IE 8

Circular-Memory-Leak Mitigation

Memory Leak Test

author by rhio.kim

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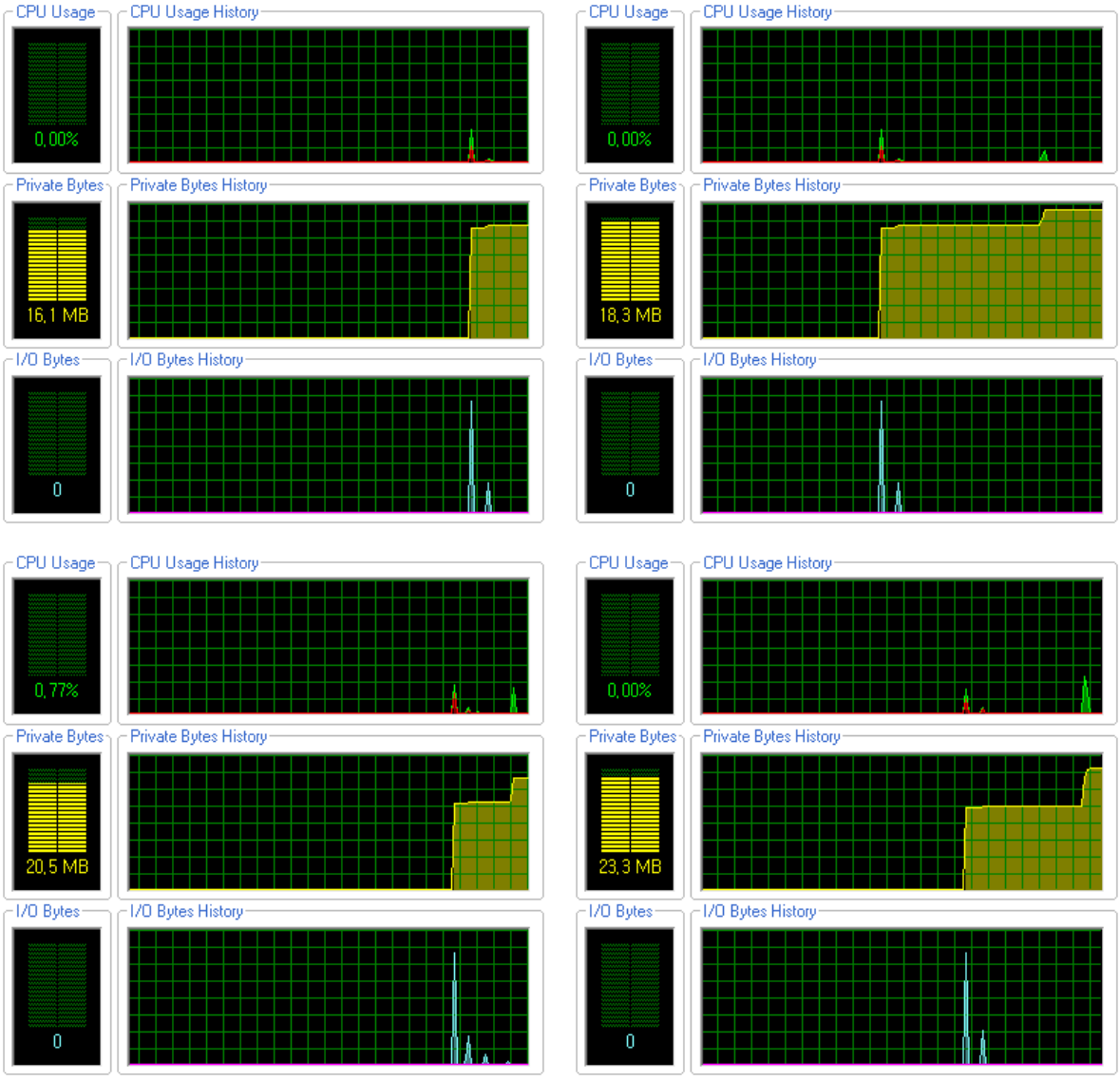
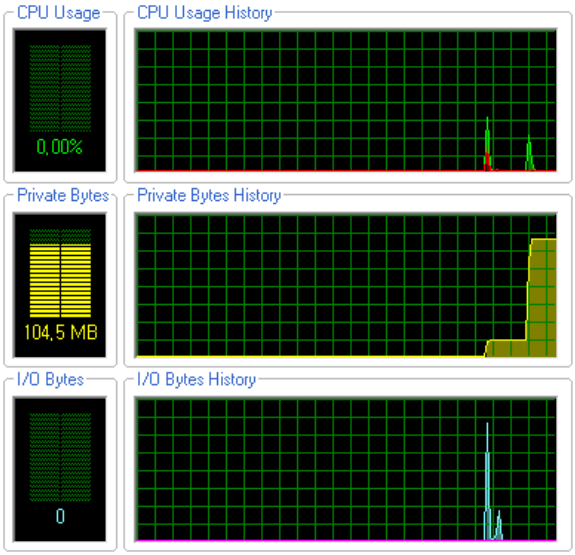
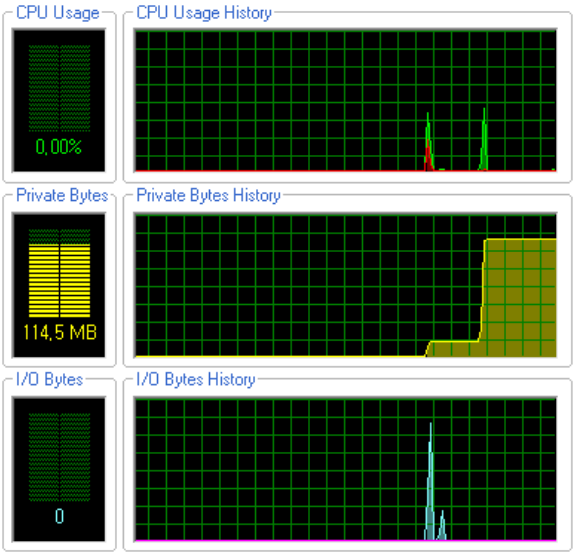
blog.ecmas4.com

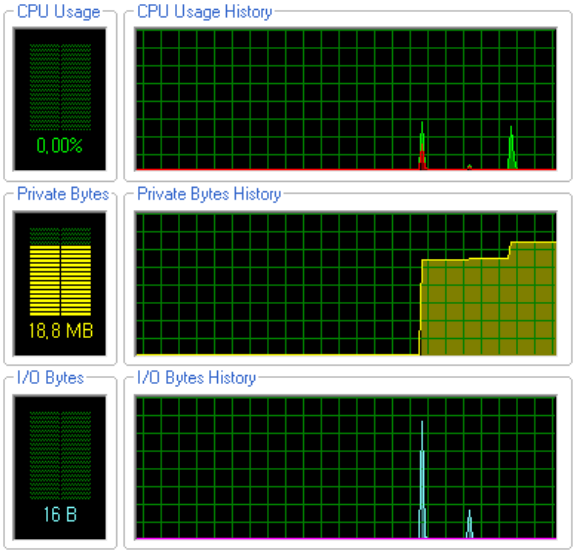
IE 6.0 브라우저 메모리 누수 테스트 (단위 : MB)

