linux.conf.au 2009 - security mini-conf

TOMOYO Linux Overview

Kentaro Takeda

takedakn@nttdata.co.jp

NTT DATA CORPORATION

About

- Part 1 (this part)
  - Brief introduction and demo.
  - Current status.
- Part 2 (from Tetsuo Handa, a main architect of TOMOYO)
  - Deep inside of TOMOYO for security guys. ☺

TOMOYO Linux

- A pathname-based MAC for Linux kernel.
- Developed by NTT DATA CORPORATION.
- Available under GPL.

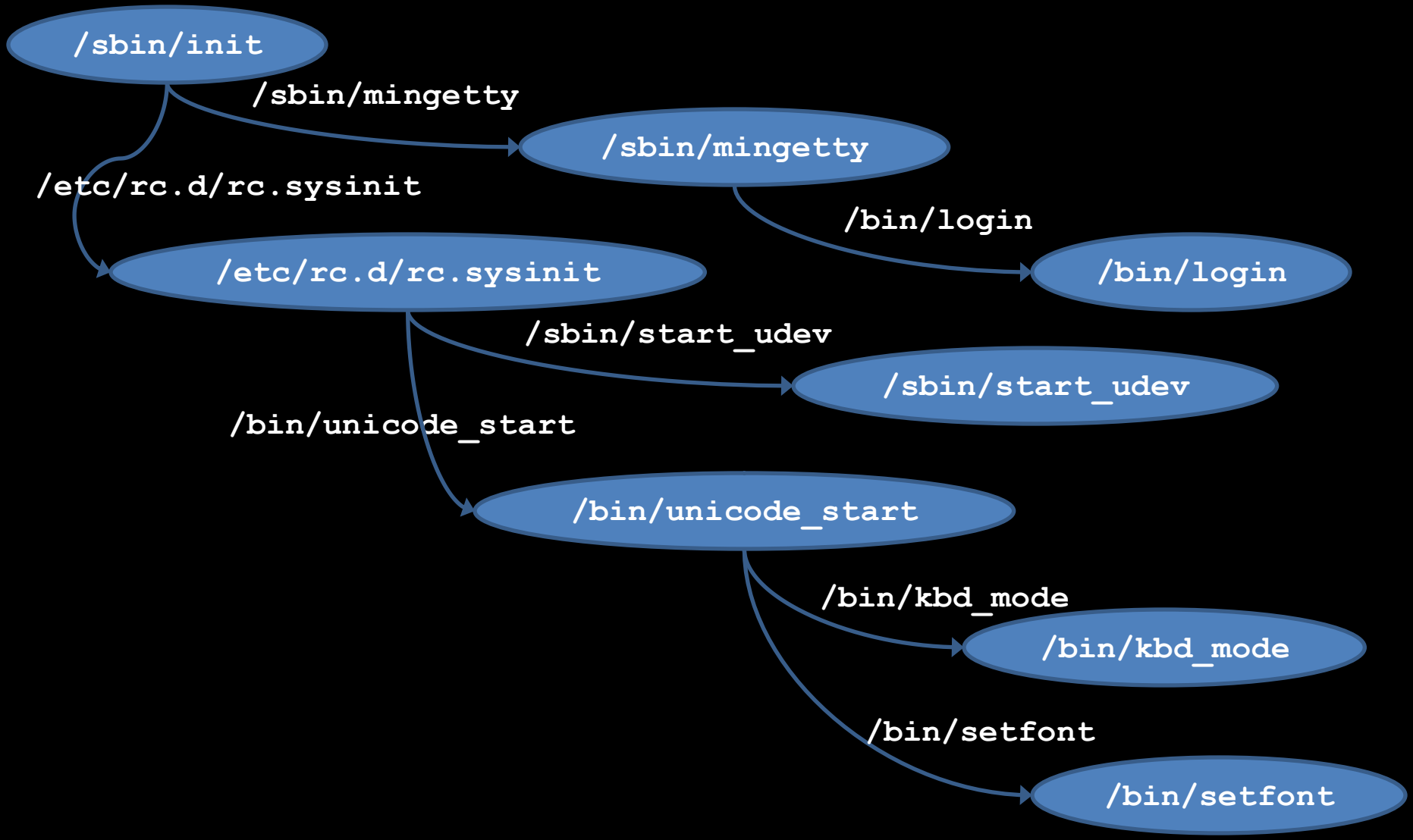
Concept

- The concept of TOMOYO is “Pathname-based security”, of course. ☺
- Tetsuo will talk about “pathname’s role” in part 2, I introduce some aspects of TOMOYO.

Main features of TOMOYO

- Designing and enforcing “state transition”.
  - Monitors and judges program execution requests.
  - Performs state transition by execution.
- Observing and restricting requests within each state.
  - Monitors and judges read/write requests to files.

State transition by execution



Attractive feature of TOMOYO

- Automatic policy learning.
  - Accumulating access permissions within each domain.
  - with pathname, of course. ☺
- Its's not essential part as a security module.
- But very attractive and friendly for averagely experienced administrators.

