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VIRTUALIZATION FOR VIDEO SURVEILLANCE ENVIRONMENTS

Pivot3 Serverless Computing offers a new way to Reduce Power, Cooling, and Rackspace

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Prepared by: Dilip Sarangan,
Industry Analyst, Frost & Sullivan

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TABLE OF CONTENTS

EVOLUTION OF VIDEO SURVEILLANCE DATA MANAGEMENT

Video management systems have evolved over the past 10 years from limited functionality analog digital video recorders (DVRs) to high-performance digital systems available today. There have been challenges in migrating to the latest digital systems because of the high initial capital expenditures required and the need to overhaul existing infrastructure. The following describes the evolution of video surveillance data management systems and how a technical breakthrough in Serverless Computing will accelerate the migration from analog to digital by offering higher returns at lower investment outlays.

The First Wave (1980s) - Analog DVRs with Tape

With analog DVRs and closed-circuit television (CCTV), the video management system and the storage are self-contained in a video cassette recorder (VCR)-based DVR. The DVR offers limited analytic or forensic capabilities (slow, sequential viewing, limited time-based or camera-based search, and analog picture resolution limitations), poor availability (no failover, no redundancy, fragile media, and recording lapses during tape replacement), limited scalability (no shared elements in large installations for efficiency) and high management costs (manual tape logistics, proprietary systems). Yet these systems were widely adopted because they were inexpensive to install and did not require specialized skills to manage.

The Second Wave (late 1990s-present) - NVRs with External DAS

With the introduction of the digital NVR, the analytic and forensic capabilities of video management systems soared. Searching became faster (random access, disk-based) and digitally-driven (event, motion, facial, policy-based, etc). Application availability improved with failover servers while storage availability and capacity improved with external direct attached storage (DAS) and in some cases shared storage area networks (SANs).

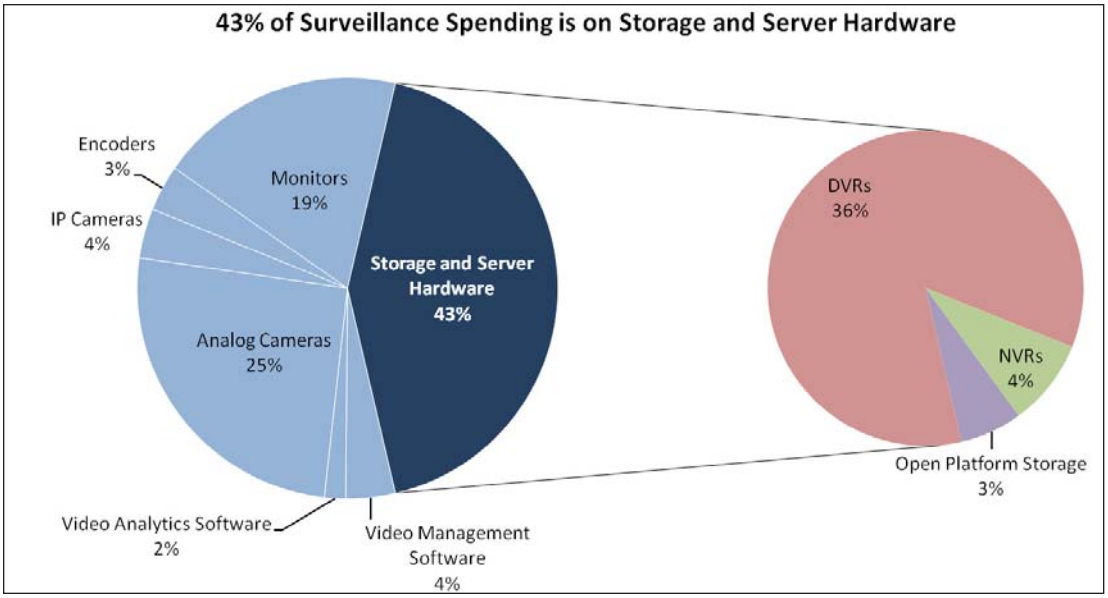
However, the dramatic increase in cost over tape-based DVRs forced many markets to stick with lower functionality solutions. In storage particularly, the adoption of SANs and the realization of SAN benefits (improved storage utilization, reduced downtime, on-line configuration changes) was stalled because of the huge investment commitment and the specialized knowledge required to learn proprietary storage technologies such as Fiber Channel switching, LUN masking, RAID optimization. As a result, the majority of the market is still analog today.

