# Wireshark Developer and User Conference

## A-4: Wireshark vs. “The Cloud”

Tuesday June 14, 2011. 3:30pm – 4:45pm

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**SHARK**FEST ‘11

Stanford University

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# Agenda

- Uh, Cloud?
- Physical vs. Virtual
- Cluster Basics
- VMs on the Move
- Capture Methods

# „Cloud“ - Terminology

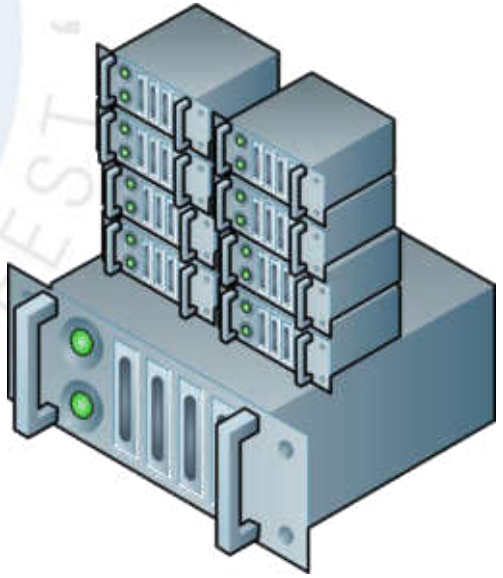
- Using Cloud ressources means
  - Servers and locations are more or less irrelevant
  - You don‘t know where your „stuff“ actually is
- Ressources may be
  - shared between multiple users/teams/companies
  - paid for what is actually used, when it‘s used
- Offering OS plattforms, installation plattforms, software catalogs
- Allows self service access to shared computing ressources

# Cloud types

- Private cloud
  - Hosted on private virtualization servers
  - Offering services to internal users/teams
- Public cloud
  - Offering services to anyone („with a credit card“)
- Hybrid cloud
  - Mix of private and public cloud
  - Usually used to outsource computing power in times of high usage, or as fallback

# Virtual Environments

- Virtual Environments consolidate multiple servers on one or more virtualization hosts
- Physical hardware runs an virtualization layer with virtualized servers on top
- Virtual Servers share
  - CPU cycles and memory
  - Storage
  - Network adapters

