



DAQUAS



Microsoft

Advanced Debugging Techniky .NET Framework

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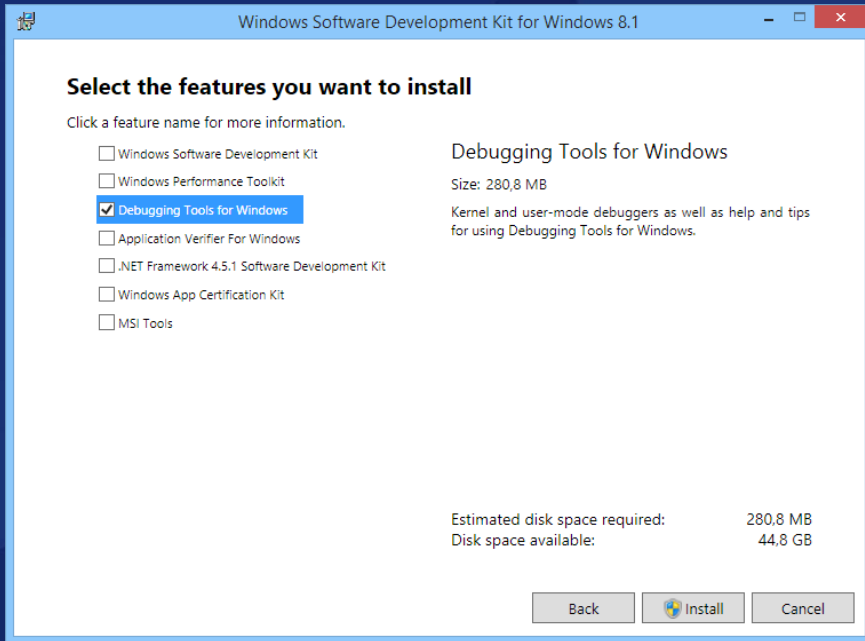
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Debugging Tools for Windows



- WinDbg – „GUI“
- NTSD – new console
- CSD – classic console

- portable
- low-level
- extensions

Debugger Extensions pro .NET

```
.load C:\path\to\extension.dll
```

SOS.dll – Son of Strike, součást .NET

```
.loadby sos mscorwks (.NET < 4)
```

```
.loadby sos clr (.NET >= 4)
```

PSSCOR2/PSSCOR4 – širší SOS (web)

SOSEX – 3rd party

```
!help [<command>]
```

Záludnosti použití Debuggeru

Platform - x86 vs. x64 vs. ...

Symbols

`.symfix` (MSFT Symbols Server)

`.sympath`, `.sympath+`

`.reload`

.NET Data Access Layer (mscordacwks.dll)

`.cordll -ve -u -l`

stejná verze, jako na laděném stroji (dtto SOS)

Režimy práce s Debuggerem

Open Executable... (**g** pro Run)

Attach to a Process...

Open Crash Dump...

- Task Manager / Create Dump File
- WIN32 API (extern .NET)
- DebugDiag / ADPLUS
- Windows Error Reporting

...

DEMO

.NET Internals - AppDomains

System

- zakládá Shared a Application
- loads mscorlib.dll (into Shared)
- spravuje AppDomains, spravuje strings
- předvytvoří instance výjimek OoM, SO, ...

Shared

- obsahuje mscorlib.dll + basic types - string, enum, ..

Application (n)

- user code

!DumpDomain [<addr>]

.NET Internals - Assemblies

Assembly = unit of deployment

- manifest
- jeden nebo několik Modules
- self-describing

JIT Compilation, MSIL, Method Tables, Method Descr.

```
!DumpAssembly <AssAddr>
```

```
!DumpModule [-mt] <ModuleAddr>
```

```
!DumpMT <MTaddr>
```

```
!IP2MD <IPaddr>
```

```
!DumpMD <MDaddr>
```


DEMO

Stack Examination

!ClrStack [-a] [-l] [-p]

!DumpStack [-EE]

!EEStack [-EE] (all threads)

!DumpStackObjects

Threads

!Threads

~123s

!ThreadPool

!ThreadState <state>

DEMO

Heap Examination

```
!DumpHeap [-stat] [-type <name>]
           [-mt <MTaddr>] [-live|dead]
!HeapStat [-inclUnrooted]
!GCRoot <ObjAddr>      !GCHandles
!GCWhere <ObjAddr>
!EEHeap -gc
!FinalizationQueue
!FindAppDomain <ObjAddr>
```

DEMO

Object Inspection

!DumpObject <ObjAddr>

!DumpArray <ObjAddr>

!DumpVC <MTaddr> <ObjAddr>

dd <addr>

dq <addr>

!ObjSize <ObjAddr>

DEMO

Error Diagnostics

`!VerifyHeap`

`!VerifyObj <ObjAddr>`

`!PrintException <ObjAddr>`

...viz další techniky + `DebugDiag`

DebugDiag

- „user“-friendly UI
- připravené analýzy
- sběr dat/dumpů
- pod pokličkou debugger services

Scénáře použití

memory leak + OutOfMemoryException

- !DumpHeap, !GCRoot

tichý crash

- StackOverflowException
- unhandled exception mimo ASP.NET thread
- !ClrStack



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Q & A

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