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WinDbg
s .NET Core

DEMO, DEMO, DEMO

WinDbg Reference

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)
.loadby sos coreclr (.NET Core)
```

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

Záludnosti použití Debuggeru

Platform - x86 vs. x64

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
- DebugDiag / ADPLUS
- Windows Error Reporting
- Windows Crash Dump
- WIN32 API (extern v .NET)

Stack Examination

```
!ClrStack [-i] [-a] [-l] [-p]
!DumpStack [-EE]
!EEStack [-EE] (all threads)
!DumpStackObjects (typy)
```

Heap Examination

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

Object Inspection

```
!DumpObject <ObjAddr>
!DumpArray <ObjAddr>
!DumpVC <MTaddr> <ObjAddr>
dd <addr>
dq <addr>
!ObjSize <ObjAddr>
```

Error Diagnostics

```
!PrintException [ObjAddr] [-nested]
!DumpAllExceptions     (PSSCOR4)
!wdae                  (NETEXT)
!wpe                   (NETEXT)
!VerifyHeap
!VerifyObj <ObjAddr>
!analyze -v            (native)
```

Threads

```
!Threads
```

```
~123s
```

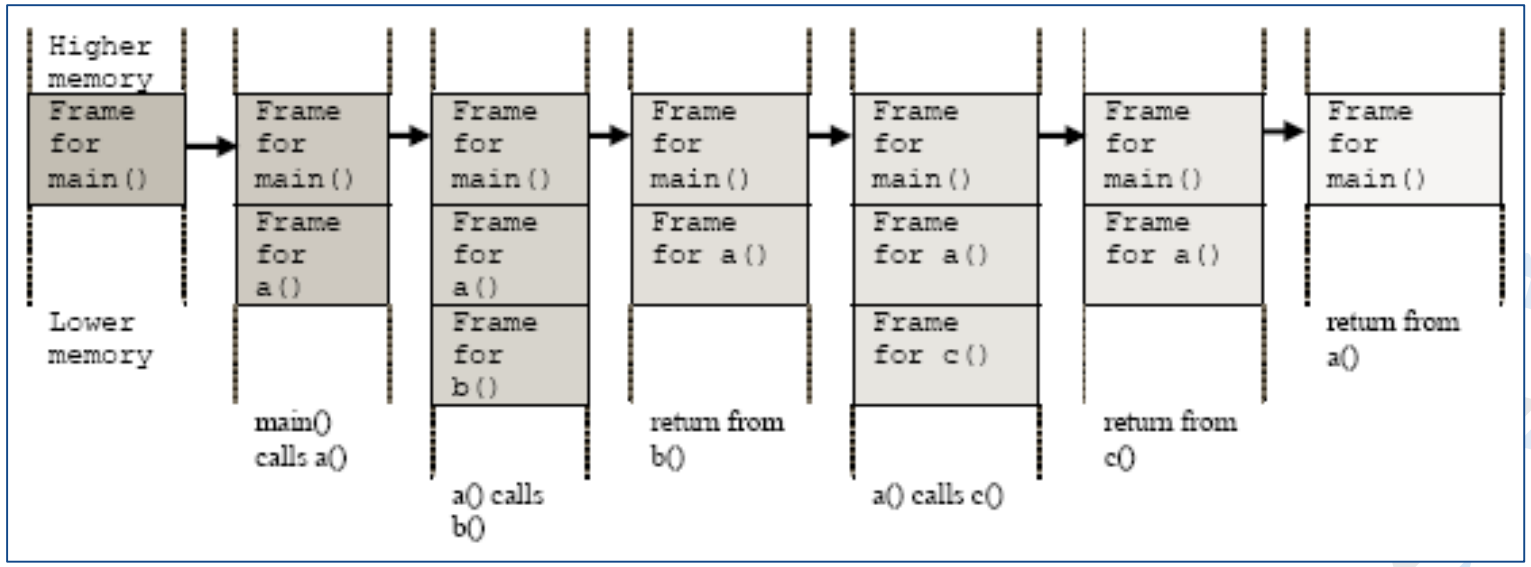
```
!ThreadPool
```

```
!ThreadState <state>
```

Stack a volání metod

```
void main()
{
    a();
}

void a()
{
    b();
    c();
}
```



Datové typy

Hodnotové

- in-place hodnota
- primitivní typy
- `Int16/32/64`, `Byte`, `Boolean`, `Double`, ...
- `char`, `Decimal`
- **`struct`** - `DateTime`, `Nullable<T>`, vlastní, ...

Referenční

- „hodnotou“ je odkaz na instanci (tj. adresa)
- `class` (vč. `Object`)
- pole – `Array`, `type[]`
- `string`
- na jednu instanci může ukazovat více referencí