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DevOps' Swiss Army knife for the BEAM

Erlang SOLUTIONS

Write code

process_info/1

```
> erlang:process_info(list_to_pid("<0.0.0>")).
[{registered_name,init},
 {current_function,{init,loop,1}},
 {initial_call,{otp_ring0,start,2}},
 {status,waiting},
 {message_queue_len,0},
 {messages,[]},
 {links,[<0.6.0>,<0.7.0>,<0.3.0>]},
 {dictionary,[]},
 {trap_exit,true},
 ...]
```

process_info/2

```
> erlang:process_info(list_to_pid("<0.974.0>"),
                      current_stacktrace).
{current_stacktrace,
 [{timer,sleep,1,
   [{file,"timer.erl"},{line,152}]},
  {riak_kv_vnode,do_put,7,
   [{file,".../riak_kv_vnode.erl"}, {line,1362}]},
 {riak_kv_vnode,handle_command,3,
  [{file,".../riak_kv_vnode.erl"}, {line,543}]},
 {riak_core_vnode,vnode_command,3,
  [{file,"src/riak_core_vnode.erl"},{line,345}]},
 {gen_fsm,handle_msg,8,
  [{file,"gen_fsm.erl"},{line,532}]},
 ...
```

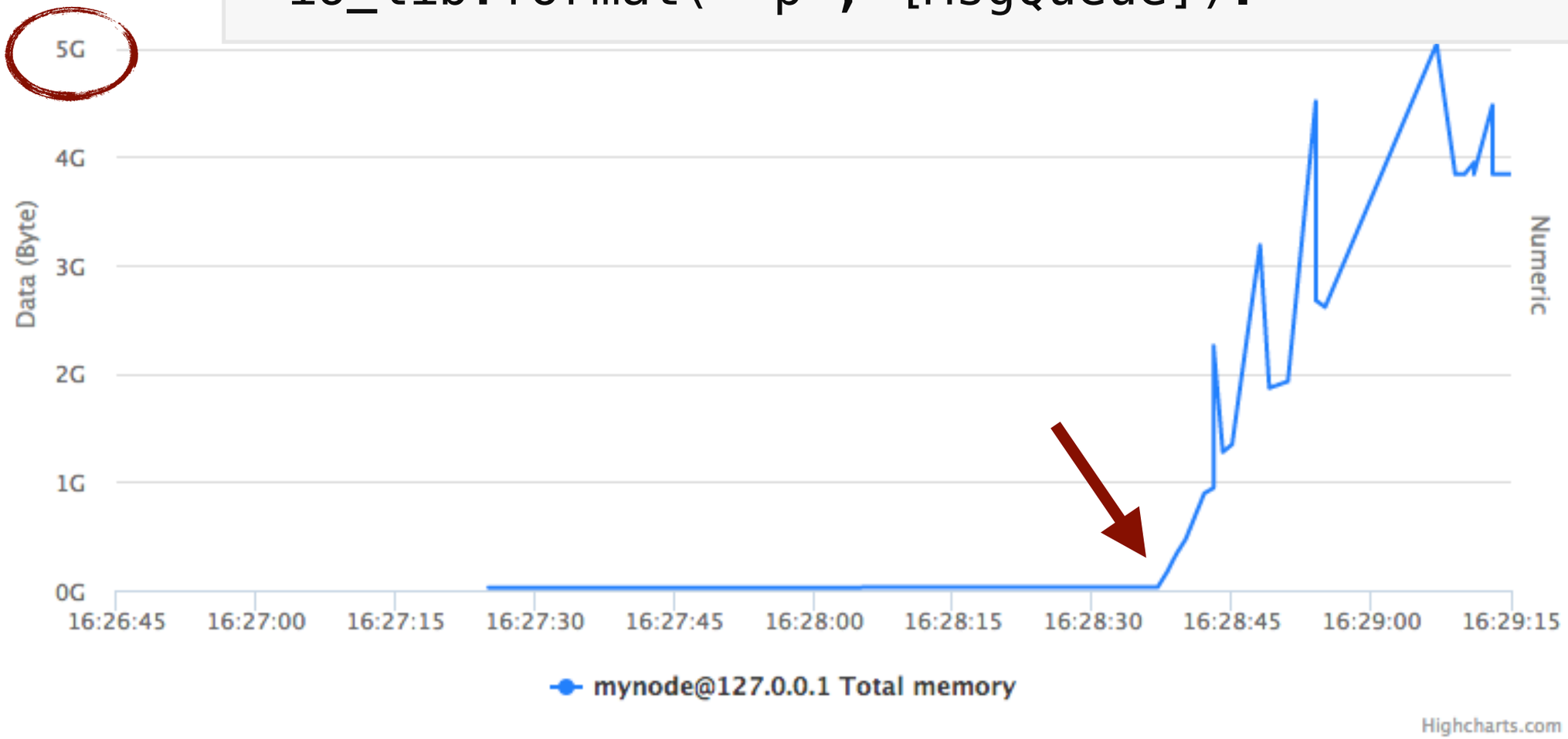
Shortcuts

```
> i(0,0,0).
[{registered_name,init},
 {current_function,{init,loop,1}},
 {initial_call,{otp_ring0,start,2}},
 {status,waiting},
 {message_queue_len,0},
 {messages,[]},
 {links,[<0.6.0>,<0.7.0>,<0.3.0>]},
 {dictionary,[]},
 {trap_exit,true},
 ...]
```


```
Msg = << <<I>> || I <- lists:seq(1,10000) >>.
```

```
MsgQueue = [Msg || _ <- lists:seq(1,5000)].
```

```
io_lib:format("~p", [MsgQueue]).
```



Write code

+ Flexible
+ No extra software required
- Tedious
- Needs expertise
- Dangerous!

