Bro Clusters

- Someone here is analyzing 7Gbps of mixed traffic with Bro.
    - With everything turned on!

Cluster Purpose

- Bro is single threaded.
- Difficult to adapt multithreading into code base as it is.
- Conceptually Bro is very parallelizable but we aren’t taking the bruteforce approach to adding multithreading.
  - This is a topic for a different time.

Cluster Background

- Initially implemented as Bro scripts and all nodes needed to be started manually.
- BroControl was originally called “Bro Cluster Shell” and contained all of the Bro script support for clusters but automated the tedium.
- 2.0 introduces the cluster framework which is more abstraction of all previous work and ideas.

Cluster Layout

- Set of Bro processes acting a single entity.
- Split Bro functionality across node types.
  - Manager
  - Proxies
  - Workers

Manager

- Receives logs
- Handles notices

Proxy

- Synchronizes limited state information across workers.
  - For example: active local IP addresses
- Does not examine packets.

Worker

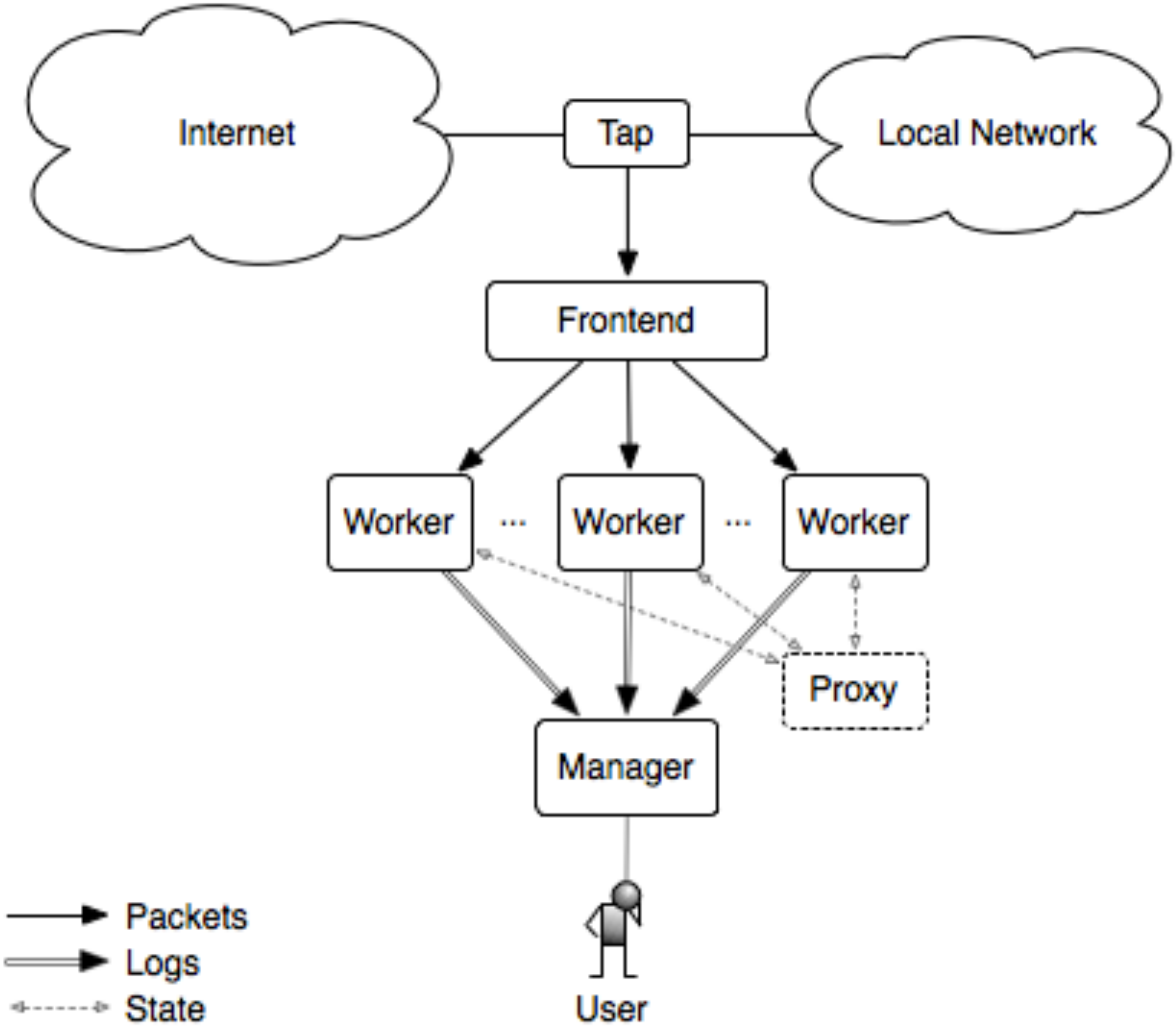
- Sniffs traffic
- Performs protocol analysis
- Generally, most of the heavy lifting