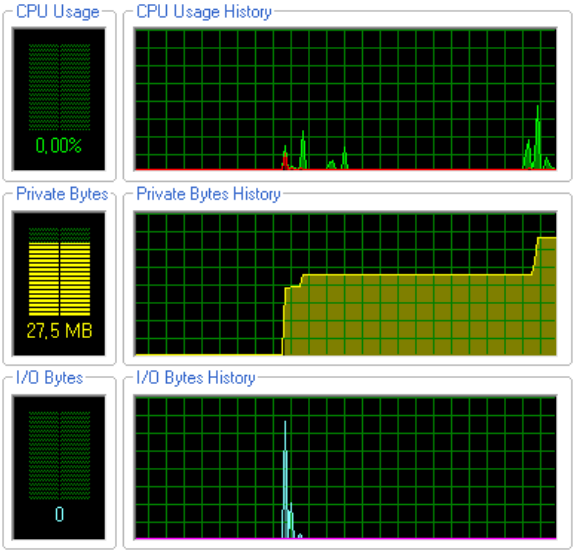
기본	Leak1	Leak2	Leak3	Leak4	Leak5	Leak6	Leak7	Leak8	Leak9	Leak10
16.1	18.3	20.5	23.3	104.5	114.5	18.8	27.5	25.3	25.3	17.1
total	239.5									

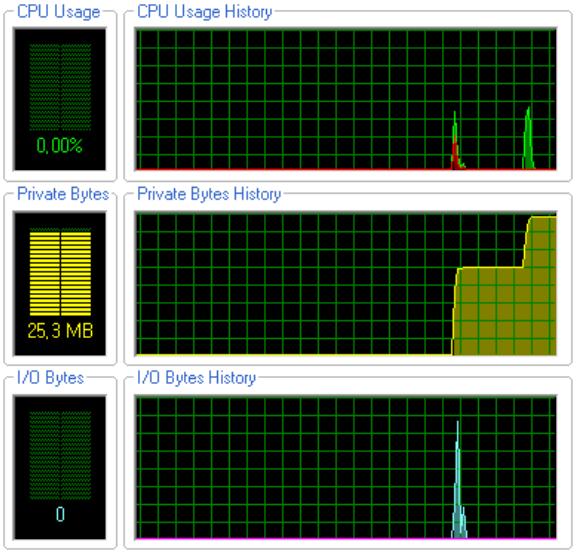


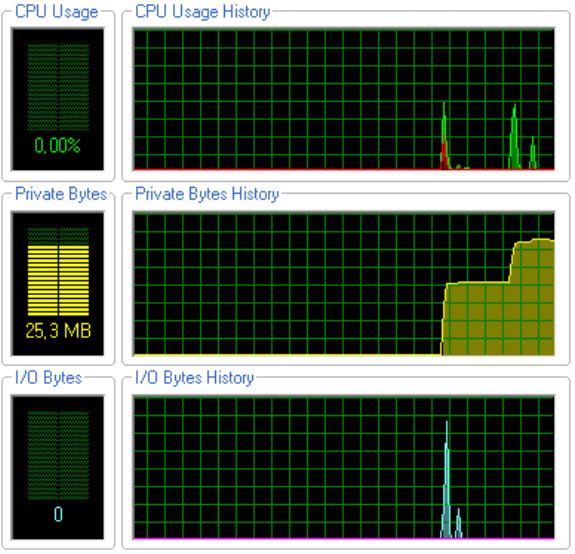

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
104,5 MB
I/O Bytes
I/O Bytes History
0

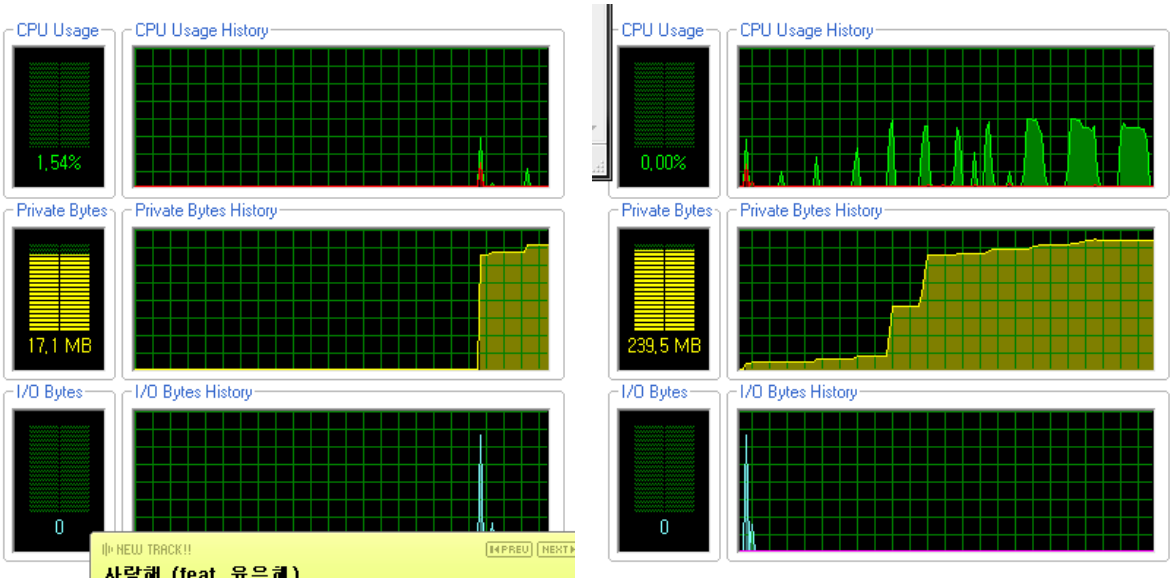

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
114,5 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
18,8 MB
I/O Bytes
I/O Bytes History
16 B


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
27,5 MB
I/O Bytes
I/O Bytes History
0

