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
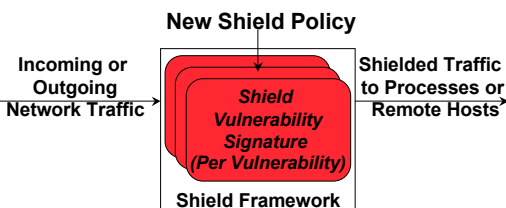
Their Vision: Shielding Before Patching

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

Shield Framework

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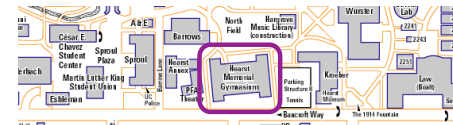- **Shields are disseminated and (automatically) installed before public vulnerability disclosure**

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 ⟹ Reader ⟹ 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   } Processor (or CPU)
  2. Datapath }
  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)
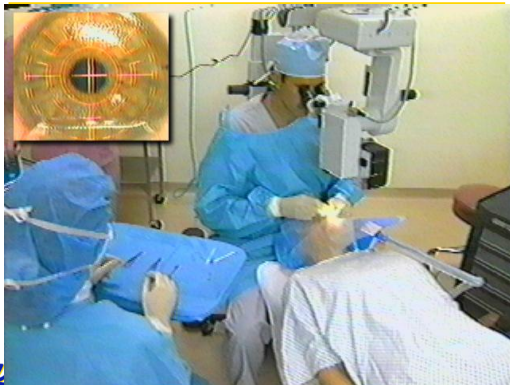- The potential is there for adaptive optics and hyperacuity (> 20/20)

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

Cal `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)
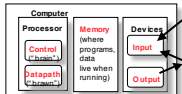 - Develop computer-generated images and animations. **Req: 3D experience, portfolio**

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?

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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

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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 Best Education
  - Never Give Up!

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

The Future is up to you!