KG REDDY College of Engineering & Technology

Computer Forensics

Mr. Raghu Kumar L

Overview

- Introduction
- What happens when a file is deleted
- Typical Computer Forensic Investigations
- Who uses Computer Forensics
- Important things to remember
- Options to avoid
- Computer Forensic software
- EnCase Forensic
- How to become a Computer Forensic Examiner
- Conclusion

What is Computer Forensics?

- Collection, preservation, analysis and presentation of computer-related evidence
- Determining the past actions that have taken place on a computer system using computer forensic techniques

What is the Purpose of Computer Forensics?

- Classic Forensics
- Computer forensics uses technology to search for digital evidence of a crime
- Attempts to retrieve information even if it has been altered or erased so it can be used in the pursuit of an attacker or a criminal
- Incident Response
  - Live System Analysis
- Computer Forensics
  - Post-Mortem Analysis

What Happens when a File is Deleted?

- Windows Operating System
  - File Allocation Table (FAT)
  - Master File Table (MFT)
- FAT/MFT tells the computer where the file begins and ends
- Deleted pointers to the file
  - FAT/MFT space occupied by the file is mark as available
- The actual data that was contained in the file is not deleted
  - Unallocated space

Typical Investigations

- Theft of Company Secrets (client, customer or employee lists)
- Employee Sabotage
- Credit Card Fraud
- Financial Crimes
- Embezzlement (money or information)
- Economic Crimes
- Harassment
- Child Pornography
- Major Crimes
- Identity Theft

Media Devices that hold Potential Data

- Computers and laptops
- iPads
- iPods
- Smartphones and most other cell phones
- MP3 music players
- Hard Drives
- Digital Cameras
- USB Memory Devices
- PDAs (Personal Digital Assistants)
- Backup Tapes
- CD-ROMs & DVD's

Computer Forensic Capabilities

- Recover deleted files
- Find out what external devices have been attached and what users accessed them
- Determine what programs ran
- Recover webpages
- Recover emails and users who read them
- Recover chat logs
- Determine file servers used
- Discover document's hidden history
- Recover phone records and SMS text messages from mobile devices
- Find malware and data collected

Who uses Computer Forensics?

- Law Enforcement
- Private Computer Forensic Organizations
- Military
- University Programs
- Computer Security and IT Professionals

Law Enforcement

- Local, State and Federal levels
- Several detectives at local levels
  - Inadequate funding
- State Police
- FBI's Computer Analysis and Response Team (CART)
- Regional Computer Forensics Laboratories (RCFLs)
  - Philadelphia
- Primarily use EnCase

Private Computer Forensic Organizations

- Radley Forensics
- Computer Forensics Associates
- Bit-X-Bit
- Empire Investigation LLC
- Marmo Technology
- Advanced Forensic Recovery of Electronic Data
- Philadelphia Computer Forensics
- Philadelphia Computer Forensics Analysis and Investigations
- New York Computer Forensic Services
- Speckin Forensic Laboratories

Military

- Test, identify, and gather evidence in the field
  - Specialized training in imaging and identifying multiple sources of electronic evidence
- Analyze the evidence for rapid intelligence gathering and responding to security breach incidents
  - Desktop and server forensic techniques

University Programs

- Bachelors and Masters degrees
  - Incident response techniques
  - Well funded research area
  - Many free sources of test images to practice on
- Community colleges
  - Partnering with 4-year universities to complete associates and bachelors degrees
  - Great for working professionals
  - Flexible schedules and affordable tuition

Computer Security Professionals and IT Personnel

- Network traffic
- Compromised networks
- Insider threats
  - Disloyal employees
- Malware
- Breach of contracts
- E-mail Fraud/Spam
- Theft of company documents

Important Factors

- Legal procedures
  - Not compromising evidence
- Treat every piece of evidence as it will be used in court
- Documentation*
- Chain of Custody
- Write Blocks
- Imaging
  - Bit by bit copy of a piece of electronic media (Hard drive)

What Should be Avoided During an Investigation?

