

# Company overview and Business Introduction



# Company Profile



N a m e	Olivetech, Inc.
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C o n t a c t	TEL: 82-31-726-4217, FAX: 82-31-726-4219 E-mail: olive@olivetech.co.kr
C E O	Jangsik Im
F o u n d e d	April 1 <sup>st</sup> , 2013
C a p i t a l	USD0.25M (KRW280,000,000)
M a j o r B u s i n e s s A r e a	<ul style="list-style-type: none"><li>▪ Secure WORM Storage OS development</li><li>▪ Enterprise WORM Storage Development &amp; Manufacturing</li><li>▪ Private Block Chain Based Archiving Solution</li></ul>



***Splendid Technology***

**Brand Name of Olivetech  
Storage Products and  
Technologies**



# Core Members

## Jangsik Im

- **Founder & CEO**
- CTO, Blueberry Co., Ltd. (2005 ~ 2013)
- CTO, Insight Technology Co., Ltd. (2003 ~ 2005)
- Principal Engineer, **Samsung Electronics** (1988 ~2003)
- BS in Computer Engineering from Seoul National University

## Hounsoo Kim

- **COO**
- CEO, Happy Echo Systems, Inc. (2013 ~ 2016)
- CEO, ET Land, Inc. (2011 ~ 2013)
- Executive V.P, **Samsung Electronics** (1991 ~2011)
- Member of Technical Staff, AT&T Bell Lab (1981 ~ 1991)
- MS in Computer Science from Illinois Institute of Technology

## Dougwon Lee

- **CTO**
- Principle Engineer, Dasan Networks, Inc. (2010 ~ 2015)
- CTO, Duksan Mecasys, Inc. (2005 ~ 2009)
- Principal Engineer, LiSys, Inc. (2000~ 2005)
- Senior Engineer, **Samsung Electronics** (1990 ~1999)
- BS in KAIST (Korea Advance Institute of Science & Technology)

## Stanley Lim

- **Head of Scalable Storage Technology**
- Founder & CEO of Limbros Technology, Inc. (2009 ~ 2016)
- CTO, Joy On, Inc. and Nadatel, Inc. (2000 ~ 2009)
- Principal Engineer, **Samsung SDS** (1994 ~ 2000)
- Researcher, Samsung Advanced Institute of Technology (1987 ~1994)
- BS & MS in Electrical Engineering from Hanyang University

## Warren Cho

- **Head of Block Chain Technology**
- Principle Engineer, Snet System, Inc. (2005 ~ 2009)
- Principal Engineer, Magici Digital (2002~ 2005)
- Senior Engineer, **LG Electronics** (1989 ~2002)
- BS in Computer Engineering from Seoul National University

## N.H Seo

- **CDO (Chief Design Officer)**
- Home Appliance Designer, **Samsung Electronics**
- BS in Industrial Design from University of Seoul

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# Core Business Introduction

WORM(Write-Once Read-Many) Storage

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# Issues Emerging in the Data Security Market

## Increased Threat of Digital Data Itself

Key Interest Area of  
“Existing Security Solutions”



External Intrusion  
Detection & Prevention



Data Leakage,  
Loss Prevention



Protect from  
Data Misuse & Abuse

*SECURING YOUR DATA STORAGE*

Soaring New Threat  
“Damage to the Data Itself”



Serious  
Ransomware

Unauthorized  
Erase of  
CCTV Video

Unauthorized  
Log Erase &  
Tampering

Medical Record  
Tampering

Data Deletion  
due to  
Hacking

Accounting &  
Auditing Data  
Tampering

Malicious  
Damage by  
Retirees or  
Insiders

Mistakes &  
Accidental  
Deletions

New Paradigm Required  
“Erase & Tamper Prevention”



Securing Legal Proof of  
Digital Data

**COMPLIANCE ISSUE**



Securing Core Digital  
Asset

**SECURITY ISSUE**



# Increased Needs for Unauthorized Erase & Tamper-proof Storage Solution

*General Storage*



*Optical Disk*



*WORM Storage*

Intentional, Illegal, Accidental



Erase  
Tampering

No way to Prevent !!!

