

Performance Tips

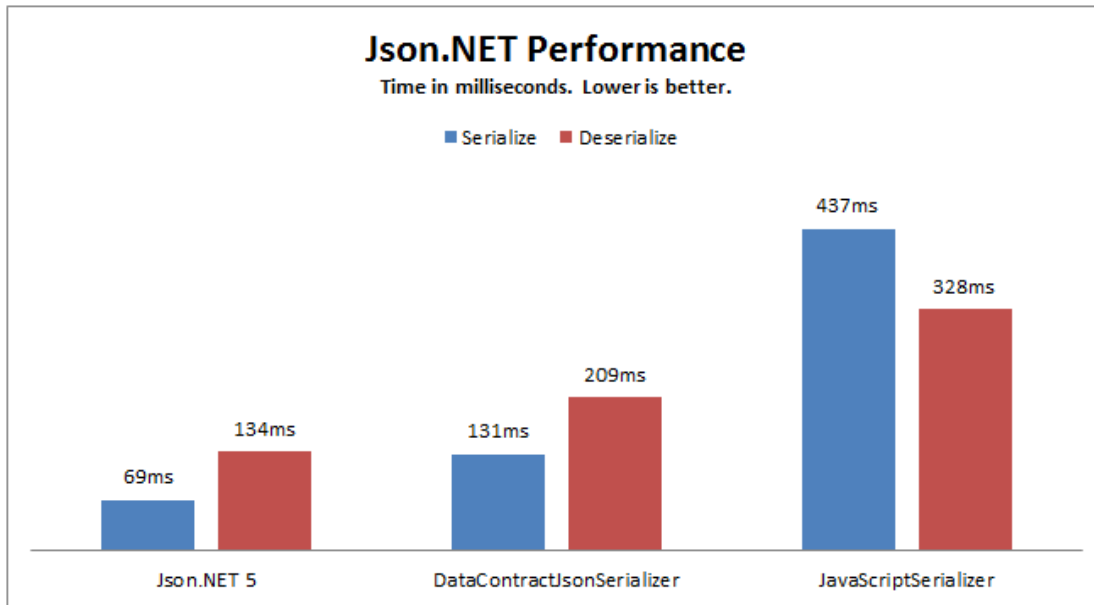


Xavier Morera

@xmorera | www.xaviermorera.com

Json.NET vs. Other Serializers

Multiple benchmarks put Json.NET as the fastest serializer



But more than comparing...

Focus on improving within Json.NET

Performance Scenarios

Manual
Serialization

Fragments

Populate Objects

Merge

Attributes

Memory Usage

How We Are Going to Measure

- Stopwatch → Easy way

```
Stopwatch watch = new Stopwatch();  
watch.Start();
```

```
Stopwatch watchNoAttributes = new Stopwatch();  
watchNoAttributes.ElapsedMilliseconds
```



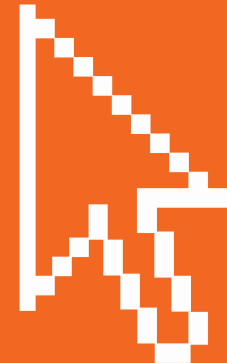
Serialize/Deserialize Manually

- Json.NET is extremely fast
- But it relies on reflection
- If speed is key → serialize manually
- Use JsonTextReader and JsonTextWriter
- Avoids using Reflection
- Less memory usage
- Fastest way of reading and writing JSON



Demo 13: Serialize & Deserialize Manually (vs. Reflection Based)

If speed is what matters...





