CS61C : Machine Structures

Lecture 43
Summary & Goodbye

2004-12-10

Lecturer PSOE Dan Garcia

`www.cs.berkeley.edu/~ddgarcia`

Time Lapse! ⟹

In the next 4 yrs, time-lapse movies will show the construction of the new CITRIS building. Very cool.

`www.cs.berkeley.edu/~ddgarcia/tl/`

Cool Stuff…the videos before lecture

SIGGRAPH2005
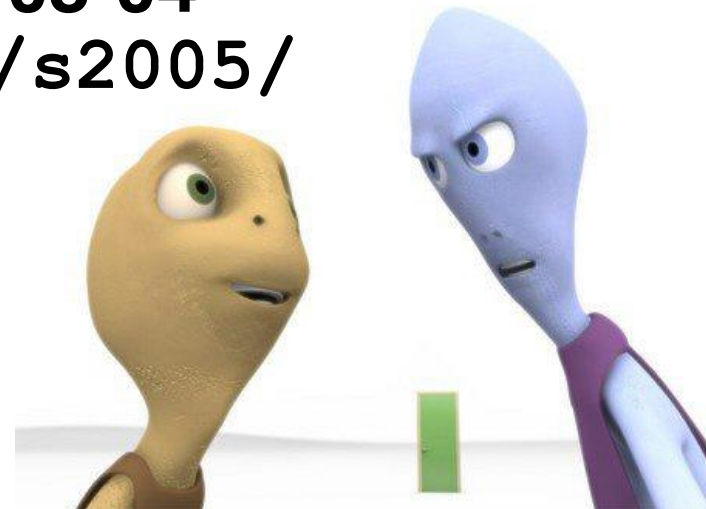
- **SIGGRAPH Electronic Theatre**

  `www.siggraph.org/publications/video-review/SVR.html`

  - **$40/video for ACM Members**

- **SIGGRAPH Conference in LA!**

  - **2004-07-31 ⇒ 2004-08-04**
    `www.siggraph.org/s2005/`

Review

- **Benchmarks**
  - **Attempt to predict performance**
  - **Updated every few years**
  - **Measure everything from simulation of desktop graphics programs to battery life**

- **Megahertz Myth**
  - **MHz ≠ performance, it's just one factor**

- **It's non-trivial to try to help people in developing countries with technology**

- **Viruses/worms have damaging potential the likes of which we can only imagine.**
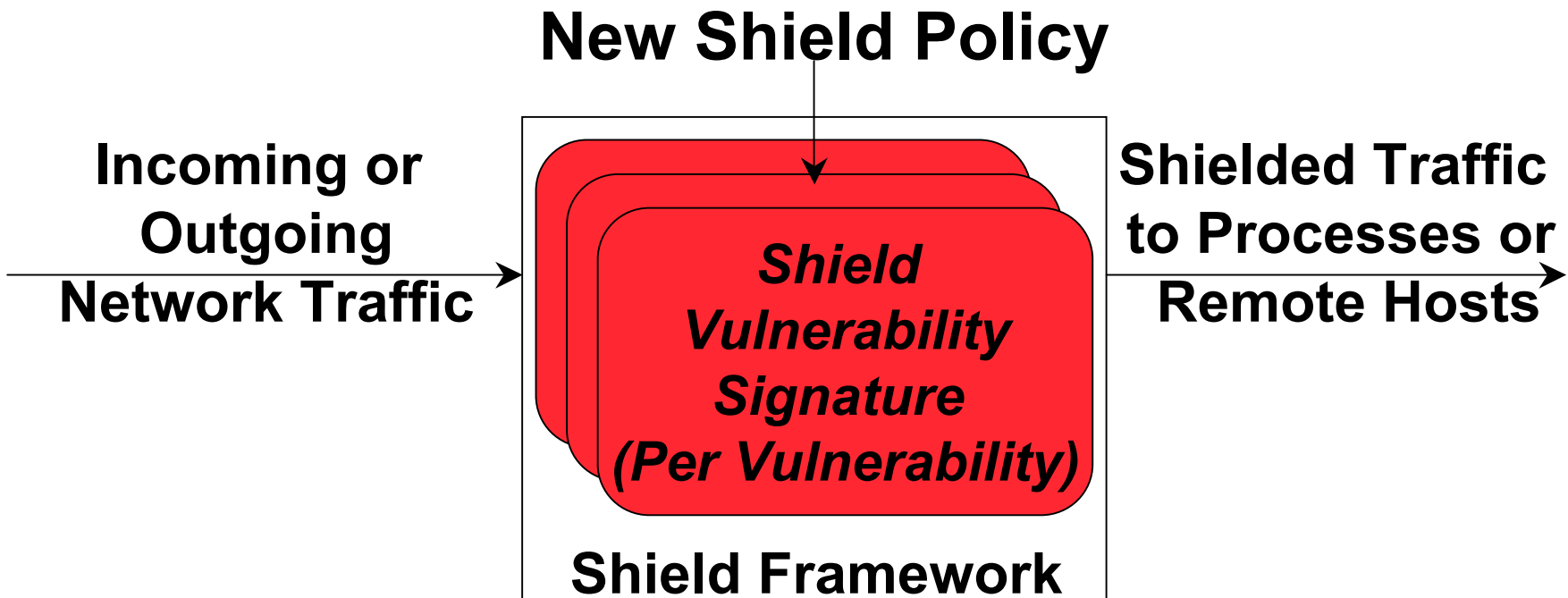
Microsoft Research response to worms