- Changing data
  - Changing time or date stamps
  - Changing files
- Overwriting unallocated disk space
  - This can happen when re-booting
- Verify Hash values from images

Computer Forensic Tools

- Parse through the created image
  - Built in system parser
- Rebuilds both active and deleted files
- Open source
- Commercial sources

Common Computer Forensic Software

- ArcSight Logger
- Netwitness Investigator
- Quest Change Auditor
- Cellebrite
- Physical Analyzer
- Lantern
- Access Data's Forensic Toolkit (FTK)
- EnCase Cybersecurity
- EnCase eDiscovery
- EnCase Portable
- EnCase Forensic*

EnCase Forensic

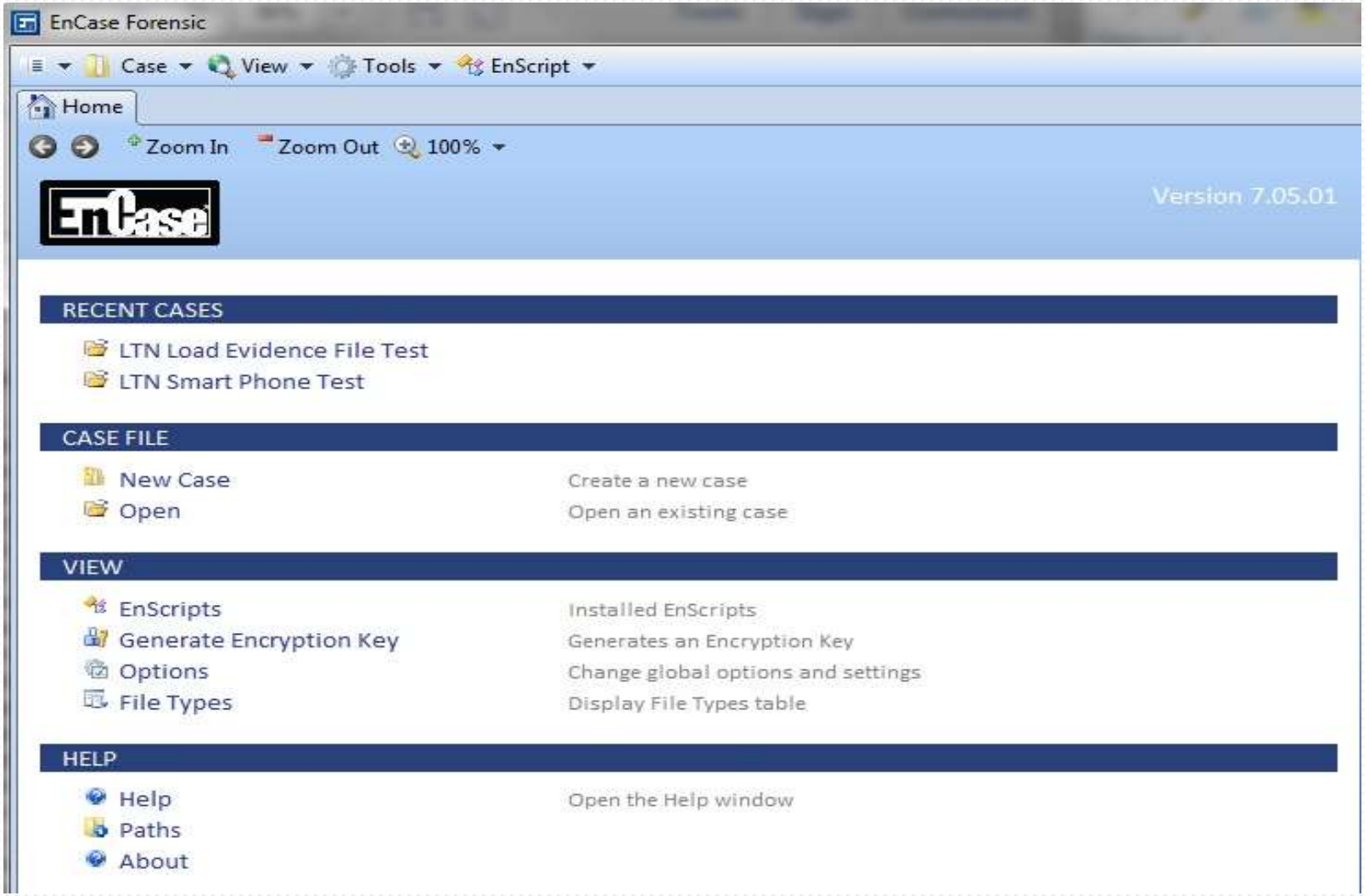
- Acquisition
- Reporting
- EnScript :
  - Scripting facility
  - Various API's for interacting with evidence
- Collect, Analyze and examine data
  - Deleted files
  - Unallocated space
  - File slack
- Duplicates of original data (Imaging)
  - Accuracy can be verified by hash and Cyclic Redundancy Check values