logs1.json

```

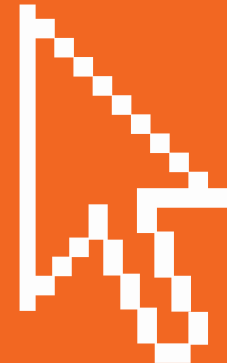
1  [{
2      "ip": "192.168.1.1",
3      "cookie": "__ar_v4=4YCMENXFKFBQLNQCLOV3GS%3A20141026%3A2%7CNPTOMQSYYZABNNUIQDRAKL%3A20141026%3A2%7CBFLWHRV7W5FLTIZIQ4OSO6%3A20141026%3A2",
4      "userAgent": "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/44.0.2403.89 Safari/537.36",
5      "acceptLanguage": "en-US,en;q=0.8,es;q=0.6",
6      "courseView": {
7          "userId": 3641,
8          "user": "user_3641",
9          "course": "Solr",
10         "watchedDate": "2015-07-13T00:00:00",
11         "secondsWatched": 696
12     },
13     "privateImportantData": {
14         "m_MaxCapacity": 2147483647,
15         "Capacity": 1024,
16         "m_StringValue":
17         "UWSVRLQCSBYHYBNHEMEDHXFXXXFTCKULYOTRTMNGXIJBXUTJRYVBIKWQUXSGWAI FMIKGUNRYWEXOXVACKKKKYKPEWAYNTYBIBBOPKMNHDHVDLHRXXPULPWGBRGJTODEXCPNWHKRXWGC
18         CHKSOHAPDDOSDTMWEDSOERE BUTUQNVOITETGMTLOMATNWJCTMMUDQXJCJWUMJCFHYJIORPQIGAQQKNWJSVAKBLQVUQWPYYEKUMNNBMCVVLWQHSRVAKSMBTFNRMTASBJGUFVWYIIFSDOO
19         OANBYBONGRJBGAVOSBDTCPVCVTVQBNSWEQYQYRBR LUADVTQYMTMRAUMXELEEXMSXLWOAEPAALIGORGCDWDHABWJEAMMMVMMIHFWBXHELROLGILECBHTERVOMKAQCMDXUWHMVECYUCOI
20         IWWQBIJUFSEOIUJXPQCXOPQJBXHXIYXBDMGPMIOSCHSCSREBTLBEAPTRFNPDALVWTCUNT COBIUGVOPITGDMGTBMSNJYRLSQKVHPFIMAILDQTMUQXHITIJPAAYCAJDWOPEVAGYCKSCDUP
21         JSFSSBKXCXHBGHPGGMPFONBOQUJXEXBFFTJQFVGQCLLQVTTYJVEFLXFBIDNXIDGECVWLWXAJFYDDBKRWBKNHSUSHOHICIIYFHSTWHCLUUUMUCAWKQWQXLCIOWOPWAWPDWTQXYSICMWUF
22         LLHKRRLKJGVQKIKMVWTCVQEFGLQDOMLNGCCLGEFIKFTQXAMPHUGOCSJUGCDFAHVVTIKIGYGQRLQQVNHGYAVSGWKMSGEEBYICIWVOOEJIOOVQBRYSTWGYLCPWWWOYTBPRCOHXQRQTQMEQA
23         SLAHLKDSIQGHYQRPJNNYDNMJABBFLIYXXVELNRIQLYTXBQRAYEGXQRVEXPHKIWHARHJCMFBRFVNETOIIJAGGBAHGYAMWKXINQTFTHONS DOSTDRJJHXAHAQAXQADDMRDGHNYMAIOBUMMDMG
24         MCHPDPMMWAVQUOS",
25         "m_currentThread": 0
26     }
27 },
28 {
29     "ip": "192.168.1.1",
30     "cookie": "__ar_v4=4YCMENXFKFBQLNQCLOV3GS%3A20141026%3A2%7CNPTOMQSYYZABNNUIQDRAKL%3A20141026%3A2%7CBFLWHRV7W5FLTIZIQ4OSO6%3A20141026%3A2",
31     "userAgent": "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/44.0.2403.89 Safari/537.36",
32     "acceptLanguage": "en-US,en;q=0.8,es;q=0.6",
33     "courseView": {
34         "userId": 1567,
35         "user": "user_1567",
36         "course": "dotTrace",
37         "watchedDate": "2015-07-02T00:00:00",
38         "secondsWatched": 22
39     }
40 }

```

Fragments

Demo 14: JSON Fragments

Deserialize only what you need!



