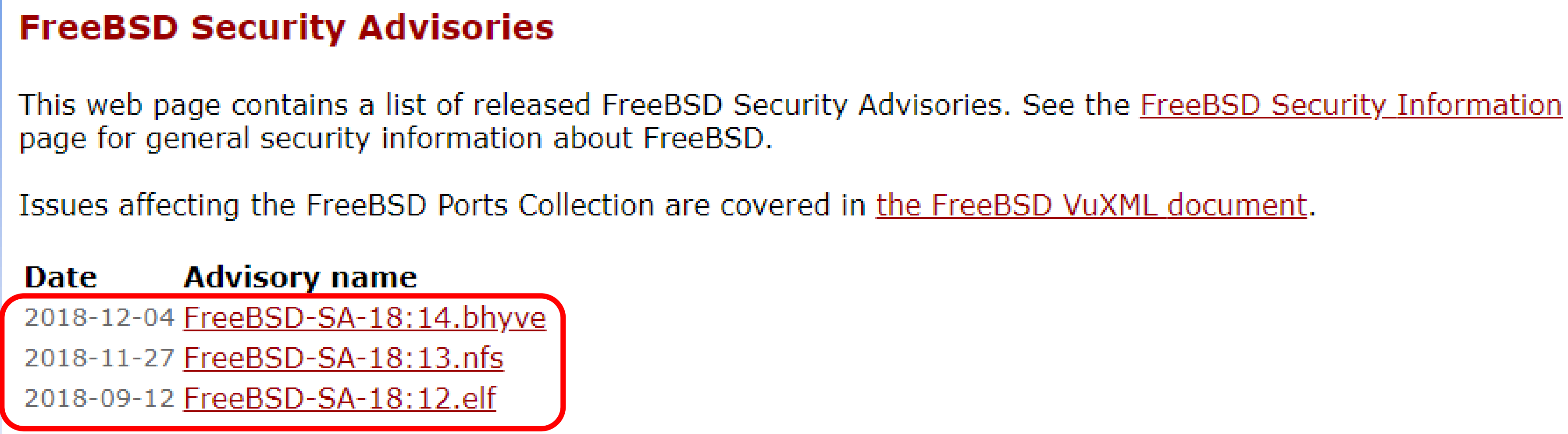
Security

FreeBSD Security Advisories

- http://www.freebsd.org/security/advisories.html



FreeBSD Security Advisories

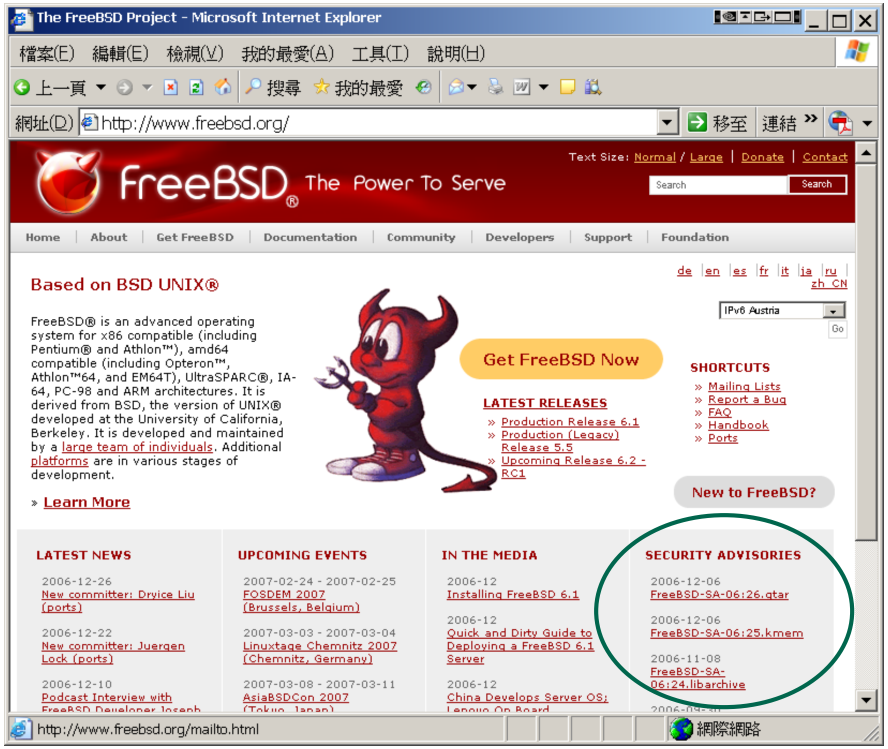
This web page contains a list of released FreeBSD Security Advisories. See the FreeBSD Security Information page for general security information about FreeBSD.

Issues affecting the FreeBSD Ports Collection are covered in the FreeBSD VuXML document.

Date	Advisory name
2018-12-04	FreeBSD-SA-18:14.bhyve
2018-11-27	FreeBSD-SA-18:13.nfs
2018-09-12	FreeBSD-SA-18:12.elf

FreeBSD Security Advisories

- ❑ Advisory
  - Security information
- ❑ Where to find it
  - Web page (Security Advisories Channel)
    - ➢ http://www.freebsd.org



The FreeBSD Project - Microsoft Internet Explorer

檔案(F) 編輯(E) 檢視(V) 我的最愛(A) 工具(T) 說明(H)
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New to FreeBSD?

Based on BSD UNIX®

FreeBSD® is an advanced operating system for x86 compatible (including Pentium® and Athlon™), amd64 compatible (including Opteron™, Athlon™64, and EM64T), UltraSPARC®, IA-64, PC-98 and ARM architectures. It is derived from BSD, the version of UNIX® developed at the University of California, Berkeley. It is developed and maintained by a large team of individuals. Additional platforms are in various stages of development.

» Learn More

LATEST RELEASES

- » Production Release 6.1
- » Production (Legacy) Release 5.5
- » Upcoming Release 6.2 - RC1

SHORTCUTS

- » Mailing Lists
- » Report a Bug
- » FAQ
- » Handbook
- » Ports

LATEST NEWS

2006-12-26
New committer: Dryice Liu (ports)

2006-12-22
New committer: Juergen Lock (ports)

2006-12-10
Podcast Interview with FreeBSD Developer Joseph

UPCOMING EVENTS

2007-02-24 - 2007-02-25
FOSDEM 2007 (Brussels, Belgium)

2007-03-03 - 2007-03-04
Linuxtage Chemnitz 2007 (Chemnitz, Germany)

2007-03-08 - 2007-03-11
AsiaBSDCon 2007 (Tokyo, Japan)

