B-10: Wireshark vs. “The Cloud”

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SHARKFEST **‘10**

Stanford University

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- Physical vs. Virtual
- Cluster Basics
- VMs on the Move
- Capture Methods
- New Capture Methods

Physical vs. Virtual

From what we know to "Virtual Environments"

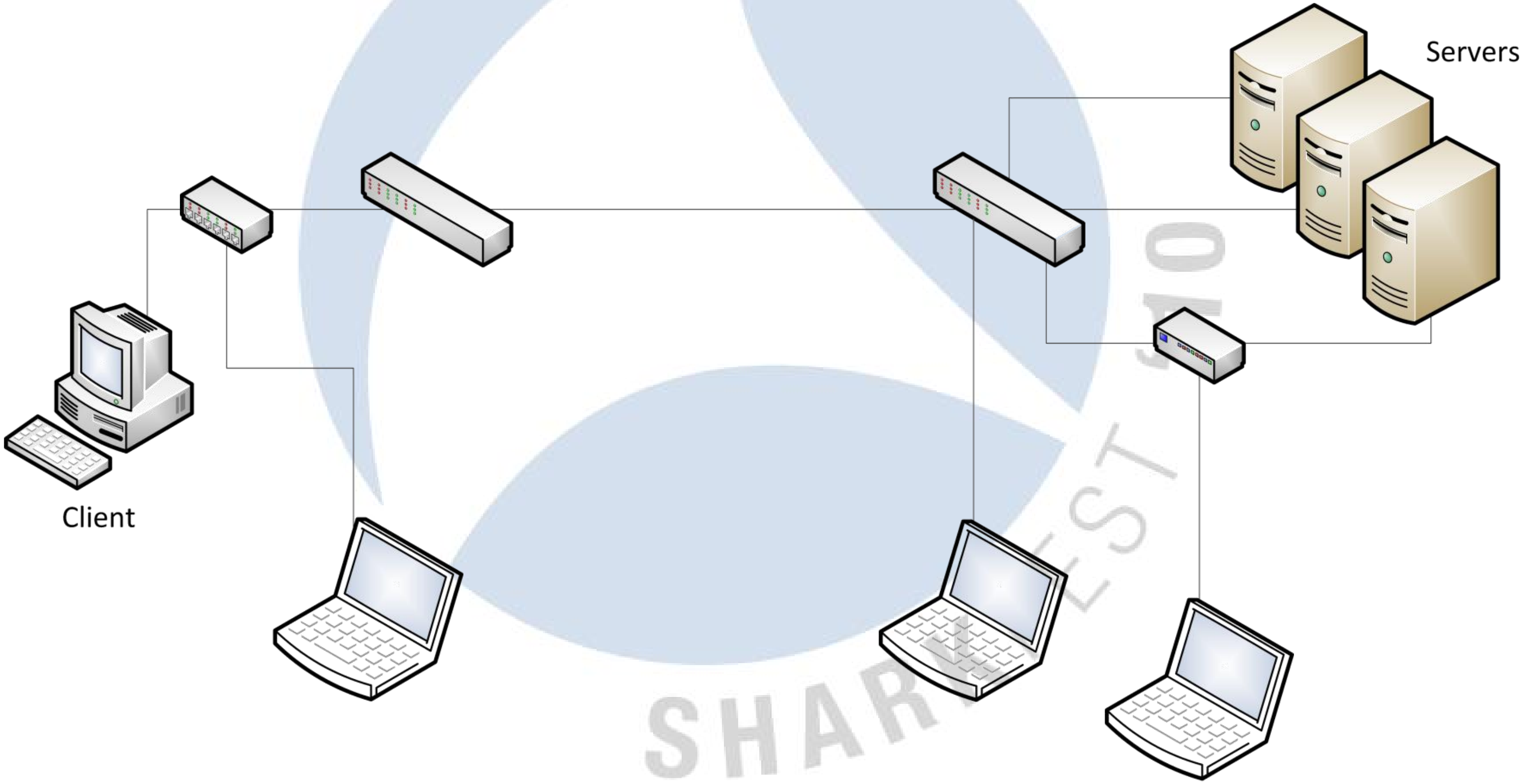
Physical Environments

- Applications and services running on “real” servers
- Often multiple servers per application/service
  - – Mail servers, Web server farms
  - – Often difficult to capture: clustered servers
- Multiple applications/services per server
  - – Web service, database service

Capture Strategies

- Common capture strategies:
  - HUB (for single clients or when really really desperate)
  - SPAN (quick, no disconnects)
  - TAP (most exact)
- Less common:
  - Inline/Pass Thru capture
  - With locally installed Wireshark (bad idea)
  - Using hacking techniques (really bad idea)