Examples

Domain

- State(=domain) transition occurs automatically.
  - Example) domains of postfix

```
/usr/sbin/postfix
    /etc/postfix/postfix-script
        /etc/postfix/postfix-script
            /bin/sh
                /bin/grep
                /bin/uname
                /usr/sbin/postconf
        /usr/lib/postfix/master
            /usr/lib/postfix/cleanup
            /usr/lib/postfix/local
            /usr/lib/postfix/pickup
            /usr/lib/postfix/qmgr
            /usr/lib/postfix/trivial-rewrite
```

  - Each line indicates a domain.

ACLs

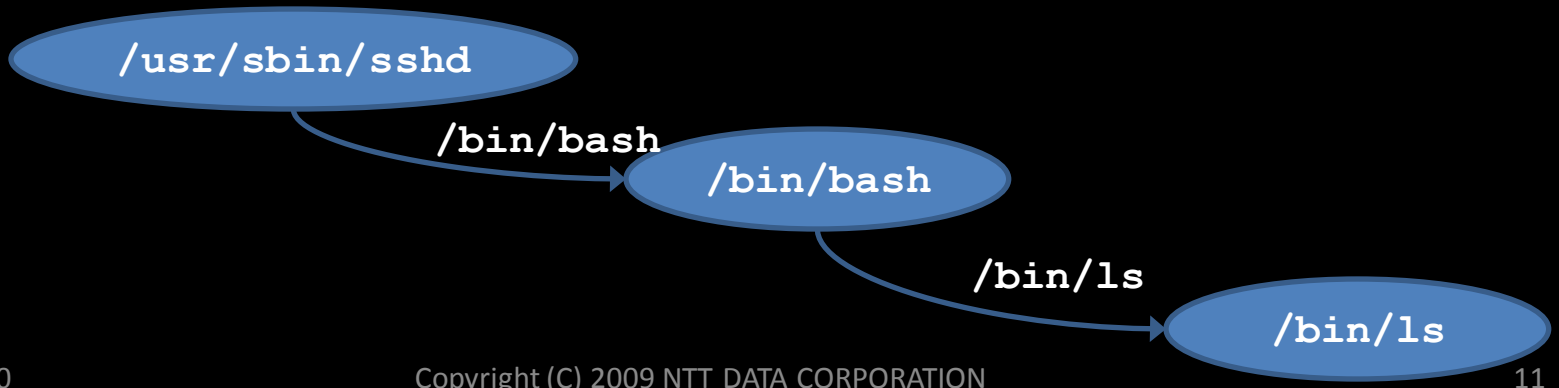
```
<kernel> /usr/sbin/httpd
allow_read    /var/www/html/\*
allow_read    /etc/httpd/\*.conf
allow_read    /usr/lib/httpd/modules/\*.so
allow_write   /var/log/httpd/\*_log
allow_create  /var/run/httpd.pid
allow_unlink  /var/run/httpd.pid
(snip)
```

- /usr/sbin/httpd
  - may read /var/www/html/* and /etc/httpd/*.conf and /usr/lib/httpd/modules/*.so
  - may write /var/log/httpd/*_log
  - may create and unlink /var/run/httpd.pid

Domain transition and ACLs

```
<kernel> /usr/sbin/sshd /bin/bash
allow_execute    /bin/ls
allow_read       /home/takedakn/.bashrc
allow_read/write /home/takedakn/.bash_history
(snip)

<kernel> /usr/sbin/sshd /bin/bash /bin/ls
allow_read /etc/group
allow_read /etc/nsswitch.conf
allow_read /etc/passwd
```



Demo

- Linux 2.6.28
- mmotm-2009-01-09-16-44
- TOMOYO (LSM version) revision 2031

Two versions of TOMOYO

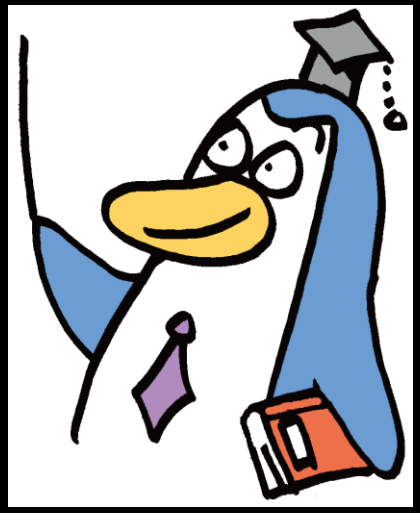
- non-LSM version
  - Our start point.
  - Full-featured version.
    - file, network, etc…
- LSM version
  - Only file restriction feature for now.
  - Proposing to mainline now.

LSM for pathname based MAC

- LSM was not designed to implement pathname based security module.
  - vfsmount * wasn't available inside LSM module.
- Now, new LSM hooks are placed where vfsmount * is available in Linus' tree.
  - *"[PATCH] Introduce new LSM hooks where vfsmount is available"*
- We're proposing TOMOYO's body now.

Thank you!

takedakn@nttdata.co.jp



Let’s dive deeper into TOMOYO.