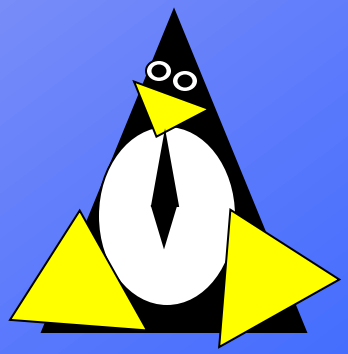
Smack and the Application Ecosystem

Casey Schaufler

September 2009



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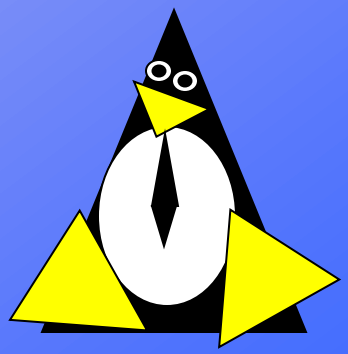
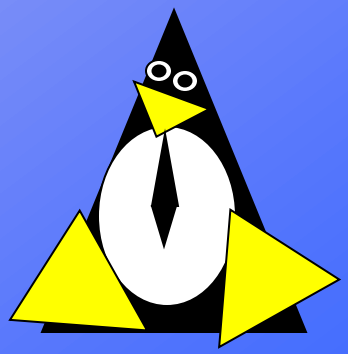
- Trusted Solaris, Trusted Irix, Linux LSM
- Various Government Efforts
  - Trusix, CMM, CHATS
- Standards
  - P1003.1e/2c, TSIG
- Smack



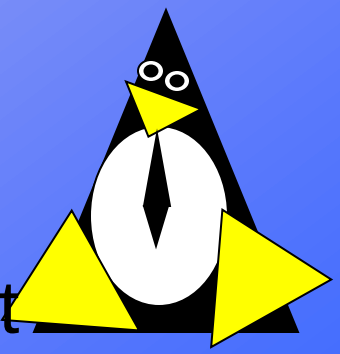
Today's Talk

- Mandatory Access Control (MAC)
- The Smack View of MAC
- Core Applications
- Security Enforcing Applications
- Third Party Applications



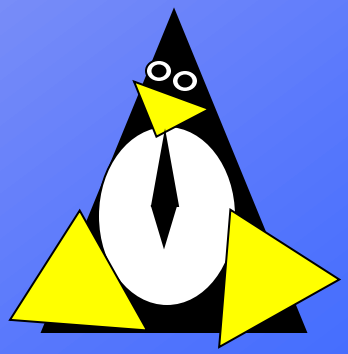
Mandatory Access Control

- Concepts
  - Subject, Object, Access
- Principles
  - User has no say in it
  - Based on system controlled attributes
- Jargon
  - Label, Multilevel Security, CIPSO
  - Bell & LaPadula, Type Enforcement



