

Visualization of Malware Behavior

DIMVA 2009
- Rump Session -



PiL - Laboratory for Dependable Distributed Systems

UNIVERSITÄT
MANNHEIM



Motivation

- CWSandbox.org
- Detailed behavior report
- 2.500 - 4.000 binaries a day
- Each contains several hundred of api-calls

1265393.xml

```
<?xml version="1.0"?>
<!-- This analysis was created by CWSandbox (c) CWSE GmbH / Sunbelt Software--&gt;
&lt;analysis cwsversion="2.1.6" time="3/28/2009 10:06:45 PM" file="C:\1265393" md5="a9f6aa1649e6a0f1bfad8a576f0193a0"
sha1="1d13db7f7b57fcc6c715084a20660a464a7aab50" logpath="C:\cwsandbox\log\1265393\run_1"&gt;
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startreason="AnalysisTarget"&gt;
&lt;calltree&gt;
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filename_hash="6be7cccf384b1b05b08b7fc5ae5bc3bb3365cc55" starttime="00:01.547" startreason="CreateProcess"/&gt;
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&lt;/process_call&gt;
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&lt;/calltree&gt;
&lt;/processes&gt;
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terminationtime="00:01.172" startreason="AnalysisTarget" terminationreason="NormalTermination" executionstatus="OK" applicationtype="Win32Application"&gt;
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&lt;all_section&gt;
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filename_hash="0f37018f672c7635691f7317ade3c5a63904ec96"/&gt;
&lt;load_dll filename="C:\WINDOWS\system32\advapi32.dll" successful="1" address="\x77DA0000" end_address="\x77E4A000" size="696320"
