

SSM Java and SSL Configuration

What to do When it Happens to You

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Java SSM Availability

- Java added to Data Server to support:
 - hpssadm, command line SSM, available 4.2
 - SSM GUI, available 5.1
- Java optional for releases 4.2, 4.3, 4.5
- Java required for release 5.1
- Try it now and get past one learning curve before DB2 arrives

General Hints

- “Up and Running: Quick Configuration”
 - Installation Guide 3.8.1.1 (HPSS 4.3)
- `hpssadm` debug option: `-d`

What we get from SSL

- Provides encryption for user's password as it is passed to the DS
- Provides digital signature for DS, preventing an imposter from posing as the DS and collecting user passwords

Definitions

- Symmetric key encryption
 - Two parties share a secret key
 - Encrypt and decrypt with same key
 - Faster than public key, authentication not as good

Definitions

- Public key / private key encryption
 - Everybody knows public key
 - Only I know my private key
 - Encrypt with public key, decrypt with private
 - Encrypt with private key, decrypt with public
 - Slower than symmetric key, better authentication

Definitions

- Public key / private key encryption, cont
 - Encrypt with public key, decrypt with private
 - Makes key management simpler:
 - You don't have to distribute your private key
 - You don't have to protect your public key; can publish
 - Encrypt with private key, decrypt with public
 - Makes digital signatures possible

Definitions

- Digital signature
 - Electronic document which identifies a party
 - If I encrypt some known piece of information with my private key, everybody can decrypt it with my public key and know I'm the only one who could have sent it
- X.509 certificate
 - A standard form of digital signature in wide use

Definitions

- Certificate authority
 - A company like Verisign who sells certificates
- Self-signed certificate
 - A certificate signed by its creator
 - Default certificate used by SSM.
 - Sites should be able to use certificate authority instead if they wish

Definitions

- Keystore
 - File where you store keys and certificates
 - keystore.ds, cacerts
- Trusted Store
 - Keystore where you store certificates
 - cacerts

Definitions

- keytool
 - Utility for managing keystores
 - Useful options:
 - -list list the keystore
 - -v verbose mode
 - -genkey create public/private key and certificate
 - -export export public key and certificate
 - -import import public key and certificate

Definitions

- SSL - Secure Socket Layer
 - Protocol which uses symmetric and public key
 - Public key:
 - For digital certificates
 - For negotiating a symmetric one-time session key
 - Symmetric key:
 - For remainder of session

Definitions

- JSSE - Java Secure Socket Extension
 - SSL for Java

Configuration Process

- Install Java and SSL
- Configure SSL (for anybody, not just SSM)
- Configure SSM for SSL
- Configure SSM for Java Security
- Configure SSM for user authentication
- Configure SSM for user authorization

Install Java and SSL

- JSSE issues:
 - Java 1.3:
 - SSL classes in vendor-specific packages
 - JSSE separate product on Sun, bundled on IBM
 - Java 1.4:
 - SSL classes in common packages
 - JSSE bundled into Java on Sun and IBM
 - SSM coded to Sun 1.3 packages

Install Java and SSL

- Java 1.3, not 1.4
 - Some minor programming differences
 - 1.4 not yet available on AIX (except as beta)
 - JSSE issues
- Sun JSSE 1.0.3 packages
 - Don't use IBM packages
 - Rename ibmjsse.jar
 - Don't use Java 1.4 on Sun, with JSSE built in

Configure SSL (for anybody)

- Reset password on trusted store:
 - `$JAVA_HOME/lib/security/cacerts`

Configure SSL (for anybody)

- Adding the security provider
 - `$JAVA_HOME/lib/security/java.security`
 - `security.provider.N=`
 - `com.sun.net.ssl.internal.ssl.Provider`
- Specifies a Java class to use for SSL:
 - `$JAVA_HOME/jre/lib/ext/jsse.jar` contains class:
 - `com/sun/net/ssl/internal/ssl/Provider.class`
- Does NOT make you go talk to a Sun site