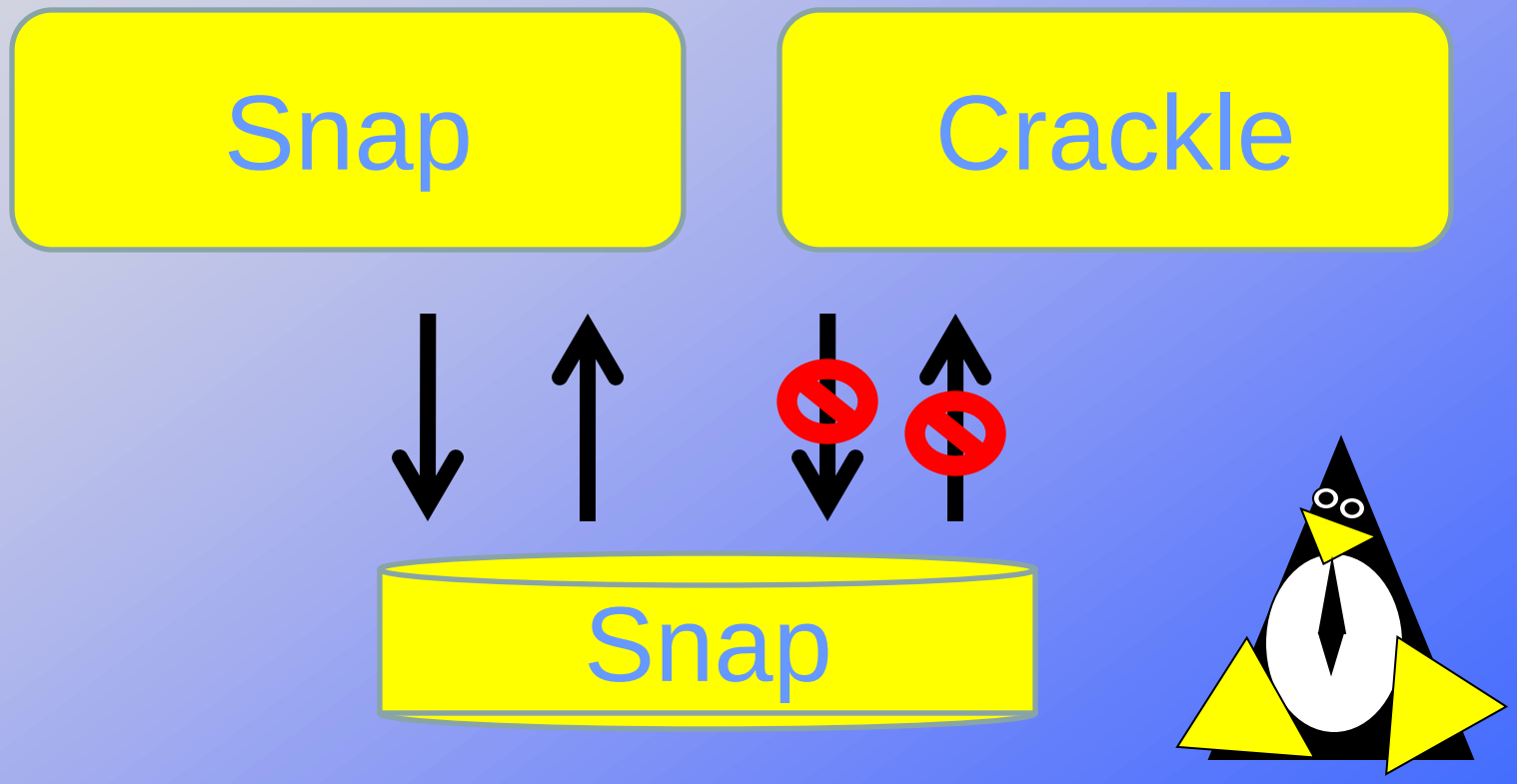
The Smack Approach

- Every subject gets a label
- Every object gets a label
- Object gets creating Subject's label
- Label is a text string
- Label value is meaningless