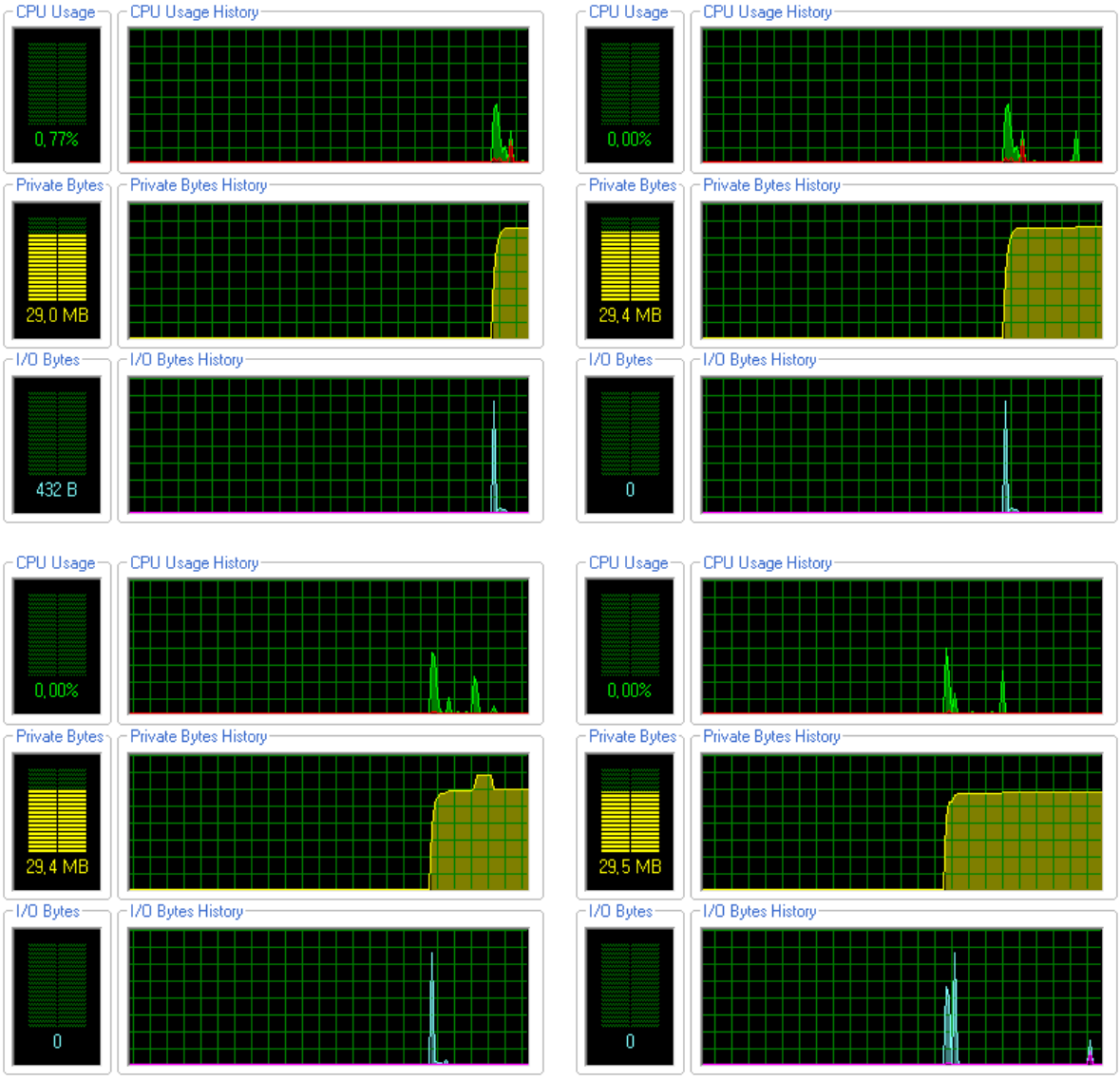

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
25,3 MB
I/O Bytes
I/O Bytes History
0

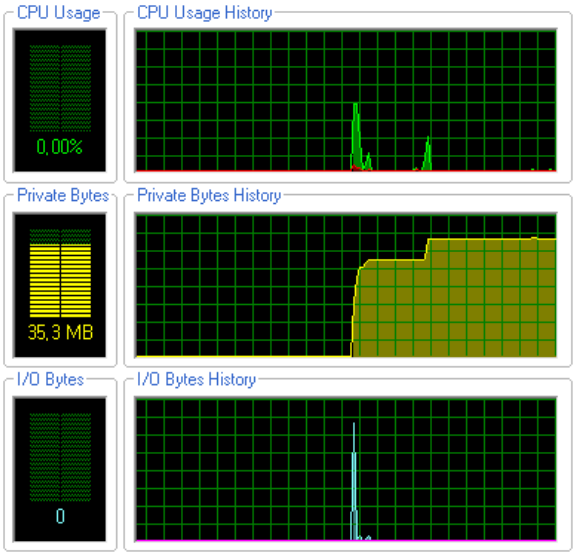

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
25,3 MB
I/O Bytes
I/O Bytes History
0

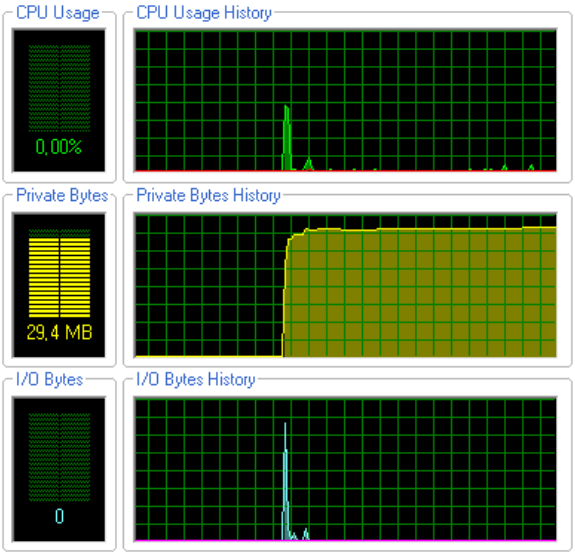

CPU Usage
CPU Usage History
1,54%
Private Bytes
Private Bytes History
17,1 MB
I/O Bytes
I/O Bytes History
0
NEW TRACK!!
PREV
NEXT
CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
239,5 MB
I/O Bytes
I/O Bytes History
0

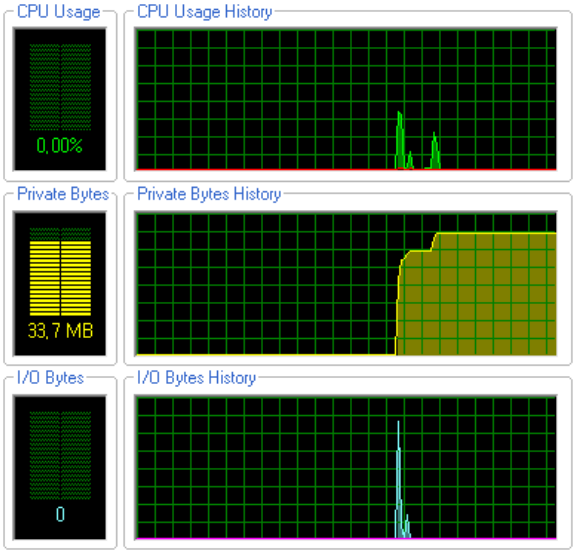
Firefox 2.0.0.9 브라우저 메모리 누수 테스트 (단위 : MB)

