Ransomware Spotlight: Water Ouroboros | Trend Micro (IN)

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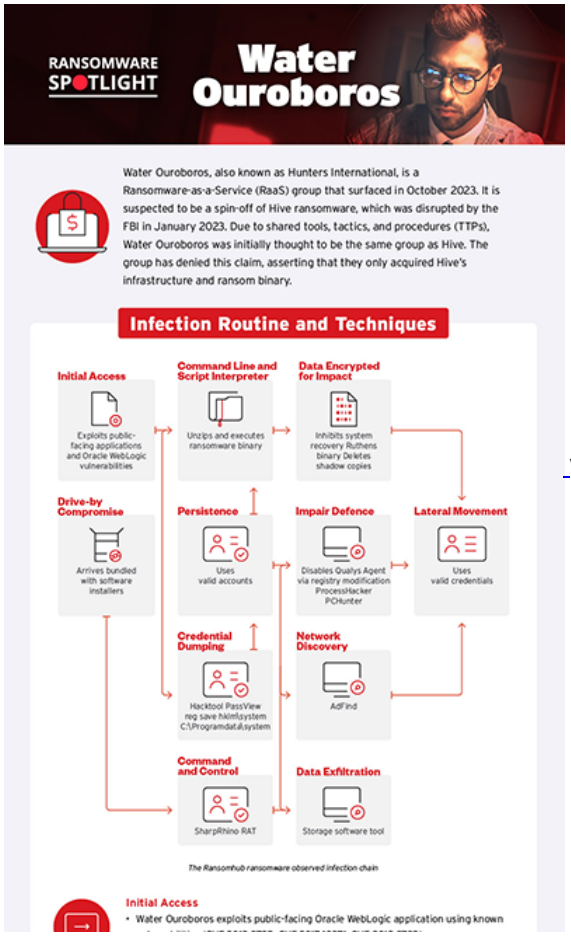
Water Ouroboros

By Trend Research

Water Ouroboros is a Ransomware-as-a-Service (RaaS) group that emerged in October 2023, using Hive ransomware infrastructure while introducing new capabilities focused on data theft, targeting multiple industries worldwide through vulnerability exploitation, credential dumping, and encryption techniques to maximize impact.



View infographic of "Ransomware Spotlight: Water Ouroboros"

Water Ouroboros (aka Hunters International) is a Ransomware-as-a-Service (RaaS) group that first emerged in October 2023. It is suspected to be a possible spin-off of Hive ransomware, which had its activities disrupted by the Federal Bureau of Investigation (FBI) in January 2023.

The group behind Water Ouroboros was initially suspected to be the same group behind Hive due to the many similarities in tools, tactics, and procedures (TTPs). However, Water Ouroboros denied the connection, claiming instead that they had acquired Hive's infrastructure and ransom binary.

The threat actor has targeted a diverse range of industries, including healthcare, automotive, manufacturing, logistics, finance, education, and food. As of this writing, at least 38 global victims have been listed on their private data leak site, which was launched in October 2023.

What organizations need to know about the Water Ouroboros ransomware

Water Ouroboros operates on a Ransomware-as-a-Service (RaaS) model, and unlike other ransomware groups, focuses primarily on data theft over encryption. While the Hive ransomware infrastructure serves as the basis for the threat actor's operations, it has been further customized for enhanced effectiveness and efficiency.

Over time, Water Ouroboros' ransomware binaries have evolved from being developed in C/C++ and Golang to the more advanced Rust language, enhancing detection evasion and accelerating encryption speeds. A key characteristic of the group's malware is its use of public keys embedded within the binary, which is then saved as a *.key* file on the encrypted drive. To prevent recovery, the generated key is wiped from memory, leaving the encrypted key as the only copy available for decryption.

The threat actor targets both Windows and Linux environments, encrypting files with a *.LOCKED* extension while simultaneously engaging in data exfiltration.

Water Ouroboros' data leak site was eventually exposed, revealing potential ties to Nigeria through domain registrations and email addresses linked to the group. On January 22, 2024, the group launched a non-dark web version of their leak site under the same name.