D:\Dropbox\xavier-morera-pluralsight-dev\json-csharp-jsondotnet-getting-started\demos\m5-18-memory-demo\logs1.json - Notepad++

FileEditSearchViewEncodingLanguageSettingsMacroRunPluginsWindow?

logs1.json

```
1  [{
2      "ip": "192.168.1.1",
3      "cookie": "__ar_v4=4YCMENXFQFBQLNQCLQOV3GS%3A20141026%3A2%7CNPTOMQSYYZABNNUIQDRAKL%3A20141026%3A2%7CBFLWHRV7W5FLTIZIQ4OSO6%3A20141026%3A2",
4      "userAgent": "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/44.0.2403.89 Safari/537.36",
5      "acceptLanguage": "en-US,en;q=0.8,es;q=0.6",
6      "courseView": {
7          "userId": 3641,
8          "user": "user_3641",
9          "course": "Solr",
10         "watchedDate": "2015-07-02T00:00:00",
11         "secondsWatched": 696
12     },
13     "privateImportantData": {
14         "m_MaxCapacity": 2147483647,
15         "Capacity": 1024,
16         "m_StringValue":
17         "UWSVRLQCSBYHYBNHEMEDHXFXXXFTCKULYOTRTMNGXIJBXUTJRYVBIKWQUXSGWAI FMIKGUNRYWEXOXVACKKKKYKPEWAYNTYBIBBOPKMNDHVDELHRXXPULPWGBRGJTODEXCPNWHKRXWGC
18         CHKSOHAPDDOSDTMWEDSOEREBUTUQNXVOITETGMTLOMATNWJCTMMUDQXJCJWUMJCFHYJIORPQIGAQQKNWJSVAKBLQVUQWPYYEKUMNNBMCVVLWQHRSVAKSMBTFNRMTASBJGUFVWYIIFSDOO
19         OANBYBONGRJBGAVOSBDTCPVCVTVQBNSWEQYQYRBRRLUADVTQYMTMRAUMXELEEEXMSXLWOAEPAALIGORGCDWDHABWJEAMMMVMMIHFJWBXHELROLGILECBHTERVOMKAQCMDXUWHMVECYUCOI
20         IWWQBIJUFSEOIUJXPQCXOPQJBXHXIYIXBDMGPMIOSCHSCSREBTLBEAPTRFNPDALVWTCCLUNTQCOBIUGVOPITGDMGTBMSNJYRLSQKVHPFIMAILDQTMUQXHITIJPAAYCAJDWOPEVAGYCKSCDUP
21         JSFSSBKXHBGHPGGMPFONBOQUJXEXBFFTJQFVGQCLLQVTTYJVEFLXFBIDNXIDGECVWLXAJFYDDDBKRWBKNHSUSHOHICIIIFYHSTWHCLUUYMUCAWKQWQWOLCOWOPWAWPDWTQXYSICMWUF
22         LLHKRRLKJGVQKIKMVWTCVQEFGLQDOMLNGCCLGEFIKFTQXAMPHUGOCSJUGCDFAHVVTIKIGYGQRLQQVNHGYAVSGWKMSGEEBYICIWVOOEJIOOVQBRYSTWGYLCPWWWOYTBPRCOHXQRQTQMEQA
23         SLAHLKDSIQGHYQRPJNNYDNMJABBFLIYXXVELNRIQLYTXBQRAYEGXQVRVEXPHKIWHARHJCMFBRFVNETOIIJAGGBAHGYAMWKXINQTFTHONSDOSTDRJHXAHAQAXQADDMDRGHNYMAIOBUMMDMG
24         MCHPDPMAVQUOS",
25         "m_currentThread": 0
26     }
27 },
28 {
29     "ip": "192.168.1.1",
30     "cookie": "__ar_v4=4YCMENXFQFBQLNQCLQOV3GS%3A20141026%3A2%7CNPTOMQSYYZABNNUIQDRAKL%3A20141026%3A2%7CBFLWHRV7W5FLTIZIQ4OSO6%3A20141026%3A2",
31     "userAgent": "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/44.0.2403.89 Safari/537.36",
32     "acceptLanguage": "en-US,en;q=0.8,es;q=0.6",
33     "courseView": {
34         "userId": 1567,
35         "user": "user_1567",
36         "course": "dotTrace",
37         "watchedDate": "2015-07-02T00:00:00",
38         "secondsWatched": 22
39     }
40 }
41 ]
```

