Linux Administration

Firewalls

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Why using a firewall?

- The network where your system is hosted may be considered as “hostile”. The public Internet is definitely hostile.
- Some applications may not provide an easy way to restrict network accesses.
- A local firewall provides an additional layer of protection.
- You may need to use firewall rules for some specific functions (redirection, logging, network address translation, …).

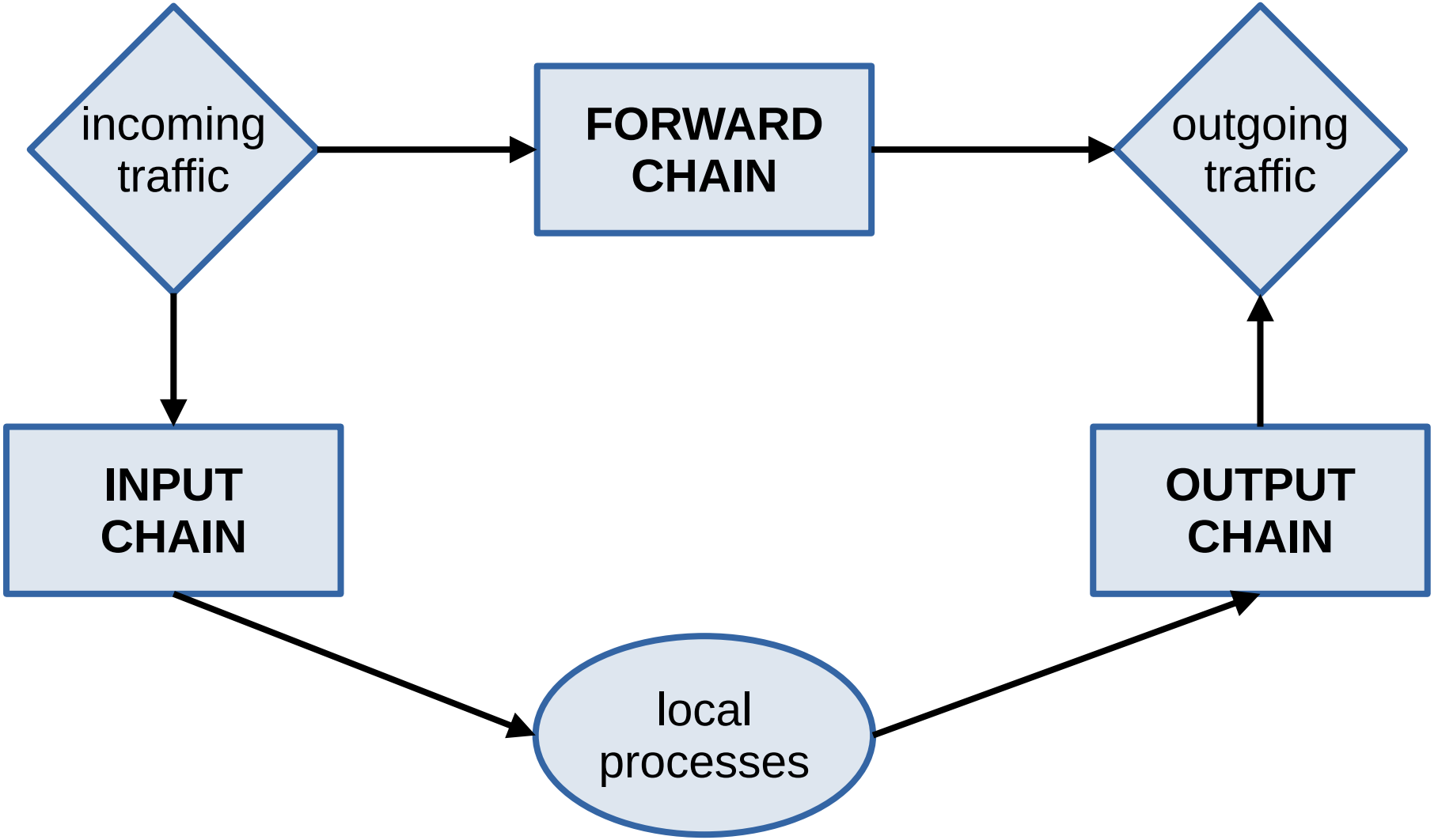
The Netfilter project

- Network filtering and related applications for the Linux system are developed under the umbrella of the Netfilter project.
- https://netfilter.org/

iptables and nftables

- iptables was the main network filtering tool available on Linux until the release of version 3.13 of the kernel, in 2014.
- Since then, nftables is used instead of iptables.
- A translation mechanism exists to keep iptables rules working with nftables, but long term management requires to work with the new tools.

Basic filter flow



iptables

- It relies on various network tables; each table contains chains, with a default policy (accept or drop).
- Filtering rules can be added or removed in each chain.
- ‘Filter’ is the default table, with three chains: input, forward and output.

nftables

Some of the main differences with iptables are:

- nftables doesn’t provide pre-build tables
- the syntax is different; you can use the iptables-translate command to convert iptables scripts
- a rule can perform multiple actions at once (blocking and logging for instance)
- the same rules can be used for both IPv4 and IPv6
- performances have been improved

The nft command

- **Manipulating tables:**
  nft { add | delete | list | flush } table { ipv4 | ipv6 | inet } table *table_name*
- **Manipulating chains:**
  nft { add | create | delete | rename | list | flush } chain *table_name chain_name* <options>
- **Manipulating rules:**
  nft { add | insert | replace | delete } rule <options>
- **Reviewing rules:**
  nft list ruleset
- **Deleting all rules:**
  nft flush ruleset

Firewall script

- Firewall rules can be set or modified manually, but it is strongly recommended to apply them with a script, during the boot process.
- Depending on your distribution, some scripts or tools may already be provided (*firewalld* on Red Hat Enterprise Linux, *ufw* on Ubuntu).
- Test your script when you are not relying on network connectivity!

Creating your first rule

- A rule usually match one or more of the following criteria:

- You can use the commands below to track the services running on the system and create the appropriate rules:
  - sudo ss -antup | grep LISTEN
  - sudo lsof -i -P | grep LISTEN
- Other criteria are available: network interface, connection status, ...

Modifying firewall rules

- Confirm that you have a script with a set of working rules (or to delete all existing rules).
- Schedule a job (with “at” or “cron”) to apply that rule set in 15 minutes.
- Make your firewall rule change.
- If you’ve lost access, wait up to 15 minutes to reconnect to the system.
- If the new rules are working properly, delete the scheduled job before it gets executed.