AI-Enabled SSDs for Fortified Cyber & Physical Security

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Chief Technology Strategist
Flexxon

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Current State of Cybercrime

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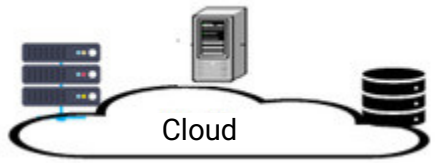
Vulnerabilities



Application Layer

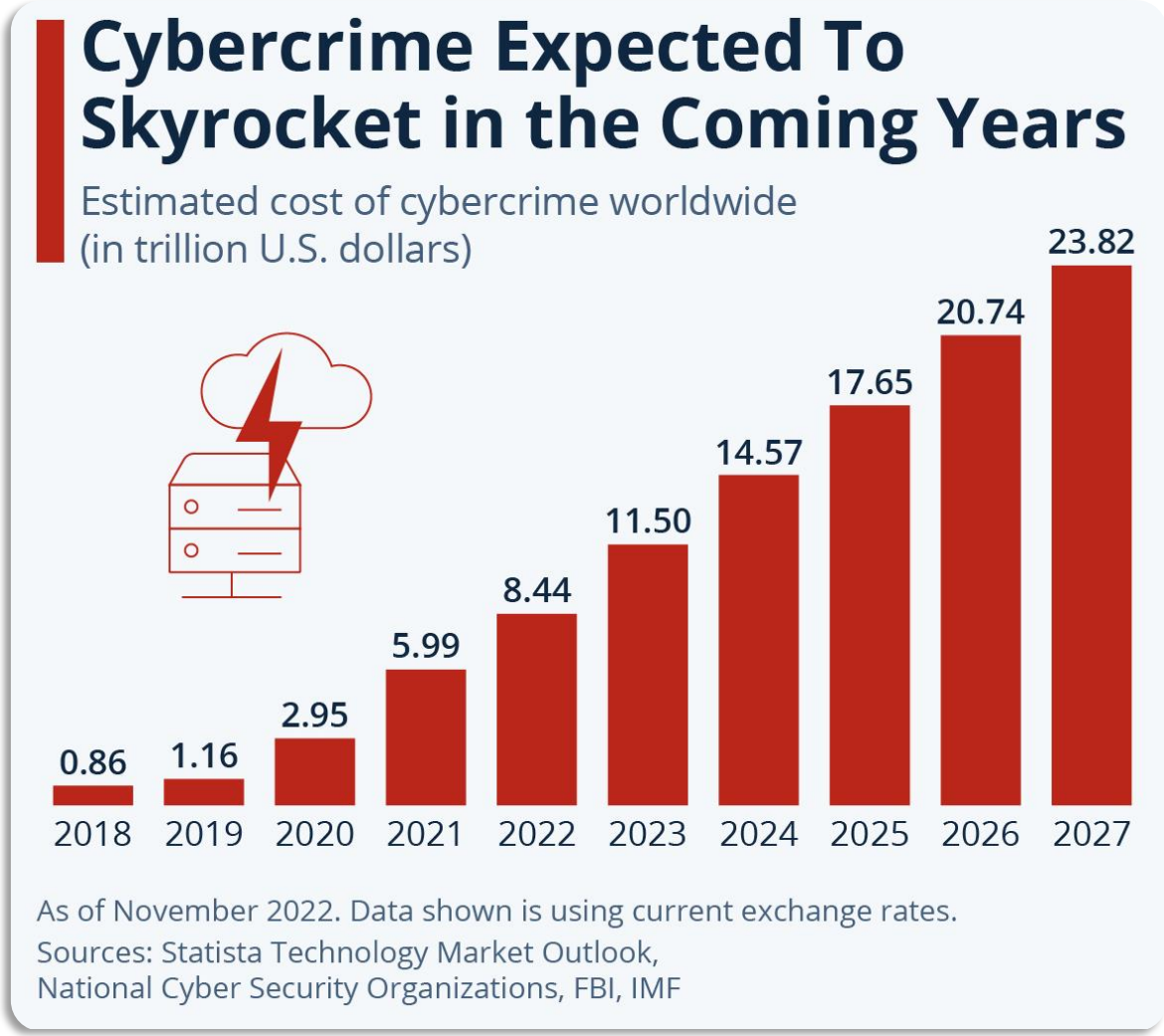
Weak passwords
Weak authentication & authorization
Insecure ecosystem configurations
Insecure network services
Insecure software
Insecure/outdated components

Network Layer

Lack of proper encryption
Weak or hardcoded passwords
Weak authentication & authorization
Insecure network services
Insecure ecosystem interfaces
Insecure security configuration
Insecure firmware

Physical Layer

Poor physical security
Lack of proper encryption
Weak or hardcoded passwords
Weak authentication & authorization
Insecure ecosystem interfaces
Unnecessarily open ports
Lack of secure boot processes
Insecure firmware
Insecure/outdated components



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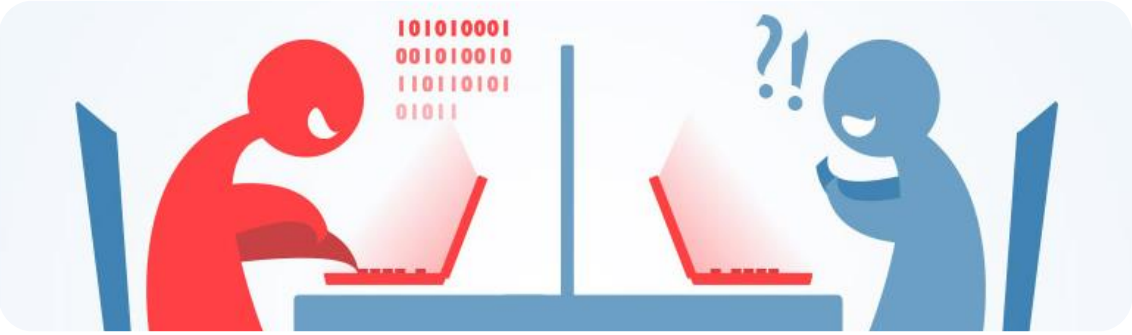
Causes of Cybersecurity Lapses

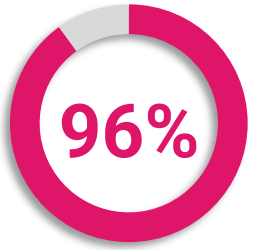
Types of Insider Threats



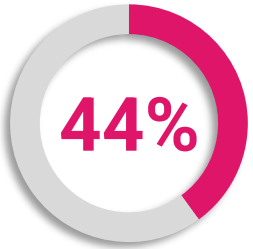
Malicious Insiders
Intentionally use their access to sensitive data to harm the company

Inadvertent Insiders
Cause damage to the company unintentionally

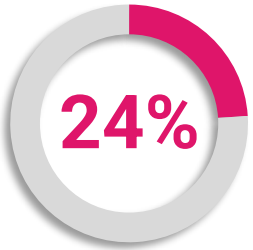
Security Breaches Led by Human Error



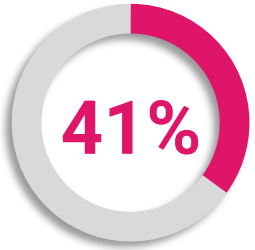
of all security breaches take place due to human error



of all targeted cyber attacks are laid on employees through emails



of data breaches occur due to employee negligence or unawareness



of the C-suite executives believe that human error is the primary cause of data breach