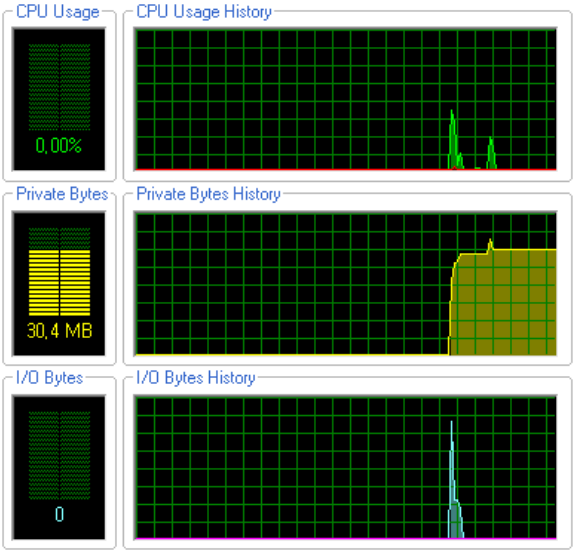
기본	Leak1	Leak2	Leak3	Leak4	Leak5	Leak6	Leak7	Leak8	Leak9	Leak10
29.0	29.4	29.4	29.5	35.3	29.4	33.7	30.4	58.7	37.7	29.5
total	45.5									

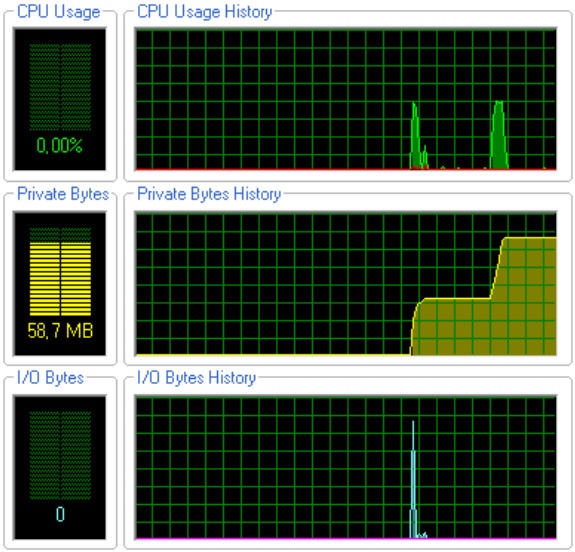


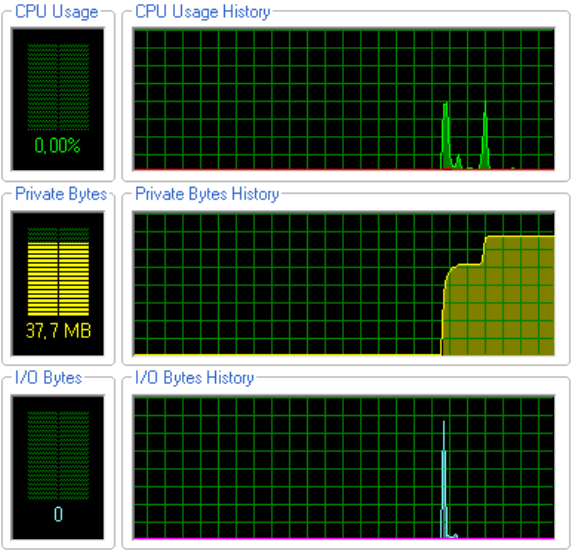

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
35,3 MB
I/O Bytes
I/O Bytes History
0

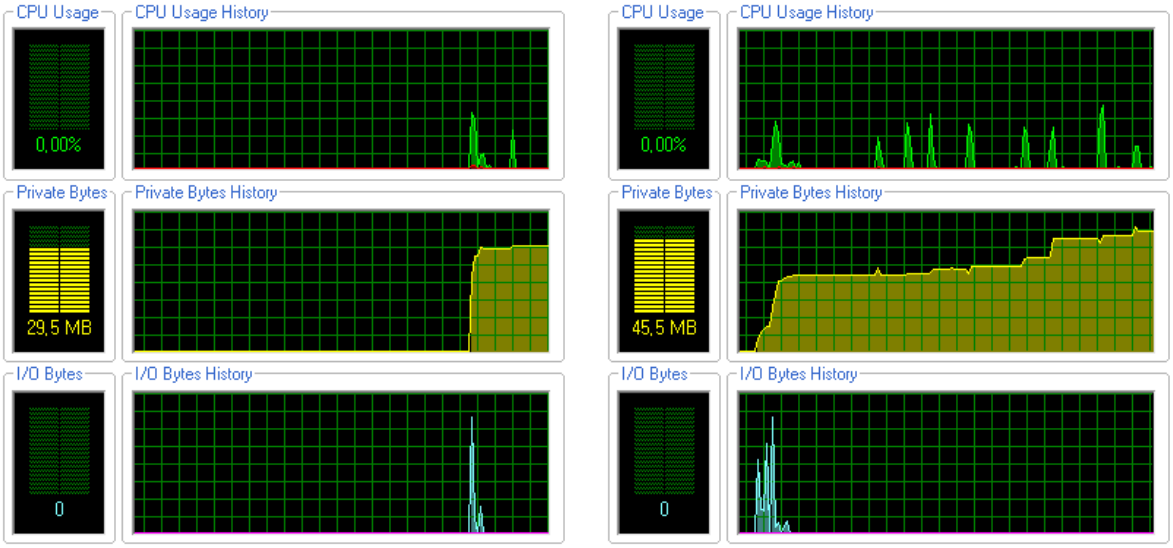

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
29,4 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
33,7 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
30,4 MB
I/O Bytes
I/O Bytes History
0

