



RET Site: Research Experience in Cybersecurity for Nevada Teachers (RECNT) RECNT: Digital Forensics Into the Computer Science Classroom



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Introduction

Carson High School's AP Computer Science Principles students will become more familiar with the binary, decimal and hexadecimal number systems by learning digital forensic file carving. Students will be given the opportunities to access Cyber Security protocols and concepts which will allow them to have hands-on discovery and problem solving activities.

Exploration of File Carving

Essential Questions for Lesson

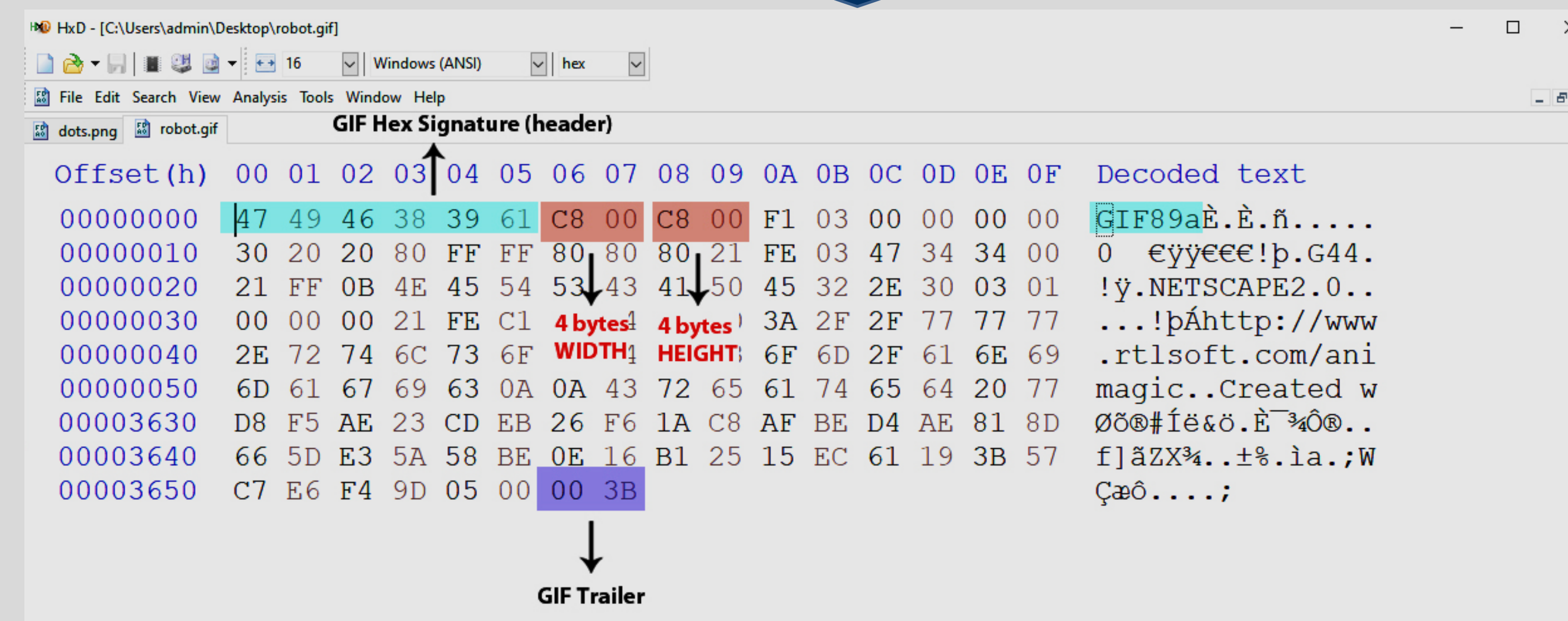
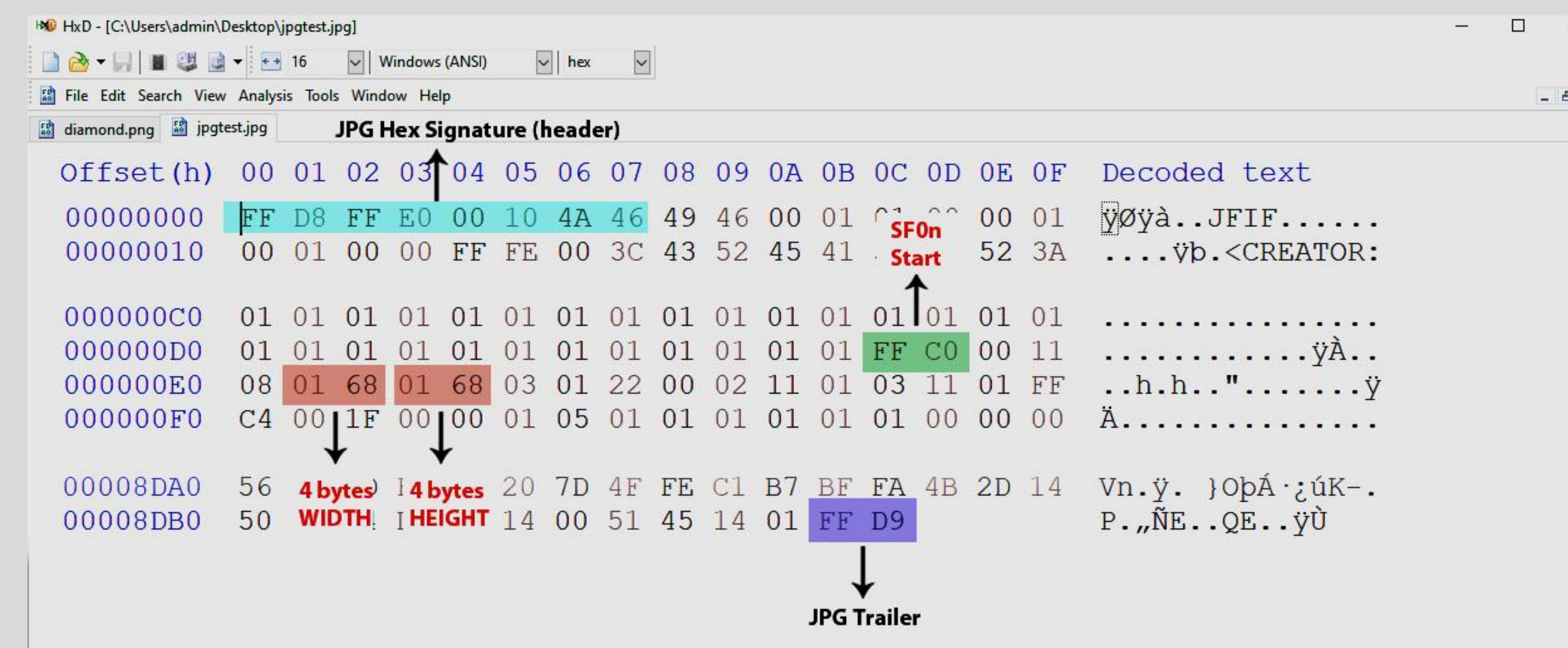
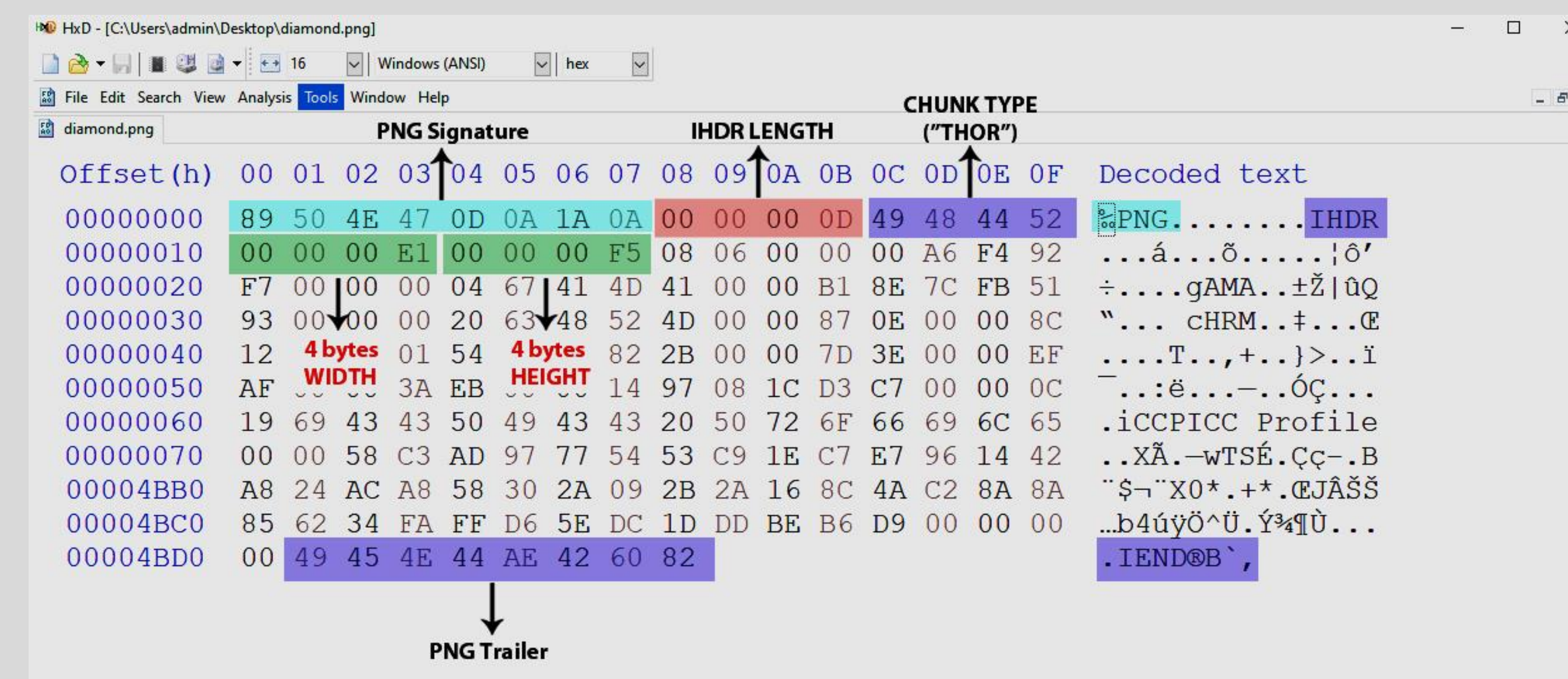
- What does the term “File Carving” mean?
File carving is a process in computer forensics to extract data from a disk drive or other storage device without the assistance of the file system that originally created the file. (<https://resources.infosecinstitute.com/file-carving/>)
- What is it used for?
File carving has provided law enforcement and cyber security professionals another tool they can use to recover damaged or deleted files.
- What is a forensic disk image?
Its a bit-by-bit, sector-by-sector direct copy of a storage device, including all files, folders, and unallocated/free space.
- File Signatures
File signature is a sequence of bytes that is used by application programs to confirm file data before loading and processing the rest of the file.
- File Carving Software/Tools
HxD (free) - FTK Imager (free) - ExifTool (free)