EnCase Forensic

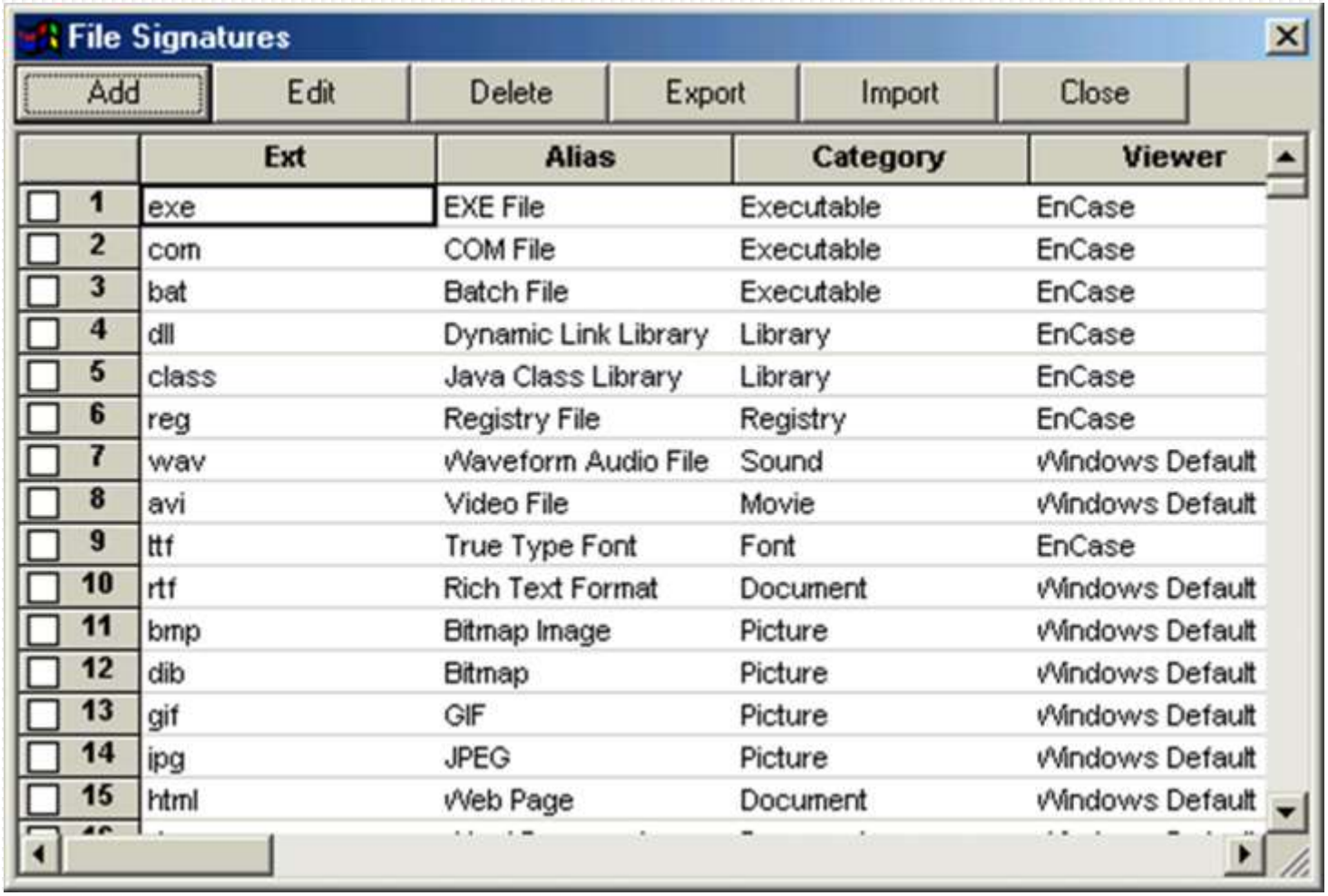
- Many operating systems
  - Windows
  - Linux
  - Apple iOS
  - Sun/Oracle Solaris
- Supported smartphones
- Recommended to run on Window 7 (64 bit) operating system

