



vCampus **Live! 2012**

Presented by **Denis Vacher**



The image features a perspective view of a tunnel formed by concentric rings of binary code (0s and 1s). The rings are arranged in a way that creates a strong sense of depth, leading the eye towards a vanishing point in the distance. The binary code is rendered in a light blue or cyan color against a dark background. In the center of the tunnel, the word "ACCURATE" is displayed in a large, white, sans-serif font. The text is slightly shadowed, making it stand out from the background.

ACCURATE

The image features a perspective view of a tunnel formed by concentric rings of binary code (0s and 1s). The rings are arranged to create a strong sense of depth, leading the eye towards a vanishing point in the distance. The binary digits are rendered in a light blue or white color against a dark background. In the center of this digital tunnel, the words "HIGH VOLUME" are written in a large, bold, white, sans-serif typeface. The text is slightly shadowed, making it stand out from the complex background of data. The overall composition suggests themes of data processing, digital storage, or high-volume information transfer.

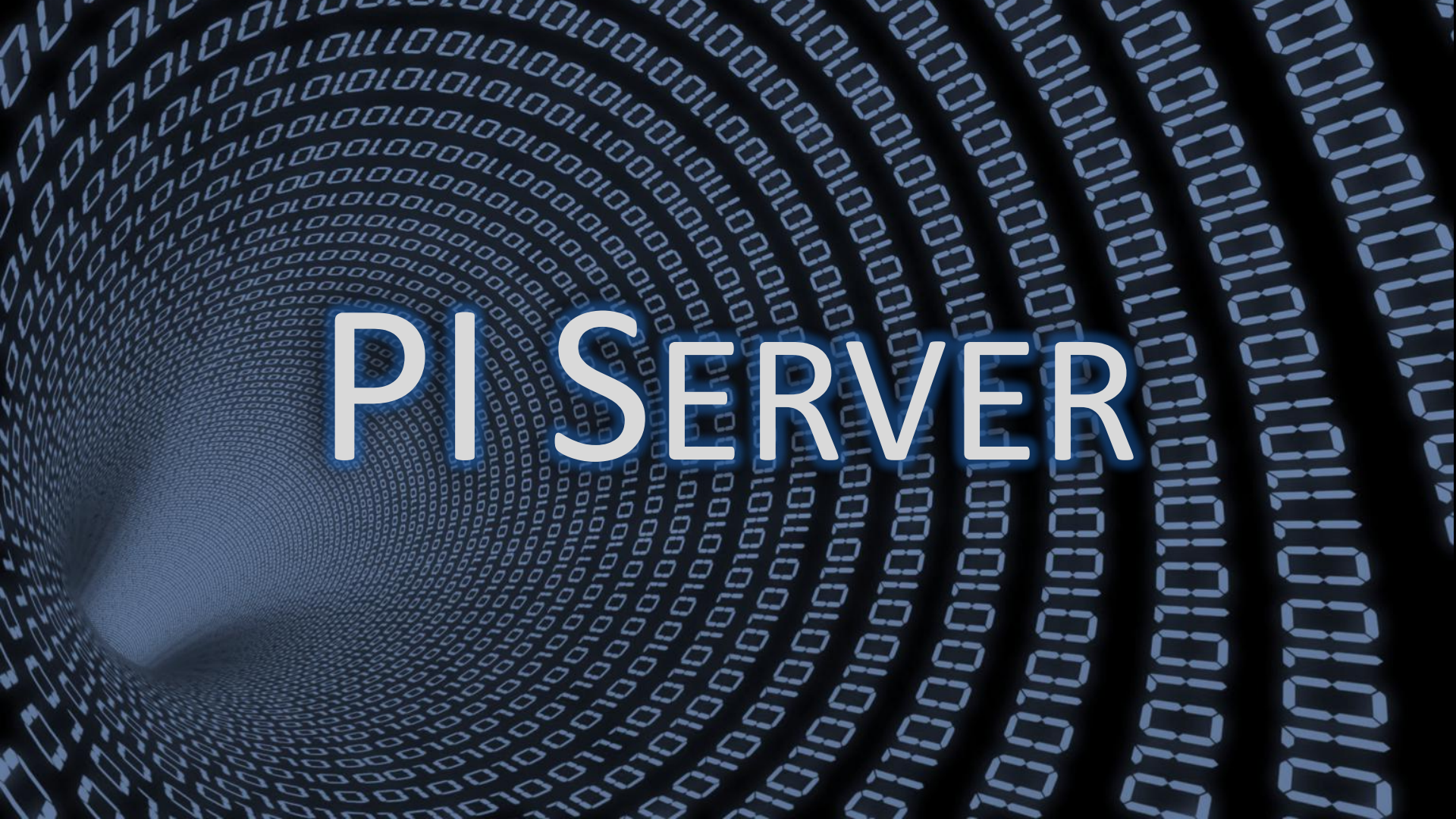
HIGH VOLUME

The image features a perspective view of a tunnel formed by concentric rings of binary code (0s and 1s). The rings are arranged in a way that creates a strong sense of depth, leading the eye towards a vanishing point in the center. The binary digits are rendered in a light blue or white color against a dark background. In the center of the tunnel, the word "AVAILABLE" is written in a large, bold, white, sans-serif font. The text is slightly offset from the center of the tunnel, appearing to float within the digital space.

AVAILABLE

The image features a perspective view of a tunnel formed by concentric rings of binary code (0s and 1s). The rings are arranged in a way that creates a strong sense of depth, leading the eye towards a vanishing point in the distance. The binary digits are rendered in a light blue or white color against a dark background. In the center of this digital tunnel, the words "REAL-TIME" are displayed in a large, bold, white, sans-serif font. The text is slightly shadowed, making it stand out from the background.

REAL-TIME

The image features a perspective view of a tunnel formed by concentric rings of binary code (0s and 1s). The rings are arranged in a way that creates a strong sense of depth, leading the eye towards a vanishing point in the center. The binary digits are rendered in a light blue or cyan color against a dark background. In the center of the tunnel, the words "PI SERVER" are displayed in a large, white, sans-serif font. The text is slightly shadowed, making it stand out from the background.