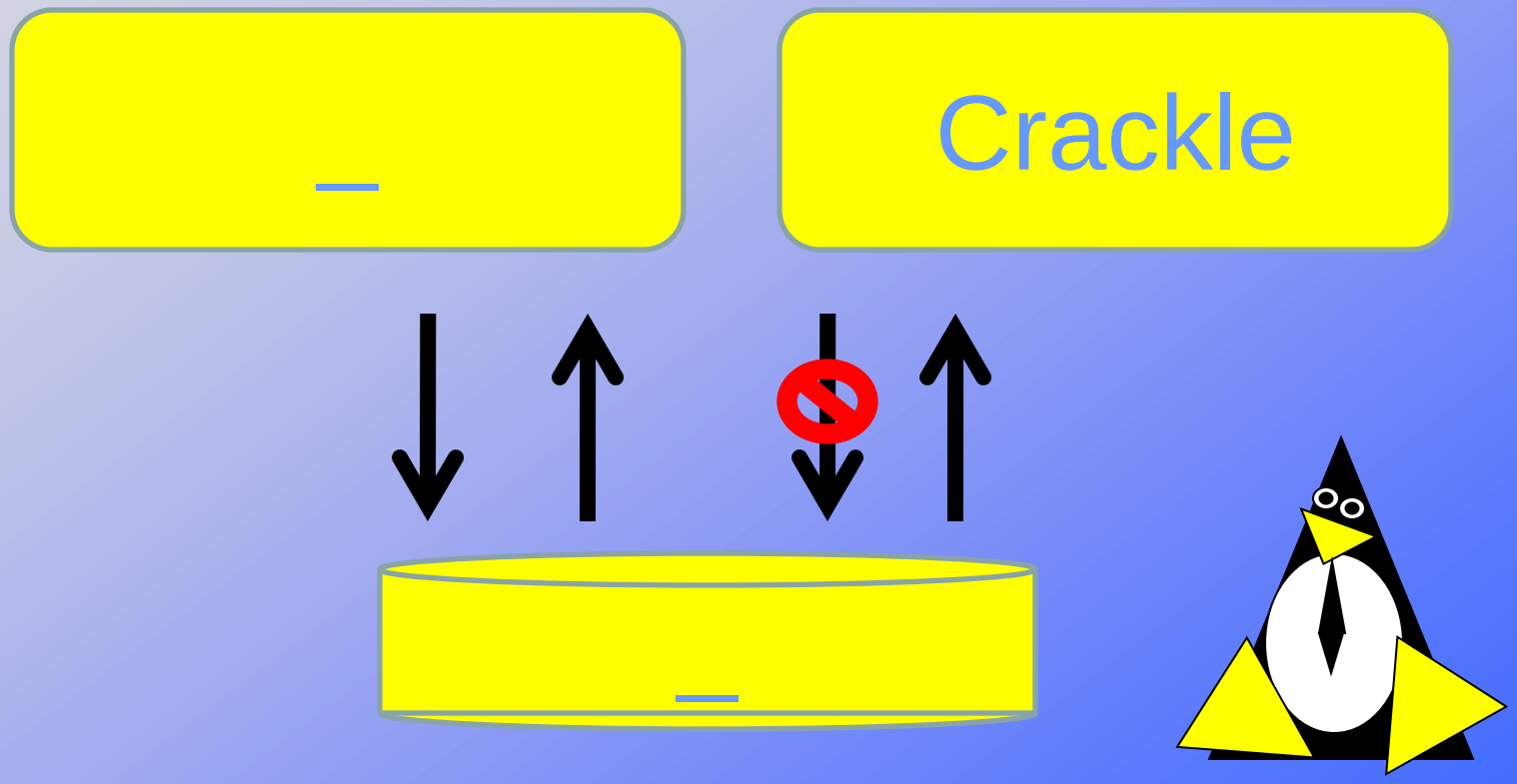
Smack Access Rules

Labels Must Match



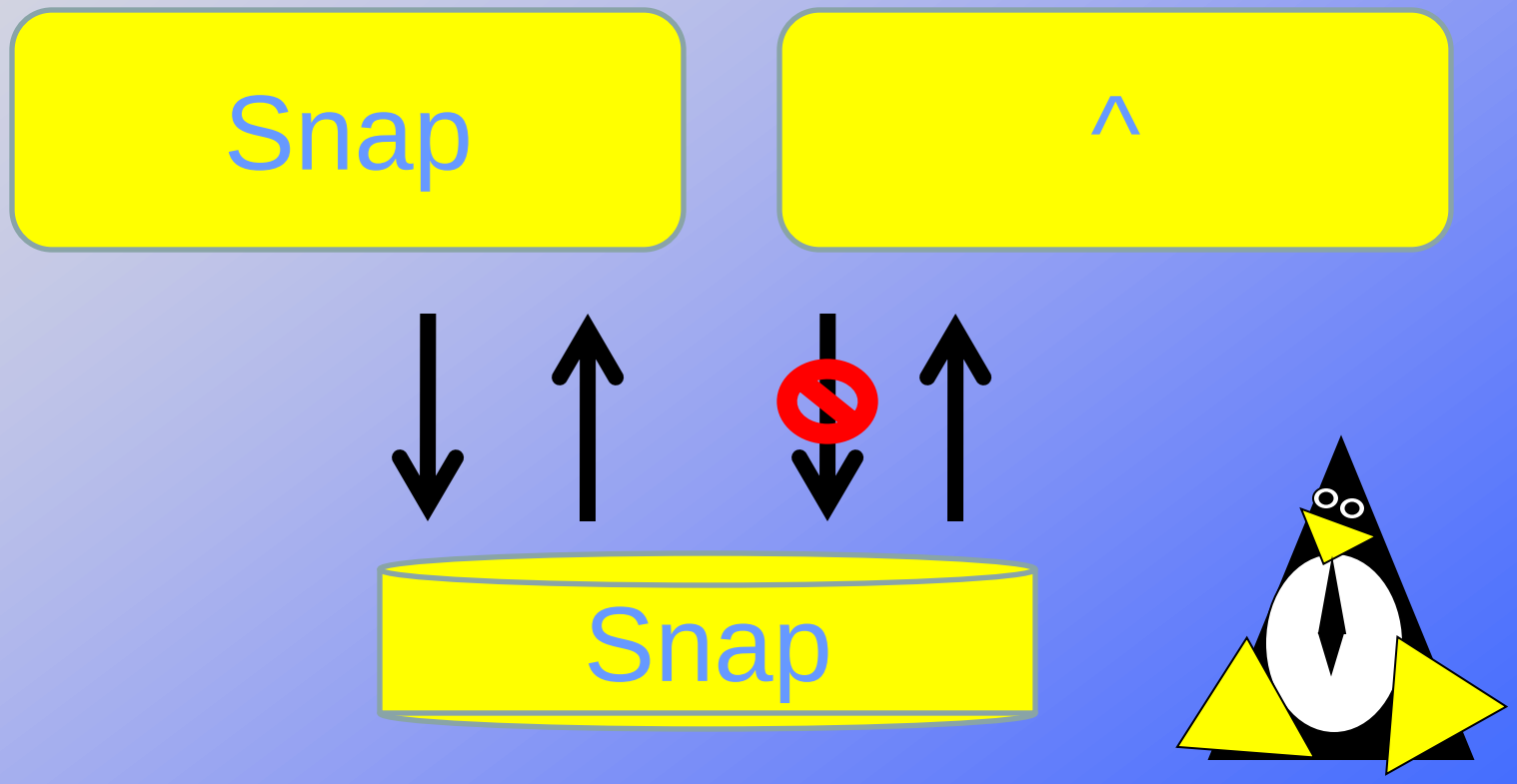
Smack Access Rules

The Floor Label



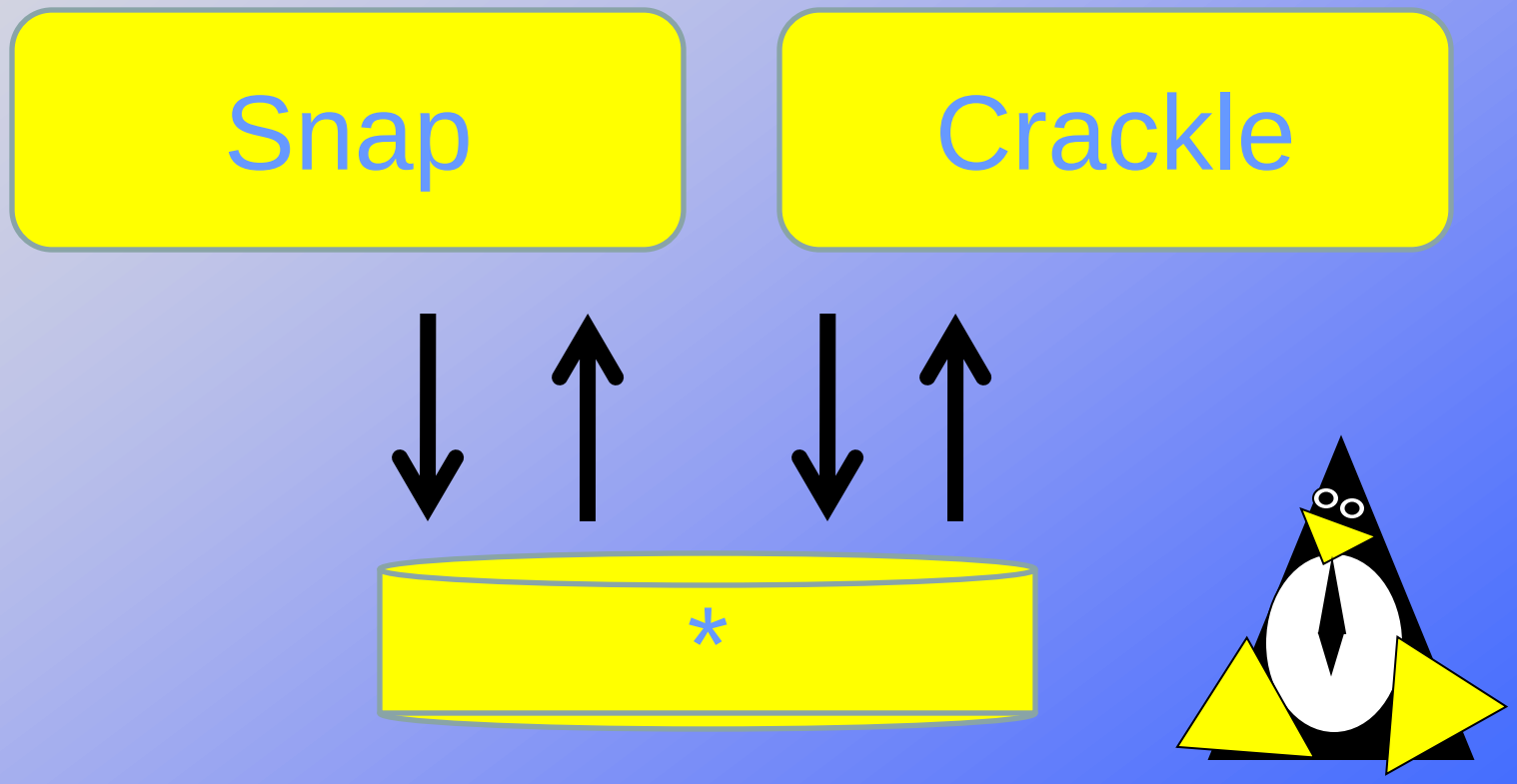
Smack Access Rules

The Hat Label



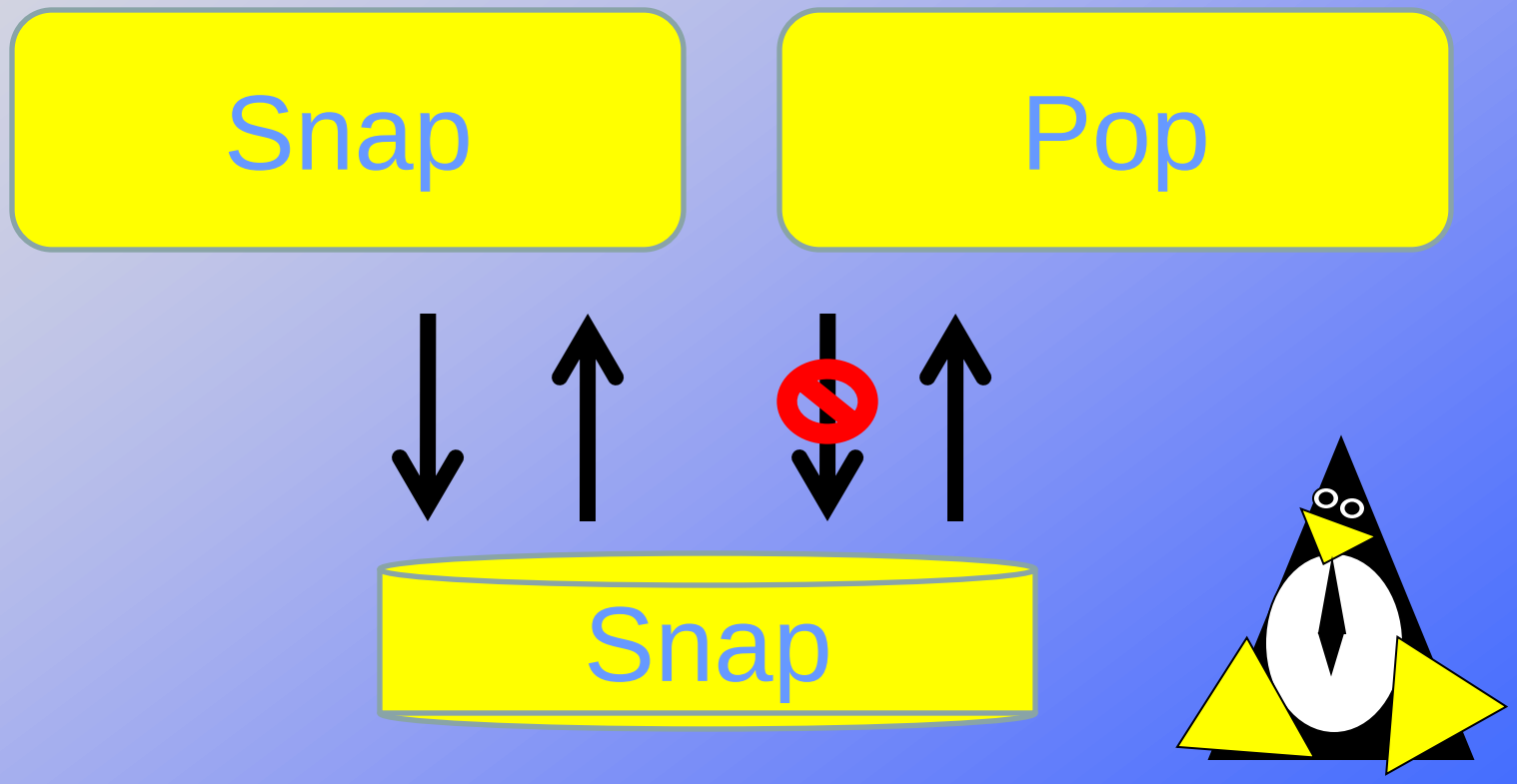
Smack Access Rules

The Star Label



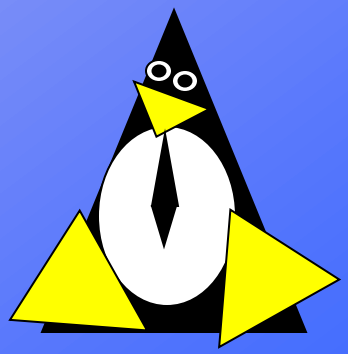