Erlang command line tools (built-in)

etop

```
1> etop:start().


==============================================================================
 nonode@nohost                                                       10:36:16
 Load:  cpu         0               Memory:  total       18423    binary         21
        procs      26                        processes    3920    code         4339
        runq        0                        atom          198    ets           280

Pid            Name or Initial Func    Time    Reds  Memory    MsgQ Current Function
------------------------------------------------------------------------------
<0.3.0>        erl_prim_loader          '-'  193931   88440       0 erl_prim_loader:loop
<0.12.0>       code_server              '-'  114170  142688       0 code_server:loop/1
<0.26.0>       erlang:apply/2           '-'   10093  122032       0 shell:shell_rep/4
<0.7.0>        application_controll     '-'    6708  263888       0 gen_server:loop/6
<0.0.0>        init                     '-'    2439   24520       0 init:loop/1
<0.11.0>       kernel_sup               '-'    1674   12152       0 gen_server:loop/6
==============================================================================
```

ets:i/0

```
> ets:i().
id       name                 type  size    mem     owner
------------------------------------------------------------------
12       cookies              set   0       305     auth
4111     code                 set   282     15671   code_server
8208     code_names           set   54      9067    code_server
12305    shell_records        ordered_set 0   95    <0.32.0>
360472   ign_requests         set   0       305     inet_gethost_
364569   ign_req_index        set   0       305     inet_gethost_
...
```

ets:i/1

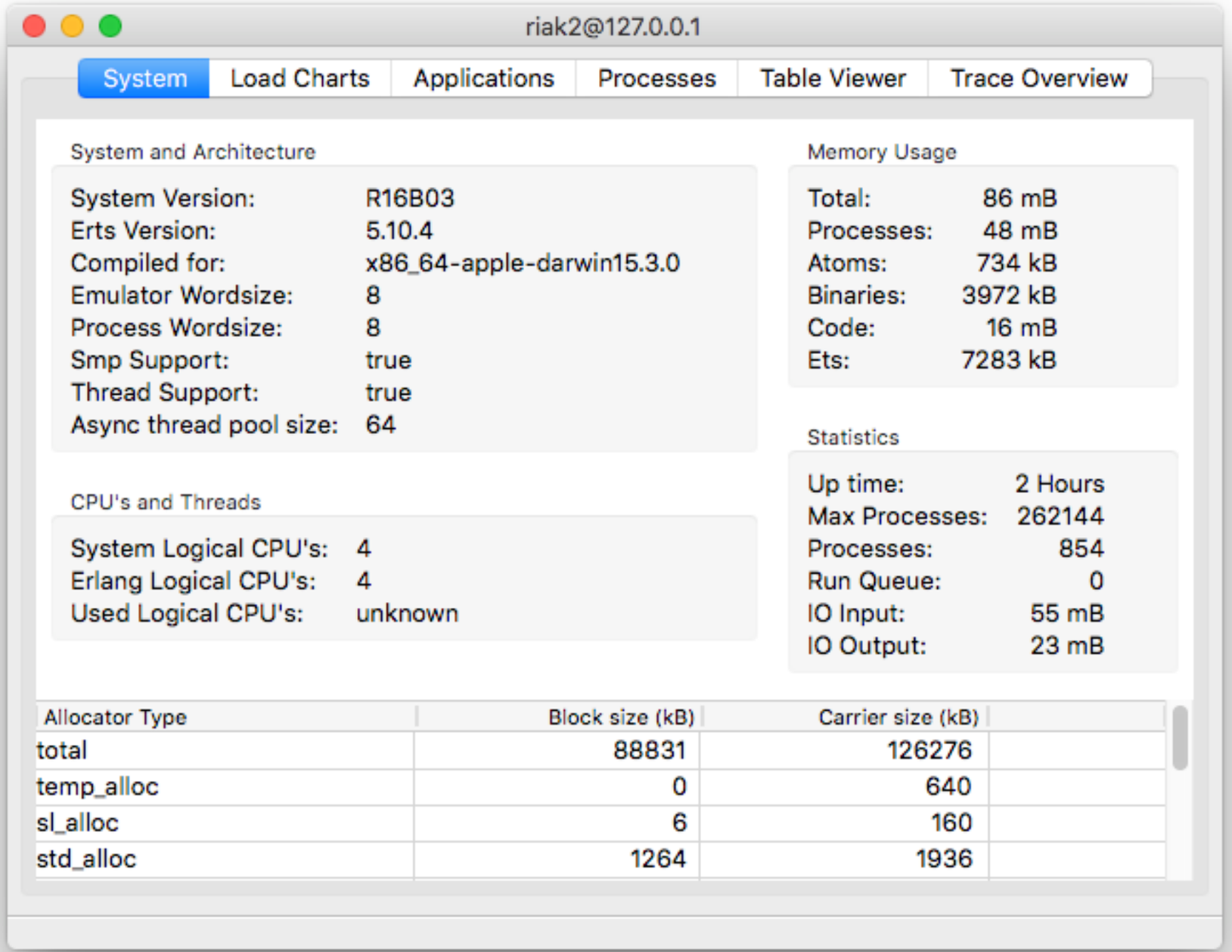
```
> ets:i(ac_tab).
<1   > {{loaded,stdlib}, {appl,stdlib, {appl_data, ...
<2   > {{env,stdlib,included_applications},[]}
<3   > {{application_master,kernel},<0.9.0>}
<4   > {{loaded,kernel}, {appl,kernel, {appl_data, ...
<5   > {{env,kernel,error_logger},tty}
<6   > {{env,kernel,included_applications},[]}
EOT  (q)uit (p)Digits (k)ill /Regexp -->
```

