Linux Administration

Firewalls

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Why using a firewall?

- The network where your system is hosted may be considered as “hostile”.
- Some applications may not provide an easy way to restrict accesses.
- This would provide an additional layer of protection.
- You may need to use firewall rules to modify the network traffic.

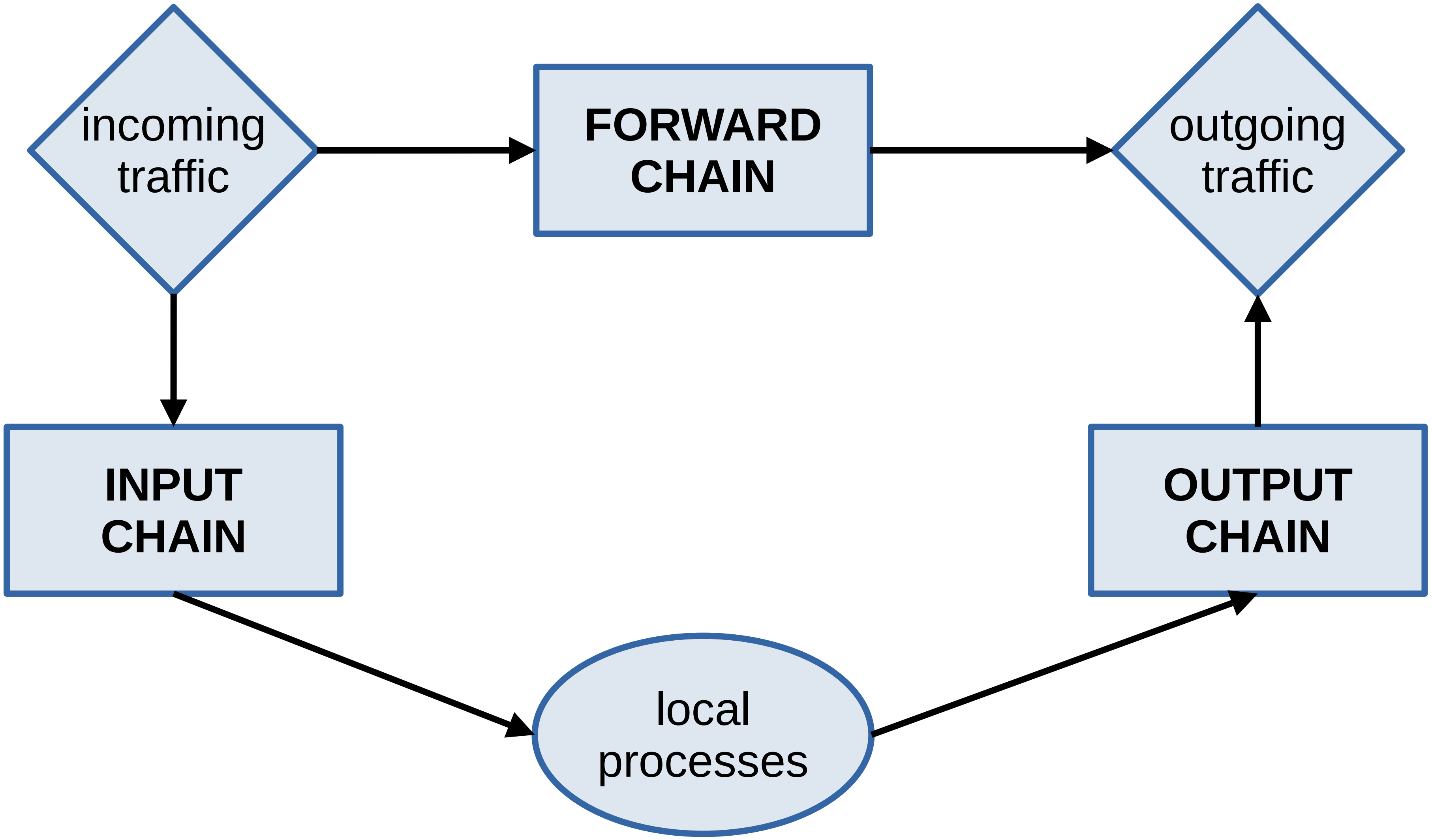
The Netfilter project

- Network filtering and related applications for the Linux system are under the umbrella of the Netfilter project.
- The main tools available to manage firewalls are iptables and nftables.
- https://netfilter.org/

iptables

- *iptables* is currently the most common filtering tool used on Linux systems.
- 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.

iptables filter table flow



Defining the default policy

The default policy should be to reject silently all packets (‘drop’); only authorized packets will be accepted.

- iptables -F (flush all the chains)
- iptables -X (delete all the chains)
- iptables -P INPUT DROP
- iptables -P FORWARD DROP
- iptables -P OUTPUT DROP

Manipulating rules

- Adding a rule: iptables -A <options>
- Inserting a rule: iptables -I <options>
- Deleting a rule: iptables -D <options>
- Replacing a rule: iptables -R <options>
- Listing the rules:
  iptables -L -n -v --line-number

Rule actions

- A rule should specify a target for a matching packet:
  - ACCEPT: the packet is transferred to the system
  - DROP: the packet is discarded
  - REJECT: the packet is refused and the sender is notified
  - LOG: the packet is logged and sent to the next rule
- Other options are available, for more advanced situations.

Creating your first rule

- A rule usually match one of those criteria:

Source IP Address | Source Port | Destination IP Address | Destination Port

- Check the /etc/services file and the ‘ss’ command output for port numbers.
- Other criteria are available: network interface, connection status, ...

Rule example

- If you want to allow all HTTP connections to your system coming from the network 192.168.5.0/24:

```
iptables -A INPUT -s 192.168.5.0/24 --dport 80 -j ACCEPT
```

- Incoming connections from other networks, on the same port will be managed with the default policy.

nftables

- This is the successor of iptables, using different tools and syntax, and allowing new types of operations.
- Both iptables and nftables may be available on the same system, but you want to use only one and ignore the other.
- Some of the main differences 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 (blocking and logging for instance)
  - the same rules can be used for both IPv4 and IPv6
  - performances have been improved

nftables syntax

One benefit of nftable is that the syntax is more explicit.

- nft { add | delete | list | flush } table { ipv4 | ipv6 | inet } table *table_name*
- nft { add | create | delete | rename | list | flush } chain *table_name chain_name* <options>
- nft { add | insert | replace | delete } rule <options>
- nft list ruleset
- 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 for instance).
- Test your script when you are not relying on network connectivity!