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```



1265393.xml

```
<open_key key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="DisableUNCCheck"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="EnableExtensions"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="DelayedExpansion"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="DefaultColor"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="CompletionChar"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="PathCompletionChar"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="AutoRun"/>
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<open_key key="HKEY_LOCAL_MACHINE\System\WPA\TabletPC"/>
<open_key key="HKEY_LOCAL_MACHINE\SYSTEM\WPA\MediaCenter"/>
<query_value key="HKEY_LOCAL_MACHINE\SYSTEM\WPA\MediaCenter" value="Installed"/>
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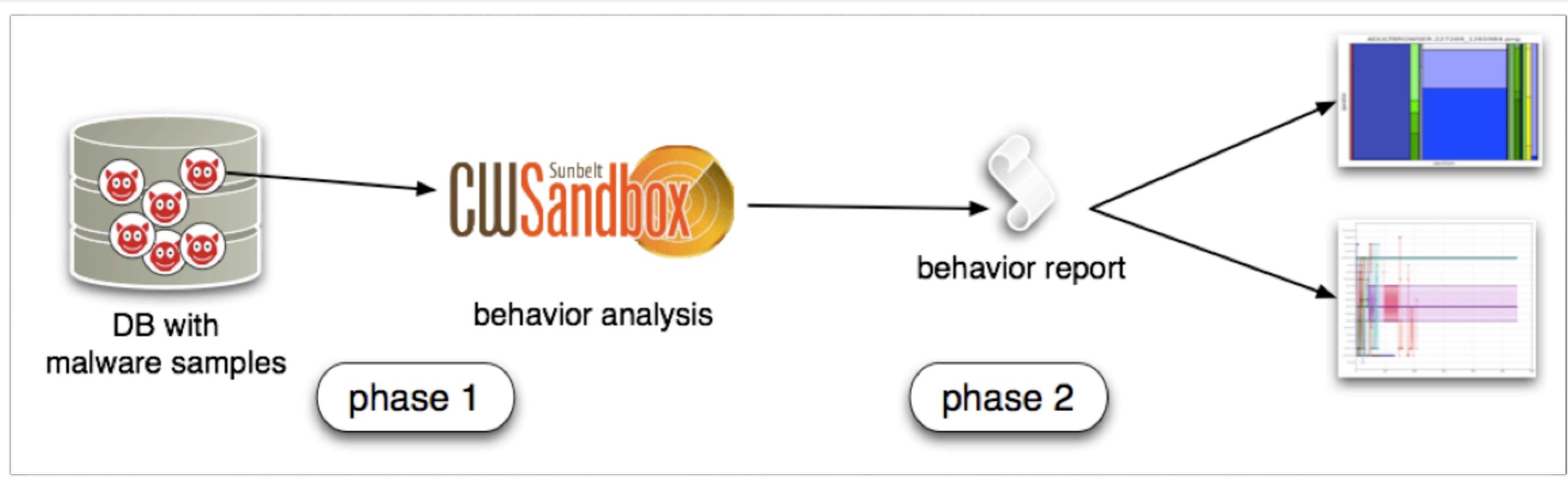


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<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="CompletionChar"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="PathCompletionChar"/>
<query_value key="HKEY_CURRENT_USER\Software\Microsoft\Command Processor" value="AutoRun"/>
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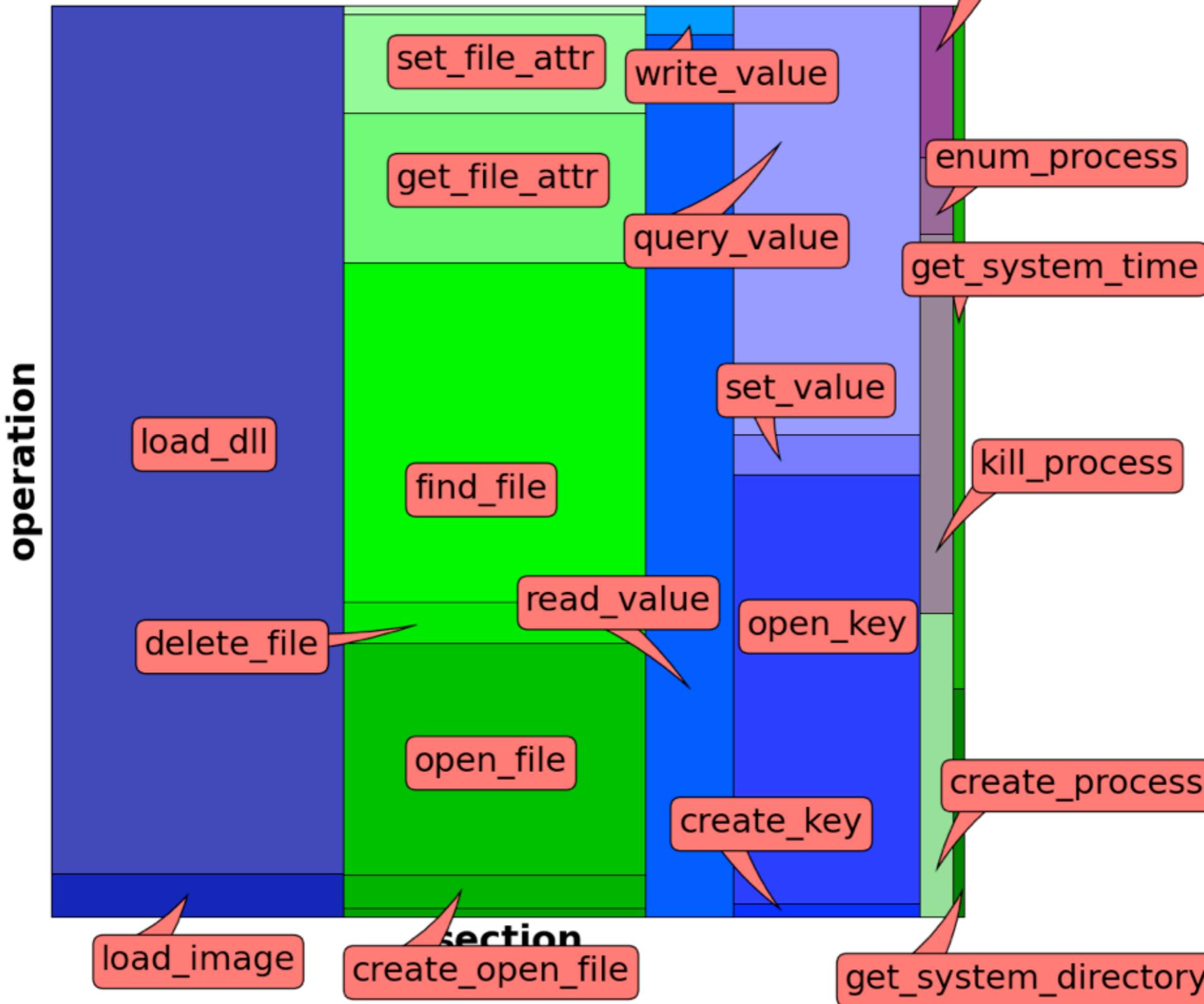


```

<open_key key="HKEY_LOCAL_MACHINE\System\WPA\TabletPC"/>
<open_key key="HKEY_LOCAL_MACHINE\SYSTEM\WPA\MediaCenter"/>
<query_value key="HKEY_LOCAL_MACHINE\SYSTEM\WPA\MediaCenter" value="Installed"/>