Their Vision: Shielding Before Patching

- **Protect the time window between vulnerability disclosure and patch application.**

- **Shields: *vulnerability-specific, exploit-generic* network filters. Currently focus on end-host based shields.**

- **Patch is the ultimate fix of the vulnerability**
  - **Shield is removed upon patch application**

Overview of Shield Usage

New Shield Policy

Incoming or Outgoing Network Traffic →

Shield Vulnerability Signature (Per Vulnerability)

Shield Framework

→ **Shielded Traffic to Processes or Remote Hosts**

- **Shield framework lies above the transport layer.**
- **Shields are disseminated and (automatically) installed before public vulnerability disclosure**

Administrivia (1/2) : Final Exam & Review

Final Exam: Tue 2004-12-14, 12:30-3:30pm
230 Hearst
Only bring two 8.5"x11" handwritten pieces of paper. Leave your backpacks, books, calculators, cells & pagers home!
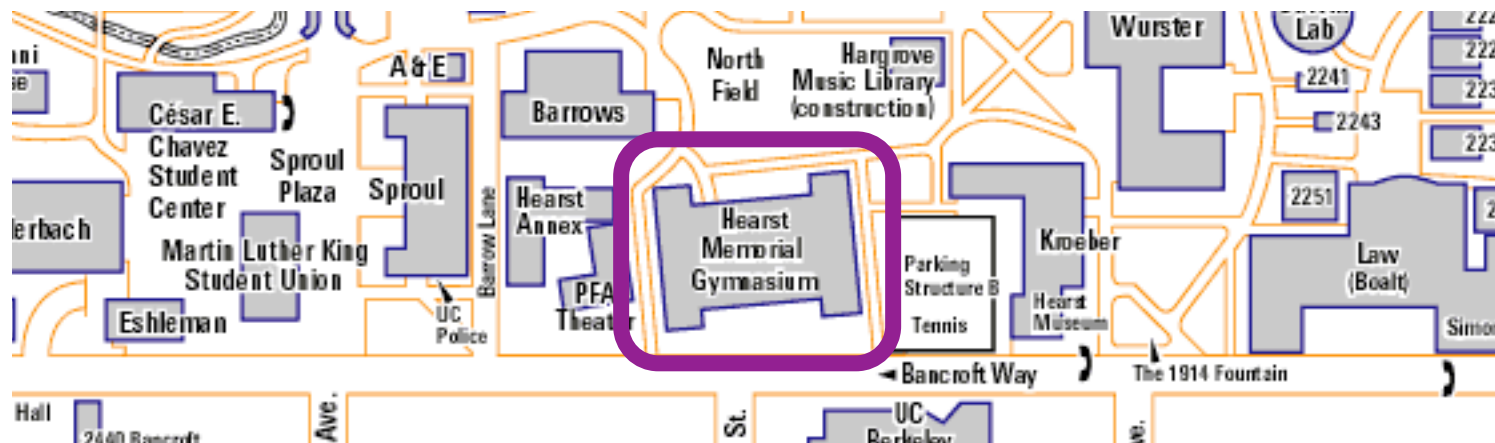
Final Exam Review
- 2004-12-12 @ 2pm in 10 Evans
- Bring questions!

Administrivia (2/2) : Join us!