Erlang command line tools

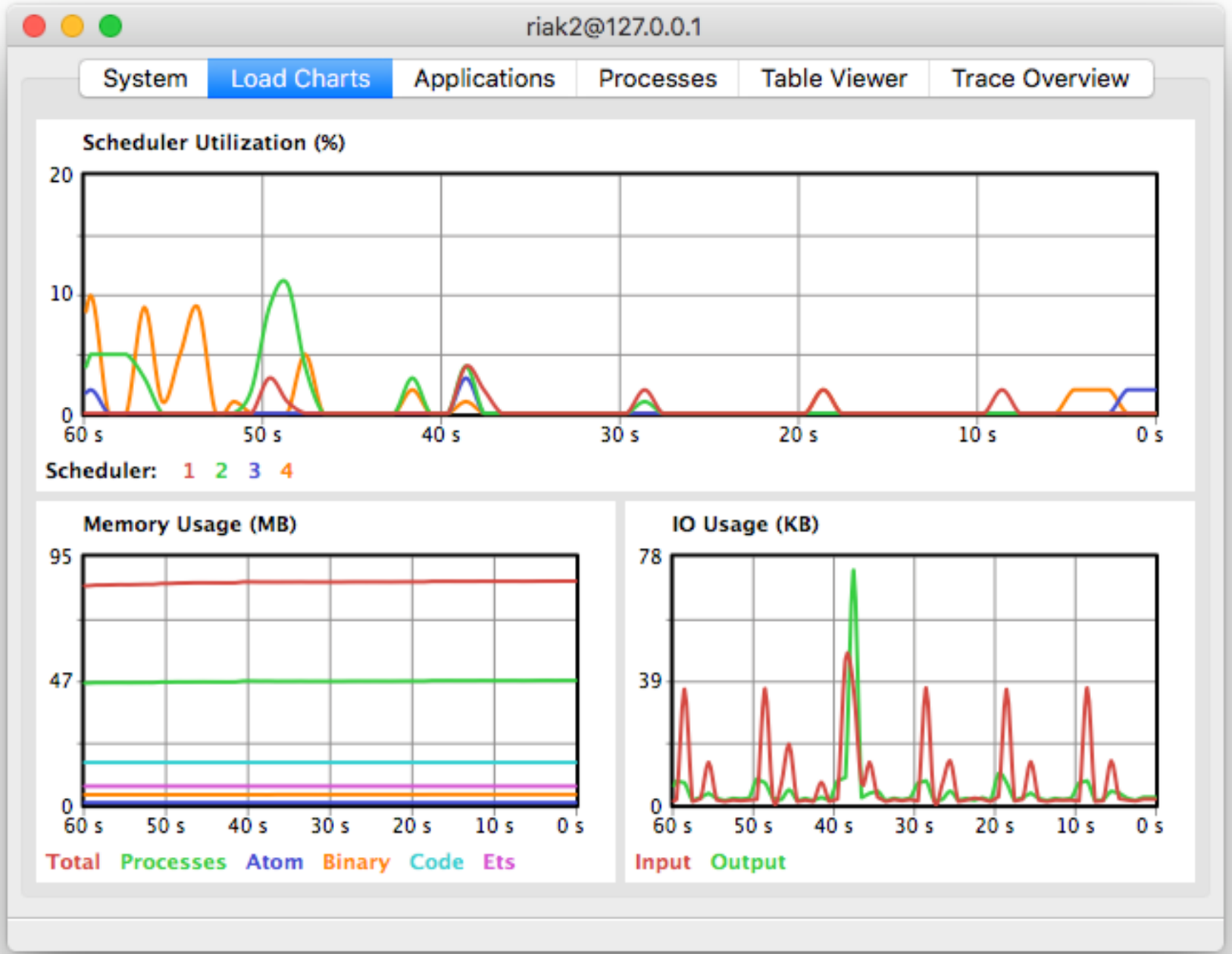
+ No extra software required
+ Do one thing safely
- Limited capabilities