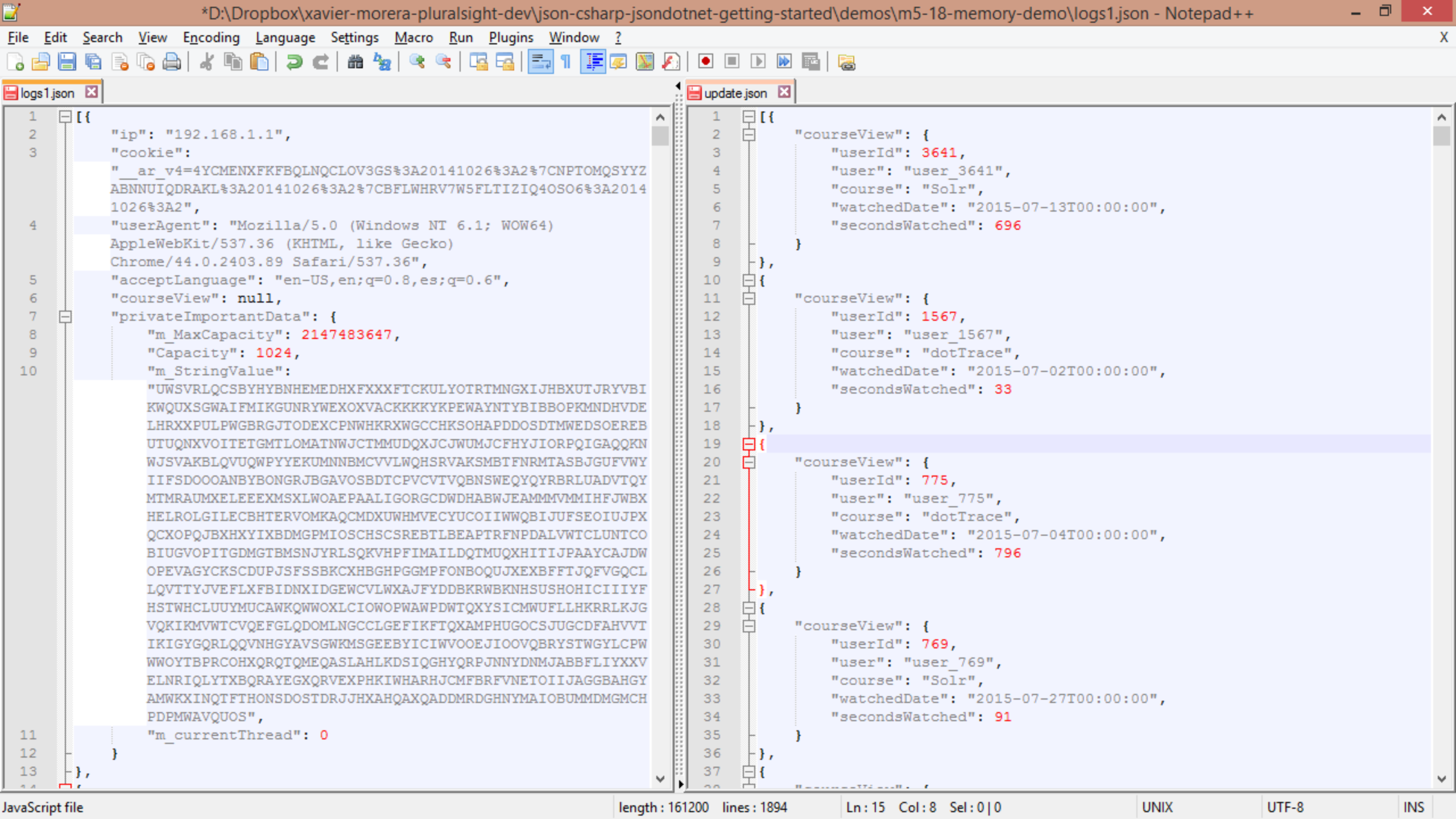
JavaScript filelength: 161325 lines: 1900Ln: 16 Col: 1029 Sel: 0|0UNIXUTF-8INS

