

# Memory Dump Analysis Anthology

---

## Volume 9a

**Dmitry Vostokov**  
**Software Diagnostics Institute**

Published by OpenTask, Republic of Ireland

Copyright © 2016 by Dmitry Vostokov

Copyright © 2016 by Software Diagnostics Institute

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, without the prior written permission of the publisher.

You must not circulate this book in any other binding or cover, and you must impose the same condition on any acquirer.

OpenTask books are available through booksellers and distributors worldwide. For further information or comments send requests to [press@opentask.com](mailto:press@opentask.com).

Product and company names mentioned in this book may be trademarks of their owners.

A CIP catalog record for this book is available from the British Library.

ISBN-13: 978-1-908043-35-1 (Paperback)

First printing, 2016

## Table of Contents

<b>Preface .....</b>	<b>7</b>
<b>About the Author .....</b>	<b>9</b>
<b>PART 1: Professional Crash Dump Analysis and Debugging .....</b>	<b>11</b>
When realloc is not a realloc.....	11
WinDbg Shortcut !ddstack .....	12
<b>PART 2: Crash Dump Analysis Patterns .....</b>	<b>15</b>
Stack Trace Collection (CPUs) .....	15
Object Distribution Anomaly (.NET Heap) .....	19
Stack Trace Surface .....	22
Hidden Stack Trace .....	24
Evental Dumps .....	27
Active Thread (Windows).....	55
Clone Dump .....	59
Parameter Flow.....	63
Diachronic Module.....	67
<b>PART 3: Pattern Interaction .....</b>	<b>69</b>
Spiking Thread, Top Module, Module Hint, and Memory Fluctuation .....	69
<b>PART 4: A Bit of Science and Philosophy .....</b>	<b>83</b>
Quotes from Memoriarch .....	83
<b>PART 5: Software Trace Analysis Patterns .....</b>	<b>85</b>
Ruptured Trace .....	85
Sequence Repeat Anomaly .....	88
Adjoint Message .....	90
Coupled Activities .....	92
Error Powerset .....	94

Trace Dimension .....	96
Calibrating Trace .....	98
Data Interval .....	99
Identification Messages .....	101
<b>PART 6: Fun with Debugging, Crash Dumps, and Traces.....</b>	<b>103</b>
Dangerous Words .....	103
Debugging Slang.....	104
<i>MOAN</i> .....	104
<i>LOG</i> .....	104
<i>Diplodoc</i> .....	104
<i>pMud</i> .....	104
<i>HLL</i> .....	104
<i>Success</i> .....	105
<i>FOOD</i> .....	105
<i>Tor-mented</i> .....	105
<i>Obsession</i> .....	105
<i>Literature</i> .....	105
<i>CLERK</i> .....	105
<i>Analysis Paralysis</i> .....	106
<i>3D Dump</i> .....	106
<i>Star Wars</i> .....	106
<i>Daily Standup</i> .....	106
Debugging Curiosities .....	107
<i>Hung vs. Hanged</i> .....	107
<i>Trace Messages</i> .....	107
<i>13</i> .....	107
<i>Similar Cases</i> .....	107
<i>Error 1917</i> .....	108
Dump2Wave Update .....	109
Diagnostics and Debugging in Science Fiction .....	110
Suspicious Volume 9a .....	111
Music for Debugging .....	112

<i>Shpongle: Nothing Lasts But Nothing Is Lost .....</i>	112
<b>PART 7: Linux Core Dump Analysis Patterns .....</b>	<b>113</b>
NULL Pointer (Data) .....	113
Stack Trace .....	114
NULL Pointer (Code) .....	115
Spiking Thread .....	116
Dynamic Memory Corruption (process heap).....	118
Execution Residue.....	119
Coincidental Symbolic Information.....	121
Stack Overflow (user mode) .....	122
Divide by Zero (user mode).....	124
Local Buffer Overflow .....	125
C++ Exception .....	126
Paratext.....	127
Active Thread .....	129
Lateral Damage.....	130
Critical Region .....	131
<b>PART 8: Software Diagnostics, Root Cause Analysis, Debugging .....</b>	<b>135</b>
Workaround Patterns .....	135
<i>Axed Data .....</i>	135
Diagnostics, Forensics, Prognostics: The Copernican Revolution .....	137
Pattern Repertoire .....	140
Pattern-Oriented Software Internals: Pattern Paradigms and Software Internals	
Pattern Stack.....	142
Software Diagnostics Canvas .....	147
Software Traces and Logs as Proteins.....	149
Patterns-Based Root Cause Analysis Methodology .....	152
Teaching Complex Diagnostic Scenarios with Artificial Debugger (ArtDbg) and	
Pseudo-Memory Dumps .....	156
The Scope of Software Diagnostics .....	159
<b>PART 9: Art and Photography .....</b>	<b>163</b>

W - I'M DEBUGGIN' IT® .....	163
Coincidental Symbolic Information Pattern.....	164
Pisa Fault System Model .....	165
System Playing Tetris .....	166
A Pattern of Zeroes .....	167
Abnormal Structure .....	168
Control Your Software Emissions! .....	169
Component-Based Bug Architecture .....	170
<b>PART 10: Miscellaneous.....</b>	<b>171</b>
Quotes.....	171
World Software Diagnostics Day.....	173
Train Journey .....	174
<b>Appendix .....</b>	<b>175</b>
Crash Dump Analysis Checklist .....	175
Pattern Changes.....	178
<b>Index of WinDbg Commands .....</b>	<b>179</b>