Data  
Erase  
Tampering



Optical Media = Safe



Once recorded,  
Data can not be erased or tampered  
Not suitable for high performance and  
large data processing



High Performance

HDD,SSD Based

Secure Storage



As Optical Disk, Once recorded data can not  
be erased or tampered  
Hard Disk Based High Performance,  
Large Capacity Secure Storage

**WRITE-ONCE READ-MANY**



# Core Technology Competency

Core Software Technology  
to Protect Digital Data from  
Unauthorized Erase or Tampering

## WORM Storage OS Technology

Global Top 4

WORM OS

Core  
Technology

Global Unique

Open Source  
LINUX OS Based  
WORM  
Storage OS

Global Unique

Low Cost SMB  
WORM  
Storage

Global Unique

Virtual  
WORM  
Storage  
Appliance

Korea Unique

Certified from  
National  
Archives of  
Korea

where security begins  
**OLIVE** TECH

where security begins  
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where security begins  
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where security begins  
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where security begins  
**OLIVE** TECH

**DELL** EMC

**NetApp**

**HITACHI**  
DATA SYSTEMS

**DELL** EMC

**HITACHI**  
DATA SYSTEMS



# Core Technology – WORM Storage OS and Platform Development

- Implemented in Kernel – Can not bypass
- No Back-Door, No Master key
- File Retention Period(M/H/D/W/Y/Forever)
- Compliance Clock, Tamper-Proof Clock
- SHA-256 based Digital Fingerprint
- Real-time recording WORM – Append Only
- Privileged Delete & Audit
- AES 256 based Real-time Encryption
- Block Level Real Time Remote Replication
- File/Folder level Scheduled Replication
- Industry standard I/F – NFS/CIFS/POSIX
- WORM, NAS, iSCSI Volume in a system
- Support All General NAS features
- Physical Appliance & Virtual Appliance

**Splentec**

**SPLENTEC  
WORM STORAGE  
OS**



STABLE SLC  
FLASH DISK



Copy Protection  
License



Web-based WORM  
Storage Management



1GbE/10GbE/40GbE



CIFS

NFS

NFS



MS  
Windows

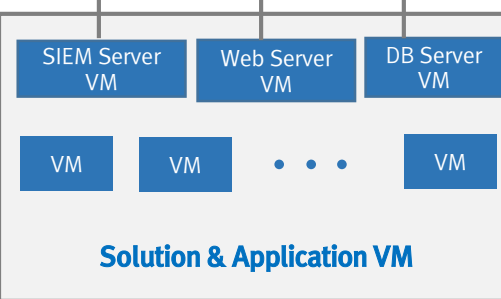
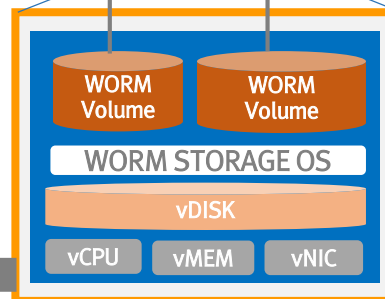


Apple  
Mac



UNIX  
Linux

NFS/CIFS



Trial License  
(30 day)

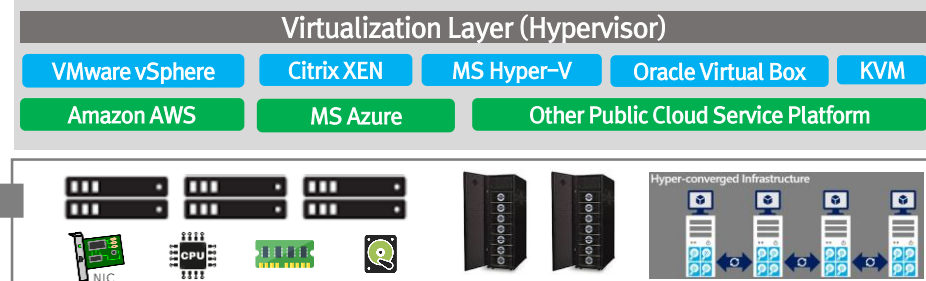


**WORM  
Volume  
Capacity  
License**

**Software Licensing**



**Hardware**



*SECURING YOUR DATA STORAGE*

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# Key Features of WORM Storage OS



## Implemented in OS KERNEL

- Hard-Coded in WORM OS Kernel
- Can not uninstall
- Can not be avoided or bypassed



## Digital Fingerprint

- SHA256 HASH algorithm based
- Digital Fingerprint for each File
- Guarantee Integrity & Validation



## Real-time Recording Protection

- Append-Only WORM
- Only adding data to the EOF is allowed
- Real-time protection of recording

\* EOF: End of File



## Real-time Remote Replication

- Block Level Remote Replication
- Real-time replication for DR
- Preserve all original WORM file properties in remote copy