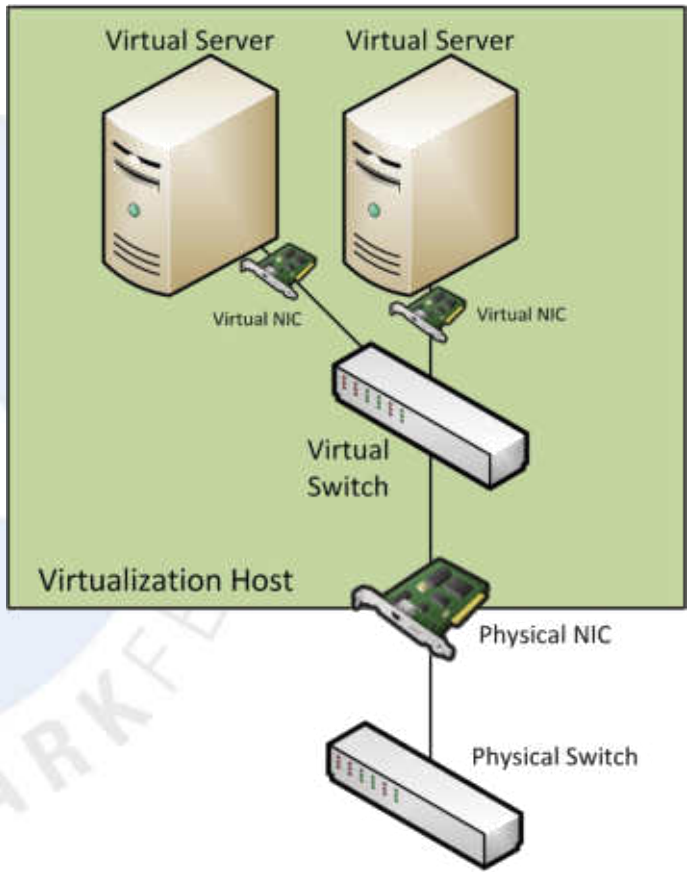


# Enterprise Virtualization

- 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

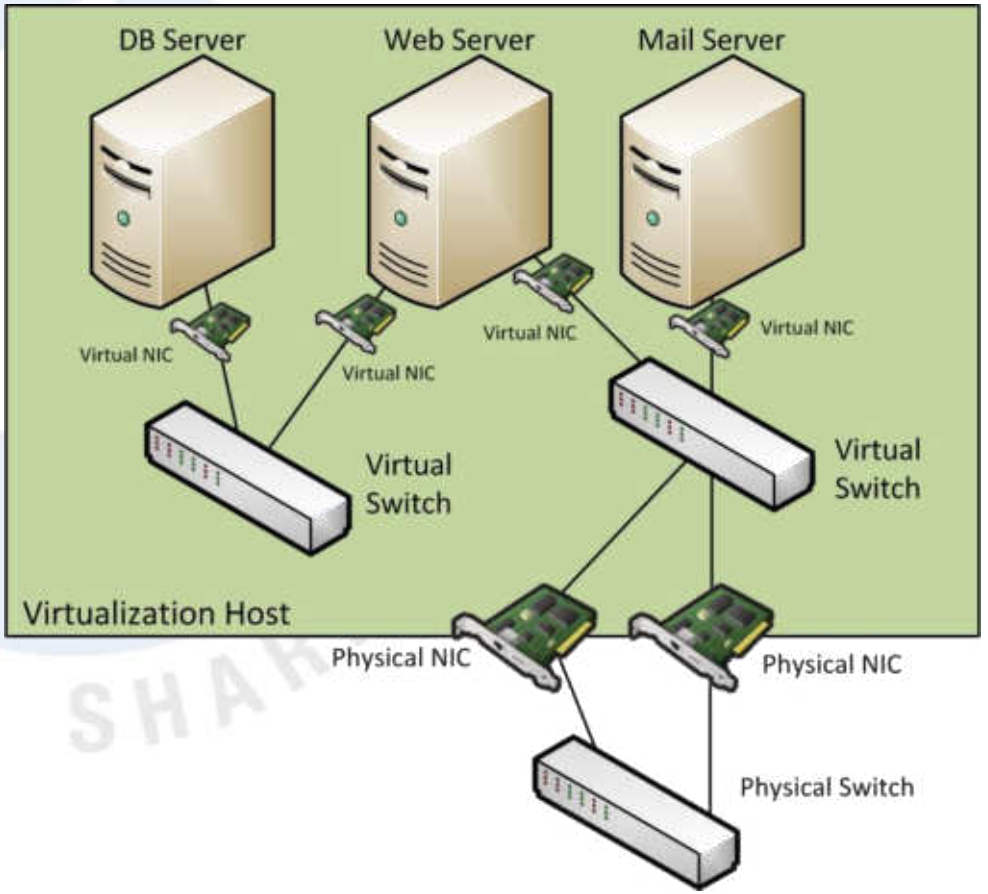


# Capturing virtual servers

- In virtual/cloud environments, virtual servers, applications, services may run everywhere
- Multiple virtual servers on physical hosts share network cards
- If you have access to the virtualization host you can SPAN/TAP its connections
- Challenges:
  - Find and capture the correct NIC
  - Isolate traffic for the virtual server/application
  - Servers with 10GBit or even faster links

