Training Course on Data Recovery and Deleted File Carving Beyond Basics

Professional Development Training Course Outline

Category	Digital Forensics	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Introduction

In the realm of digital forensics and cyber incident response, the ability to effectively perform data recovery and deleted file carving is a critical skill, often determining the success of an investigation. Training Course on Data Recovery and Deleted File Carving Beyond Basics propels participants beyond fundamental concepts into the sophisticated methodologies and cutting-edge tools required to retrieve even the most elusive data. Focusing on complex data loss scenarios, fragmented files, and overwritten data, this program provides an in-depth understanding of low-level disk structures, file system intricacies, and advanced carving algorithms necessary for recovering critical digital evidence from damaged or intentionally manipulated storage media.

This intensive course emphasizes hands-on application and problem-solving in real-world scenarios, preparing participants to confront the challenges of modern data destruction techniques and anti-forensic measures. Attendees will master both open-source and commercial data recovery software, delving into signature analysis, header/footer identification, and custom carving techniques. By the end of this program, professionals will possess the specialized expertise to reconstruct severely compromised data, significantly enhancing their capabilities in e-discovery, malware analysis, intellectual property protection, and other high-stakes digital investigations.

Programme Curriculum

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Course Objectives

1. Master advanced principles of data recovery from diverse storage media.
2. Perform in-depth analysis of file system structures to identify deleted data remnants.
3. Utilize advanced file carving techniques for various file formats (documents, multimedia, executables).
4. Recover fragmented and partially overwritten files with high precision.
5. Develop custom carving signatures for unique or proprietary file types.
6. Apply sophisticated data reconstruction methodologies for severely damaged data.
7. Understand and bypass common anti-forensic techniques impacting data recovery.
8. Leverage specialized commercial data recovery tools for challenging scenarios.
9. Integrate data recovery findings into comprehensive forensic investigations.
10. Perform deep-dive analysis of unallocated space for hidden data artifacts.
11. Recover data from logically corrupted file systems and RAID configurations.
12. Implement best practices for evidence preservation during data recovery operations.
13. Stay current with emerging trends in data storage, data loss, and recovery technologies.

Organizational Benefits

1. Maximized Data Retrieval: Recover critical data from virtually any data loss scenario.
2. Enhanced Incident Response: Faster and more effective recovery from data breaches/ransomware.
3. Improved E-Discovery Capabilities: Uncover more relevant data for legal proceedings.

4. Strengthened IP Protection: Recover stolen or deleted intellectual property.
5. Reduced Downtime & Costs: Minimize impact of data loss incidents, reducing reliance on external services.
6. Comprehensive Digital Investigations: Ensure no critical evidence is overlooked.
7. Increased Investigative Success Rate: Successfully handle cases previously deemed irrecoverable.
8. Better Business Continuity: Contribute to resilience against data loss events.
9. Internal Expertise Development: Build in-house advanced data recovery specialists.
10. Competitive Advantage: Possess superior capabilities in digital evidence recovery.

Target Participants

· Experienced Digital Forensic Examiners

· Incident Response Team Leads

· Cybersecurity Analysts specializing in data loss

· Law Enforcement Digital Crime Specialists

· E-Discovery Professionals

· IT Administrators responsible for data backup and recovery

· Data Recovery Service Professionals

· Malware Analysts dealing with encrypted or fragmented samples

· Information Security Managers overseeing data protection

· Researchers in advanced data recovery techniques

Course Outline

Module 1: Advanced Data Loss Scenarios & Storage Media

- **Deep Dive into Data Loss:** Accidental deletion, formatting, corruption, physical damage.
- **HDD vs. SSD Recovery Challenges:** TRIM, wear leveling, NAND flash architecture.
- **RAID Configurations & Recovery:** RAID 0, 1, 5, 10 breakdown and reconstruction challenges.
- **Emerging Storage Technologies:** NVMe, eMMC, UFS and their impact on recovery.
- **Case Study:** Analyzing a physically damaged external hard drive for potential recovery.

Module 2: Low-Level Disk Structures & Raw Data Analysis

- **Sector & Cluster Mapping:** Understanding physical vs. logical addresses.
- **Hexadecimal & Binary Forensics:** Interpreting raw disk data.
- **Partition Table Forensics:** MBR, GPT, and their role in data access.
- **Boot Sector Analysis:** VBR (Volume Boot Record) and its importance for recovery.
- **Case Study:** Manually identifying the start of a deleted partition using a hex editor.

Module 3: Advanced File System Forensics for Recovery (NTFS & FAT)

- **NTFS Deep Dive:** Master File Table (MFT) analysis for deleted entries and attributes.
- **NTFS Log File ($LogFile) & Journal Analysis:** Reconstructing file system events.
- **FAT File System:** Directory entries, FAT chains, and unallocated space.
- **Metadata vs. Content:** Distinguishing between file system pointers and actual data.
- **Case Study:** Recovering files from a partially corrupted NTFS partition by repairing MFT entries.

