

April 27, 2005 -- Lecture 38



22C:169

# Computer Security

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Voting Standards

# Technology before computers

1888, in United States

*first use of Australian Ballot in US*

*first use of mechanical lever voting machine*



800 LBS, TYP

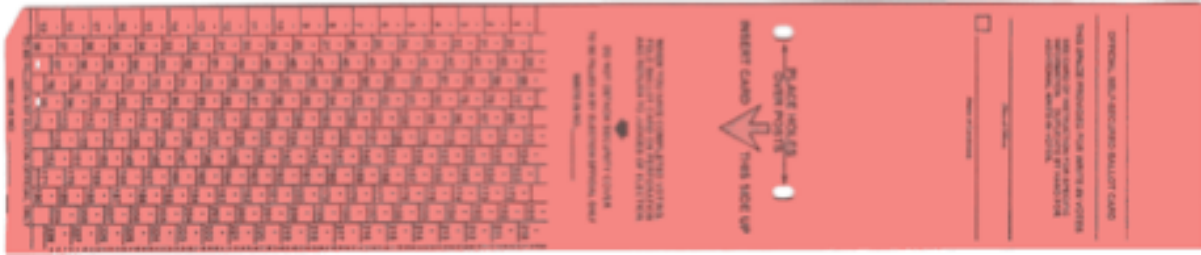
by the 1930's,

*mechanical lever machines were dominant,  
"pull the lever" became synonym for "vote"*

Lever machines could be rigged

*You must trust the technician!*

# Computers enter the scene



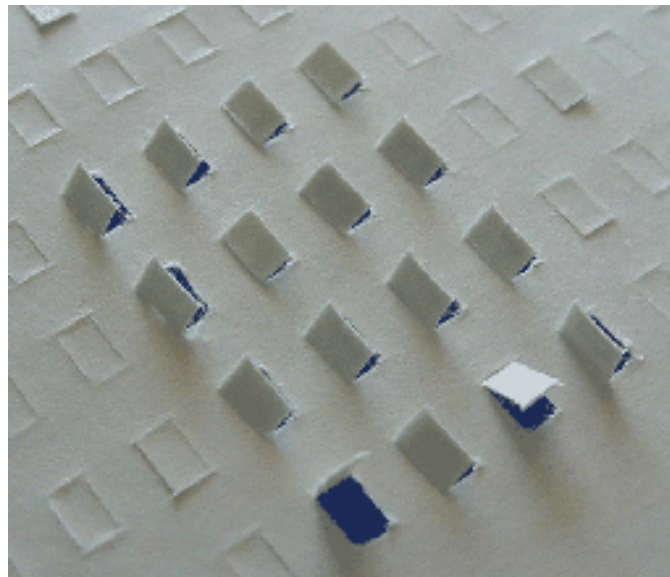
1964, First use of punched card ballots

FULTON & DEKALB CO GEORGIA

*tabulated by electromechanical sorter  
or tabulated by computer*

Became dominant technology by 1970's

*But what about ambiguous punches?*



Dangling Chad, Pregnant Chad?

# Optical Mark-Sense Ballots

OFFICIAL BALLOT Random County, Somestate	
<small>INSTRUCTIONS: To vote for a candidate, make an X in the oval beside the name of the candidate you prefer.</small>	
<b>PRESIDENT (vote for one)</b>	<b>U.S. CONGRESS (vote for one)</b>
<input type="radio"/> G. Washington	<input type="radio"/> S. Rayburn
<input type="radio"/> A. Lincoln	<input type="radio"/> J.G. Cannon
<input type="radio"/> _____ (write in)	<input type="radio"/> _____ (write in)

## 1952, First Use of Mark-Sense Ballots

KERN CITY, CALIFORNIA

Widespread use began in late 1970's

*Rapidly accepted technology for  
central-count and absentee ballots.*

All mark-sense tabulation is computerized

*Hand recount of paper ballots is rare  
so error or fraud in software is a threat!*

# Voting System Standards - Part I

Response to rising use of computers

Federal Election Commission VSS

1990: First edition

2002: Second edition

Problems with FEC writing standards:

*not authorized to enforce standards*

*never wrote technical standards before*

*never funded to develop standards*

Result:

*Standards are ineffective and "voluntary"*

## Direct Recording Electronic (DRE) Voting



Votes recorded directly by computer

*Push-button or touch screen interface*

Technology developed in mid 1970's

*Used only hesitantly until VSS in place*

Explosive growth of use in 1990's

*Inexpensive laptop computer motherboards*

*Inexpensive touch-screen displays*

*Widely available GUI software*

*Perception that standards were solid*

## **For DRE, Standards mandate**

Redundant internal record of votes

*Multiple flash EEPROM typical today  
in 1990, typically battery backed RAM  
No statement of how redundancy is used!*

Ability to print totals when polls close

*Paper record in plus to electronic transmit*

Vague statement that

*System must be secure without  
testable standards for what this means*

## **Discovery of severity of problem**

Nov 6, 1997:

*Iowa examines Global AccuTouch DRE  
I found that key management was bungled*

*Only one key, hard coded!*

Jan 2003: Diebold acquires Global

Feb 5, 2003: Source code found on-line

*Bev Harris found it using Google!*

July 24, 2003: Hopkins Report

*Bungled key management still present  
Many other security issues mishandled*

*Firestorm -- Corporate reaction  
is to attack integrity of Hopkins group*

Outside evaluations done for OH & MD

*Confirm Hopkins report*

*Show other vendors not much better*



## **Voting System Standards - Part II**

2002 - Help America Vote Act

*Passed only after Miami has trouble with  
new DRE machines in August primary*

Creates election assistance commission

*Told to work with NIST to develop VSS*

NO FUNDS BUDGETED FOR VSS

Outlaws punched-card and lever machines

*Offers funds for immediate replacement*

FUNDS FOR THIS BUDGETED!