

OSIsoft.

vCampus Live! 2013

PI System on Windows Azure IaaS

Presented by **David Black**
Denis Vacher

OSIsoft®

vCampus **Live! 2013**

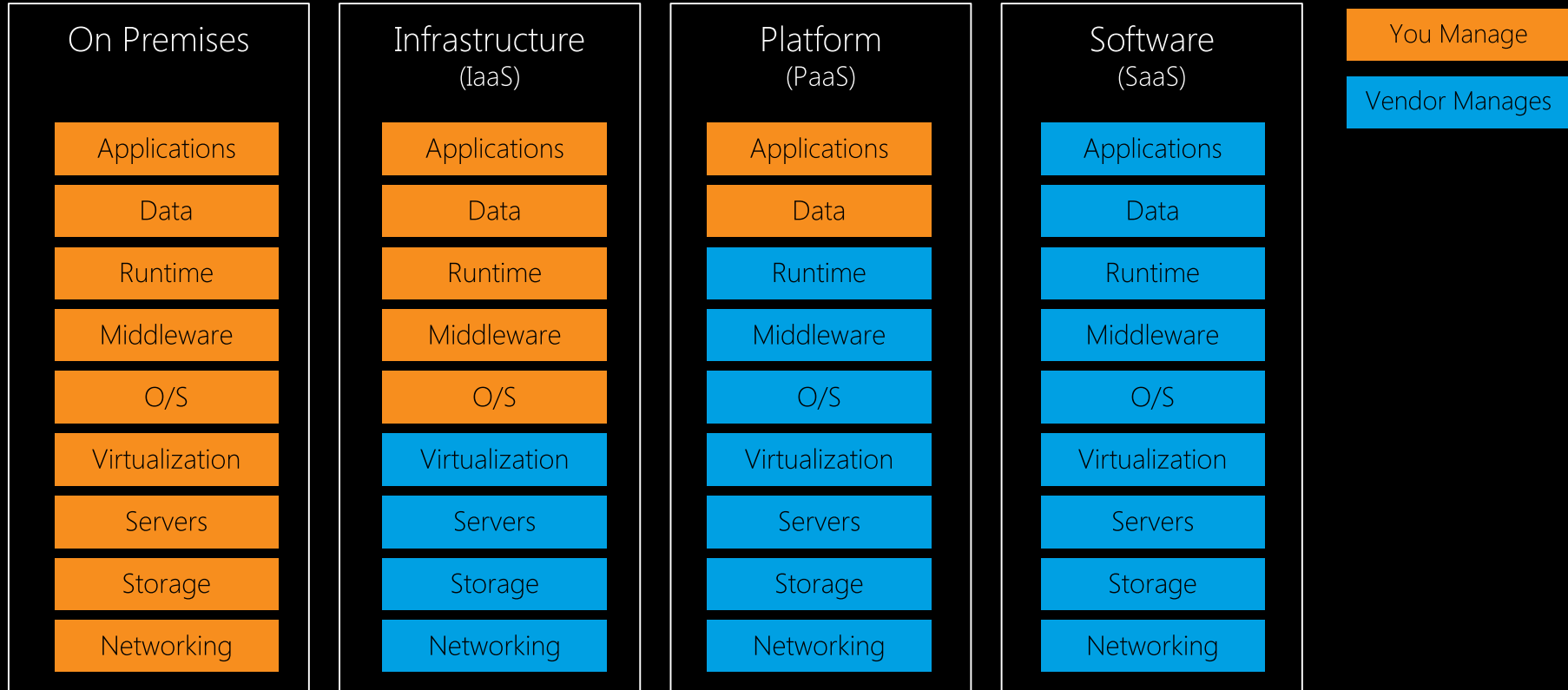
WHERE PI GEEKS MEET



The PI System in Windows Azure



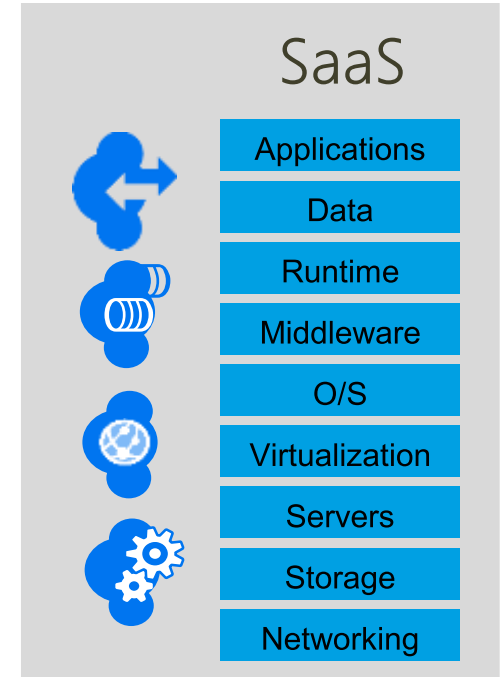
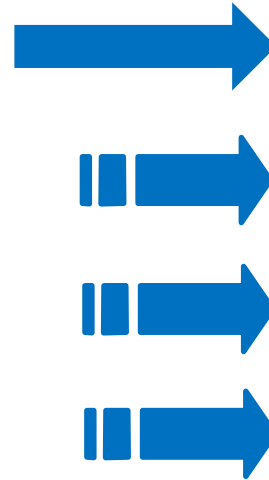
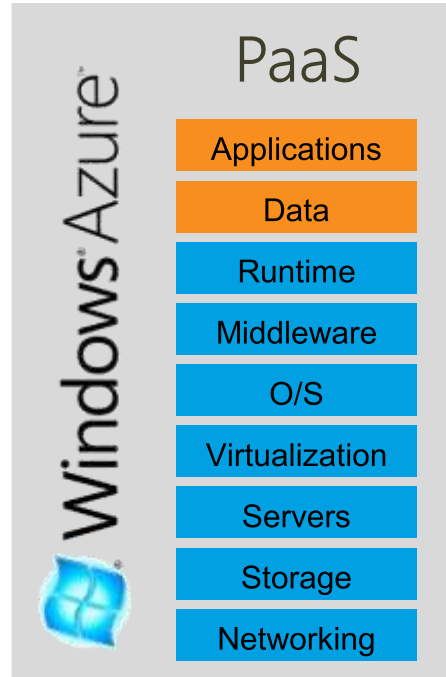
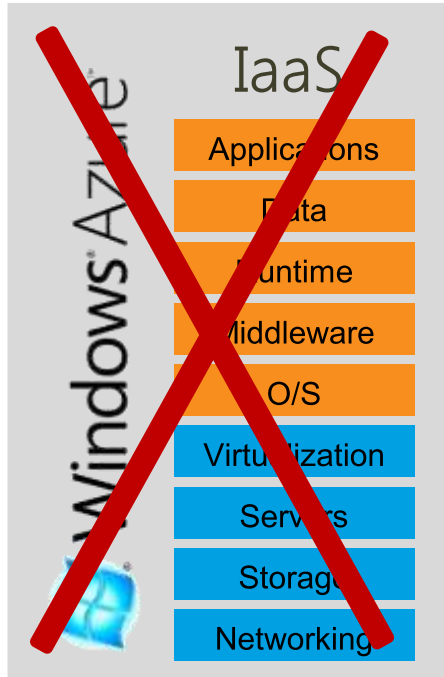
Cloud Services offerings