Smack Access Rules

Explicit: Pop Snap r



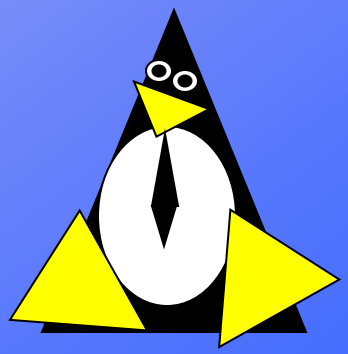
File System Model

- Process accesses file
- Attributes are part of the file
  - lstat() requires MAC read access
  - chmod() requires MAC write access
- No blind writes
  - Write access requires read access



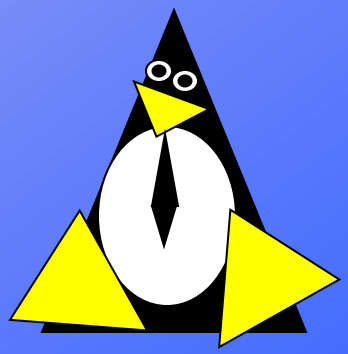
Networking Model

- Sender writes to receiver
  - Sender is subject, receiver is object
- Socket, packet not policy components
- **`Crackle Pop  w`**
  - Allows a UDP packet
- **`Pop Crackle  r`**
  - Does not allow a UDP Packet



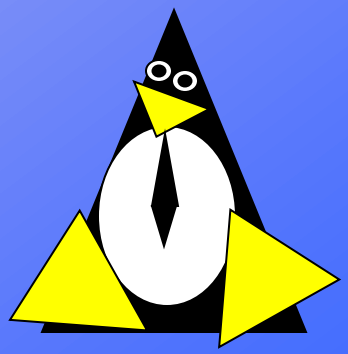
Packet Labeling

- CIPSO used by preference
  - Smack label encoded in the IP header
- Unlabeled packets for the Ambient label
  - Inbound, outbound, and internal
- Single label network ranges
  - **`192.168.230.0/24 Crackle`**



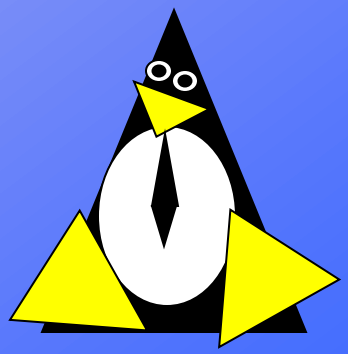
Core Applications

- Showing Smack labels
  - ls, id, attr
- Setting Smack labels
  - login, newsmack
- Setting the Smack environment
  - mount
- There isn’t much to see here