IN THE MEDIA

2006-12
Installing FreeBSD 6.1

2006-12
Quick and Dirty Guide to Deploying a FreeBSD 6.1 Server

2006-12
China Develops Server OS; Lenovo On Board

SECURITY ADVISORIES

2006-12-06
FreeBSD-SA-06:26.gtar

2006-12-06
FreeBSD-SA-06:25.kmem

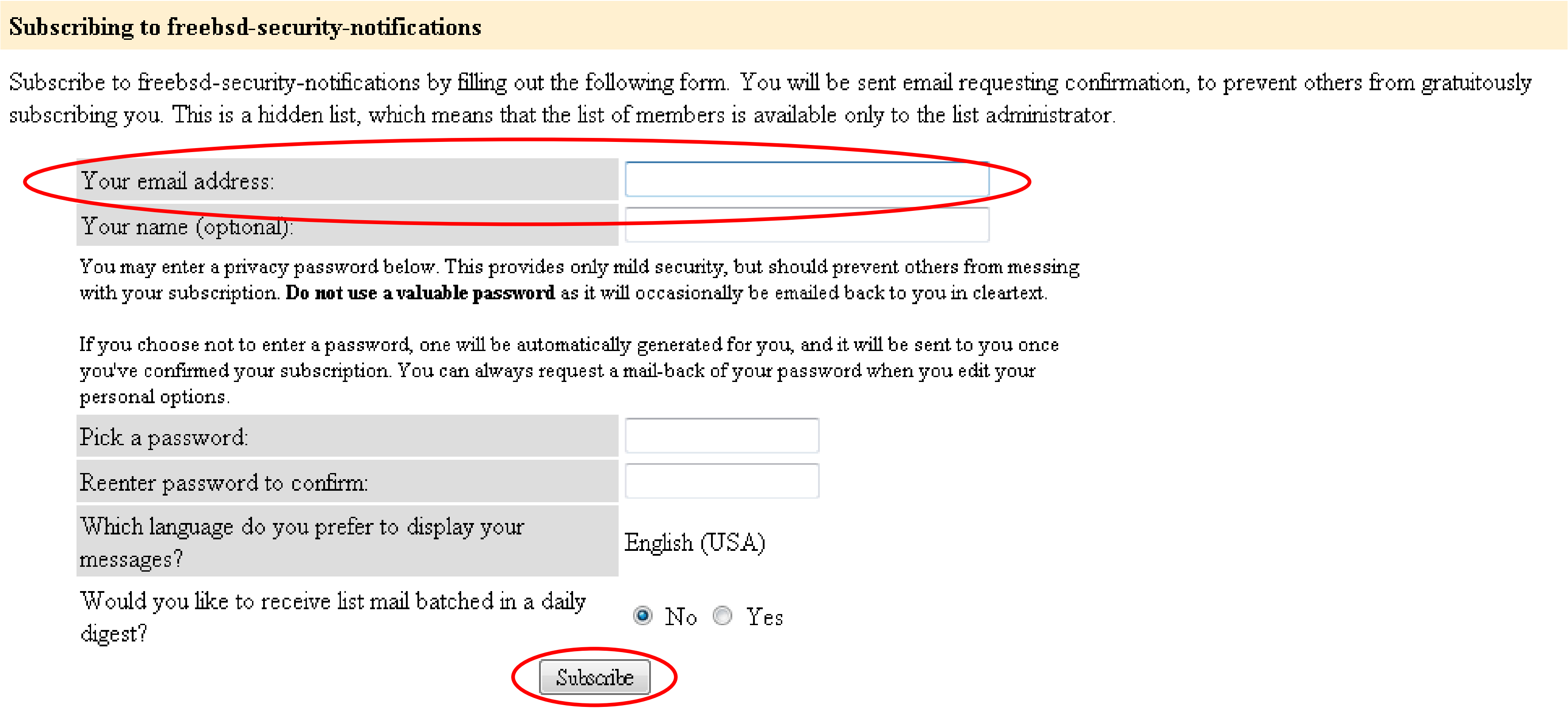
2006-11-08
FreeBSD-SA-06:24.libarchive

2006-09-30

http://www.freebsd.org/mailto.html

FreeBSD Security Advisories

- Where to find it
  - freebsd-security-notifications Mailing list
    - http://lists.freebsd.org/mailman/listinfo/freebsd-security-notifications



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Subscribe to freebsd-security-notifications by filling out the following form. You will be sent email requesting confirmation, to prevent others from gratuitously subscribing you. This is a hidden list, which means that the list of members is available only to the list administrator.

Your email address:	
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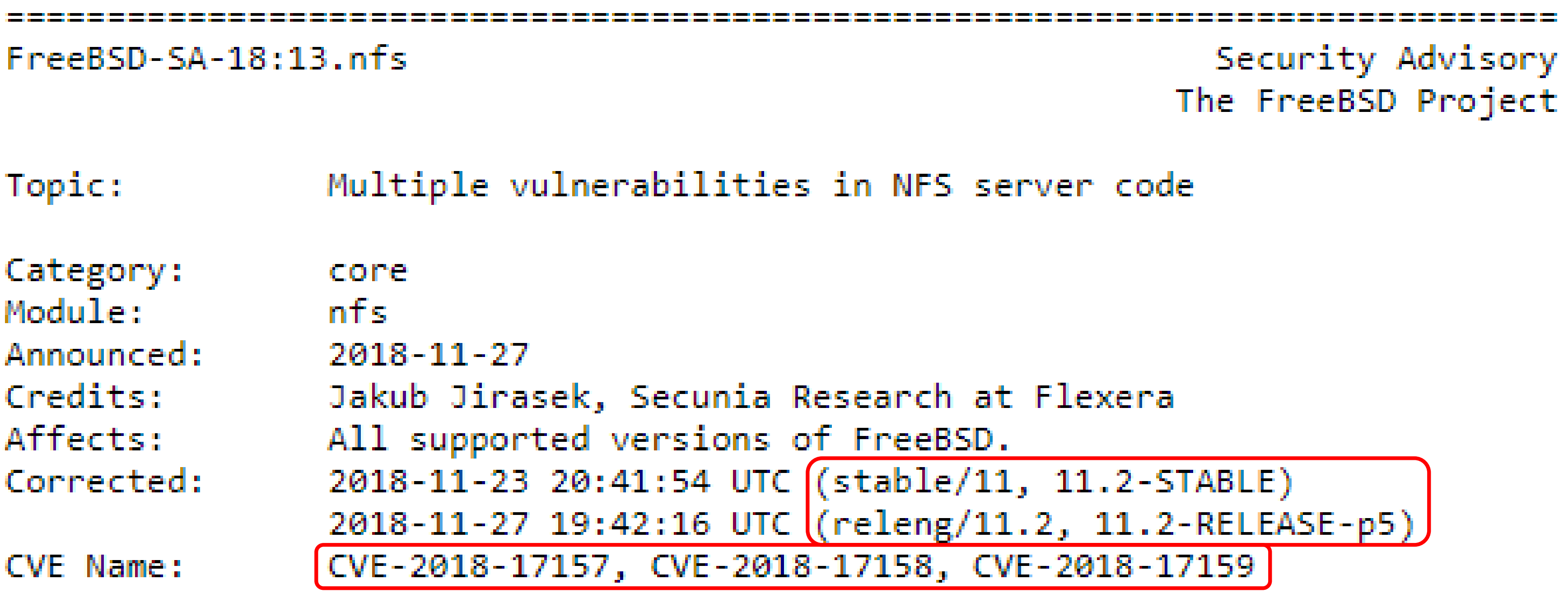
You may enter a privacy password below. This provides only mild security, but should prevent others from messing with your subscription. **Do not use a valuable password** as it will occasionally be emailed back to you in cleartext.

If you choose not to enter a password, one will be automatically generated for you, and it will be sent to you once you've confirmed your subscription. You can always request a mail-back of your password when you edit your personal options.

