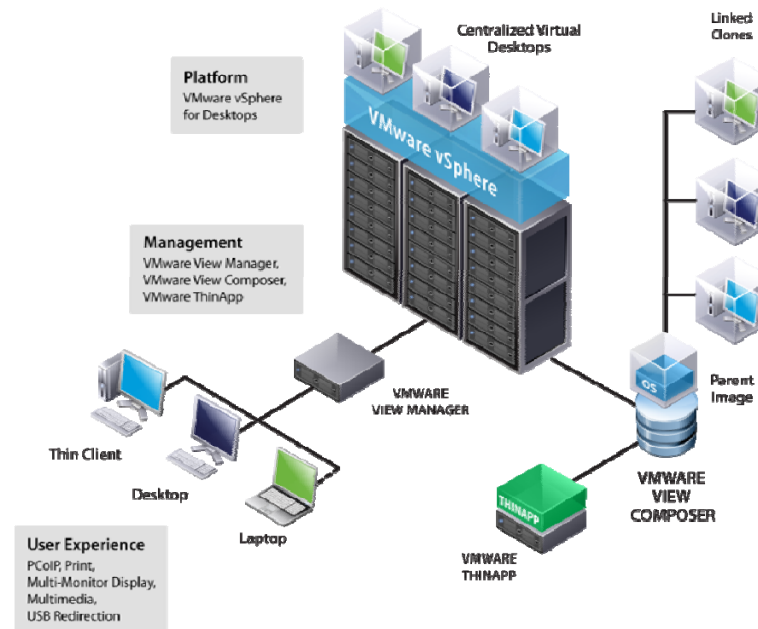# Your desktop blew up my storage strategy
Lessons from the VDI front

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A butterfly flaps its wings…

- A storage hurricane is on the way in the shape of VDI
- What's driving VDI adoption?
  - Desktops are aging – some are 4 to 5+ years old.
  - Windows 7, Security & Desktop Disaster Recovery are some of the key drivers in the move to VDI architecture.
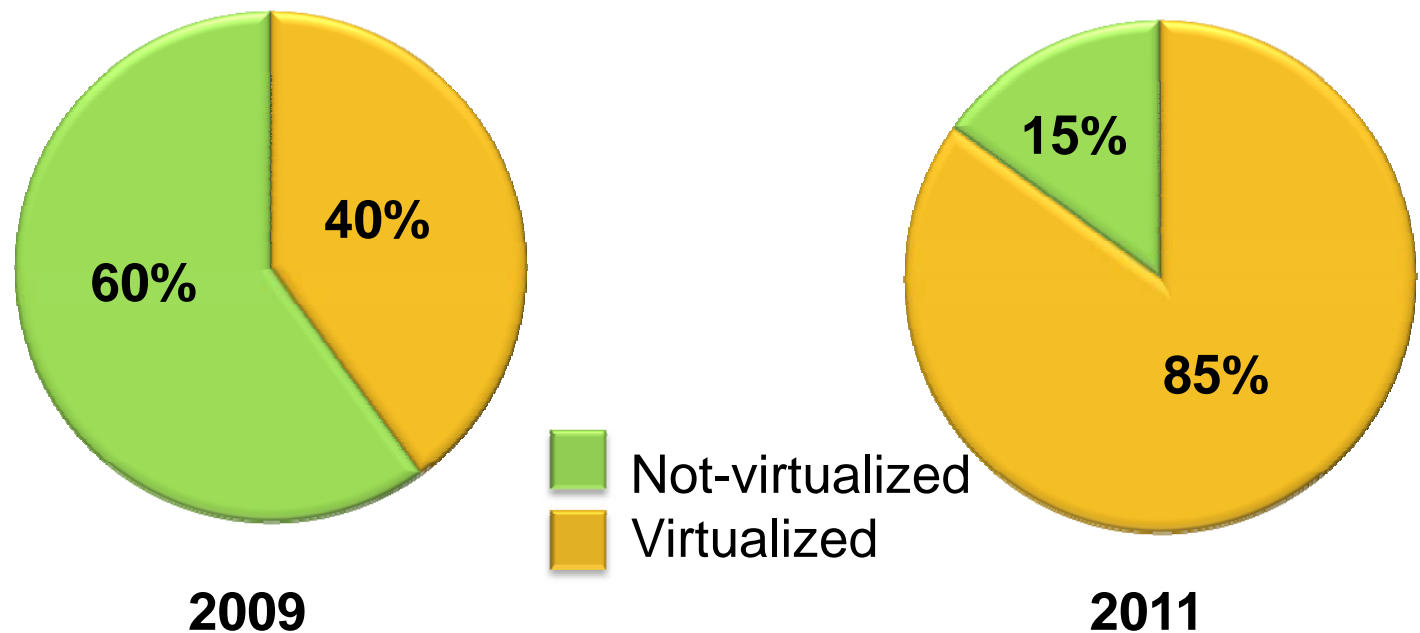
- Desktop Group ← → Storage Group ??