Module 4: Advanced File System Forensics for Recovery (Ext4 & APFS)

- **Ext4 Inode Analysis:** Understanding how deleted files are marked and recovered.
- **Ext4 Journaling & Snapshots:** Extracting deleted data from journal entries.
- **APFS Containers & Volumes:** APFS snapshots, space re-allocation, and data recovery complexities.
- **HFS+ Recovery Challenges:** Catalog files, B-trees, and fork data.
- **Case Study:** Extracting deleted sensitive documents from an Ext4 filesystem with partial overwrite.

Module 5: Principles of File Carving & Signature Analysis

- **Defining File Carving:** Recovering files based on content signatures.
- **Header & Footer Analysis:** Identifying unique file patterns for carving.
- **Signature Databases:** Building and utilizing custom signature sets.
- **Carving Tools & Algorithms:** PhotoRec, Scalpel, Foremost, TestDisk.
- **Case Study:** Carving specific image files (e.g., JPEG, PNG) from unallocated space.

Module 6: Advanced File Carving Techniques & Tools

- **Fragmented File Carving:** Reconstructing files from non-contiguous sectors.
- **Greedy Carving vs. Smart Carving:** Pros and cons for different data types.
- **Commercial Carving Engines:** Advanced features in EnCase, FTK, Magnet AXIOM for carving.
- **Carving from RAID & Virtual Disks:** Specific considerations and tools.
- **Case Study:** Reconstructing a fragmented video file from a corrupted logical drive.

Module 7: Custom Signature Development & File Identification

- **Reverse Engineering File Formats:** Analyzing unknown file types for carving.
- **Creating Custom Carving Signatures:** Using hex editors and file format specifications.
- **Automating Signature Generation:** Scripting for pattern identification.
- **Handling Encrypted & Compressed Files during Carving:** Challenges and workarounds.
- **Case Study:** Developing a custom carving signature for a proprietary document format.

Module 8: Data Reconstruction & Validation Beyond Basic Carving

- **Contextual Analysis for Carving:** Using surrounding data to improve recovery.
- **Metadata Reconstruction:** Rebuilding file system attributes (timestamps, size).
- **Data Validation Techniques:** Ensuring integrity and usability of recovered data.
- **Error Correction & Redundancy in Recovery:** Parity, ECC, and their role.
- **Case Study:** Reconstructing a database file from carved fragments and validating its integrity.

Module 9: Anti-Forensics & Data Wiping Countermeasures

- **Common Wiping Techniques:** Single pass, multi-pass, secure erase.
- **Understanding TRIM & SSD Wiping:** How data is physically destroyed on SSDs.
- **Analyzing Anti-Forensic Tools:** Investigating the impact of tools like DBAN, Eraser.
- **Recovering from Wiped Drives:** Strategies for partial recovery and artifact identification.

- **Case Study:** Attempting to recover data from a drive that underwent a single-pass wipe.

Module 10: Damaged Media & Physical Data Recovery Concepts

- **Introduction to Cleanroom Environments:** When physical recovery is necessary.
- **Common Physical Damage:** Head crashes, platter damage, electronic failure.
- **Techniques for Stabilizing Drives:** Image acquisition from unstable media.
- **Understanding Drive Components:** Platters, heads, motor, PCB.
- **Case Study:** Analyzing a "clicking" hard drive to assess feasibility of data extraction before cleanroom.

Module 11: Advanced Recovery from Corrupted & Unallocated Space

- **Unallocated Space Deep Dive:** Significance in forensics and recovery.
- **Slack Space Analysis:** Recovering data from unused portions of clusters.
- **Volume Shadow Copies (VSS):** Recovering previous file versions.
- **Carving from Live Systems:** Risks and techniques for volatile data recovery.
- **Case Study:** Extracting hidden messages from the unallocated space of a forensic image.

Module 12: E-Discovery Implications & Legal Admissibility

- **Chain of Custody for Recovered Data:** Maintaining integrity from recovery to court.
- **Documenting Recovery Processes:** Detailed logs and reports for legal defensibility.
- **Expert Witness Testimony for Data Recovery:** Presenting findings in court.
- **Challenging Recovery Claims:** Understanding potential pitfalls and biases.
- **Case Study:** Preparing a formal report documenting the recovery of deleted emails for a legal proceeding.

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call +254769199797

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
21 Sep 2026	02 Oct 2026	Online	$2,000
21 Sep 2026	02 Oct 2026	Physical	$3,000
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0
21 Sep 2026	02 Oct 2026	Physical	$0

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