Pick a password:	
Reenter password to confirm:	
Which language do you prefer to display your messages?	English (USA)
Would you like to receive list mail batched in a daily digest?	● No ○ Yes

FreeBSD Security Advisories

- Example
  - nfs

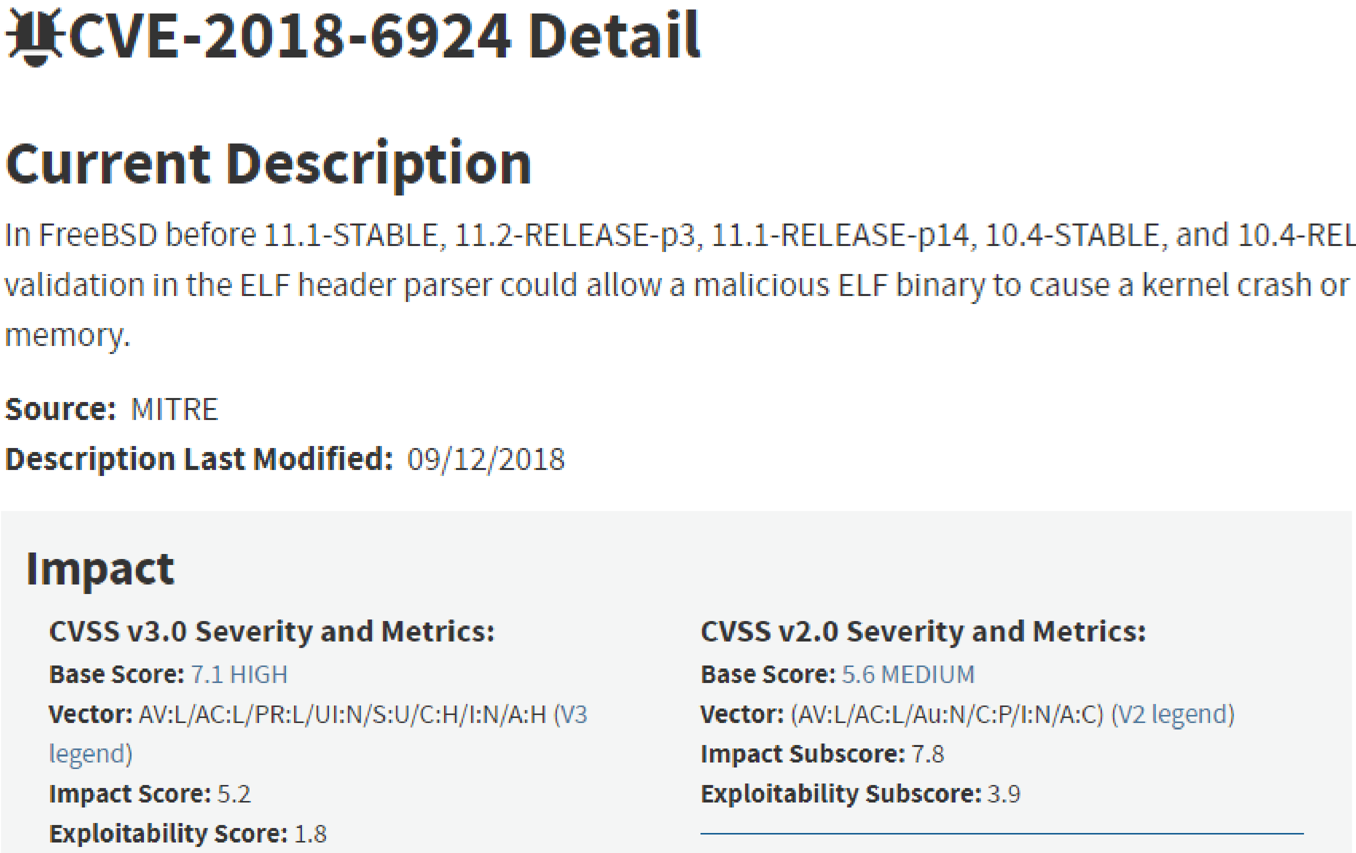


```
=============================================================================
FreeBSD-SA-18:13.nfs                                        Security Advisory
                                                          The FreeBSD Project

Topic:          Multiple vulnerabilities in NFS server code

Category:       core
Module:         nfs
Announced:      2018-11-27
Credits:        Jakub Jirasek, Secunia Research at Flexera
Affects:        All supported versions of FreeBSD.
Corrected:      2018-11-23 20:41:54 UTC (stable/11, 11.2-STABLE)
                2018-11-27 19:42:16 UTC (releng/11.2, 11.2-RELEASE-p5)
CVE Name:       CVE-2018-17157, CVE-2018-17158, CVE-2018-17159
```

CVE: Common Vulnerabilities and Exposures

FreeBSD Security Advisories

- ❑ CVE-2017-3737
  - https://nvd.nist.gov/vuln/detail/CVE-2018-6924



CVE-2018-6924 Detail

Current Description

In FreeBSD before 11.1-STABLE, 11.2-RELEASE-p3, 11.1-RELEASE-p14, 10.4-STABLE, and 10.4-RELEASE-p12, insufficient validation in the ELF header parser could allow a malicious ELF binary to cause a kernel crash or disclose kernel memory.

Source: MITRE

Description Last Modified: 09/12/2018

Impact

CVSS v3.0 Severity and Metrics:

Base Score: 7.1 HIGH
Vector: AV:L/AC:L/PR:L/UI:N/S:U/C:H/I:N/A:H (V3 legend)
Impact Score: 5.2
Exploitability Score: 1.8

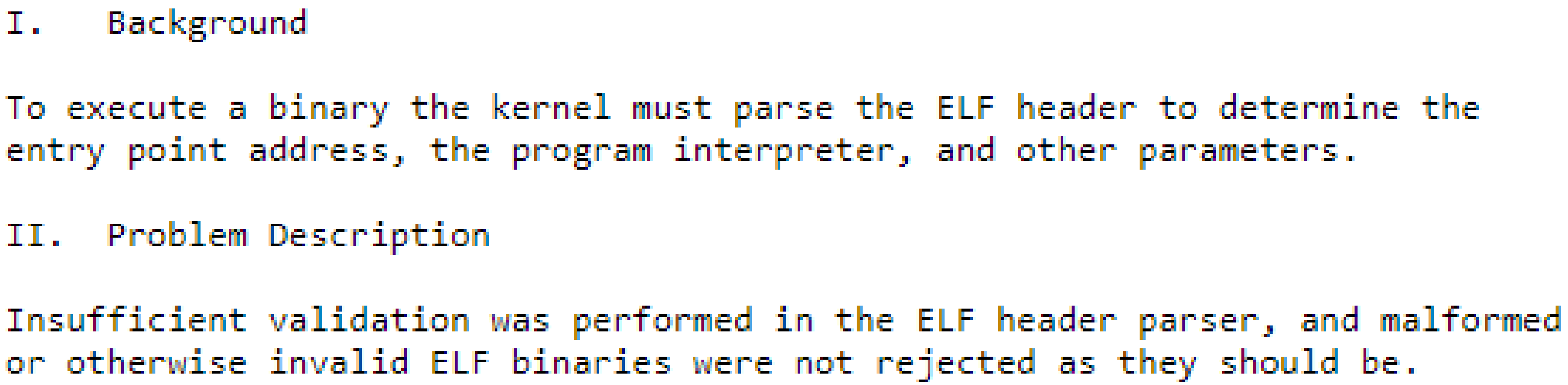
CVSS v2.0 Severity and Metrics:

Base Score: 5.6 MEDIUM
Vector: (AV:L/AC:L/Au:N/C:P/I:N/A:C) (V2 legend)
Impact Subscore: 7.8
Exploitability Subscore: 3.9

CVSS: Common Vulnerability Scoring System

FreeBSD Security Advisories

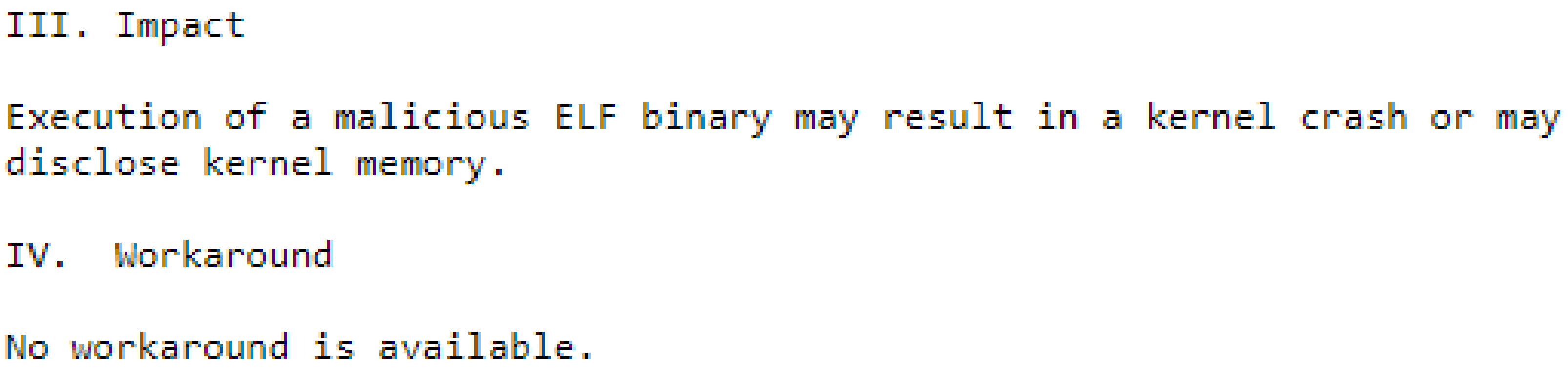
- Example
  - Problem Description



```
I.   Background

To execute a binary the kernel must parse the ELF header to determine the
entry point address, the program interpreter, and other parameters.

II.  Problem Description

Insufficient validation was performed in the ELF header parser, and malformed
or otherwise invalid ELF binaries were not rejected as they should be.
```

FreeBSD Security Advisories

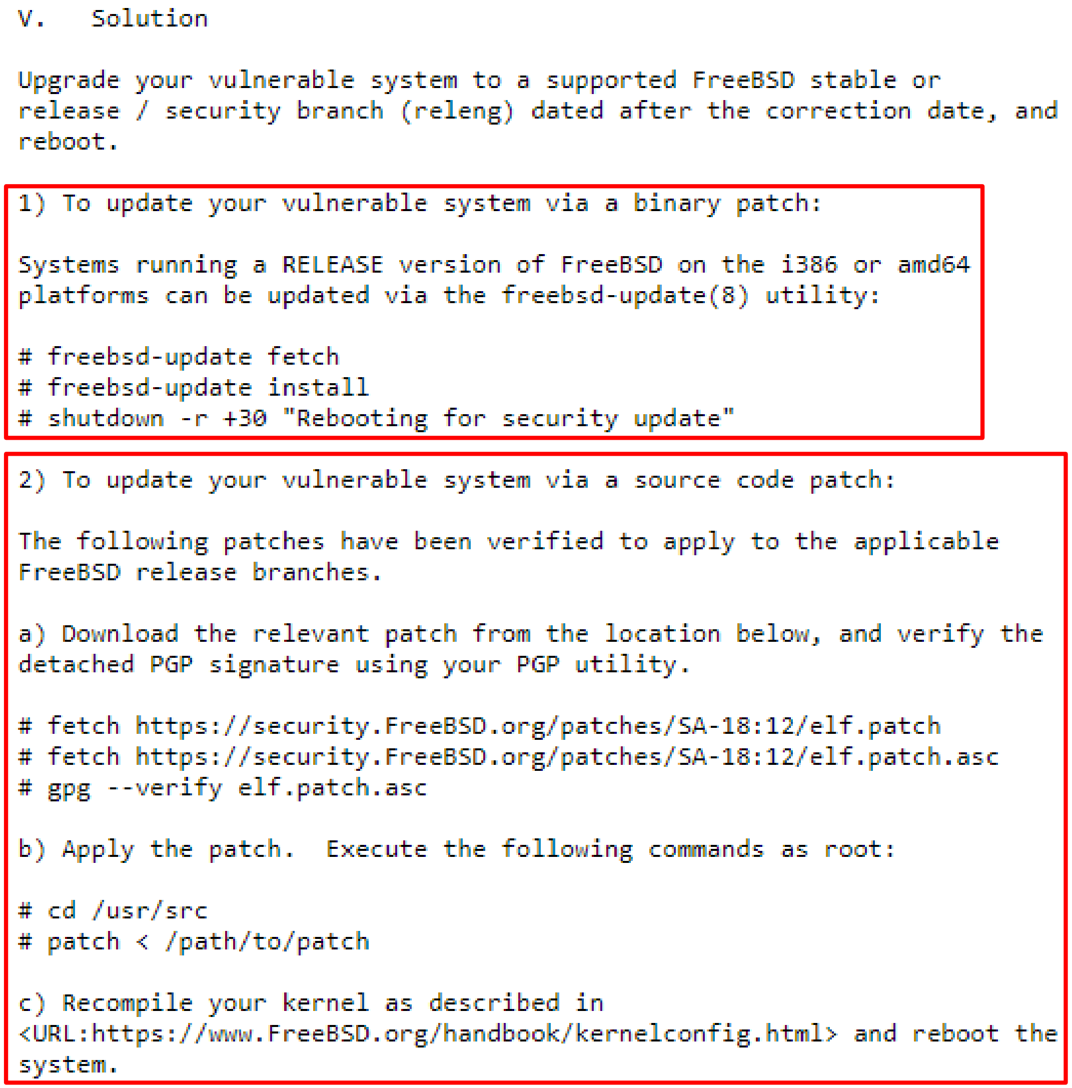
- ❑ Example
  - Workaround



```
III. Impact

Execution of a malicious ELF binary may result in a kernel crash or may
disclose kernel memory.

IV.  Workaround

No workaround is available.
```