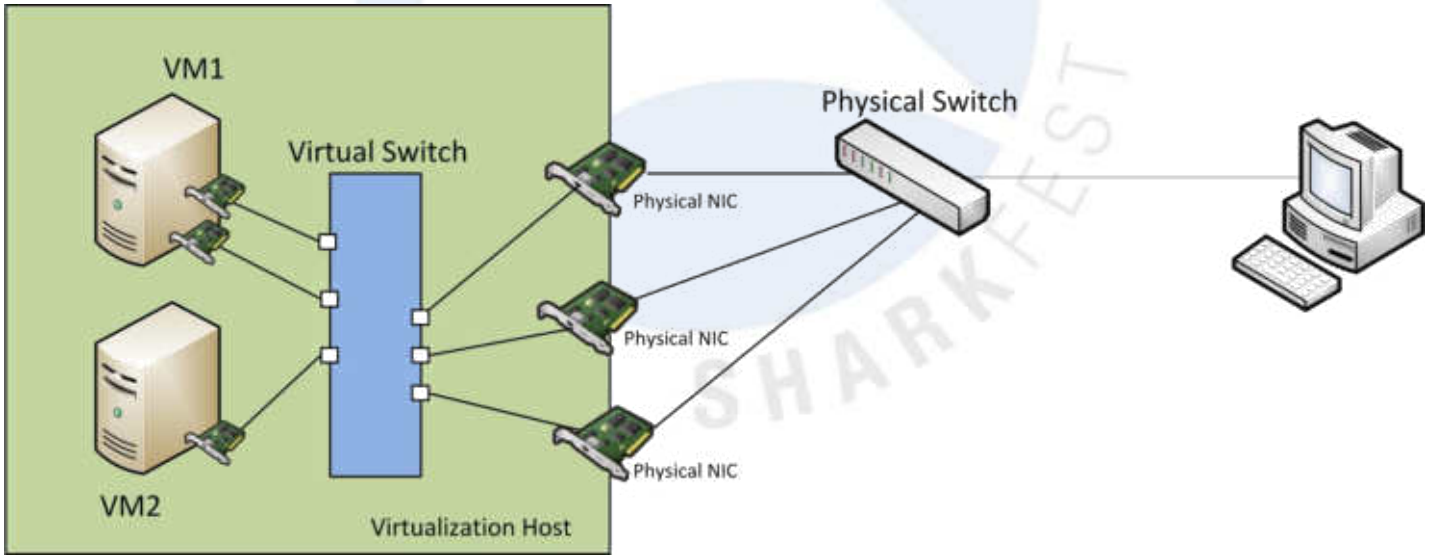
# Host Virtualization Example #2

- There may also be „internal only“ switches making things complicated
- Data on internal switches never leaves the virtualization host
- No physical pickup possible



# NIC Teaming Strategies

- Port ID based
- Source MAC hash
- Source/Destination IP hash
- Based on physical NIC load