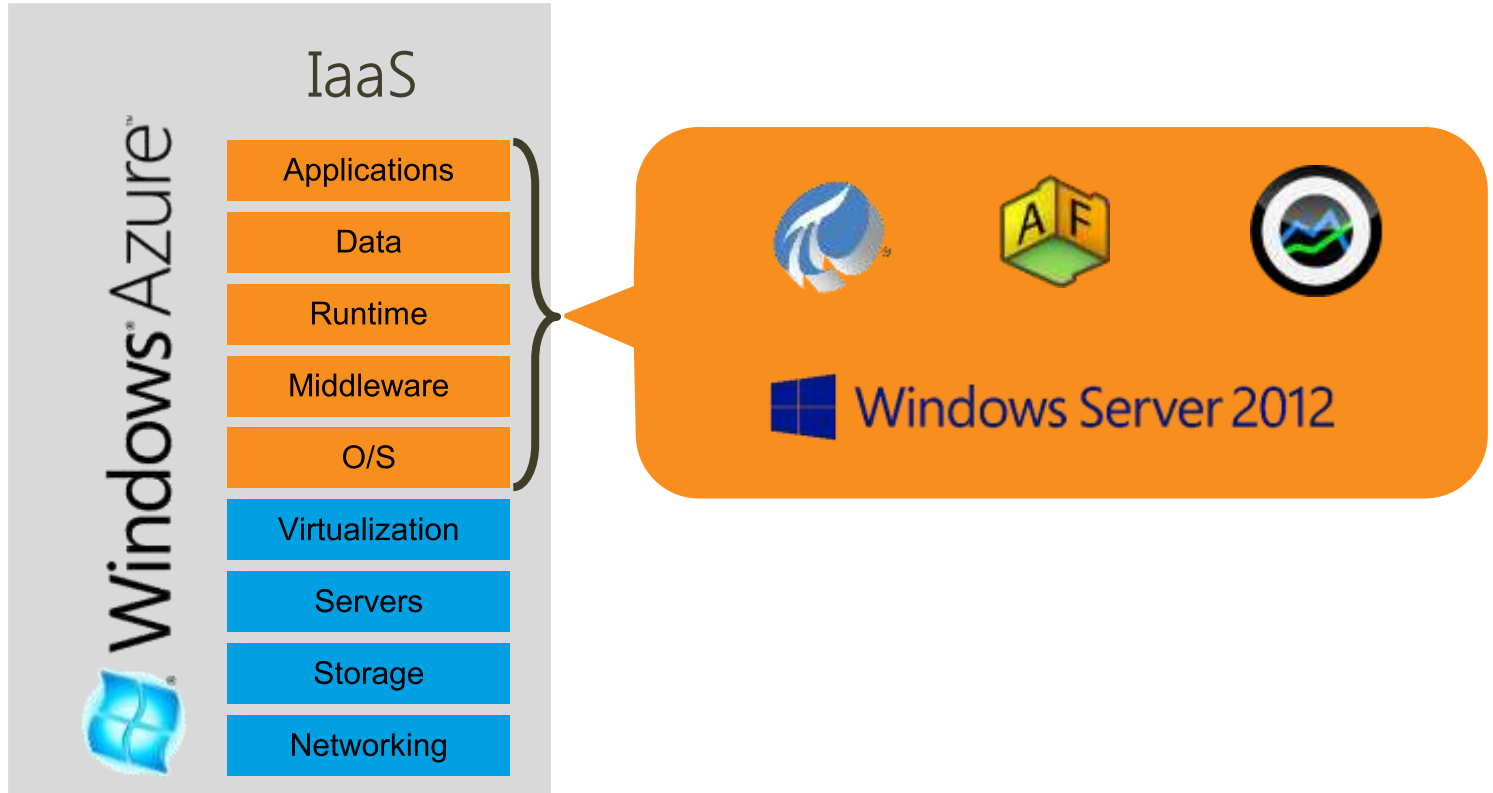
OSIsoft and Windows Azure



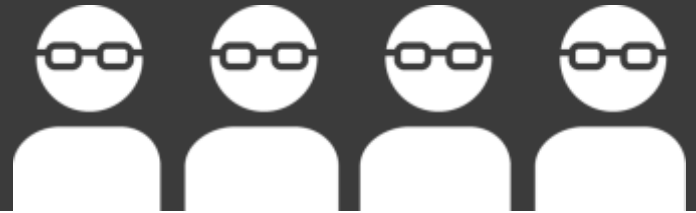
Customers/Partners



Customers & Partners



Customer Solutions Lab Testing



OSIsoft Customer Solutions Lab

- Created to test at a “solution” level
- A group, rather than a physical lab
- Tests on various hardware
 - OSIsoft internal testing hardware
 - IBM
 - Dell
 - Cloud where applicable