## File Retention Period

- Retention period for each file
- Min, H, D, W, Y Base or Permanent
- After expiration: Can delete or extend period but still can not modify the file



## Tamperproof Clock

- Compliance Clock
- Volume-based independent S/W clock
- Protect Retention Period from being neutralized



## Real-time Data Encryption

- Volume-level real-time encryption
- AES128bit, 256bit support
- Data leakage protection from media or storage theft



## Scheduled File/Folder Replication

- File/Folder Scheduled Replication
- Replication to Local or Remote System
- Preserve all original WORM file properties in remote Copy

# Key Features of WORM Storage OS (Continued)



## Privileged Delete

- Can delete file during retention period under strict control & audit recording
- Dedicated special account required
- Optional property for a volume



## Audit

- Audit log for the various operation
- Undeletable privileged delete log
- Strict protection for the audit log

## 2-Level Security Mode

- WORM Security Level Selectable
- Soft Security : Protec File & Folder
- Hard Security: Protect Volume, File & Folder



## Full Industry Standard Interface

- Access & Utilization through Full Industry Standard Interface
- NFS/CIFS Protocol & POSIX Command
- Easy Utilization & Solution Integration



## All-In-One Multi-Purpose

- Support WORM, NAS, iSCSI Volume
- Concurrent Configuration of three types of Volumes
- All-In-One, Multi-Purpose





# Major Target Market of WORM Storage



## Original Log Preservation

- Prevent Evidence Destruction
- Log Preservation for tracking the cause of security breach
- Internal Control



## Safe Backup Against Ransomware

- Prevent Deletion & Encryption of Backup Data
- Same Effect as Back-up & off-line the Backup Media



## Medical Industry

- HIPAA compliance
- Medical Record Preservation
- Backup Against Ransomware



## Public Sector

- Public Record Archiving
- Various Scan Data (Tax, etc.)
- National Archives



## Contact Center

- Voice Recording Preservation
- Contact Center Recording – Contract & Legal Evidence
- Preparing Various Disputes



## Legal Regulation

- SOX, SEC Rule, FINRA
- HIPAA, GDPR
- PCI-DSS, ISMS, DOD, CJIS



## Financial Sector

- Trading Record of Internet Bank
- Scanning Data (Contract, etc.)
- Brokerage Related Record



## CCTV Surveillance

- Prevent Deletion of CCTV Video Record
- Record for CCTV control (PTZ) History as Legal Evidence