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· desiredaccess="FILE_ANY_ACCESS FILE_WRITE_ACCESS FILE_WRITE_DATA FILE_ADD_FILE FILE_ADD_SUBDIRECTORY FILE_APPEND_DATA FILE_CREATE_PIPE_INSTANCE
· FILE_WRITE_EA FILE_WRITE_ATTRIBUTES" flags="FILE_ATTRIBUTE_NORMAL SECURITY_ANONYMOUS"/>
<open_file filetype="file" srcfile="C:\WINDOWS\system32\" srcfile_hash="hash_error" desiredaccess="FILE_ANY_ACCESS FILE_READ_ACCESS FILE_READ_DATA
· FILE_LIST_DIRECTORY" shareaccess="FILE_SHARE_READ FILE_SHARE_WRITE" flags="SECURITY_ANONYMOUS"/>
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· desiredaccess="FILE_ANY_ACCESS" flags="SECURITY_ANONYMOUS"/>
<open_key key="HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\AppCompatFlags\Layers"/>
<open_key key="HKEY_CURRENT_USER\Software\Microsoft\Windows NT\CurrentVersion\AppCompatFlags\Layers"/>
<open_key key="HKEY_LOCAL_MACHINE\Software\Microsoft\Windows NT\CurrentVersion\AppCompatFlags\Custom\attrib.exe"/>
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HOOKSHELL-207706_1265393

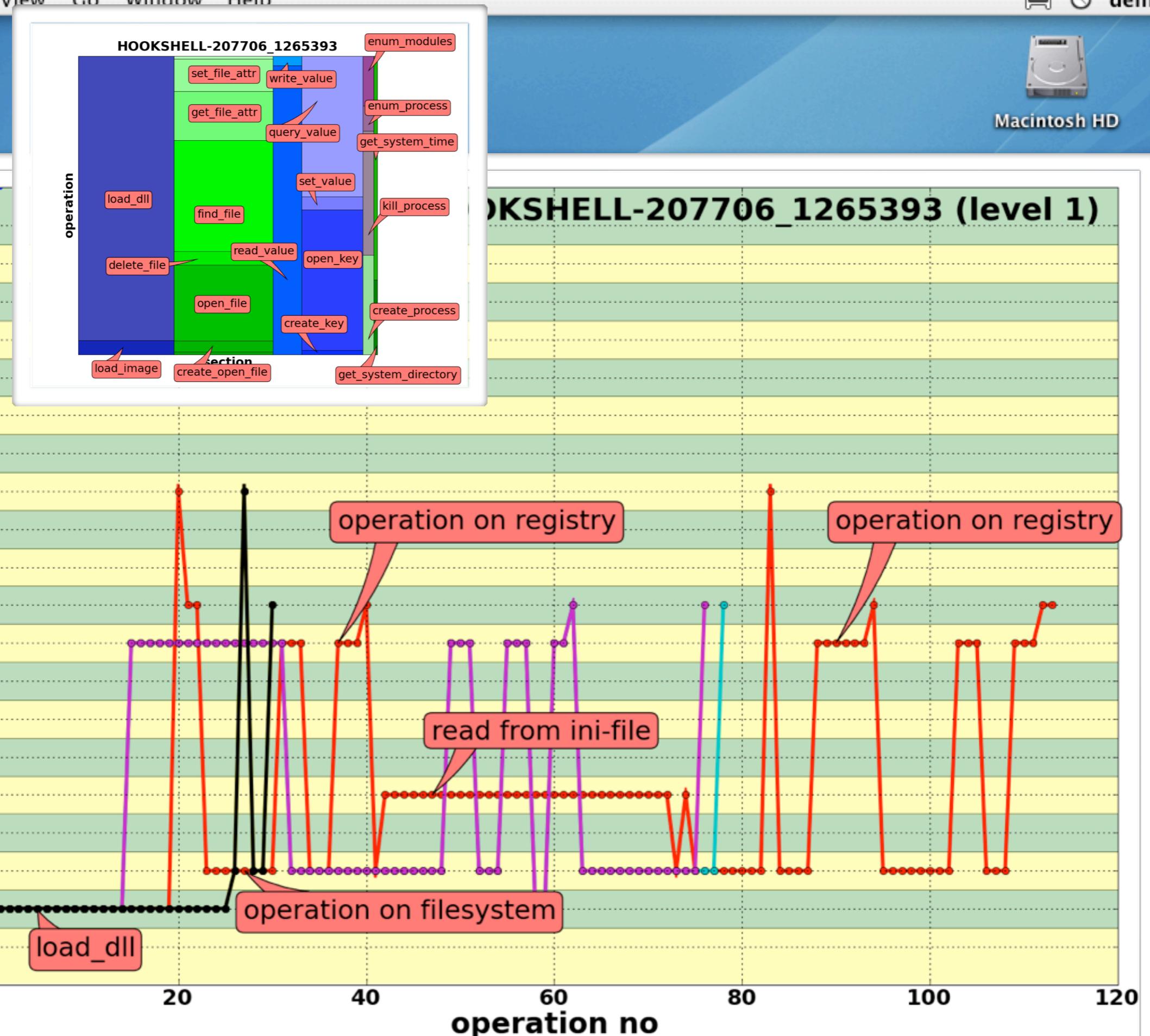


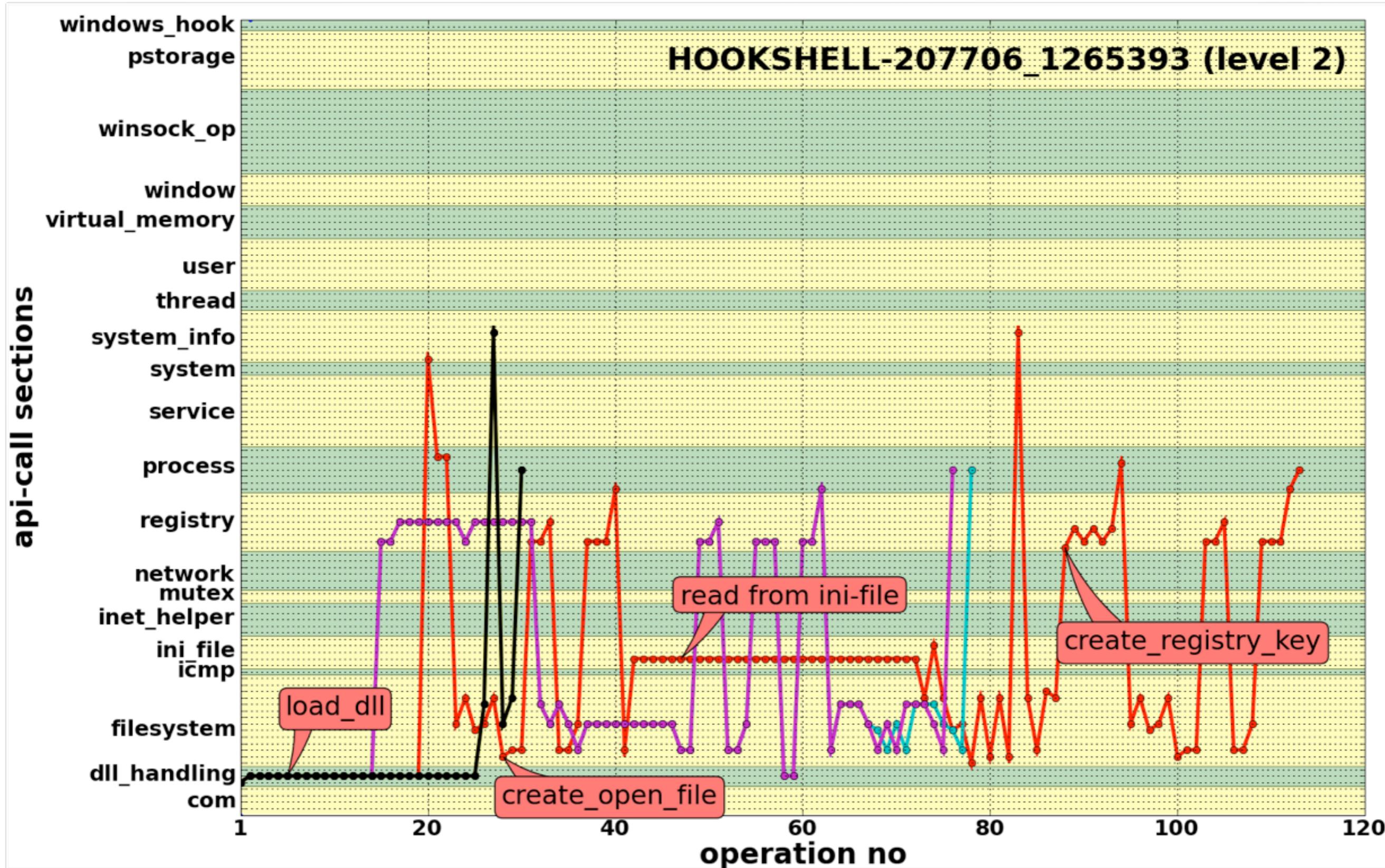


Macintosh HD

api-call sections

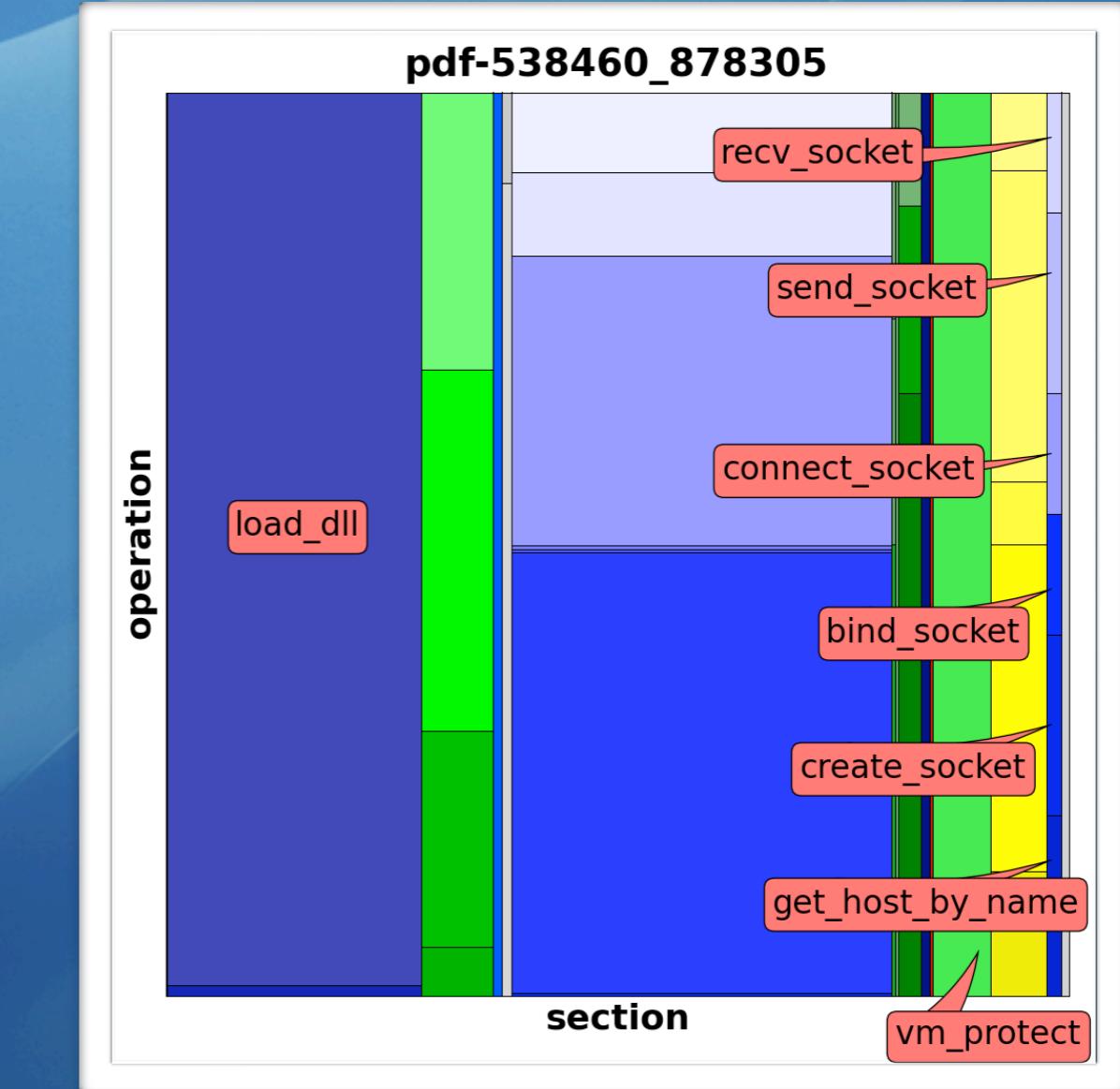
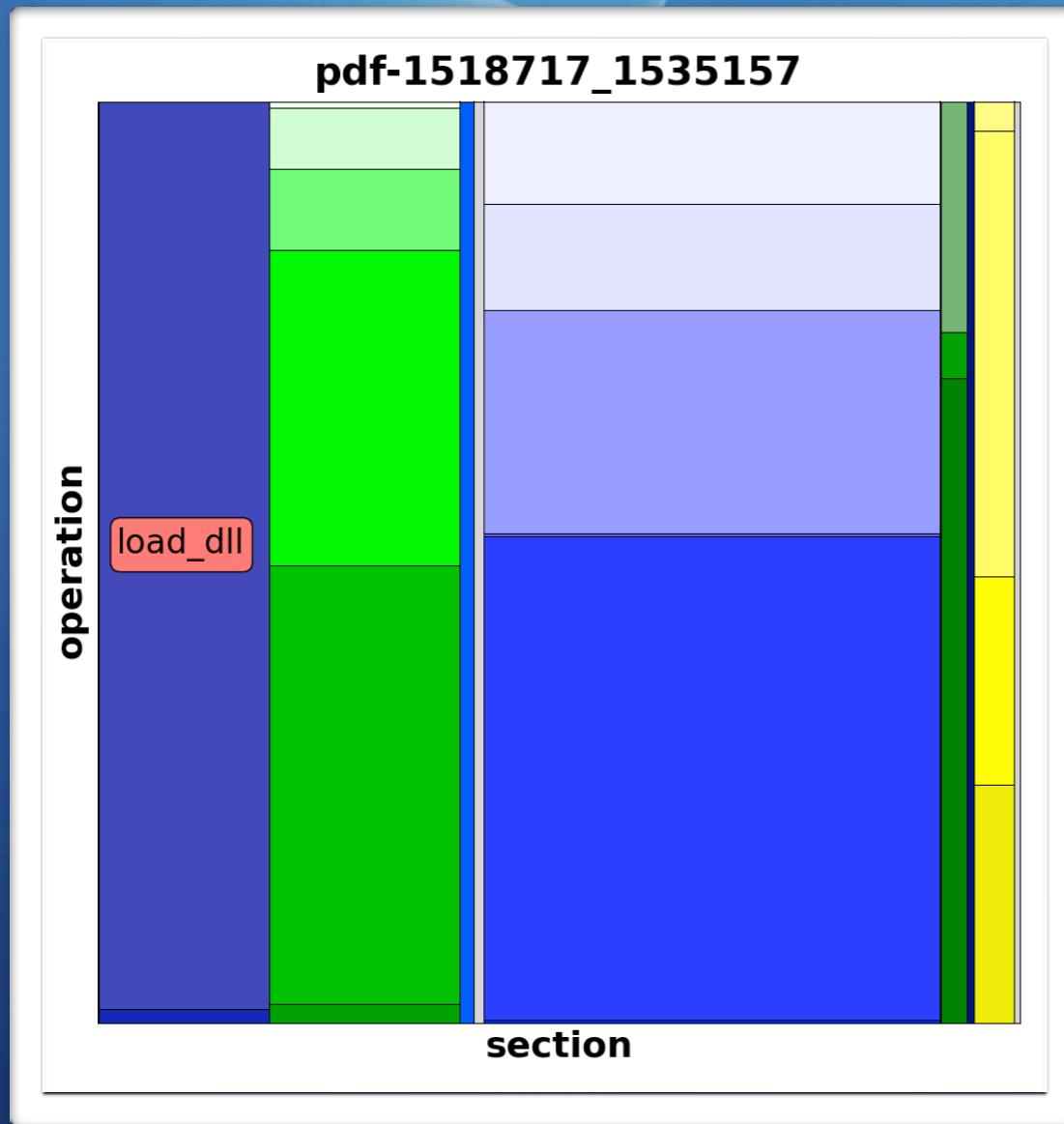
- windows_hook
- pstorage
- winsock_op
- window
- virtual_memory
- user
- thread
- system_info
- system
- service
- process
- registry
- network
- mutex
- inet_helper
- ini_file
- icmp
- filesystem
- dll_handling
- com





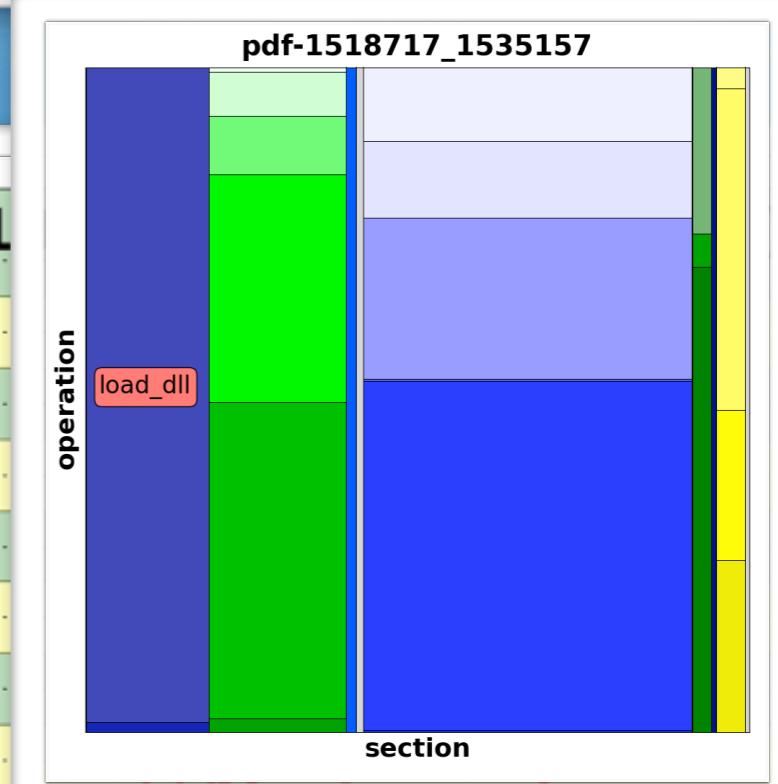
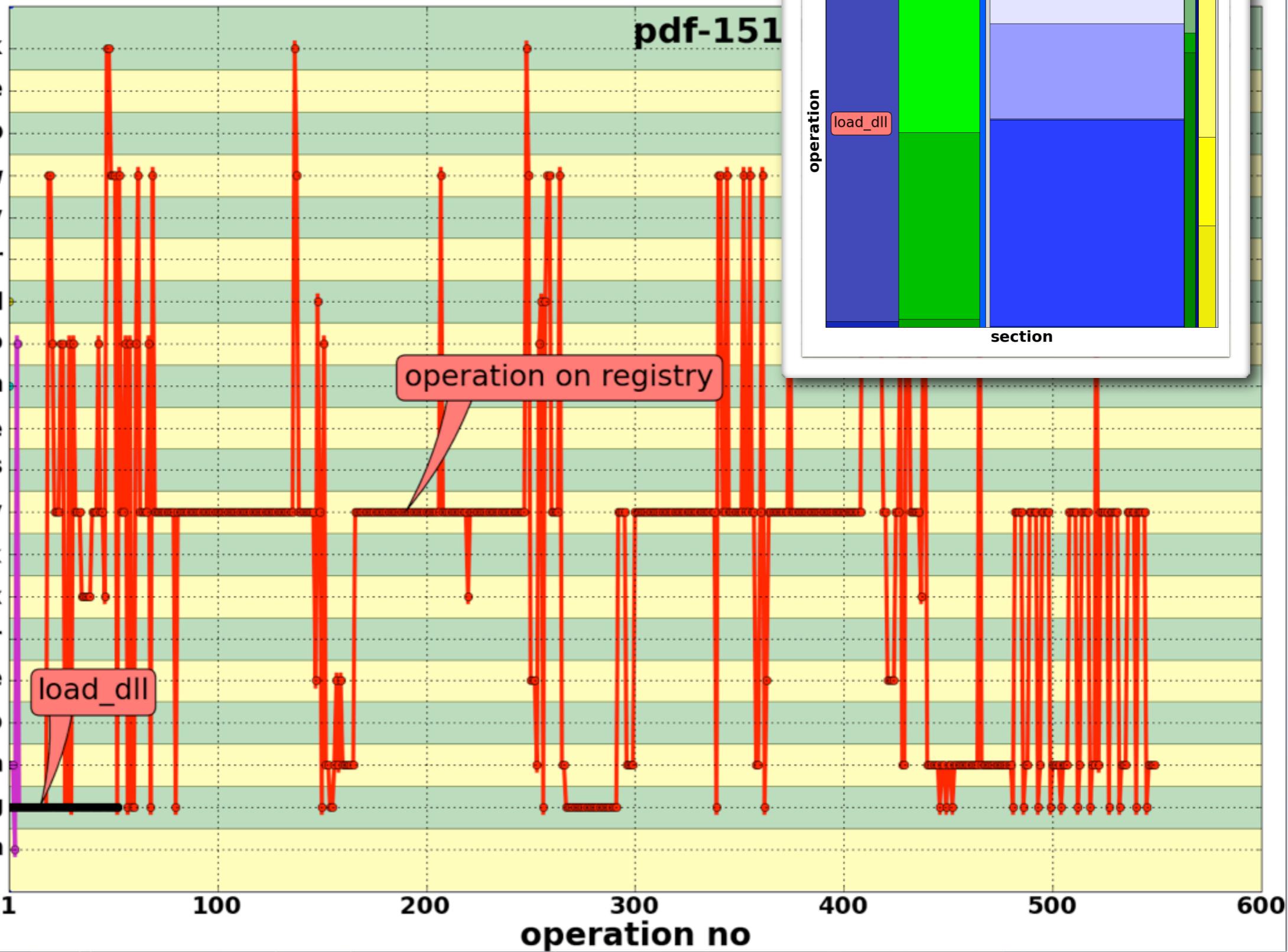


Macintosh HD



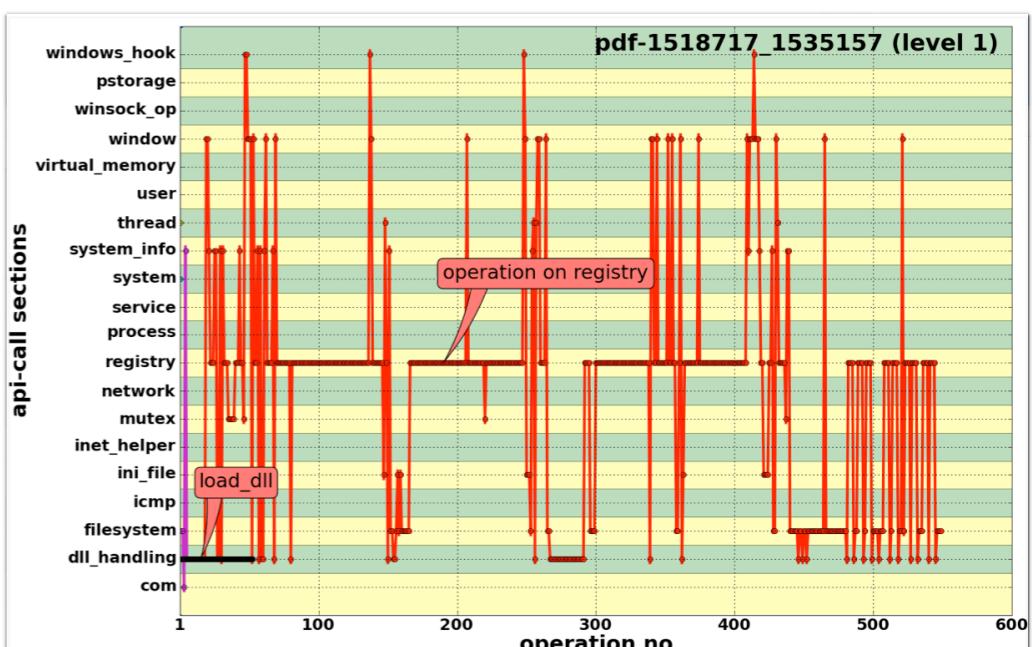
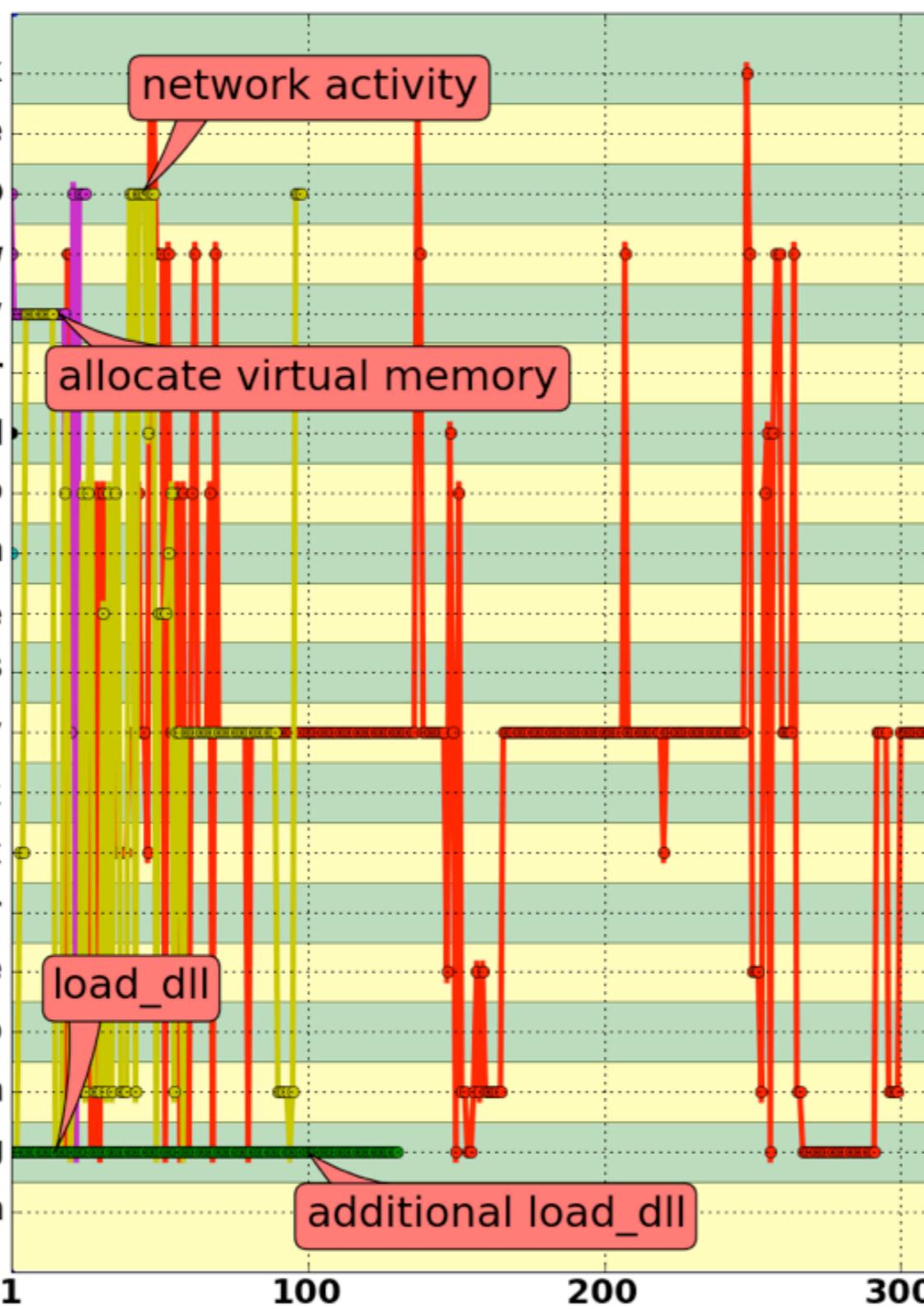