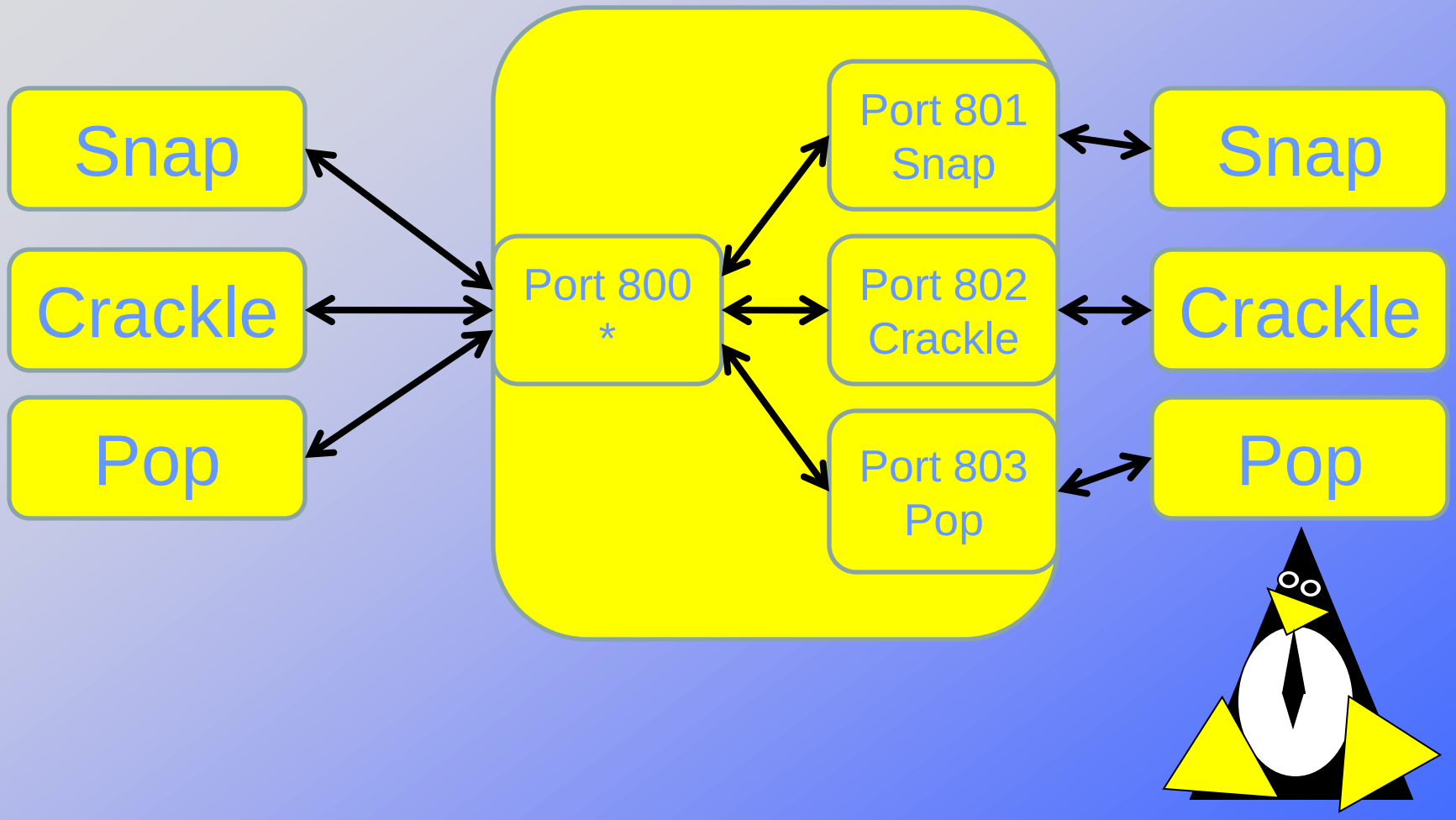


Network Applications

- Network login
  - sshd
- Smack port mutliplexer
  - smackpolyport
  - One advertised port
  - Multiple servers at various labels
- X11

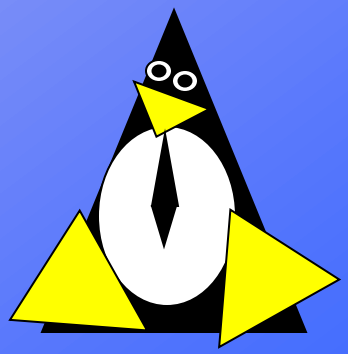


smackpolyport



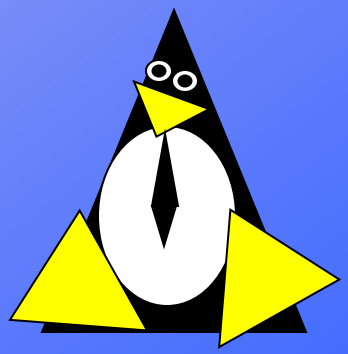
Smack and X11

- XACE
  - X11 Access Control Extension
  - Smack extension in test
- Window Manager
  - As much or more work that the server
  - Unbegun
- Message bus and more