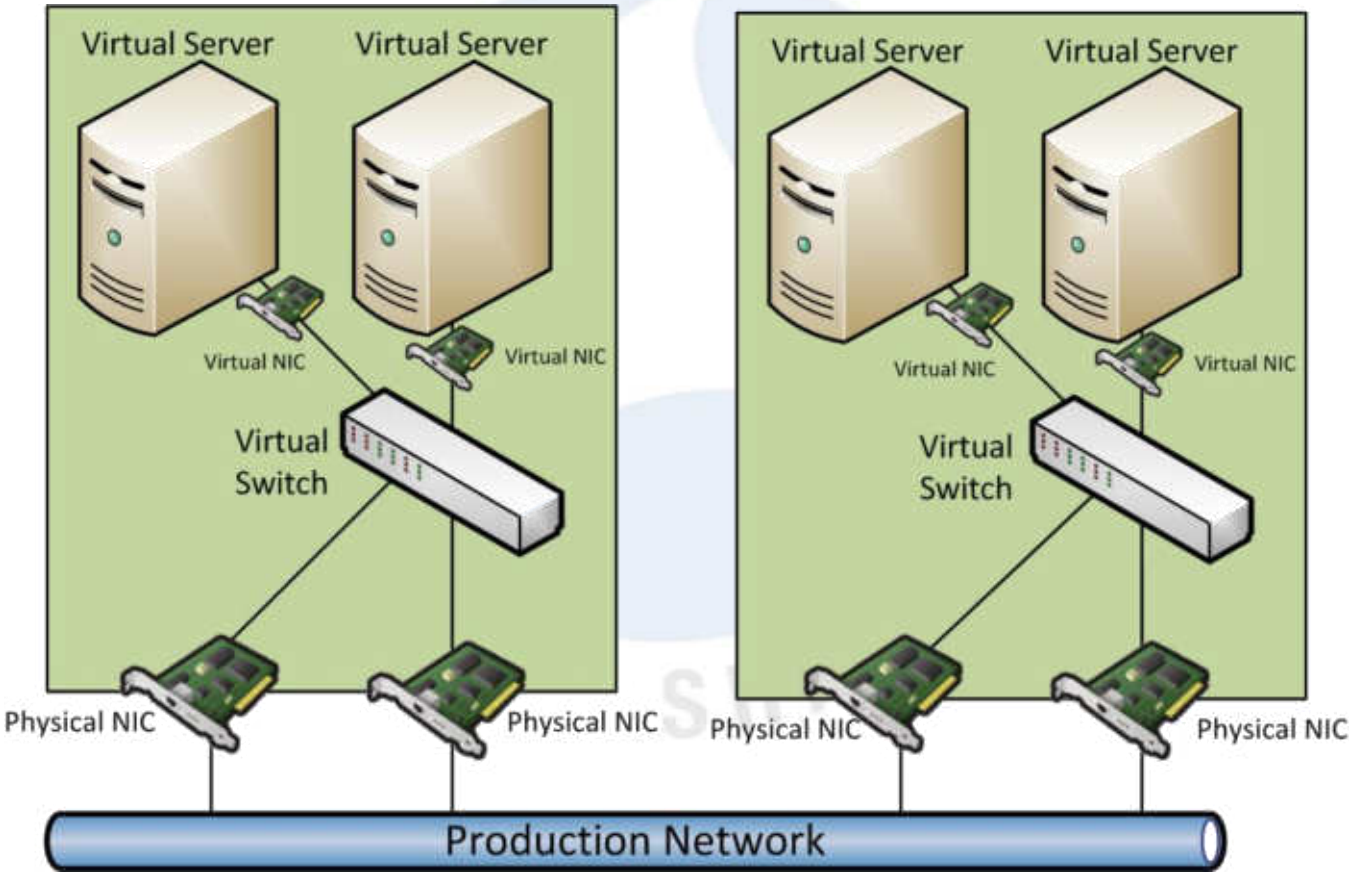


# Virtualization Cluster Basics

## 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 ☺

