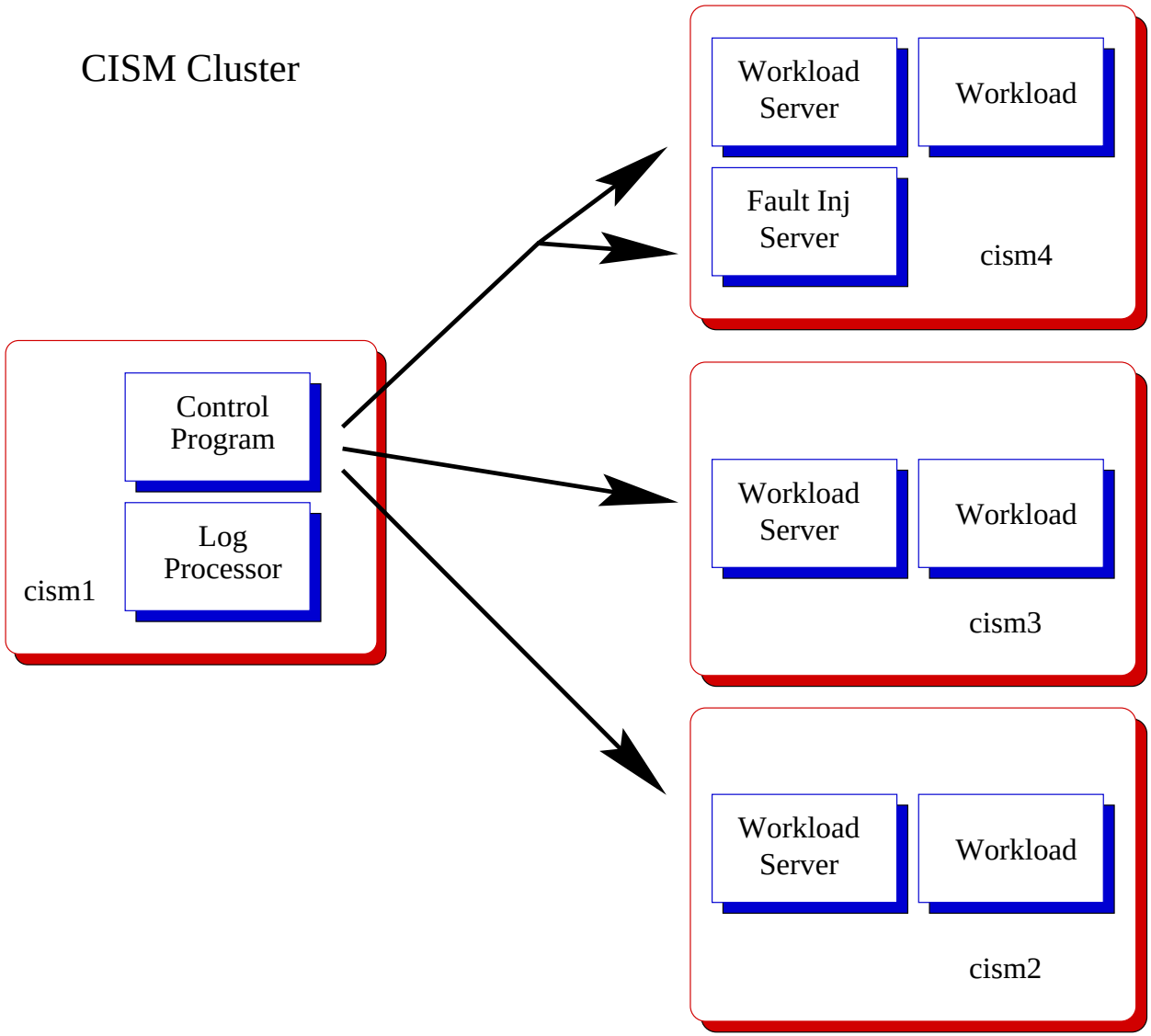
DARPA Fault Tolerance Workshop JPL

David T Stott
dstott@crhc.uiuc.edu

Center for Reliable and High-Performance Computing
Coordinated Science Laboratory
University of Illinois