PopulateObject

Demo 15: PopulateObject

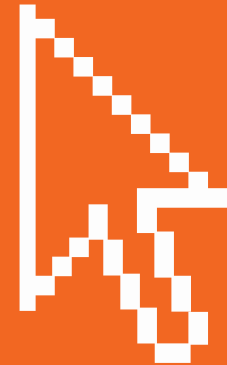
Populate JSON into Objects





Demo 16: Merge

Merge JSON Objects



*C:\Users\xavier\Documents\update.json - Notepad++

FileEditSearchViewEncodingLanguageSettingsMacroRunPluginsWindow?

logs1.json

14 {

15 "ip": "192.168.1.1",

16 "cookie":

17 "__ar_v4=4YCMENXFKFBQLNQCLOV3GS%3A20141026%3A2%7CNPTOMQSYYZABNNUIQDRAKL%3A20141026%3A2%7CBFLWHRV7W5FLTIZIQ4OSO6%3A20141026%3A2",

18 "userAgent": "Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/44.0.2403.89 Safari/537.36",

19 "acceptLanguage": "en-US,en;q=0.8,es;q=0.6",

20 "courseView": {

21 "userId": 1567,

22 "user": "user_1567",

23 "course": "dotTrace",

24 "watchedDate": "2015-07-02T00:00:00",

25 "secondsWatched": 33

26 },

27 "privateImportantData": {

28 "m_MaxCapacity": 2147483647,

29 "Capacity": 1024,

30 "m_StringValue":

