[]redmine[]  
  password: "redmine[]"  
  encoding: utf8mb4
```

```
# $(production)$(
```

Redmine????????????

- Redmine????????????

```
cd /home/www-data/redmine/ && pwd
```

```
/home/www-data/redmine/ (Redmine????????????)????????????
```

- bundle install

```
sudo -u www-data bundle install --without development test --path vendor/bundle
```

- ?????????????

```
sudo -u www-data bundle exec rake generate_secret_token
```

- DB????????

```
sudo -u www-data RAILS_ENV=production bundle exec rake db:migrate
```

- ????

```
sudo -u www-data RAILS_ENV=production REDMINE_LANG=ja bundle exec rake redmine:load_default_data
```

Apache????????????

?????????Redmine????/????????????

```
cat <<- __EOF__ | sudo tee -a /etc/apache2/sites-available/redmine.conf
<VirtualHost *:80>
  ServerName hoge.example.com
  # ServerName$(redmine$(
  DocumentRoot /home/www-data/redmine/public
  <Directory /home/www-data/redmine/public>
    Options -MultiViews
    AllowOverride All
    Require all granted
  </Directory>
</VirtualHost>
__EOF__
```

??????????

- ???????

```
ls -l /etc/apache2/sites-available/redmine.conf
```

- ????????

```
sudo a2ensite redmine.conf
```

- ?????????

```
sudo a2dissite 000-default.conf
```

```
sudo a2dissite default-ssl.conf
```

- ?????????????

```
sudo apache2ctl configtest
```

Syntax OK ?????

- ??????apache??????

```
systemctl status apache2.service
```

active(running)?????

- apache??

```
sudo systemctl restart apache2.service
```

- ??????apache??????

```
systemctl status apache2.service
```

active(running)?????

Web????????????

http://???Redmine???

?Redmine????????????????

???admin/admin????????????????

Redmine????

Ubuntu

20.04/22.04/24.04?Redmine5.1????

???

????????????????

- Ubuntu 20.04
- Ubuntu 22.04
- Ubuntu 24.04

????????????????Ubuntu 20.04????????????????????

??????????

1. Redmine????????????????????
2. Redmine?????????(Ruby/????/Web????)????????
3. ?????Web????????
4. Redmine????

????????

- ?Redmine?Ubuntu????
- ?????

??

- Ubuntu????
- DNS????
- ?????
 - Apache?
 - MySQL
 - Ruby
 - 2.7 (Ubuntu 20.04)
 - 3.0 (Ubuntu 22.04)
 - 3.2 (Ubuntu 24.04)
- ?????apt????

????

- ????Redmine 5.1????
- ?????Ubuntu22.04????

- `??redmine????/home/www-data/redmine????(/var/lib/redmine)????`
- `????`
 - `????`

??

Apache????

```
sudo add-apt-repository ppa:ondrej/apache2
```

????

- `????`

```
sudo aptitude update
```

- `????`

```
sudo aptitude install build-essential zlib1g-dev libssl-dev libreadline-dev libyaml-dev libcurl4-openssl-dev libffi-  
dev mysql-server mysql-client apache2 apache2-dev libapr1-dev libaprutil1-dev imagemagick libmagick++-dev  
fonts-takao-pgothic subversion git ruby libruby ruby-dev libmysqlclient-dev
```

apache????

```
sudo aptitude install libapache2-mod-passenger
```

apache????

```
apache2ctl -v
```

Apache/2.4.59 `????2.4.58http/2????????`

ruby????(gem)????

```
sudo gem install bundler racc mysql2
```

3 gems installed????

????mysql????

mysql_secure_installation????

????

mysql?DB???????????

```
sudo mysql -u root -p
```

???????mysql?root?????????mysql???????

```
CREATE DATABASE redmine character set utf8mb4;
```

DB "redmine" ??????

```
CREATE USER 'redmine'@'localhost' IDENTIFIED BY 'password';
```

??? "redmine"?????????????
??'password'?????????????