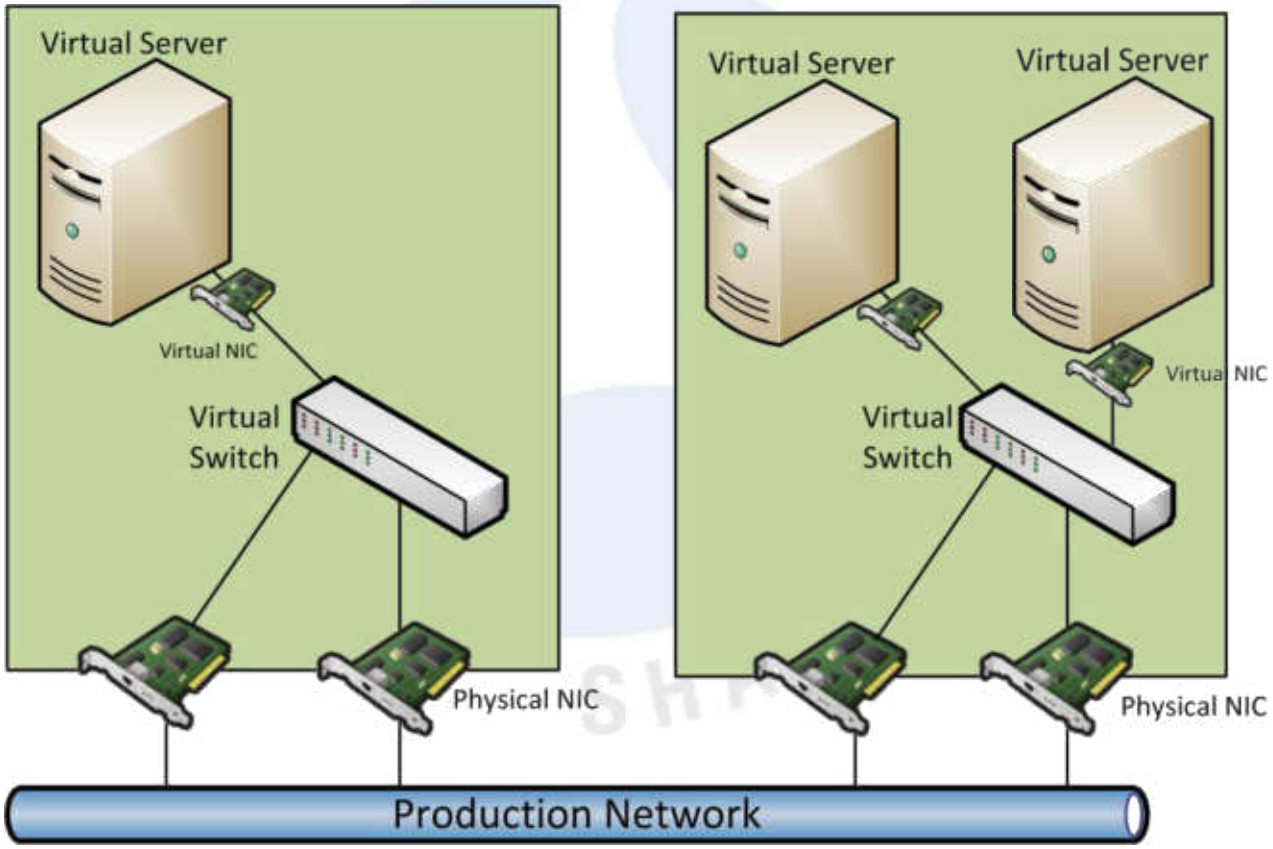
# Virtualization Clusters

- 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… unless you like megatons of data