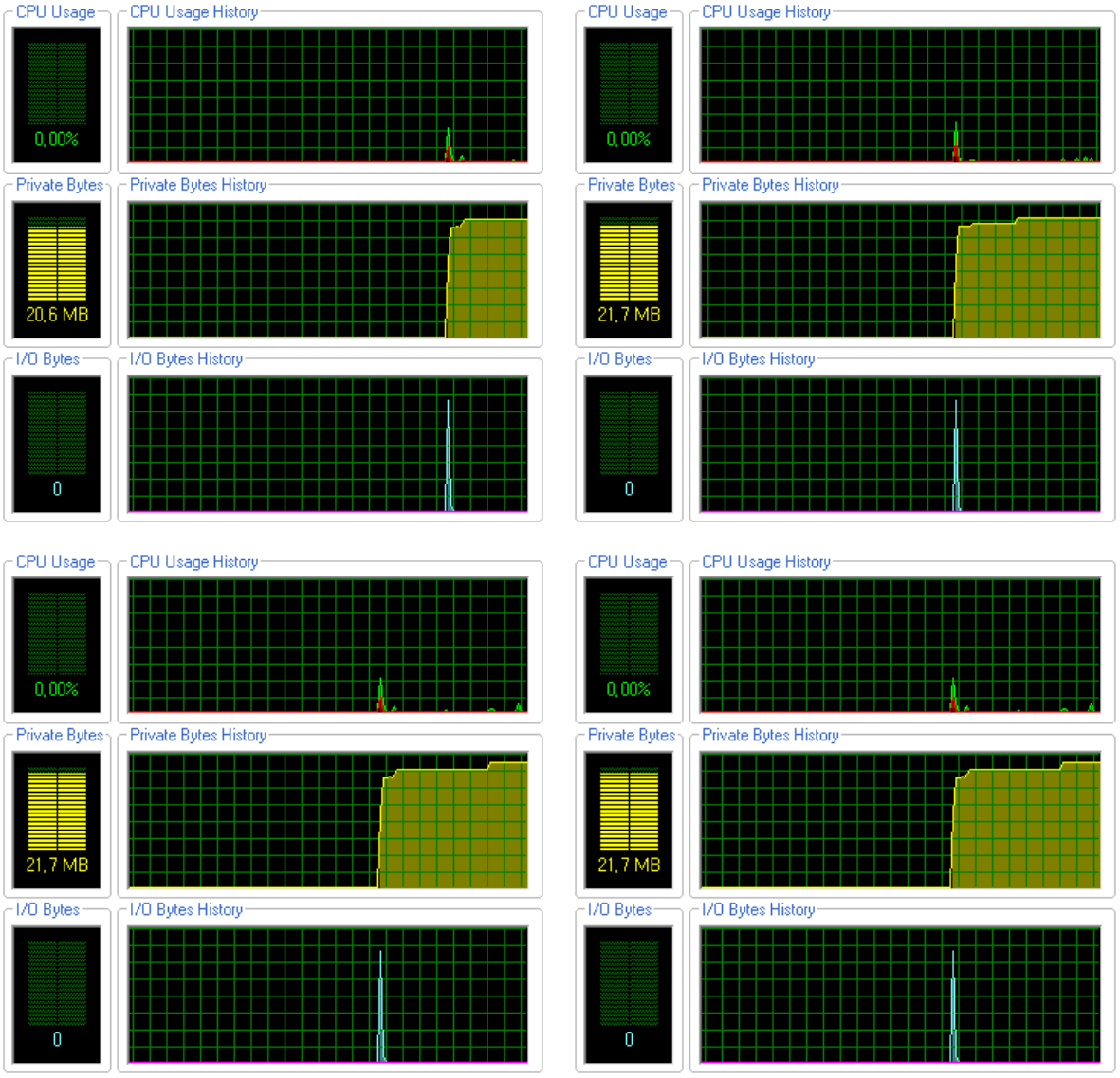

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
58,7 MB
I/O Bytes
I/O Bytes History
0

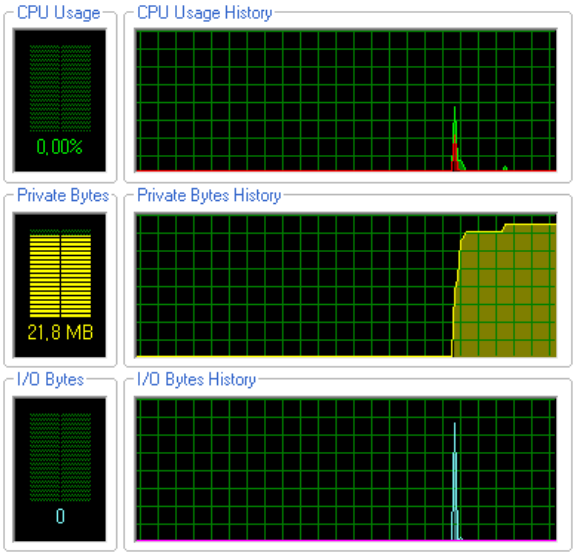

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
37,7 MB
I/O Bytes
I/O Bytes History
0

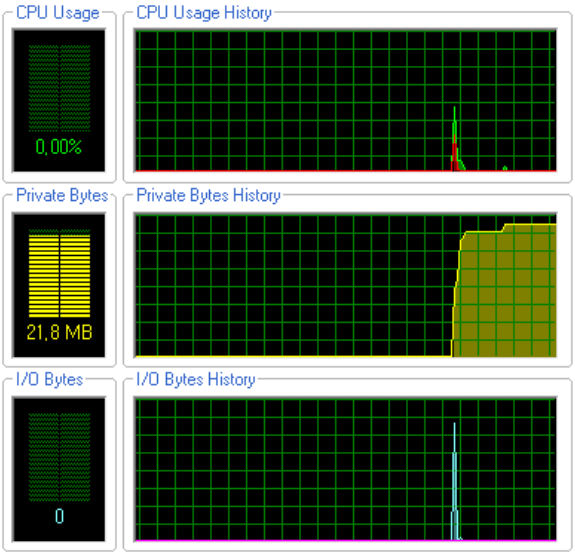

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
29,5 MB
I/O Bytes
I/O Bytes History
0
CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
45,5 MB
I/O Bytes
I/O Bytes History
0

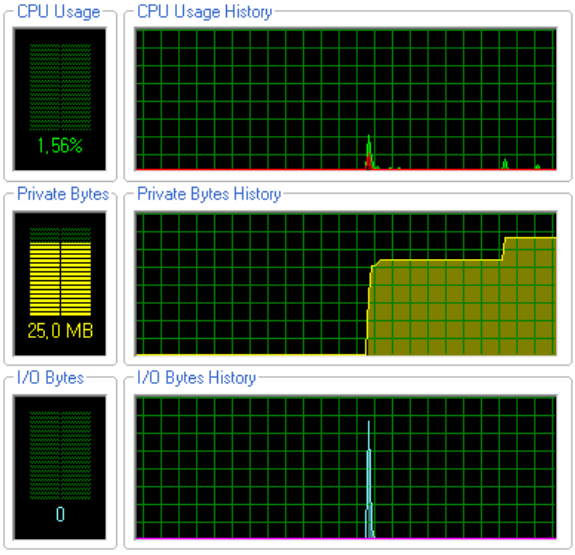
Safari 3.1 브라우저 메모리 누수 테스트 (단위 : MB)