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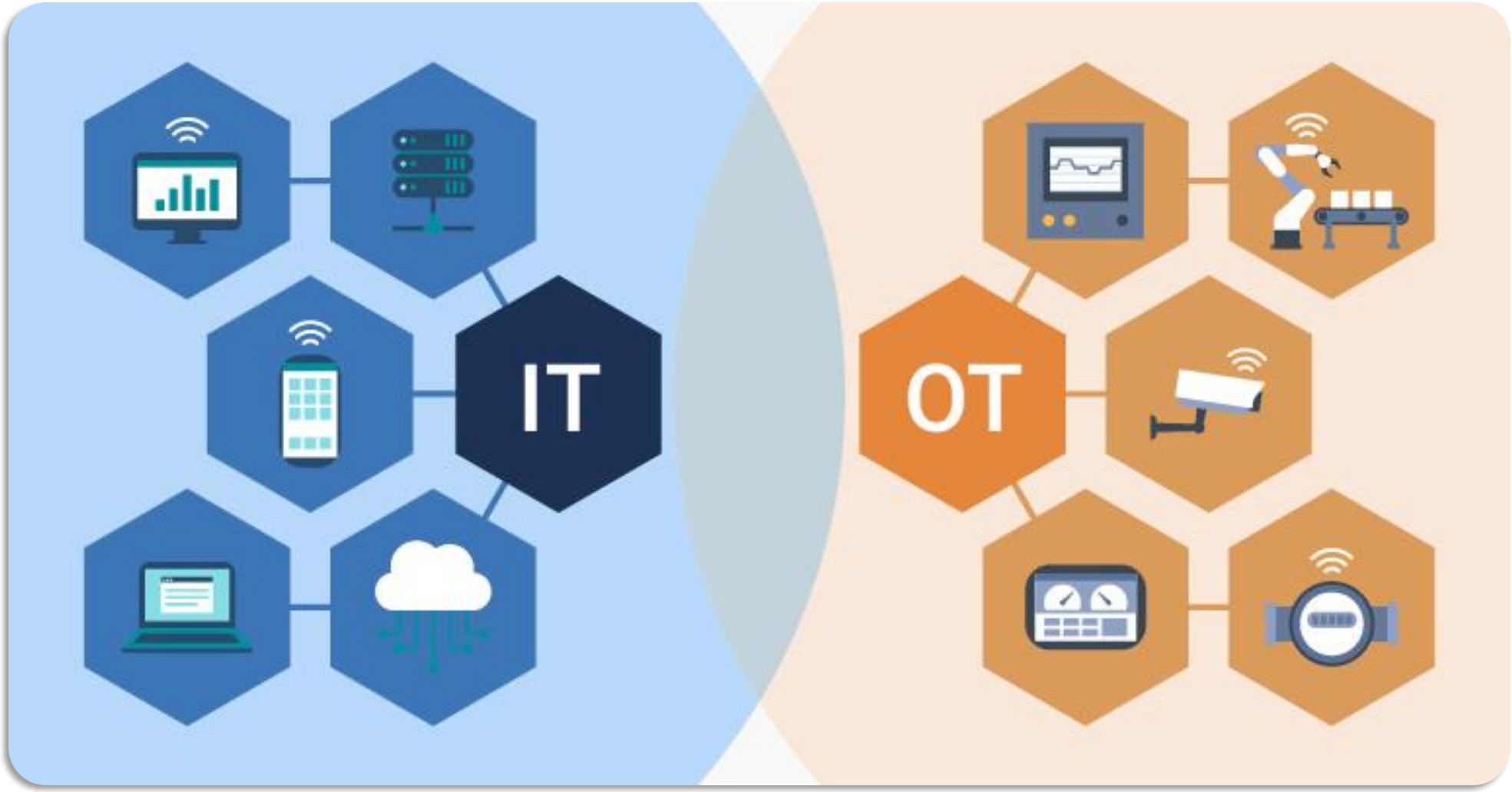
IT/OT Convergence



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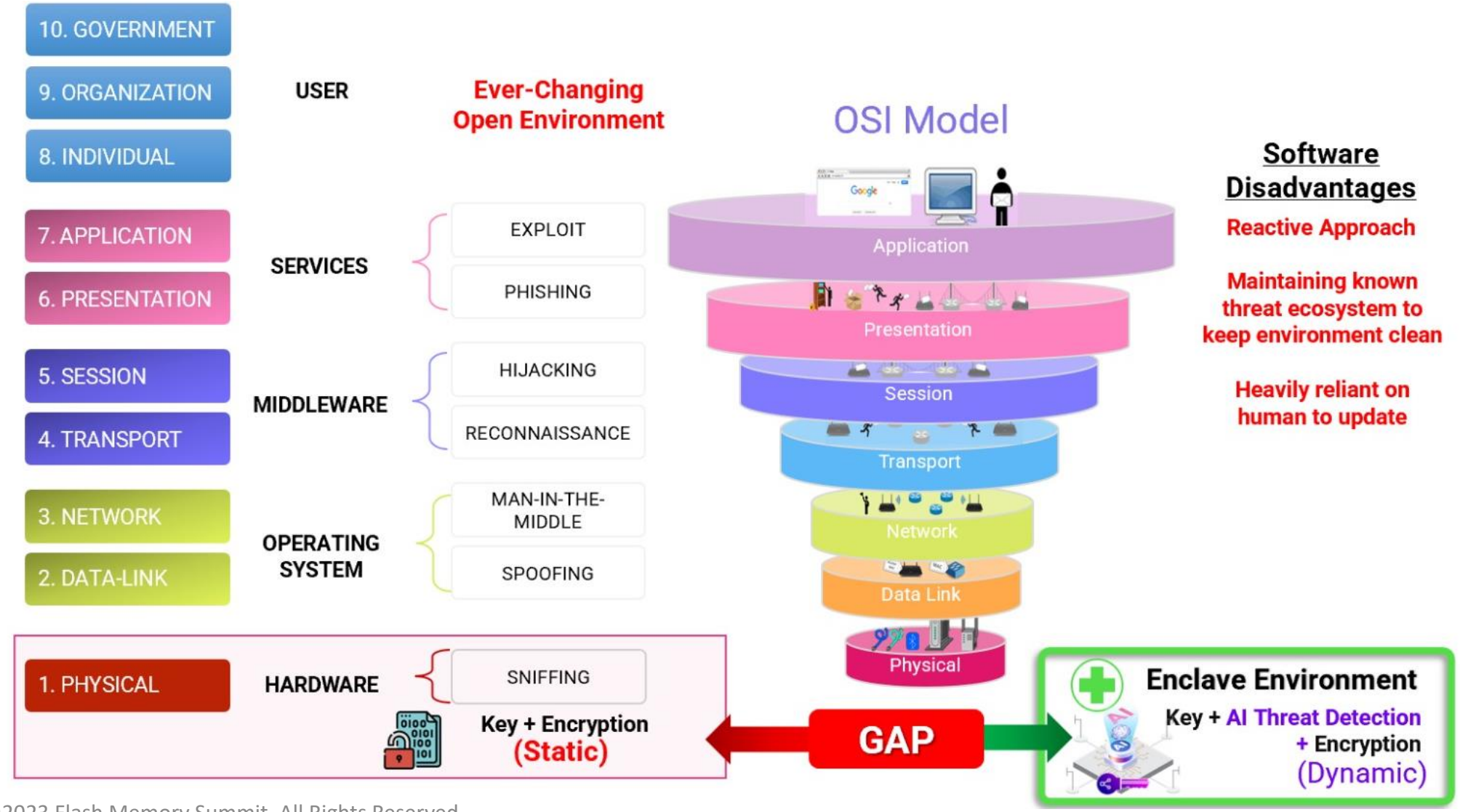
Cybersecurity Landscape