KG REDDY College of Engineering & Technology

EnCase Forensic



File Signatures



File Signatures

Add | Edit | Delete | Export | Import | Close

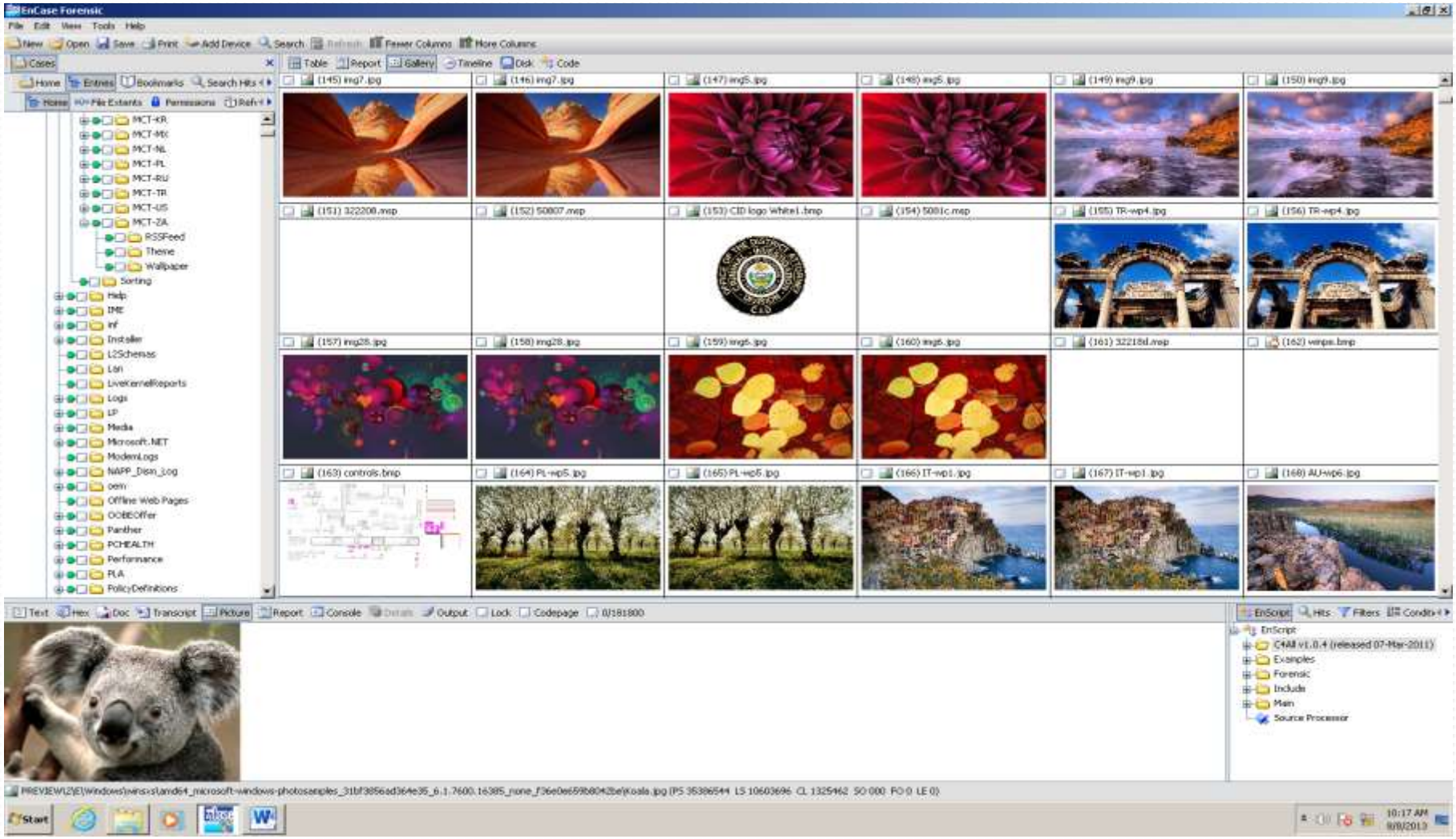
	Ext	Alias	Category	Viewer
1	exe	EXE File	Executable	EnCase
2	com	COM File	Executable	EnCase
3	bat	Batch File	Executable	EnCase
4	dll	Dynamic Link Library	Library	EnCase
5	class	Java Class Library	Library	EnCase
6	reg	Registry File	Registry	EnCase
7	wav	Waveform Audio File	Sound	Windows Default
8	avi	Video File	Movie	Windows Default
9	ttf	True Type Font	Font	EnCase
10	rtf	Rich Text Format	Document	Windows Default
11	bmp	Bitmap Image	Picture	Windows Default
12	dib	Bitmap	Picture	Windows Default
13	gif	GIF	Picture	Windows Default
14	jpg	JPEG	Picture	Windows Default
15	html	Web Page	Document	Windows Default