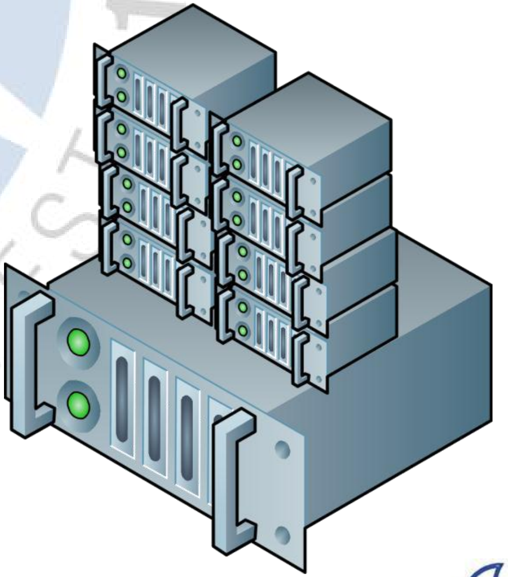
Typical physical setup example



Let‘s go virtual...

Virtual Environments

- Virtual Environments usually consolidate multiple servers on one or multiple virtualization hosts
- Physical hardware runs an virtualization layer with virtual servers on top
- Shared Resources
  - – CPU cycles and memory
  - – Storage
  - – Of course: network adapters!

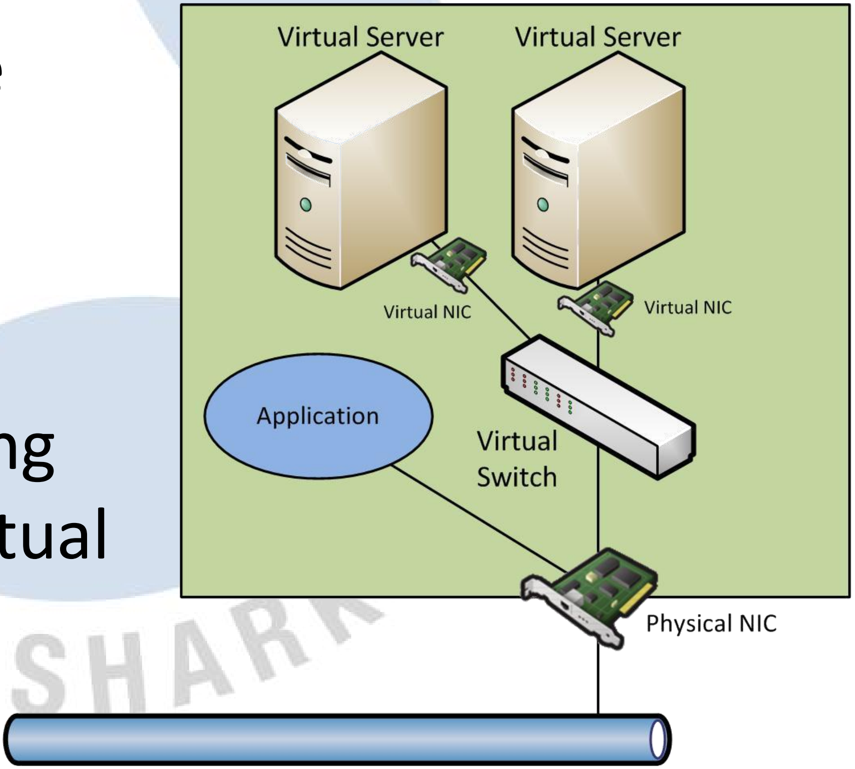


Enterprise Virtualization

- Common virtualization solutions found in datacenters today are:
  - Citrix XenServer
  - Microsoft Hyper-V
  - Red Hat Enterprise Virtualization
  - VMware vSphere
- Basically all enterprise virtualization solutions have the same basic features
  - or will have them sooner or later

Host Virtualization Example #1

- Virtualization host runs multiple Virtual Machines on a single NIC
- The host may use the NIC for its own data communication, too
- Potentially dozens of virtual servers showing up with their own virtual MAC address on the physical NIC