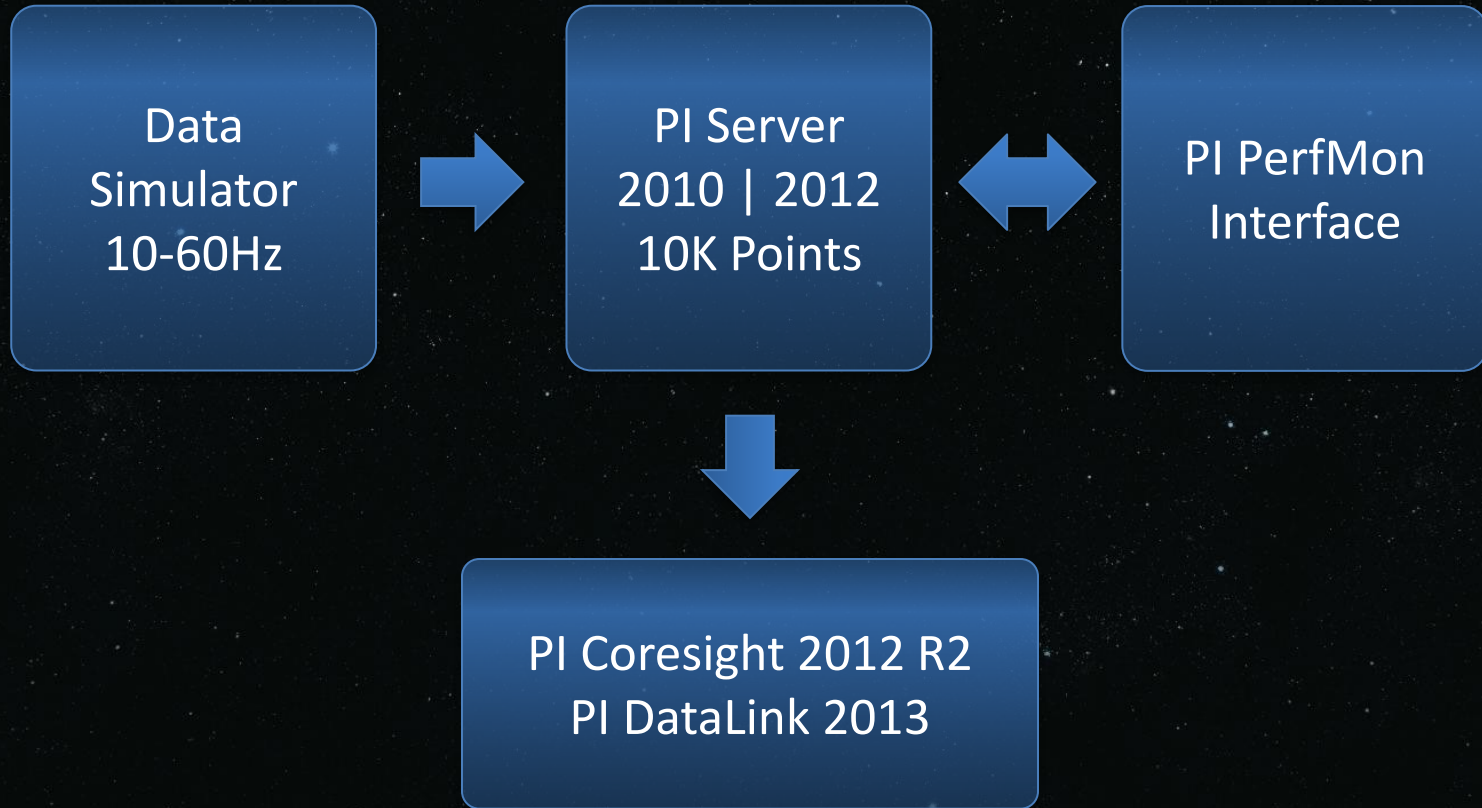
PI SERVER

2012 vs. 2010

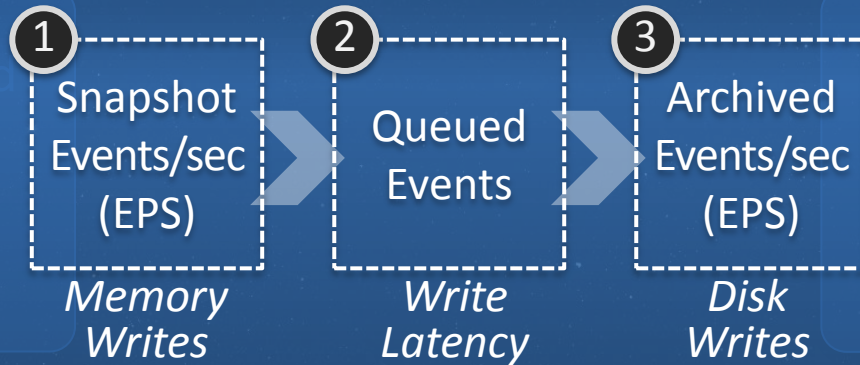


RULES

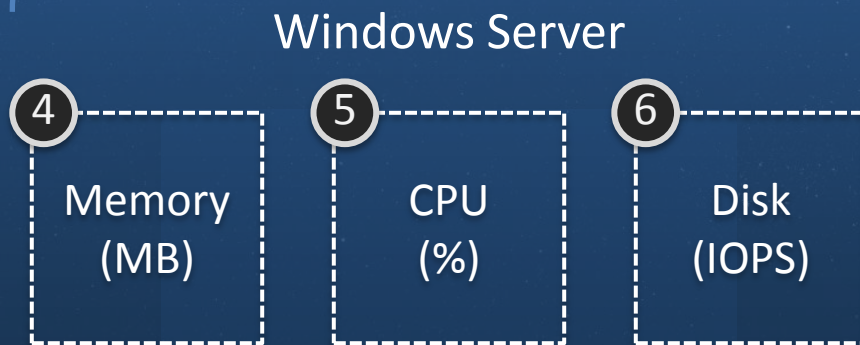
1. Same Hardware
2. Same Configuration
3. Same Data Source
4. Same Client Apps
5. One Difference:
Speed of Data...



High-Speed
Data
Simulator
10-60Hz



PI PerfMon
Interface



DEMO

DELL PRECISION T7600

Intel Xeon E5-2630 2.3GHz, 12 Cores, 32GB RAM, Dell PERC H310 Controller

MICROSOFT WINDOWS SERVER 2012

Standard Edition, Core Installation, Hyper-V Role

Samsung PM83
256GB SSD x 2



Samsung 830
256GB SSD x 4

DELL PRECISION T7600

Seagate
2TB HDD x 2

DELL PRECISION
T7600



DELL PRECISION T7600

Intel Xeon E5-2630 2.3GHz, 12 Cores, 32GB RAM, Dell PERC H310 Controller

MICROSOFT WINDOWS SERVER 2012

Standard Edition, Core Installation, Hyper-V Role

\$4,900

List Price*

Samsung PM83
256GB SSD x 2

VM #1: VCL-PI2010

Windows/SQL Server 2012
6 Virtual CPUs, 12GB RAM

10K Points @ 15Hz

Sustained Writes:

150K EPS, High Latency

PI SERVER 2010



Samsung 830
256GB SSD x 4

VM #2: VCL-PI2012

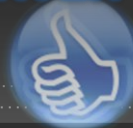
Windows/SQL Server 2012
6 Virtual CPUs, 12GB RAM

10K Points @ 60Hz

Sustained Writes:

600K EPS, No Latency

PI SERVER 2012



Seagate
2TB HDD x 2

VM #3: VCL-CLIENT

Windows/IIS/SQL Server 2012 – 4 Virtual CPUs, 4GB RAM