The Third Wave (2008 and on) – Combined NVR/SAN Platforms

What's been needed to jolt the mass market from analog to digital is a distinct reduction in the cost of buying and managing newer digital video management systems. The introduction of a combined NVR/SAN platform is a critical technology breakthrough that will speed the Third Wave adoption.

As a point of reference, over 40 percent of surveillance solution dollars are spent on the combined NVR and storage platforms today as illustrated in Chart 1.1.

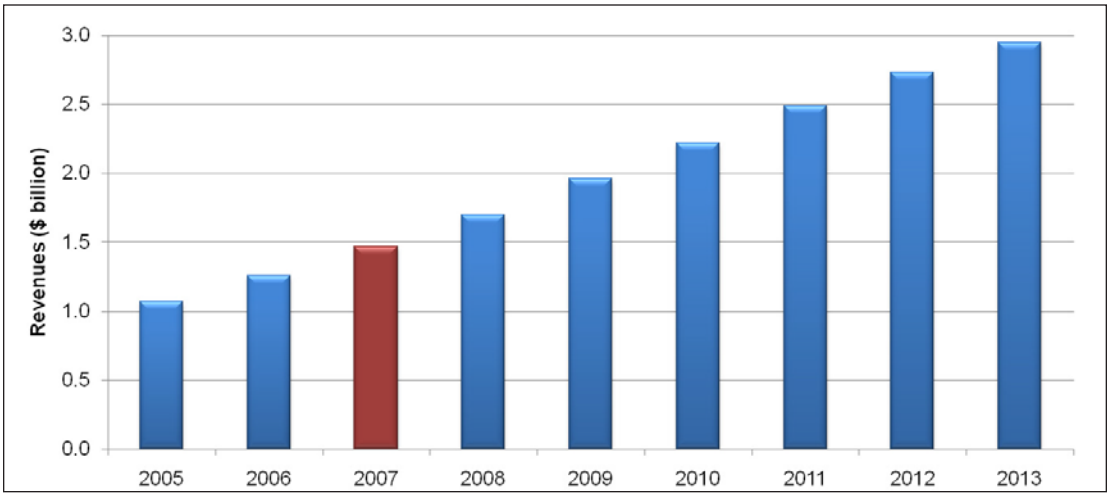
Chart 1.1: Spending on Video Surveillance Technologies, 2007



Note: All figures are rounded; base year is 2007; Source: Frost & Sullivan

The video surveillance market is poised for substantial growth over the next 6 years. In 2007, storage accounted for $1.57 billion in end user spending on video surveillance. In 2013, it is expected to grow to $2.95 billion at a compounded annual growth rate (CAGR) of 12.3 percent from 2007 to 2013. The highest growth in this market is due to increasing market penetration for NVRs and Open Platform Storage systems. These technologies are expected to grow at over 25 percent CAGR between 2007 and 2012.

Chart 1.2: Video Surveillance Storage and Server Hardware Market



Note: All figures are rounded; base year is 2007; Source: Frost & Sullivan

A combined NVR/SAN platform addresses both the acquisition and operational costs inherent in the Second Wave solutions. On acquisition costs, an integrated solution eliminates the out-of-pocket costs for standalone servers. Operational costs are lowered through reduced power, cooling and rack space. And finally, management costs are contained through a standards-based approach that relies on well-known server and Ethernet technologies.

The result is to consolidate NVR physical servers so that customers get the same server performance on top of reduced power, cooling, rack space and cost that those server resources would normally impose.