Technical Details

The ransomware accepts the following arguments:

Argument	Details
c {username}:{password}	A required argument that specifies the username and password to access the contact page
-a, -attach, --attach	Enables logging
-A, -no-aggressive, --no-aggressive	Disables the deletion of backups and recovery
-E, -no-extension, --no-extension	Disables appending of extension to files
-m, -min-size, --min-size	Specifies the minimum file size for encryption (in bytes)
{File or Path to encrypt}	Encrypts a specific file or directory

Table 1. The arguments accepted by the Water Ouroboros ransomware

It encrypts fixed, removable, and network drives. It also executes the following commands:

- wmic.exe shadowcopy delete
- bcdedit.exe /set {default} bootstatuspolicy ignoreallfailures
- wbadmin.exe delete systemstatebackup -keepVersions:3
- wbadmin.exe delete systemstatebackup
- bcdedit.exe /set {default} recoveryenabled No
- vssadmin.exe delete shadows /all /quiet
- wbadmin.exe delete catalog-quiet
- notepad.exe {Drive}:\Contact Us.txt

During encryption, Water Ouroboros appends the following extension to the file name of the encrypted files:

    {original filename}.{original extension}.locked

The ransomware contains a list of strings or extensions to determine which files to avoid for encryption:

- 386
- adv
- ani
- bat
- bin
- cab
- cmd
- com
- cpl
- cur
- deskthemepack
- diagcab
- diagcfg
- diagpkg
- dll
- drv
- exe
- hlp
- hta
- icl
- icns
- ico
- ics
- idx
- key
- ldf
- lnk
- lock
- mod

- mpa
- msc
- msi
- msp
- msstyles
- msu
- nls
- nomedia
- ocx
- pdb
- prf
- ps1
- rom
- rtp
- scr
- shs
- spl
- sys
- theme
- themepack
- wpxF

Certain variants avoid encrypting files with the specified strings or extensions in their file path.

The following are the ransom notes dropped during infection:

- {Encrypted Directory}\Contact Us.txt
- {Drive}:\Contact Us.txt

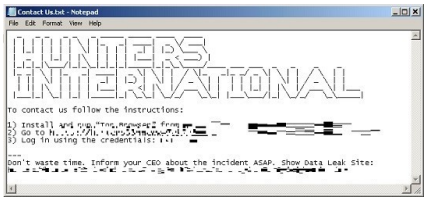


Figure 1. The Water Ouroboros ransom note

During the encryption routine, it generates and exports the encryption keys and generates the ransom note. It directs the victim to a password-protected Onion domain (TOR website):

> https://hivecust6vhekztbqgdnkks64ucehqacge3dij3gyrrpdp57zoq3ooqd[.]onion/

It also warns the victim of the impending disclosure of their stolen data on the Hive Leaks site:

> https://hiveleakdbtnp76ulyhi52eag6c6tyc.onion/

From the function *App_ExportKey()*, it uses standard Go crypto functions to generate RSA keys. A key file is then exported.

It generates a random key for the encryption process using the *RTLGenRandom* API, which is initially saved in memory. This key is then used to encrypt the files via a custom encryption implementation.

The key is subsequently encrypted via GoLang's implementation of RSA, using a list of public keys embedded in the binary. The encrypted key is then saved as .key on the encrypted drive.

Finally, the generated key is wiped from memory, ensuring that the encrypted key is the only copy available for decryption.

Infection chain and techniques

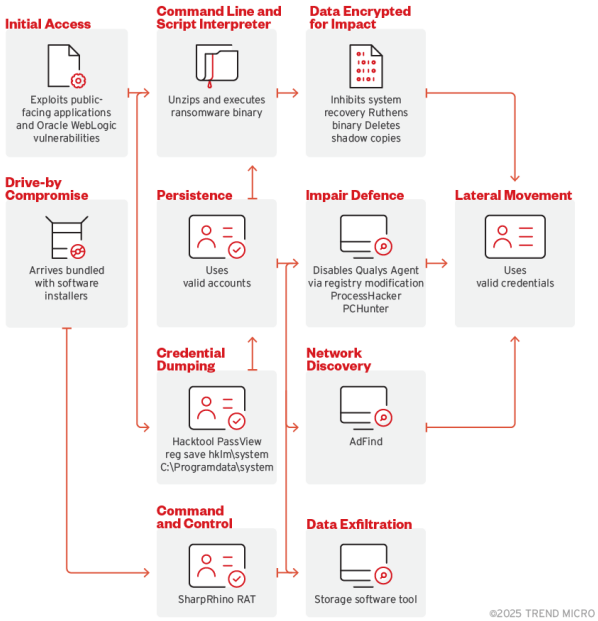


Figure 2. Observed Water Ouroboros infection chain

Initial Access

- Water Ouroboros exploits public-facing Oracle WebLogic application using known vulnerabilities (CVE-2019-2725, CVE-2017-10271, CVE-2019-2729).
- It comes bundled in a software installer package (Drive-by Compromise).

Execution

- Water Ouroboros performs remote command execution on the compromised server.
- It downloads and executes crack software and key generators on multiple endpoints.