- **<u>Storage infrastructure is typically the # 1 reason VDI deployments have issues.</u>**

2010: The Year of The Desktop

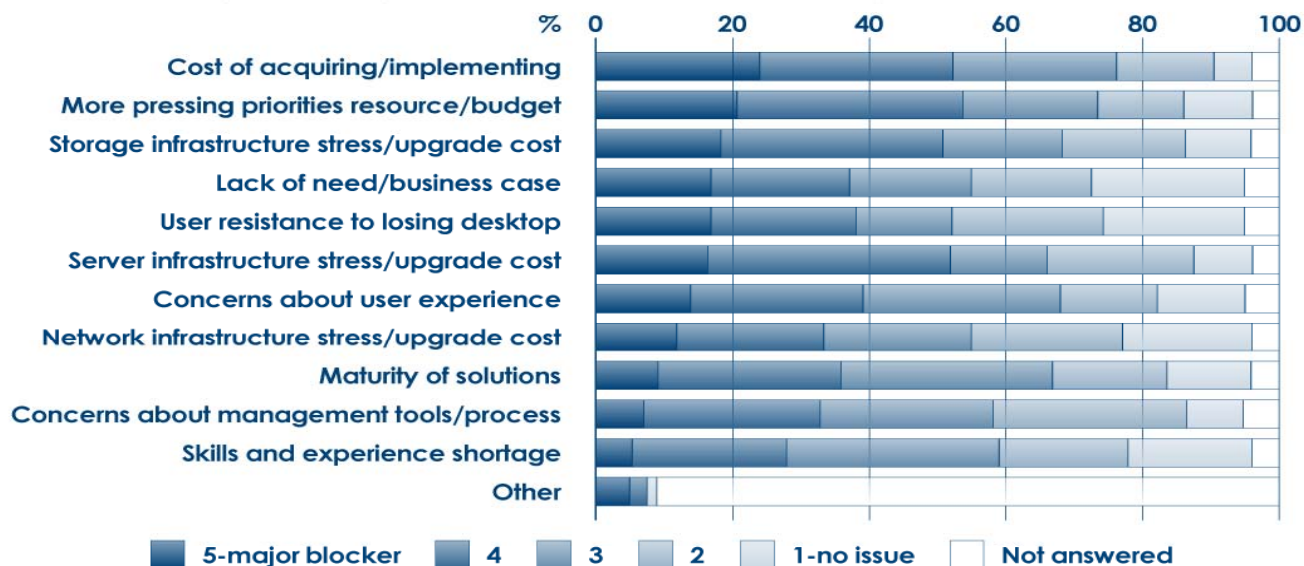Percentage of companies that have deployed or will deploy desktop virtualization?

