VHDL通用调试工具

Cache Debugger

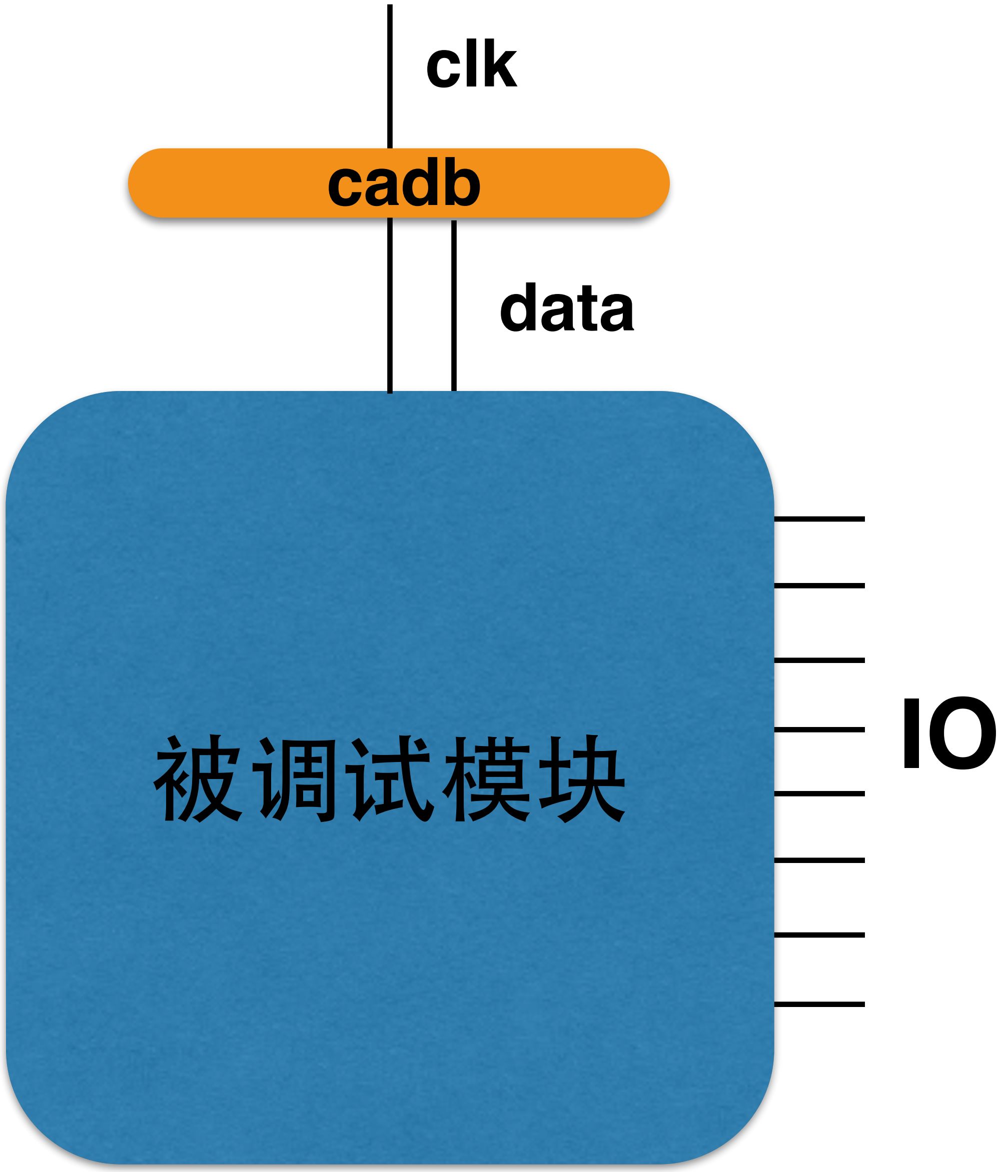
Cache小组

2015.1.4

功能概述

- 断点
    - 支持通配模式，灵活、精确
- 定步调试
- 信号查看
    - 不限数量、自由长度
- PC交互
    - 操作便捷、轻松部署

硬件部署

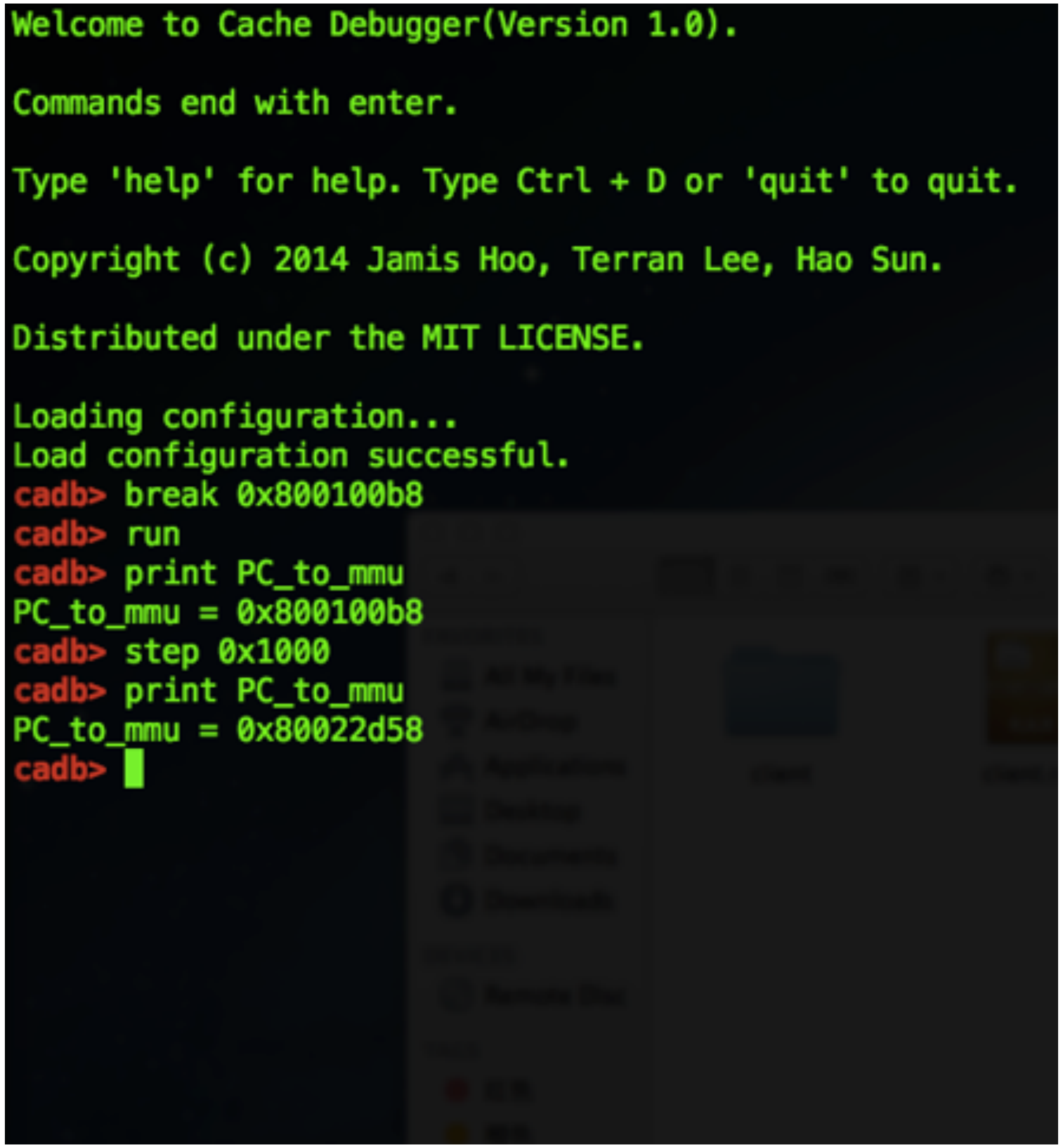


- 耦合度低
- 调试与实际运行效果相同
- 占用资源少
  - 占用约500个逻辑单元