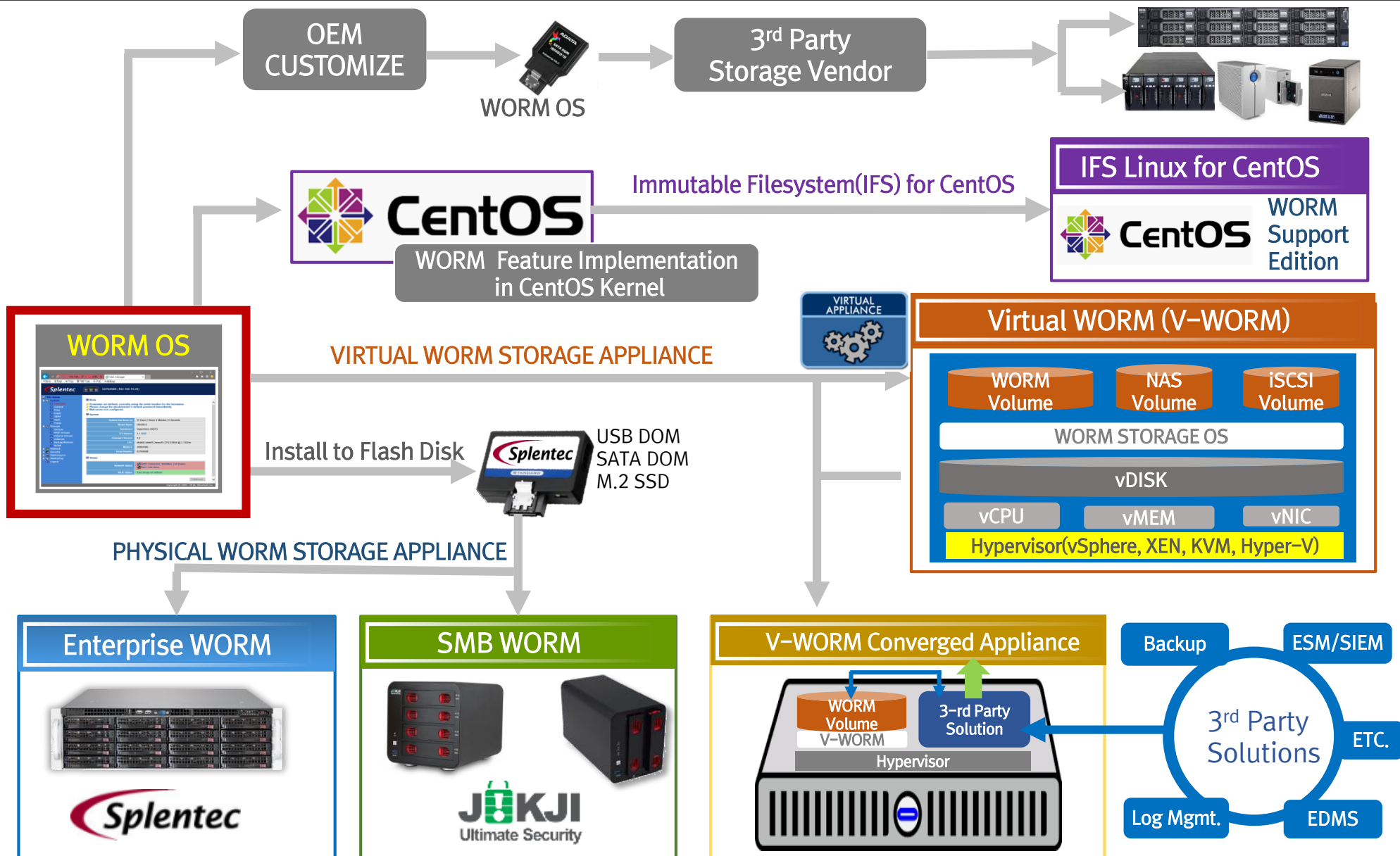


## R&D Institute Unstructured Data

- Experiments & Measurement Data Preservation
- Keep Data from Ransomware
- Avoid Malicious Damage



# Business Models utilizing WORM storage OS





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# Physical WORM Storage






## Enterprise WORM storage appliance

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# Enterprise Physical WORM Storage Appliance

- High performance large capacity WORM storage system in 19-inch industry standard rack mount type
- Equipped with high performance multi-core Intel Xeon CPU
- Equipped with high performance hardware-based RAID controller & capacity expansion through additional JBOD
- High reliability through redundancy of major hardware parts such as FAN and power supply

Model		F4000-8W	F4000-12W	F4000-16W	F4000-24W	F4000-36W
Chassis						
Dimension		2U	2U	3U	4U	4U
CPU		Intel® E5-2609 v4 (1.7GHz) x 1EA	Intel® E5-2609 v4 (1.7GHz) x 1EA	Intel® E5-2609 v4 (1.7GHz) x 2EA	Intel® E5-2609 v4 (1.7GHz) x 2EA	Intel® E5-2609 v4 (1.7GHz) x 2EA
Memory		8GB ~ 192GB	8GB ~ 192GB	16GB ~ 1TB	16GB ~ 1TB	16GB ~ 1TB
Disk	Bay	3.5" Hot-Swap Bay (Optional 2.5")				
	Type	Enterprise SATA, NL-SAS, SAS, SSD				
	#of hdd	8EA	12EA	16EA	24EA	36EA
	Base capacity	8TB ~ 96TB	12TB ~ 144TB	16TB ~ 192TB	24TB ~ 288TB	36TB ~ 432TB
	Expansion	No	JBOD x 4EA, 12/16/24/36 Bay JBOD available, Maximum Expansion Capacity (2.1PB)			
RAID	Controller	H/W RAID controller				
	Level	0 / 1 / 10 / 5 / 6 / 50 / 60				
Network	Default	1GbE x 2Port				
	Optional	10GbE, 10G SFP+				
Power Supply		740W Redundant	920W Redundant	1,000W Redundant	1,280W Redundant	1,280W Redundant



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# **V-WORM**

**Virtual WORM Storage Appliance**

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# Virtual WORM Storage Appliance(V-WORM) & License

- Provides WORM storage in a virtual machine appliance format that can be run in a virtualized environment with same functions and interfaces as physical WORM storage
- Provided as a virtual machine image → V-WORM can be used immediately without any installation process (VMDK, VHDX, QEMU)
- Required WORM volume capacity can be purchased in 1TB increments license