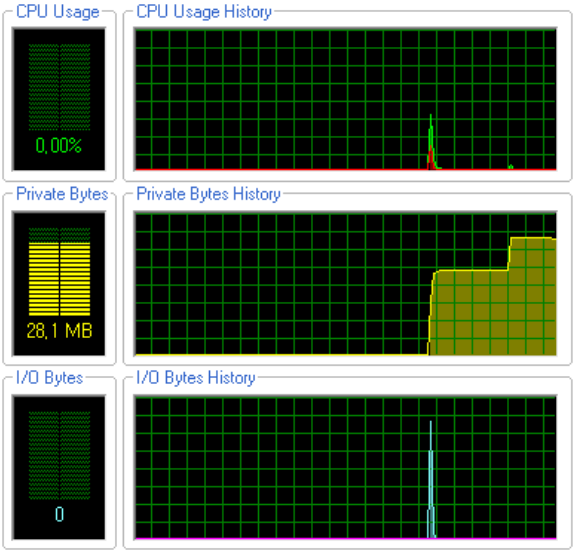
기본	Leak1	Leak2	Leak3	Leak4	Leak5	Leak6	Leak7	Leak8	Leak9	Leak10
20.6	21.7	21.7	21.7	21.8	-	25.0	28.1	-	30.1	21.8
total	43.5									

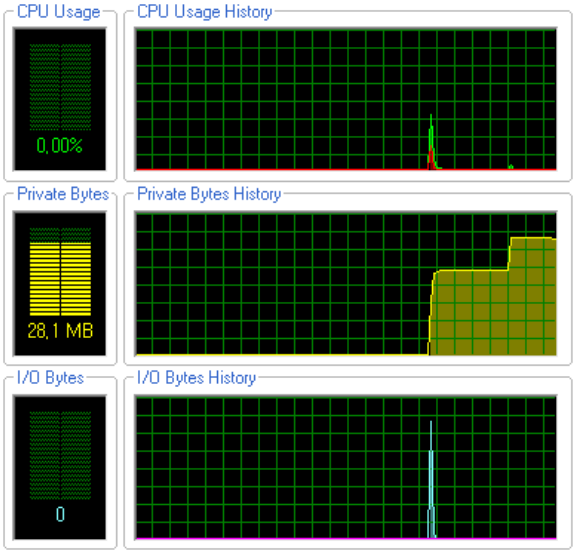


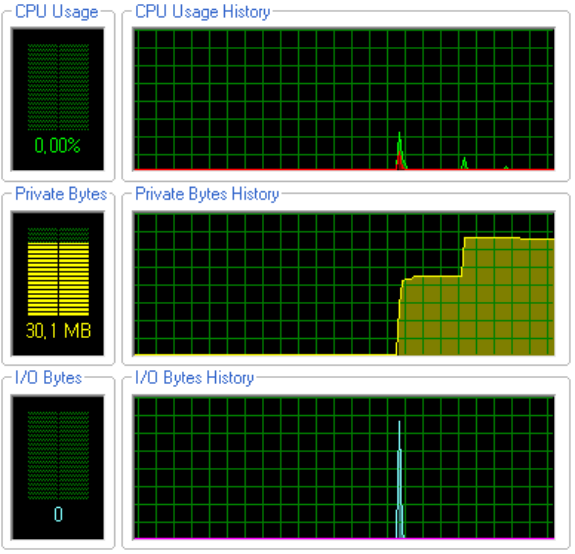

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
21,8 MB
I/O Bytes
I/O Bytes History
0

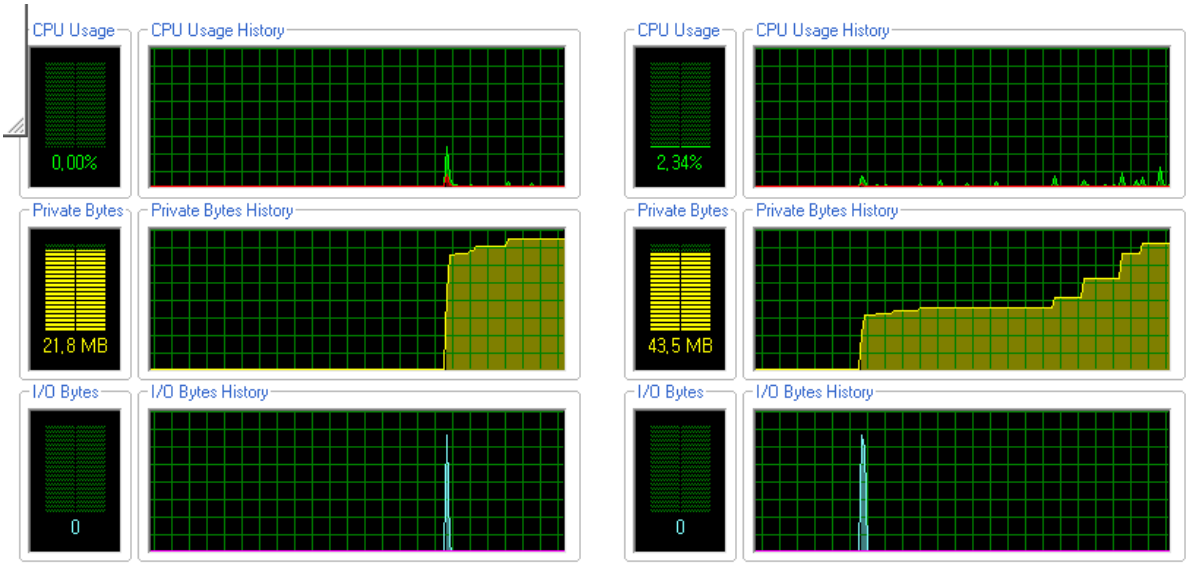

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
21,8 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
1,56%
Private Bytes
Private Bytes History
25,0 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
28,1 MB
I/O Bytes
I/O Bytes History
0

