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Definition of Graphical Passwords

A graphical password is a secret that a human user inputs to a computer with the aid of the computers' graphical input.

Background / History

- Information and computer security is dependent on passwords for the authentication of human users.
- As presented in previous lectures, common methods include text passwords, biometrics and etc.

Background / History

- Main drawback of passwords is the password problem.
- What is this password problem?
 - Passwords should be easy to remember.
 - User authentication protocol should be executed quickly and easily by humans.
 - Passwords should be secure.

Background / History

- Graphical passwords may be a solution to the password problem.
- The idea of graphical passwords was pioneered by Greg Blonder who also holds the US patent 5559961 (1996).

Passwords: Text AND Graphical



Text Passwords:

- Alpha-numeric passwords guidelines
 - At least 8 characters long.
 - Should not be easy to relate to the user (e.g. last name, birth date).
 - Should not be a word that can be found in a dictionary or public dictionary.
 - Should combine upper and lower case letters and digits.

Text Passwords:

- Examples:
 - DiNoSaUr (by alternating upper and lower case).
 - rUaSoNiD (by reversing the string).
 - oSNaiUDr (by shuffling the string).
 - D9n6s7u3 (combining numbers and letters).

Graphical Passwords:

- Advantages
 - Human brains can process graphical images easily.
 - Examples include places we visited, faces of people and things we have seen.
 - Difficult to implement automated attacks (such as dictionary attacks) against graphical passwords.

Hamid & Arash



Research papers & applications

- A Password Scheme Strongly Resistant to Spy ware.
- Picture Password: A Visual Login Technique for Mobile Devices.
- Pass faces.
- On User Choice in Graphical Password Schemes.

A Password Scheme Strongly Resistant to Spy ware

- Spy ware is one of the biggest threat to computer security.
- Spy ware gathers information about users and their computer systems without their permissions and send these lucrative information to parties who installed the spy ware.
- It is an arms race for the counter spyware vendors.

A Password Scheme Strongly Resistant to Spy ware

- Password system will lead the user going through the 4 pass icons to set up the password.
- User will choose a string and enters the string beneath the variation.
- Strings are chosen to relate to some events in the user's life.

A Password Scheme Strongly Resistant to Spy ware



Figure 2: Face icon with 4 variations



Figure 3: Pin icon with 4 variations

A Password Scheme Strongly Resistant to Spyware



A Password Scheme Strongly Resistant to Spy ware

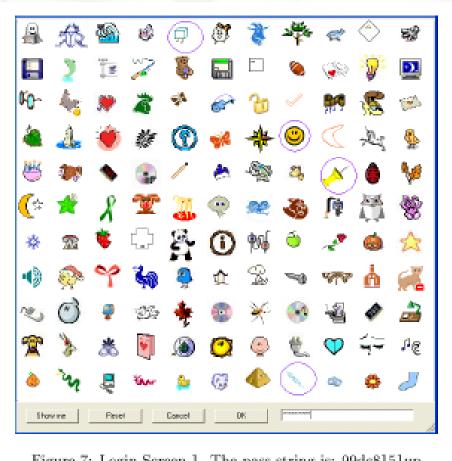


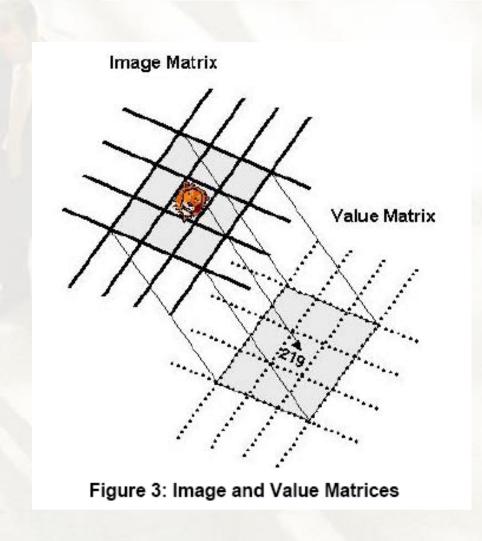
Figure 7: Login Screen 1. The pass-string is: 99dc8151up