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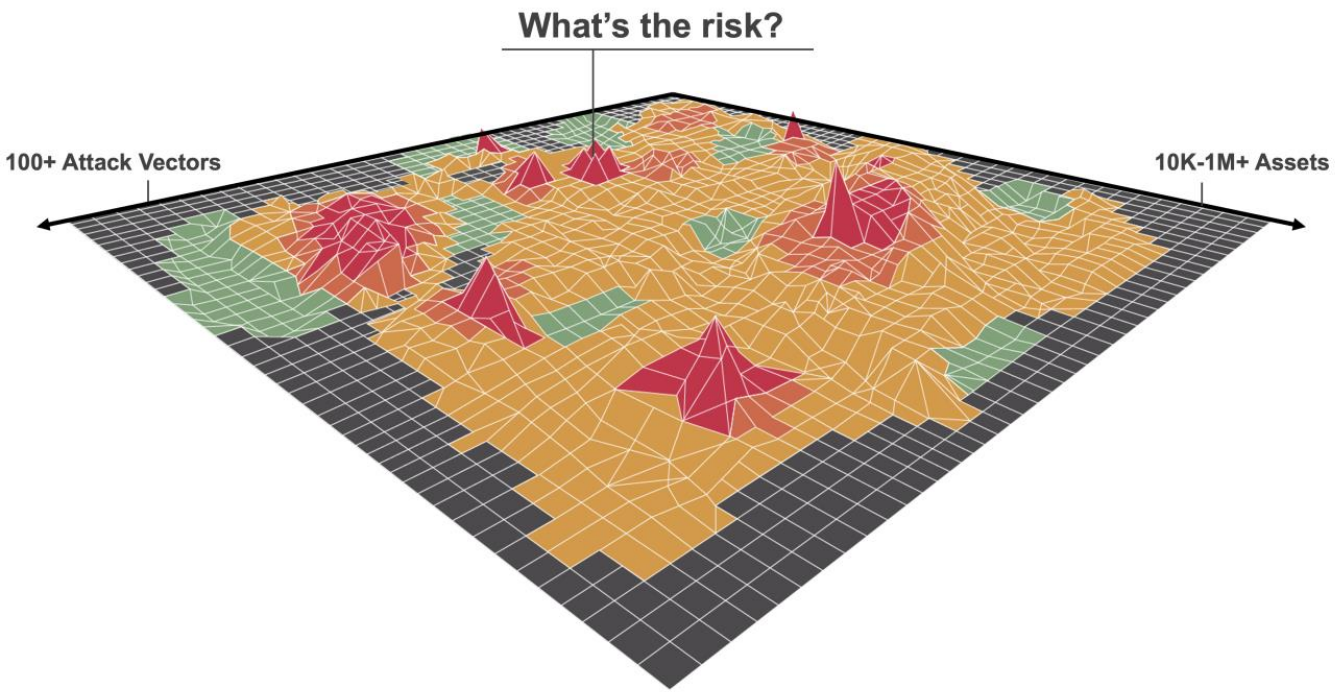
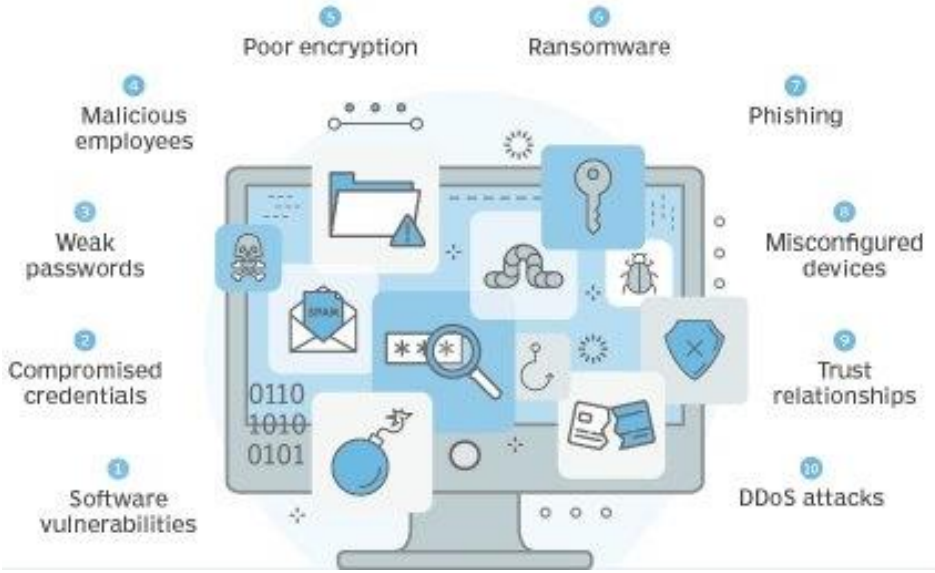
Attack Surface & Attack Vectors



10 Common Attack Vectors



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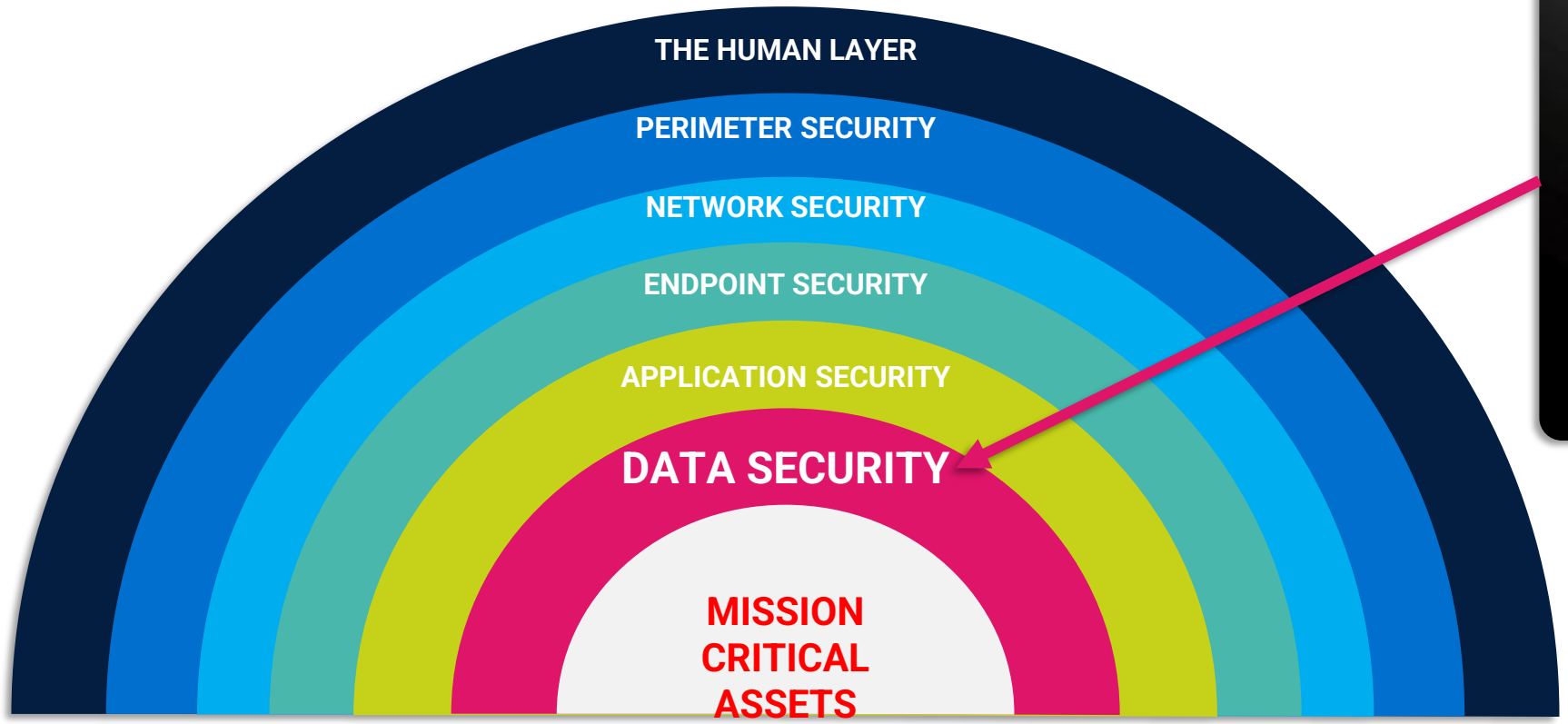
Data Safety, Privacy, and Integrity



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Hardware-Based Security (Hardsec)

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c8secure
A Continent 8 Company