FreeBSD Security Advisories

- ❑ Example
  - Solution
    - ➢ Upgrade to
    - ➢ Source code patch
    - ➢ Binary patch



```
V.   Solution

Upgrade your vulnerable system to a supported FreeBSD stable or
release / security branch (releng) dated after the correction date, and
reboot.

1) To update your vulnerable system via a binary patch:

Systems running a RELEASE version of FreeBSD on the i386 or amd64
platforms can be updated via the freebsd-update(8) utility:

# freebsd-update fetch
# freebsd-update install
# shutdown -r +30 "Rebooting for security update"

2) To update your vulnerable system via a source code patch:

The following patches have been verified to apply to the applicable
FreeBSD release branches.

a) Download the relevant patch from the location below, and verify the
detached PGP signature using your PGP utility.

# fetch https://security.FreeBSD.org/patches/SA-18:12/elf.patch
# fetch https://security.FreeBSD.org/patches/SA-18:12/elf.patch.asc
# gpg --verify elf.patch.asc

b) Apply the patch.  Execute the following commands as root:

# cd /usr/src
# patch < /path/to/patch

c) Recompile your kernel as described in
<URL:https://www.FreeBSD.org/handbook/kernelconfig.html> and reboot the
system.
```

Common Security Problems

- Software bugs
  - FreeBSD security advisor
  - pkg audit
    - pkg-audit(8)
- Unreliable wetware
  - Phishing site
- Open doors
  - Account password
  - Disk share with the world

pkg audit (1)

- pkg audit
  - Checks installed ports against a list of security vulnerabilities
  - pkg audit -F
    - -F: Fetch the current database from the FreeBSD servers.
- Security Output

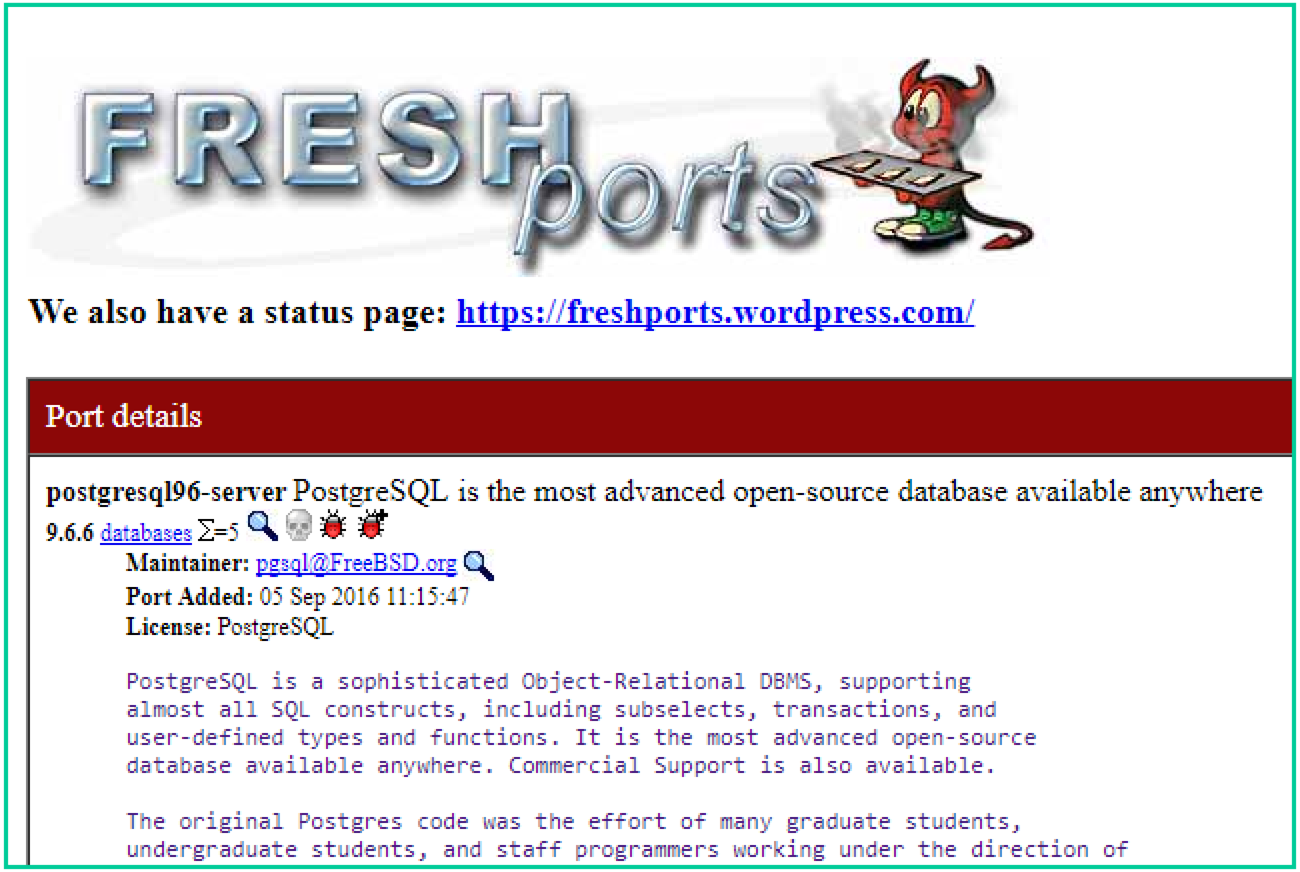
pkg audit (2)

- ❑ pkg audit -F

```
Fetching vuln.xml.bz2: 100%  694 KiB 710.2kB/s    00:01
libxml2-2.9.4 is vulnerable:
libxml2 -- Multiple Issues
CVE: CVE-2017-9050
CVE: CVE-2017-9049
CVE: CVE-2017-9048
CVE: CVE-2017-9047
CVE: CVE-2017-8872
WWW: https://vuxml.FreeBSD.org/freebsd/76e59f55-4f7a-4887-bcb0-11604004163a.html

1 problem(s) in the installed packages found.
```

- ❑ http://www.freshports.org/<category>/<portname>
  - https://www.freshports.org/databases/postgresql96-server/

pkg audit (3)



We also have a status page: https://freshports.wordpress.com/

Port details

postgresql96-server PostgreSQL is the most advanced open-source database available anywhere
9.6.6 databases Σ=5 🔍 💀 🐞 🐞

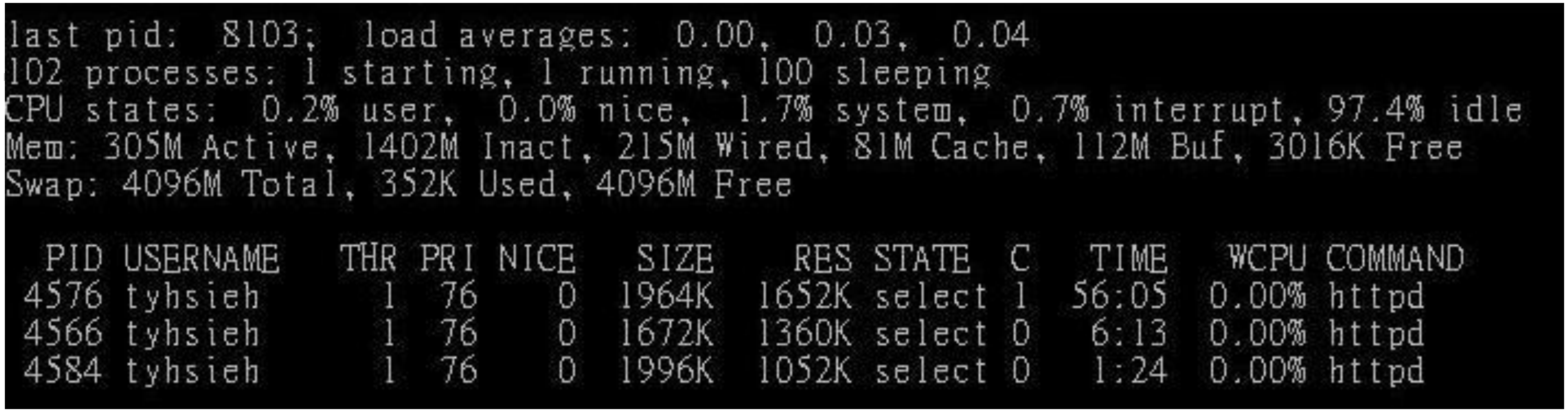
Maintainer: pgsql@FreeBSD.org 🔍
Port Added: 05 Sep 2016 11:15:47
License: PostgreSQL

```
PostgreSQL is a sophisticated Object-Relational DBMS, supporting
almost all SQL constructs, including subselects, transactions, and
user-defined types and functions. It is the most advanced open-source
database available anywhere. Commercial Support is also available.

The original Postgres code was the effort of many graduate students,
undergraduate students, and staff programmers working under the direction of
```

