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DevOps' Swiss Army knife for
the BEAM





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

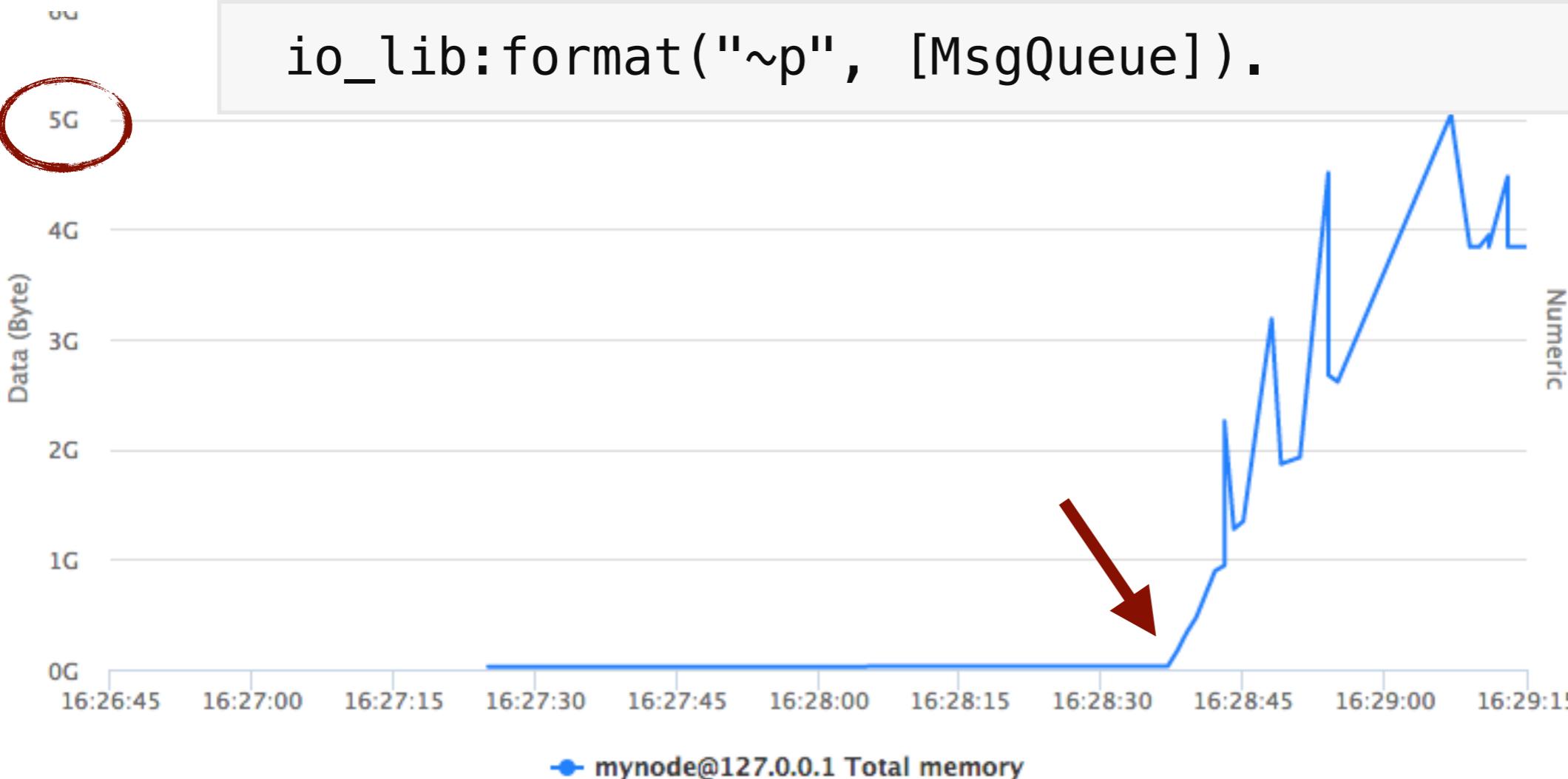
```
> i(0,0,0).
[{registered_name,init},
 {current_function,{init,loop,1}},
 {initial_call,{otp_ring0,start,2}},
 {status,waiting},
 {message_queue_len,0},
 {messages,[]},
 {links,[<0.6.0>,<0.7.0>,<0.3.0>]}],
 {dictionary,[]},
 {trap_exit,true},
 ...]
```



