Presentation Specifications

Presentation title:Making Login Services Independent of Authentication Technologies

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Making Login Services Independent of Authentication Technologies

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Authentication Requirements

- Users
  - Remember only one password
  - Do not want to learn about new authentication schemes

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Authentication Requirements

- Vendors
  - System entry services independent of authentication technologies
  - Flexible, modular system to accommodate new authentication technologies

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Authentication Requirements

- System Administrators
  - Ease of use to manage N authentication systems for M system entry services
  - Flexibility to have machine specific configurations
  - Flexible, modular system to accommodate new authentication technologies

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Control Flow of a Typical Login Service

get login id get password verify password	authentication
verify account validity	account management
change passwords	password management
update system accounts	session management

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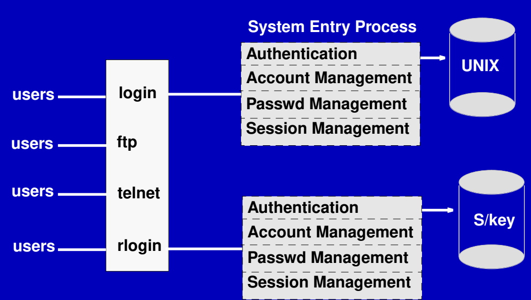
Current Architecture



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Problems with Current Architecture

- All components of the system entry services are hard-coded
  - authentication
  - account management
  - password management
  - session management
- No easy way to integrate multiple authentication systems

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Problems with Current Architecture

- Authentication systems need to know about the system entry services
- Different system entry services may have different authentication needs
  - rlogin for trusted hosts
  - ftp does not allow multiple passwords
- Need separate services for graphical and non-graphical system entry

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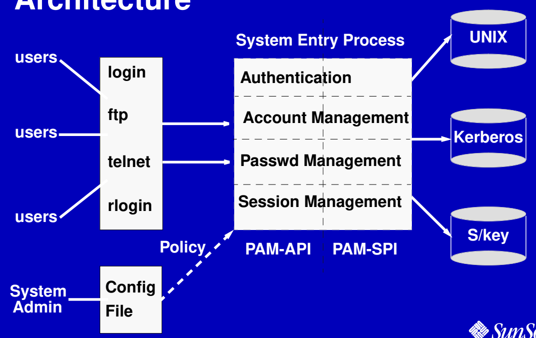
Pluggable Authentication Modules Architecture



PAM Configuration

service	module	control_flag	module_path	options
login	auth	required	pam_unix.so	
login	session	required	pam_unix.so	
login	account	required	pam_unix.so	nowarn
#				
rlogin	auth	required	pam_skey_auth.so	debug
rlogin	session	required	pam_unix.so	
#				
OTHER	auth	required	pam_unix.so	
OTHER	session	required	pam_unix.so	
OTHER	account	required	pam_unix.so	
OTHER	password	required	pam_unix.so	

Support for Multiple Modules

service	module	control_flag	module_path	options
login	auth	optional	pam_unix.so	
login	auth	required	pam_dce.so	use_first_pass
login	auth	required	pam_rsa.so	use_mapped_pass
#				
login	account	required	pam_users.so	allow=charlie
login	account	required	pam_unix.so	
#				
rlogin	auth	sufficient	pam_rhosts_auth.so	
rlogin	auth	required	pam_unix.so	
#				

Framework APIs

- pam_start(service, user name, callback, pam_handle)
  - Sets authentication transaction parameters
  - Specifies the callback function to read and write data
- pam_end(pam_handle, status)
  - Recovers PAM resources

Authentication APIs

- pam_authenticate(pam_handle, flags)
  - Authenticate the user
  - Invoke stacked modules specified in the PAM configuration file
  - All stacked modules are called to hide source of failure
  - Retry done by the application
- pam_setcred(pam_handle, flags)
  - Sets, refreshes, destroy's user credentials

Account Management APIs

- pam_acct_mgmt(pam_handle, flags)
  - Should this person be allowed to have a login session?
  - Checks password expiry, login hour restrictions, etc.

Session Management APIs

- pam_open_session(pam_handle, flags)
  - A new interactive session has started
  - Do any session processing
- pam_close_session(pam_handle, flags)
  - The session has terminated
  - Typically called by a different process (e.g. init)

Password Management APIs

- pam_chauthtok(pam_handle, flags)
  - Change the authentication token with all modules
  - The callback functions may be invoked to prompt for new authentication tokens

Example Login Service (login.c)

```
pam_start("login", username, &pam_conv, &pam_handle);
while (not authenticated && retry < 3)
    pam_authenticate(pam_handle, flags);
error = pam_acct_mgmt(pam_handle, flags);
if (error == PAM_AUTHTOK_EXPIRED)
    pam_chauthtok(pam_handle, flags);
pam_open_session(pam_handle, flags);
pam_setcred(pam_handle, flags);
pam_end(pam_handle);
```

Conversation Function for Login

```
login_conv(msg, response, appdata) {
    switch (message->msg_style)
    case PAM_PROMPT_ECHO_OFF:
        response = strdup(getpass(message->msg));
    case PAM_PROMPT_ECHO_ON:
        fputs(message->msg, stdout);
        fgets(response, 512, stdin);
    case PAM_ERROR_MSG:
        fputs(message->mst, stderr);
    case PAM_TEXTINFO:
        fputs(message->msg, stdout);
}
```

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PAM Module (Unix Authentication)

pam_sm_authenticate()

```
{
    pamh->conversation();     /* prompt for user name */
    getpwnam();               /* check to see if user name valid */
    getspnam();               /* obtain encrypted password */
    pamh->conversation();     /* prompt for password */
    crypt();                  /* compare passwords */
    if (password incorrect)
        return (PAM_AUTH_ERR);
    else
        return (PAM_SUCCESS);
}
```

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PAM Module Specific APIs

- pam_set_data(pam_handle, identifying_name, data, cleanup)
  - Stores module specific information that can be shared between different modules
  - Cleanup function invoked during pam_end()
- pam_get_data(pam_handle, identifying_name, data)
  - Returns the data stored by pam_set_data()

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Status

- PAM available as a public API in a future release of Solaris™
- PAMified system entry services include
  - login
  - dtlogin
  - passwd
  - su
  - rlogind
  - telnetd
  - ftpd

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Status

- Developed sample module implementations for
  - UNIX®
  - DCE
  - Kerberos
  - S/key
  - ruserok() based remote authentication
  - dialpass port based authentication

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PAM and CDE

- Common Desktop Environment (CDE) Security Group tasked to solve the multiple authentication problem in early '95
- SunSoft's PAM solution selected in June, '95
- PAM sample implementation delivered to CDE in September '95
- Published OSF RFC 86.0 describing PAM in October '95
- CDENext will include PAM

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Summary

- PAM provides a generic way to authenticate the user to system entry services
- PAM supports multiple authentication systems
- PAM supports machine and application specific policies
- PAM enables single-passwd login with multiple mechanisms
- Multi-vendor support
- Available as a public API in a future release of Solaris

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Q&A

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