- **If you did well in CS3 or 61{A,B,C} (A- or above) and want to be on staff?**

  - **Usual path: Lab assistant $\Rightarrow$ Reader $\Rightarrow$ TA**

  - **Fill in form outside 367 Soda before first week of semester…**

  - **I (Dan) strongly encourage anyone who gets an A- or above in the class to follow this path… I'll be teaching 61C all of 2005!**

CS61C: So what's in it for me? (1st lecture)

Learn some of the big ideas in CS & engineering:

- 5 Classic components of a Computer

- Principle of abstraction, systems built as layers

- Data can be anything (integers, floating point, characters): a program determines what it is

- Stored program concept: instructions just data

- Compilation v. interpretation thru system layers

- Principle of Locality, exploited via a memory hierarchy (cache)

- Greater performance by exploiting parallelism (pipelining)

- Principles/Pitfalls of Performance Measurement

Rapid Change AND Little Change

- **Continued Rapid Improvement in Computing**

  - **2X every 1.5 years (10X/5yrs, 1000X/15yrs)**

  - **Processor speed, Memory size: Moore's Law as enabler (2X transistors/chip/1.5 yrs); Disk capacity too (not Moore's Law)**

  - **Caches, Pipelining, Branch Prediction, ...**

- **5 classic components of all computers**

  1. **Control**
  2. **Datapath** } **Processor (or CPU)**
  3. **Memory**
  4. **Input**
  5. **Output**
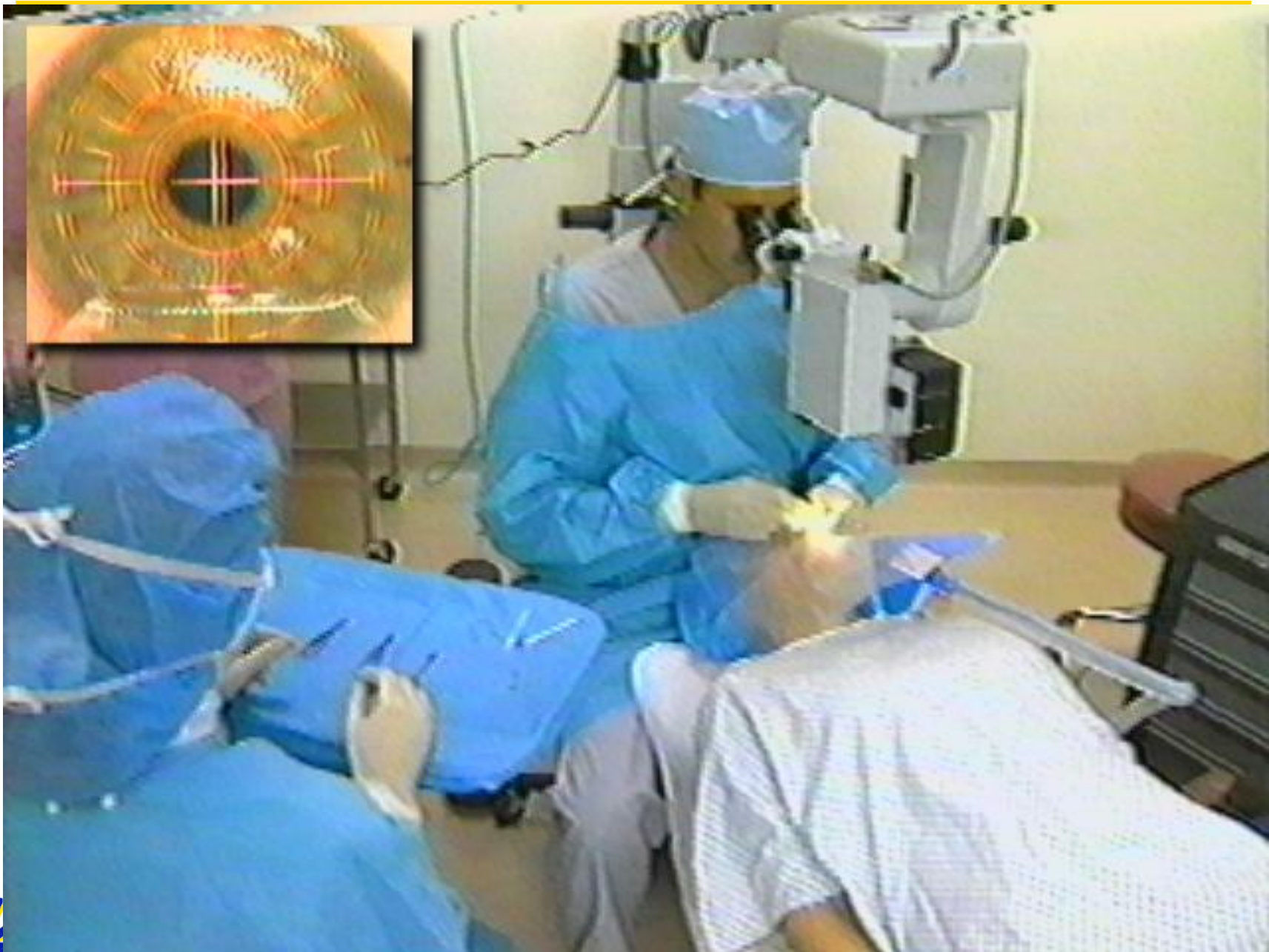
What's this stuff good for? (1/3)