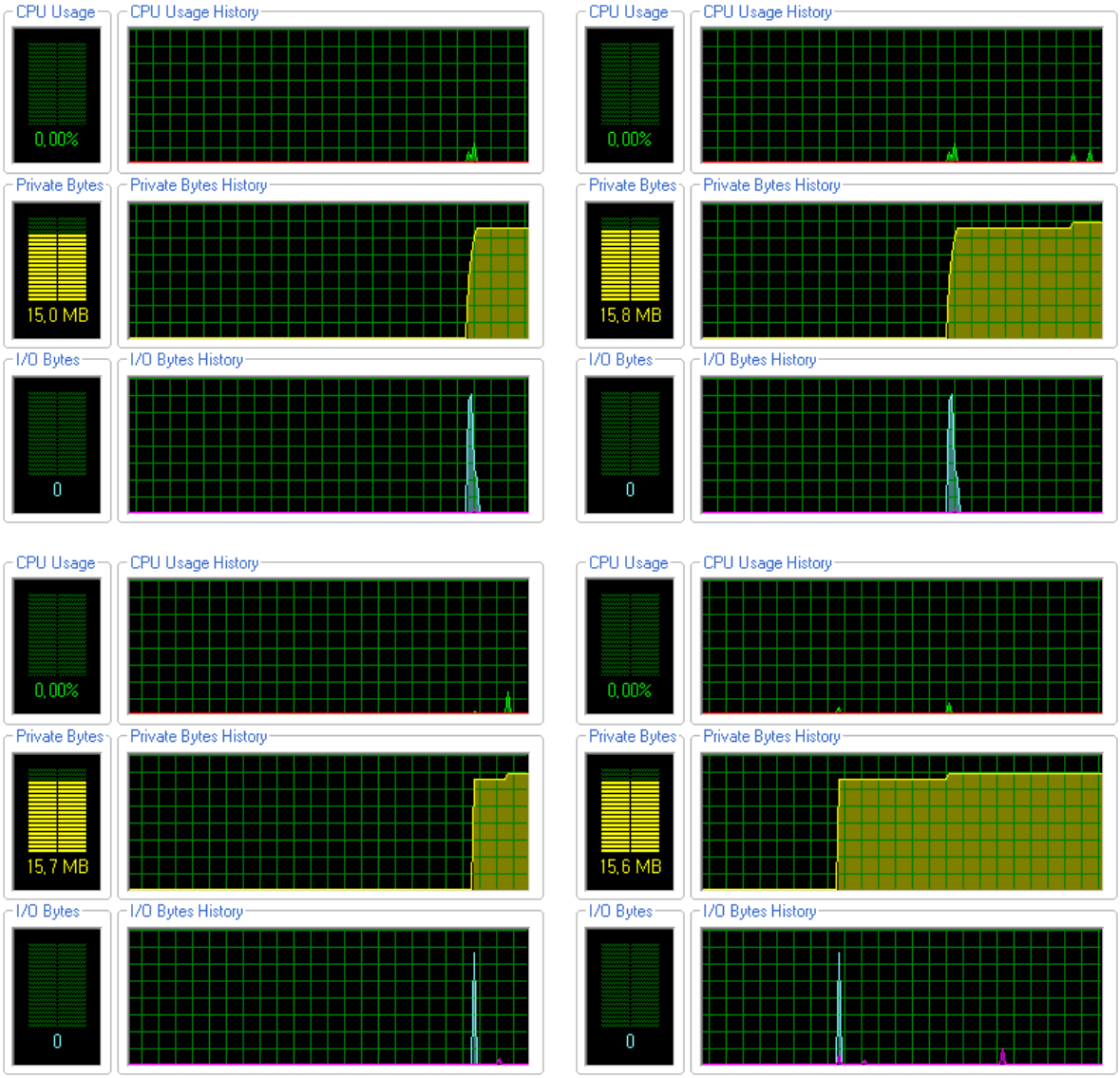

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
28,1 MB
I/O Bytes
I/O Bytes History
0

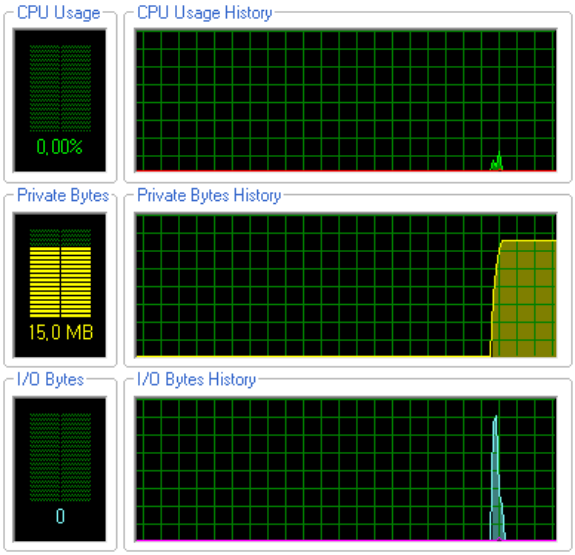

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
30,1 MB
I/O Bytes
I/O Bytes History
0

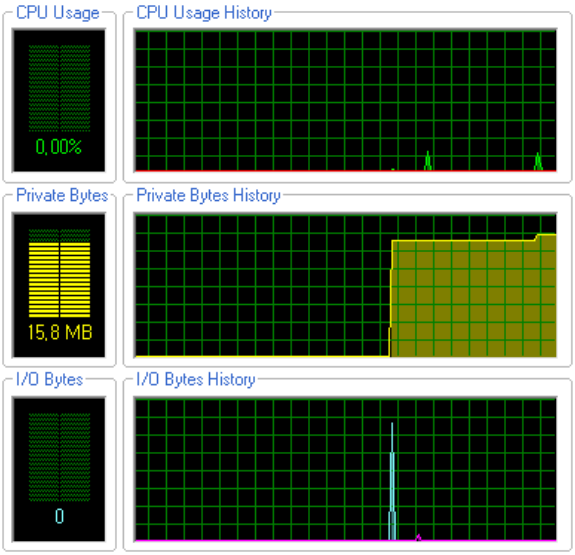

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
21,8 MB
I/O Bytes
I/O Bytes History
0
CPU Usage
CPU Usage History
2,34%
Private Bytes
Private Bytes History
43,5 MB
I/O Bytes
I/O Bytes History
0

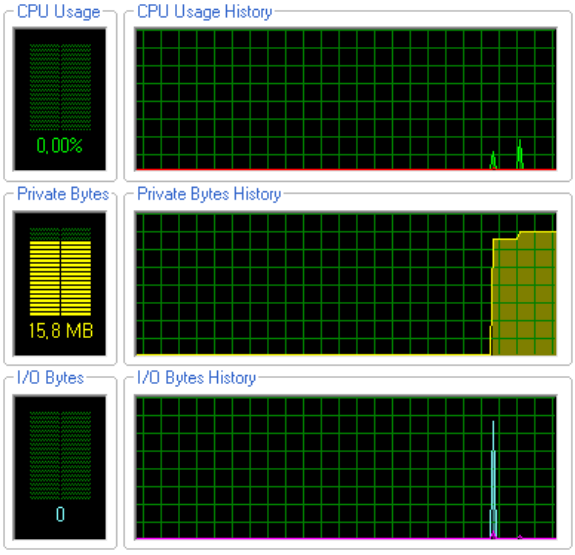
Opera 9.24 브라우저 메모리 누수 테스트 (단위 : MB)