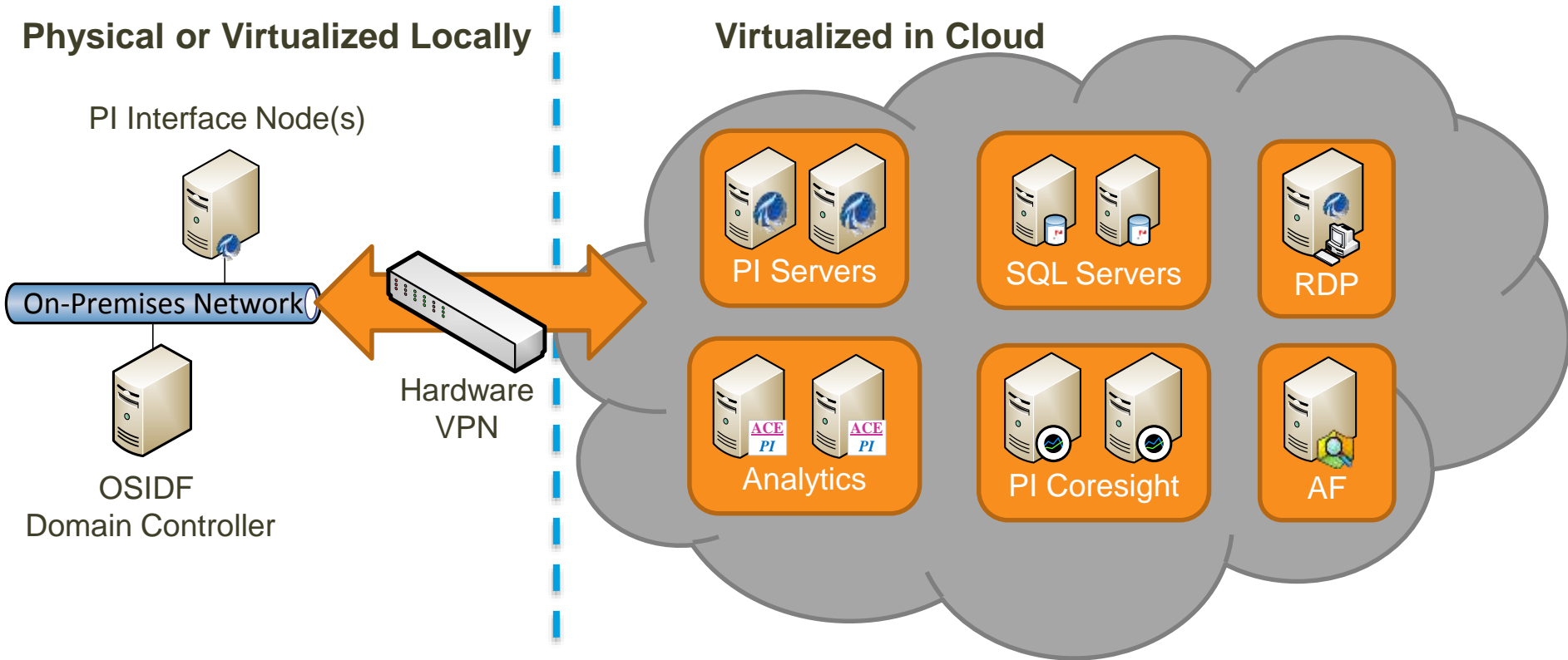
Lab Azure IaaS Test Goals

- Initial “smoke test”
- Are there any **critical failure points** of the PI System on Azure IaaS?
- What would a customer PI System architecture on Azure IaaS look like?
- Training for OSIsoft Technical Support Engineers

Lab Azure IaaS Test Architecture

Physical or Virtualized Locally

Virtualized in Cloud



Lab Azure IaaS Test Architecture

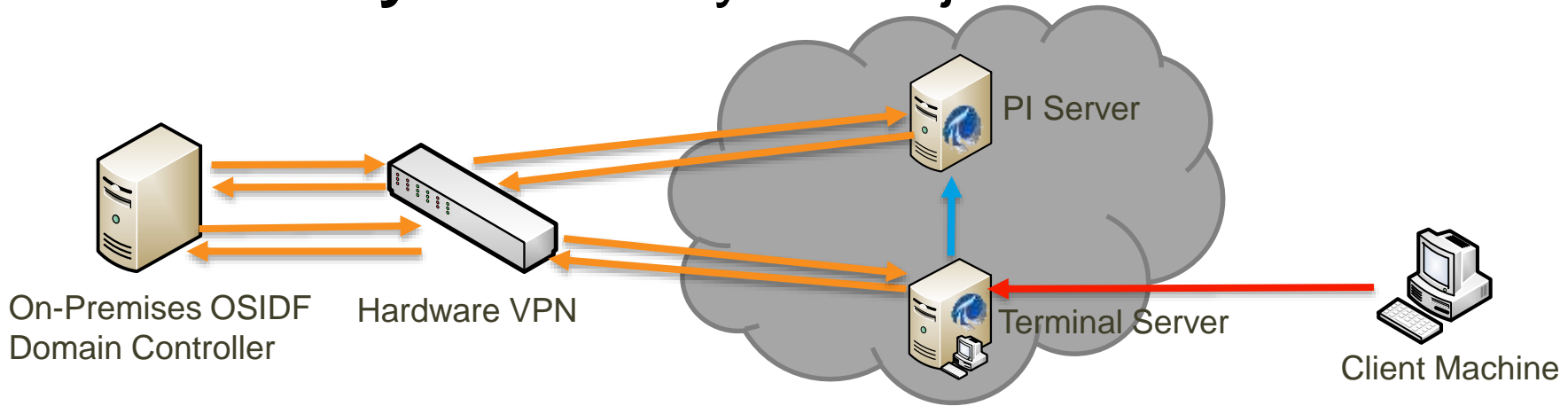
Size	CPU cores	Memory	Max. data disks (1 TB each)	Max. IOPS (500 per disk)	Bandwidth
Extra Small	Shared	768 MB	1	1x500	5 Mbps
Small	1	1.75 GB	2	2x500	100 Mbps
Medium	2	3.5 GB	4	2,000 (4x500)	200 Mbps
Large	4	7 GB	8	4,000 (8x500)	400 Mbps
Extra Large	8	14 GB	16	8,000 (16x500)	800 Mbps
A5	2	14 GB	4	2,000 (4x500)	200 Mbps
A6	4	28 GB	8	4,000 (8x500)	400 Mbps
A7	8	56 GB	16	8,000 (16x500)	800 Mbps