CYBERSAFE
YOUR SECURITY, OUR PRIORITY

CYS

ISACA
Singapore Chapter

Standards Development Organisation

FIPS VALIDATED 140-2

Common Criteria

PHASE 01 — Endpoint Security

PHASE 02 — System Security

PHASE 03 — Standards & Ecosystem

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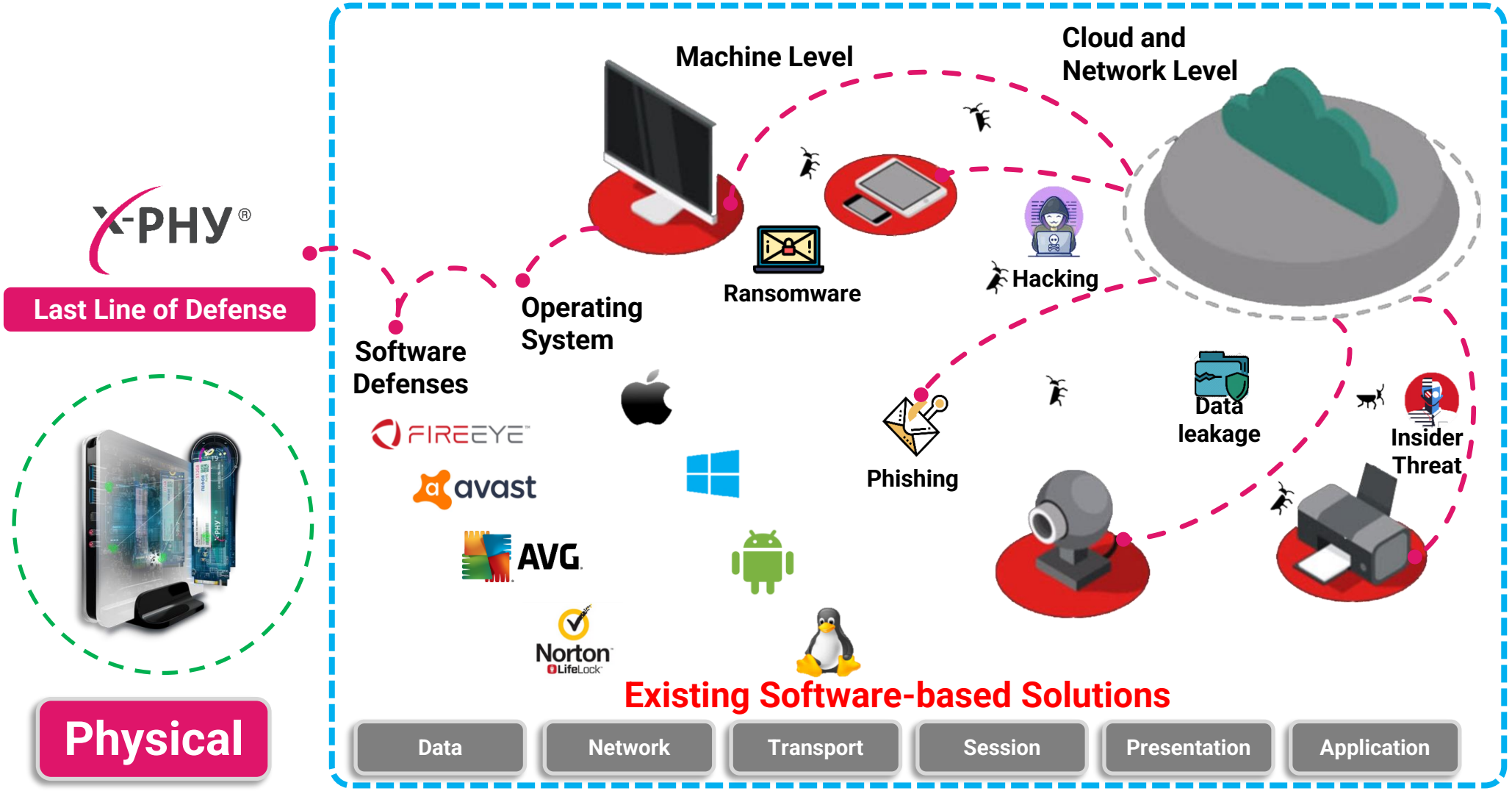
Why Data Storage (SSD)?



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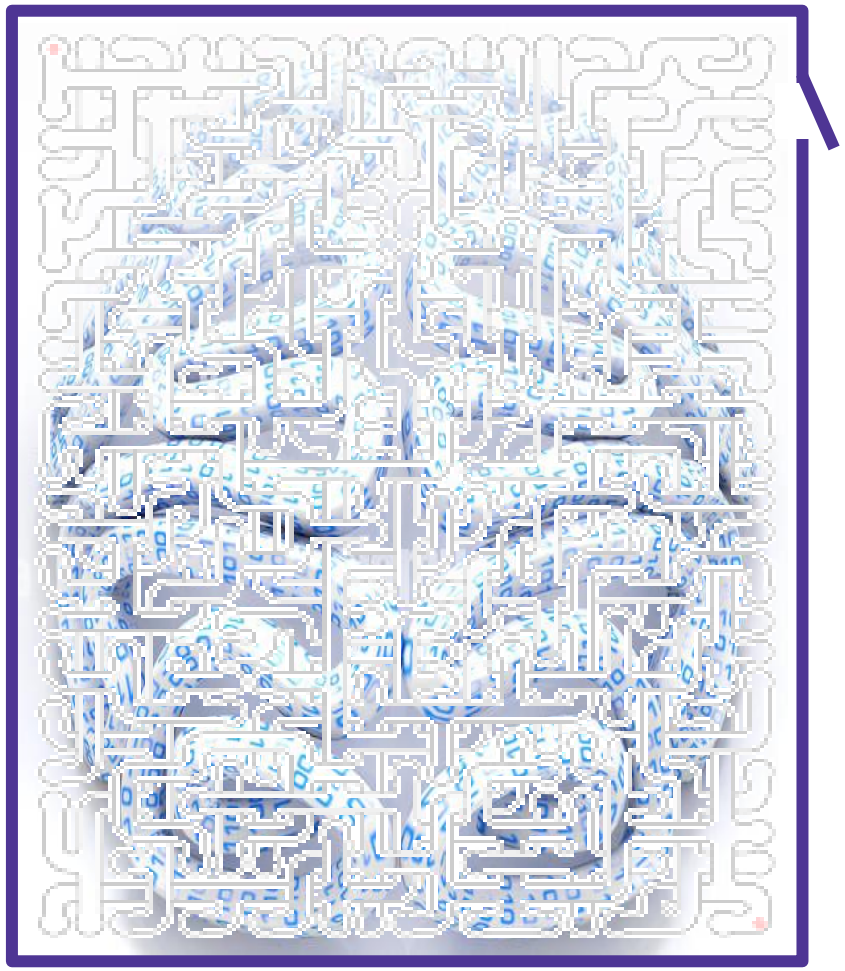
Why Data Storage (SSD)?



One Door Access PCIe/ NVMe
All data streams must go through a single door access point, reducing the risk of unauthorized access to the data.

Closest proximity to Data
Embedding dynamic cybersecurity features for real-time detection and response.

Artificial Intelligence (AI) feature
Added into the controller to detect any anomalous read/write activities at memory level.

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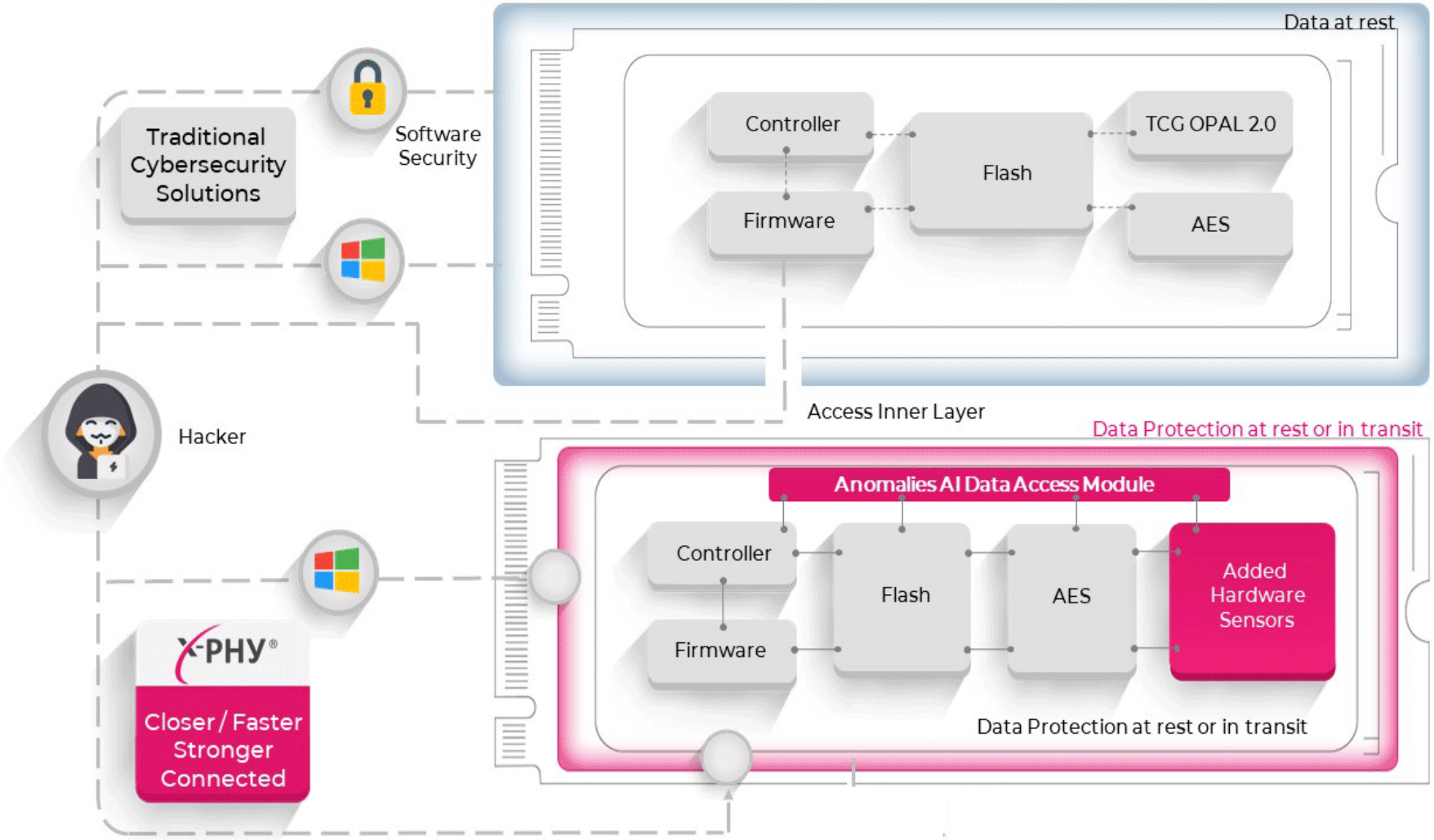
AI-Enabled SSD vs. Traditional SSD