Observer

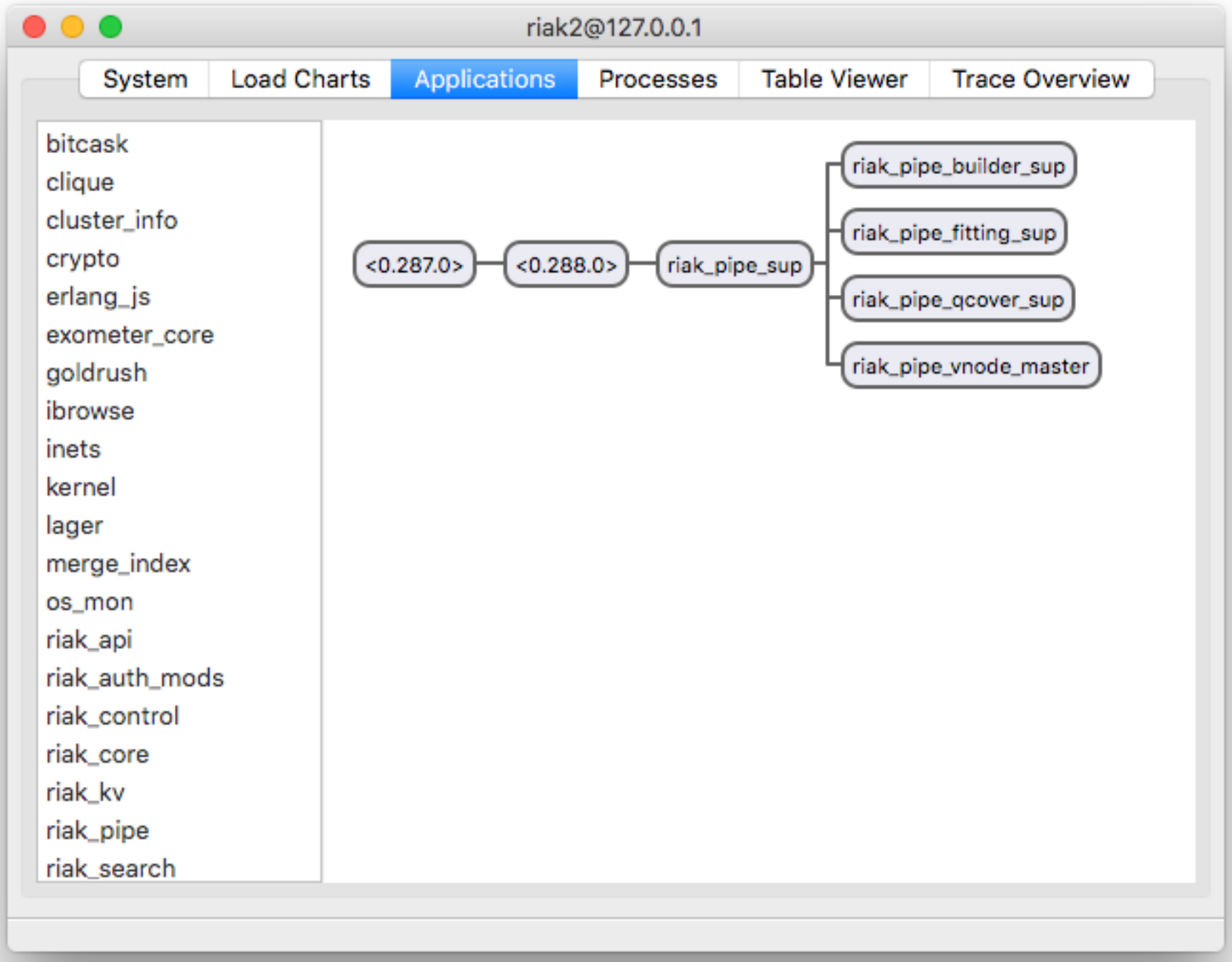
Observer



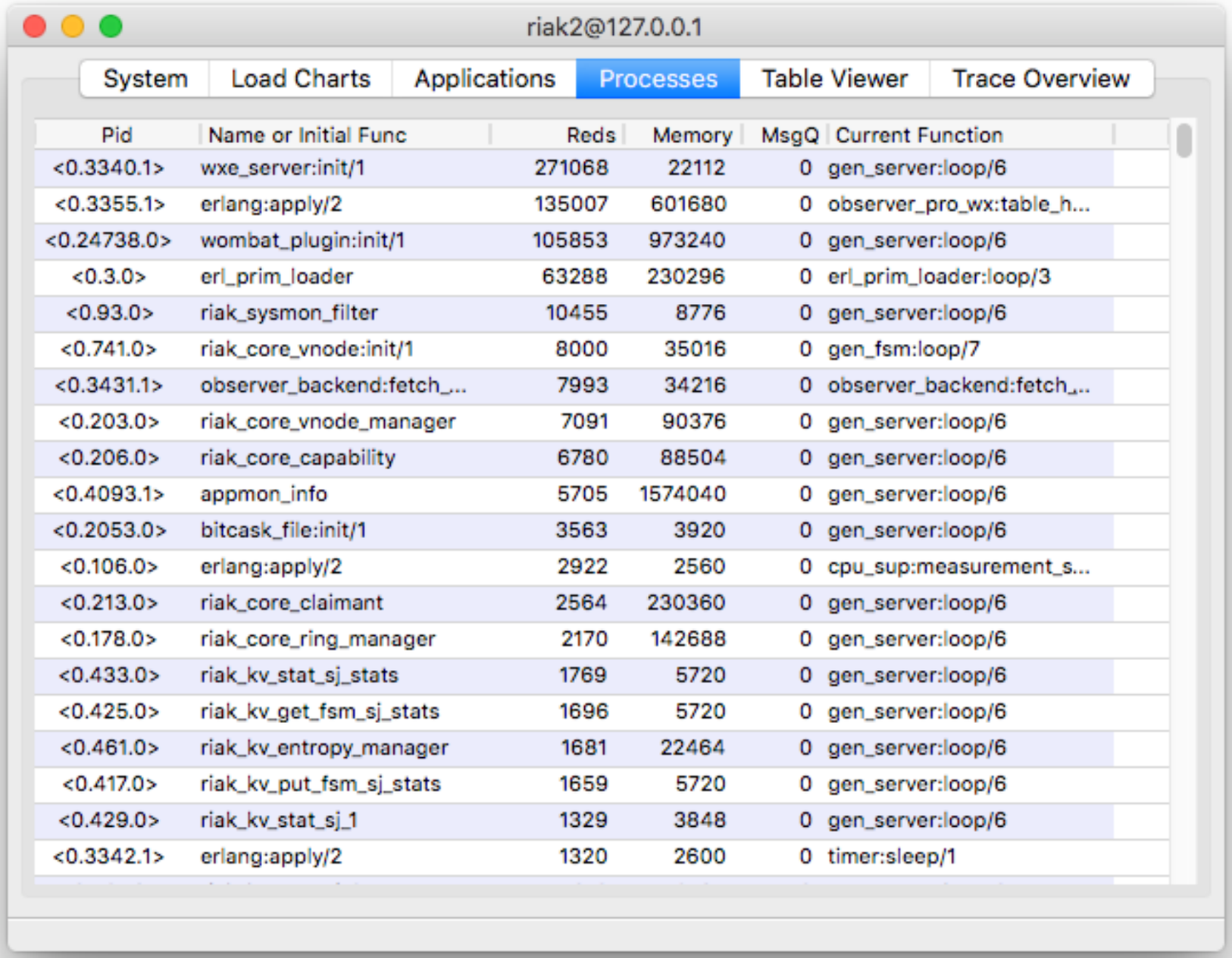
Observer



Observer

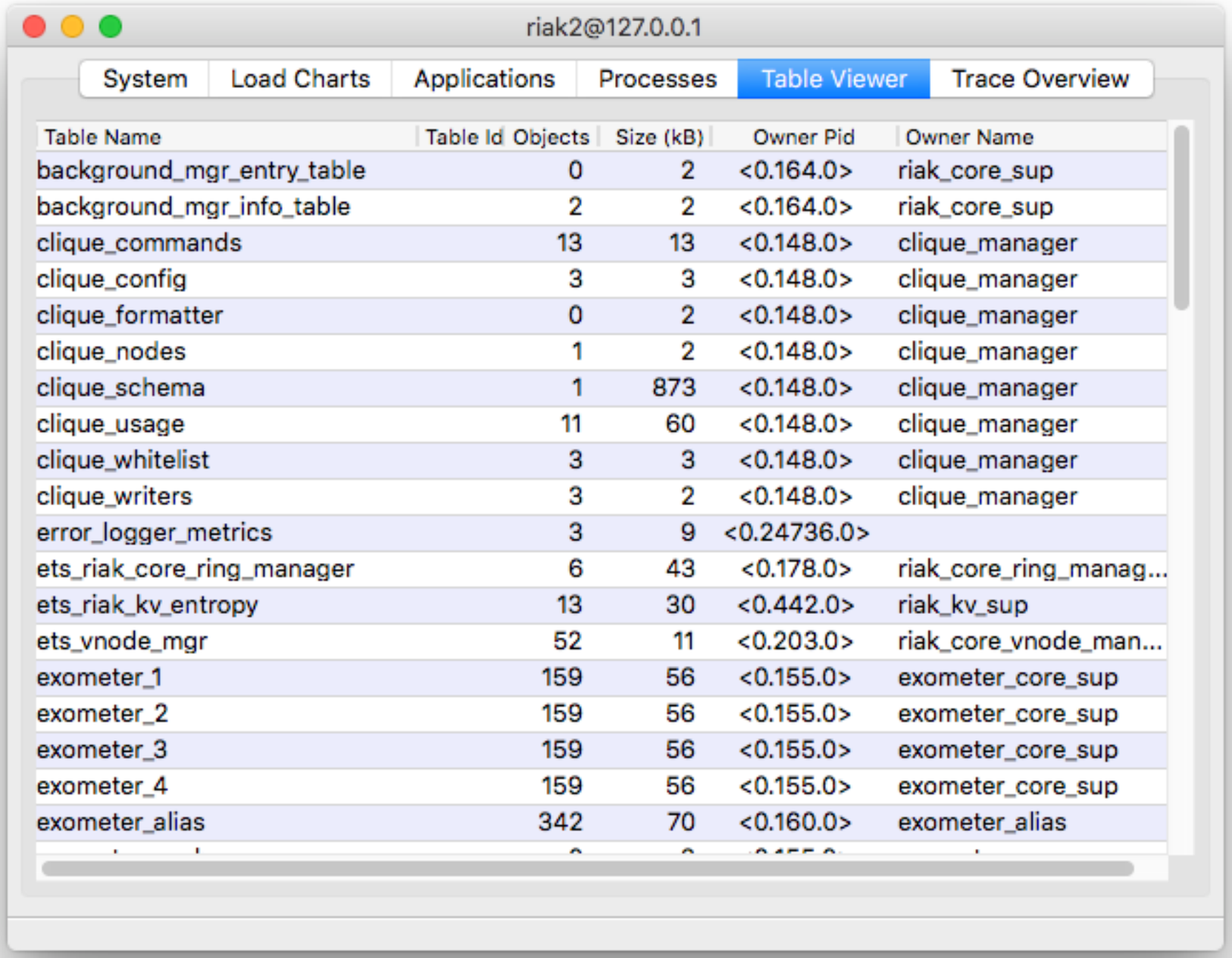


Observer



Pid	Name or Initial Func	Reds	Memory	MsgQ	Current Function
<0.3340.1>	wxe_server:init/1	271068	22112	0	gen_server:loop/6
<0.3355.1>	erlang:apply/2	135007	601680	0	observer_pro_wx:table_h...
<0.24738.0>	wombat_plugin:init/1	105853	973240	0	gen_server:loop/6
<0.3.0>	erl_prim_loader	63288	230296	0	erl_prim_loader:loop/3
<0.93.0>	riak_sysmon_filter	10455	8776	0	gen_server:loop/6
<0.741.0>	riak_core_vnode:init/1	8000	35016	0	gen_fsm:loop/7
<0.3431.1>	observer_backend:fetch_...	7993	34216	0	observer_backend:fetch_...
<0.203.0>	riak_core_vnode_manager	7091	90376	0	gen_server:loop/6
<0.206.0>	riak_core_capability	6780	88504	0	gen_server:loop/6
<0.4093.1>	appmon_info	5705	1574040	0	gen_server:loop/6
<0.2053.0>	bitcask_file:init/1	3563	3920	0	gen_server:loop/6
<0.106.0>	erlang:apply/2	2922	2560	0	cpu_sup:measurement_s...
<0.213.0>	riak_core_claimant	2564	230360	0	gen_server:loop/6
<0.178.0>	riak_core_ring_manager	2170	142688	0	gen_server:loop/6
<0.433.0>	riak_kv_stat_sj_stats	1769	5720	0	gen_server:loop/6
