MoonGen
A Scriptable High-Speed Packet Generator

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Design goals

Design goal of MoonGen

Combine the advantages of software (cheap, flexible) and hardware (precise, accurate) packet generators.

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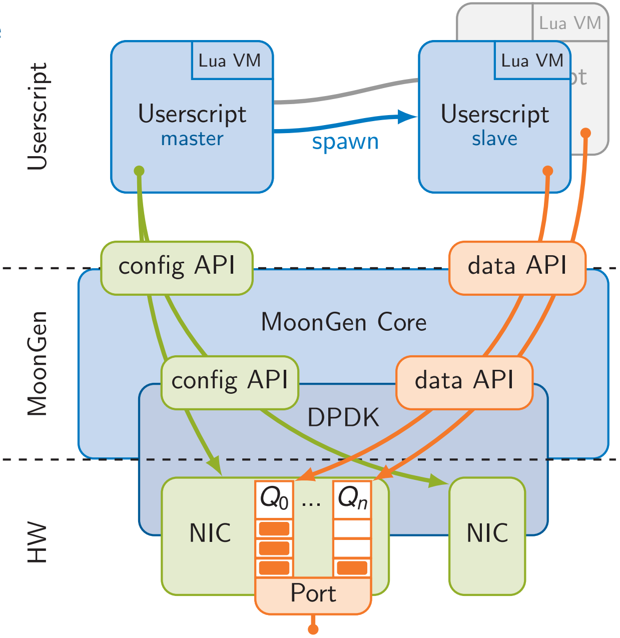
- Fast: DPDK for packet I/O, explicit multi-core support
- Flexible: Craft all packets in user-controller Lua scripts
- Timestamping: Utilize hardware features found on modern commodity NICs
- Rate control: Hardware features and a novel software approach

Architecture



Device Initilization

```lua
function master(txPort, rxPort, rate)
  local tDev = device.config{port = txPort, txQueues = 2}
  local rDev = device.config{port = rxPort, rxQueues = 2}
  device.waitForLinks()
  tDev:getTxQueue(0):setRate(rate)
  mg.launchLua("loadSlave", tDev:getTxQueue(0))
  mg.launchLua("timerSlave", tDev:getTxQueue(1),
                             rDev:getRxQueue(1))
  mg.waitForSlaves()
end
```

Measuring Latency

```lua
function timerSlave(txQ, rxQ)
  rxQ.dev:filterTimestamps(rxQ)
  local timestamper = ts:newUdpTimestamper(txQ, rxQ)
  local hist = histogram:new()
  while mg.running() do
    hist:update(timestamper:measureLatency(function(buf)
      local pkt = buf:getUdpPacket()
      pkt.ip4.src:set(math.random(0, 2^32 - 1))
      pkt.udp.src:set(math.random(0, 2^16 - 1))
    end))
  end
  hist:save("histogram.csv")
end
```

Generating Load

```lua
function loadSlave(queue)
  local mempool = memory.createMemPool(function(buf)
    buf:getUdpPacket():fill()
  end)
  local bufs = mempool:bufArray()
  while mg.running() do
    bufs:alloc(60)
    for i, buf in ipairs(bufs) do
      local pkt = buf:getUdpPacket()
      pkt.ip4.src:set(math.random(0, 2^32 - 1))
      pkt.udp.src:set(math.random(0, 2^16 - 1))
  end
  bufs:offloadUdpChecksums()
  queue:send(bufs)
end
```