Persistence

- Water Ouroboros uses a compromised admin account to maintain access to the target's machine.
- It disables security services by modifying the registry.

Privilege

Water Ouroboros employs credential dumping via registry hives to access sensitive OS credentials.

Lateral Movement

Water Ouroboros uses Remote Desktop Protocol (RDP) and Server Message Block (SMB) to access other systems within the network.

Discovery

- Water Ouroboros discovers networks and accounts using tools like AdFind.
- It performs credential discovery via PassView or Registry Hive Dumping.

Exfiltration

- Water Ouroboros transfers files over the C&C channel to external IP addresses.
- It uses storage software tools for exfiltration.

Defense Evasion

- Water Ouroboros disables security tools and services.
- PCHunter and ProcessHacker are disabled via a valid account RDP or Remote Access Tools (RATs).

Credential Dumping

Water Ouroboros dumps credentials using HackTool PassView or Registry Hive.

Collection

Water Ouroboros transfers malicious tools and scripts to compromised systems.

Command and Control

- Water Ouroboros communicates with C&C servers using web protocols.
- It uses the SharpRhino RAT.

Impact

- Water Ouroboros encrypts data.
- It drops ransom notes to notify the user of file encryption and potential data leaks.
- It inhibits system recovery by deleting volume shadow copies and disabling recovery measures.

MITRE tactics and techniques

Initial Access	Execution	Defense Evasion	Credential Access	Discovery	Lateral Movement	Exfiltration	Command and Control	Impact

Initial Access	Execution	Defense Evasion	Credential Access	Discovery	Lateral Movement	Exfiltration	Command and Control	Impact
T1190 - Exploit Public-Facing Application *Water Ouroboros exploits Oracle Weblogic Remote Command Execution resulting in outbound network traffic to a remote host.* **T1189** - Drive-by Compromise *User downloads cracked software, indicating potential malware infection through untrusted sources.* **T1078** - Valid Accounts *Water Ouroboros maintains malicious activity using a compromised account.*	**T1059.003** - Command and Scripting Interpreter: Windows Command Shell *Water Ouroboros employs the command line to execute and decompress an archive file containing a ransomware binary.*	**T1562.001** - Impair Defenses: Disable or Modify Tools *Water Ouroboros modifies the registry to disable the Qualys agent security service.*	**T1003.002** - OS Credential Dumping: Security Account Manager (SAM) *Water Ouroboros performs credential dumping via the Registry hive using the reg command to save the SAM database.*	**T1595.002** - Active Scanning: Vulnerability Scanning *Water Ouroboros conducts vulnerability scanning from specific IP addresses, indicating preparation for exploitation.* **T1087** - Account Discovery *Water Ouroboros used AdFind tool to perform account, remote system, and group discovery.* **T1018** - Remote System Discovery *Water Ouroboros continues using AdFind to discover other computers on the network.* **T1069.002** - Permission Groups Discovery: Domain Trusts *Water Ouroboros further uses AdFind to enumerate domain trusts and organizational units.*	**T1021.001** - Remote Services: Remote Desktop Protocol *Water Ouroboros uses RDP for remote access and lateral movement.* **T1021.002** - Remote Services: SMB/Windows Admin Shares *Water Ouroboros uses SMB to transfer files or remotely access systems, indicating lateral movement.*	**T1041** - Exfiltration Over Command and Control Channel *Water Ouroboros performs suspected data exfiltration over an outbound SMB connection.*	**T1105** - Ingress Tool Transfer *Water Ouroboros transfers and uses scripts and discovery tools on the compromised system.* **T1071.001** - Application Layer Protocol: Web Protocols *Water Ouroboros employs HTTP/HTTPS protocols to make requests to various C&C servers.*	**T1486** - Data Encrypted for Impact *The perpetrators execute the ransomware binary to encrypt data on the system.* **T1490** - Inhibit System Recovery *Water Ouroboros deletes volume shadow copies and disables boot-time recovery measures to hinder system recovery.* **T1105** - Service Stop *Water Ouroboros executes ProcessHacker to stop services and potentially evade detection.*

Summary of malware, tools, and exploits used

Security teams can look for the presence of the following tools and exploits that are typically used in Water Ouroboros attacks:

ATTACK TOOL	MITRE TTP
SharpRhino	
Storage Software	Exfiltration

ATTACK TOOL	MITRE TTP
PCHunter	Discovery, Defense Evasion
ProcessHacker	Discovery, Defense Evasion
AdFind	Lateral Movement

Top affected countries, industries, and business sizes

The US bore the overwhelming impact of Water Ouroboros attacks, experiencing nearly ten times as many incidents (136) as the next most-targeted country, Canada. The UK, France, Germany, and Italy also ranked among the group's primary targets.