<0.425.0>	riak_kv_get_fsm_sj_stats	1696	5720	0	gen_server:loop/6
<0.461.0>	riak_kv_entropy_manager	1681	22464	0	gen_server:loop/6
<0.417.0>	riak_kv_put_fsm_sj_stats	1659	5720	0	gen_server:loop/6
<0.429.0>	riak_kv_stat_sj_1	1329	3848	0	gen_server:loop/6
<0.3342.1>	erlang:apply/2	1320	2600	0	timer:sleep/1

Observer



Observer

+ Intuitive
+ Convenient
- wx is required

Erlang CLI tools (not built-in)

entop

```
Node: 'riak1@127.0.0.1' (Connected) (R16B03/5.10.4) unix (darwin 15.5.0) CPU:4 SMP +A:64 +K
Time: local time 16:17:57, up for 000:05:53:33, 0ms latency,
Processes: total 809 (RQ 0) at 28838 RpI using 45845.5k (45869.7k allocated)
Memory: Sys 34256.3k, Atom 678.5k/686.9k, Bin 2341.0k, Code 14568.6k, Ets 6824.7k

Interval 1000ms, Sorting on "MQueue" (Descending), Retrieved in 3ms
        Pid Registered Name       Reductions   MQueue HSize  SSize  HTot
   <0.782.0> -                    10772588     228    121536 31     121536
     <0.0.0> init                 351138       0      2586   2      2586
     <0.3.0> erl_prim_loader      165629191    0      46422  6      46422
     <0.6.0> error_logger         149969       0      987    9      987
     <0.7.0> application_controll 4818144      0      4185   7      4185
     <0.9.0> -                    64           0      376    6      376
    <0.10.0> -                    69           0      233    5      233
    <0.11.0> kernel_sup           2689         0      1598   9      1598
    <0.12.0> rex                  915195       0      121536 9      121536
    <0.13.0> global_name_server   4032         0      233    9      233
    <0.14.0> -                    3851         0      610    5      610
    <0.15.0> -                    3            0      233    2      233
    <0.16.0> inet_db              348          0      233    9      233
    <0.17.0> net_sup              312          0      987    9      987
    <0.18.0> erl_epmd             268          0      233    9      233
    <0.19.0> auth                 234          0      233    9      233
    <0.20.0> net_kernel           188957       0      376    9      376
    <0.21.0> -                    7660         0      233    9      233
    <0.22.0> -                    2717         0      233    3      233
    <0.23.0> global_group         246          0      233    9      233
    <0.24.0> file_server_2        1150172      0      610    9      610
    <0.25.0> code_server          5058972      0      46422  3      46422
```

