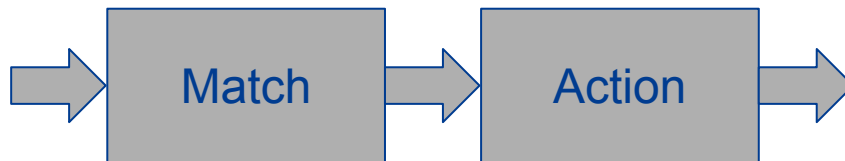# NETRONOME

TC Flower Offload

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- Programmable datapaths are new and exciting
- Match-action tables are more static but widely used
- Packets traverse one or more table of match-action rules
  - Classifier seeds flow key
  - Flow key is optionally masked
  - Flow key is used to lookup rules of table
  - If a match is found the actions of the rule are executed
  - Otherwise some fall-through occurs

```
→ [ Match ] → [ Action ] →
```

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- TC Flower classifier allows matching packets against pre-defined flow key fields:
  - Packet headers: f.e. IPv6 source address
  - Tunnel metadata: f.e. Tunnel Key ID
  - Metadata: Input port
- TC actions allow packet to be modified, forwarded, dropped, etc…
  - pedit: modify packet data
  - mirred: output packet
  - vlan: push, pop or modify VLAN
  - ...

- TC Flower makes use of the flow disector to perform classification
- Resulting flow key is masked
  - Only one mask allowed per priority
- Used to lookup flows
- If a match is found then TC actions of rule are executed
- If not packet processing proceeds to next classifier
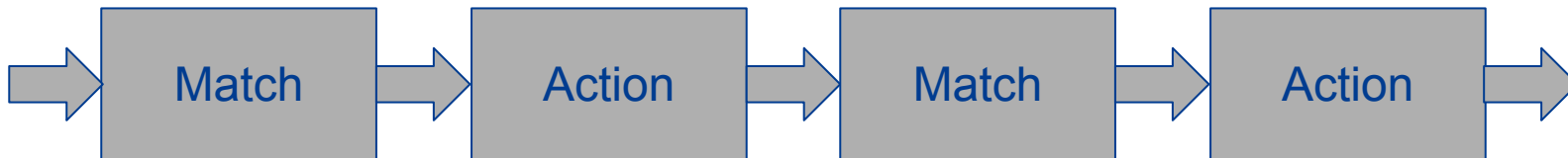 - Standard TC behaviour

- Provide greater throughput
- Increase CPU core efficiency and scalability

- mqprio offload introduced in v2.6.39
- Introduced ndo_setup_tc
- u32 Classifier offload introduced in v4.6
- As of v4.15-rc4 BPF, flower and matchall classifier offload also supported
- Netronome NFP driver implements BPF and flower classifier offload

Hardware Offload Policy

- skip_hw and skip_sw flags
  - Allow users to influence placement of flows by kernel
  - Default is to add to hardware and try to add to software
- in_hw and not_in_hw flags
  - Allow kernel to report presence of flow in hardware

- IPv6 label and neighbour discovery
- Maskable match of MPLS LSE fields
- GENEVE options

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- **Aim would be to allow enhanced rules to be written**
  - By taking into account Conntrack state
- **Scheme implemented by Open vSwitch datapath is:**
  - Conntrack action passes packet to through conntrack
  - Packet is then classified for a second time; conntrack state may form part of flow key

```
→ [ Match ] → [ Action ] → [ Match ] → [ Action ] →
```

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Thank You