# VMs on the move

# Live Moving of Virtual Machines

- Virtual Machines may move from host to host while running



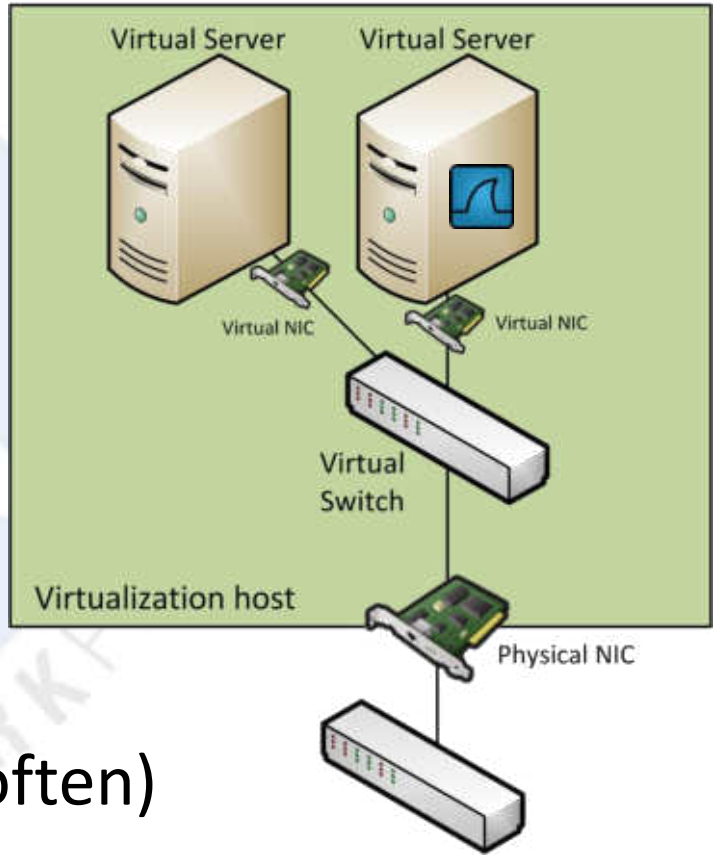
# Cluster Movement Features

- 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

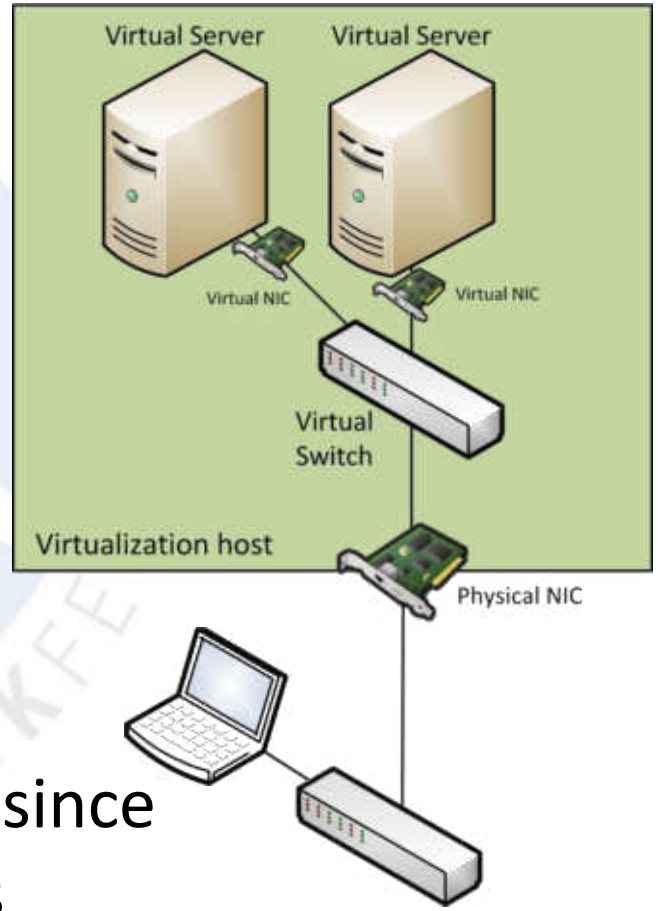
# Capture Strategy #1

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



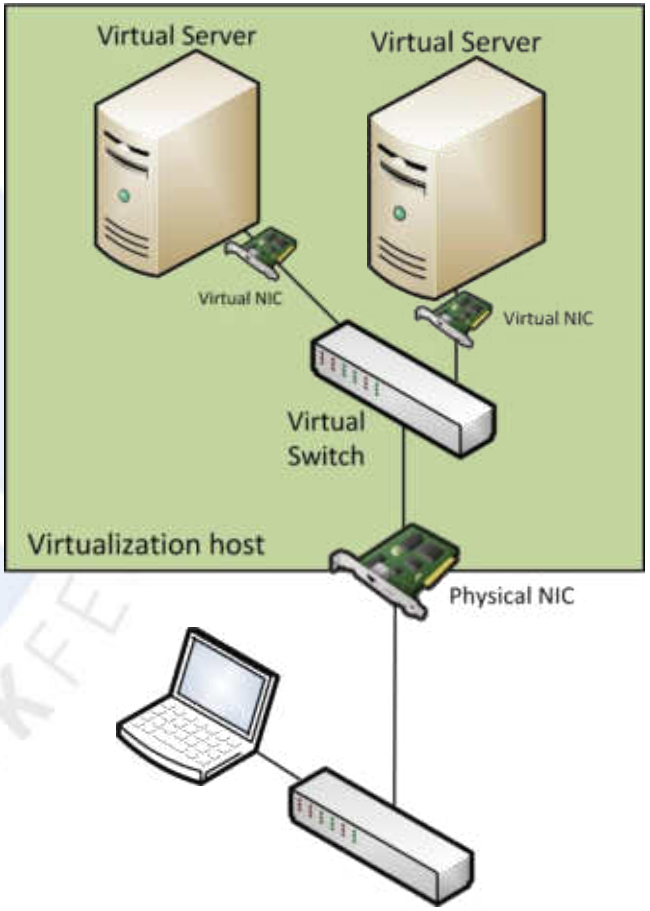
# Capture Strategy #2

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

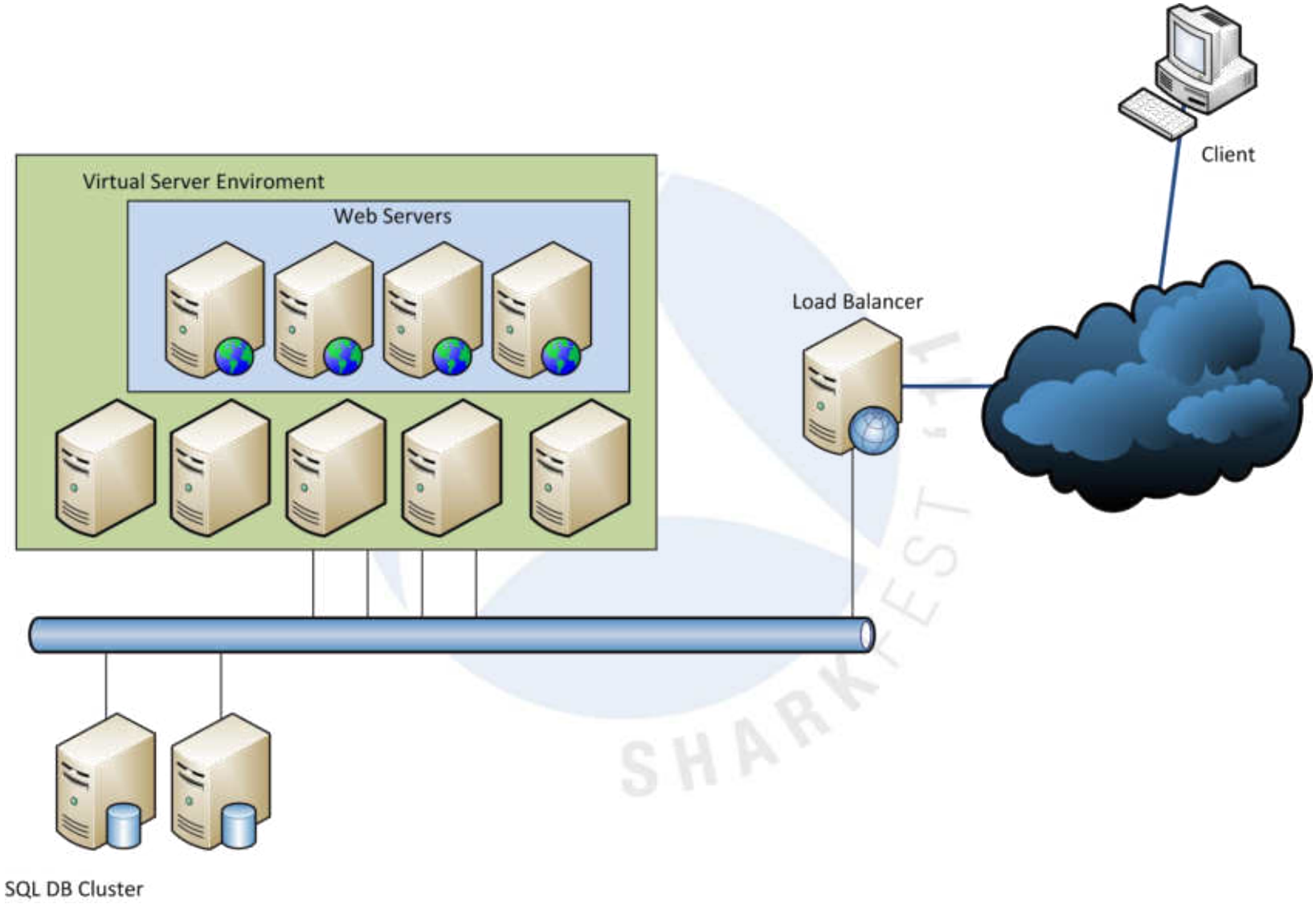


# Capture Strategy #2

- Disadvantages:
  - May get you tons and tons of data to sort
  - Server uplink may be too fast for your capture device or the SPAN port
  - 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
  - Use dumpcap on command line

# 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?“
- Worst case: the vSwitch behaves like a dumb switch (a.k.a. Desktop Switch) – out of luck

- Promiscuous Mode on virtual switch or port group
  - Puts switch/port group into „hub“ mode
  - Security risk
  - Increased traffic
- Virtual SPAN sessions
  - Only on some devices, like Cisco Nexus 1000v
- Virtual TAPs
  - Probably: additional license required
  - Installation/configuration ain‘t exactly childs play

# Demo

# Questions?