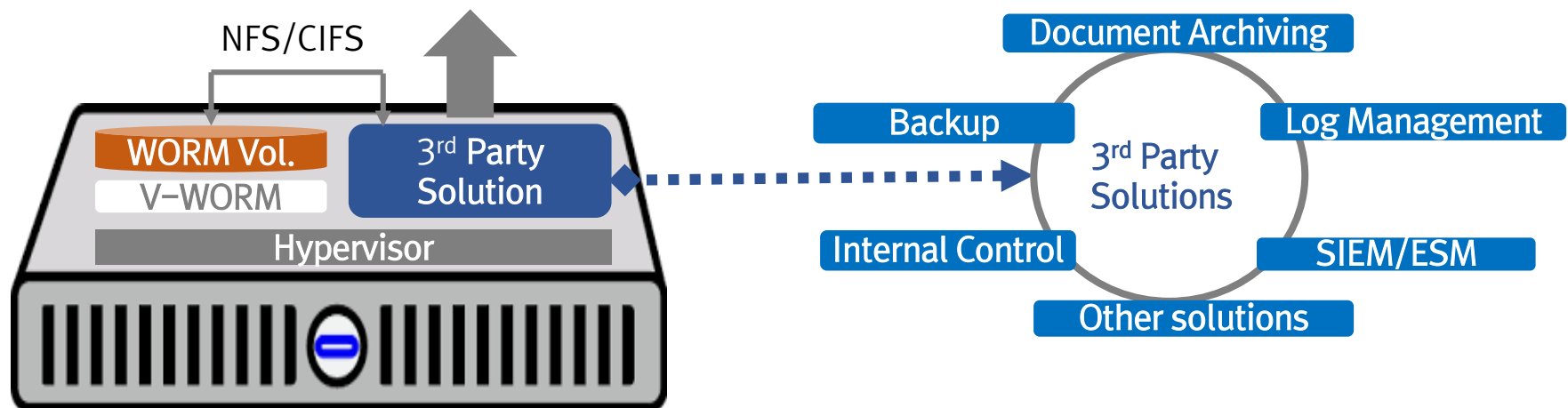
V-WORM License	Description
V-WORM Trial Version	<ul style="list-style-type: none"><li>▪ 30-Day free trial version</li><li>▪ No restrictions on NAS, WORM functionality and configurable capacity</li><li>▪ Upgradeable to V-WORM Base Platform (full version)</li></ul>
V-WORM Base Platform	<ul style="list-style-type: none"><li>▪ NAS, WORM full feature permanently available</li><li>▪ No limit on the number and capacity of configurable NAS volumes</li><li>▪ No limit on the number of configurable WORM volumes</li><li>▪ V-WORM ACL is required for WORM volume configuration</li></ul>
V-WORM Additional Capacity License(ACL)	<ul style="list-style-type: none"><li>▪ Available in 1TB increments (i.e. 1TB, 15TB, etc.)</li><li>▪ ACLs purchased for a particular V-WORM can not be used for other V-WORM</li></ul>



# V-WORM Utilization: Solution Convergence WORM Appliance

## Increasing need for compliance with digital data in diverse solutions

- Increased needs to protect data from unauthorized deletion and anti-tampering in various types of solutions
- Provides WORM storage capabilities and solutions integrated into one server platform through virtualization
  - WORM functionality is seen as a function provided by the solution.
  - Free selection of software environment including OS for 3<sup>rd</sup> party solution
  - Provides compliance response to the solution
  - Provides powerful data protection for the solution





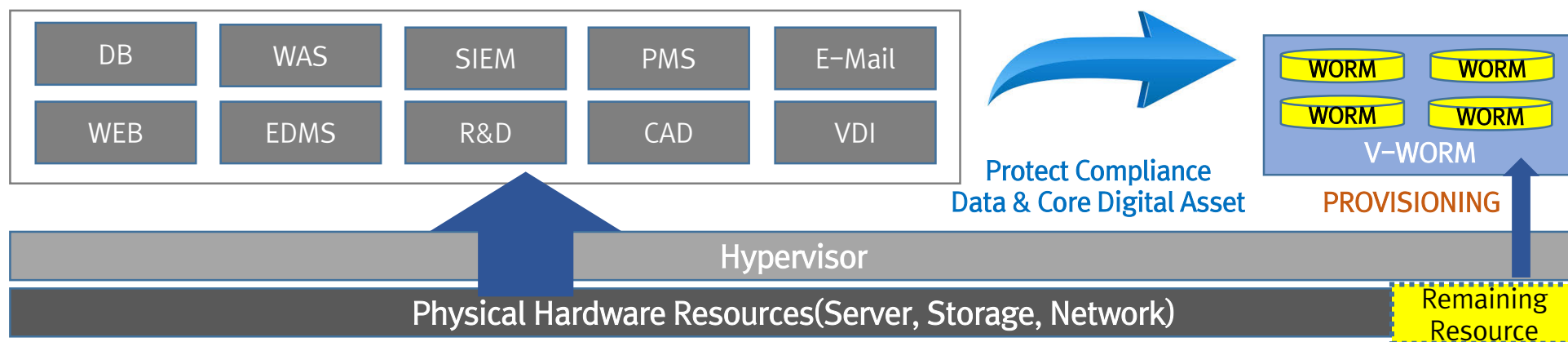
# V-WORM Utilization: Customers having Virtualized Infrastructure