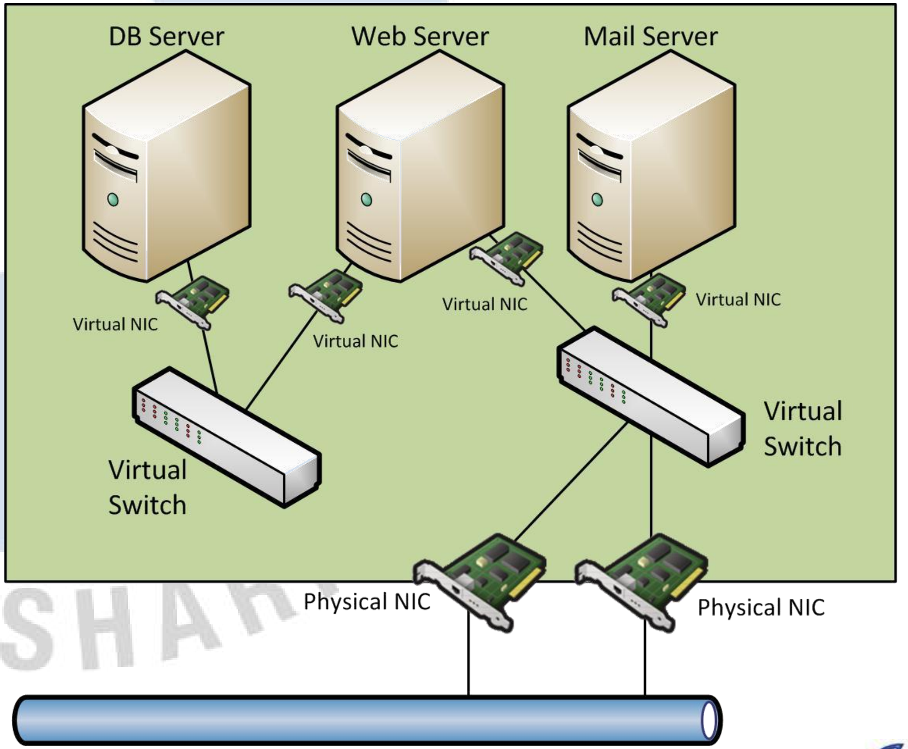


Capturing virtual servers

- Virtual servers running on a physical host share one or multiple network cards
- Capturing possible using HUB/SPAN/TAB method at the physical uplink to the host
- Challenges:
  - Capture at the correct NIC in case of multiple cards (and there will be, trust me)
  - Isolate traffic for the virtual server you want
  - Server Blade Centers with 10GBit or faster uplinks