60% **40%**

15% **85%**

🟩 Not-virtualized
🟨 Virtualized

2009

2011

Source: Goldman Sachs IT Spending Survey

Biggest Concerns for
Customers Implementing VDI

So what's the big deal…

Storage Considerations:
- Boot Ups
    - Commonly referred to as "Boot Storms".
    - Occurs when a large number of desktop VMs are powered on and applications are launched.
    - Example: at 8am, the first shift arrives
    - They all boot their desktops at nearly the same time, then open their e-mail.
- Read/Write Considerations
    - What sort of applications will the desktop users utilize?
    - What are the ramifications of a group of those users launching the application at the same time?
- My Docs
    - How much capacity will each user receive?
- Graphics
    - Specifically rendering applications like CAD?
- Client Side Apps vs. Thin App
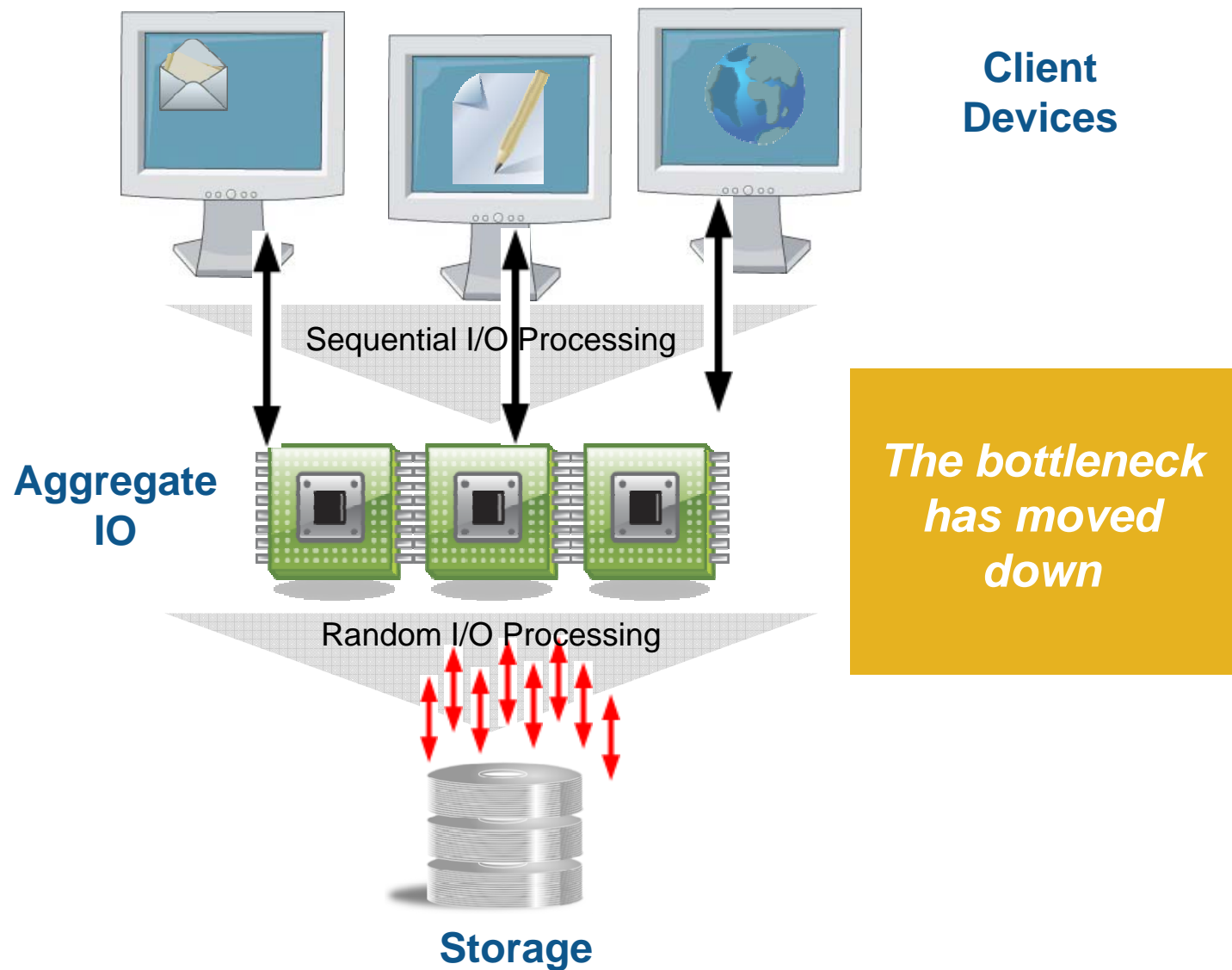- Backup/Restore and Disaster Recovery

Why your VDI project blew up my storage strategy

- Do you add Virtual Desktop workloads to your existing storage array solution?
  - How do you manage the IOPS requirements for Virtual Desktops vs. other mission critical applications?
  - Separate "church and state" from a Storage perspective.
- If you need 1000+ Desktops, how do you architect a solution that doesn't require you to purchase everything now?
  - Most companies I've worked for, or with work on a 3 year cycle. 1/3 of their desktops get replaced each year.
  - TCO might make a ton of sense, but the CAPEX will KILL YOU !!
- How do you size for VDI and Storage
- Most legacy arrays are designed for server workloads, not desktops
- You REALLY need to rethink your storage strategy for VDI

Effect of Virtual Machine Workloads on Disk Performance Requirements A1

Client Devices

Sequential I/O Processing

Aggregate IO

The bottleneck has moved down

Random I/O Processing

Storage

A1   Problem for all virutal environments

Author, 8/3/2010

IOP Sizing

	Light	Medium	Heavy	Very Heavy
IOPS	5 – 10	10-15	20 – 30	30 - 40

- First and foremost: "Your mileage will vary"
  - A good rule of thumb to size for a large VDI deployment is about 20 IOPS per desktop.

