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webwise secure web server

hp webwise mpe/ix secure web server

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Solution Symposium 2002

prerequisite knowledge

- General Apache knowledge
- POSIX shell basics
- Hierarchical File System basics

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webwise A.03.00 product overview

- A.01.00 released as a separately purchasable product for 6.5
- A.03.00 now bundled into 7.5 FOS as a drop-in replacement for Apache A.02.00
- adds SSL encryption and X.509 authentication to Apache

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webwise A.03.00 is built from…

- Apache 1.3.22
- Mod_ssl 2.8.5 SSL/TLS encryption module
  - MM 1.1.3 shared memory library
- OpenSSL 0.9.6b general purpose SSL/TLS and crypto toolkit
- RSA BSAFE Crypto-C 5.2 crypto toolkit
  - RC2, RC4, and RSA algorithms

new apache functionality since 1.3.14

- mostly bug fixes & portability enhancements
- LogFormat %c for logging connection status at request completion
- mod_auth file-owner and file-group authentication enforcement
- rotatelogs utility supports date/timestamp references in logfile names
- Apache manual pages moved outside of the htdocs DocumentRoot; i.e. /APACHE/PUB/htdocs/manual moved to /APACHE/CURRENT/htmanual

webwise changes since A.01.00

- Apache 1.3.9 updated to 1.3.22
- child processes run as WWW.APACHE instead of SECURE.APACHE; may have file ownership and permissions implications!
- uses the same V.UU.FF-based file layout scheme as Apache A.02.00 (the old SECURE.APACHE group is not modified or referenced by A.03.00)

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migrating from previous versions of apache or webwise

- Create new JHTTPD from JHTTPD.sample
- Create new config files from corresponding *.sample files
- Copy existing WebWise A.01.00 server key and certificate to new A.03.00 locations
- Copy existing WebWise A.01.00 htdocs content and cgi-bin scripts from /APACHE/SECURE to the new A.03.00 /APACHE/PUB locations, or modify the new A.03.00 config files to refer to the old A.01.00 locations

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migrating to hpux

- WebWise on MPE shares the same core architecture as the Apache bundle on HPUX
- 100% upward compatible
- a few additional standard Apache modules on HPUX
- extra HP modules on HPUX for integration with other HPUX products

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mod_ssl is...

- The heart of WebWise
  - encrypted TCP connections
  - client and server X.509 authentication
- Consists of:
  - Patches to extend the Apache API (EAPI)
  - the mod_ssl module
  - bin/sign.sh script
- bin/openssl command line utility included for key/certificate management