Common trick

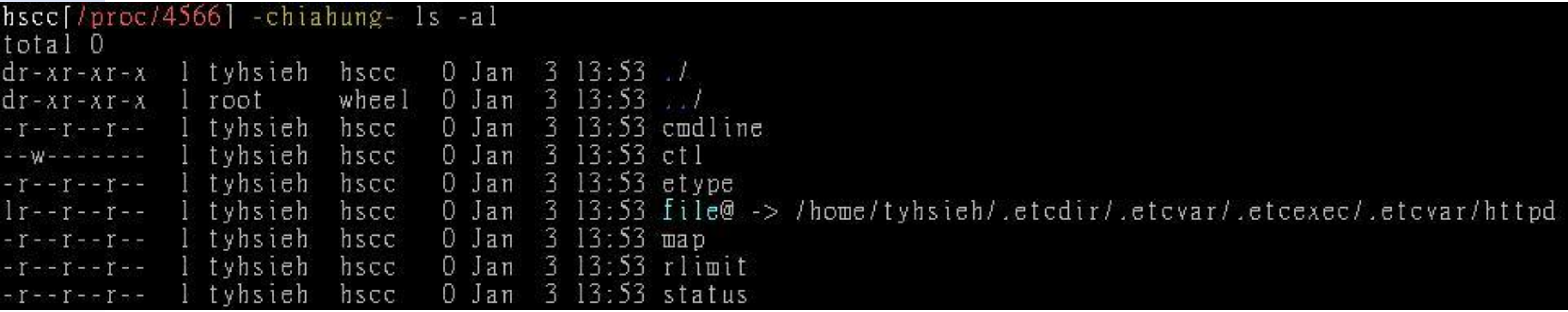
- ❑ Tricks
  - ssh scan and hack
    - ➢ ssh guard
    - ➢ sshit
    - ➢ …
  - Phishing
  - XSS & SQL injection
  - …
- ❑ Objective
  - Spam
  - Jump gateway
  - File sharing
  - …

Process file system - procfs



```
last pid:  8103;  load averages:  0.00,  0.03,  0.04
102 processes: 1 starting, 1 running, 100 sleeping
CPU states:  0.2% user,  0.0% nice,  1.7% system,  0.7% interrupt, 97.4% idle
Mem: 305M Active, 1402M Inact, 215M Wired, 81M Cache, 112M Buf, 3016K Free
Swap: 4096M Total, 352K Used, 4096M Free

  PID USERNAME    THR PRI NICE   SIZE    RES STATE  C   TIME   WCPU COMMAND
 4576 tyhsieh       1  76    0  1964K  1652K select 1  56:05  0.00% httpd
 4566 tyhsieh       1  76    0  1672K  1360K select 0   6:13  0.00% httpd
 4584 tyhsieh       1  76    0  1996K  1052K select 0   1:24  0.00% httpd
```

- ❑ Procfs
  - A view of the system process table
  - Normally mount on /proc
  - mount -t procfs proc /proc



```
hscc[/proc/4566] -chiahung- ls -al
total 0
dr-xr-xr-x  1 tyhsieh  hscc   0 Jan  3 13:53 ./
dr-xr-xr-x  1 root     wheel  0 Jan  3 13:53 ../
-r--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 cmdline
--w-------  1 tyhsieh  hscc   0 Jan  3 13:53 ctl
-r--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 etype
lr--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 file@ -> /home/tyhsieh/.etcdir/.etcvar/.etcexec/.etcvar/httpd
-r--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 map
-r--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 rlimit
-r--r--r--  1 tyhsieh  hscc   0 Jan  3 13:53 status
```

Simple SQL injection example

- Username/password authentication

```
SELECT * FROM usrTable
WHERE user =
AND pass = ;
```

- No input validation

```
SELECT * FROM usrTable
WHERE user = 'test'
AND pass = 'a' OR 'a' = 'a'
```

setuid program

- passwd

```
zfs[~] -chiahung- ls -al /usr/bin/passwd
-r-sr-xr-x  2 root  wheel  8224 Dec  5 22:00 /usr/bin/passwd
```

  - /etc/master.passwd is of mode 600 (-rw-------) !

- Setuid shell scripts are especially apt to cause security problems
  - Minimize the number of setuid programs

```
/usr/bin/find / -user root -perm -4000 -print |
/bin/mail -s "Setuid root files" username
```

  - Disable the setuid execution on individual filesystems
    - -o nosuid

Security issues

- /etc/hosts.equiv and ~/.rhosts
- Trusted remote host and user name DB
  - Allow user to login (via rlogin) and copy files (rcp) between machines without passwords
  - Format:
    - Simple: hostname [username]
    - Complex: [+-][hostname|@netgroup]
      [[+-][username|@netgorup]]
  - Example

bar.com foo	(trust user "foo" from host "bar.com")
+@adm_cs_cc	(trust all from amd_cs_cc group)
+@adm_cs_cc -@chwong	

- Do not use this

Why not su nor sudo?

❑ Becoming other users

- A pseudo-user for services, sometimes shared by multiple users

```
User_Alias newsTA=wangyr
Runas_Alias NEWSADM=news
newsTA  ALL=(NEWSADM) ALL
```

- sudo -u news -s   (?)

Too dirty!