api-call sections

windows_hook
pstorage
winsock_op
window
virtual_memory
user
thread
system_info
system
service
process
registry
network
mutex
inet_helper
ini_file
icmp
filesystem
dll_handling
com



api-call sections

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system_info
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mutex
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filesystem
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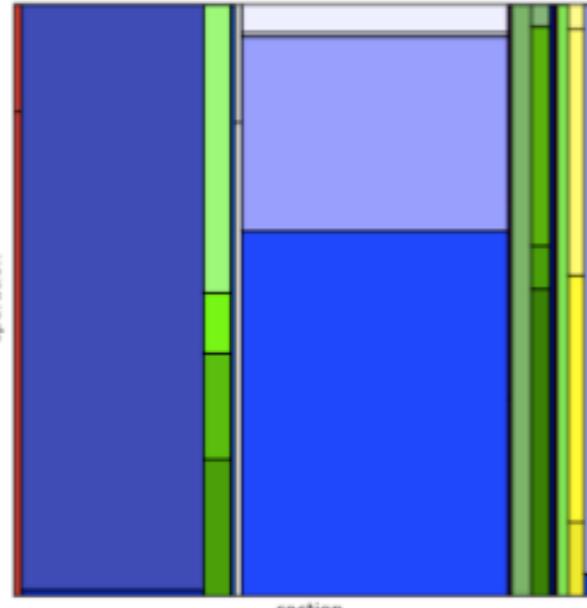
Future Work

- More / More suitable visualization techniques
- Getting feedback of other analysts
 - Include the Pics into CW Sandbox.org
 - What do you think?
- Image clustering and classification

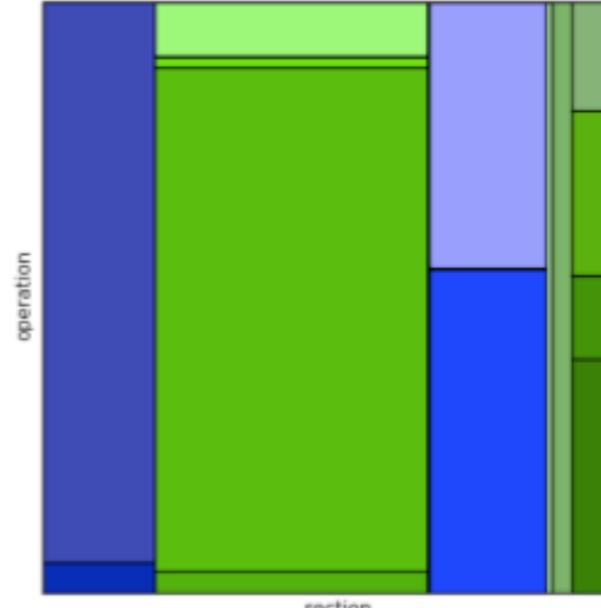


Macintosh HD