KG REDDY College of Engineering & Technology

EnCase Gallery

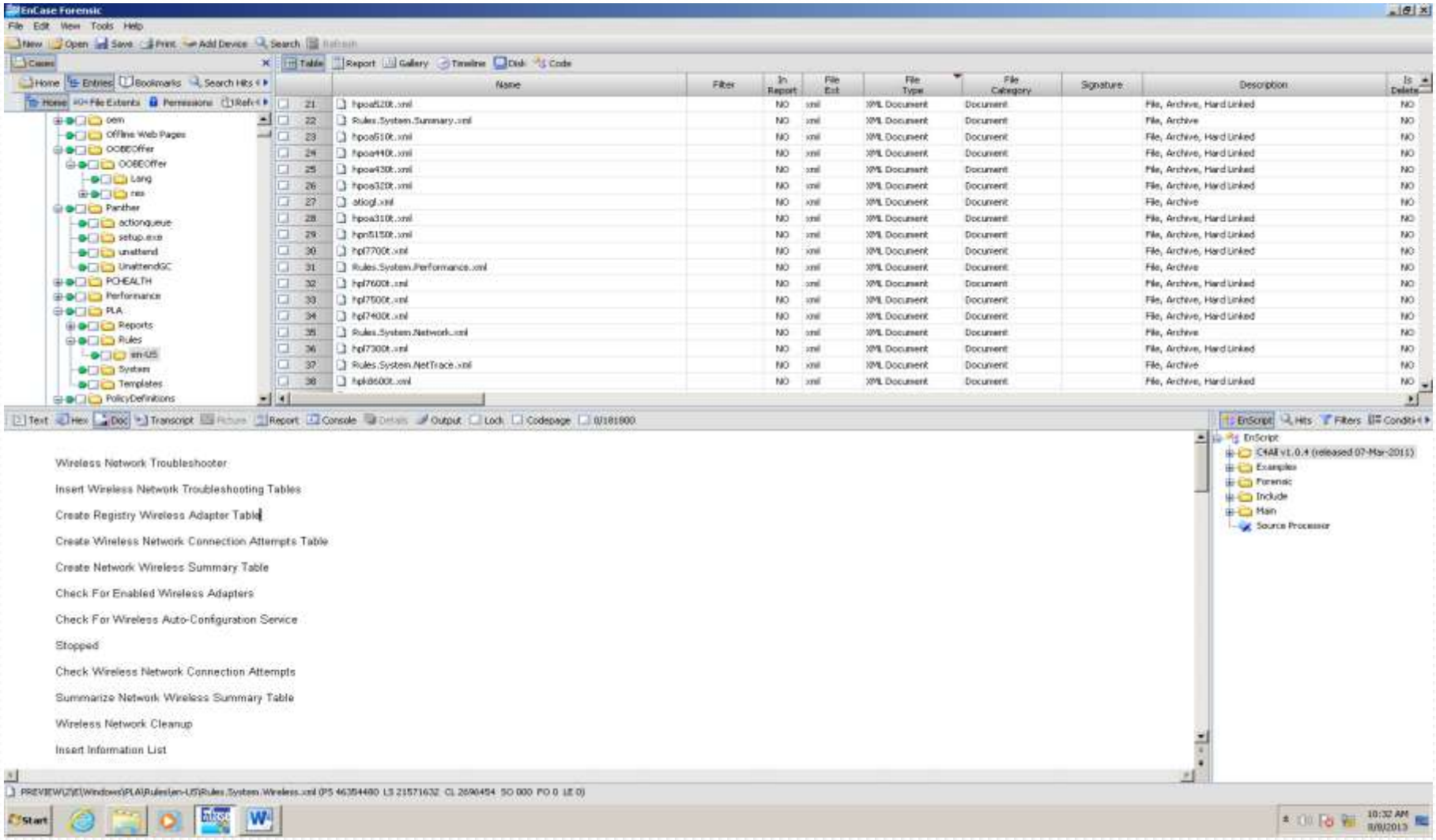
KG REDDY College of Engineering & Technology