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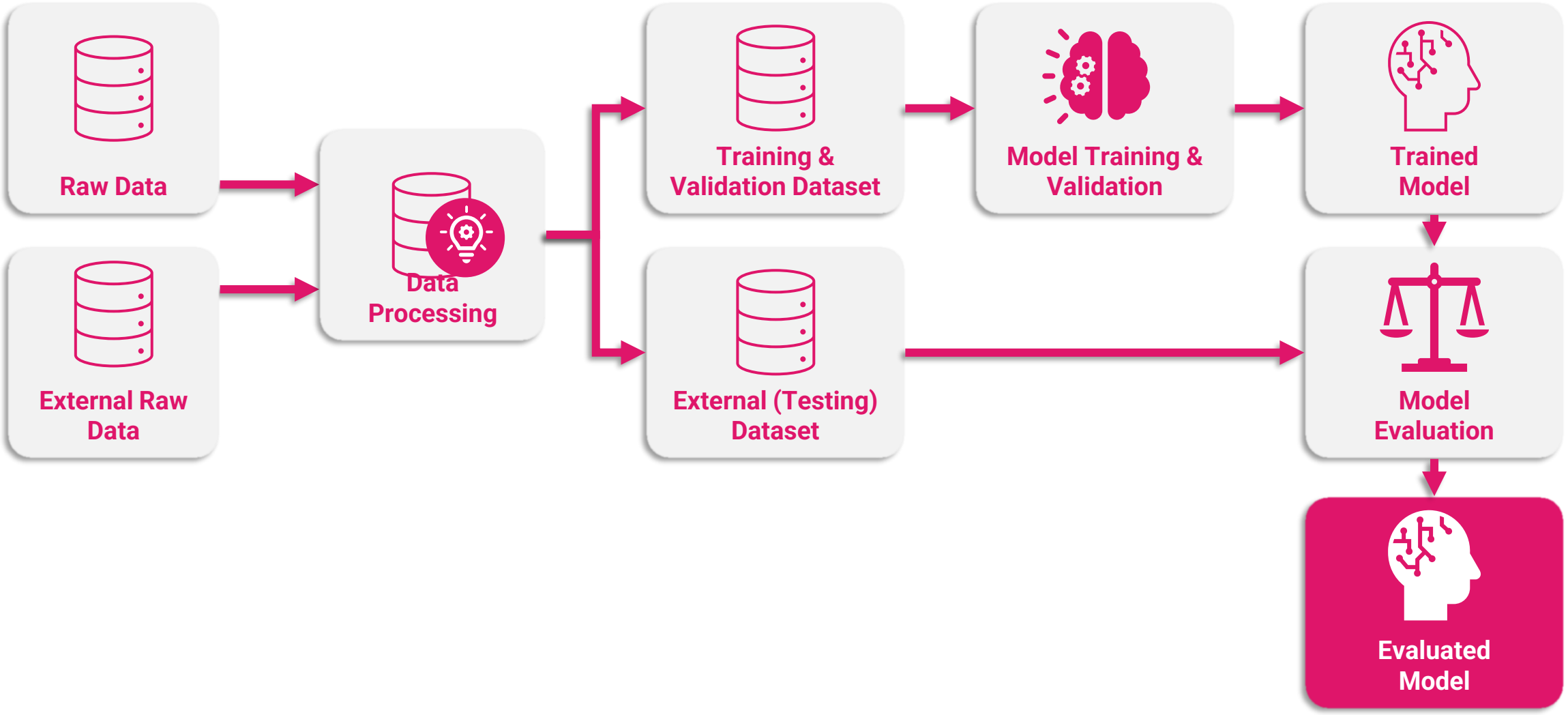
AI-Powered Analysis



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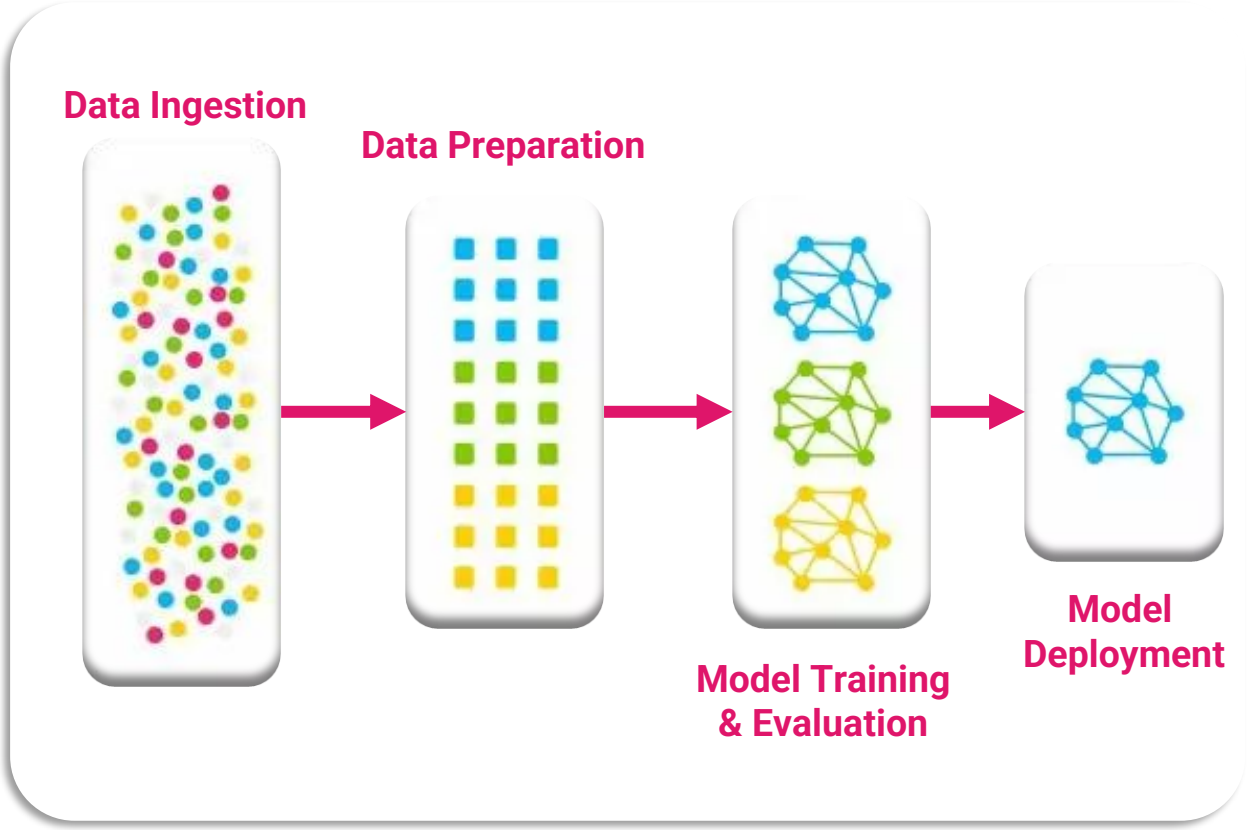
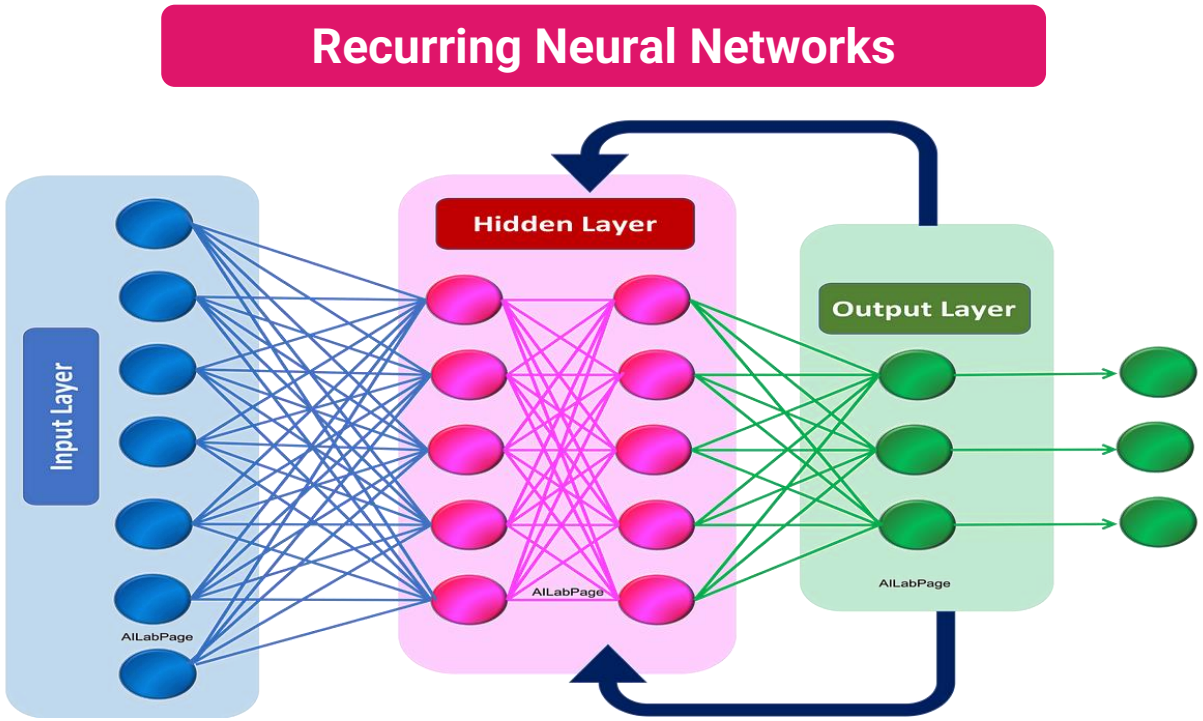
AI-Powered Analysis