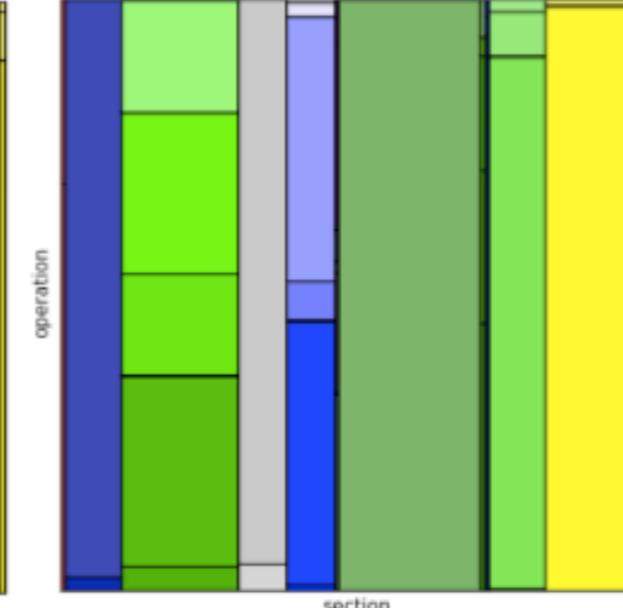
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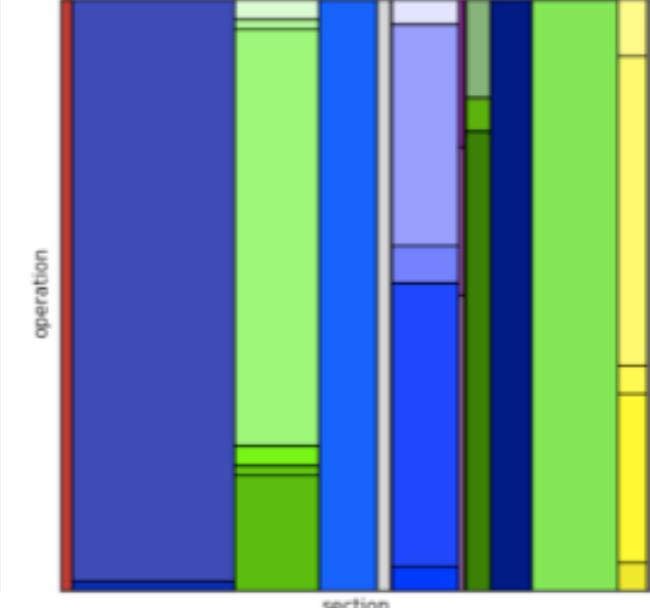
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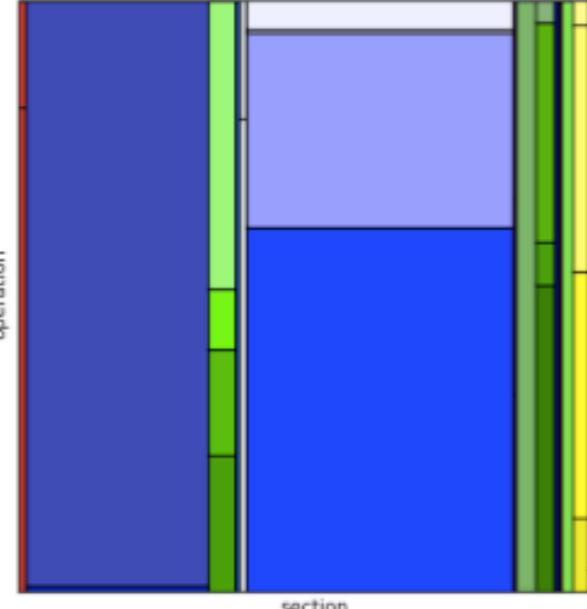
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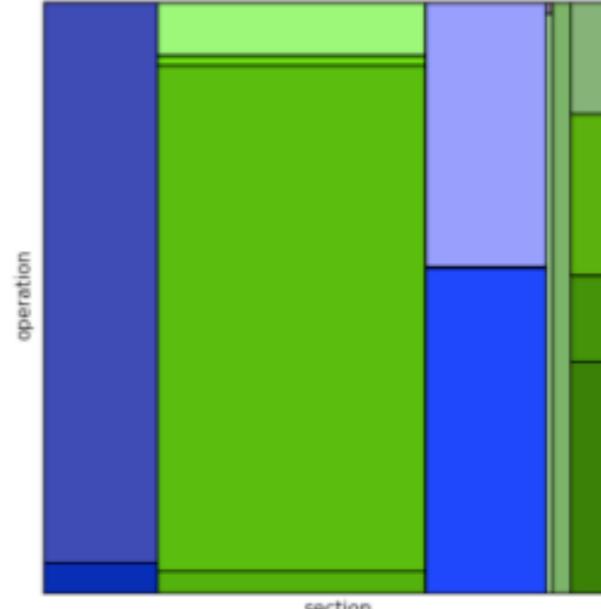
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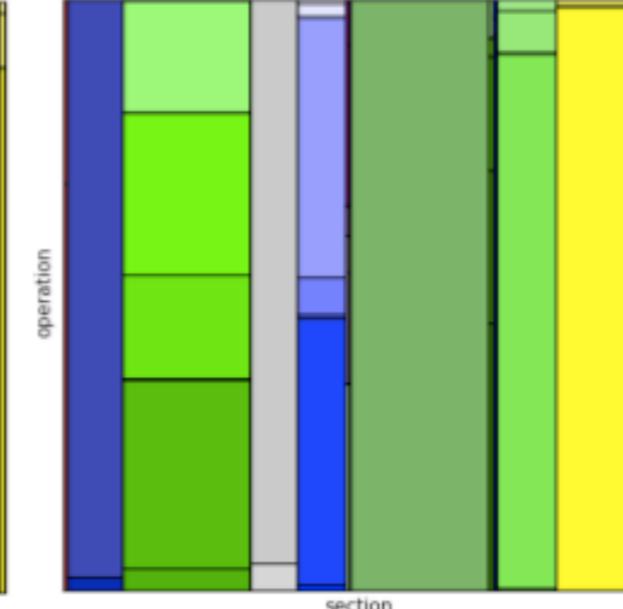
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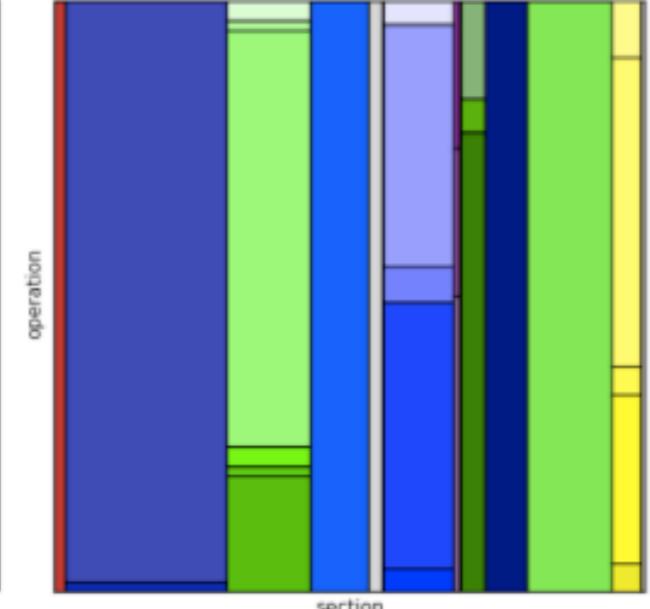
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SRAMLER.77768_1264061.png



BAGLE.207223_1265368.png



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What do you think?



PiL - Laboratory for Dependable Distributed Systems

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