```
GRANT ALL ON redmine.* TO 'redmine'@'localhost';
```

```
flush privileges;
```

```
exit
```

????DB???????????????

```
mysql -u redmine -p
```

```
SHOW DATABASES;
```

```
exit
```

- ????????

```
sudo mkdir -p /home/www-data/redmine
```

???????????

- ????

```
sudo chown -R www-data:www-data /home/www-data
```

- Redmine 5.1???

```
sudo -u www-data svn co https://svn.redmine.org/redmine/branches/5.1-stable /home/www-data/redmine
```

Redmine????????????

- ?????????????????

```
sudo cp -pi /home/www-data/redmine/config/database.yml.example /home/www-  
data/redmine/config/database.yml
```

```
/home/www-data/redmine/config/database.yml
```

????????????????????

database.yml ????

```
production:  
  adapter: mysql2  
  database: redmine  
  host: localhost  
  username: redmine  
  # root[]redmine[]  
  password: "redmine[]"  
  encoding: utf8mb4  
  # [](production)[]
```

Redmine????????????

- Redmine????????????

```
cd /home/www-data/redmine/ && pwd
```

```
/home/www-data/redmine/ (Redmine?????????)????????
```

- bundle install

```
sudo -u www-data bundle install --without development test --path vendor/bundle
```

- ?????????????

```
sudo -u www-data bundle exec rake generate_secret_token
```

- ?????????????(Ubuntu 20.04???)

```
sudo -u www-data bundle exec rake generate_secret_token
```

??????



Could not find date-3.3.4, timeout-0.4.1 in any of the sources
Run `bundle install` to install missing gems.

????????????

```
sudo -u www-data bundle update date
```

??????

```
sudo -u www-data bundle exec rake generate_secret_token
```

????????????

- DB??????

```
sudo -u www-data RAILS_ENV=production bundle exec rake db:migrate
```

- ???

```
sudo -u www-data RAILS_ENV=production REDMINE_LANG=ja bundle exec rake redmine:load_default_data
```

Apache????????

????????Redmine????/????????

```
cat <<- __EOF__ | sudo tee -a /etc/apache2/sites-available/redmine.conf
<VirtualHost *:80>
    ServerName hoge.example.com
    # ServerName redmine
    DocumentRoot /home/www-data/redmine/public
    <Directory /home/www-data/redmine/public>
        Options -MultiViews
        AllowOverride All
        Require all granted
    </Directory>
</VirtualHost>
__EOF__
```

????????

- ?????

```
ls -l /etc/apache2/sites-available/redmine.conf
```

- ????????

```
sudo a2ensite redmine.conf
```

- ??????????

```
sudo a2dissite 000-default.conf
```

```
sudo a2dissite default-ssl.conf
```

- ?????????????

```
sudo apache2ctl configtest
```

Syntax OK ?????

- ??????apache??????

```
systemctl status apache2.service
```

active(running)?????

- apache???

```
sudo systemctl restart apache2.service
```

- ??????apache??????

```
systemctl status apache2.service
```

active(running)?????

Web????????????

http://???Redmine???

?Redmine????????????????

???admin/admin????????????????????

Redmine4.2(Redmine 5.x)?SSL??

??????????

- ??????????Redmine?SSL?????
- ??SSL???????????

??????????

- Redmine?SSL???????
- SSL?????????????

??

???????????????

- Ubuntu 20.04? / Ubuntu 22.04??Redmine 5.x)
- Apache2.4
- ?????Redmine???????????????????
- ?????SSL???????????????

????

?????SSL???????????????????????

- ????????????????????????
- Let's Encrypt???????????

????????????

1. ????????????????????????
2. ??SSL???????????????????????????
3. Apache??????????SSL???????????
4. Redmine?????????????
5. [?????]?????????Redmine???????????????

???????

?SSL?????????????????????????????(Let's Encrypt?????3??)

???????????Apache??????????????????????????/???????????????????????????

??????????????

- ?????????????