  - 编译时间稍有增加
  - 只使用一个串口

硬件部署

- 通过管理时钟实现断点功能
- 用户自定义断点信号
- 使用通配符灵活选择断点，一次编译适用多种断点模式
- 自由选择被查看信号数量且相关代码自动生成

软件使用



```
Welcome to Cache Debugger(Version 1.0).

Commands end with enter.

Type 'help' for help. Type Ctrl + D or 'quit' to quit.

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Loading configuration...
Load configuration successful.
cadb> break 0x800100b8
cadb> run
cadb> print PC_to_mmu
PC_to_mmu = 0x800100b8
cadb> step 0x1000
cadb> print PC_to_mmu
PC_to_mmu = 0x80022d58
cadb> 
```
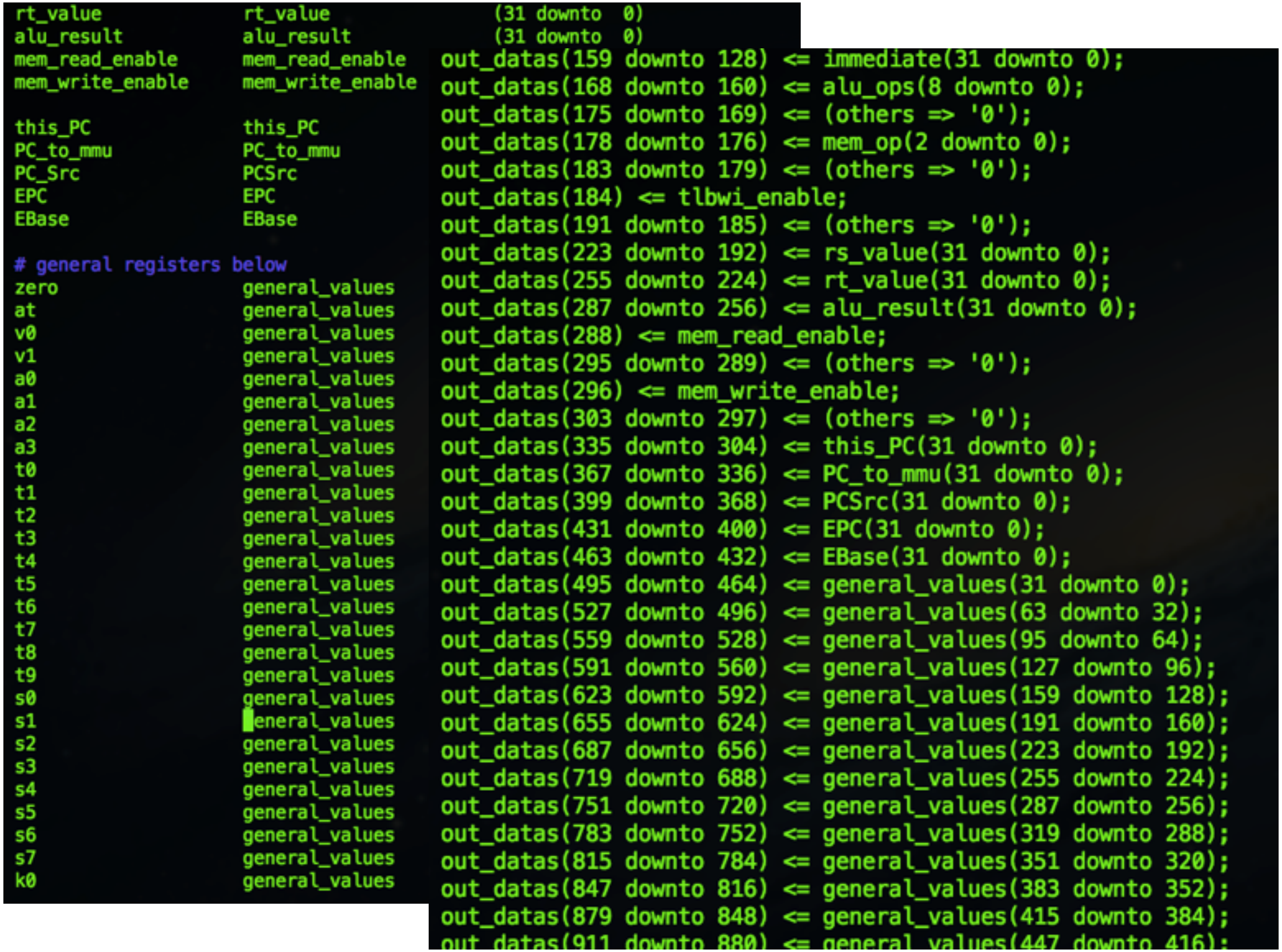