Tested

Tested

Lab Azure IaaS Test Architecture

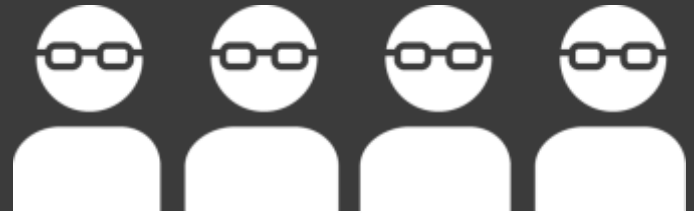
- **Connection** – Hardware VPN
 - Exposed to internet – Terminal Server, Web server
- **Security** – Cloud systems joined to local domain



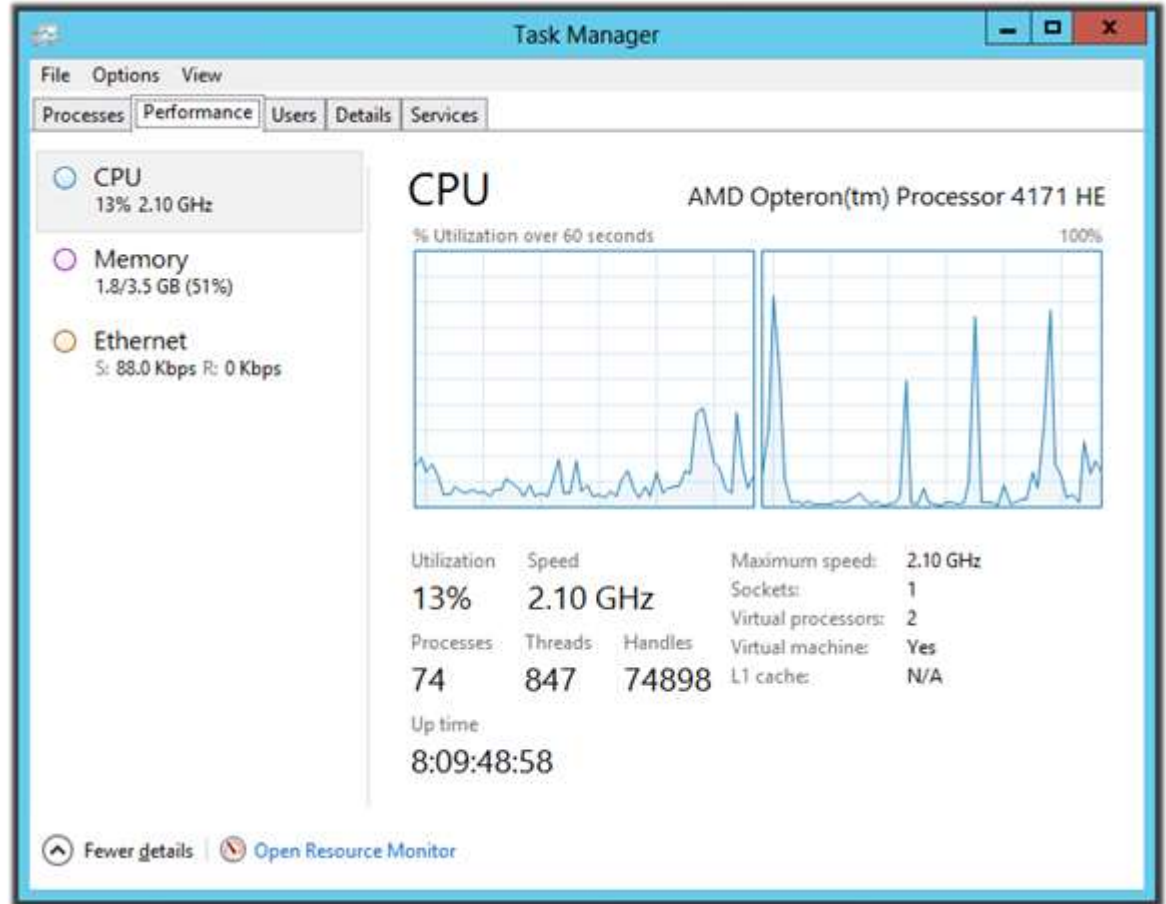
Lab Azure IaaS Test General Results

- No “critical stop” issues found
- All products worked as expected
- Hardware VPN worked well
- Security was functional and responsive
- IaaS VM's are capable of running PI Servers in certain use cases – Disk IO limited!

Analyzing VM Performance with the PI Server



Anything Missing?