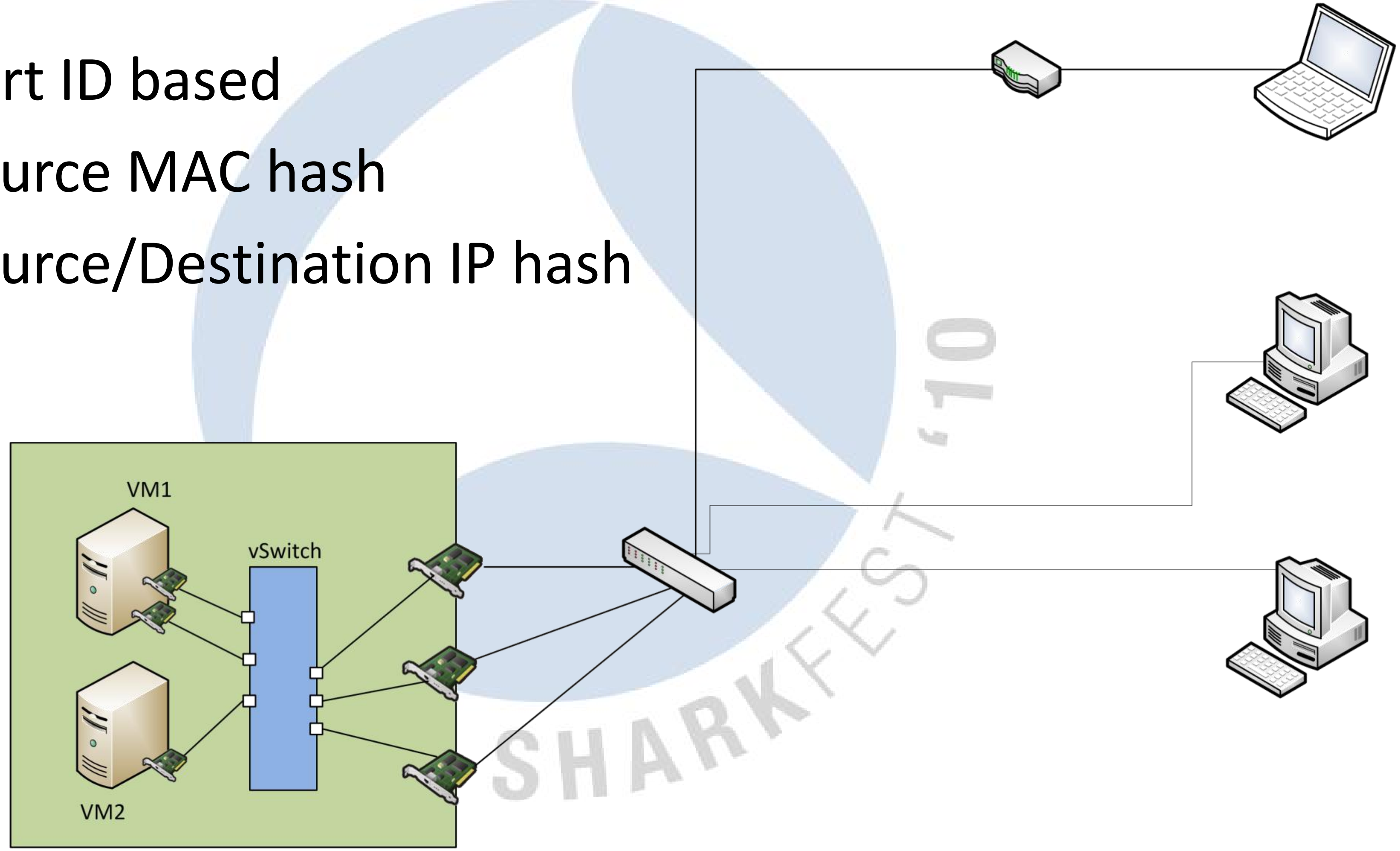
Host Virtualization Example #2

- There may also be „internal only“ switches making things complicated
- Data on internal switches never leaves the host
- No physical pickup possible
- Watch out for teamed NICs!



Common NIC Teaming Strategies

- Port ID based
- Source MAC hash
- Source/Destination IP hash

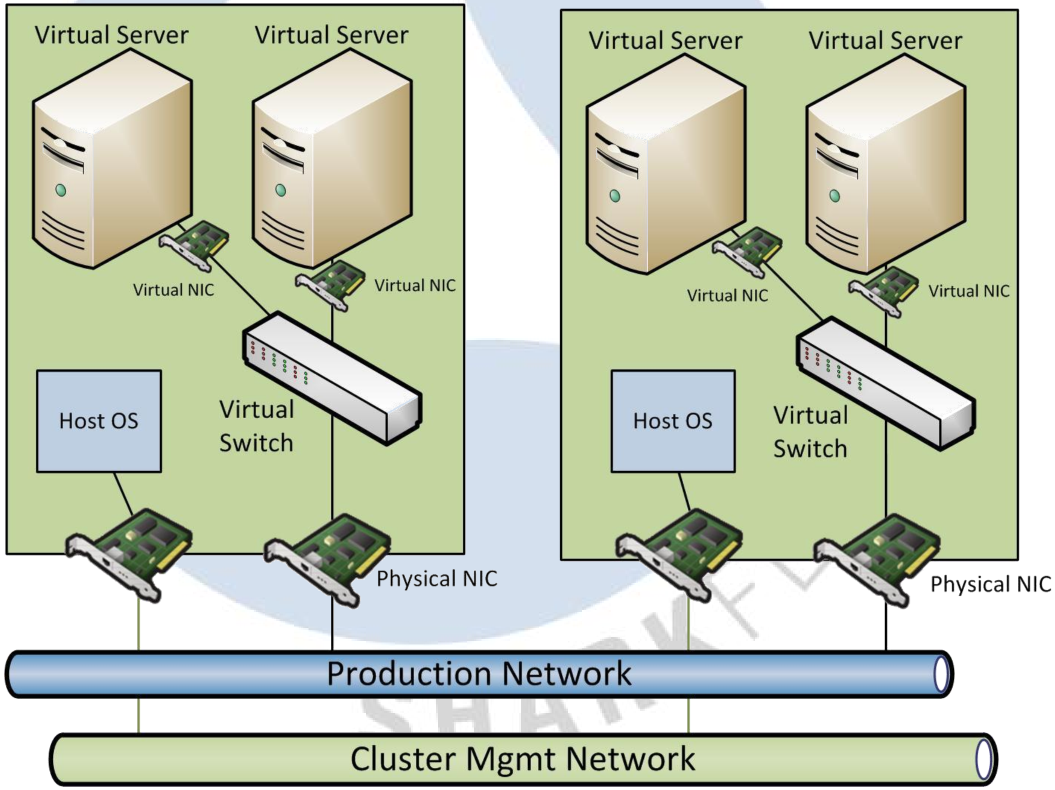


Virtual Cluster Basics

Trouble Brewing

Virtualization Cluster Example

- Group of virtualization hosts combined into a cluster



Cluster Basics

- Server clusters are always difficult to capture
  - Even without virtualization you usually don’t know where the connection will end up
- Possible solutions include
  - Forcing specific connections to certain cluster members that can be captured
  - Capturing a common cluster uplink if available
  - Las Vegas style: capture somewhere and hope that you’ll catch the relevant frames ☺