redbug

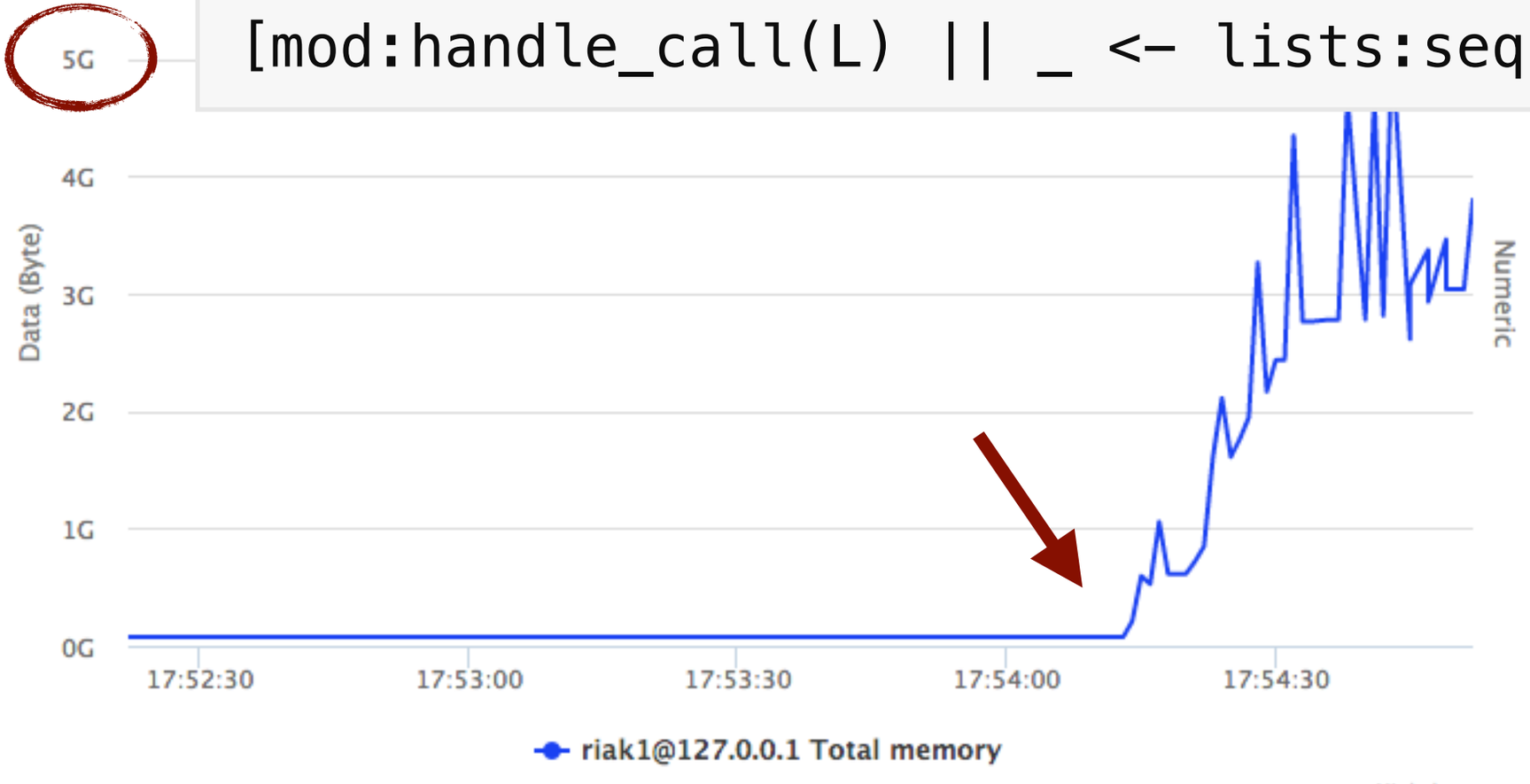
```
> redbug:start(["lists:member->return"],
               [{msgs,10},{time,60000}]).
{1,1}

19:01:57 <0.11077.0>({erlang,apply,2})
{lists,member,[nprocs, [nprocs, avg1,
avg5, avg15]]}

19:01:57 <0.11077.0>({erlang,apply,2})
lists:member/2 -> true

...
```


```
% mod.erl
handle_call(A) ->
    A.
```

```
redbug:start(
  ["mod:handle_call->return"],
  [{msgs,100},
   {time,60000},
   {print_file, "/tmp/out"}]).
```

```
Item = << <<I>> || I <- lists:seq(1,10000) >>.
L = [Item || _ <- lists:seq(1,500)].
```

```
[mod:handle_call(L) || _ <- lists:seq(1,100)].
```



Other tools

- recon

+

+

- erlyberly

WOMBATOAM

ERLANG

Erlang SOLUTIONS

Tools

I Want Everything!

Chaos

Challenge

Broad Picture

WHEN?

WHERE?

WHAT?

WHY?

HOW?

Welcome to the Erlang World!

“ The world is concurrent.

Things in the world don’t share data.

Things communicate with messages.

Things fail.”