Storage Virtualization Is Wonderful

Capacity | Cost | Reliability



» Disk La



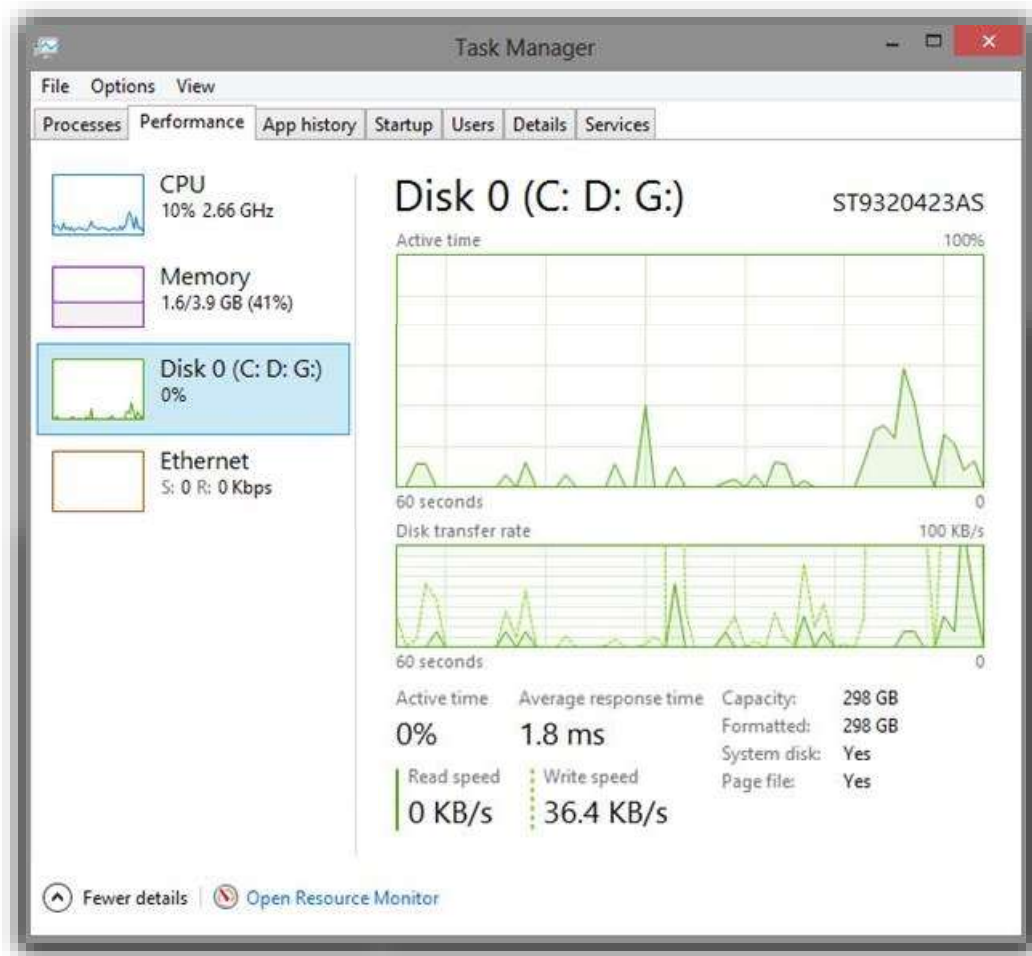
...



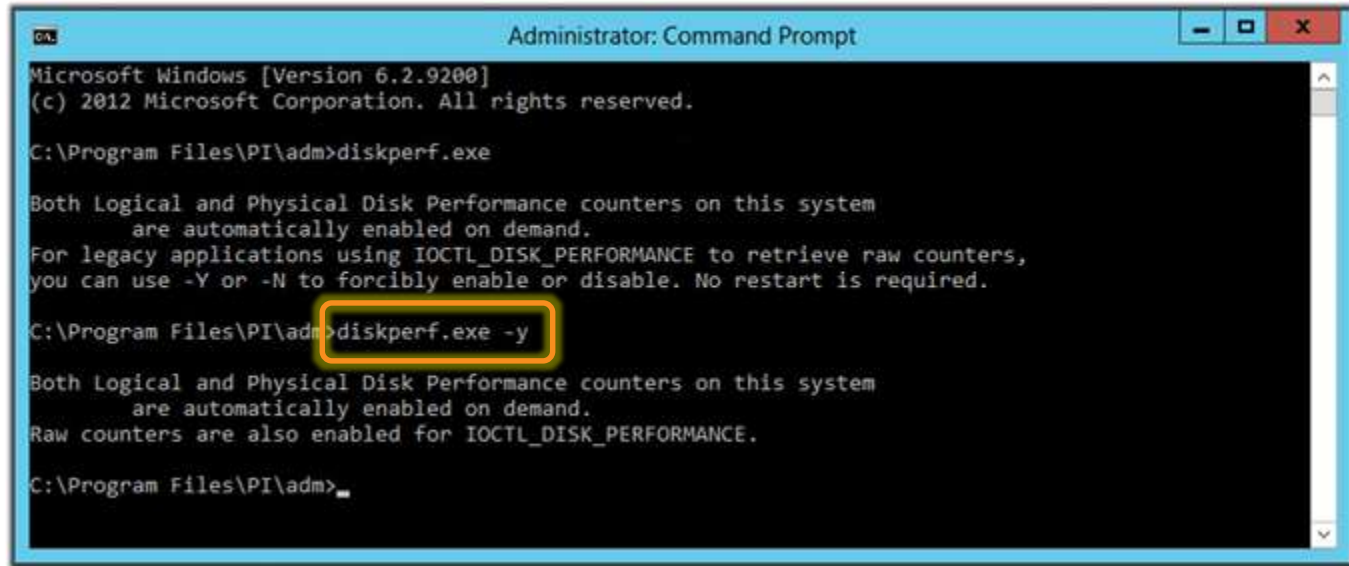
DP
, and jitter)



