9/25 CS240 - Eraser

Announcements

For next class (Tuesday 9/30)

1. Read: Experience with Processes and Monitors in Mesa
2. Submit answers to reading questions (see course schedule) before class

When saying something in class, please state your first name the first time you say something.

Paper Background

- Authors
  - DEC SRC - Digital Equipment Corporation (DEC) System Research Center (SRC)
    - Xerox PARC defections in 1984
  - Internships: Stefan Savage
  - Mike Burrows
- Paper Venue
  - SOSP'97 & ACM Transaction of Computer Systems
- Enable technology from DEC Western Research Lab (WRL)
  - ATOM - A System for Building Customized Program Analysis Tools
- DEC CEO Ken Olsen: “There is no reason for any individual to have a computer in his home.”

Race Condition Discussion

- What is a race condition? Why is it bad?
- How is it defined in the paper?
  - Does their definition include all races?
- Does this have a data race?

```
int foo;

// Run on many threads simultaneously
foo++;
```

State Action Table - Fill in shadow memory and state change

State (v)	Read(v)	Write(v)	Race?
Virgin (v)			
Exclusive (v)			
Shared (v)			
Share-Modified (v)			

What are the parameters to the function call inserted by ATOM?

Convincing Evidence

- How good of job did they do convincing you Eraser is good idea?
  - What more would you have liked to see?

Resource consumption

- What kind of slow down?
- Increases memory usage?
- Could you write a program that blew up Eraser's state storage?

What is happens before?

What does this mean?

```
Combine::XorFPTag::FPVal( ) {
  if (!this→validFP) {                          // is fingerprint marked valid?
                                                // no? calculate fingerprint
    NamesFP(fps, bv, this→fp, imap);            //   (NamesFP changes this→fp)
    this→validFP = true;                        // and mark it as valid
  }
  return this→fp;
}
```

This is a serious data race, since in the absence of memory barriers the Alpha semantics does not guarantee that the contents of the **validFP** field are consistent with the **fp** field.

Some more questions

- Why did they special case index off register R30?
- What does the following sentence mean:

  Eraser also caches the result of each intersection, so that the fast case for set intersection is simply a table lookup.

What's the deal with annotations?

Reading Question

1. An intuitive sketch of a class of race conditions it will miss,
2. An example of a race condition in that class, and
3. An explanation of how Eraser could be extended to catch such race conditions.

Next class

Read: Experience with Processes and Monitors in Mesa

Do reading questions