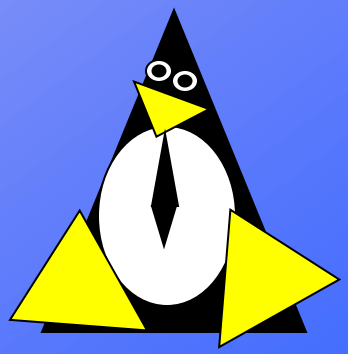
Oracle 11gR1 on Smack

- Readily available
- Useful
- Typical of network service applications
- Requires SELinux be disabled



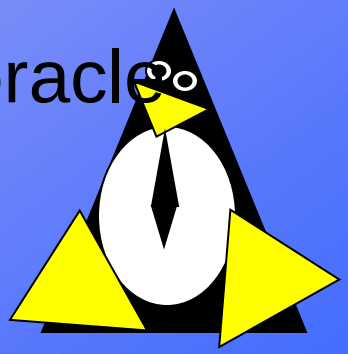
Smack Setup

- Create a Smack Kernel
  - 2.6.29 or newer
  - SELinux and TOMOYO off, Smack on
- Install smack-util
  - newsmack
- Mount Options
  - /smack
  - /dev/shm



Oracle Setup

- Install Oracle 11gR1
  - According to instructions
  - As root with the floor label “_”
- Relabel the oracle files
  - /home/oracle /u01 /tmp/.oracle
  - /var/tmp/.oracle /var/tmp/oradiag_oracle
  - find –exec attr –S –s SMACK64 \
    - –V Database {} \;



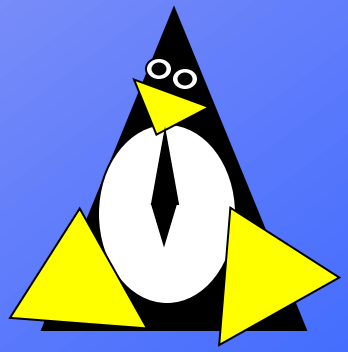
Oracle Startup

newsmack Database

su – oracle

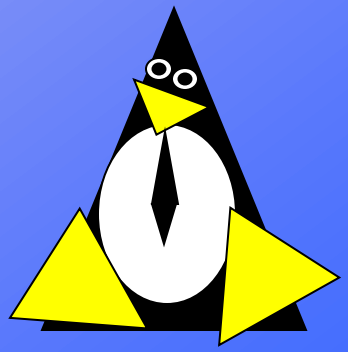
% . oraenv

…



Access By Address

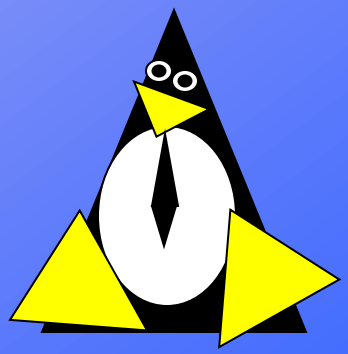
```
# echo ‘192.168.230.131 Database’ > \
    /smack/netlabel
# echo ‘192.168.231.0/24 Database’ > \
    /smack/netlabel
```



Access By Label

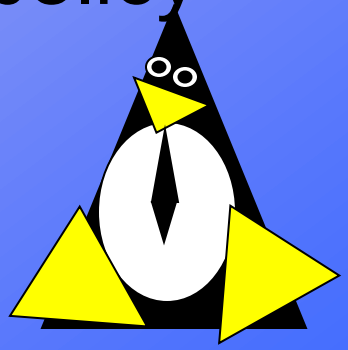
In /etc/smack/accesses

UserLabel	Database	w
Database	UserLabel	w
OtherLabel	Database	w
Database	Otherlabel	w



What Have You Learned?

- Simple Separation is … Simple
- Policy matters
  - File system protection
  - Network access
- Applications can be trusted with policy
- … or not



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