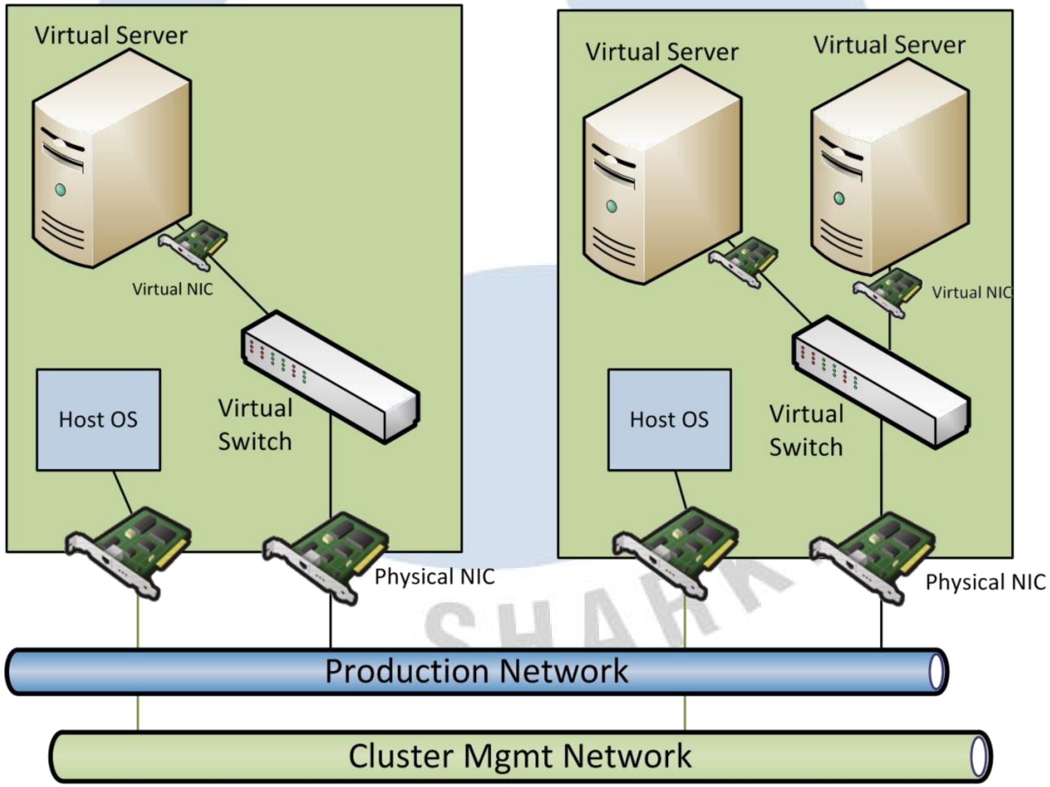
Virtualization clusters

- Virtualization clusters are even more complex than clusters of physical servers
  - Load Balancing of virtual machines
  - High Availability / Failover
- Virtual machines may move from host to host without warning, at any given time!
- Requires shared storage
  - Fibre Channel, iSCSI, NFS
  - Lets better hope you never have to capture those… ☺

VMs on the move

Live Moving of Virtual Machines

- Virtual Machines may move between virtualization hosts while they continue to run



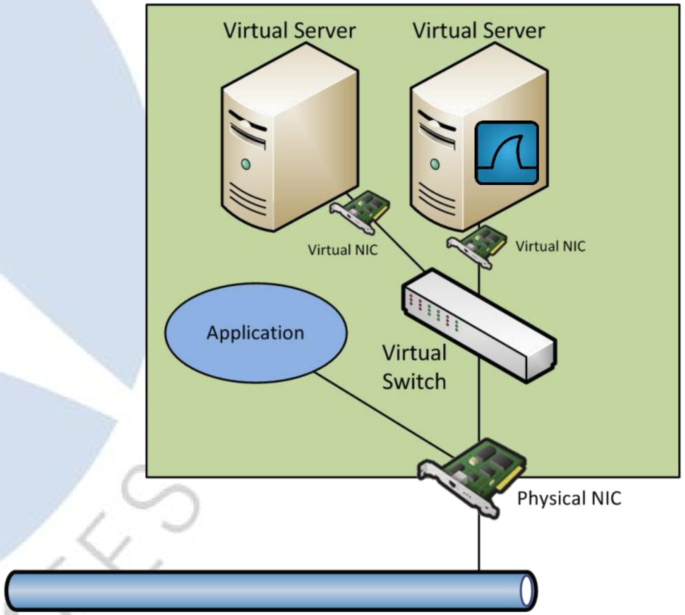
Cluster Movement Features

- High Availability (sort of)
  - Restart virtual machines on other hosts if there is a host crash
- Real High Availability
  - Running an “invisible” hot standby VM on a secondary host that is kept in sync
- Fully automatic live VM moving
  - Load Balancing virtual machines across virtualization hosts

