ID218:
Help Protect Yourself with New Security Features in IBM Lotus Domino 8

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Agenda and Goals

- IBM Lotus Notes/Domino Protocols
  - Larger Keys for Notes Protocols
  - Certifier Key Rollover
  - ID File Recovery APIs
  - Local Database Encryption
- Internet Protocols
  - Certificate revocation checking via OCSP
  - Internet Password Lockout -- "3 strikes" for http
  - Smartcard enhancements
  - AES for SSL
  - SSO using LTPAToken2
- Domino Security Futures

Lotus

Security Improvements in IBM Lotus Domino 8

Notes/Domino Protocols

Larger Keys and Key Rollover for Notes Protocols

- Larger Keys in Review
  - Large Internet keys supported since R4.x
  - Support for Notes Keys larger than the "classic" 630 bit keys has been phased in gradually starting in ND6
  - ND8 adds support for 2048 bit keys for users and servers and 4096 bit key for certifiers
- Tools for Administrators
  - Option to specify key size during registration (ND7)
  - User key rollover controlled by security policies (ND7)
  - Server key rollover controlled by server document (ND7)
  - Certifier key rollover controlled in administrator client (ND8)

Cost of Cracking – How Strong is Strong?

- Guessing a...
  - Coin Flip: 1 bit key
  - Spin of a Roulette wheel: 5.25 bit key
  - Birthday: 8.5 bit key
  - Specific person in the US: ~28 bit key
  - Specific person in the world: ~32.5 bit key
- Most well known cracks are due to weak protocols, short keys, or both
  - DVD encryption (CSS)
    - 40 bit disk keys, attacked as a 25 bit keys
    - Stream cipher attacked as a 16 bit key
    - "Hash" of disk key broken in less than 20 sec on a 450MHz PIII.
  - 802.11 encryption (WEP), etc.
- 40 bit keys: "Export grade"
  - Order of weeks or less on an ordinary personal computer
  - RC5-40 cracked in less than four hours in 1997 by a network of about 250 workstations

Cost of Cracking Symmetric Keys

- 56 bit keys: (Single DES)
  - Electronic Frontier Foundation (EFF)'s DES cracker
    - Less than $250,000, including design costs
    - Took 56 hours in July 1998
  - Distributed.Net
    - EFF's DES cracker plus 100,000 PCs on the Internet
    - Took 22 hours and 15 minutes in January 1999
- 64 bit keys (RC2, RC4)
  - Distributed.Net cracked a 64-bit RC5 key in 2002
    - 331,252 people working together for 1,757 days
    - Equivalent to 790 days at an artificial peak rate equivalent to 46k 2GHz Athlon CPUs
    - RC5-72 crack started in 2002, and still in progress
- 128 bit keys (RC2, RC4, AES)
  - A machine that could crack a 56-bit key in 1 second would take approximately 149 thousand billion years to crack a 128-bit key.
- Additional limits set by the laws of thermodynamics
- Then why use 256 bit keys?
  - Could guard against future attacks, such as quantum computing

Cost of Cracking RSA keys

- General Number Field Sieve (GNFS)
  - Sieving is compute-bound and distributable
  - Matrix row reduction blocked on memory and communication
- RSA-640 factored November 2005
  - 640 binary digits or 193 decimal digits
  - German Federal Agency for Information Technology Security (BSI)
  - Sieving: 3 months on 80 2.2 GHz Opteron CPUs
  - Matrix: 1.5 months on a Gigabit cluster of 80 2.2 GHz Opteron CPUs
- RSA-200 factored May 2005
  - 663 binary digits or 200 decimal digits
  - German Federal Agency for Information Technology Security (BSI)
  - Sieving estimate: appx 55 years on a single 2.2 GHz Opteron CPU
  - Matrix step: 3 months using cluster of 80 2.2 GHz Opteron CPUs
- 640 to 663 bits approximately doubled the time to crack

Cost of “Cracking” Hashes

- What makes a hash strong?
  - Not reversible (one-way)
  - Collision resistance
  - Changing one input bit should change about half of the output bits
- The Birthday Attack
  - Finding two people with the same birthday is easier than finding one person with a specific birthday
- Collisions have been found in MD5, SHA-0
  - Currently known techniques generate carefully sculpted pairs of messages
  - Cannot be used against existing signatures
- Notes hashing (MD2*)
  - Most hashes are based on repeated calls to a compression function
  - MD2 includes a checksum that is appended to the end of the message