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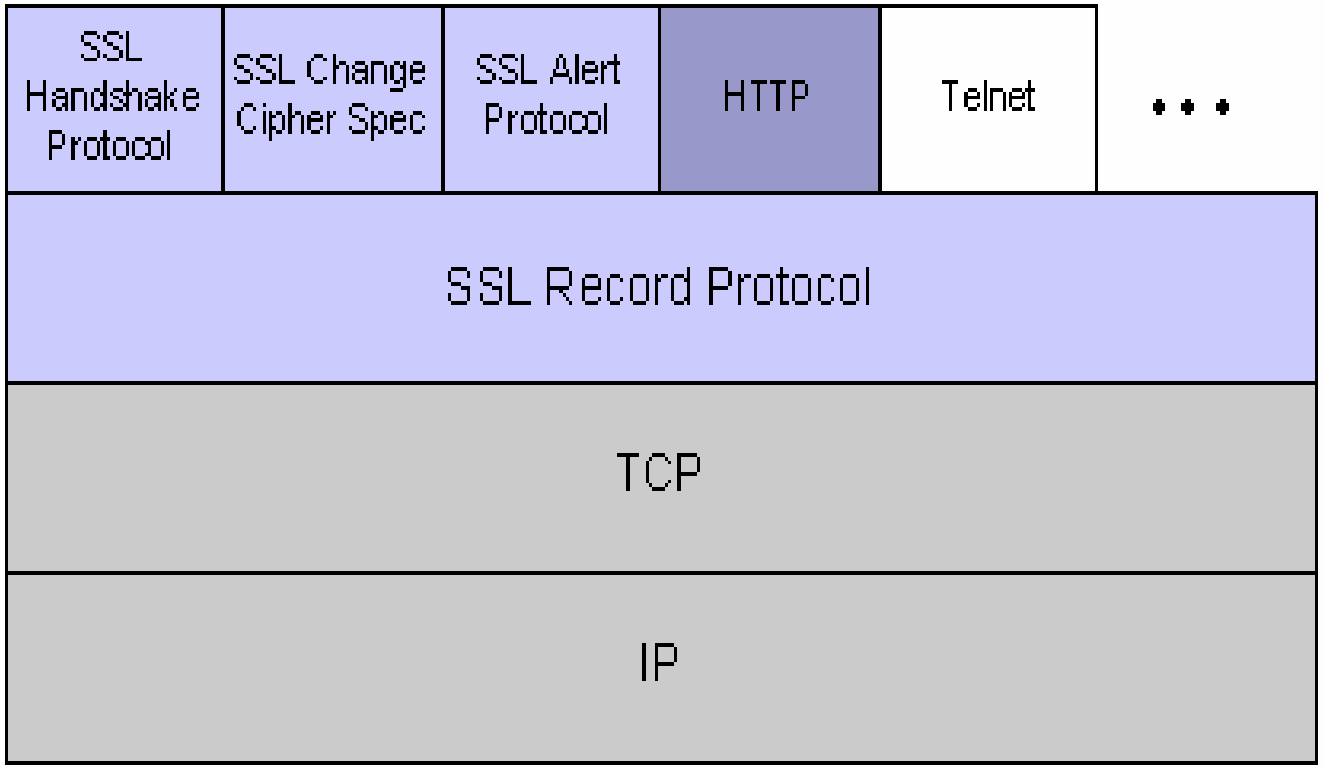
mod_ssl is NOT…

- a substitute for a firewall
- a substitute for good host security practices
- a substitute for good application security practices
- a substitute for good human security practices

definitions: secure sockets layer (ssl)

- A protocol layer between any application stream protocol (such as HTTP) and TCP that allows secure communications via encryption, digests, signatures, and authentication
- SSLv2.0 - vendor standard from Netscape
- SSLv3.0 - expired Internet Draft from Netscape
- Supported by all browsers

definitions: secure sockets layer (cont.)



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definitions: transport layer security (tls)

- An evolution of SSLv3.0
- Defined in RFC2246
- Supported by all modern browsers

definitions: key

- A really big random number (1024 bits)
  - 40 bits? 56 bits? 128 bits? 1024 bits? SAY WHAT???
- Split into two mathematically related components:
  - private key
  - public key
- A key establishes your identity -- protect it! (chmod 400 and pass phrase)
- Both servers and clients have keys
- RSA keys / algorithm defined by RFC 2437

definitions: private key

- Uniquely identifies you
- Protect it with your life!
- You use it to:
  - create digital signatures
  - create digital certificates
  - decrypt data sent to you that was encrypted with your public key

definitions: public key

- Allows the public to send you encrypted data which only you can decrypt with your private key
- Your public key is also included in your certificate

definitions: message digest

- Short, fixed-length representation of longer, variable-length messages (hash)
- Can’t determine original msg from digest
- No two messages have the same digest
- Digest algorithms:
  - MD5 (128-bit hash)
  - SHA1 (160-bit hash)

definitions: digital signature

- Message digest (plus sequence number) encrypted with sender's private key
- Alter the message and the digest won't match
- Alter the digest and the public key decryption won't work

definitions: certificate

- Validates your identity to others
- Format defined by X.509 standard
- Created by a Certificate Authority
- Contains:
  - your identity (name, company, locality, etc)
  - your public key
  - validity dates
  - the identity and signature of a trusted agency called a Certificate Authority

definitions: certificate authority (ca)

- A trusted agency that issues certificates
- Validates the identity of a person requesting a certificate
- The CA signs the certificate request with their own CA certificate, thus creating a certificate for the requestor
- CA certificate may be self-signed (root-level), or signed by a higher CA
- You can be your own CA!

definitions: certificate authority (cont.)