## Requirements and characteristics of virtualized business environment

- Minimize the need to install and utilize a separate physical system independent of the virtualization infrastructure in a virtualized work environment. → Streamline management and operations
- Various solutions such as security and backup → Want to be integrated and managed as part of virtualization
- Virtualize resources and allocate them flexibly → All resources can be used without waste
- Physical resources are not always used 100% allocated → Ease of use of remaining resources

## Utilizing V-WORM for virtualized work environment

- Archiving Compliance Data for Solutions Running in Virtual Machines
- Backs up important data of PC and server from malicious software including Ransomware and accidental and malicious damage to safe place
- Core business data such as design, source code, design, and content → Store in WORM storage space → Safe retention and constant use through standard interface



# V-WORM Utilization: HCI(Hyper-Converged Infrastructure) Platform

## Hyperconvergence Solves the Data Problem



## HCI Platform Business and V-WORM

- Customers purchase HCI platform for virtualization deployment
  - Easy to adopt and apply V-WORM
- HCI-based virtualization deployment customers: relatively large organization
  - Systematic IT management is important
  - Greater need for compliance management and protection of core data itself
  - Increased usability of V-WORM
- Use V-WORM for additional value creation of HCI-related platform and solution provider

# Advantages of using V-WORM

## Utilizing stable hardware infrastructure

Utilize high performance, availability, and scalability infrastructure built for virtualization



## Efficient use of remaining resources

Configuring V-WORM with Surplus Resources & Securing WORM area with minimum investment



## Protect Core Digital Assets

Secure backup space for Ransomware  
USB removable disk replacement, safe backup



## Flexible capacity-based licensing

Purchase licenses as needed  
Flexible scalability in 1TB increments



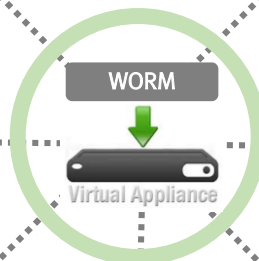
## Easy compliance

No separate WORM storage required  
Deletion, Falsification, Tamper Protection  
Regulatory Compliance



## Interworking and utilizing various solutions

Utilizing HCI virtualization platform  
Leveraging existing virtualization platforms  
Combine 3rd Party Solutions



## Convergence Appliance

3-rd Party Solution and WORM Convergence  
Providing solution that supports WORM function with single server



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# **IFS for CentOS Linux**

## **Immutable File System for CentOS Kernel**

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# IFS(Immutable File System) for CentOS Linux