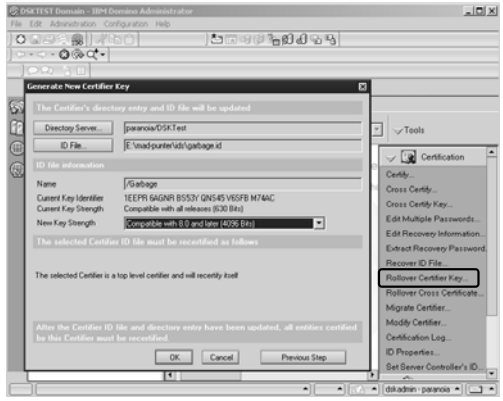
Interoperability

- 6.0
  - Can use 1024 bit RSA keys, but will not generate them
  - Can use 128-bit RC4 keys, but cannot use 128 bit RC2 keys
- 6.0.4/6.5.1
  - Can use 1024 bit RSA keys, but will not generate them
  - Can use 128 bit RC2 keys, but will not generate them
- 7.0
  - Can generate and use 1024 bit RSA keys
  - Can generate and use 128 bit RC2 keys
  - Adds underlying support for 2048 bit RSA keys
- 8.0
  - Can generate and use 2048 bit RSA keys for users and servers
  - Can generate and use 4096 bit RSA keys for certifiers
  - Adds underlying support for 4096 bit RSA keys for users and servers
  - Adds underlying support for 8192 bit RSA keys for certifiers

Why use Key Rollover?

- All Notes users and Domino servers have public/private key pairs stored in their ID files
- Key rollover needed:
  - periodically as a precaution against undetected compromise of the private key
  - as a remedy to recover from a known compromise of the private key (e.g. ID file is stolen)
  - to increase security by updating to a stronger key

Certifier Key Rollover in 8.0



Certifier Key Rollover Tips

- Recertification of users and servers is not automatic to avoid an adminp replication storm
  - Existing ID files will continue to work without recertification for a period of time
  - Good opportunity to roll over user and server keys
- Start at the root of the hierarchy and work your way down
  - After rolling over Os and OUs, roll over servers then users
  - Can do one branch of the hierarchy at a time or do everything
  - Wait a week or so between rounds of recertification or key rollover
  - Good idea to at least recertify users and servers beneath a CA with a new key

APIs for ID File Recovery

- New APIs enable customers and partners to integrate the security of ID File Recovery with the convenience of custom organization-wide management systems
- Why use ID File Recovery?
  - Forgotten passwords
  - Lost or corrupted ID files
  - Automatic ID file backups
  - Automatic recovery information updates starting in ND6
  - Enhanced logging and configuration starting in ND7
- Functions defined in kfm.h:
  - SECGetRecoveryInfo
  - SECImportRecoveryInfo
  - SECMailRecoveryID
  - SECRecoverIDFile
  - SECExtractRecoveryPassword
  - SECBuildEncryptedBackupIDFile

Local Database Encryption Enhancements

- Weak and Medium encryption options removed
  - Existing databases using Weak or Medium encryption still supported
  - No actual known problems with Medium encryption, but Strong uses more standard techniques
- New local database replicas encrypted with Strong when created

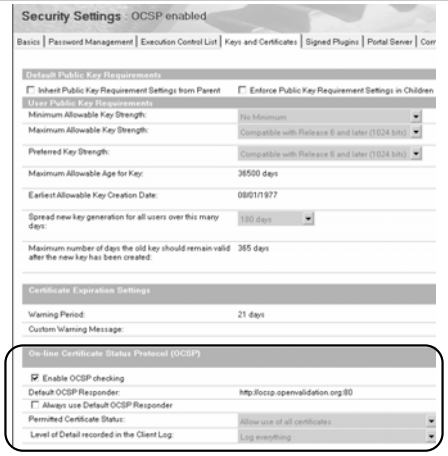
Security Improvements in IBM Lotus Domino 8

Internet Protocols

Certificate Revocation Checking via OCSP

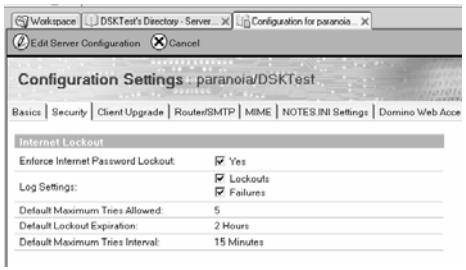
- Online Certificate Status Protocol, RFC 2560
  - Determine the revocation state of an X.509 certificate
  - More timely information than CRLs, no CRL cache required
- Enhances security for:
  - S/MIME signature verification
  - S/MIME encrypted sender verification
  - SSL certificate verification
- OCSP client support, not an OCSP responder
  - Third-party OCSP responders can be configured to return information from CRLs issued by the Domino CA
- OCSP must be enabled to be used
  - Security policy for the Notes client
  - OCSP_RESPONDER, OCSP_LOGLEVEL, OCSP_CERTSTATUS notes.ini variables for a Domino server