EnCase Gallery



KG REDDY College of Engineering & Technology

EnCase Document View



Perform a Search

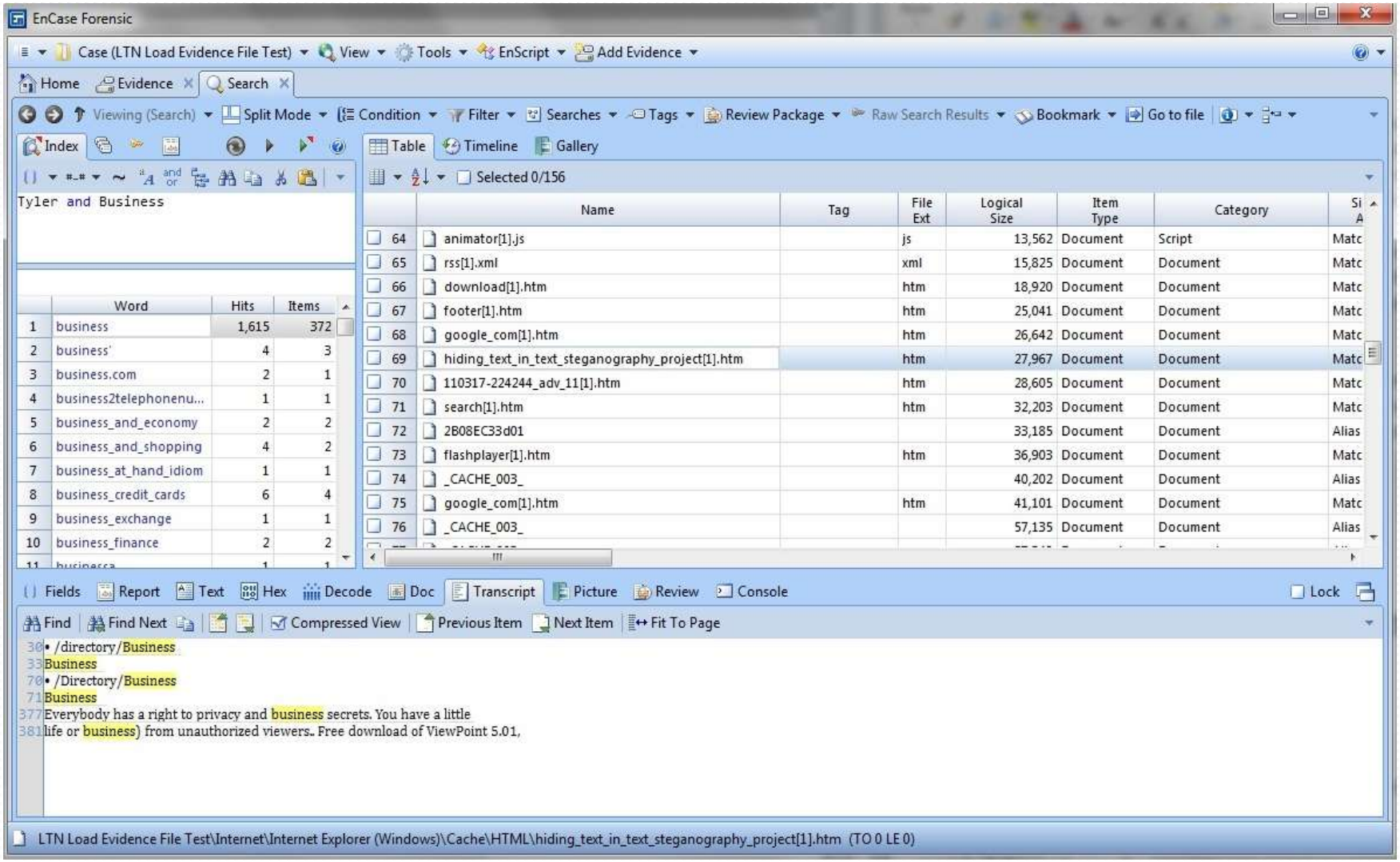
- Raw Search
  - A search based on keywords that search the entire drive for a match
  - Slow process on larger drives
- Indexed Search
  - A search that requires the drive to be indexed
  - Indexing can take a long time
  - Searches are instantaneous