3<sup>rd</sup> Party Solution

IFS for CentOS



CentOS Kernel

Major Features of  
WORM storage OS



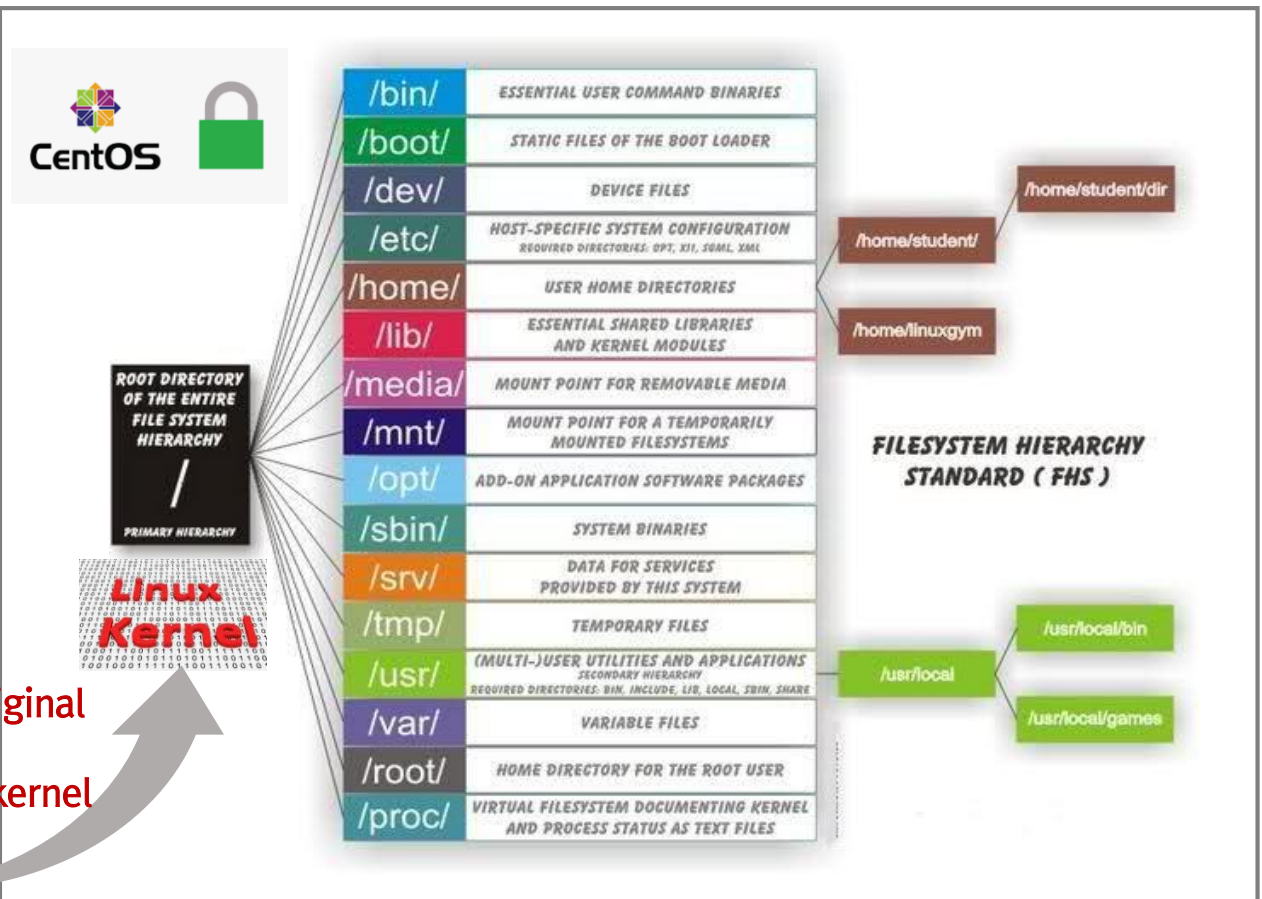
WORM feature  
implementation  
In Original CentOS Kernel



WORM supported  
CentOS Kernel

Replacement of original  
kernel by  
WORM supported kernel

Official CentOS Distribution + WORM feature supported Kernel





# Major Features & Usage Model

Feature	Description
In-Kernel Implementation	<ul style="list-style-type: none"><li>▪ Hard coded in CentOS kernel filesystem (Immutable File System)</li></ul>
WORM Volume Creation	<ul style="list-style-type: none"><li>▪ WORM volume creation supporting IFS</li></ul>
Retention Period	<ul style="list-style-type: none"><li>▪ Specify retention period for each file</li><li>▪ Immutable during retention period (non-erasable &amp; non-rewritable)</li></ul>
WORM Trigger	<ul style="list-style-type: none"><li>▪ Commitment function to finalize a file with WORM file attributes</li></ul>
Compliance Clock	<ul style="list-style-type: none"><li>• Volume-based independent S/W clock</li><li>• Protect Retention Period from being neutralized by system clock change</li></ul>
Append-Only WORM	<ul style="list-style-type: none"><li>• Byte-level real-time protection of file recording process</li></ul>
Capacity License	<ul style="list-style-type: none"><li>• License for limiting total size of WORM volume in a system</li></ul>
Compatibility	<ul style="list-style-type: none"><li>• Compatible with CentOS 6.x &amp; 7.x</li><li>• Continuous upgrade &amp; patch support</li></ul>