OCSP Policy Configuration



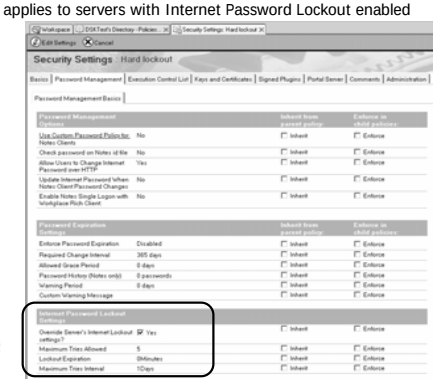
Internet Password Lockout – "3 strikes" for http

- Lock out the user after "X" incorrect login attempts
- Enable feature and configure defaults for one or more servers at a time in a server configuration settings document.



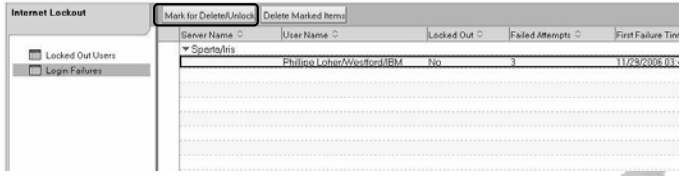
Internet Password Lockout – User Configuration

- Can override server default settings with user security policies
  - Special rules for CEOs or other users with special needs
  - Only applies to servers with Internet Password Lockout enabled



Internet Password Lockout - Inetlockout.nsf

- Created automatically on each server when Internet Password Lockout is enabled; can take up to 10 minutes without server restart
- Contains current lockout state, not history
  - Lockout history logged via DDM
- Each database has the same replica ID, but replication is disabled by default
- Replication will not sum lockouts across different servers, but can be used to easily view the lockout state across multiple servers
- Deleting a user's entry in inetlockout.nsf on the correct server will unlock

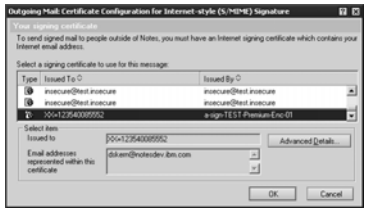


Internet Password Lockout -Tips and Notes

- Strikes are logged per-server, not per-domain
  - Avoids replication storm
- Custom Login Forms can be created for locked out users with single or multi-session authentication
- Use "Fewer name variations with higher security" name mapping to minimize the harm caused by an attacker
- SSO ignores all internet password policies, including Internet Password Lockout

Smartcard Enhancements

- Check release notes for list of newly supported tokens
- Using X.509 certificates preconfigured on smartcards:
  - Import not required
  - Lock ID not required
  - No information from smartcard stored in ID file or visa-versa
- New dialog to dynamically pick S/MIME signing certificate
  - To pick X.509 certs that exist on a smartcard but are not in the ID file
  - Can switch signing certs without changing the default signing cert in the USD



AES support for SSL

- Advanced Encryption Standard (AES)
  - Symmetric algorithm chosen by NIST after a five-year long contest
  - US FIPS PUB 197
  - Intended to replace the Digital Encryption Standard (DES)
- New cyphersuites supported by Domino SSL server:
  - RSA_WITH_AES_128_CBC_SHA
  - RSA_WITH_AES_256_CBC_SHA

SSO using LTPAToken2

- New token format added for Websphere 6.0 interoperability

Domino Security Futures

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Domino Security Futures

- Single Sign On improvements
- Password and ID file recovery improvements
- Lower costs to manage ID files
- Help in meeting regulatory compliance issues
- FIPS 140-2
- Modest improvements in security administration

Links

- Lotus Security Homepage – bulletins, articles, redbooks, doc
  - http://www.ibm.com/developerworks/lotus/security/
- Domino Blog
  - http://www.dominoblog.com/
- Redpaper: Security Considerations in Notes and Domino 7
  - http://www.redbooks.ibm.com/abstracts/sg247256.html
- Lotus Security Redbook
  - http://www.redbooks.ibm.com/abstracts/sg247017.html?Open
- Policy-based system administration
  - http://www.lotus.com/ldd/today.nsf/Lookup/policy
- Domino CA & CPS
  - http://www.lotus.com/ldd/today.nsf/0/d3646dc17fbea0b200256c410049d8d5?OpenDocument
  - http://www.ibm.com/developerworks/lotus/library/article/domino-cps/
- Secure Messaging
  - http://www.ibm.com/developerworks/lotus/library/article/securemessaging/
- Security APIs in ND7
  - http://www.ibm.com/developerworks/lotus/library/nd7-security-api/

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(Or Please Come Talk to Us In “Meet The Developers”)