Capture Strategies

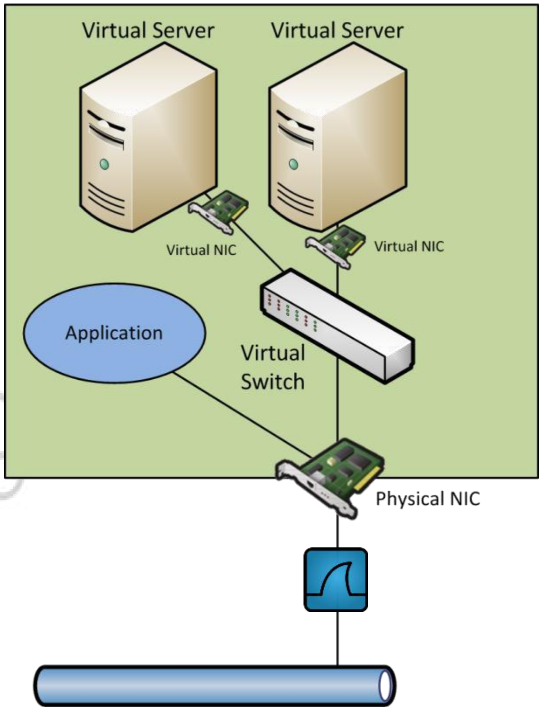
Capture Strategy #1

- Install Wireshark on the virtual system of interest
- Advantages:
  - Can capture, even on VMs with internal only NICs
  - Easy to do
- Disadvantage:
  - Changes the environment
  - Gets funny results (way to often)
  - May crash the VM



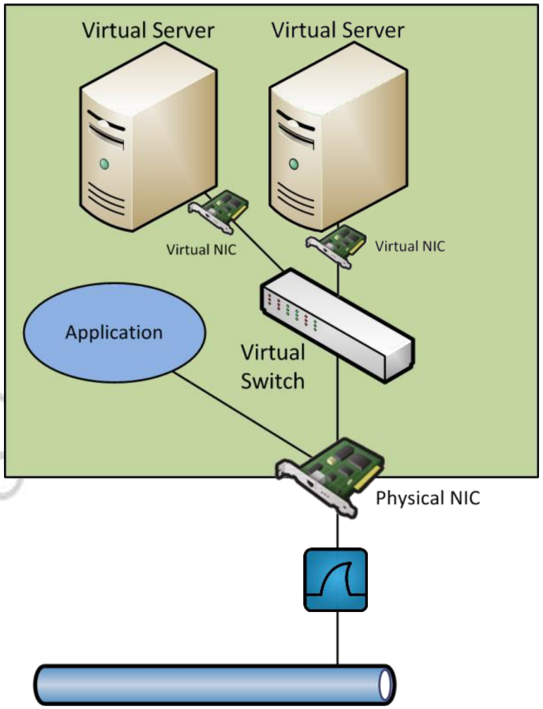
Capture Strategy #2

- Capture at virtualization host uplink (TAP/SPAN)
- Maybe your only option when you have no better access to the virtual infrastructure
- Advantages:
  - Easy to do in simple setups
  - Usually gets good data
  - Most familiar way to get data since its similar to physical captures

