Practical Reversing II – Unpacking EXE

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Acknowledgement

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Reversing & Malware Analysis Training

This presentation is part of our **Reverse Engineering & Malware Analysis** Training program. Currently it is delivered only during our local meet for FREE of cost.

For complete details of this course, visit our Security Training page.

Who am I

Nagareshwar Talekar

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Contents

- What is EXE Packing?
- Purpose of Packing EXE
- What is Unpacking?
- Detection of Packer
- Execution of Packed EXE Program
- Standard Process of Unpacking EXE
- Unpacking UPX using OllyDbg
- DEMO - Unpacking UPX
- Anti Anti-Debugging Plugins
- References

What is EXE Packing/Protecting?

- **EXE Packing:**

  Compressing the Executable to a smaller Size

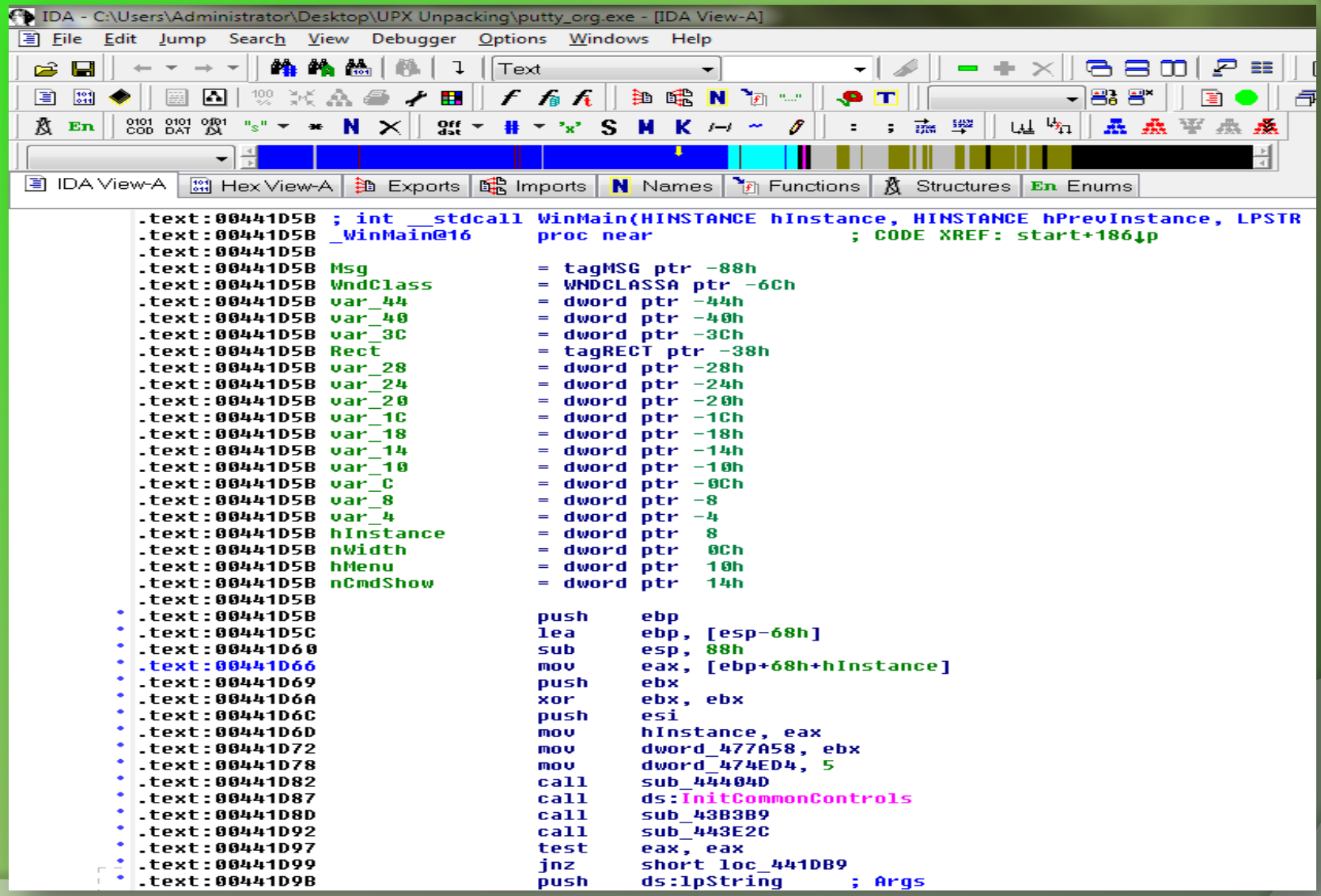
- **EXE Protecting:**

  Encrypting with Anti-Debugging Techniques to prevent Reversing

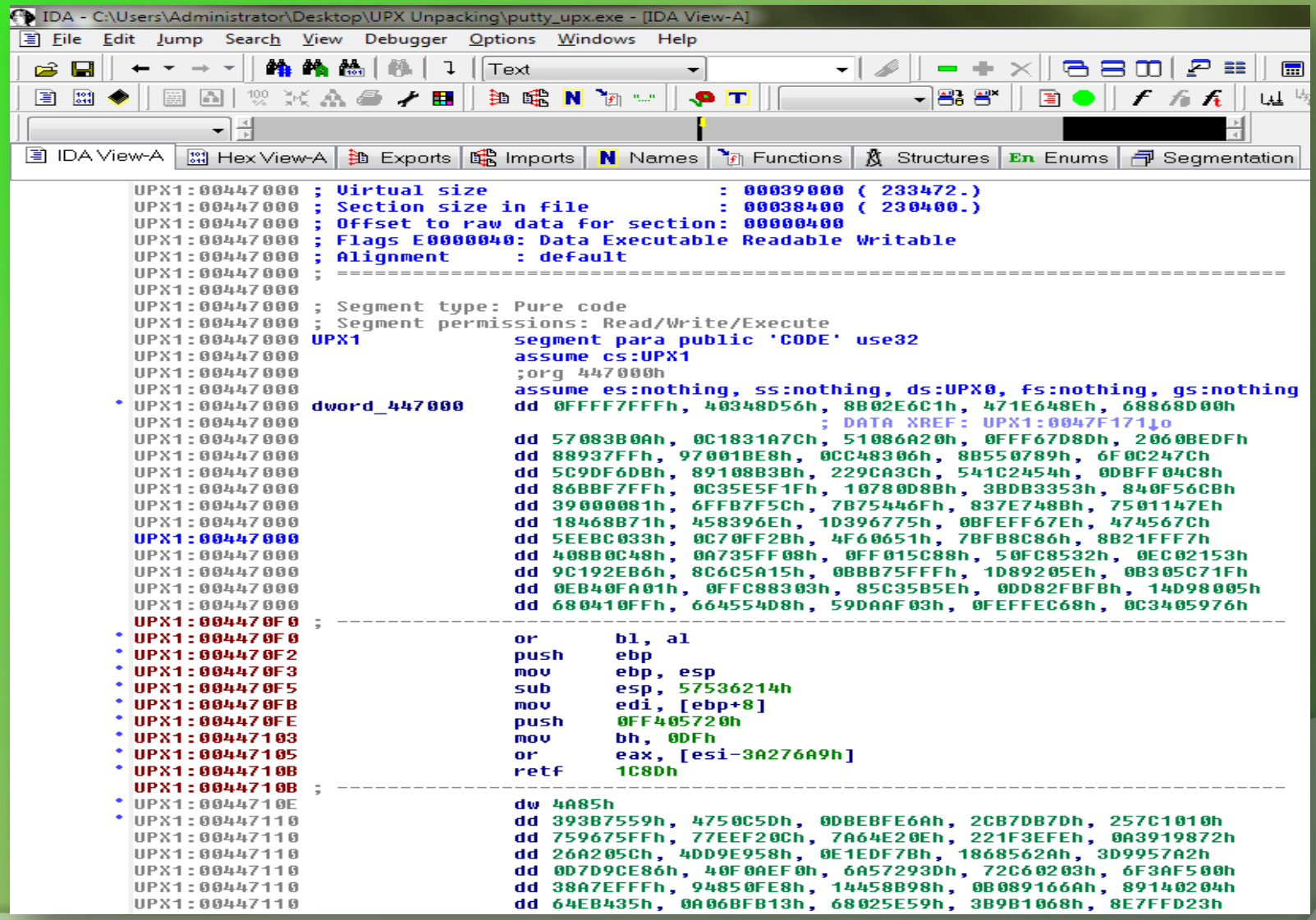
✓ In Reversing world, both Packer & Protector is commonly referred as **Packer**.

Examples of Packers: UPX, AsProtect, Armadillo etc.

