



Periodic Processes

CRON – Schedule Commands (1)

❑ What we want?

- Do things at right time automatically

❑ cron daemon

- The daemon that handles periodic execution
- cron daemon reads configuration file and executes commands on time

`cron(8)`, `crontab(1)`, `crontab(5)`

CRON – Schedule Commands (2)

❑ Configuration file

- So called: **crontab** (cron table)
- Location of user cron configuration file
 - Every user can have at most one crontab file and this file will be named the user's login ID
 - Edit using crontab(1) command

System	Cron Dir
FreeBSD	/var/cron/tabs
Red Hat	/var/spool/cron
Solaris	/var/spool/cron/crontabs
SunOS	/var/spool/cron/crontabs

- Location of System Cron Configuration file
 - /etc/crontab

CRON – Schedule Commands (3)

❑ Configuration File Format

1. Ignored
 - Blank lines or leading spaces and tabs
2. Comments
 - pound-sign Lines whose first non-space character is a #
3. environment setting
 - name = value
 - Default environment variables
 - LOGNAME, SHELL, PATH, HOME, MAILTO

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

4. cron command

Format:

minute hour day month weekday command

```
33 7 * * * /usr/local/bin/rsync -al -delete /home/ backup:/raid/home/
```

CRON – Schedule Commands (4)

❑ cron command format – *minute hour day month weekday command*

Field	Description	Range
minute	Minute of the hour	0 ~ 59
hour	Hour of the day	0 ~ 23
day	Day of the month	1 ~ 31
month	Month of the year	1 ~ 12
weekday	Day of the week	0 ~ 6 (0 = Sunday)

❑ Rule Matching

- * matches everything
- Single character matches exactly
- Dash(-) matches range
- Comma(,) matches any listed value
- Slash(/) matches skips of the number's value through the range.

CRON – Schedule Commands (5)

❑ crontab time format example

45 10 * * 1-5

→ AM 10:45, from Mon. to Fri.

10 * * * *

→ On 10 minutes of each hour

*/3 * * * *

→ Every three minutes

periodic

e.g. $1-59/2 = 1, 3, 5, 7,$

30 15 5 * *

→ PM 3:30 of each 5-th day

9, ..., 59

0 0 14 2 *

→ On the Midnight of Valentine's day

5 0-6 * * *

→ On 5 minutes, from 0 to 6 o'clock.

0,30 * 13 * 5

→ every half-hour on Fri. and every
half-hour on the 13-th day

❑ crontab example

20 1 * * *

find /tmp -atime +3 -exec rm -f {} ‘;’

55 23 * * 0-3,6

/home/chwong/cputemp-check.sh

CRON – Schedule Commands (6)

- ❑ Special strings to specify the time

string	meaning	in 5 fields format
@reboot	Run once, <u>at startup</u> .	N/A
@yearly	Run once a year	0 0 1 1 *
@annually	(same as @yearly)	
@monthly	Run once a month	0 0 1 * *
@weekly	Run once a week	0 0 * * 0
@daily	Run once a day	0 0 * * *
@midnight	(same as @daily)	
@hourly	Run once an hour	0 * * * *

crontab command

❑ crontab(1)

% crontab -e [-u user]

- Edit the [user's] crontab using editor

% crontab -l

- List the content of the crontab

% crontab -r

- Remove the current crontab

% crontab *filename*

- Install *filename* as your crontab

crontab management

❑ To Allow or deny user from using cron daemon

- By default, all users can have their own crontab
- allow file
 - A list of users that may use crontab, any other not in the list can not use it
- deny file
 - Reverse meaning

❑ log

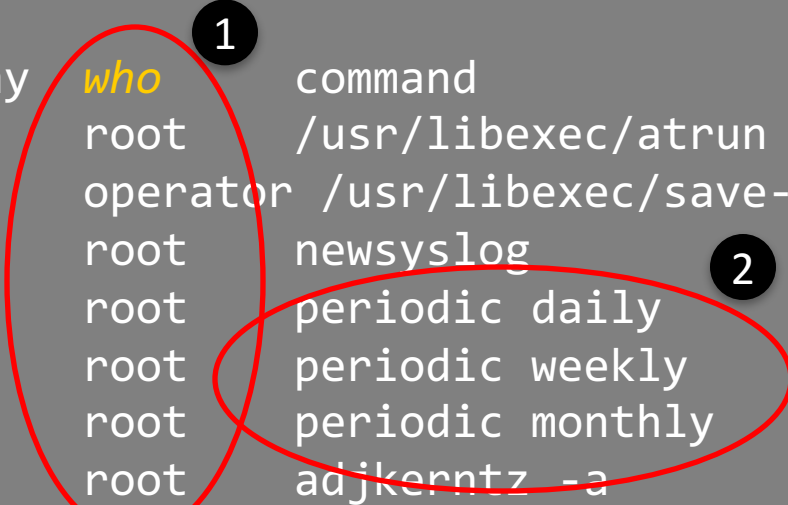
System	Allow or deny file	Log file
FreeBSD	/var/cron/{allow,deny}	By syslogd
Red Hat	/etc/cron.{allow,deny}	/var/log/cron
Solaris	/etc/cron.d/cron.{allow,deny}	/var/cron/log
SunOS	/var/spool/cron/cron.{allow,deny}	By syslogd