Major Usage Model	Description
Support Compliance	<ul style="list-style-type: none"><li>▪ Satisfy compliance regulation with lower cost than external WORM storage</li></ul>
Differentiation	<ul style="list-style-type: none"><li>▪ Differentiate from competitors over existing solutions</li></ul>
Security enhancement	<ul style="list-style-type: none"><li>▪ Enhance Security for existing solutions</li><li>▪ Provides differentiated premium features that offer higher added value</li></ul>

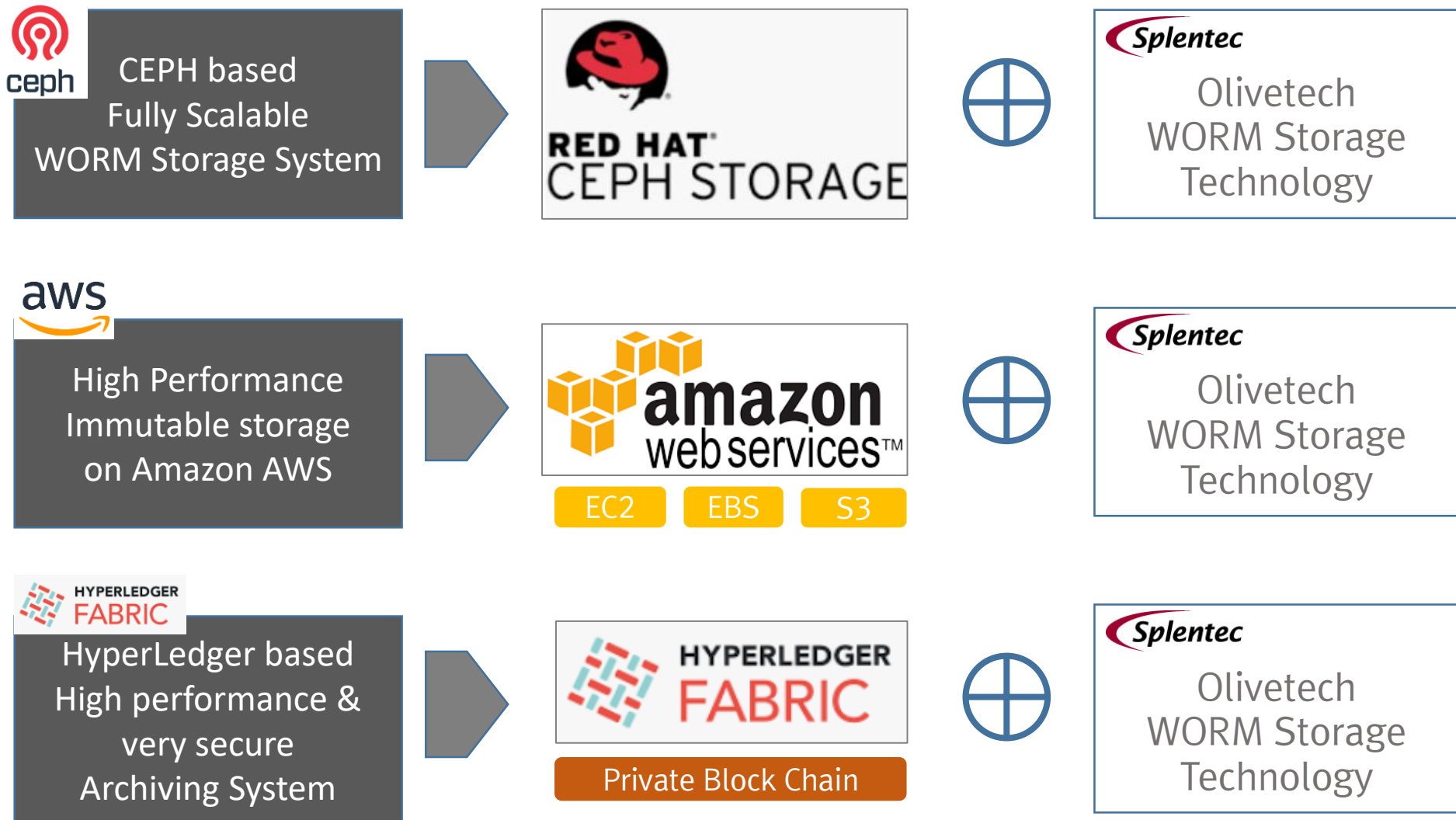
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# Coming Soon Roadmap

(2019 2H ~ 2020 1H)

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# Coming Soon Roadmap (2019 2H ~ 2020 1H)



# Olivetech WORM Storage Major Customers (over 200)

## Public & Military Sector



## Financial Sector



## Manufacturing & Service





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# THANKS



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