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

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

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



Highcharts.com

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



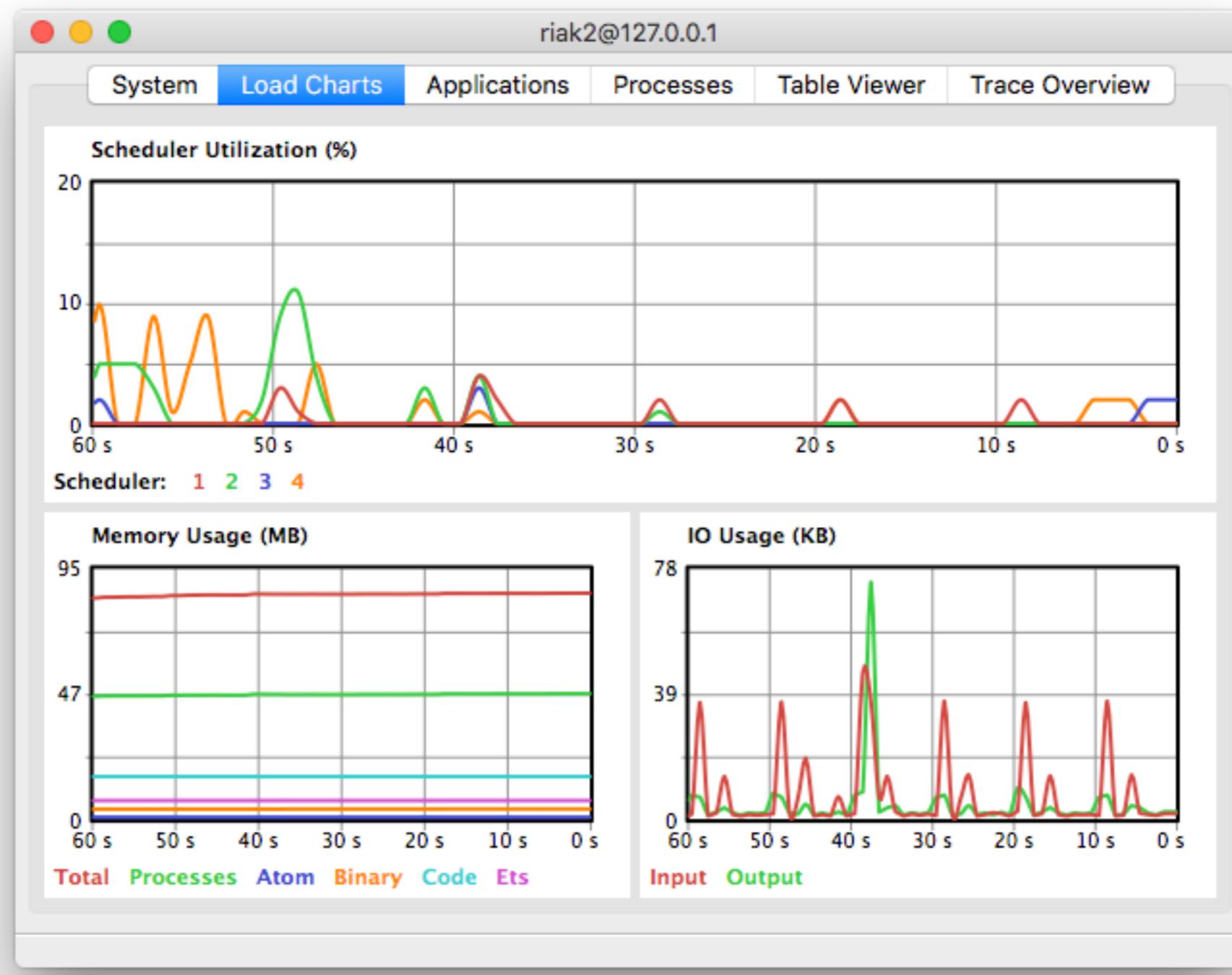
Observer

The screenshot shows the Erlang Observer interface with the 'System' tab selected. The title bar reads 'riak2@127.0.0.1'. The main area is divided into several sections:

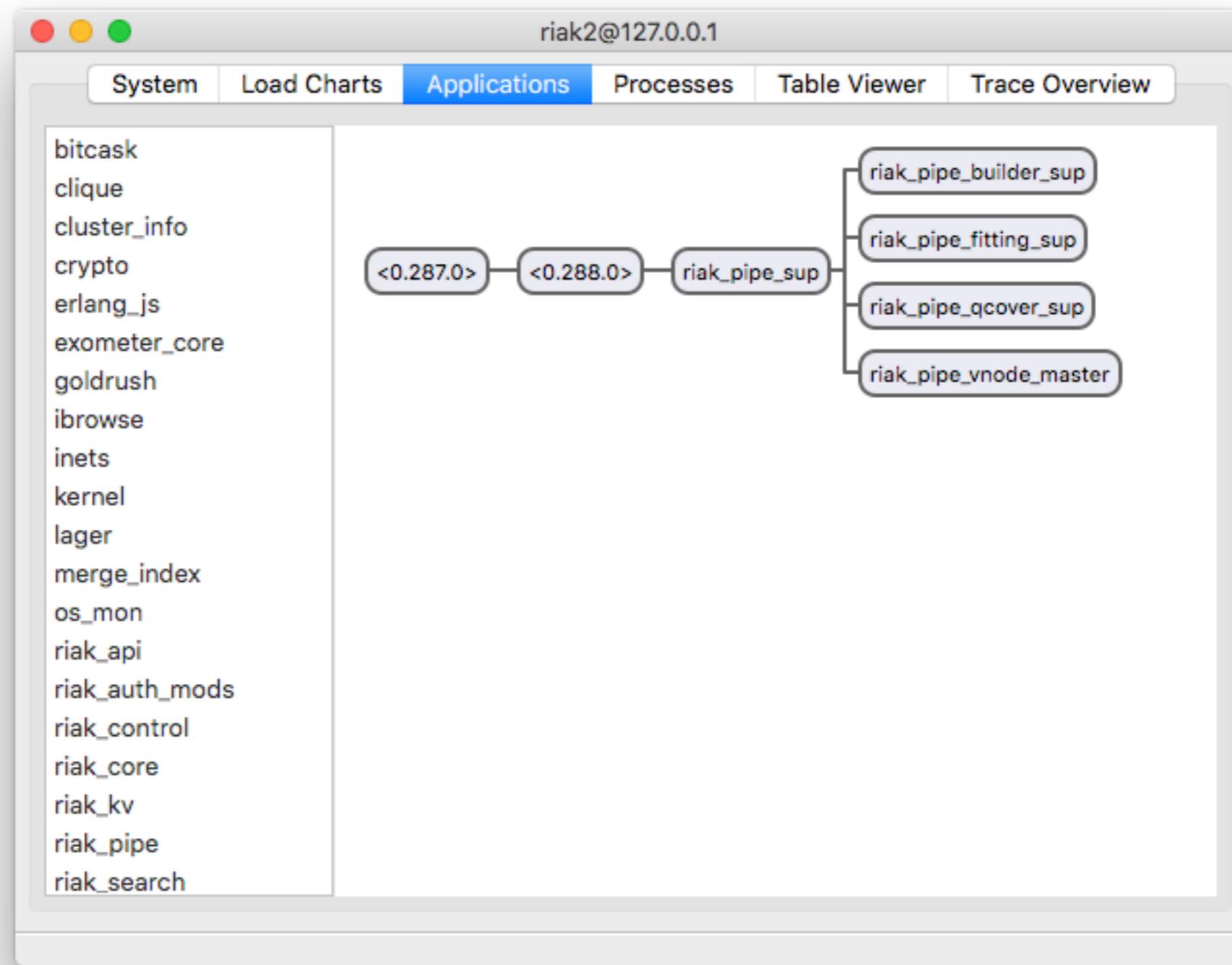
- System and Architecture**:
 - System Version: R16B03
 - Erts Version: 5.10.4
 - Compiled for: x86_64-apple-darwin15.3.0
 - Emulator Wordsize: 8
 - Process Wordsize: 8
 - Smp Support: true
 - Thread Support: true
 - Async thread pool size: 64
- Memory Usage**:
 - Total: 86 mB
 - Processes: 48 mB
 - Atoms: 734 kB
 - Binaries: 3972 kB
 - Code: 16 mB
 - Ets: 7283 kB
- CPU's and Threads**:
 - System Logical CPU's: 4
 - Erlang Logical CPU's: 4
 - Used Logical CPU's: unknown
- Statistics**:
 - Up time: 2 Hours
 - Max Processes: 262144
 - Processes: 854
 - Run Queue: 0
 - IO Input: 55 mB
 - IO Output: 23 mB
- Allocator Type**: A table showing allocator statistics:

Allocator Type	Block size (kB)	Carrier size (kB)
total	88831	126276
temp_alloc	0	640
sl_alloc	6	160
std_alloc	1264	1936

Observer



Observer



Observer

The screenshot shows the Erlang Observer interface with the title "riak2@127.0.0.1". The "Processes" tab is selected. The table displays various Erlang processes with their Pid, Name or Initial Func, Reds, Memory, MsgQ, and Current Function. The table has columns: Pid, Name or Initial Func, Reds, Memory, MsgQ, and Current Function.

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

The screenshot shows a Mac OS X style window titled "riak2@127.0.0.1". The window contains a navigation bar with tabs: System, Load Charts, Applications, Processes, Table Viewer (which is selected and highlighted in blue), and Trace Overview. Below the navigation bar is a table with the following data:

Table Name	Table Id	Objects	Size (kB)	Owner Pid	Owner Name
background_mgr_entry_table		0	2	<0.164.0>	riak_core_sup
background_mgr_info_table		2	2	<0.164.0>	riak_core_sup
clique_commands		13	13	<0.148.0>	clique_manager
clique_config		3	3	<0.148.0>	clique_manager
clique_formatter		0	2	<0.148.0>	clique_manager
clique_nodes		1	2	<0.148.0>	clique_manager
clique_schema		1	873	<0.148.0>	clique_manager
clique_usage		11	60	<0.148.0>	clique_manager
clique_whitelist		3	3	<0.148.0>	clique_manager
clique_writers		3	2	<0.148.0>	clique_manager
error_logger_metrics		3	9	<0.24736.0>	
ets_riak_core_ring_manager		6	43	<0.178.0>	riak_core_ring_manag...
ets_riak_kv_entropy		13	30	<0.442.0>	riak_kv_sup
ets_vnode_mgr		52	11	<0.203.0>	riak_core_vnode_man...
exometer_1		159	56	<0.155.0>	exometer_core_sup
exometer_2		159	56	<0.155.0>	exometer_core_sup
exometer_3		159	56	<0.155.0>	exometer_core_sup
exometer_4		159	56	<0.155.0>	exometer_core_sup
exometer_alias		342	70	<0.160.0>	exometer_alias