AF SDK 2012, PI DATALINK 2013, PI CORESIGHT 2012 R2

DELL PRECISION
T7600

SPEC SHEET

PI SERVER 2012	S	M	L
Size/Budget (USD)	\$1,000	\$5,000	\$15,000
Processors	4 Cores	8 Cores	16 Cores
Memory (RAM)	4 GB	16 GB	64 GB
Disk Throughput	1K IOPS	5K IOPS	10K IOPS
Network Class	10 Mb/S	100 Mb/S	1 Gb/S
Data Streams (Points) ¹	250K	1M	5M
Write Throughput (EPS) ²	50K	200K	500K
Data Volume (per month)	375 GB	1.5 TB	3.75 TB
Read Throughput (EPS) ³	200K	1M	5M
Concurrent Users/Apps ⁴	10	50	250
Example Deployments & Applications	Plant Historian	HQ/Regional Center	WAMS, Fleet O&M



PI SERVER 2012 Size/Budget (USD)	XS \$200	S \$1,000	M \$5,000	L \$15,000
Processors	1 Core	4 Cores	8 Cores	16 Cores
Memory (RAM)	1 GB	4 GB	16 GB	64 GB
Disk Throughput	100 IOPS	1K IOPS	5K IOPS	10K IOPS
Network Class	1 Mb/S	10 Mb/S	100 Mb/S	1 Gb/S
Data Streams (Points) ¹	50K	250K	1M	5M
Write Throughput (EPS) ²	10K	50K	200K	500K
Data Volume (per month)	75 GB	375 GB	1.5 TB	3.75 TB
Read Throughput (EPS) ³	20K	200K	1M	5M
Concurrent Users/Apps ⁴	5	10	50	250
(1) Maximum data streams, or PI Points, based on available RAM				
(2) Maximum sustained data write rate, in events/Second, with 50% compression				
(3) Maximum sustained data read rate, in events/Second, with 50% compression				
(4) Approximate number of PI Client applications, such as PI ProcessBook				