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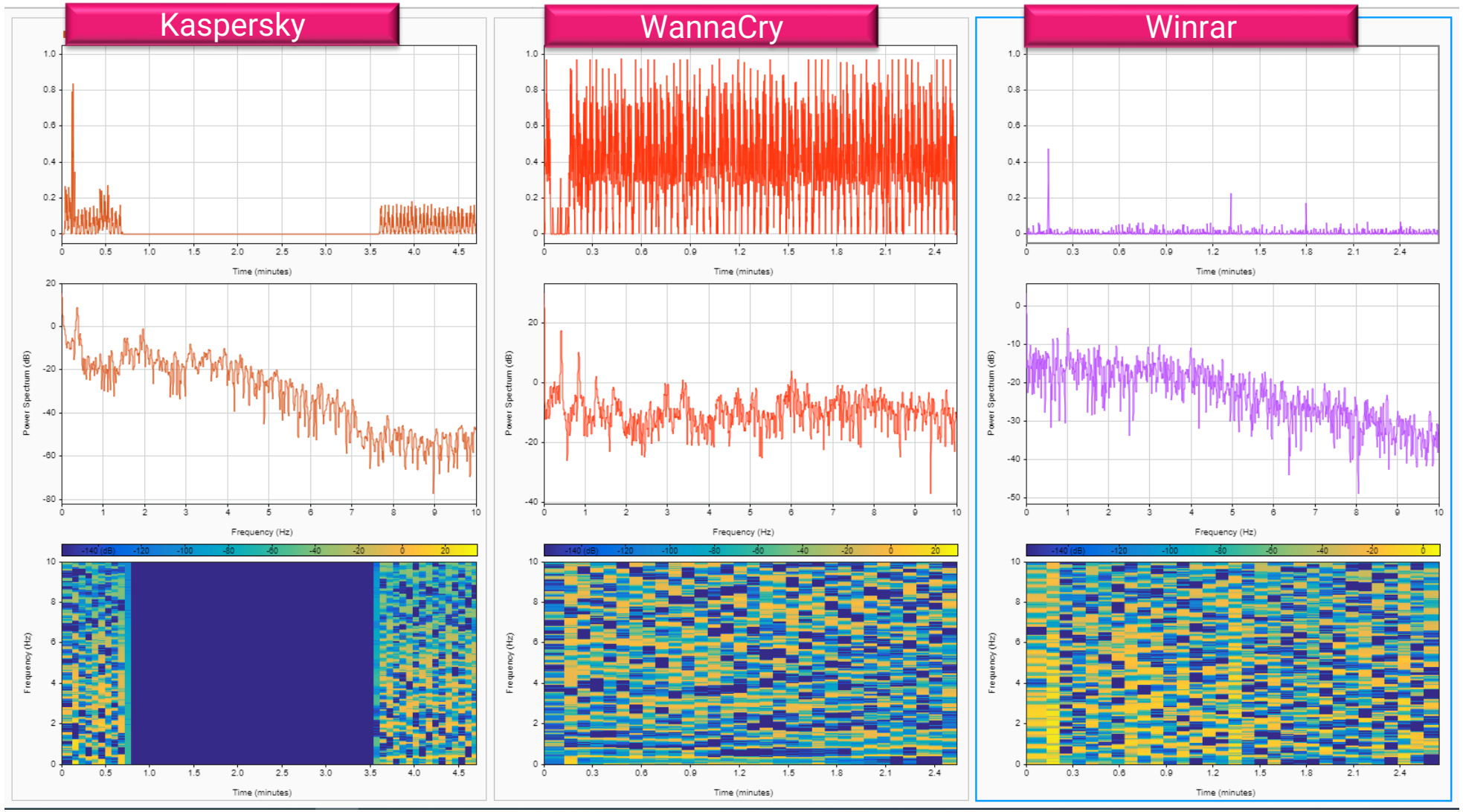
Distinguishable SSD Reads



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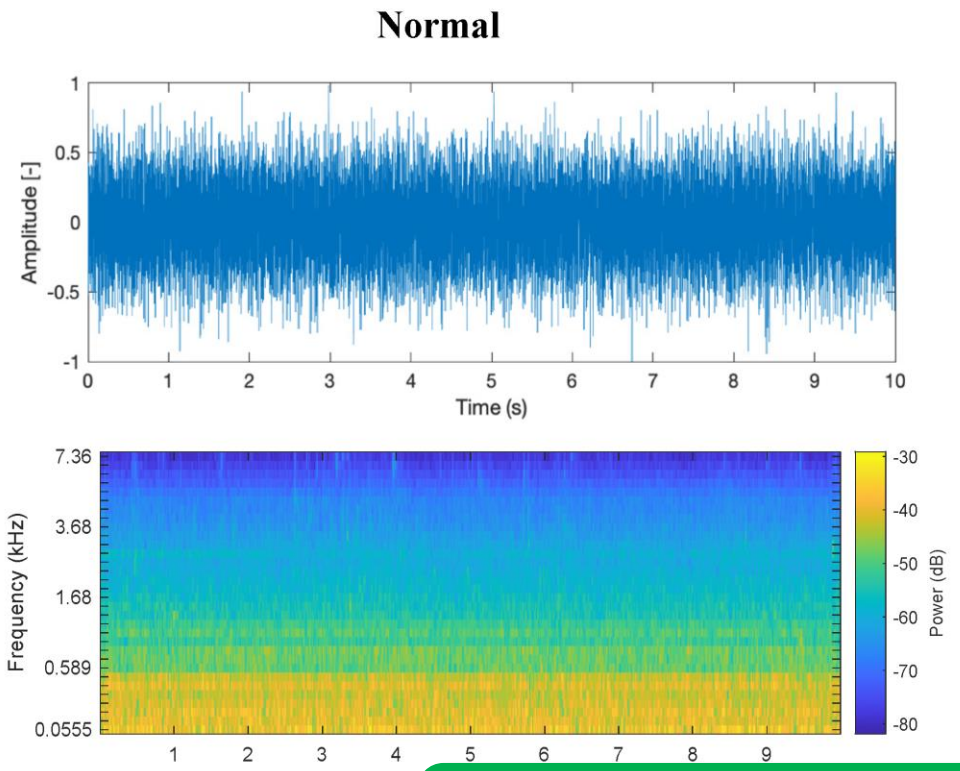
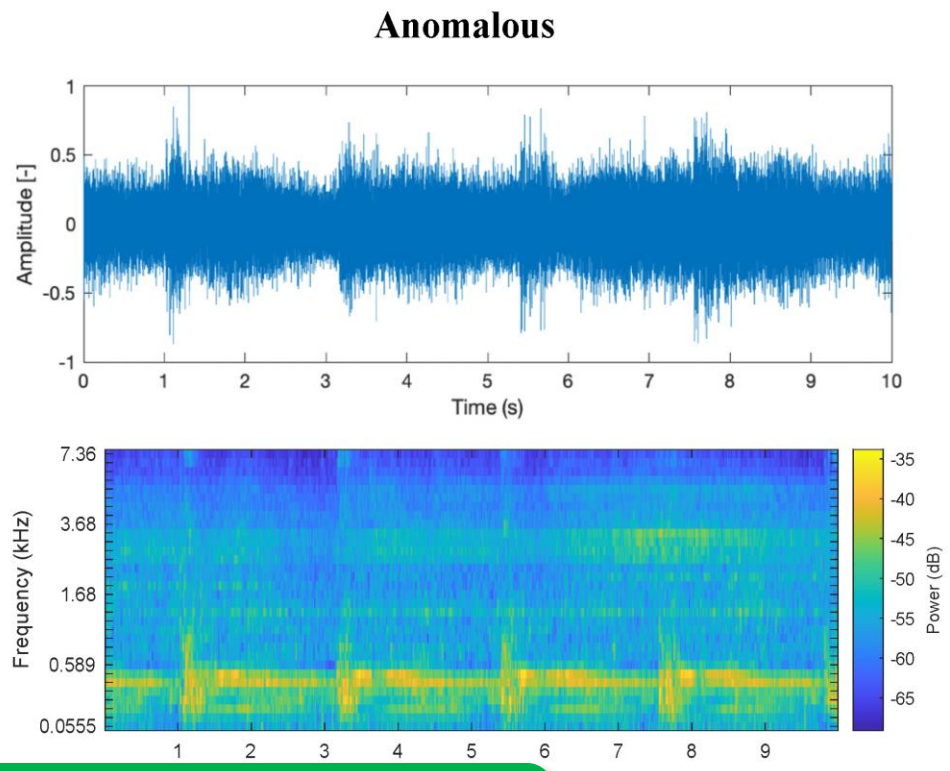
Anomaly Detection in SSD Writes