- Browsers are pre-configured to trust certain CAs
  - Netscape: Edit, Preferences, Privacy & Security, Certificates, Manage Certificates, Authorities
  - MSIE: Tools, Internet Options, Content, Certificates, Intermediate Certification Authorities, Trusted Root Certification Authorities
- You can add new trusted CAs
- Server certificates signed by trusted CAs are automatically accepted!

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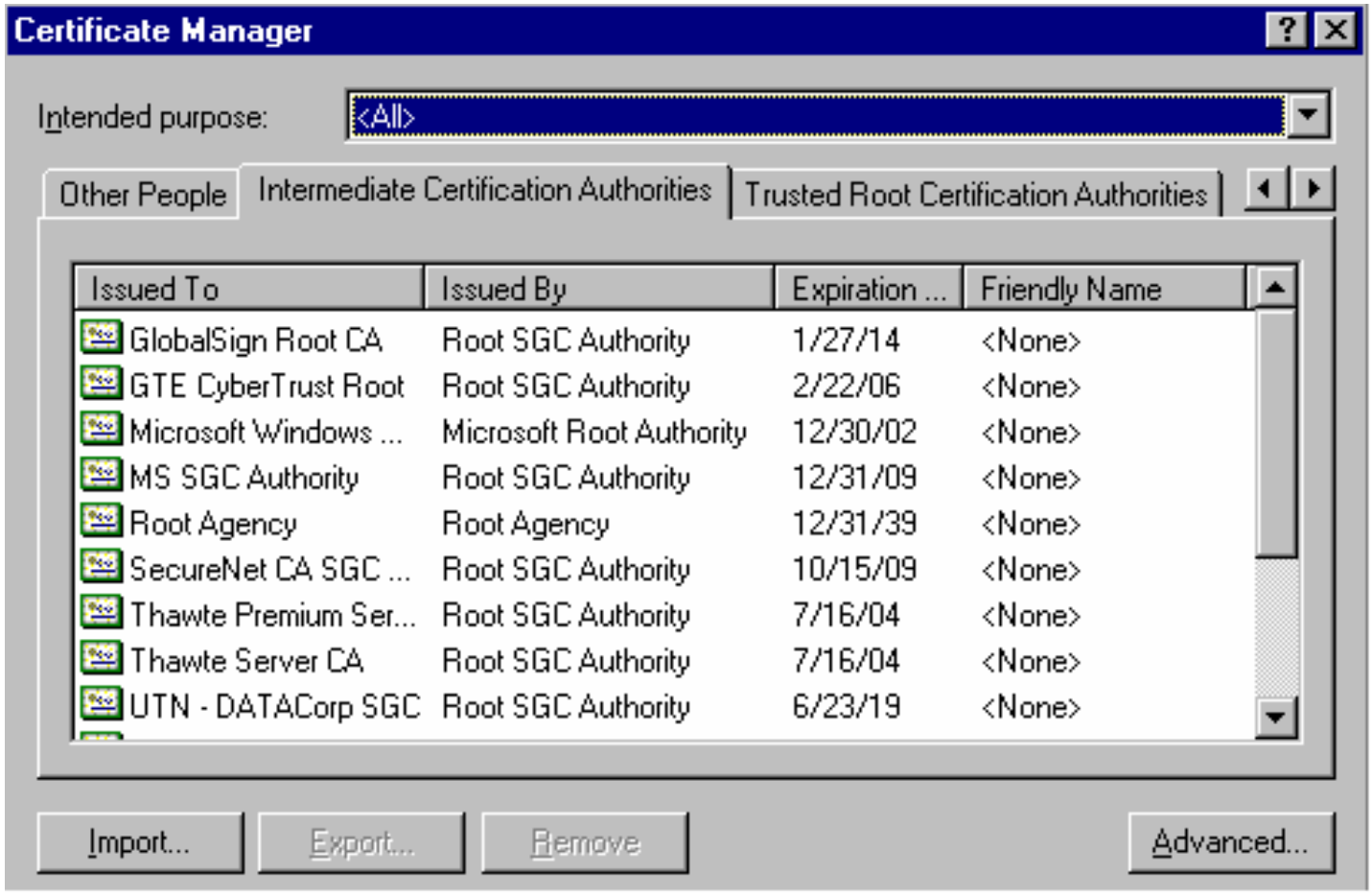
msie5.5 ca window