Bookmark Specific Evidence

- Bookmark Findings
  - Raw Text Bookmarks
  - Data Structure Bookmarks
  - Notable File Bookmarks
  - Multiple Notable File Bookmarks
  - Note Bookmarks
  - Table Bookmarks
  - Transcript Bookmarks

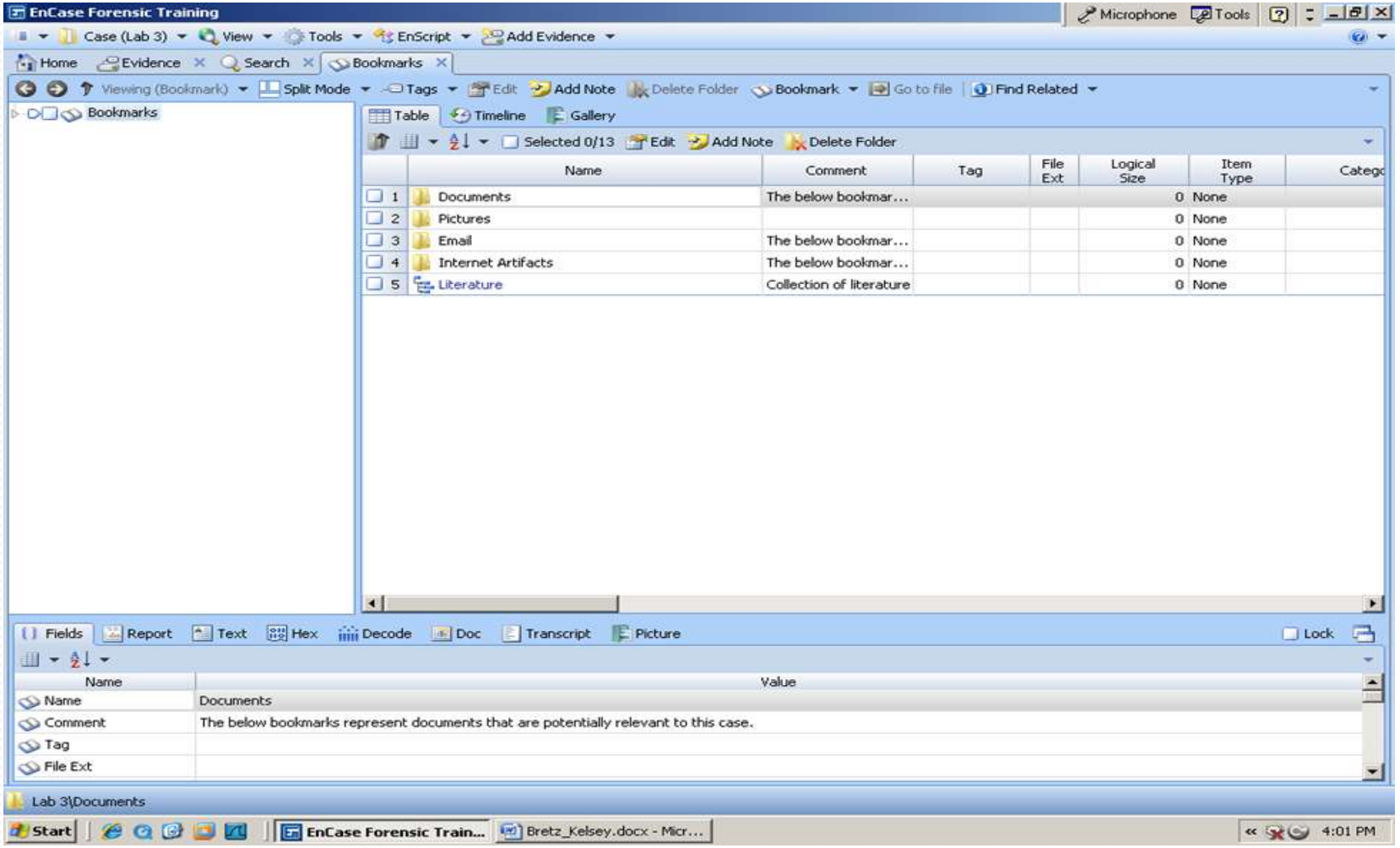
KG REDDY College of Engineering & Technology