```
sudo mkdir /etc/certs
```

????????????

- ?????????????

```
sudo mkdir /etc/private
```

????????????

????????????????????

- SCP?SFTP????????????????
- Let's Encrypt????????????????????/????

????????????

???Let's Encrypt?yyyy?mm?????hoge.sample.com (/etc/letsencrypt/live/????/????????)??

- hoge.sample.com.crt.yyyymm (???:/etc/certs???)
- hoge.sample.com.key.yyyymm (???:/etc/private???)

??????

????????????

hoge.sample.com.crt.CA.yyyymm

????????????

????????????????????

- ?????????????

```
cd /etc/certs && pwd
```

```
/etc/certs
```

- ?????????

```
sudo ln -sf hoge.sample.com.crt.$(date +%Y%m) hoge.sample.com.crt
```

?????? hoge.sample.com.crt.\$(date +%Y%m) ? hoge.sample.com.crt ?????????????

- ?????????

```
ls -l hoge.sample.com.crt
```

???????hoge.sample.com.crt.yyyymm??????????

- ???????????

```
sudo ln -sf hoge.sample.com.crt.CA.$(date +%Y%m) hoge.sample.com.CA.crt
```

??????Global Sign, Sectigo, GeoTrust????????????????????(Let's Encrypt???chain.pem???)

????????????????????

- ???????????

```
cd /etc/private && pwd
```

/etc/private ???????

- ???????????

```
sudo ln -sf hoge.sample.com.key.$(date +%Y%m) hoge.sample.com.key
```

?????? hoge.sample.com.key.\$(date +%Y%m) ? hoge.sample.com.k1y ???????????????

- ???????????

```
ls -l hoge.sample.com.key
```

???????hoge.sample.com.crt.yyyymm??????????

????????????????

```
openssl x509 -noout -dates -subject -in /etc/certs/hoge.sample.com.crt
```

- notBefore=
- notAfter=

????????????????????????????

- subject=CN =

????????????????????????????hoge.sample.com ????????????????? *.sample.com

- ?????????????????

```
openssl x509 -pubkey -in /etc/certs/hoge.example.com.crt -noout | openssl md5
```

? (stdin)= [????]????

```
openssl pkey -pubout -in /etc/private/hoge.example.com.key | openssl md5
```


? (stdin)= `TTTT`????

????????????????????????????2????????????????????????????????

- ???????????? (Let's Encrypt????????????????)

```
openssl x509 -issuer_hash -noout -in /etc/certs/hoge.example.com.crt
```

```
sed -n -e'1d' -e'/BEGIN/, $p' /etc/certs/hoge.example.com.crt | openssl x509 -subject_hash -noout
```

????????????????????????????2????????????????????????????????

- ???????????? (????????????????)

```
openssl x509 -issuer_hash -noout -in /etc/certs/hoge.example.com.crt
```

```
openssl x509 -subject_hash -noout -in /etc/certs/hoge.sample.com.CA.crt
```

????????????????????????????2????????????????????????????????

??SSL????????????????

- ???????

```
cat /etc/apache2/mods-available/rewrite.load
```

```
cat /etc/apache2/mods-available/ssl.load
```

```
cat /etc/apache2/mods-available/headers.load
```

????????????????

????????

```
sudo a2enmod rewrite
```

```
sudo a2enmod ssl
```

```
sudo a2enmod headers
```

??????

- apache??

```
sudo systemctl restart apache2
```

http????????????

- ???????

```
cd /etc/apache2/sites-available && pwd
```

- ?????

```
sudo a2dissite redmine.conf
```

- apache??

```
sudo systemctl restart apache2.service
```

1. http????????????????????
2. http????Redmine????????????????

- ???????

```
sudo mv redmine.conf /path/to/backup/directory/redmine.conf.$(date +%Y%m%d)
```

???http????????????????????????????????

??SSL????????

- ?????????????????????????????????
- cat ? __EOF__???????????????? ? ??????(????????????) ? ?????????????????