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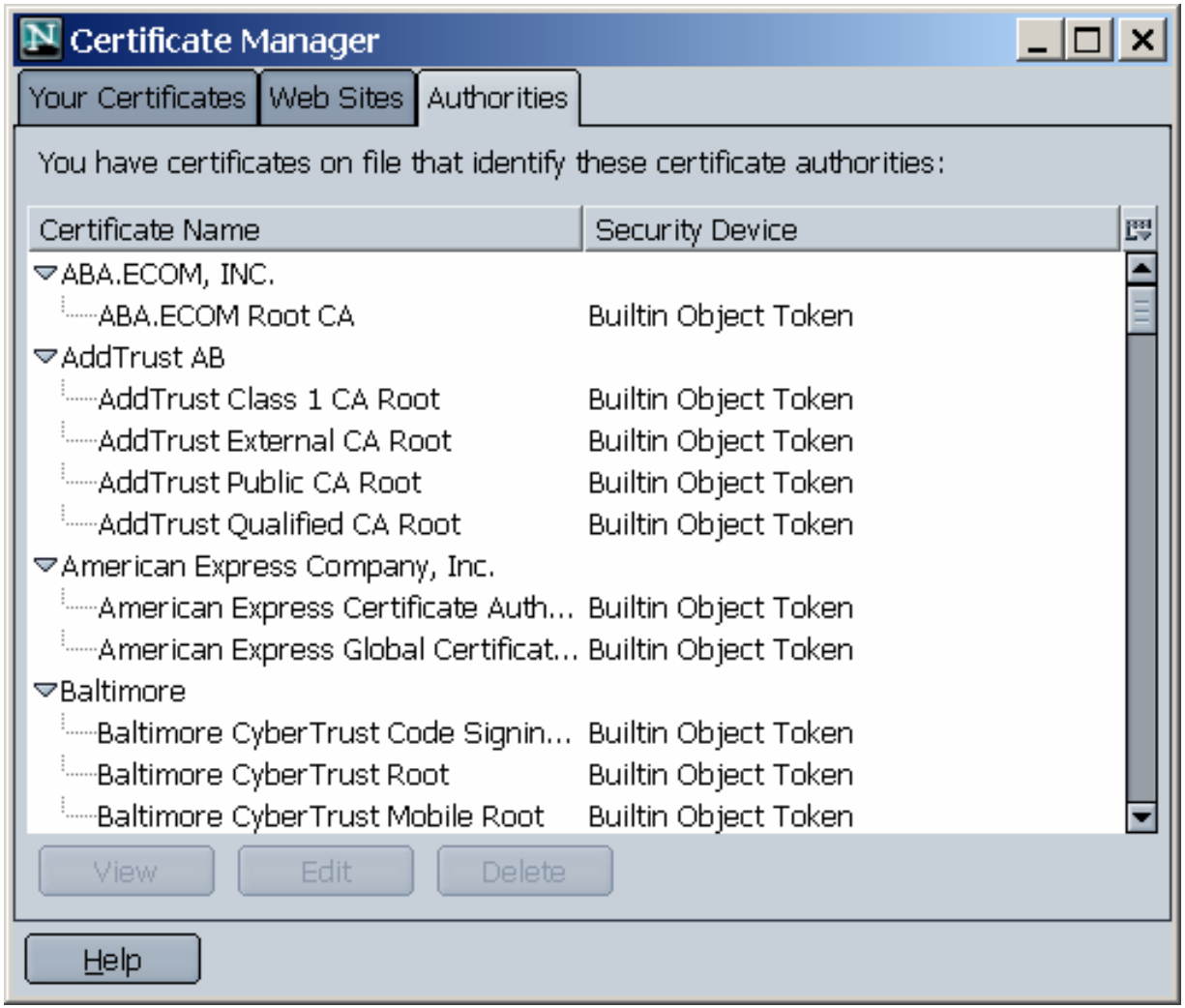
netscape 6.2.1 ca window