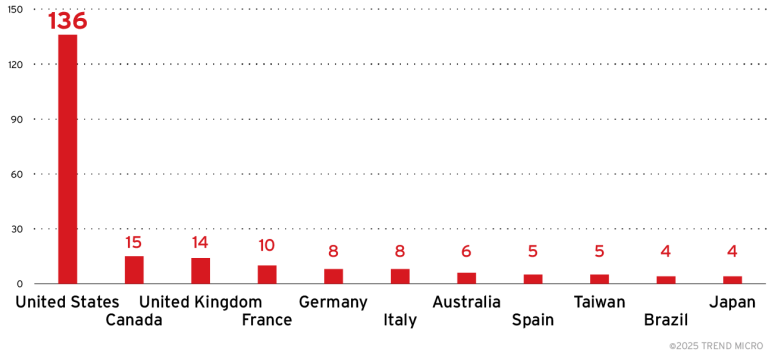


Figure 6. The distribution of countries (top 10) targeted by the Water Ouroboros Sources: Water Ouroboros leak site data and Trend open-source intelligence (OSINT) research (Oct. 2023- Feb. 2025)

Companies in the construction, IT, manufacturing, and healthcare industries experienced the highest number of attacks. However, Water Ouroboros targeted a wide range of sectors, demonstrating a broad and diverse attack strategy.

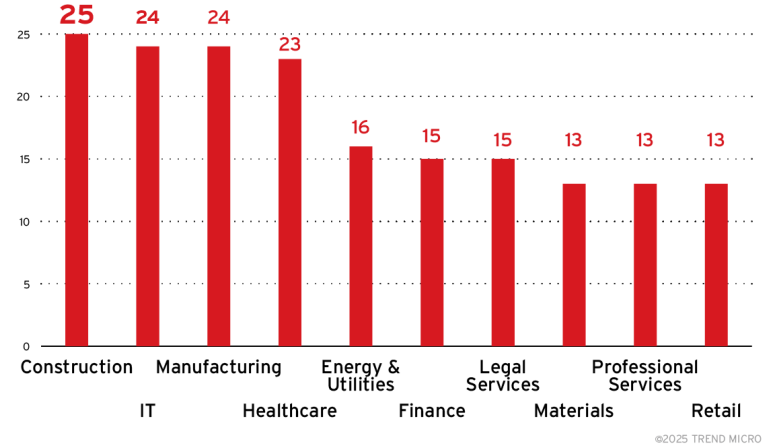


Figure 7. A breakdown of the top 10 industries targeted by Water Ouroboros ransomware attacks Sources: Water Ouroboros leak site data and OSINT research (Oct. 2023- Feb. 2025)

The threat actor launched attacks against organizations of all sizes but appeared to prefer targeting small and medium-sized businesses (1–200 and 201–1,000 employees, respectively), likely due to their limited cybersecurity resources.