31 "YHKGEEJASVFTEWKJMAUVNNTKMCVETUWILLDEVGXDGDVPQFRTKEGDPPELLNASBHEGXXV

32 IRSFNGCRPKQDSGKCTPOTSGYRPVNWUBVXRUAAPYAXNBTKGLQFJPIDDBRAPRSFVNNRK

33 XJJBPYOSTRXWFOBFPPQGNQUIYOGUBYMBYICGETQTKIISDJDQYGWHCWGNBBABHWSRLV

34 FFYYKWOUCHLOVETPVTCEXBBNFCOLMPPGGDWRYUYRGTYCLEVGRBXPWDDKSIDAJPRUH

35 PAWXXVLDLQHCLTWWHTLQAYJASGGMVRWEHGDOUTEYMUFBVBYKGRPDATIFADRPLGSTDUE

36 QIBXAHNRNEDDRGHBOAHAGLTITGCNNFBLSGTHCESOVIGECWKKIJSQSLDNSVYGRXSEICRKL

37 LYYKGRDXFPGWUQFDNIYPRBLCWBQDEWCJLYXIJGMTYPNFSIVGMATTSUSKMWMEBATHNVL

38 URVSHUEPCNGIOEJPDDIQQFNUMSHSXUFRVWBOPHMXNEQVGNXYQKPEFFUPDBFNNLQGIOM

39 QDUYUPJCLOROXUHCNFPALPCLKOBKBNJNRBGVULTOUCIALLRHFDJBHCVORKJTQYBXFEV

40 VNLGCKLPNSKYDTGEQKHGPFDRDKBAXUBKTHPLDSDAQULHUGKGAJTJNWWGPVIVAJNULIPR

41 NHDNLNJQKDWVVYUANARVWJIUGKGYGGQVMPSSRRGIUEGMDRALWEIATSLSIEMVBHJJEMBIF

42 FCIHRWRQVFCGXJUXGVDBWKNEKGNTPVPQQFQBARCVSCLYJOCWOLWPXHIUODWKJXTNOLO

43 SSSWOTGHTXOUUEPFKKASJVUMVTQMUHWJXYJDUNIUQANWAICGSSJDORFVXGBTCTLMBEV

44 UTLJVCEBIIIXLMRKSCWTUFSNFOLOSBNBUVMGLGIMAKPWWAUOBRAJOGJPBFGUJNKEUGCP

45 ALXMTJSJOVAETWNBVELOLVEGYNCMYLGBGXENOSMPPEMYBFEBBYJIPTMDEHRMFHFK",

46

47 "m_currentThread": 0

48 }

49 },

50 }

update.json

1 [{

2 "courseView": {

3 "userId": 3641,

4 "user": "user_3641",

5 "course": "Solr",

6 "watchedDate": "2015-07-13T00:00:00",

7 "secondsWatched": 696

8 }

9 }]

JavaScript file

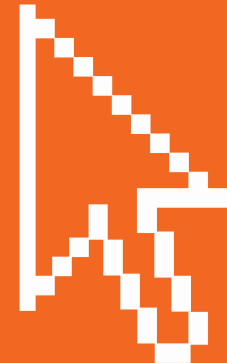
length: 155428 lines: 1867

Ln: 39 Col: 1 Sel: 0 | 0

Dos\Windows UTF-8 INS

Demo 17: Attributes for Performance

Serialize and Deserialize
Only What You Need



Profiling

xml-node-reader.exe (PID: 17352)



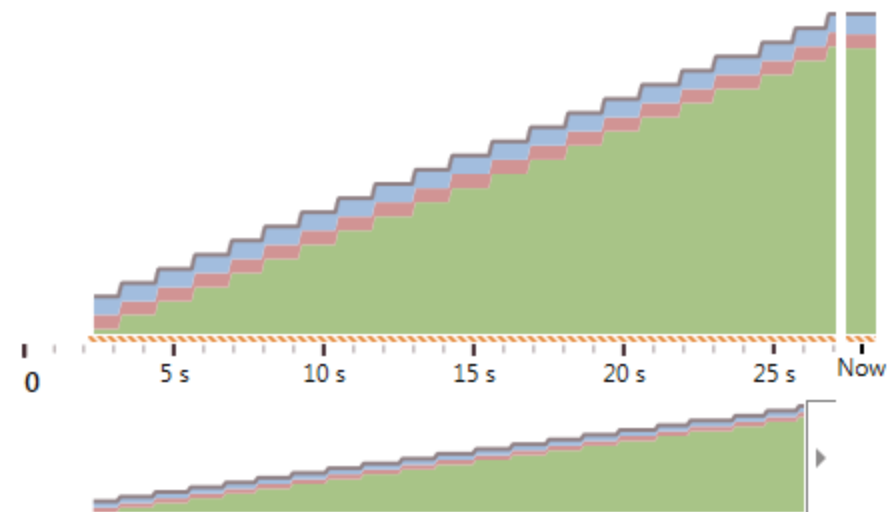
Force GC

Detach

Kill Process

Collect Allocations

Get Snapshot



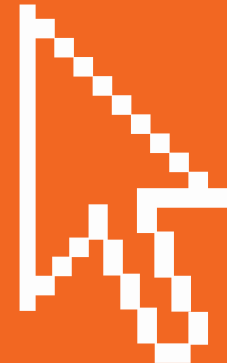
Memory Snapshots

☐ Show unmanaged memory

Demo 18: Optimize Memory Usage

Avoid Large Object Heap

Use Streams



Takeaway

Manual
Serialization

Fragments

Populate Objects

Merge

Attributes

Memory Usage