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definitions: certificate signing request (csr)

- What you send to a CA in order to request a certificate
- Contains:
  - your identity (name, company, locality, etc)
  - your public key
- The CA signs your CSR with the CA certificate, resulting in your certificate

definitions: certificate chain

- Every certificate is signed by a CA
- CA certificates are signed by other CAs
- A chain of valid CA signatures (assumes trust is inherited)

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definitions: certificate revocation list (crl)

- A list of certificates that a CA has revoked (I.e. invalidated)
- An employer CA would revoke the certificate of a terminated employee and list that certificate in a CRL
- Must be obtained manually from the CA

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mod_ssl configuration directives - sslengine (required)

- Specifies whether SSL/TLS is enabled; typically used inside <VirtualHost>
- on: SSL/TLS is enabled
- off: SSL/TLS is disabled

sslmutex (required)

- Specifies the method of synchronization used between WebWise children
- none - use at your own risk!
- File:/path/to/mutex - uses fcntl() locking on the specified filename with the parent PID appended for uniqueness
- sem - not implemented for MPE!

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sslrandomseed (required)

- SSLRandomSeed context source [bytes]
- Seeds the Pseudo Random Number Generator (PRNG)
- Context is either “startup” or “connect”
- Sources:
  - builtin - current time, process id, and 1KB of random scoreboard data
  - file:/path/to/source - reads from a file
  - exec:/path/to/program - reads from program stdout

sslsessioncache (recommended)

- Specifies the SSL session cache method used to avoid repeated (slow) SSL handshaking
- none - no cache; terrible performance
- dbm:/path/to/datafile - disk file cache
- shmht:/path/to/datafile(size) - shared memory cache hash table (file not created on MPE)
- shmcb:/path/to/datafile(size) - shared memory cache cyclic buffers (file not created on MPE); best performance!

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sslsessioncachetimeout (optional)

- Specifies the session cache timeout in seconds
- Default is 300

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sslprotocol (optional)

- Specifies accepted SSL protocols
- + or - syntax like Options
- Default is all
- SSLv2
- SSLv3
- TLSv1
- All
- SSLProtocol All -SSLv2

sslciphersuite (optional)

- Specifies the ordered list of ciphers to be negotiated during the SSL handshake
- Default: ALL:!ADH:RC4+RSA:+HIGH:+MEDIUM:+LOW:+SSLv2:+EXP
- 128-bit RC4 will be chosen first
- **`/APACHE/CURRENT/bin/openssl ciphers -v`** will list all available ciphers

sslcertificatekeyfile (required)

- Specifies the server key file
- /APACHE/PUB/conf/ssl.key/server.key
- Protect the key file with your life!
- Well, maybe just with chmod 400 permissions and a pass phrase
- Whoever has the key can impersonate you!

sslpassphrasedialog (recommended)

- How to obtain the pass phrase for encrypted private keys
- builtin - read the pass phrase from $STDIN after !RUN HTTPD
- exec:/path/to/program - program prints pass phrase to $STDLIST; two parms:
  - servername:portname
  - RSA or DSA
- Protect the pass phrase!
  - Whoever knows the pass phrase can get your key!