- 使用方法与GDB相似
  - run 开始运行
  - break 设置断点
  - continue 继续运行
  - print 查看信号
  - step [n] 定步调试
  - display 自动查看
  - undisplay 取消自动查看

软件使用

- 自动管理串口接收缓冲区
- 自动检测丢包
- 用户编写配置文件，自动生成VHDL代码

软件使用



```
rt_value                 rt_value                  (31 downto  0)
alu_result               alu_result                (31 downto  0)
mem_read_enable          mem_read_enable
mem_write_enable         mem_write_enable

this_PC                  this_PC
PC_to_mmu                PC_to_mmu
PC_Src                   PCSrc
EPC                      EPC
EBase                    EBase

# general registers below
zero                     general_values
at                       general_values
v0                       general_values
v1                       general_values
a0                       general_values
a1                       general_values
a2                       general_values
a3                       general_values
t0                       general_values
t1                       general_values
t2                       general_values
t3                       general_values
t4                       general_values
t5                       general_values
t6                       general_values
t7                       general_values
t8                       general_values
t9                       general_values
s0                       general_values
s1                       general_values
s2                       general_values
s3                       general_values
s4                       general_values
s5                       general_values
s6                       general_values
s7                       general_values
k0                       general_values
```

```
out_datas(159 downto 128) <= immediate(31 downto 0);
out_datas(168 downto 160) <= alu_ops(8 downto 0);
out_datas(175 downto 169) <= (others => '0');
out_datas(178 downto 176) <= mem_op(2 downto 0);
out_datas(183 downto 179) <= (others => '0');
out_datas(184) <= tlbwi_enable;
out_datas(191 downto 185) <= (others => '0');
out_datas(223 downto 192) <= rs_value(31 downto 0);
out_datas(255 downto 224) <= rt_value(31 downto 0);
out_datas(287 downto 256) <= alu_result(31 downto 0);
out_datas(288) <= mem_read_enable;
out_datas(295 downto 289) <= (others => '0');
out_datas(296) <= mem_write_enable;
out_datas(303 downto 297) <= (others => '0');
out_datas(335 downto 304) <= this_PC(31 downto 0);
out_datas(367 downto 336) <= PC_to_mmu(31 downto 0);
out_datas(399 downto 368) <= PCSrc(31 downto 0);
out_datas(431 downto 400) <= EPC(31 downto 0);
out_datas(463 downto 432) <= EBase(31 downto 0);
out_datas(495 downto 464) <= general_values(31 downto 0);
out_datas(527 downto 496) <= general_values(63 downto 32);
out_datas(559 downto 528) <= general_values(95 downto 64);
out_datas(591 downto 560) <= general_values(127 downto 96);
out_datas(623 downto 592) <= general_values(159 downto 128);
out_datas(655 downto 624) <= general_values(191 downto 160);
out_datas(687 downto 656) <= general_values(223 downto 192);
out_datas(719 downto 688) <= general_values(255 downto 224);
out_datas(751 downto 720) <= general_values(287 downto 256);
out_datas(783 downto 752) <= general_values(319 downto 288);
out_datas(815 downto 784) <= general_values(351 downto 320);
out_datas(847 downto 816) <= general_values(383 downto 352);
out_datas(879 downto 848) <= general_values(415 downto 384);
out_datas(911 downto 880) <= general_values(447 downto 416);
```

高级用法

- 包含通配符(_)的断点
  - 追踪每次异常现场
  - <status><addr> 110________
  - 多种断点切换，无需重复编译
  - <instruction><address> xxxxxxxx________ ________yyyyyyyy

Thanks!