System crontab: /etc/crontab

❑ System crontab

- /etc/crontab

```
SHELL=/bin/sh
PATH=/etc:/bin:/sbin:/usr/bin:/usr/sbin
HOME=/var/log
#minute hour mday month wday who command
*/5 * * * * root /usr/libexec/atrun
*/11 * * * * operator /usr/libexec/save-entropy
0 * * * * root newsyslog
1 3 * * * root periodic daily
15 4 * * 6 root periodic weekly
30 5 1 * * root periodic monthly
1,31 0-5 * * * root adjkerntz -a
```



periodic utility (1)

□ periodic utility

- Run periodic system function under /etc/periodic

```
sabsd [/home/chwong] -chwong- ls -ld /etc/periodic/*
drwxr-xr-x  2 root  wheel  1024 Sep 26 21:43 /etc/periodic/daily
drwxr-xr-x  2 root  wheel   512 Sep 27 03:49 /etc/periodic/monthly
drwxr-xr-x  2 root  wheel   512 Sep 27 03:49 /etc/periodic/security
drwxr-xr-x  2 root  wheel   512 Sep 27 03:49 /etc/periodic/weekly
```

```
sabsd [/home/chwong] -chwong- ls /etc/periodic/daily
100.clean-disks          200.backup-passwd      405.status-ata-raid    430.status-rwho
110.clean-tmps           210.backup-aliases     406.status-gmirror     440.status-mailq
120.clean-preserve       300.calendar           407.status-graid3      450.status-security
130.clean-msgs           310.accounting         408.status-gstripe     470.status-named
140.clean-rwho           330.news                409.status-gconcat     500.queuerun
150.clean-hoststat       400.status-disks       420.status-network     999.local
```

- /etc/periodic.conf
- /etc/defaults/periodic.conf

```
nctucs [~] -wangth- ls -al /usr/local/etc/periodic/security
total 18
drwxr-xr-x  2 root  wheel    4 Apr 12 2017 .
drwxr-xr-x  8 root  wheel    8 Aug 20 2016 ..
-r-xr-xr-x  1 root  wheel  4944 Apr  2 2017 410.pkg-audit
-r-xr-xr-x  1 root  wheel  1686 Apr  2 2017 460.pkg-checksum
```

periodic utility (2)

□ periodic utility

- For custom system programs: /usr/local/etc/periodic

```
nctucs [~] -wngth- ls -l /usr/local/etc/periodic/  
total 19  
drwxr-xr-x  2 root  wheel  6 Apr 12  2017 daily  
drwxr-xr-x  2 root  wheel  4 Aug 20  2016 hourly  
drwxr-xr-x  2 root  wheel  4 Aug 20  2016 monthly  
drwxr-xr-x  2 root  wheel  3 Aug 20  2016 reboot  
drwxr-xr-x  2 root  wheel  4 Apr 12  2017 security  
drwxr-xr-x  2 root  wheel  6 Apr 12  2017 weekly
```

```
nctucs [~] -wngth- ls -l /usr/local/etc/periodic/daily/  
total 18  
-r-xr-xr-x  1 root  wheel  1512 Jul 29  2016 402.zfSnap  
-r-xr-xr-x  1 root  wheel  1073 Jul 29  2016 403.zfSnap_delete  
-r-xr-xr-x  1 root  wheel  2746 Apr  2  2017 411.pkg-backup  
-r-xr-xr-x  1 root  wheel  2506 Apr  2  2017 490.status-pkg-changes
```

periodic utility (3)

- ❑ Execution order depends on filenames
 - Use number as prefix to control the order
- ❑ All scripts under that directory will be executed
 - Unlike /etc/rc.conf
 - Even though there is no “YES” in /etc/periodic.conf
- ❑ /etc/periodic.conf

```
nctucs [~] -wangth- cat /etc/periodic.conf
daily_clean_tmps_enable="YES"           # Delete stuff daily
daily_clean_tmps_dirs="/tmp /var/tmp"   # Delete under here
daily_clean_tmps_days="3"              # If not accessed for
daily_status_zfs_enable="YES"          # Check ZFS
daily_status_ntpd_enable="YES"         # Check NTP status
weekly_dehydrated_enable="YES"
...
```

- ❑ Driven by crontab(1)

at command

❑ at command

- executes commands at a specified time

at [-q queue] [-f file] [-mldbv] time

or at [-q queue] [-f file] [-mldbv] -t [[CC]YY]MMDDhhmm[.SS]

❑ at management

- atq: View job queue
- atrm: Remove jobs
- /var/at/at.{allow,deny}
 - By default, only root can execute “at” command

❑ Driven by crontab(1)

- Invoked every 5 minutes

at(1), atrun(8)