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
```

...

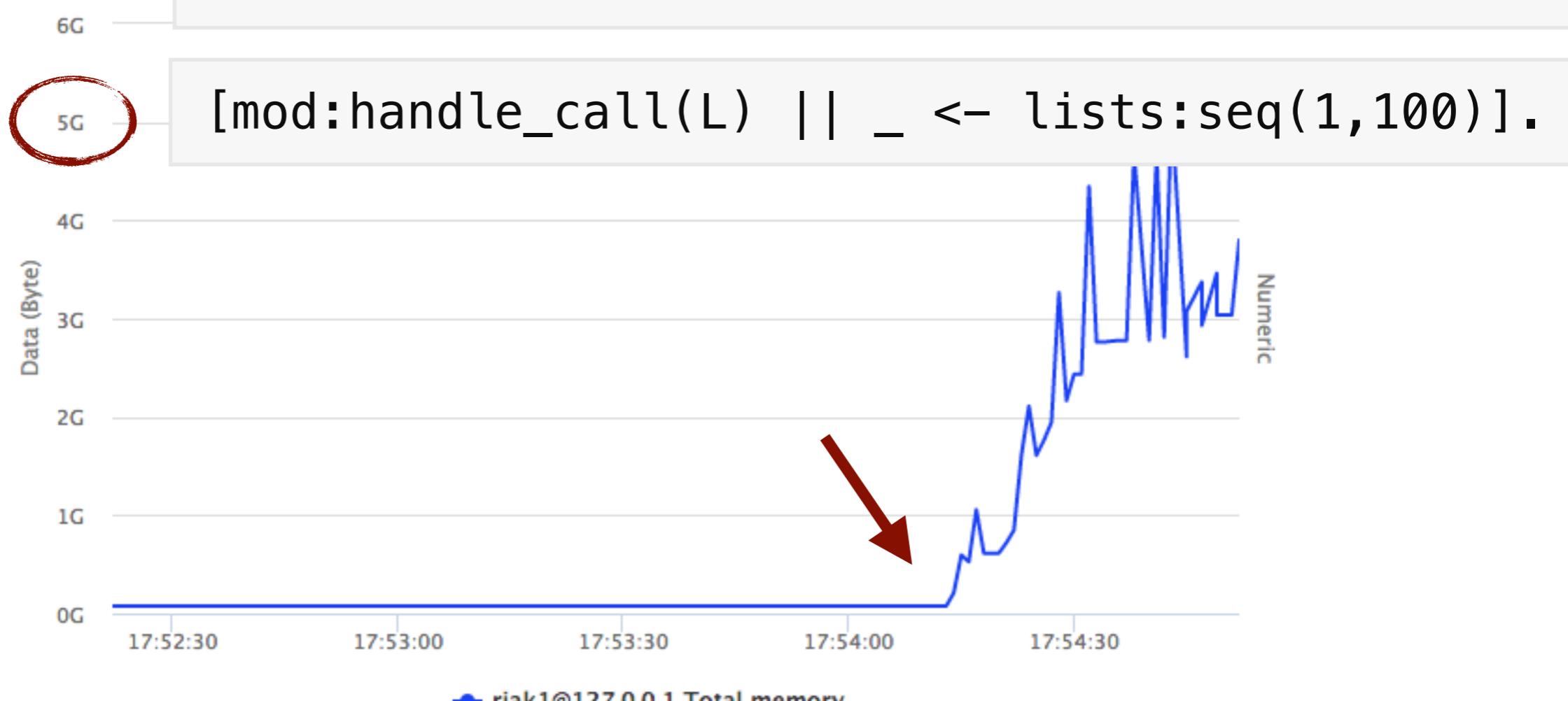