Joe Armstrong

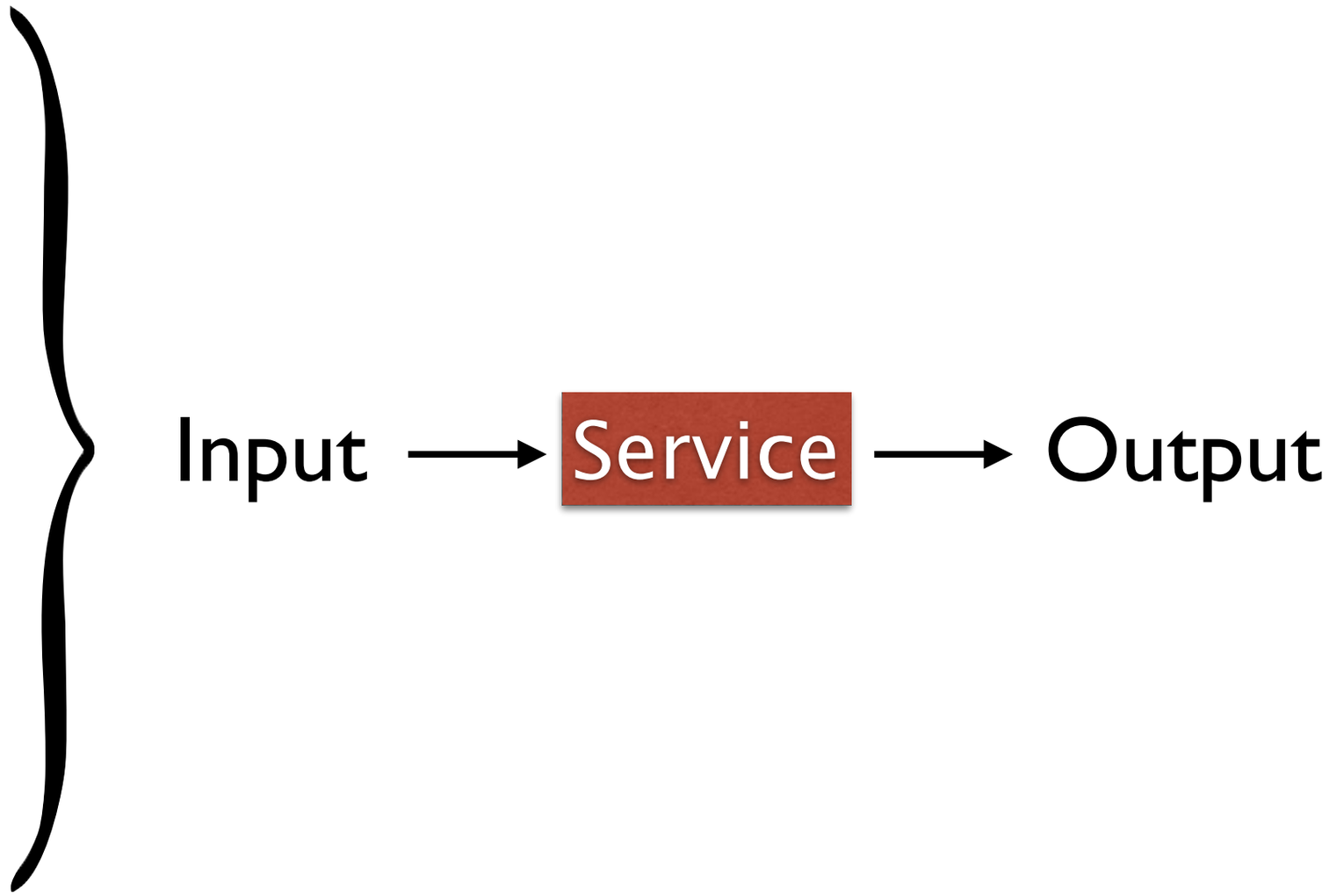
Going into Detail

Etop

Process state

Soft purge

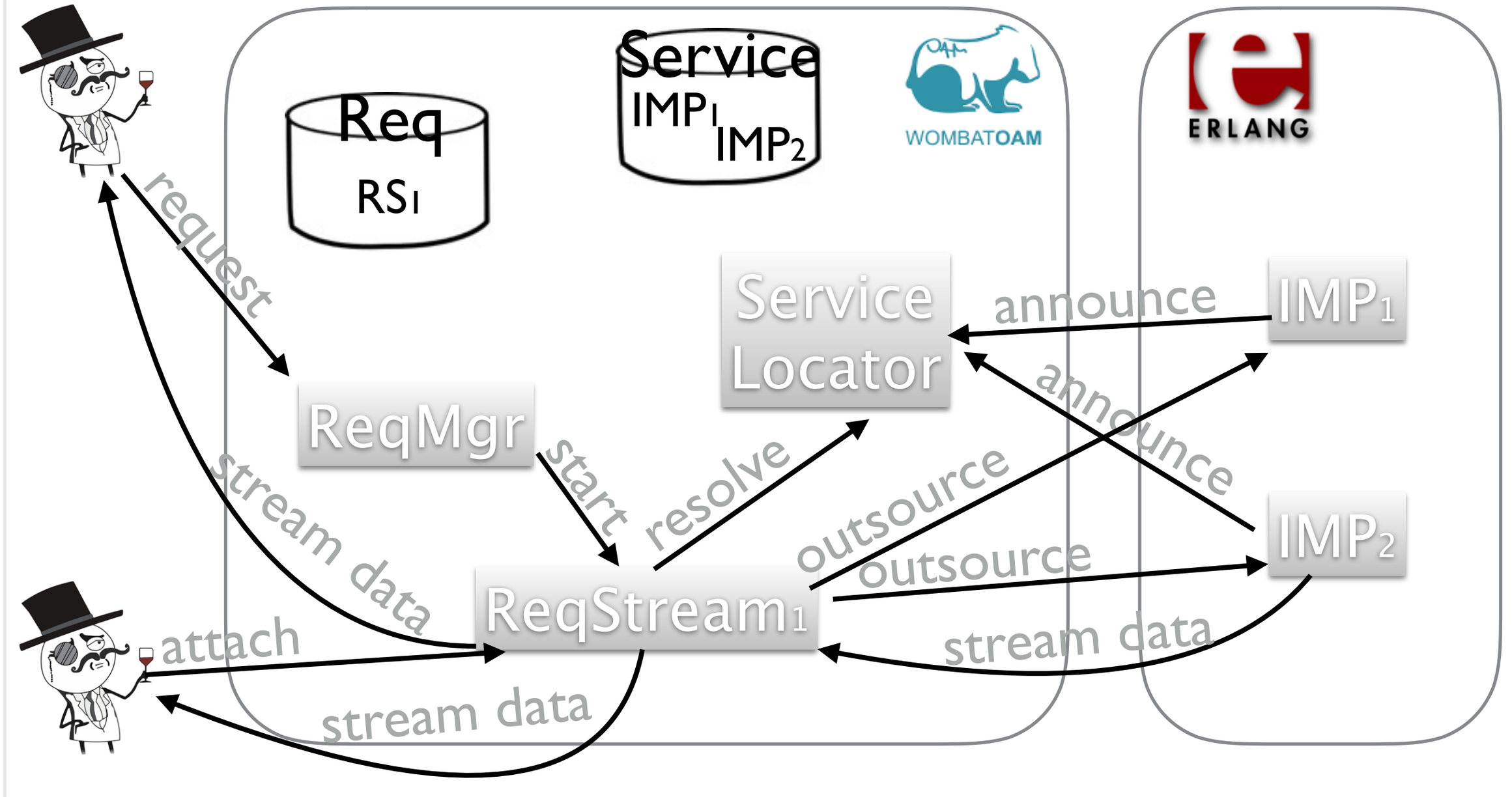
Tracing



Behaviour

```
-callback init_request(ReqID, CapID, ReqArgs, State) ->
                {ok, DisplayInfo, ExecutionInfo, NewState} |
                {out_of_scope, ReasonBinStr, NewState} |
                {error, ReasonBinStr, NewState}.


-callback execute_request(ReqID, CapID, State) ->
                 {continue | close,
                  no_data | {data, Data},
                  NewState} |
                {error, ReasonBinStr, NewState}.

-callback cleanup_request(ReqID, CapID, State) ->
                {ok, NewState}.
```

Architecture



Architecture