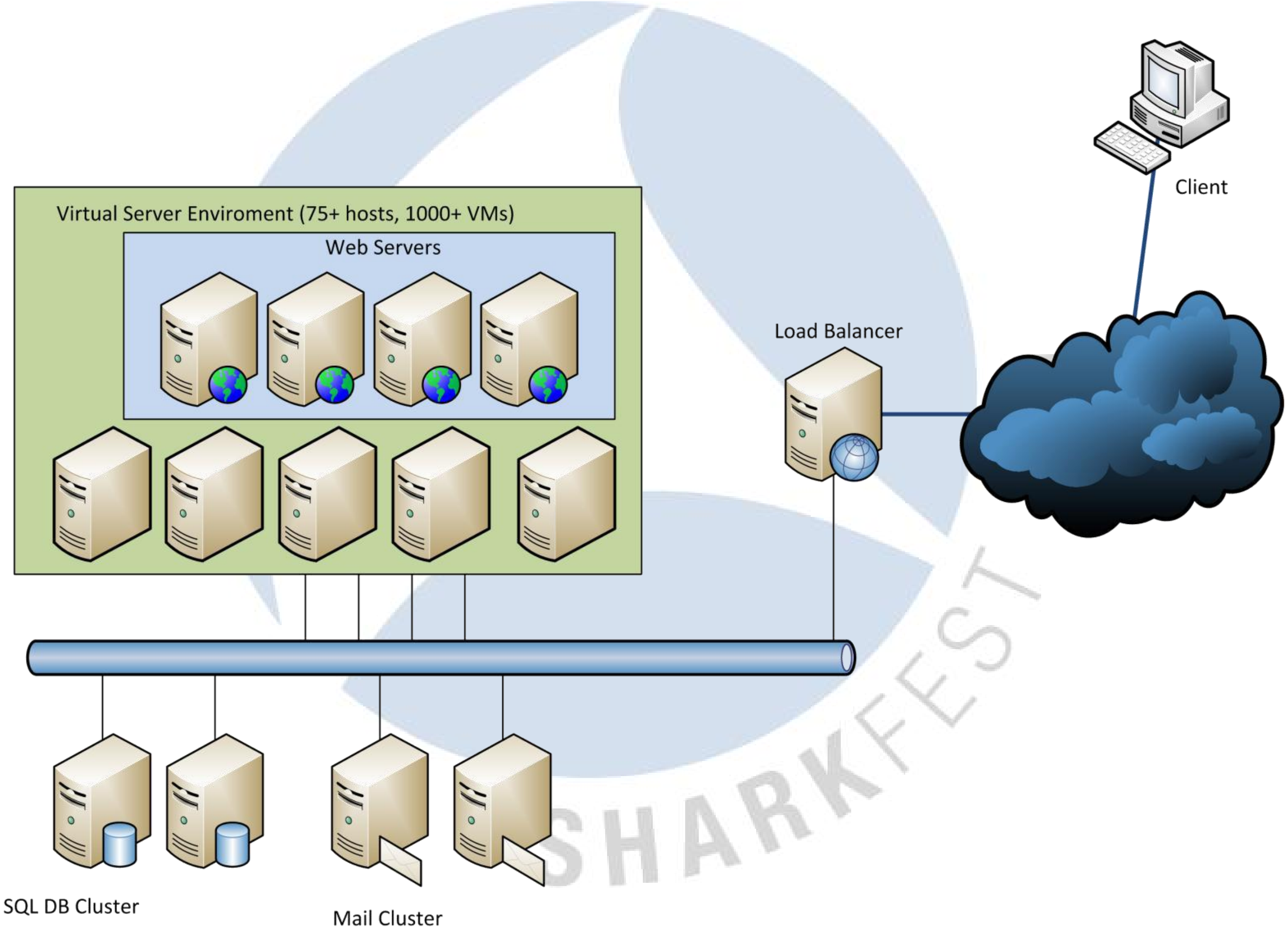


Capture Strategy #2

- Disadvantages:
  - May get you tons and tons of data to sort
  - Server uplink may be too fast for your capture device
  - VM may be live-moved off the server, interupting the capture
  - Worst case: you don‘t even know where to capture!



Real World Example



„Too much data“

- Ways to handle „too much data“ (a.k.a „dropped frames“) on physical captures:
  - use frame slicing if possible
  - SPAN only as few affected ports or VLANs as possible
  - use a filtering TAP
  - Capture Filters on the Wireshark itself may help, too

New Capture Stratgies

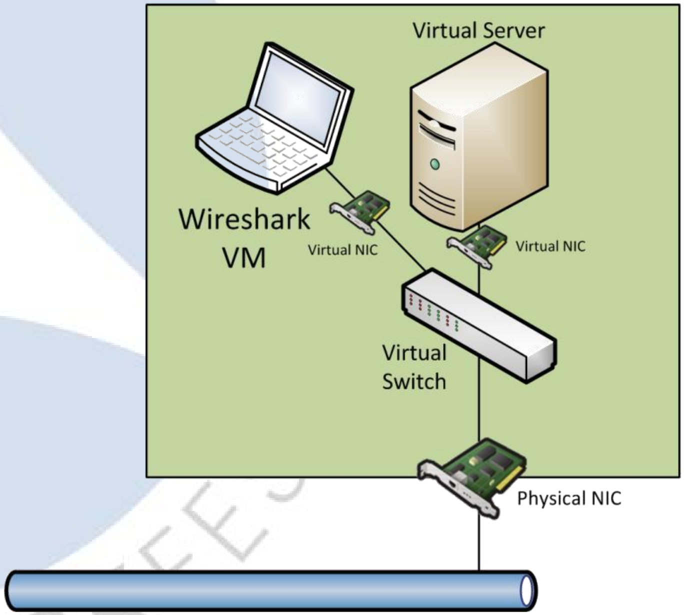
Virtual captures for a virtual environment