LASIK Eye Surgery

- **Allows for computer-controlled custom corneal surgery**

- **It's not there yet (imho)**

- **The potential is there for adaptive optics and hyperacuity (> 20/20)**

Complications: `http://www.surgicaleyes.org/`

What's this stuff good for? (2/3)

What's this stuff good for? (3/3)

- **Toto, #1 Toilet maker in Japan, charges $4,000 for high-tech toilets.**
  - **Microprocessor-control**
  - **Heated seat**
  - **Bidet (temp & pressure)**
  - **Hot air, perfume**
  - **Rear-end washer**
  - **Noisemaker to mask sounds**
  - **Clock, Remote control**
  - **Auto-urinalysis, contacts your doctor**

http://www.theplumber.com/japan.html

Taking advantage of Cal Opportunities

"The Godfather answers all of life's questions"
– Heard in "You've got Mail"

- **Why are we the #2 Univ in the WORLD?**
  - **Research, reseach, research!**
  - **Whether you want to go to grad school or industry, you need someone to vouch for you! (as is the case with the Mob)**

- **Techniques**
  - **Find out what you like, do lots of web research (read published papers), hit OH of prof, show enthusiasm & initiative**

- `http://research.berkeley.edu/`

Opportunities with me Spring 2005

- **GamesCrafters**
  - We are developing SW, analysis on small 2-person games of no chance. (e.g., achi, connect-4, dots-and-boxes, etc.)
  - Req: A- in CS61C, Game Theory Interest

- **MS-DOS X** (Mac Student Developers)
  - Help students develop apps for OS X. No requirements (other than Mac, interest)
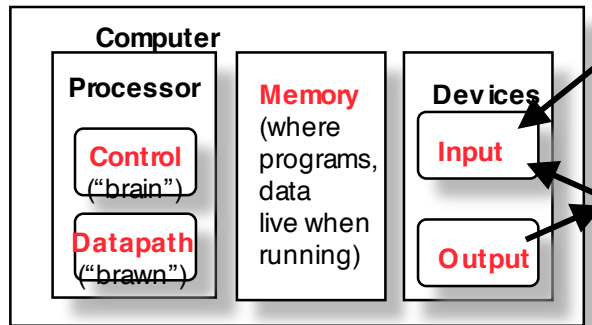
- **UCBUGG** (Recreational Graphics)
  - Develop computer-generated images and animations. Req: 3D experience, portfolio

Peer Instruction

Strong or Weak AI? Strong AI: Machines that act intelligently have real, conscious minds...sentience Weak AI: Machines can be made to act as if they were intelligent.

In the future, what'll be the most important computer component?

Computer

Processor

Control ("brain")

Datapath ("brawn")

Memory (where programs, data live when running)

Devices

Input

Output

Strong AI
1: Control
2: Datapath
3: Memory
4: Input
5: Output

Weak AI
6: Control
7: Datapath
8: Memory
9: Input
0: Output

Peer Instruction Answer

"Forget cloning. Forget TVs on your wrist watch. The biggest invention of the next 100 years will be the ability to directly connect your brain to a machine. **– Dan Garcia**

- **A macaque monkey at Duke University can already control a robotic arm with thought.**

- **DARPA is extremely interested in the technology for mind-control robots & flying**

- **Virtual Reality could be achieved with proper I/O interfacing…**

www.popsci.com/popsci/medicine/article/0,12543,576464,00.html

Penultimate slide: Thanks to the staff!

- **TAs**
  - **José María González (Head TA)**
  - **Andy Carle (Head TA)**
  - **Paul Burstein**
  - **Steven Kusalo**
  - **Andrew Schultz**
  - **Slav Petrov**

- **Readers**
  - **Andrew Farmer**
  - **Michael Le**
  - **Benjamin Mellblom**
  - **Mark Whitney**

The Future for Future Cal Alumni

- **What's The Future?**

- **New Millennium**
  - **Internet, Wireless, Nanotechnology, ...**
  - **Rapid Changes in Technology**
  - **World's (2nd) Best Education**
  - **Never Give Up!**

"The best way to predict the future is to invent it" – Alan Kay

The Future is up to you!