Configure SSM for SSL

- Create DS public/private key and certificate
- Protect password to private key
- Distribute public key and certificate
- Verify distributed public key and certificate

Configure SSM for SSL

- Create DS public/private key and certificate
 - `keytool -genkey \`
 - `-keystore /var/hpss/ssm/keystore.ds \`
 - `-dname "cn=HPSS Data Server" \`
 - `-alias hpss_ssmds -validity 365`
 - Creates `/var/hpss/ssm/keystore.ds`
 - Prompts you for password for `keystore.ds`
 - You get to choose and set password

Configure SSM for SSL

- Protect password to keystore.ds
 - Store and protect online (default):
 - Store in /var/hpss/ssm/keystore.ds.pw
 - HPSS_SSMDS_KEYSTORE_PW=
 - /var/hpss/ssm/keystore.ds.pw
 - Type in at DS startup:
 - Let DS prompt you at startup to type in password
 - HPSS_SSMDS_KEYSTORE_PW=“PROMPT”
- Protect Unix permissions on both files

Configure SSM for SSL

- Distribute public key and certificate
 - Export from keystore.ds into tmp file
 - `keytool -export`
 - `keystore /var/hpss/ssm/keystore.ds \`
 - `-alias hpss_ssm ds -file /tmp/ds.cer`
 - Import from tmp file into trusted store
 - `keytool -import`
 - `keystore $JAVA_HOME/lib/security/cacerts \`
 - `-alias hpss_ssm ds -file /tmp/ds.cer`

Configure SSM for SSL

- “keytool -import” prompts for verification:
 - Dumps fingerprints:
 - MD5:
 - 78:00:B0:E0:18:A4:CF:34:CF:19:2E:D2:DE:E0:60:6B
 - SHA1:
 - A7:8C:AF:9C:41:80:56:DD:5C:D8:06:0B:00:AF:F1:E4:DC:D7:C2:00
 - Compare with fingerprints from keystore.ds:
 - `keytool -keystore /var/hpss/ssm/keystore.ds -list -v`

Configure SSM for SSL

- Don't forget keytool -alias option
 - Install guide specifies “hpss_ssmds”
 - keytool -alias hpss_ssmds
 - This alias is the short tag used to identify the entry in the keystore
 - Without it, you get a default alias “mykey”

Configure SSM for SSL

- Don't try to set expiration date to “forever”
 - Install guide specifies 365 days:
 - `keytool -validity 365`
 - 100 years is too long
 - keytool does create the key and certificate
 - expiration date is invalid
 - DS will use certificate, but clients will reject it

Configure SSM for SSL

- Expired certificates
 - Verify: read the keystore with verbose option:
 - `keytool -keystore cacerts -list -v`
 - Valid from: Tue Sep 18 14:05:43 EDT 2001
 - until: Wed Sep 18 14:05:43 EDT 2002

Configure SSM for SSL

- Expired certificates
 - To replace:
 - Remove old certificate from trusted store:
 - `keytool -keystore cacerts -delete -alias hpss_ssmds`
 - Create new public/private key and redistribute

Configure SSM for Java

- Nothing to do with SSL
- Code imposes Java Security Manager which abides by policy files
 - /var/hpss/ssm/java.policy.ds
 - /var/hpss/ssm/java.policy.hpssadm
 - Renamed to java.policy.ssmuser in 5.1

Configure SSM for Java

- Policy files:
 - Use templates as starting files:
 - /opt/hpss/config/templates
 - java.policy.ds.template
 - java.policy.hpssadm.template
 - Make sure Unix permissions allow access

Configure SSM for Java

- Policy files, continued:
 - Customize SocketPermission
 - “*.hpss.acme.com:1024-”,
 - Wildcards allowed only for first field
 - Wildcards don't work with numeric addresses