```
% mod.erl  
handle_call(A) ->  
    A.
```

```
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)].
```



Other tools

- recon



+

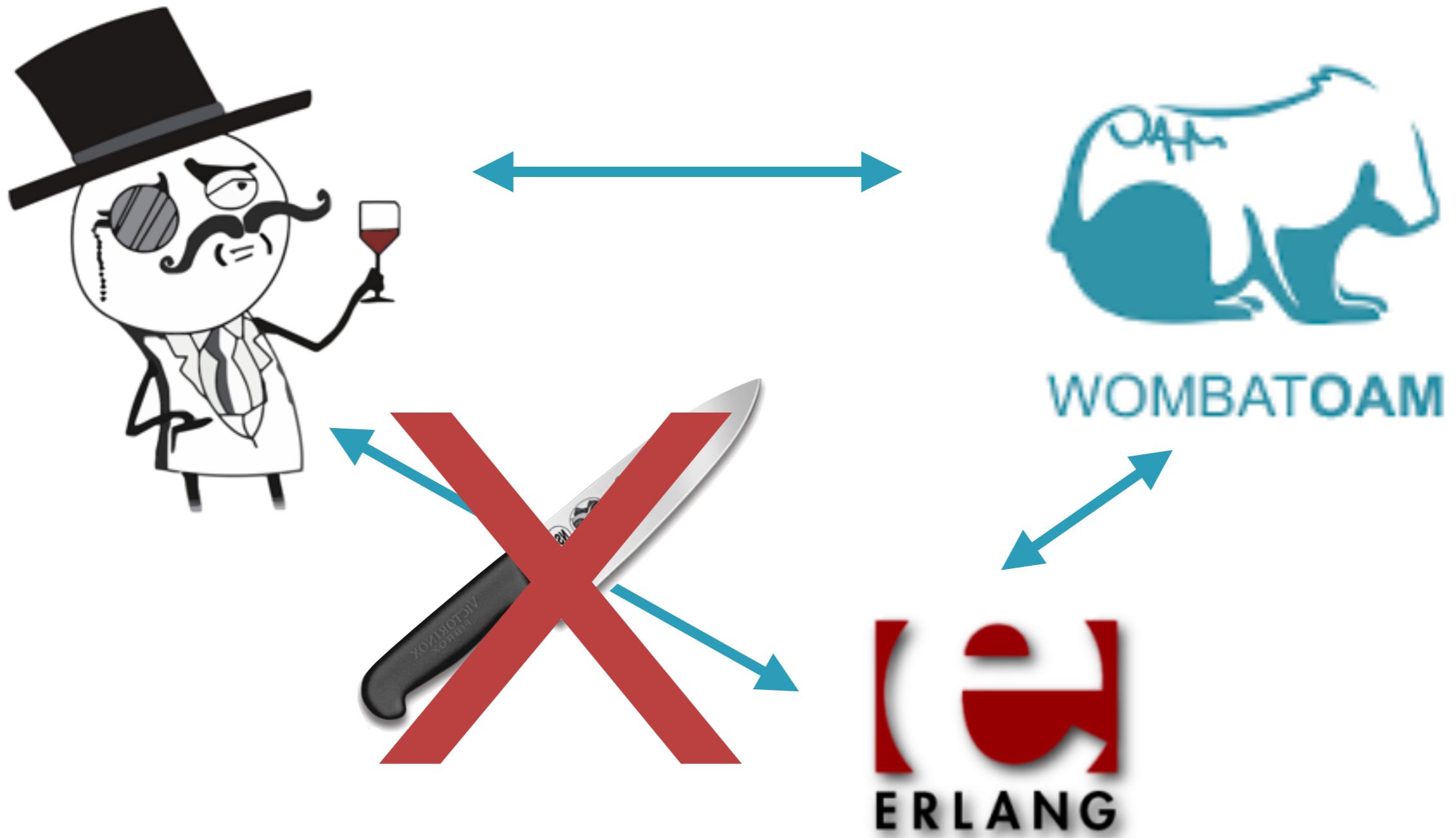


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- erlyberly