File Carving Demonstration

Hands-on Teacher Lead Demo

- Students will examine image files and practice manual file carving using HxD software and Tools.
- Students will be given a variety of images, ie. PNG, JPG and GIF to discover how each file is different from each other.

Image File Signatures



File Carving Activities

Students Apply their new knowledge to a hands-on application

- Students will be given a USB drive with damaged or deleted images and written activities instructions.
- Students will demonstrate mastery of the following procedures:
 - ✓ Create a forensic disk image.
 - ✓ Use File Carving Software and Tools
 - ✓ The recovered results will determine which damaged/deleted information is available for analysis.
 - ✓ Use correct terminology when writing the final analysis.

Evaluation

- Pre-Assessment: Students will complete a KWL chart. The KWL chart will be used to engage students in a new topic, and activate prior knowledge. All activities will be assessed using formative and summative assessments.
- Post-Assessment: Students will complete their KWL chart. Students will be given an end of unit exam based on the skills learned and trends in the real world. Students will complete an end of unit self-reflection survey.

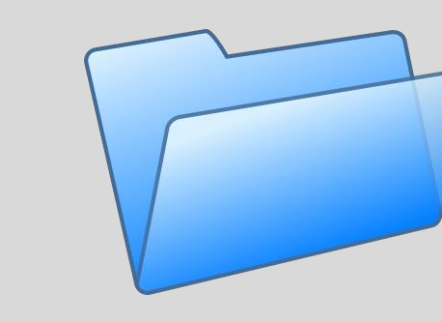
Resources



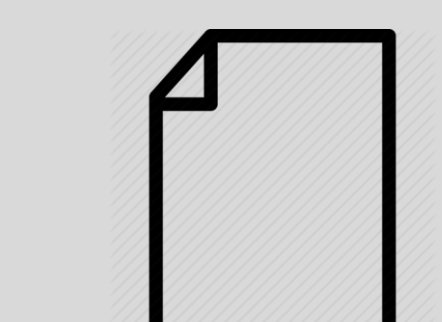
Code.org (<https://code.org>)



Hex Editor (<https://mh-nexus.de/en/hxd>)



Practice Images Files



File Carving Resources

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