New Capture Strategies

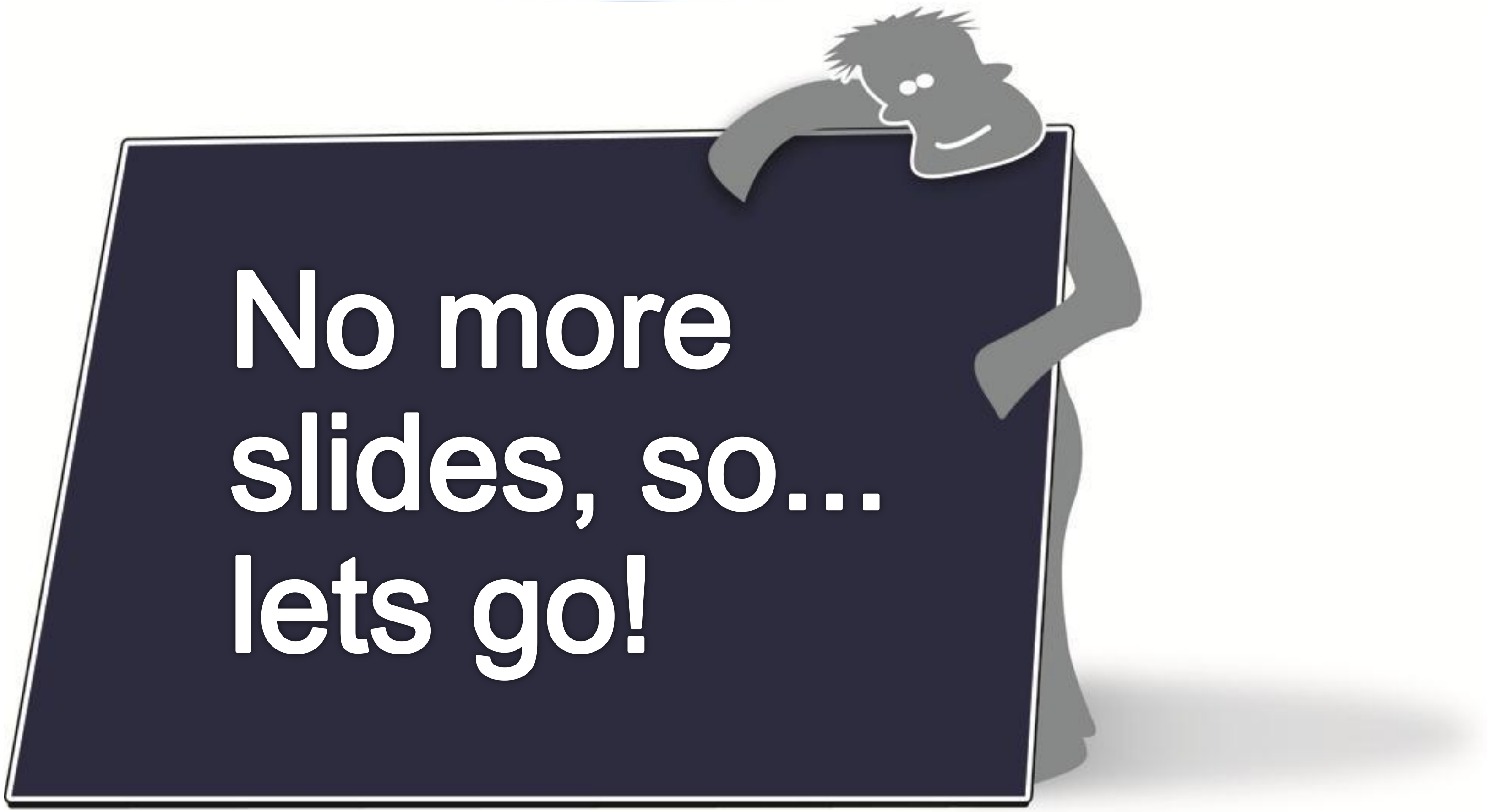
- Virtualization technologies may or may not offer additional capture strategies
- The big question usually is „what can you do with that virtual switch thingy?“ ☺
- Worst case: the vSwitch behaves like a dumb switch (a.k.a. Desktop Switch) – out of luck ☹

New Capture Strategies

- Promiscuous vSwitch Mode (a.k.a „let‘s play hub...“)
- Virtual SPAN sessions
- Virtual TAPs



Demo



Questions?