```
cat <<- __EOF__ | sudo tee -a /etc/apache2/sites-available/redmine.conf
```

```
<VirtualHost *:80>
```

```
servername [hoge.example.com]
```

```
# [ ]
```

```
RewriteEngine On
```

```
    RewriteCond %{HTTPS} off
```

```
    RewriteRule ^(.*)$ https://%{HTTP_HOST}%{REQUEST_URI} [R=301,L]
```

```
# HTTP[ ]HTTPS[ ]
```

```
</VirtualHost>
```

```
<VirtualHost *:443>
```

```
ServerName [hoge.example.com]
```

```
# [ ]
```

```
DocumentRoot [ /home/www-data/redmine/public ]
```

```
# [redacted]
<Directory [redacted]/home/www-data/redmine/public[redacted]>
# [redacted]
    Options -MultiViews
    AllowOverride All
    Require all granted
</Directory>

#SSL[redacted]
    SSLEngine on
    Protocols h2 http/1.1
# SSL[redacted]

SSLCertificateFile [redacted]/etc/certs/hoge.example.com.crt[redacted]
# SSL[redacted]
SSLCertificateKeyFile [redacted]/etc/private/hoge.example.com.key[redacted]
# [redacted]

# SSLCACertificateFile [redacted]/etc/certs/hoge.example.com.CA.crt[redacted]
# [redacted]

# [redacted]

    Header always set Strict-Transport-Security "max-age=63072000"
    Header set X-Content-Type-Options "nosniff"
    Header always append X-Frame-Options "SAMEORIGIN"
    Header set X-XSS-Protection "1; mode=block"

</VirtualHost>

SSLProtocol          all -SSLv3 -TLSv1 -TLSv1.1 -TLSv1.2
SSLCipherSuite        ECDHE-ECDSA-AES128-GCM-SHA256:ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-
AES256-GCM-SHA384:EC6-GCM-SHA384
SSLHonorCipherOrder   off
SSLSessionTickets     off

SSLUseStapling On
SSLStaplingCache "shmcb:logs/ssl_stapling(32768)"
# [redacted]SSL[redacted]
# </VirtualHost>[redacted]
```

__EOF__

????????

- ?????redmine??????

```
sudo a2ensite redmine
```

- ?????

```
sudo apache2ctl configtest
```

Syntax OK??

- apache????????????

```
systemctl status apache2.service
```

active(running)??????

- apache??

```
sudo systemctl restart apache2.service
```

```
- apache[ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]
```

```
```bash
```

```
systemctl status apache2.service
```

active(running)??????

????????????

????????????redmine????????????????

- https????????
- ???????????
- ?????????????

??????

# Redmine????????????

1. Redmine????????????
2. ?? ? ????????
3. ?????????????????(hoge.example.com)
4. ???????HTTP?HTTPS????

RedmineSSL

# RedmineSSL

- Redmine
- Let's Encrypt

## SSL

<https://www.ssllabs.com/ssltest/>

1. Hostname:RedmineURL
2. Do not show the results on the boards( )
3. Submit

20231ApacheA+

Redmine?????

# Redmine4.2(Redmine5.x)??????????

## ??????????

- Apache????????????????????Redmine?log??????????????????
- ???????????????????
- Redmine????????????Web UI??????????????????

## ??????????

- Redmine???????? / ???????????????????

## ??

????????????????

- Ubuntu 20.04?
  - Ubuntu 22.04????
- Redmine 4.2
  - Redmine5.0????????(2023/02/09)
  - Redmine5.1????(2024/04/01)
- Apache 2.4

## ????

????????????????????????????????????????????????????????????

## ??????????

1. Apache????????????redmine????????????????????
2. syslog????????????????????
3. Redmine????????????????????????????????????

## Apache????????????????????

- ?????????????????????

```
cd /etc/apache2/sites-available && pwd
```

- ???????????

```
sudo cp -pi redmine.conf /path/to/backup/directory/redmine.conf.$(date +%Y%m%d)
```

????????????????????????????