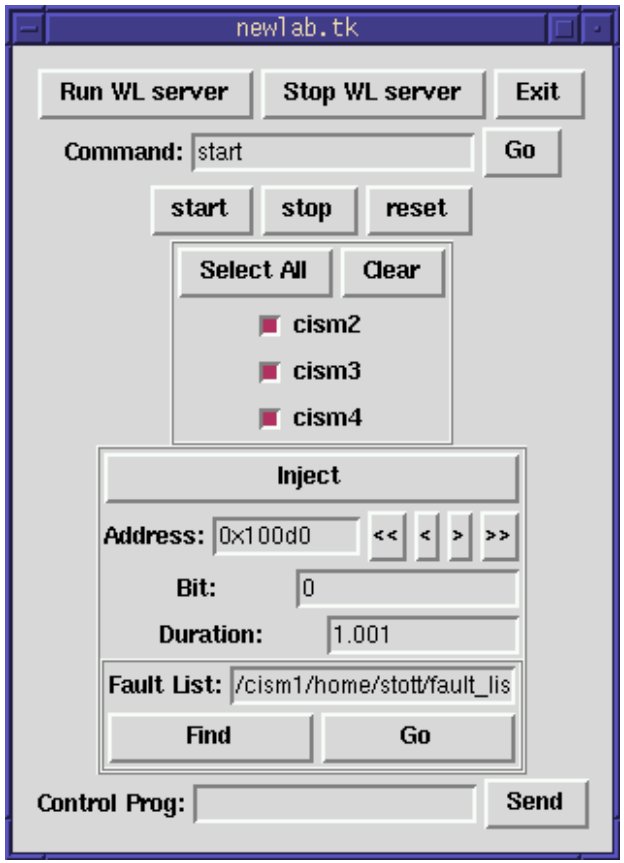
September 11, 1997

Environment



Control Program

- processes user requests
- injects faults (through fault injection server)
- resets hung machines