EXE - Before Packing



EXE - After Packing



Purpose of Packing EXE

- **Prevent Reverse Engineering [Crack License, Secret Code etc.]**
  - **Defeat Static Disassembling**
  - **Make Dynamic Debugging Difficult**
- **Reduce the size of Executable file**
- **Bypass Anti-virus Detections with multi-level Packing**

✓ **It is used by Software Vendors to prevent Serial Cracking and Malware Authors to prevent analysis by AV Researchers.**

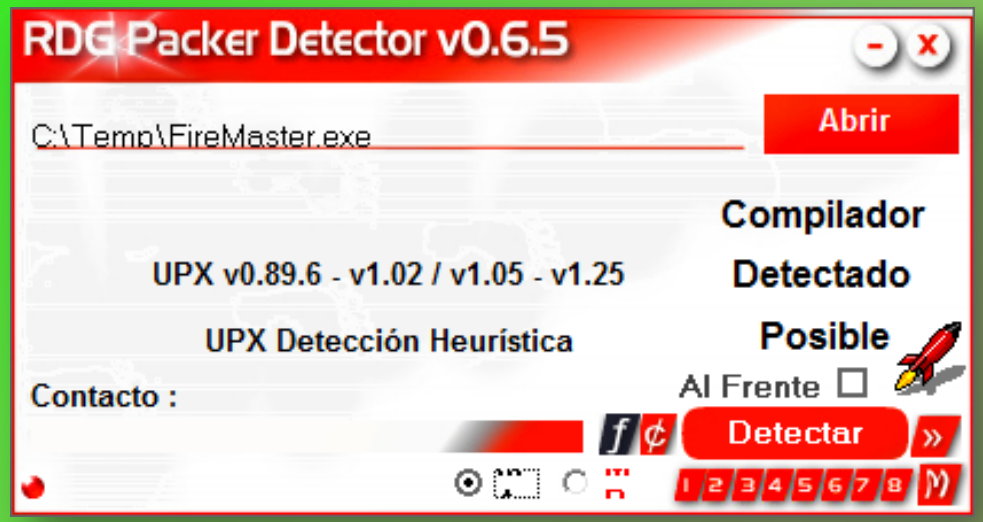
What is Unpacking?

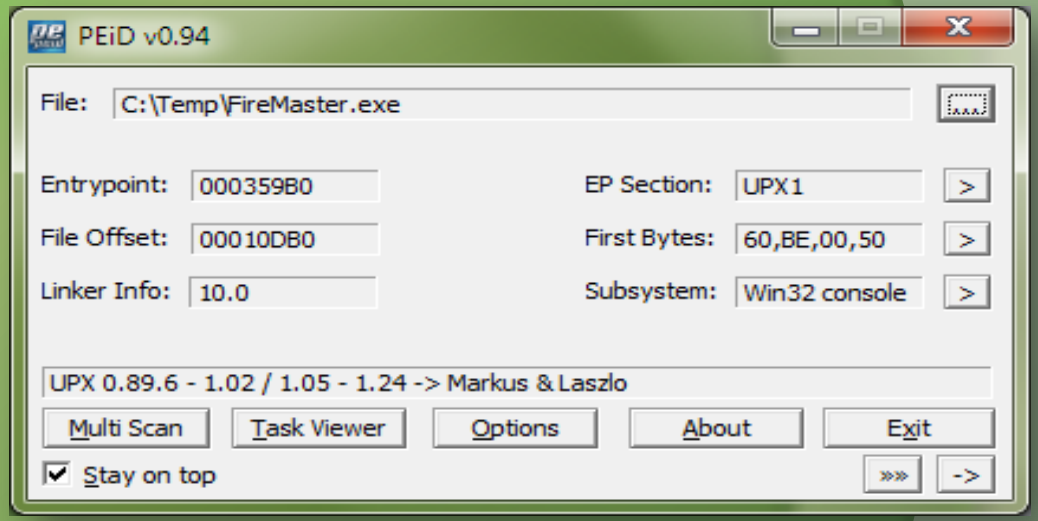
- **Extracting the Original Binary from the Packed Executable File.**
- **Automatic Unpackers available for popular Packers.**
  - **May not work with different versions**
  - **Not available for Complex packers**
- **Involves Live Debugging by Defeating Anti-Debugging techniques**