AI Validation Database

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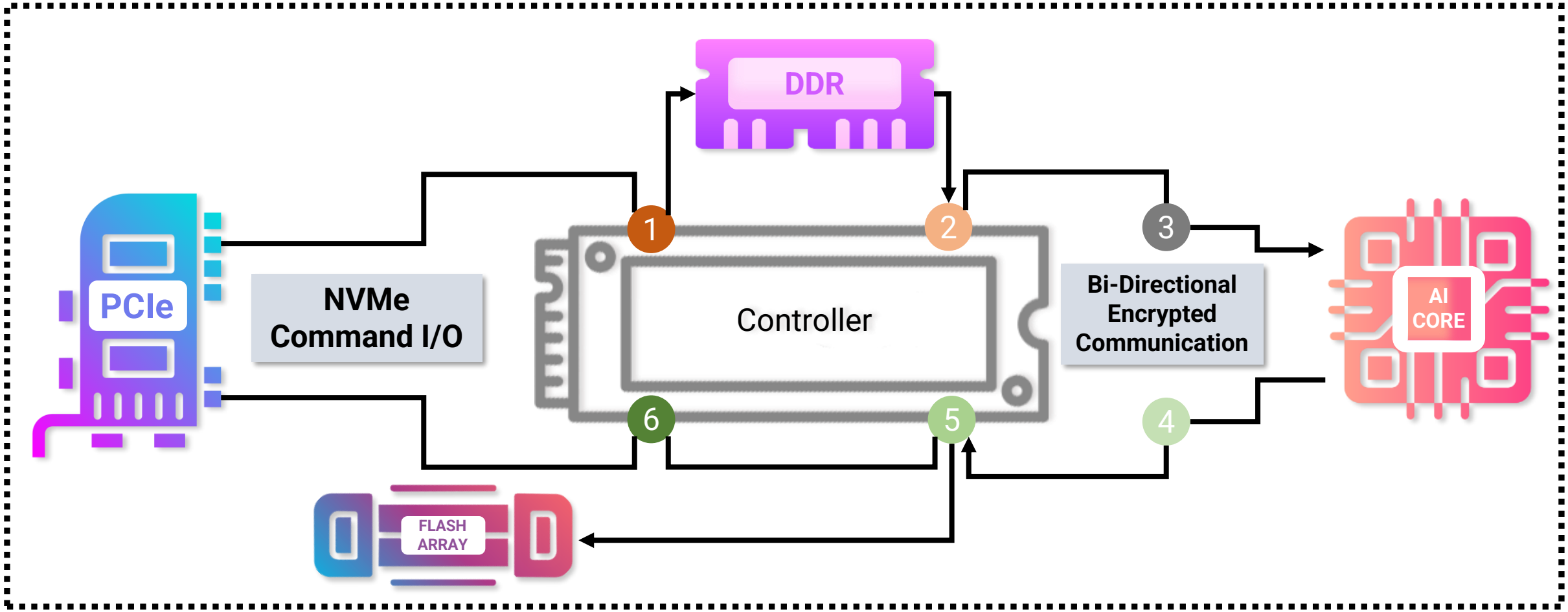
Ransomware Detection