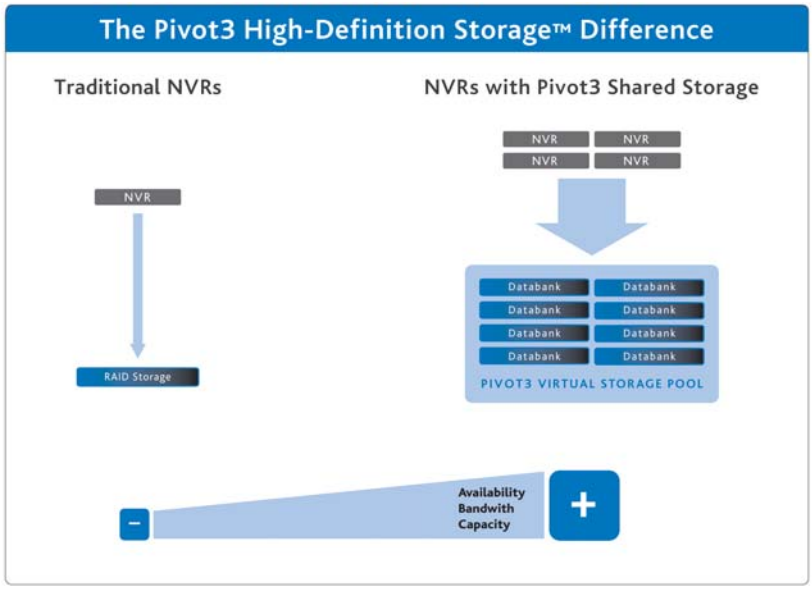
An Overview of Serverless Computing

Serverless Computing is the first integrated NVR / SAN platform that runs video management software directly on IP SAN hardware. The innovation relies on three key components:

1. The RAIGE™ Architecture

Pivot3's RAIGE (RAID Across Independent Gigabit Ethernet) technology is a clustered IP SAN solution with extremely high bandwidth. RAIGE software runs on x86-based appliances and delivers a consolidated pool of storage that is extremely reliable.

Chart 1.3: Architecture for Pivot3 Serverless Computing



Source: Pivot3

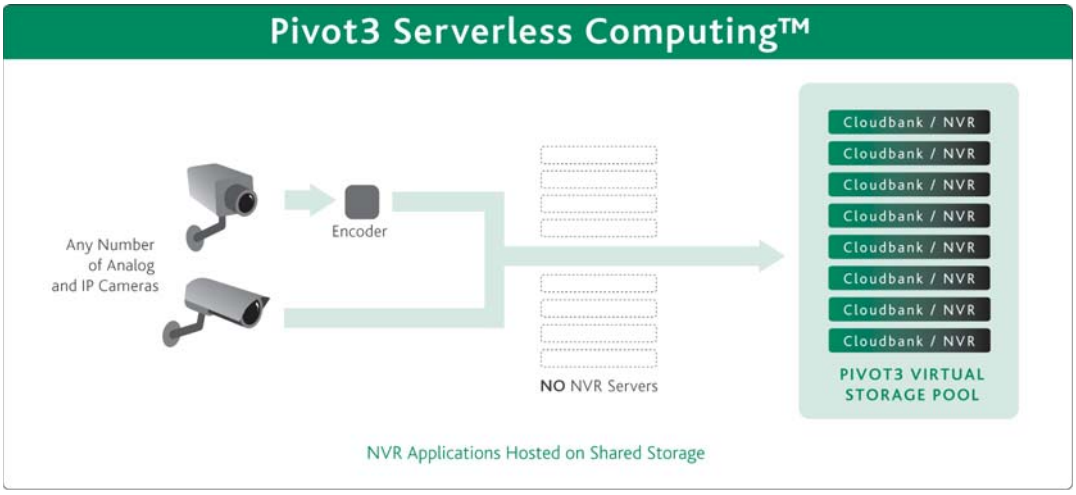
2. The Cloudbank™ Appliance

Serverless Computing relies on a high-performance clustered appliance to power both the RAIGE software and the NVR application. However, the additional x86 CPU, RAM, and network ports drive less power, cooling and cost than a standalone NVR server.