**Disk performance
only matters on
desktop
computers?**



With a little bit of magic...



```
Administrator: Command Prompt
Microsoft Windows [Version 6.2.9200]
(c) 2012 Microsoft Corporation. All rights reserved.

C:\Program Files\PI\adm>diskperf.exe

Both Logical and Physical Disk Performance counters on this system
are automatically enabled on demand.
For legacy applications using IOCTL_DISK_PERFORMANCE to retrieve raw counters,
you can use -Y or -N to forcibly enable or disable. No restart is required.

C:\Program Files\PI\adm>diskperf.exe -y

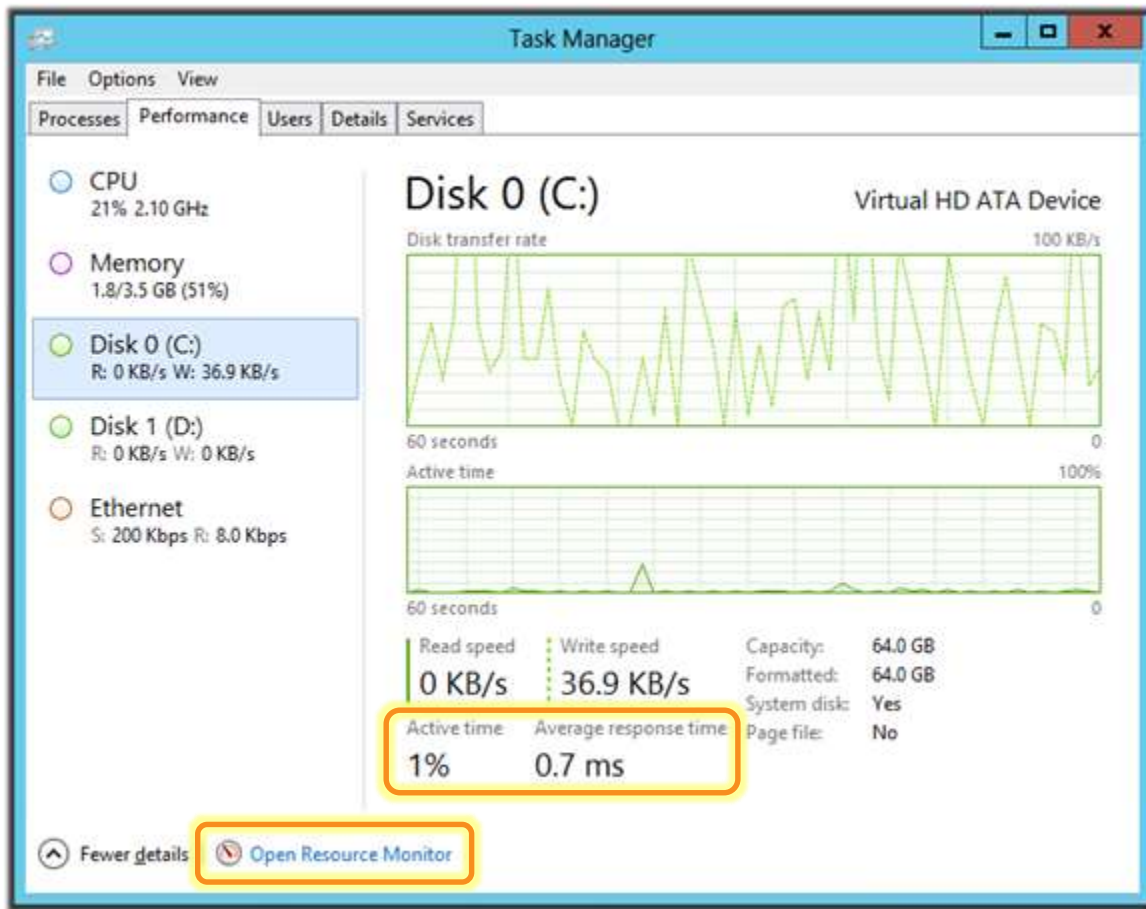
Both Logical and Physical Disk Performance counters on this system
are automatically enabled on demand.
Raw counters are also enabled for IOCTL_DISK_PERFORMANCE.

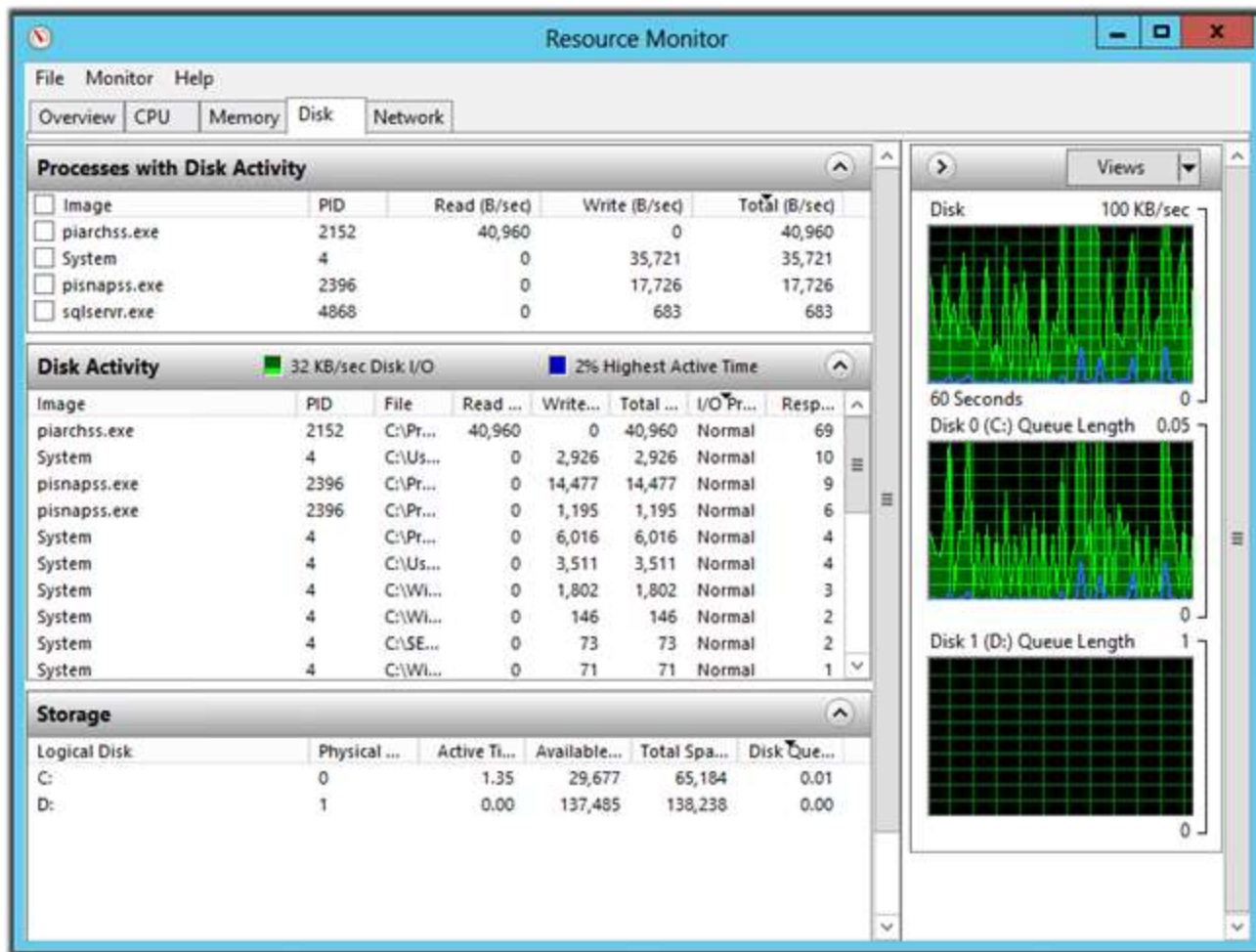
C:\Program Files\PI\adm>
```