Detection of Packer

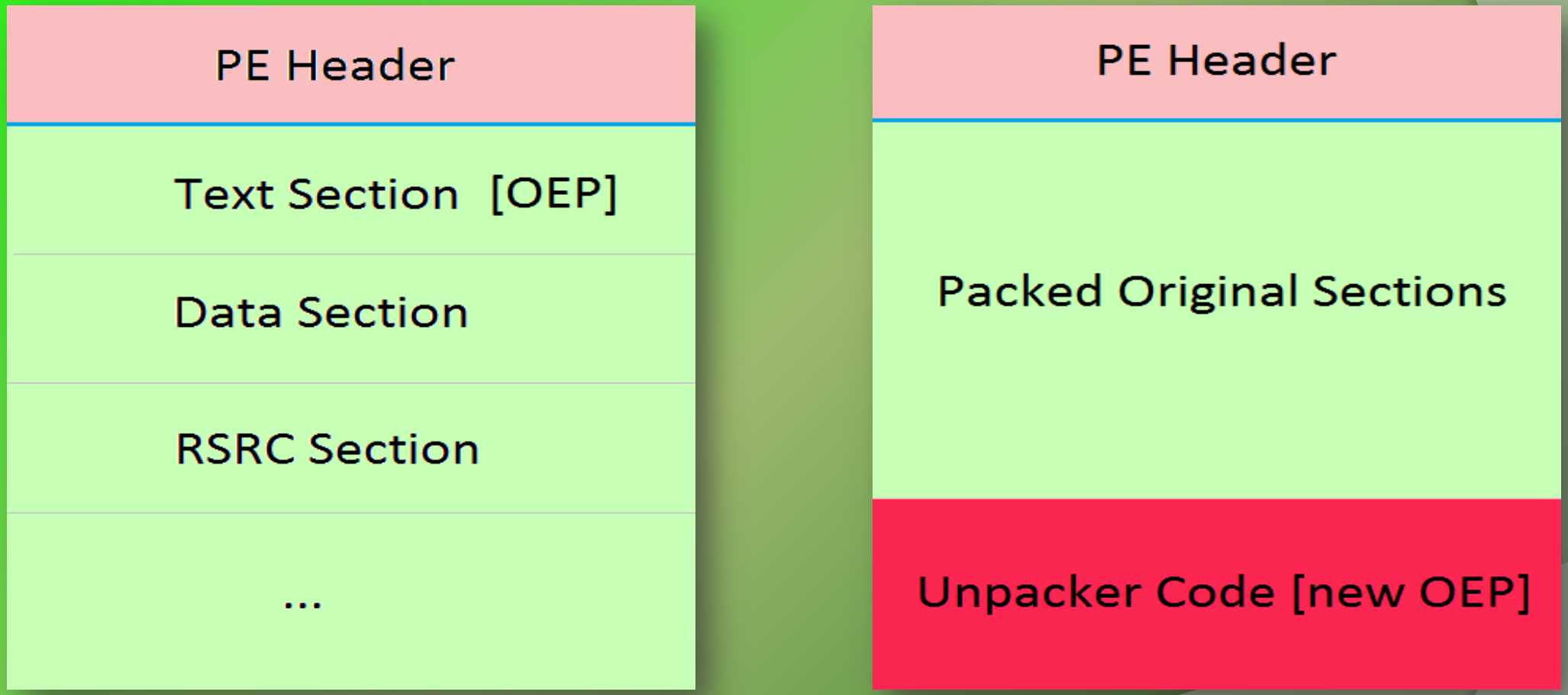
- **Packer Detectors like PEiD, RDG, ExeScan etc**
  - **Detect the popular Packers**
  - **Show the version of Packer also**
- **PE Viewer Tools like PEditor, PEview**
  - **Look at Section Table**
  - **Look at Import Table**

Packer Detectors





Structure of Packed EXE



Before Packing

After Packing

Execution of Packed EXE Program

- Execution starts from new OEP
- Saves the Register status using PUSHAD instruction
- All the Packed Sections are Unpacked in memory
- Resolve the import table of original executable file.
- Restore the original Register Status using POPAD instruction
- Finally Jumps to Original Entry point to begin the actual execution

Standard Process of Unpacking EXE

- Debug the EXE to find the real OEP (Original Entry Point)
- At OEP, Dump the fully Unpacked Program to Disk
- [?] Fix the Import Table using ImpRec Tool
- [?] Fix the PE Header