- ??????

```
diff -u redmine.conf /path/to/backup/directory/redmine.conf.$(date +%Y%m%d)
```

????????????????????

## /var/log????????????

- Linux????????

```
cd /var/log && pwd
```

- ?????????????????`

```
sudo ln -sf /home/www-data/redmine/log/ redmine
```

????????????????

- ?????????

```
ls -l redmine
```

???????Redmine????????????

## Apache????????

????????????????

```
/etc/apache2/sites-available/redmine.conf
```

???????redmine????????

- ??????

```
CustomLog /home/www-data/redmine/log/access.log combined
ErrorLog /home/www-data/redmine/log/error.log
Redmine[]/[]

[]
<VirtualHost *:443>
ServerName [] []
CustomLog /home/www-data/redmine/log/access.log combined
ErrorLog /home/www-data/redmine/log
#
[]SSL[]HTTP[]
```

- ???

```
diff -u /path/to/backup/directory/redmine.$(date +%Y%m%d) /etc/apache2/sites-available/redmine.conf
```

????????????????????

- ??

```
<VirtualHost *:443>
 ServerName Redmine[]
+ CustomLog /home/www-data/redmine/log/access.log combined
+ ErrorLog /home/www-data/redmine/log/error.log
+
```

????????

- ?????????

```
sudo apache2ctl configtest
```

Syntax OK????

- ?????Apache????

```
systemctl status apache2.service
```

active(running)????

- apache??

```
sudo systemctl restart apache2.service
```

- ?????Apache????

```
systemctl status apache2.service
```

active(running)????

????????????

```
tail -f /home/www-data/redmine/log/access.log
```

????????

????????Redmine????????????

????????



- ???????????

```
sudo chown www-data:www-data /home/www-data/redmine/log/access.log
```

- ???????????

```
sudo chown www-data:www-data /home/www-data/redmine/log/error.log
```

?????Redmine??????????????????

## Redmine??????????????????

- ?????????????????

```
cat <<- __EOF__ | sudo tee -a /etc/logrotate.d/redmine
/var/log/redmine/*.log {
 daily
 missingok
 ifempty
 copytruncate
 rotate 10
 compress
 su www-data www-data
}
__EOF__
```

???

- ?????????????????
- 10???
- ???????????
- ?????????????????

??????????

## ??????????????????

```
sudo logrotate -dv /etc/logrotate.d/redmine
```

??????????????

## Redmine????????????????????

- Redmine????????????????

```
cd /home/www-data/redmine/plugins && pwd
```

??????????

- git??????????

```
sudo -u www-data git clone https://github.com/haru/redmine_logs
```

- ??????Apache??????

```
systemctl status apache2.service
```

active(running)?????

- apache??

```
sudo systemctl restart apache2.service
```

- ??????Apache??????

```
systemctl status apache2.service
```

active(running)?????

????

1. Redmine????????????????
2. ???????????
3. ?????????????????????

Redmine????

# Redmine4.2(5.x)?Gmail??????

????????

- Redmine?Gmail???????Redmine????????????????

????????

- ?????????SMTP????????
  - (AWS?SMTP????????)
- redmine?configuration.yml??????

??

??????

- Redmine????SSH?????
  - ?????????
- Gmail??????

??Redmine????

/home/www-data/redmine

????????????????

????

????????????

- Gmail????????????????????

????????????

??

????????

1. Gmail??????????
2. ???????????
3. Redmine??????????
4. ???????

## Google????????

### Google????????

1. Google???? ? ?????????
2. Google?????2??????????

????????????????

### ????????

1. Google???? ? ?????????
2. Google???? ? ?????????
3. ?????????????????
  1. ???????
  2. ???????(????)
  3. ????(redmine?)??
4. ?????????????Google????????????