Example Deployments
& Applications

Line/OEM
Historian

Plant
Historian

HQ/Regional
Center

WAMS,
Fleet O&M




PI SERVER 2012	XS	S	M	L	XL
Size/Budget (USD)	\$200	\$1,000	\$5,000	\$15,000	\$50,000
Processors	1 Core	4 Cores	8 Cores	16 Cores	32 Cores
Memory (RAM)	1 GB	4 GB	16 GB	64 GB	256 GB
Disk Throughput	100 IOPS	1K IOPS	5K IOPS	10K IOPS	50K IOPS
Network Class	1 Mb/S	10 Mb/S	100 Mb/S	1 Gb/S	10 Gb/S
Data Streams (Points) ¹	50K	250K	1M	5M	20M+
Write Throughput (EPS) ²	10K	50K	200K	500K	1M+
Data Volume (per month)	75 GB	375 GB	1.5 TB	3.75 TB	7.5 TB
Read Throughput (EPS) ³	20K	200K	1M	5M	10M+
Concurrent Users/Apps ⁴	5	10	50	250	1,000+

(1) Maximum data streams, or PI Points, based on available RAM

(2) Maximum sustained data write rate, in events/second, with 50% compression

(3) Maximum sustained data read rate, in events/second, with 50% compression

(4) Approximate number of PI Client applications, such as PI ProcessBook

**Example Deployments
& Applications**

**Line/OEM
Historian**

**Plant
Historian**

**HQ/Regional
Center**

**WAMS,
Fleet O&M**

**AMI,
Smart Grid**

XXL?





SYSTEM REFERENCE ARCHITECTURE for Smart Grid Data Management

4 x POWEREDGE R720 SERVERS

Intel Xeon E5-2690 2.9GHz, 16 Cores, 192GB RAM, Dell PERC H700 Controller
2 x 300GB SAS 15K RPM 2.5" HDD (RAID 1)

DAS

4 x DELL 350GB HOT-PLUGGABLE PCIe FLASH DRIVES → TIER 0

SAN

2 x QLOGIC 22563 FIBER CHANNEL 8GB ADAPTERS
2 x BROCADE 5100 FIBER CHANNEL 8GB SWITCHES
DELL COMPELLENT SC40 STORAGE CONTROLLER

- 24 x 200GB ENTERPRISE 2.5" SSD → TIER 1
- 24 x 300GB SAS 15K RPM 2.5" HDD → TIER 2
- 12 x 2TB SAS 7.2K RPM 3.5" HDD → TIER 3

LAN

INTEL X520 DP 10Gb DA/SFP+ ETHERNET ADAPTER
DELL FORCE10 S4810 10/40 Gb ETHERNET SWITCH



DAS
TIER 0

1.3 TB
@ 135K
IOPS

Read Throughput

Sustained
14.6M EPS

Peak
47.2M EPS

(No File Cache)

1.5 Years

PMU data (60 Hz)
analyzed per min.

X N

PI Collective
node count

SAN
TIERS 1-3

24 TB
@ 24.5K
IOPS

Read Throughput

Sustained
4.3M EPS

Peak
24M EPS

(No File Cache)

278 Days

PMU data (60 Hz)
analyzed per min.



PI SERVER 2012

A glowing blue lightsaber is positioned diagonally across the frame, from the bottom left towards the top right. The hilt is visible at the bottom left, and the blade extends towards the top right. The background is a dark space filled with numerous small, distant stars. The text "AVAILABLE TODAY" is centered over the lightsaber blade.

AVAILABLE TODAY



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WHERE PI GEEKS MEET