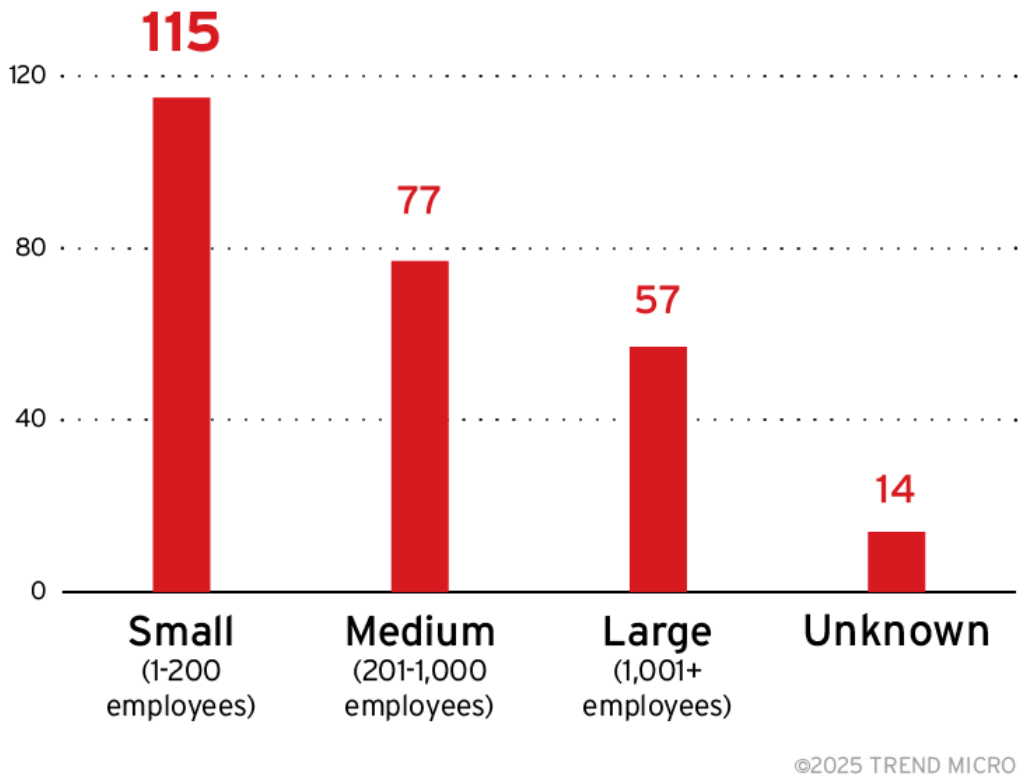


Figure 8. A breakdown of the sizes of the organizations targeted by Water Ouroboros ransomware attacks Sources: Water Ouroboros leak site data and OSINT research (Oct. 2023- Feb. 2025)

Trend Vision One™

Trend Vision One™ is a cybersecurity platform that simplifies security and helps enterprises detect and stop threats faster by consolidating multiple security capabilities, enabling greater command of the enterprise's attack surface, and providing complete visibility into its cyber risk posture. The cloud-based platform leverages AI and threat intelligence from 250 million sensors and 16 threat research centers around the globe to provide comprehensive risk insights, earlier threat detection, and automated risk and threat response options in a single solution.

Trend Vision One Threat Intelligence

To stay ahead of evolving threats, Trend Vision One customers can access a range of Intelligence Reports and Threat Insights within Vision One. Threat Insights helps customers stay ahead of cyber threats before they happen and allows them to prepare for emerging threats by offering comprehensive information on threat actors, their malicious activities, and their techniques. By leveraging this intelligence, customers can take proactive steps to protect their environments, mitigate risks, and effectively respond to threats.

Trend Micro Vision One Intelligence Reports App [IOC Sweeping]

- *Hunters International (Hive Ransomware Rebranding)*
- *New Ransomware-as-a-Service Group: Hunters International seen in multiple LAR Companies*
- *SharpRhino – New Hunters International RAT*

Trend Vision One Threat Insights App

Hunting queries

Trend Vision One Search App

Trend Vision One customers can use the Search App to match or hunt the malicious indicators mentioned in this blog post with data in their environment.

```
Hunters International Ransomware Detection
malName:*RUTHENS* AND LogType: detection
```

More hunting queries are available for Trend Vision One customers with Threat Insights Entitlement enabled.

Recommendations

Water Ouroboros, a Ransomware-as-a-Service (RaaS) operation, demonstrates how threat actors can employ existing ransomware infrastructures while introducing new capabilities to evade detection and enhance efficiency. Despite being a relatively new group, Water Ouroboros has already targeted multiple industries worldwide, underscoring the persistent and evolving threat posed by ransomware operations.

The increasing reliance on vulnerability exploitation as an initial infection vector highlights the importance of timely patching and proactive security measures. Organizations should prioritize securing public-facing applications, as seen in Water Ouroboros' exploitation of Oracle WebLogic vulnerabilities. Additionally, threat actors are placing greater emphasis on data exfiltration rather than encryption, reinforcing the need for robust data security and incident response strategies.

To protect systems against Water Ouroboros and similar ransomware threats, organizations should implement a comprehensive security strategy that systematically allocates resources to establish strong defenses. The following best practices can help mitigate ransomware risks:

Audit and inventory

- Take an inventory of assets and data
- Identify authorized and unauthorized devices and software
- Make an audit of event and incident logs

Configure and monitor

- Manage hardware and software configurations
- Grant admin privileges and access only when necessary to an employee's role
- Monitor network ports, protocols, and services
- Activate security configurations on network infrastructure devices such as firewalls and routers
- Establish a software allow list that only executes legitimate applications

Patch and update

- Conduct regular vulnerability assessments
- Perform patching or virtual patching for operating systems and applications
- Update software and applications to their latest versions

Protect and recover

- Implement data protection, backup, and recovery measures
- Enable multifactor authentication (MFA)

Secure and defend

- Employ sandbox analysis to block malicious emails
- Deploy the latest versions of security solutions to all layers of the system, including email, endpoint, web, and network

- Detect early signs of an attack such as the presence of suspicious tools in the system
- Use advanced detection technologies such as those powered by AI and machine learning

Train and test

- Regularly train and assess employees on security skills
- Conduct red-team exercises and penetration tests

HIDE

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