Introducing RAMP & RDL

- Research Accelerator for Multiple Processors (RAMP)
  A RAMP System is a cross platform architectural simulator.
  Designed to foster community research (Share & verify results).
  Orders of magnitude faster than existing solutions.
  Eases component re-use and integration.

- RAMP Description Language (RDL)
  A distributed event & message passing system framework.
  The "Target System", the system being emulated, is captured in RDL
  and emulated on the "Host System," an FPGA or CPU.
  Allows virtualization of simulation time to provide cycle accurate
  simulation results. Compiled by RDLC into Verilog or Java.

- Current Applications of RDL
  RAMP Blue: A RAMP System built using Xilinx uBlaze processors on the BEE2
  FLEET. A highly concurrent processor architecture focused on comm. not comp.
  Overlog/P2: A distributed dataflow description language and execution system

The Counter Example

```verbatim
unit { input bit[1] UpDown; output bit[32] Count; }
unit { output bits[1] Value; attribute Calinx2 attribute Calinx2
  platform { language "verilog"; default link } }
map { platform Calinx2 unit CounterExample }
unit { instance IO::BooleanInput; instance IO::Display7Seg
  channel fifoPipe[1, 1, 1] inChannel
  { BooleanInput.Value -> Count.Updated
  Channel fifoPipe[1, 1, 1] outChannel
  { Counter.Count -> Display7Seg.Value }
  }
```

The "Target" Model

- Units communicate over point-to-point, unidirectional channels.
  A unit would be ~10,000 gates (Processor + 1 cache)
- Units are implemented in the "host" language, eg. Verilog.
- Existing message passing hardware/software can be ported easily

- Channels Delay Model
  Allows cycle accurate simulations
  Static data, variable size messages
  Bitwidth (Fragment)
  Latency (Both directions)
  Buffering

- Benefits
  Automatic channel implementation
  Ease of unit re-use and sharing

Timeline

- Unit shell, ready for implementation
- Verilog, Java, etc...
- RDLC (Shell)
- RDLC (Map)
- Complete host implementation

The Compiler Path

- Standard Compiler
- Berkeley Calinx2
- Any computer
- BEE2