Tools



I Want Everything!



Chaos



Challenge



Controlling Chaos
in the Kitchen

gingerbabymama.blogspot.ca

Broad Picture

WHEN?

WHERE?

WHAT?

WHY?

HOW?

Welcome to the Erlang World!

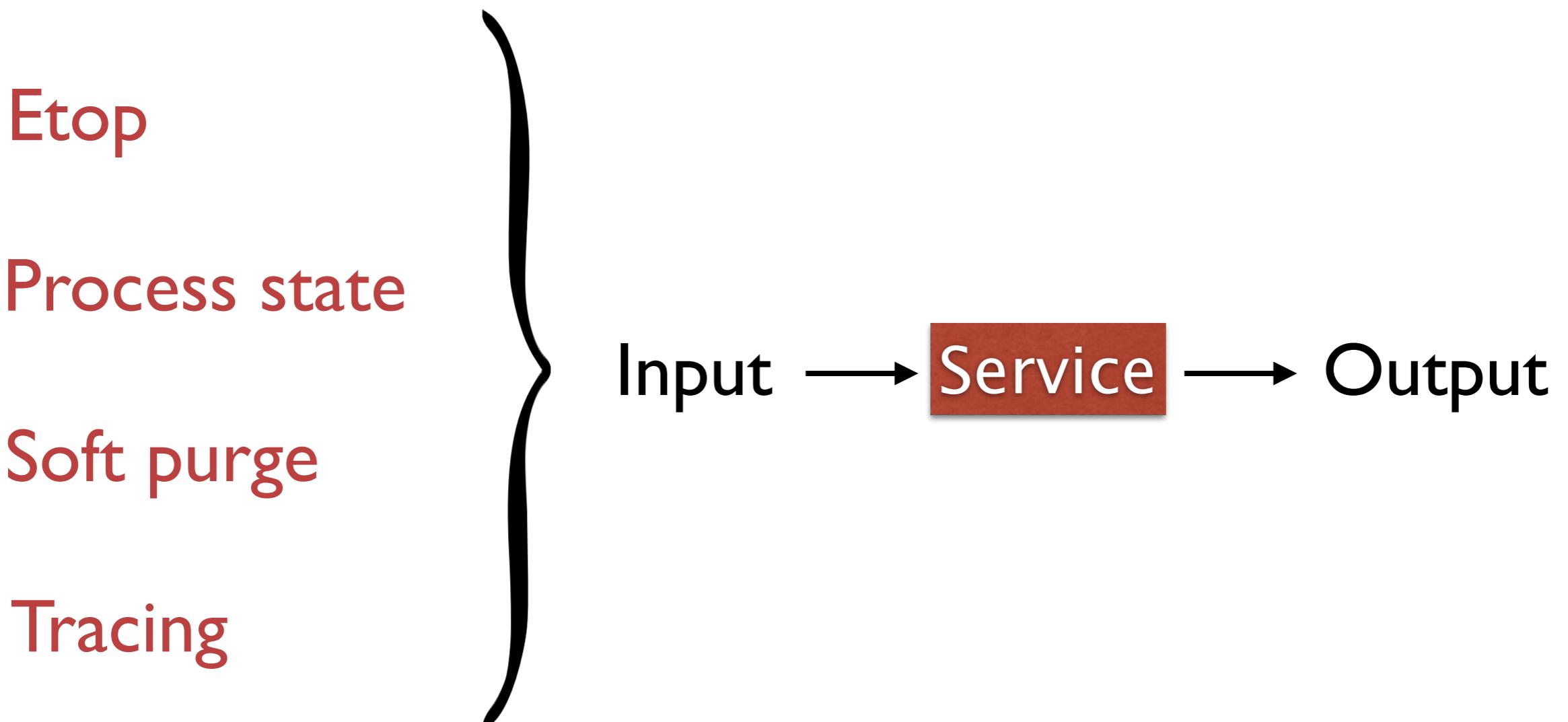
