Intro to Computer Science

Social issues in Computing
Ethics and Responsibility

• In Math/Science discipline like computer science
  – easy to focus on getting the program right
  – but also need to consider the program itself.
  – In age of computerized everything
    • do we really want all functions computerized.
    • for those that are, what are the risks
Bugs

- computer complexity
  - bugs a fact of life
  - MS windows
    - Monthly updates
  - Linux& unix
    - irregular updates.
- live with bugs in some things
  - but not others.
  - like what?
Therac-25: big and bad

- Therac-25 total computer problem.
  - radiation treatment machine
  - successor to previous machines developed as joint venture.
  - completely software controlled.
    - previous versions of software designed for previous machines
    - prev machines had hardware safeties.
    - operator types x (x-ray), then e (low powered electron beam), system reports ready, operator says go
      - system says error (usually means dose not administered)
      - operator tells it to try again.
Therac-25 Interface


Figure A. Operator interface screen layout.
Other Serious computer problems in history

- 1983: Russian computer says that us has launched nukes
  - http://www.commondreams.org/views03/0923-11.htm
- 1996: ESA loses rocket
- 1988: civilian airliner shotdown
  - http://press.princeton.edu/books/rochlin/chapter_09.html#p30
  - 2004 LA air traffic control voice goes out
1983: Russian computer says that US has launched nukes

- September 26, 1983:
  - period on high tension
    - Reagan: Russia Evil Empire
    - Russia: Russian military shot down a Korean passenger jet
  - Lt. Colonel Stanislav Petrov in command of Russian early warning bunker
    - monitoring incoming signals from satellites
    - reported to the head early warning center which reported to the Kremlin
    - warning system computers say US has launched preemptive strike.
  - in this case, commander managed to get better info before telling superiors.
ESA Loses Rocket

• On June 4, 1996:
  – unmanned Ariane 5 rocket launched by the European Space Agency exploded just forty seconds after its lift-off
  – rocket on its first voyage,
  – cost:
    ● a decade of development costing $7 billion.
    ● rocket and its cargo valued at $500 million.

• cause of the failure
  – software failure
  – 64 bit floating point number relating to the horizontal velocity of the rocket was converted to a 16 bit signed integer
  – value was greater than 32,767
Patriot Missal Failure

- **1991 Gulf war I**
  - summary: Patriot Missile battery in Dharan, Saudi Arabia, failed to track and intercept incoming Iraqi Scud missile. Scud struck an Army barracks, killing 28 soldiers and injuring around 100 other people.
  - cause: small rounding error caused by representing fraction 1/10 in binary (repeating number in binary)
    - hardware had counter that counted number of tenths of a second since bootup. Get current time by counter * 1/10
    - time needed to predict where scud should be at current time.
    - battery had been on alert for 100 hours, error was .34 seconds
      - in that time the scud traveled close to half a mile.
Interactions of high tech and people

1988: civilian airliner shotdown (Iran)
- situation in 1988 Iran, attack by Iraqi jet on US warship previous year; Iran saber rattling, US Embargo
- three warships enforcing embargo including Aegis crusier
  - Aegis is deep water, high tech vessel
  - attacked by Iran's navy, executing sharp turn/evasive maneuvers
  - meanwhile civilian airliner takes off 18 minutes late and flies over battle. 99.9% of time emits “squawk III” one very brief “squawk II”
  - mess from sharp turn and battle prevents standard lookup on paper
  - no reply to challenges to “unknown airliner” on military and civilian bands: personnel start thinking hostile: begin to refer to unidentified "Iranian F-14."
- eventually fires anti fighter weapon, takes down passenger jet
- interface issues.
2003 North East blackout

• Second largest power failure in history
  – Michigan to Massachusetts
  – Ohio to Ontario

• Two causes
  – Electric company in Ohio had sub standard equipment
  – Critical computer failure just as hardware was failing
    • Race condition
    • Prevented alarms from reaching control room for first hour of crisis
  – Ref 3-mile island
LA Air traffic control

• 2004 Voice communications lost from LA air traffic to the planes they were supposed to be directing
  - planes heading toward one another
  - couldn't redirect.
  - win2k system has timer that counts down from startup to determine time
  - goes to zero (and crashes system) in 50 3/8 days
  - gets rebooted every month
  - main sys admin was on vacation.
A smattering of other major failures

- 1997 USS Yorktown
  - Crew member enters 0 in database field
  - Divide by zero error crashes all windows machines on network – dead in water

- 2006 F-22 squadron goes on overseas deployment for the first time
  - Hawaii to Okinawa Japan
  - Crosses international dateline
  - All computer systems 'dump' (crash)
  - No navigation – no nothing.
  - Followed the refueling tanker plane to Japan
More recent

- **2011:** Comp error frees violent prisoners in California
  - Too many prisoners, so need to parole some of them
  - Want to parole least likely to cause more trouble.
  - Accidentally included 450 very violent recent convicts whose info hadn't made it into the system yet

- **2012:** Computer error causes sales of recently purchased stock
  - Knight capital runs the wrong program on one of its 8 computers doing the trading and it works against the others
  - Lost 10 million a minute (almost half a billion)
    - Went bankrupt
Small selection

- Small selection of major software and human interaction glitches
  - some worse than others
  - some situations need to be more careful than others.
  - Many are from a while ago.
    - software better?
    - maybe just more declassified from a while ago.
Professional Codes of Ethics

- In addition to general codes
  - We are a profession
  - Professional societies have professional codes of ethics
  - ACM: one of the biggest cs professional societies
  - Code of ethics
    - http://www.acm.org/about/code-of-ethics
Professional Certification

• Software engineer
  – Term for someone who handles the whole lifecycle of computer software
  – But in Ontario and Texas
    • Official term of professional license and credentialing
      – You are only an engineer after you pass the exam
      – Similar to lawyers/attorneys
  – Advantages and disadvantages
Workplace Use of technology and computing

- In workplace
  - Employer owns
    - Computer
    - Network
    - Software licenses
  - They can set the rules
    - Can read any employee email
    - Can monitor employee computing
      - Upheld by court decision.
  - Read and live by acceptable use policies.
Computers and the law

• Lori Drew
  – Who was she?
Computers and the law

- Lori Drew
  - Mother of former friend of Megan Meier
  - Creator of “josh evens”
  - Myspace, cyber-bullying
  - “the world would be a better place without you”
  - Linked profiles start to dogpile on Megan
    - Found hanging from a noose in her closet.
  - Lori Drew charged with what?
Lori Drew

- Lori Drew
  - No cyber bullying law
  - No law against being an awful person
  - So tried in California for
    - Hacking!?!?
  - How did she hack?
    - By violating the terms of service
    - When did you last read your terms of service
  - Initially convicted of misdemeanor hacking
    - Criminal charges not found guilty by jury
  - Eventually (July 2009) all overturned
    - Good thing or all “enemies of state” jailed arbitrarily.
What information is out there

• anonymously available info
  - Google archived info
    • Google 716-634-6286 (this is a couple years out of date)
    • then lets follow the map link
    • any issue here?
  - Superpages.com.

• Information available from other public directories.

• For Profit information providers
  - http://www.ussearch.com/consumer/index.jsp
Public record info

- http://www.detective-plus.net/?atid=2g1.91
- http://www.publicrecordfinder.com/
- Others?