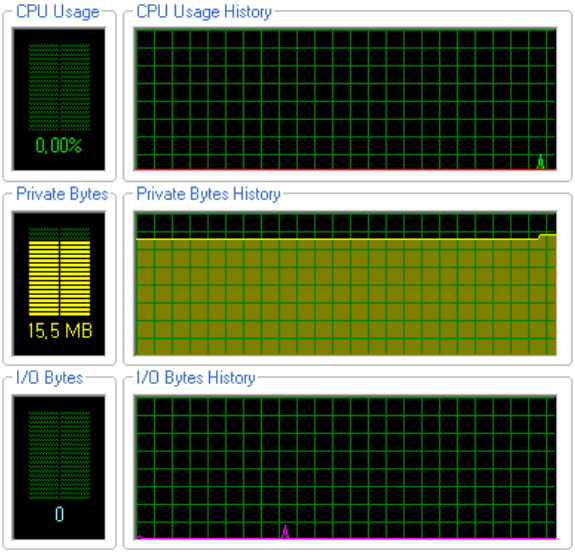
기본	Leak1	Leak2	Leak3	Leak4	Leak5	Leak6	Leak7	Leak8	Leak9	Leak10
15.0	15.8	15.7	15.6	-	15.8	15.8	15.5	15.5	-	15.8
total	-									

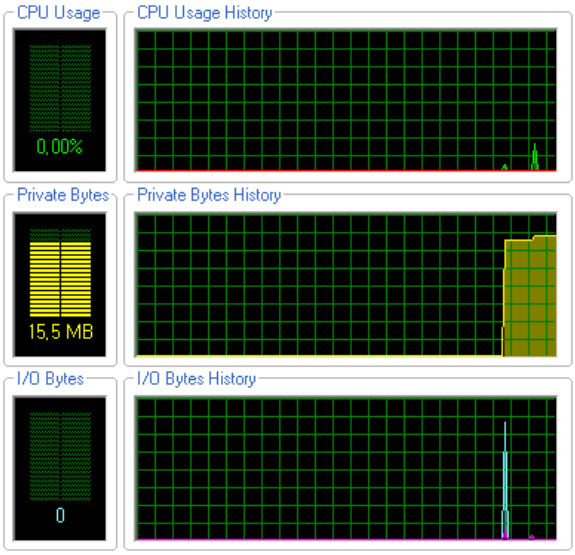


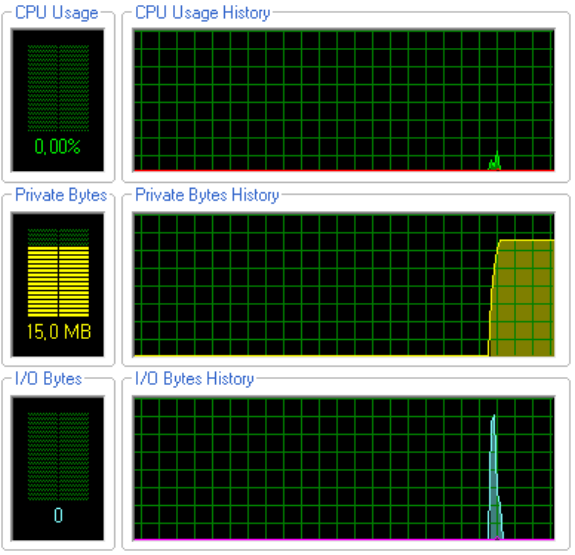

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,0 MB
I/O Bytes
I/O Bytes History
0

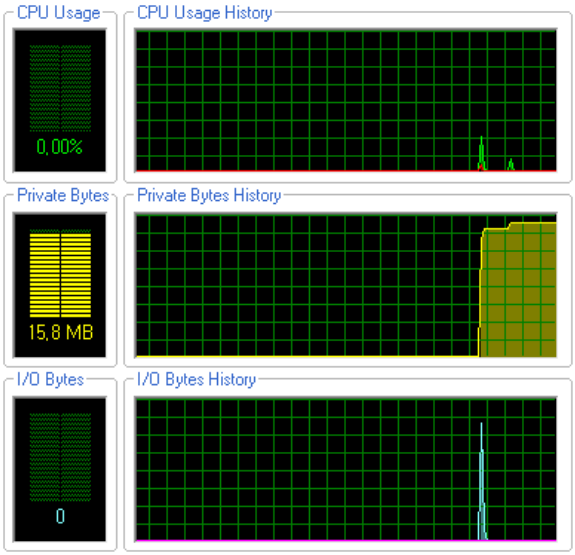

CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,8 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,8 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,5 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,5 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
CPU Usage History
0,00%
Private Bytes
Private Bytes History
15,0 MB
I/O Bytes
I/O Bytes History
0


CPU Usage
0,00%
CPU Usage History
Private Bytes
15,8 MB
Private Bytes History
I/O Bytes
0
I/O Bytes History

위의 결과에서도 알 수 있지만 IE의 경우 상당한 메모리 누수를 발생하고 있습니다. 이전 가비지 컬랙션에 대한 글에 기재했지만 IE의 경우에 Jscript가 DOM을 관리하지 않기 때문에 순환참조의 경우에 가비지 컬랙터에 의해서 카비지 컬랙션이 일어나지 않아는 문제가 발생합니다.

이는 Ajax 어플리케이션 개발 시 매우 심각한 문제이며 이런 메모리 부분을 각 브라우저마다 테스트 해복 개발해 놓은 요소들에 메모리 누수가 없는지 테스트 하는 환경을 만들어야 할 것입니다.

사실 이런 순환참조에 대한 메모리 누수이지 어떤 부분에 있어서는 예를 들어 { } 오브젝트가 생성될 때

```
var a0 = { };
  ...
var an = { };
```

위 경우 FF에서는 IE에 비해서 좀더 많은 메모리 누수 현상이 발생합니다. 그 이유는 정확히 모르겠지만 이처럼 꼭 IE만 메모리 누수가 심하게 발생하는 것은 아닙니다. 경우에 따라서는 Firefox에서 더욱 심한 메모리 누수가 발생하기 때문입니다.
계속 말씀 드리지만 개발 과정에 있어서 메모리 누수가 발생한 요소에 대한 메모리 테스트는 자주 하는 것이 좋습니다. 간단한 메모리 테스트를 위한 프로그램으로는 작업관리자 ^-^

프로세서 탐색기 - Process Explorer v11.04 를 추천합니다. 메모리 누수 뿐만 아니라 다양한 프로세스 정보를 한눈에 볼 수 있습니다.