**“ The world is concurrent.
Things in the world don’t share data.
Things communicate with messages.**

Things fail.”

Joe Armstrong



Going into Detail



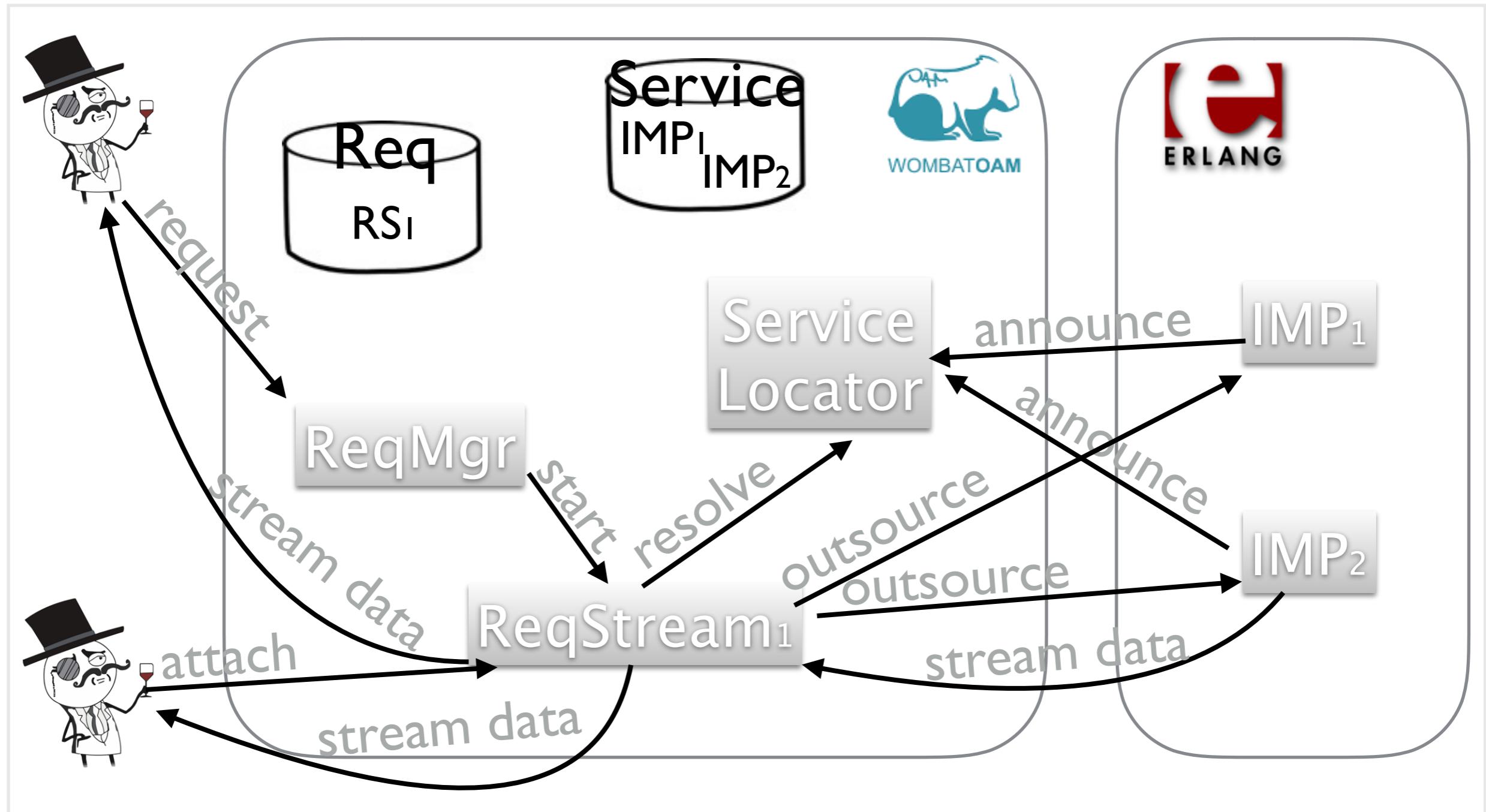
Behaviour

```
-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