Configure SSM for User Authentication

- Keytab for each user
 - Create using `rgy_edit`
 - Store and protect on machine where user executes `hpssadm`

Configure SSM for User Authentication

- Why not let user type in his password?
 - Can't avoid echoing the password unless:
 - We use native (non-Java) code
 - Then it's less portable
 - We use graphics
 - Then it's no longer a pure ASCII application
 - keytab required for batch mode anyway
 - User community is small; sysadms/operators

Configure SSM for User Authentication

- Suggestion:
 - Run hpssadm only from DS machine
 - No real advantage running it elsewhere
- GUI won't require keytab
- GUI login screen will hide password

Configure SSM for User Authorization

- `hpssadm.config`
 - Lists authorized SSM users
 - Equivalent of Sammi `user_authorization.dat`
 - `HPSS_SSMDS_AUTH_USER=joe`
- HPSS 5.1:
 - Renamed to `ssmuser.config`
 - `hpssuser` will be modified to add users here

Configure SSM for User Authorization

- `hpssadm.config, cont`
 - `/opt/hpss/config/templates:`
 - `hpssadm.config.template`
 - Ignore old options:
 - `#HPSS_SSMDS_LANGUAGE=en`
 - `#HPSS_SSMDS_COUNTRY=US`
 - `#HPSS_SSMDS_RMI_NAME=//arm1:1066/ssm`
 - `#HPSS_SSMDS_INTERVAL=60000`

Other Security Measures

- Protect the DS machine
 - It houses keystore.ds
 - It may house keystore.ds.pw
 - RMI registry writable by anybody on same machine

Other Security Measures

- Set the DS umask to 077
 - Keystore passwords show up in core files
 - 4.5 has umask fix in start_ssm script
 - Operational service bulletin for 4.2, 4.3

SSM 5.1 Security Enhancements

- Firewall navigation
 - Can get through ports your net admin allows
- NAT (Network Address Translation)
 - VPN, cable modems

Common Error Messages

- SSL implementation not available
 - JSSE is not installed
 - SSL provider not added to security file
 - `$JAVA_HOME/lib/security/java.security` file
 - Mixed JSSE versions and/or vendors

Common Error Messages

- Connection refused
 - DS is not executing
 - Non-Java version of DS is executing
 - Mismatch for RMI name and/or port
 - Policy file does not allow access to/from host
 - Firewall or VPN

Common Error Messages

- untrusted server cert chain
 - DS certificate is not in trusted store (cacerts)
 - DS certificate in cacerts doesn't match the one the DS is using from its keystore.ds file
 - DS certificate is expired

Common Error Messages

- `java.io.FilePermission`
 - Usually gives name of file and type of permission lacking
 - Example:
 - `java.io.FilePermission keystore.ds read`
 - Java policy file does not allow read access to file `keystore.ds`

Common Error Messages

- `java.lang.ClassNotFoundException`
 - CLASSPATH set wrong
 - `config/hpss_env`
 - Not all jar files installed
 - Need to do a make from clean:
 - `/opt/hpss/src/ssm`

Common Error Messages

- Almost anything
 - HPSS_ROOT set wrong
 - config/hpss_env
 - Not all jar files installed
 - Need to do a make from clean
 - Need to restart DS
 - Let it reread policy file, config file, etc.

References

- Introduction to Public-Key Cryptography
 - <http://developer.netscape.com/docs/manuals/security/pkin/index.htm>
- Introduction to SSL
 - <http://developer.netscape.com/docs/manuals/security/sslin/contents.htm>
- Java policy file syntax:
 - <http://java.sun.com/products/jdk/1.2/docs/guide/security/PolicyFiles.html>
- keytool utility man page:
 - <http://java.sun.com/products/jdk/1.2/docs/tooldocs/solaris/keytool.html>
 - <http://java.sun.com/products/jdk/1.2/docs/tooldocs/win32/keytool.html>