3. Integration of Server and Storage Virtualization

The integration of storage and server virtualization technologies is central to the Pivot3 patent-pending technology, and provides performance, automatic load balancing, and failover capabilities across a clustered solution.

Chart 1.4: Combined NVR / SAN Platform with Serverless Computing



Source: Pivot3

Users can access storage from both hosted applications and from external server-based applications for the complete investment protection of their existing infrastructure.

Serverless Computing Benefits – An Airport Example

The following example shows how using Pivot3's Serverless Computing in an airport setting with 34 NVRs and 1 Petabyte of capacity would save $156K over three years and eliminate nearly two full racks of server hardware from the airport surveillance data center.

Chart 1.5: Cost Savings with Pivot3 Serverless Computing™

	Acquisition Costs			Operational Costs			Rack Space
Cost Driver	Quantity	Cost	Total	Power	Cooling	Energy	in U
	($000's)	($000's)		(W)	(W)	($) *	
Less Servers	34	$3,000	$102,000	500	500	$178,204	68
Cloudbank Delta	34	$0.00	$0.00	120	120	$42,889	0
Net Savings			$102,000			$135,815	68U

** 3 year savings assuming $0.20/KWH, Source: Pivot3*

Hard savings such as these are easy to cost-justify and will help users make the jump from today's analog DVR world to the bright Third Wave of Video Management Systems.

FROST & SULLIVAN'S ASSESSMENT OF SERVERLESS COMPUTING

A Unique Technology Integration Approach

Serverless Computing™ is a technology integration approach developed by Pivot3 to accelerate adoption of digital surveillance systems across a broad spectrum of markets.

A Catalyst Speeding Adoption of Network-Based Solutions

The consolidation of one level of hardware (servers) into another hardware platform (storage) makes Serverless Computing an attractive solution to end-users ready to invest in the migration from analog systems to network-based solutions. The elimination of standalone server hardware with corresponding reductions in capital outlays, operational expenses, and energy savings makes Serverless Computing an important catalyst in speeding the end-user adoption of leading-edge network-based solutions.

Concrete Savings in Cost, Power, Cooling and Rack Space

In data center environments, power and cooling concerns are a top priority as more storage, compute and network resources drive energy expenses and space build-out costs. Serverless Computing reduces both capital costs and operational costs by hosting NVR applications directly on the Pivot3 Serverless Computing hardware.

Direct Benefits for Surveillance and Data Center Markets

We see Serverless Computing being especially beneficial for 1) end-users of video surveillance solutions who closely manage cost and 2) general data center operators who are looking for significant reductions in power consumption and total cost of ownership. For both audiences, storage costs can dominate overall system costs, and the opportunity to apply server virtualization in a new way should be extremely compelling.

Conclusion

Pivot3 Serverless Computing offers savings in up-front capital expenditure and ongoing, significant operating expenses, and we believe these savings will merit close consideration in large-capacity deployments. Server and storage hardware typically makes up forty-three percent of video surveillance hardware costs. With Serverless Computing, these costs can be reduced dramatically with all savings transferred directly to end-users.

CONTACT US

Beijing

Bengaluru

Bogotá

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New York

Oxford

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Silicon Valley

Singapore

Sydney

Tel Aviv

Tokyo

Toronto

Warsaw

Silicon Valley
331 E. Evelyn Ave.
Suite 100 Mountain View, CA 94041
Tel 650.475.4500
Fax 650.475.1570

San Antonio
7550 West Interstate 10, Suite 400,
San Antonio, Texas 78229-5616
Tel 210.348.1000
Fax 210.348.1003

London
4, Grosvenor Gardens,
London SWIW ODH,UK
Tel 44(0)20 7730 3438
Fax 44(0)20 7730 3343

877.GoFrost
myfrost@frost.com
http://www.frost.com

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