Figure 1: Picture Password Cats and Dogs Theme

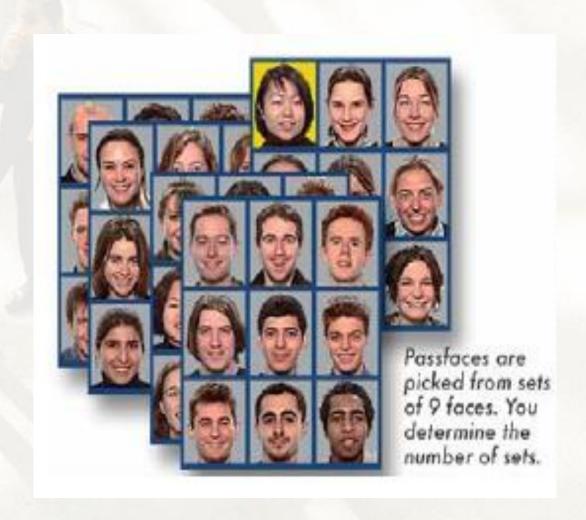


Figure 2: Sea & Shore Theme



- NIST Secure Hash Algorithm is used to compute the cryptographic hash and results in a 20-byte binary value.
- The value matrix maps selected thumbnails to their underlying alphabet values.
- This scheme matches the capabilities and limitations of the handheld devices.

- Pass faces (formerly known as Real User Corporation) is an information security technology company based in Annapolis, Maryland.
- Commercial application leverages the brain's innate cognitive ability to recognize human faces.



- Logon Process:
 - Users are asked to pick their assigned Pass faces from a 3 x 3 grids containing one Pass face and 8 decoys.
 - The faces appear in random positions within the grid each time.
 - This process is repeated until each of the assigned Pass faces is identified.

Operational Flow

Users pick their Passfaces one at a time from from matricies of 9. One matrix is presented for each Passface in the access code.



Client sends 9 images per Passface in the access code. (5 Passface code = 45 faces. 5 passfaces and 40 decoys).



2F3A 111D CA32 134D F23C

Client sends result to the server as an HTTP form. Result is an ASCII string of hexadecimal digits (4 per Passface) Existing Security System



Used as a password, compressed, or passed through a one-way function before storage or comparison using existing databases or directory services.

Customizable Skins





User Choice in Graphical Password Schemes

- Conclusions of the study:
 - User choice of passwords is not a good method.
 - Limits should be imposed on the number of incorrect password guesses.
 - Educate the users on better approaches to select passwords.
 - Graphical passwords (faces or story) must be easy to remember. [20]

- **References for Graphical Password Lecture: Fabian Monrose and Michael Reiter** [01] **Chapter 9 - Security and Usability** The Graphical Passwords Project [02] Funded by the NSF CyberTrust Project Co-Pls: J.C. Birget (Rutgers-Camden), D. Hong (Rutgers-Camden), N. Memon (Brooklyn Polytechnic), S.Man (SW Minn. State), S. Wiedenbeck (Drexel) [03] The Graphical Passwords Project Funded by the NSF CyberTrust Project Co-Pls: J.C. Birget (Rutgers-Camden), D. Hong (Rutgers-Camden), N. Memon (Brooklyn Polytechnic), S.Man (SW Minn. State), S. Wiedenbeck (Drexel) **Graphical Passwords** [04] **Leonardo Sobrado and Jean-Camille Birget Department of Computer Science, Rutgers University Graphical Passwords** [05] **Leonardo Sobrado and Jean-Camille Birget** Department of Computer Science, Rutgers University **Graphical Passwords** [06] **Leonardo Sobrado and Jean-Camille Birget Department of Computer Science, Rutgers University Graphical Passwords** [07] **Leonardo Sobrado and Jean-Camille Birget** Department of Computer Science, Rutgers University [80] A Password Scheme Strongly Resistant to Spyware Dawei Hong (Rutgers University), ShuShuang Man & Barbra Hawes (Southwest Minnesota State University), Manton Matthews (University of South Carolina). A Password Scheme Strongly Resistant to Spyware Dawei Hong (Rutgers University), ShuShuang Man & Barbra Hawes (Southwest Minnesota State University), Manton Matthews (University of South Carolina).
- [10] A Password Scheme Strongly Resistant to Spyware
- Dawei Hong (Rutgers University), ShuShuang Man & Barbra Hawes (Southwest Minnesota State University), Manton Matthews (University of South Carolina).