Unpacking UPX using OllyDbg

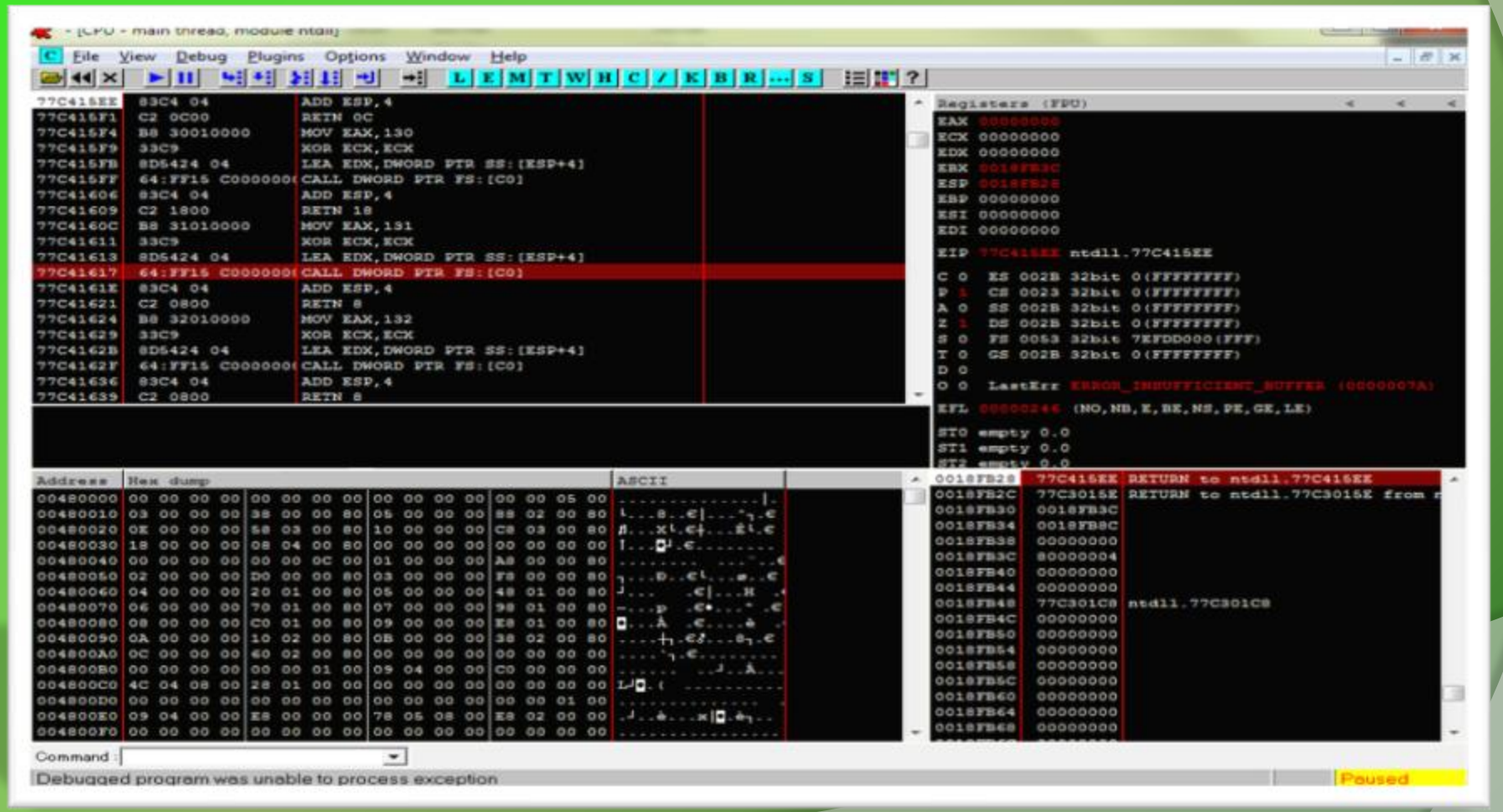
- Load the UPX packed EXE file into the OllyDbg
- Start tracing the EXE, until you encounter a PUSHAD instruction.
- At this stage, put the Hardware Breakpoint (type 'hr esp-4' at command bar) so as to stop at POPAD instruction.
- Other way is to manually search for POPAD (Opcode 61) instruction and then set Breakpoint on it.

Unpacking UPX using OllyDbg (contd)

- Next press F9 to continue the Execution.
- You will break on the instruction which is immediately after POPAD or on POPAD instruction [based on the method you have chosen]
- Now start tracing with F7 and soon you will encounter a JMP instruction which will Jump to OEP in the original program.
- At OEP, dump the whole program using OllyDmp plugin.

DEMO - Unpacking UPX

http://vimeo.com/42197903



Anti Anti-Debugging Plugins

Here are useful OllyDbg Plugins for Anti Anti-Debugging

- **Olly Advanced**
- **Hide Debugger**
- **NtGlobalFlag**
- **Anti Anti BPM**

Useful Tips

- Always use simple EXE for Unpacking exercises
- Use same EXE for all – You will know the OEP & other magic numbers
- Use Windows XP for better (less annoying) debugging experience.
- Have Patience, Its an Art and takes time.
- For best results, do it in the Moon Light ☺

What's Next?

- **Try Unpacking AsPack, AsProtect, PESpin, YodaP etc**
- **Try Unpacking Packed DLL (Google - Neolite DLL Unpacking)**
- **Try Advanced Packers: Armadillo ☺**

Reference

- Complete Reference Guide for Reversing & Malware Analysis Training

Thank You !

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