- /etc/inetd.conf
  - ➢ login stream tcp nowait root /usr/libexec/rlogind rlogind
- ~notftpadm/.rhosts
  - ➢ localhost wangyr
- rlogin -l news localhost

Security tools

- nmap
- john, crack
- PGP
- CA
- …

- Firewall
- TCP Wrapper
- …

TCP Wrapper

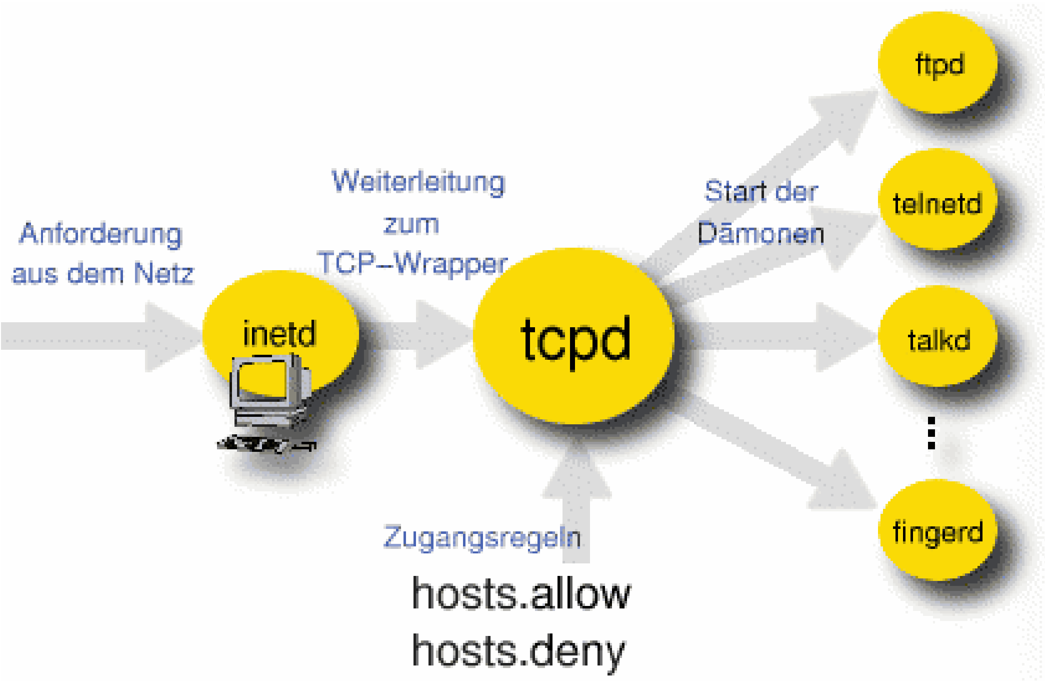
- ❑ There are something that a firewall will not handle
  - Sending text back to the source

- ❑ TCP wrapper
  - Extend the abilities of inetd
    - Provide support for every server daemon under its control
  - Logging support
  - Return message
  - Permit a daemon to only accept internal connetions

TCP Wrapper

❑ TCP Wrapper

- Provide support for every server daemon under its control



TCP Wrapper

- ❑ To see what daemons are controlled by inetd, see /etc/inetd.conf

```
#ftp    stream  tcp     nowait  root    /usr/libexec/ftpd       ftpd -l
#ftp    stream  tcp6    nowait  root    /usr/libexec/ftpd       ftpd -l
#telnet stream  tcp     nowait  root    /usr/libexec/telnetd    telnetd
#telnet stream  tcp6    nowait  root    /usr/libexec/telnetd    telnetd
shell   stream  tcp     nowait  root    /usr/libexec/rshd       rshd
#shell  stream  tcp6    nowait  root    /usr/libexec/rshd       rshd
login   stream  tcp     nowait  root    /usr/libexec/rlogind    rlogind
#login  stream  tcp6    nowait  root    /usr/libexec/rlogind    rlogind
```

- ❑ TCP wrapper should not be considered a replacement of a good firewall. Instead, it should be used in conjunction with a firewall or other security tools

TCP Wrapper

❑ To use TCP wrapper

1. inetd daemon must start up with “-Ww” option (default)

   Or edit /etc/rc.conf

```
inetd_enable="YES"
inetd_flags="-wW"
```

- Edit /etc/hosts.allow
  - Format:

    daemon:address:action

    – daemon is the daemon name which inetd started

    – address can be hostname, IPv4 addr, IPv6 addr

    – action can be "allow" or "deny"

    – Keyword "ALL" can be used in daemon and address fields to means everything

/etc/hosts.allow

- ❑ First rule match semantic
  - Meaning that the configuration file is scanned in ascending order for a matching rule
  - When a match is found, the rule is applied and the search process will stop
- ❑ example

```
ALL :     localhost, loghost @adm_cc_cs : allow
ptelnetd pftpd sshd: @sun_cc_cs, @bsd_cc_cs, @linux_cc_cs : allow
ptelnetd pftpd sshd: zeiss, chbsd, sabsd : allow
identd :  ALL : allow
portmap :  140.113.17. ALL : allow
sendmail : ALL : allow
rpc.rstatd : @all_cc_cs 140.113.17.203: allow
rpc.rusersd : @all_cc_cs 140.113.17.203: allow
ALL : ALL : deny
```

/etc/hosts.allow

❑ Advance configuration

- External commands (twist option)
  - ➢ twist will be called to execute a shell command or script

```
# The rest of the daemons are protected.
telnet : ALL \
         : severity auth.info \
         : twist /bin/echo "You are not welcome to use %d from %h."
```

- External commands (spawn option)
  - ➢ spawn is like twist, but it will not send a reply back to the client

```
# We do not allow connections from example.com:
ALL : .example.com \
      : spawn (/bin/echo %a from %h attempted to access %d >> \
      /var/log/connections.log) \
      : deny
```

/etc/hosts.allow

- Wildcard (PARANOID option)
  - Match any connection that is made from an IP address that differs from its hostname

```
# Block possibly spoofed requests to sendmail:
sendmail : PARANOID : deny
```