1 Submission queue

2 Extract attributes

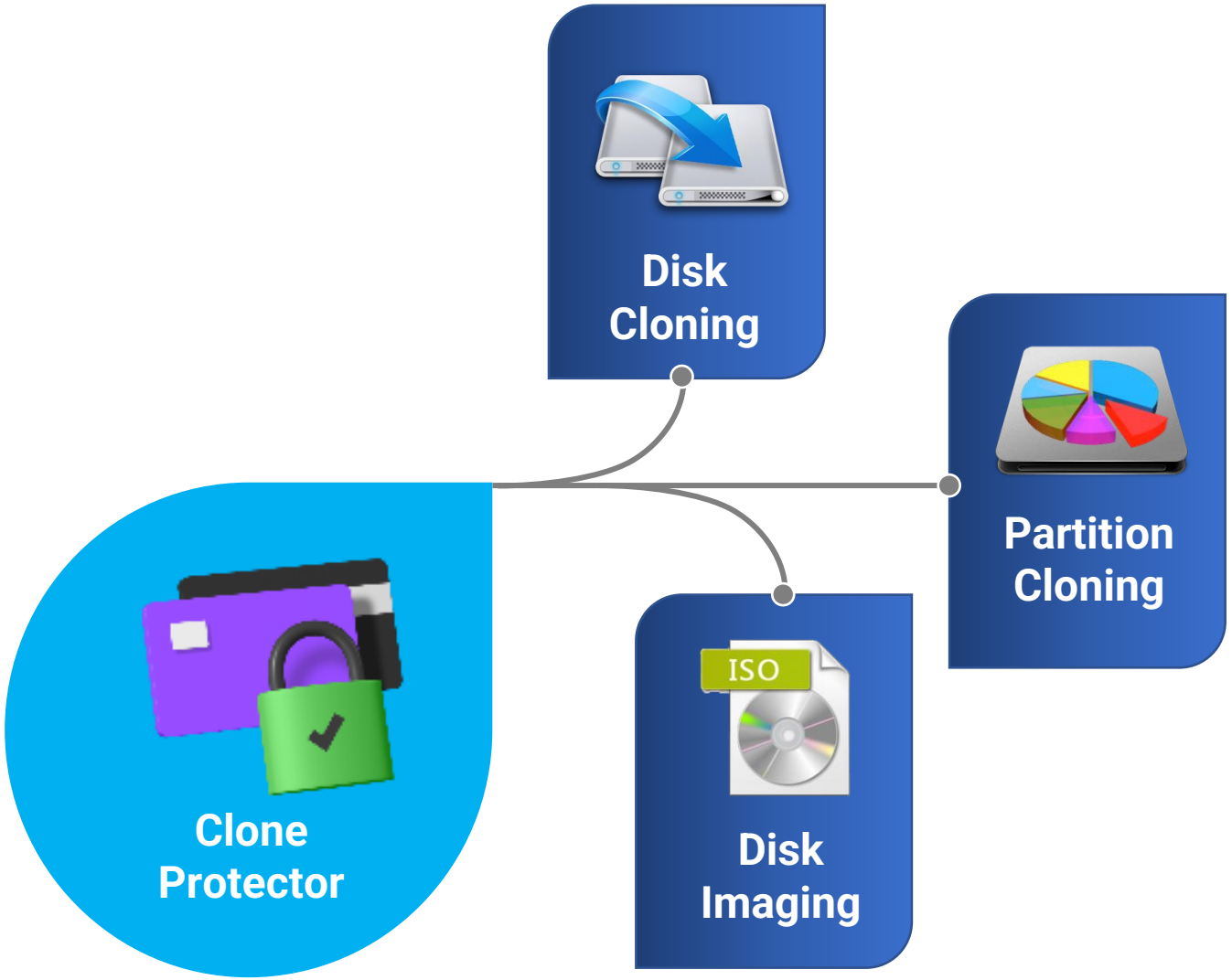
3 Search for ransomware

4 Return result

5 Data keep? (yes/no)

6 Return completion or error

Cloning Protection



Functions Isolated from Host's

- Operating System (OS)
- Software
- Hardware

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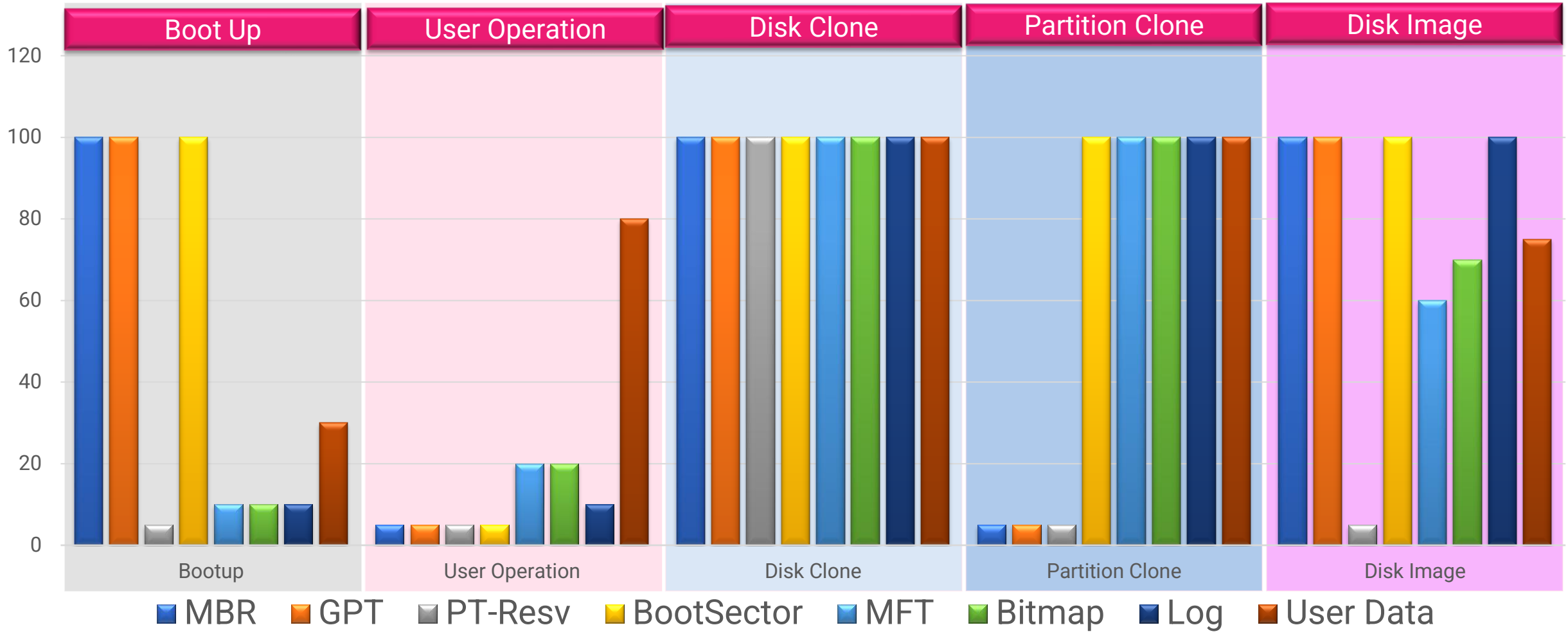
Cloning Protection



AI Validation Database

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Multiple Simultaneous Cyberattacks

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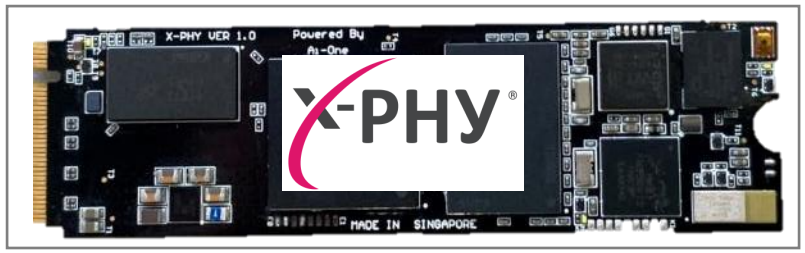
Temperature Attack

USING HEAT SOURCE

Hackers try to **bypass 2FA**-AUTHENTICATION

Hackers **induce heating** to cause fault injection to CPU by causing magnetism abnormal



Heating up 300C on SSD IC for a couple of seconds

All log stored in SSD lock itself and enable **high level of security**

KALMANFILTER analyze the status to make sure it is not **drifting or wrong alert**

CPU check **internal + external sensors**

Temperature sudden rise within couple of seconds

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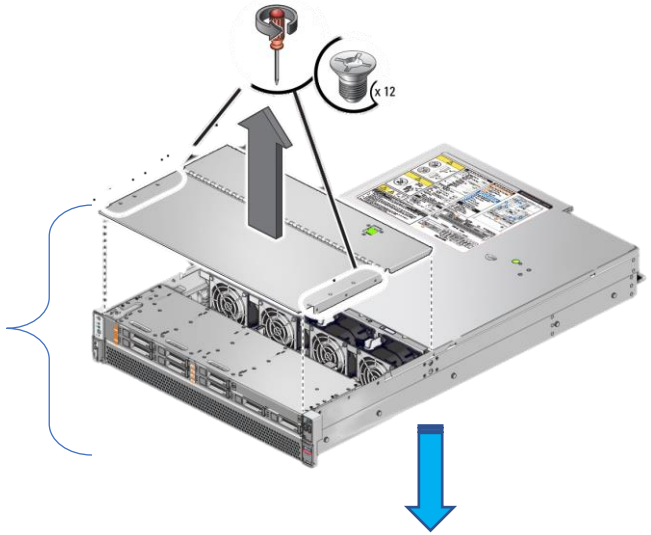
Tampering and Theft

Illegal Access

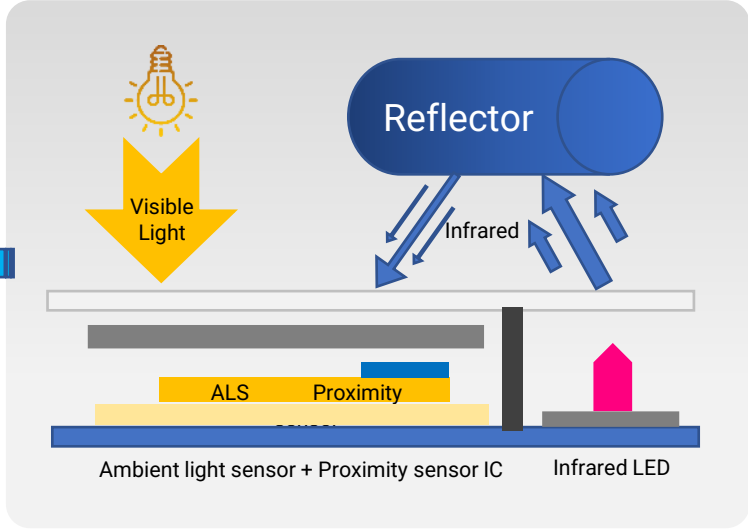
Cover open detected through Light or IR reflection in +/- 1mm accuracy



Security is at high level settings defined by the supervisor

- Rapid Purge Data or
- Lock SSD or
- Enable Alarm over Wireless gateway

Sensors embedded in X-PHY PCB



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AI-Enabled SSD (X-PHY®) Prevents…

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- Ransomware
- Cloning Attacks
- Malware
- Heat & Cold Attacks
- Insider Threats
- Physical Theft of Drives

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X-PHY® vs. Software-Based Protection

		X-PHY®	Software – Signature Based	Software – Behavioral Based
Detection approach	Method	**Data Access Pattern (Read / Write)**	Signature Library	Behavioral Patterns
	Perimeter	**Internal Protocol**	External Environment	
Human Intervention		**None**	High	Medium
Zero-day Protection Coverage		**Tested with 100% accuracy**	Low (Known threats only)	Medium (Defined variable and threshold)
False Positive		**Low**	High	Medium
Physical Protection		**Yes**	No	No

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Questions?

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THANK YOU

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