

ADVANCED

.NET DEBUGGING

ADVIDEM (030b)Types.exe)

Type VI

Field Offset

Type VI

C ... Types+Coordina

Custem.Int3

MARIO HEWARDT

Foreword by PATRICK DUSSUD Technical Fellow, CLR, .NET FX, Microsoft Corporation

Praise for Advanced .NET Debugging

"While the .NET environment provides a developer with a powerful toolbox to accomplish their goals, it can often be a daunting task to debug some of the issues that inevitably crop up during software development. This book provides the crucial details about how the CLR works internally, which you need to know to diagnose many classes of bugs in your .NET programs, and it provides clear examples of how to solve the same types of issues we see our customers struggle with on a daily basis. This book is required reading for all serious .NET developers."

-Lee Culver, CLR Quick Response Team, Microsoft Corporation

"Have you ever wondered why your .NET application is not responding? Or why it's intermittently consuming high CPU? Or crashing? When things go wrong you need to think low level, using the proper knowledge and tools to investigate the internals of your application. *Advanced .NET Debugging* delivers the knowledge necessary to quickly isolate nasty software problems. Welcome to the debugging world!"

-Roberto A. Farah, Senior Premier Field Engineer, Microsoft Corporation

"Mario Hewardt's *Advanced .NET Debugging* is an excellent resource for both beginner and experienced developers working with .NET. The book is also packed with many debugging tips and discussions of CLR internals that will benefit developers architecting software. I highly recommend Mario's book."

-Jeffrey Richter, consultant, trainer, and author at Wintellect

"Mario has done it again. His Advanced Windows Debugging (coauthored with Daniel Pravat) is an invaluable resource for native code debugging, and Advanced .NET Debugging achieves the same quality, clarity and breadth to make it just as invaluable for .NET debugging. The detail he provides on how to measure managed heap usage, understand the behavior of the garbage collector, and how to track down synchronization bugs will make you more efficient at finding and fixing bugs in your managed code projects."

-Mark Russinovich, Technical Fellow, Microsoft Corporation

Advanced .NET Debugging

Table of Contents

C	\sim	n	t	Δ	n	tc
١,				_		-

Foreword

Preface

Acknowledgments

About the Author

PART I: OVERVIEW

Chapter 1: Introduction to the Tools

Debugging Tools for Windows

.NET 2.0Redistributable

.NET 2.0SDK

SOS

SOSEX

CLR Profiler

Performance Counters

Reflector for .NET

PowerDbg

Managed Debugging Assistants

Summary

Chapter 2: CLR Fundamentals

High-Level Overview

CLR and the Windows Loader

Application Domains

Assembly Overview

Assembly Manifest



Table of Contents

Type Metadata

Summary

Chapter 3: Basic Debugging Tasks

The Debugger and the Debugger Target

Symbols

Controlling Execution

Loading Managed Code Extensions

Controlling CLR Debugging

Setting Breakpoints

Object Inspection

Thread Operations

Code Inspection

CLR Internals Commands

Diagnostics Commands

SOSEX Extension Commands

Crash Dump Files

Summary

PART II: APPLIED DEBUGGING

Chapter 4: Assembly Loader

CLR Loader Overview

Simple Assembly Load Failure

Load Context Failure

Interoperability and DIINotFoundException

Debugging Light Weight Code Generation

Summary

Chapter 5: Managed Heap and Garbage Collection

Windows Memory Architecture Overview

Garbage Collector Internals

Debugging Managed Heap Corruptions



Table of Contents

Debugging Managed Heap Fragmentation

Debugging Out of Memory Exceptions

Summary

Chapter 6: Synchronization

Synchronization Basics

Thread Synchronization Primitives

Synchronization Internals

Synchronization Scenarios

Summary

Chapter 7: Interoperability

Platform Invocation

COM Interoperability

Debugging P/Invoke Calls

Debugging Interop Leaks

Debugging COM Interop Finalization

Summary

PART III: ADVANCED TOPICS

Chapter 8: Postmortem Debugging

Dump File Fundamentals

Windows Error Reporting

Summary

Chapter 9: Power Tools

PowerDbg

Visual Studio

CLR Profiler

WinDbg and the CmdTree Command

Summary

Chapter 10: CLR 4.0

Tools



Table of Contents

Managed Heap and Garbage Collection Synchronization Interoperability Postmortem Debugging Summary

Index