## Redmine????????

### ????????

????????

```
cat <<- __EOF__ | sudo tee -a /home/www-data/redmine/config/configuration.yml
default:
 email_delivery:
 delivery_method: :smtp
 smtp_settings:
 address: "smtp.gmail.com"
 port: 587
 authentication: :plain
 domain: "smtp.gmail.com"
 user_name: "[Gmail]"
 password: "[]"
__EOF__
```

```
ls -l /home/www-data/redmine/configconfiguration.yml
[]
[]
```

????????

```
sudo systemctl restart apache2.service
```

[illegible]

# Redmine????

????????????????

1. ??????????
2. ?????????????????????????????????

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- ??????????????????
- ??????(bcc):??????
- ??????????????:????????

????????????

1. Redmine????????? 1.????????????????????????????????????
2. ?????????/????????????????????????

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Redmine?????

# Redmine4.2(5.x)????????????

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Redmine????????????????????????????????

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- ?????????????
- ?????????????????????????

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- Ubuntu 20.04?Linux
  - Ubuntu22.04????????
- Redmine 4.2
  - Redmine5.1????????

??

????????????????

- Redmine????????????
  - (Gmail????????????????)
  - <https://barrel.reisalin.com/books/redmine/page/redmine425xgmail>
- ?????Cron????????
  - ?????????????????????

??????????

1. ?????????????????
2. cron????????????

????????????

- ?????????????

```
mkdir /home/hoge/scripts
```

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- ?????????????

```
cd /home/hoge/scripts && pwd
```

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```
cat <<- __EOF__ | tee -a redmine_reminder_3days.sh
#!/bin/sh

SHELL=/bin/sh
PATH=/usr/local/sbin:/usr/local/bin:/sbin:/bin:/usr/sbin:/usr/bin

cd /var/lib/redmine/
#####Redmine#####
bundle exec rake redmine:send_reminders days=3 RAILS_ENV=production
#####3#####days=n#####
__EOF__
```

???

- 1? (redmine\_reminder\_1day.sh)
- 3? (redmine\_reminder\_3days.sh)
- 7? (redmine\_reminder\_7days.sh)
- 31? (redmine\_reminder\_31days.sh)

?4????????????????????????

????????????????????

- ????

```
chmod +x redmine_reminder_*day*.sh && ls -l redmine_reminder_*day*.sh
```

????????????

- ???

```
sudo -u www-data bash /home/hoge/scripts/redmine_reminder_3days.sh
```

warning????????

?????3????????????????????

crontab??

```
sudo crontab -e -u www-data
```

- ?????

```
?????????????????crontab??
```

- ???

```
20 8 * * * /home/hoge/scripts/redmine_reminder_31days.sh
30 8 * * * /home/hoge/scripts/redmine_reminder_1day.sh

30 16 * * * /home/hoge/scripts/redmine_reminder_7days.sh
40 16 * * * /home/hoge/scripts/redmine_reminder_1day.sh

20 20 * * * /home/hoge/scripts/redmine_reminder_3days.sh
30 20 * * * /home/hoge/scripts/redmine_reminder_1day.sh
```

```
30 8 * * * /home/hoge/scripts/redmine_reminder_1day.sh
```

```
30 16 *** /home/hoge/scripts/redmine_reminder_7days.sh
```

```
40 16 * * * /home/hoge/scripts/redmine_reminder_1day.sh
```

```
20 20 * * * /home/hoge/scripts/redmine_reminder_3days.sh
```

```
30 20 * * * /home/hoge/scripts/redmine_reminder_1day.sh
```

??????

- 8:20 ? 31????????????????
- 8:30 ? 1????????????????
- 16:30 ? 7????????????????
- 16:40 ? 1????????????????
- 20:20 ? 3????????????????
- 20:30 ? 1????????????????

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- crontab ????

```
sudo crontab -l -u www-data
```

????????????????

- cron??

```
cat /var/log/cron.log
```

- BEGIN EDIT (www-data)
- REPLACE (www-data)
- END EDIT (www-data)

??crontab????????????????

```
????????????????????(????????????cron????????????)
```