[Keith Mayer \(TechNet Blog\): Task Manager in Windows Server 2012](#)

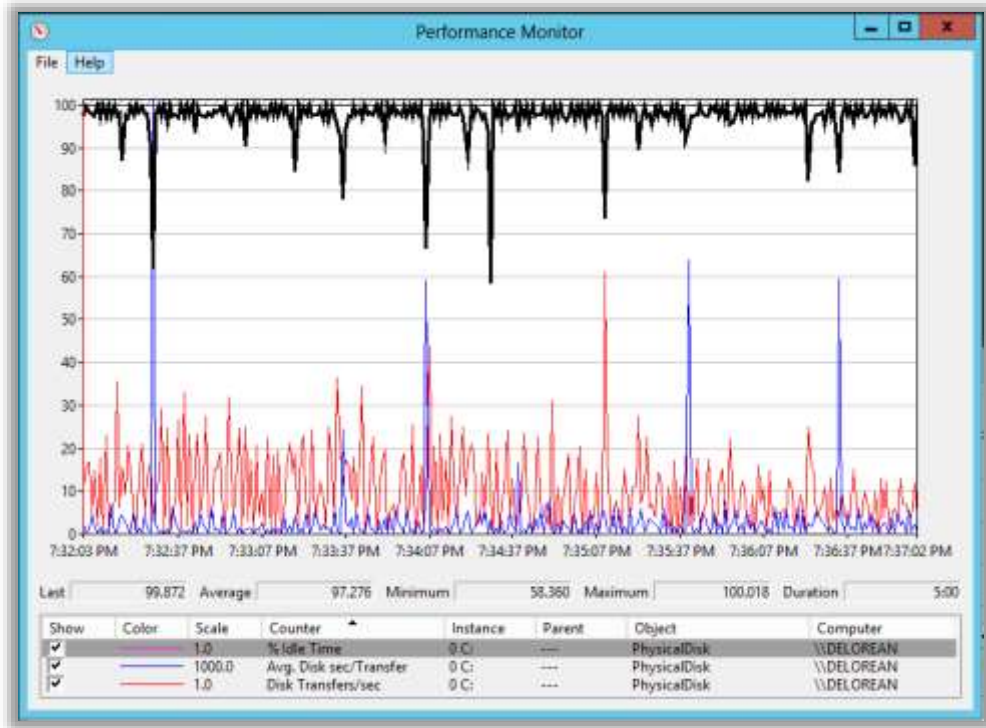
[Microsoft TechNet: The Task Manager in Windows 8 / Windows Server 2012](#)

Here's our new Task Manager





Basic IO Monitoring



Physical Disk Perf Counters

1. % Idle Time

Should be above ~90%
Never dip below ~50%

2. Avg. Disk sec/Transfer

Should be lower than 0.01s
Never spike above 0.1s

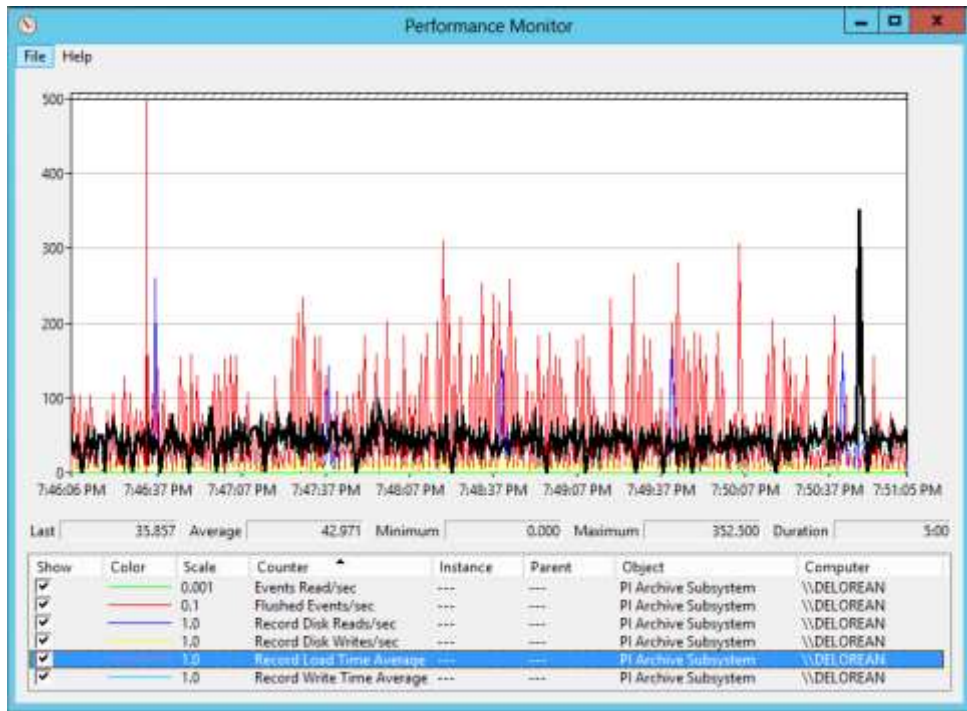
3. Disk Transfers/sec

Hard IOPS (R + W load)