- So what makes up an IOPS number:
  - Workload Workload Workload
  - Outlook, multiple Internet Explorer Tabs, Excel, PPT, Word, TweetDeck, Instant Messenger Clients, PDF, RSS feeds, VPN, …
  - The more apps your users utilize, the more intense the IOPS request will be.

  -

Sizing a Storage Array for VDI

- You can size storage arrays 2 different ways.
  - Size by Performance
  - Size by Capacity
- Each has it's pluses and minuses
- You need to pay attention to both !!
- If you don't, you can get yourself in a world of trouble !!
- The ensuing sizing can vary SIGNIFICANTLY between both methods
- Most arrays have to over-provision (high spindle count, short-stroke) to obtain performance
- If so, you end up with excess capacity and therefore CAPEX is too high
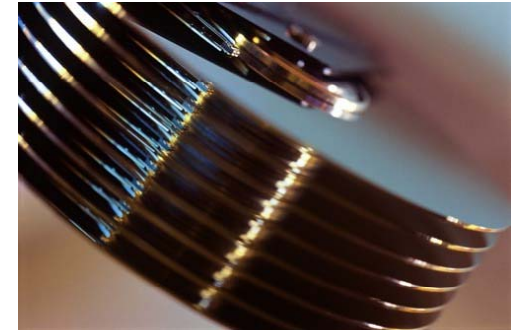
Sizing by Capacity:

- 1000 Desktops requirement for medium user base
- Need 30GB per desktop (user)
- 30GB X 1000 users = 30TB's of capacity
- 1 TB ATA = 910GB BASE 2
- 30,000 / 910 = 33 (ea) drives
  - This doesn't take into consideration sparing space or RAID overhead
- ATA Drive – at 70% full = 58 IOPS a drive
  - 58 X 33 = 1914 IOPS
- Boot Ups:
  - 1914 IOPS / 20 IOPS/user = 95 users

Sizing by Performance:

- 1000 Desktops requirement for medium user base
- 20 IOPS per VDI (Heavy User)
- 20 IOPS X 1000 users = 20,000 IOPS of performance
- 600 GB 15k drives = 119 IOPS per drive – based on 70% full storage array
- 20,000 IOPS / 119 = 168 (ea) drives
- 168 Drives
  - 600GB BASE 10 = 546GB BASE 2
  - 168 X 546 = 92TB's of Capacity
  - 92TB – 70% = 64TB
    - Not counting RAID or Hot Spares
  - 64,000GB / 1000 Users = 64GB per user !!
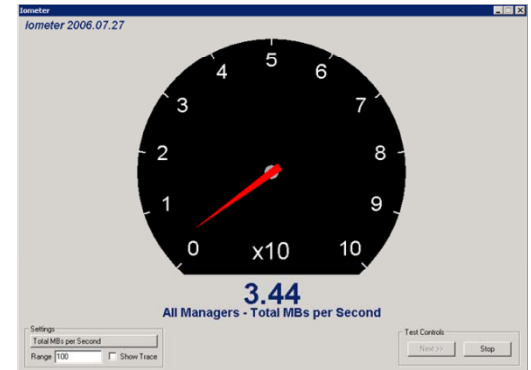
Storage…Storage…Ugh more Storage

- If you are in Storage–VDI is AWESOME!
- There are things you can do to reduce the capacity impact
- linked clones is a great example of a feature that helps reduce utilization
  - linked clone are "Snapshots" of a VM that you can mount "Read/Write" and only take up a very small percentage for the change data
  - It also helps with patching, and application upgrades. You just have to patch and recompose the VM.