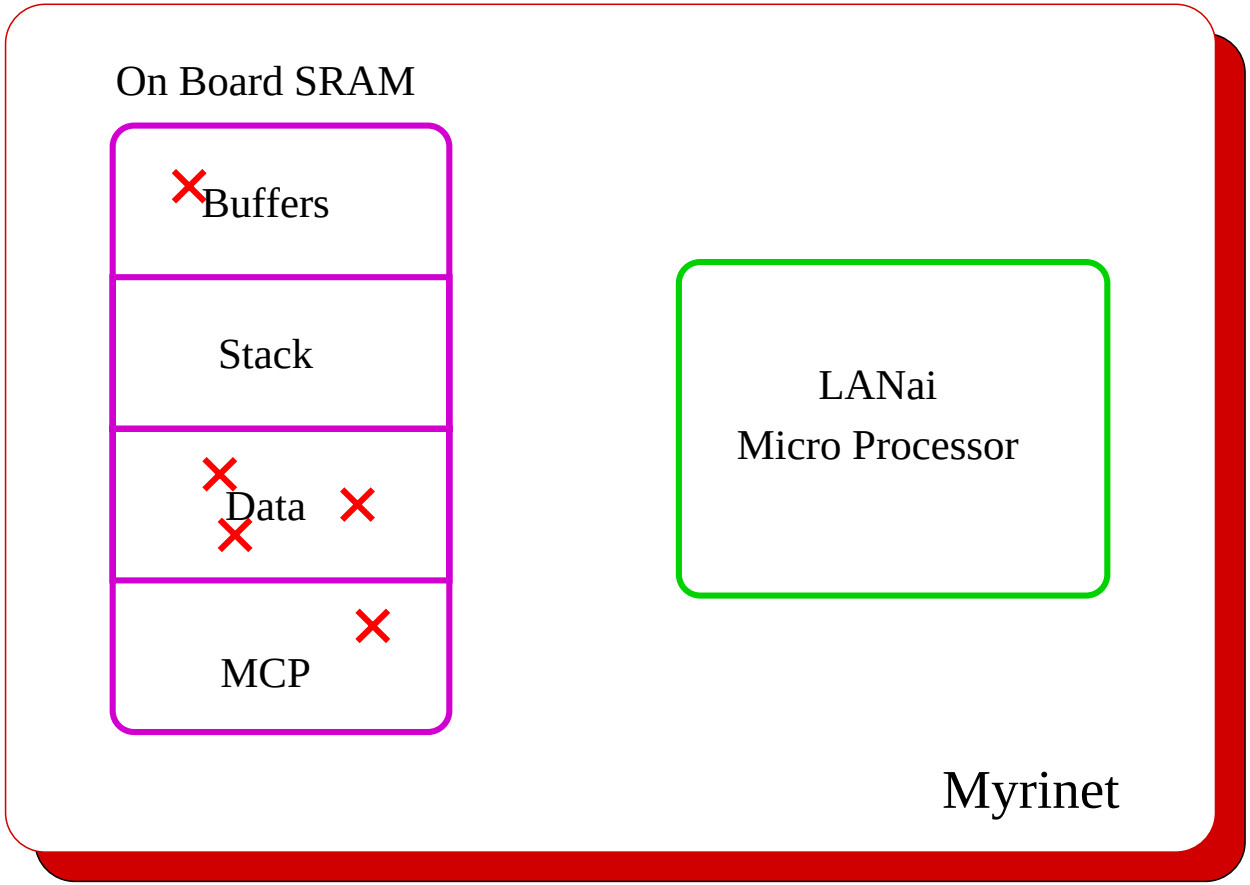


Workload

- Workload I
  - implements error detection and logging
  - maintains high network workload
    - do FOREVER
      - choose host; send short data message
      - recv any incoming message and check validity
      - check that data has been sent over each link recently
      - check that data has been recved from each link
    - DONE
- Workload II
  - Caltech RAIN demo (skier movie)

Fault Model

- Consider transient faults to memory on interface card
- Single bit-flip or set value (e.g., set to -1)



Sample Fault List

```
log start 0
log dir /tmp/logs/sendbuf
log base sendbuf0
flip 0x36720 0 0
flip 0x36724 0 0
flip 0x36728 0 0
flip 0x3672c 0 0
flip 0x36730 0 0
flip 0x36734 0 0
flip 0x36738 0 0
flip 0x3673c 0 0
flip 0x36740 0 0
flip 0x36744 0 0
flip 0x36748 0 0
... and so on
```

Sample Output

```
15:39:20 inject_from_sting: sending <inject 0x14d4c 0 1.0> to injector
15:39:20 update_net_status: cism4 Injecting 85324 0 1
15:39:20 update_net_status: cism4 Injecting fault (0,0x14d4c,0x0)
15:39:21 update_net_status: cism3 *** Unexpected message sequence (2044420 != 2044423) from cism4
15:39:21 update_net_status: cism2 *** Unexpected message sequence (2047280 != 2044424) from cism4
15:39:21 update_net_status: cism3 *** Version should be 0x10, not 0x0
15:39:21 update_net_status: cism2 *** Unexpected message sequence (2044425 != 2047281) from cism4
15:39:21 update_net_status: cism3 *** Got message from illegal host: 00:00:00:00:00:00:00:00
15:39:21 update_net_status: cism3 *** cism3 got data from (Unknown host): Sending message 2044422
15:39:21 update_net_status: cism3 *** Unexpected message sequence (2044424 != 2044422) from cism4
15:39:22 update_net_status: cism4 Restoring mem value (0x14d4c = 0x1)
15:39:24 update_net_status: cism3 *** Unexpected message sequence (2049551 != 2049553) from cism4
15:39:24 update_net_status: cism3 Counter: HostReceiveDrops=4
15:39:24 update_net_status: cism3 *** Unexpected message sequence (2068956 != 2068958) from cism2
15:39:25 update_inject_status: injection complete
15:39:25 check_link_status: All links up
15:39:25 update_inject_status: inject 0x14d50 0 1.0
```