PI Server IO Health

PI Archive Subsystem Counters

- 1. Flushed Events/sec**
Events Read/sec
PI Events written and read
- 2. Record Disk Writes/sec**
Record Disk Reads/sec
Buffered IOPS, 1KB blocks
- 3. Record Write Time Average**
Record Load Time Average
Buffered IO Latency, in microseconds!





Lessons Learned



Lessons Learned – IO Load

- Azure disks are limited to **500 IOPS**
 - RAID0 striping for higher rates
 - VMs have a total network bandwidth limit
- Azure disks have high latency
 - Spikes > 20 seconds during testing

Lessons Learned – Availability Sets

- “For all Internet facing Virtual Machines that have **two or more instances** deployed in the same **Availability Set**, we guarantee you will have external connectivity at least 99.95% of the time.”
<http://www.windowsazure.com/en-us/support/legal/sla/>
- For PI Systems in Azure:
 - PI Servers (PI Collective)
 - SQL Servers
 - PI ACE
 - PI Notifications
 - PI WebParts (SharePoint)
 - PI Coresight

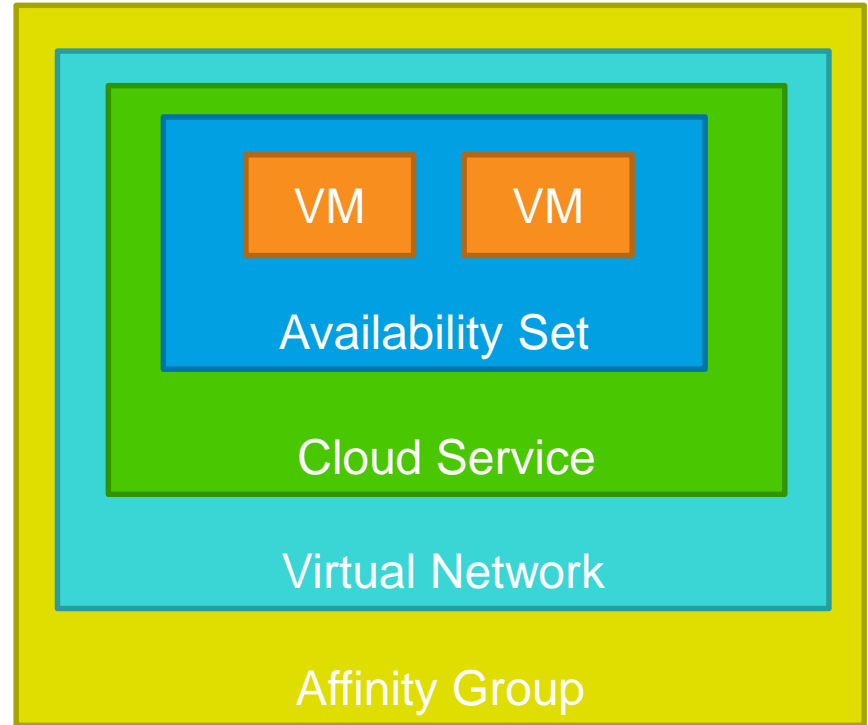
Lessons Learned – VPN Options

- Hardware VPN is the only released supported solution
- Point to Site VPN is in CTP
- DO NOT expose PI System ports externally
 - VPN Security is critical to avoid intrusions



Lessons Learned – Levels of Abstraction

- Azure IaaS has many levels of abstraction
 - Affinity Group, Cloud Service, Availability Set, etc.
- Specific Azure IaaS training is critical



Lessons Learned – Azure Flux

- Windows Azure IaaS is a very new product and in constant flux
- Not unique to IaaS or Azure!
- Cloud offerings are constantly in flux
 - Advantage: Usually improving
 - Disadvantage: Challenging for users

Conclusions

- Azure IaaS will work for some PI System use cases – more research to come!
- Work with us, work with Microsoft!

Future Azure IaaS Testing Plans

- Point-to-Site Software VPN
- Different Security Deployments
- PI System Licensing on Windows Azure
- OSIsoft NOC Monitoring of IaaS VM's
- PI Cloud Connect
- Further IO Testing

Question for the Audience

- What type of security deployment do you plan on using in Azure IaaS?
 - Domain Controller on premises only?
 - Domain Controller on premises federated to cloud?
 - Domain Controller in cloud only (non federated)?

Question for the Audience

- What connection type is necessary for your architecture?
 - Hardware site to site VPN?
 - Software point to site VPN?

Contact Information

David Black

Customer Solutions Lab Architect

OSIsoft, LLC

dblack@osisoft.com

Denis Vacher

PI Server Group Lead

OSIsoft, LLC

dvacher@osisoft.com

Please don't forget to...

Complete the online survey for
this session

eventmobi.com/vcampus13

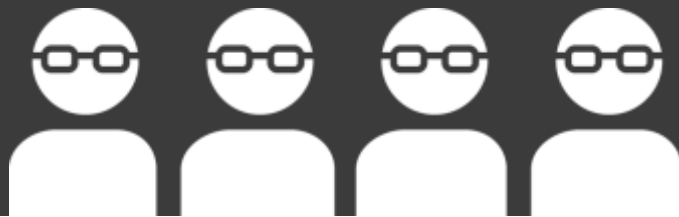


Share with your friends

#VCL13



THANK YOU



Brought to you by  **OSIsoft.**