Tiered Storage

- Most Virtual Desktop Solutions can take advantage of Tiered Storage natively.
  - Create "Pools" of storage tiers
    - Tier 1, Tier 2, Tier 3
    - Create Desktops in Tier 3 Storage
    - Use Tier 1 or 2 to hold the changing data, especially if you allow 'save to desktop'. Most of the desktop is stagnant otherwise.
  - Cuts down on expensive tier 1 and 2 hardware costs without taking a "software" license penalty from your storage manufacturer.
  - **Beware of license fees/models which increase as storage capacity or # of drives increase – this may drive TCO down to the point that the VDI project has negative TCO compared to fat desktops**
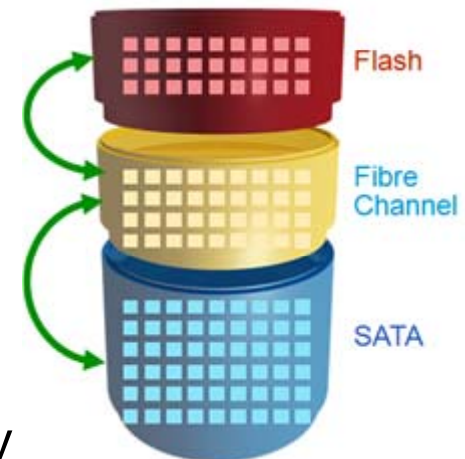
Disaster Recovery

- If you have a DR plan – continue paying attention, if not please feel free to check your e-mail or something. ☺

- Desktop disaster recovery is something you have to consider and plan for.
  - Does your co-lo provide space for desktops or zero/thin clients?
  - Can you utilize hotel meeting room space?

- VDI can add complexity to your existing disaster recovery plan.
  - Can you current storage array handle the replication ? Can your target location run your desktop infrastrucutre if you have disaster ?

- One of the largest drivers of VDI deployment.

Our Disaster Recovery Plan Goes Something Like This...

HELP! HELP!

DILBERT
By Scott Adams

Proof of Concepts

- POC's can be powerful if done correctly
- Keep in mind, as capacity usage of an array increases its overall performance drops
  - The drop-off point can be anywhere between 30% and 70% full, but it is there in all arrays
  - This includes SSD – there is a drop-off as the device fills to capacity
- Pay attention to how your POC is designed
  - What happens to performance when you are at 50% full?
  - What happens to performance when you are at 80% full?
  - What happens to performance when you are at 95% full?
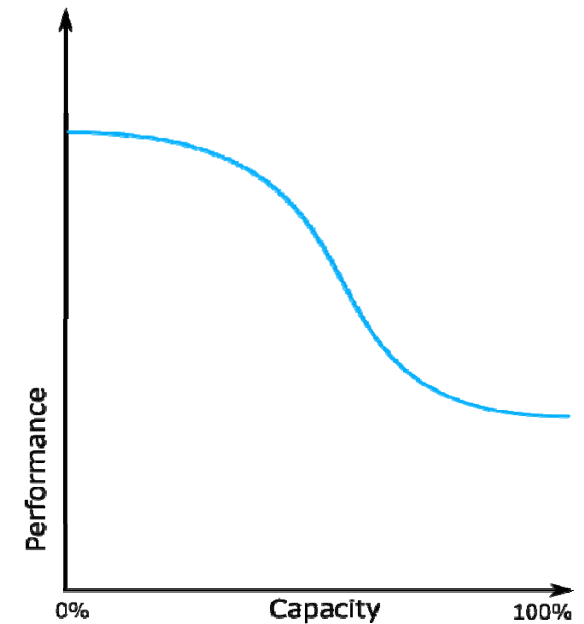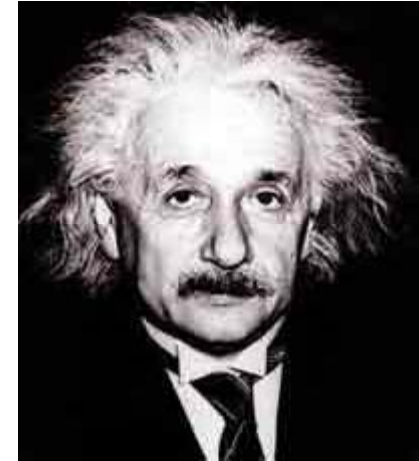
Summary

- It's not a matter of 'if", but when you do VDI.
  - Get out in front now, while you still can.
- Time to re-evaluate your storage strategy
  - Mulit-tenancy might make sense, pay attention to IOPS needs
- Pay attention to your performance requirements.
  - Try and understand your usage profiles among your end users.
- Time to re-evaluate your disaster recovery strategy.
- Proof-of-concepts are important, but don't forget to ask about scalability !! (empty array is faster then a full array)