Indexed Search



KG REDDY College of Engineering & Technology

Bookmark Screen



KG REDDY College of Engineering & Technology

Deleted Files

8	exFAT.E01	05/25/10 01:15:30PM	05/25/10 01:16:00PM	05/25/10 01:16:00PM
9	exFAT (Extended FAT)-Hamm-5-26-201...	03/27/10 12:26:26PM	05/25/10 01:09:18PM	05/25/10 01:09:18PM
10	ReadyBoostPerfTest.tmp	06/25/10 10:00:16AM	06/25/10 10:00:14AM	06/25/10 10:00:16AM
11	EDT (UTC-4hrs).txt	06/25/10 10:00:24AM	06/25/10 10:00:24AM	06/25/10 10:00:24AM
12	Deleted.txt	05/25/10 01:09:56PM	05/25/10 01:09:42PM	05/25/10 01:09:56PM
13	UTC.txt	06/25/10 03:00:58PM	06/25/10 03:00:58PM	06/25/10 03:00:58PM
14	Berlin (UTC+1hr).txt	06/25/10 04:01:40PM	06/25/10 04:01:40PM	06/25/10 04:01:40PM
15	Kathmandu (UTC+5.45hr).txt	06/25/10 07:47:20PM	06/25/10 07:47:20PM	06/25/10 07:47:20PM
16	EDT (UTC-4hrs).txt	06/25/10 10:04:32AM	06/25/10 10:04:32AM	06/25/10 10:04:32AM
17	New Text Document.txt	06/25/10 02:05:32PM	06/25/10 02:05:32PM	06/25/10 02:05:32PM
18	UTC.txt	06/25/10 02:05:32PM	06/25/10 02:05:32PM	06/25/10 02:05:32PM
19	Berlin Time (UTC+1hr).txt	06/25/10 04:06:12PM	06/25/10 04:06:12PM	06/25/10 04:06:12PM
20	Kathmandu (UTC+5.45hr).txt	06/25/10 07:51:58PM	06/25/10 07:51:58PM	06/25/10 07:51:58PM
21	BobbyHelmsLyrics.txt	05/25/10 01:07:56PM	05/25/10 01:08:56PM	05/25/10 01:08:56PM
22	New Text Document.txt	06/25/10 03:00:58PM	06/25/10 03:00:58PM	06/25/10 03:00:58PM

EIC2010 (F:) Search CEIC201

Burn New folder

Name	Date modified	Type	Size
Berlin Time (UTC+1hr).txt	6/25/2010 10:06 AM	Text Document	0 KB
EDT (UTC-4hrs).txt	6/25/2010 10:04 AM	Text Document	0 KB
Kathmandu (UTC+5.45hr).txt	6/25/2010 10:07 AM	Text Document	0 KB
UTC.txt	6/25/2010 10:05 AM	Text Document	0 KB

How to get Started

- Step 1: Obtain a degree
  - Today a bachelors degree is favored
  - FBI prefers a different scholarly degree over computer forensics
- Step 2: Get Certified
  - EnCase Certified Examiner (EnCE)
  - Computer Forensics Examiner (CCFE)
  - Certified Computer Examiner (CCE)
  - Some states require a Private Investigator License
- Step 3: Find a Job
  - Law Enforcement (Local, State, Federal)
    - Homeland Security offices, the NSA and the FBI have a growing need for examiners
  - Military
  - Private Firms
  - IT/Security Professions

KG REDDY College of Engineering & Technology

http://www.youtube.com/watch?v=vJdME6vczeo

Conclusion

- Computer Forensics helps determine the WHO, WHAT, WHEN, and WHERE related to a computer-based crime or violation.
- Who uses Computer Forensics
- Situations to use Computer Forensics
- Computer Forensic Software
- Do and Don’ts of practicing Computer Forensics
- How to get involved in Computer Forensics

KG REDDY College of Engineering & Technology

References

- http://www.computer-forensics.net/
- http://www.scmagazine.com/best-computer-forensics-tool/article/195999/
- http://www.law.com/jsp/lawtechnologynews/PubArticleLTN.jsp?id=1202584495563&Product_Review_Encase_Forensic_7&slreturn=20130405160529
- https://www.ncjrs.gov/pdffiles1/nij/183451.pdf
- http://www.westwood.edu/programs/school-of-technology/computer-forensics-online-degree/law-enforcement-computer-forensics
- Computer Forensics: Info Sec Pro Guide
- Security Guide to Network Security Fundamentals

KG REDDY College of Engineering & Technology

Questions?