

Notes for November 8, 1999

1. Greetings and Felicitations!
2. Puzzle of the Day
3. Password Storage
 - a. In the clear; MULTICS story
 - b. Enciphers; key must be kept available; get to it and it's all over
 - c. Hashed; present idea of one-way functions using identity and sum
 - d. Show UNIX version
4. Attack Schemes Directed to the Passwords
 - a. Exhaustive search: UNIX is 1-8 chars, say 96 possibles; it's about $7e16$
 - b. Inspired guessing: think of what people would like (see above)
 - c. Random guessing: can't defend against it; bad login messages aid it
 - d. Scavenging: passwords often typed where they might be recorded (b)as login name, in other contexts, *etc.*
 - e. Ask the user: very common with some public access services
 - f. Expected time to guess
5. Password aging
 - a. Pick age so when password is guessed, it's no longer valid
 - b. Implementation: track previous passwords vs. upper, lower time bounds
6. Ultimate in aging: One-Time Pads
 - a. Password is valid for only one use
 - b. May work from list, or new password may be generated from old by a function
 - c. Example: S/Key™
7. Challenge-response systems
 - a. Computer issues challenge, user presents response to verify secret information known/item possessed
 - b. Example operations: $f(x) = x+1$, random, string (for users without computers), time of day, computer sends $E(x)$, you answer $E(D(E(x))+1)$
 - c. Note: password never sent on wire or network
 - d. Attack: monkey-in-the-middle
 - e. Defense: mutual authentication (will discuss more sophisticated network-based protocols later)
8. Biometrics
 - a. Depend on physical characteristics
 - b. Examples: pattern of typing (remarkably effective), retinal scans, *etc.*
9. Location
 - a. Bind user to some location detection device (human, GPS)
 - b. Authenticate by location of the device