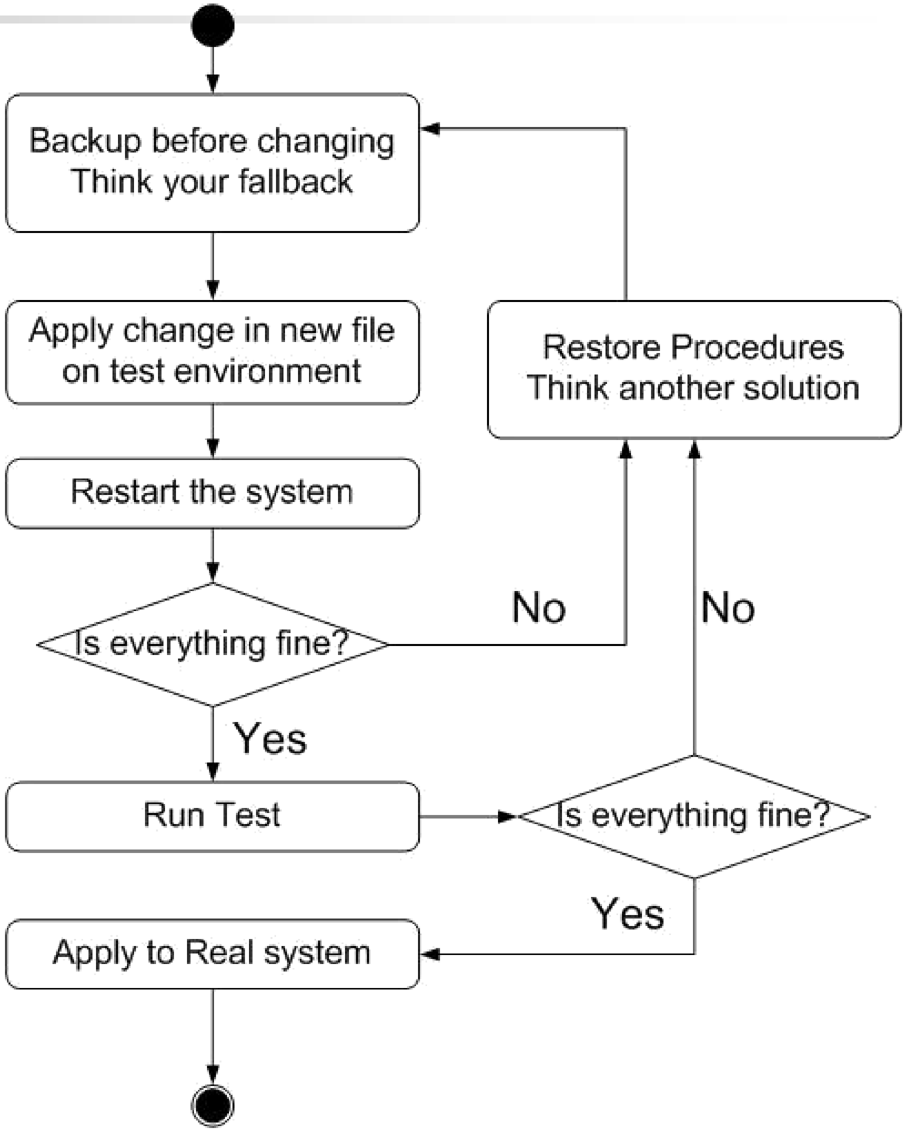
❑ See

- man 5 hosts_access
- man 5 hosts_options

When you perform any change.

❑ Philosophy of SA

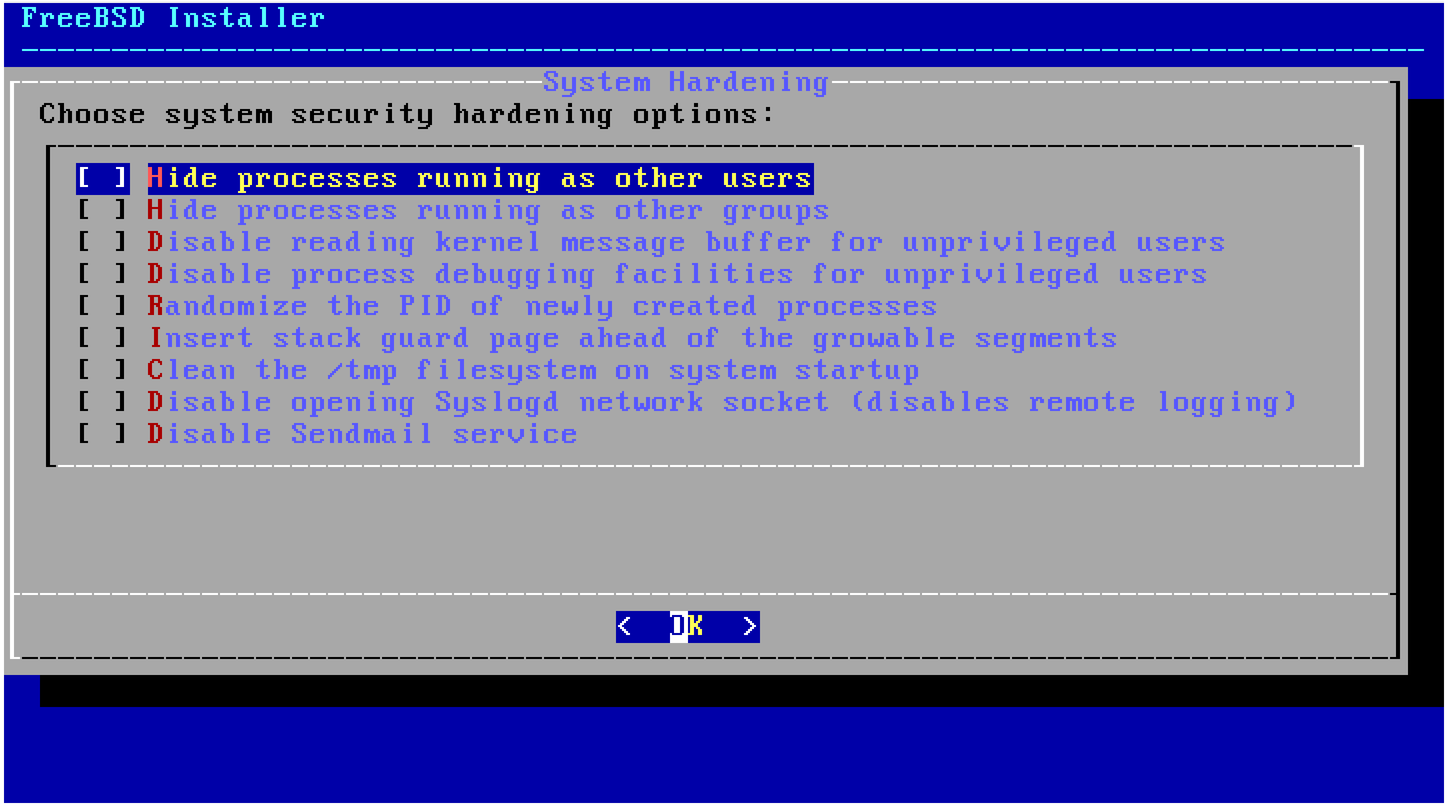
- Know how things really work.
- Plan it before you do it.
- Make it reversible
- Make changes incrementally.
- Test before you unleash it .



Appendix

System Security Hardening Options (1/3)

- Include various system hardening options during installation since FreeBSD 11.0-RELEASE



```
FreeBSD Installer

System Hardening
Choose system security hardening options:

[ ] Hide processes running as other users
[ ] Hide processes running as other groups
[ ] Disable reading kernel message buffer for unprivileged users
[ ] Disable process debugging facilities for unprivileged users
[ ] Randomize the PID of newly created processes
[ ] Insert stack guard page ahead of the growable segments
[ ] Clean the /tmp filesystem on system startup
[ ] Disable opening Syslogd network socket (disables remote logging)
[ ] Disable Sendmail service
```

  - /usr/src/usr.sbin/bsdinstall/scripts/hardening

System Security Hardening Options (2/3)

- ❑ Hide processes running as other users
  - security.bsd.see_other_uids=0
  - Type: Integer, Default: 1
- ❑ Hide processes running as other groups
  - security.bsd.see_other_gids=0
  - Type: Integer, Default: 1
- ❑ Disable reading kernel message buffer for unprivileged users
  - security.bsd.unprivileged_read_msgbuf=0
  - Type: Integer, Default: 1
- ❑ Disable process debugging facilities for unprivileged users
  - security.bsd.unprivileged_proc_debug=0
  - Type: Integer, Default: 1

System Security Hardening Options (3/3)

- ❑ Randomize the PID of newly created processes
  - kern.randompid=$(jot -r 1 9999)
    - ➢ Random PID modulus
  - Type: Integer, Default: 0
- ❑ Insert stack guard page ahead of the growable segments
  - security.bsd.stack_guard_page=1
  - Type: Integer, Default: 0
- ❑ Clean the /tmp filesystem on system startup
  - clear_tmp_enable="YES" (/etc/rc.conf)
- ❑ Disable opening Syslogd network socket (disables remote logging)
  - syslogd_flags="-ss" (/etc/rc.conf)
- ❑ Disable Sendmail service
  - sendmail_enable="NONE" (/etc/rc.conf)