Frontend

- Not a Bro process!

Bidirectional Flow Load Balancing

- Turn a large “pipe” into many bundles of sessions.
- Most common balancing is 4- or 5-tuple
  - 4-tuple - SRC_IP+SRC_PORT+DST_IP+DST_PORT
  - 5-tuple - SRC_IP+SRC_PORT+DST_IP+DST_PORT+PROTO
- Network based balancing.
- Host base balancing.


Internet
Tap
Local Network
Frontend
Worker
...
Worker
...
Worker
Proxy
Manager
User
Packets
Logs
State

BroControl

- Cluster layout specification.
- Easy management and control of large numbers of processes on large numbers of physical hosts.

BroControl in “standalone” mode

node.cfg

```
[bro]
type=standalone
host=localhost
interface=en1
```

BroControl in “cluster” mode

node.cfg

```
[manager]
type=manager
host=192.168.1.72

[proxy-1]
type=proxy
host=192.168.1.72

[worker-1]
type=worker
host=192.168.1.72
interface=eth0

[worker-2]
type=worker
host=192.168.1.72
interface=eth1
```

```
$ sudo /bro/bin/broctl
Password:

Welcome to BroControl 0.41-128

Type "help" for help.

[BroControl] >
```

```
[BroControl] > check
manager is ok.
proxy-1 is ok.
worker-1 is ok.
worker-2 is ok.
```

```
[BroControl] > install
removing old policies in /usr/local/bro/spool/policy/site ... done.
removing old policies in /usr/local/bro/spool/policy/auto ... done.
creating policy directories ... done.
installing site policies ... done.
generating cluster-layout.bro ... done.
generating local-networks.bro ... done.
generating broctl-config.bro ... done.
updating nodes ... done.
```

```
[BroControl] > start
starting manager ...
starting proxy-1 ...
starting worker-1 ...
starting worker-2 ...
```

```
[BroControl] > ?

BroControl Version 0.41-128

    capstats <nodes> [secs]       - report interface statistics (needs capstats)
    check <nodes>                 - check configuration before installing it
    cleanup [--all] <nodes>       - delete working dirs on nodes (flushes state)
    config                        - print broctl configuration
    cron                          - perform jobs intended to run from cron
    cron enable|disable|?         - enable/disable "cron" jobs
    df                            - print nodes' current disk usage
    diag <nodes>                  - output diagnostics for nodes
    exec <shell cmd>              - execute shell command on all nodes
    exit                          - exit shell
    install                       - update broctl installation/configuration
    netstats                      - print nodes' current packet counters
    nodes                         - print node configuration
    print <id> <nodes>            - print current values of script variable at nodes
    peerstatus <nodes>            - print current status of nodes' remote connections
    process <trace> [Bro options] - runs Bro offline on trace file
    quit                          - exit shell
    restart [--clean] <nodes>     - stop and then restart processing
    scripts [-p|-c] <nodes>       - Lists the Bro scripts the nodes will be loading
    start <nodes>                 - start processing
    status <nodes>                - summarize node status
    stop <nodes>                  - stop processing
    update <nodes>                - update configuration of nodes on the fly
    top <nodes>                   - show Bro processes ala top

Commands provided by plugins:

    ps.bro [<nodes>]              - Shows Bro processes currently running on nodes' systems.
```