sslcertificatefile (required)

- Specifies the web server certificate file
- /APACHE/PUB/conf/ssl.crt/server.crt
- May also contain a private key in the same file, but this isn't recommended
- Protect this file with chmod 400 permissions

sslcertificatechainfile (optional)

- Specifies the all-in-one file containing the concatenated CA certificates of all CA signers between the server certificate and the CA root
- Makes it easier for browsers to validate your server certificate

sslcacertificatefile (optional)

- Specifies the all-in-one file containing the concatenated CA certificates that might have been used to sign the certificates of your clients
- This directive and/or SSLCACertificatePath is required for client authentication

sslcacertificatepath (optional)

- Specifies the directory containing all of the individual CA certificates that might have been used to sign the certificates of your clients
- Hash symlinks must be present in this directory
- /APACHE/PUB/conf/ssl.crt/Makefile will create the hash symlinks
- This directive or SSLCACertificateFile is required for client authentication

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sslcarevocationfile (optional)

- Specifies the all-in-one file containing the concatenated CRLs of all of the CAs that might have signed the certificates of your clients
- This directive or SSLCARevocationPath is recommended for client authentication

sslcarevocationpath (optional)

- Specifies the directory containing all of the individual CRLs of all of the CAs that might have signed the certificates of your clients
- Hash symlinks must be present in this directory
- /APACHE/PUB/conf/ssl.crl/Makefile will create the hash symlinks
- This directive or SSLCARevocationFile is recommended for client authentication

sslverifyclient (optional)

- Specifies the type of client certificate authentication desired
  - none: no client certificate is required
  - optional: the client may present a valid certificate
  - require: the client must present a valid certificate
  - optional_no_ca: the client may present a certificate, but it doesn't have to be valid
- "optional" doesn't work with all browsers, and "optional_no_ca" is really for testing

sslverifydepth (optional)

- Specifies the maximum number of CA certificates to be used when validating the client certificate
- 0 means that self-signed client certificates are accepted only
- 1 (default) means the client certificate can be self-signed or has to be signed by a CA which is directly known to the server, etc, etc

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ssllog (required)

- Specifies the mod_ssl log file
- Serious errors are duplicated to the ErrorLog
- |/path/to/program or /path/to/file

sslloglevel (optional)

- Specifies the logfile verbosity fence
- none - no dedicated logging, but “error” messages still written to ErrorLog
- error - fatal messages
- warn - non-fatal messages
- info - major processing steps
- trace - minor processing steps
- debug - very VERY verbose!

sslrequiressl (optional)

- Forbids access unless SSL is being used for this connection
- Useful for protecting against exposing sensitive data over non-SSL connections

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sslrequire (optional)

- Allow access only if an arbitrarily complex boolean expression is true
- **SSLRequire (%{SSL_CIPHER} !~ m/^(EXP|NULL)-/ and %{SSL_CLIENT_S_DN_O} eq "Snake Oil, Ltd." and %{SSL_CLIENT_S_DN_OU} in {"Staff", "CA", "Dev"} and %{TIME_WDAY} >= 1 and %{TIME_WDAY} <= 5 and %{TIME_HOUR} >= 8 and %{TIME_HOUR} <= 20) or %{REMOTE_ADDR} =~ m/^192\.76\.162\.[0-9]+$/**

ssloptions (optional)

- Specifies various SSL-related runtime options
- Similar to Options directive
- StdEnvVars - creates SSL-related environment variables for CGI/SSI applications; expensive!
- CompatEnvVars - creates extra environment variables for compatibility with other Apache-based SSL servers

ssloptions (cont.)

- ExportCertData - creates environment variables containing applicable X.509 certificates in PEM format
- FakeBasicAuth - client certificate Subject is used as userid lookup into Basic Authentication password file; user not prompted for password (assumed to be “password”)
- StrictRequire - access denial due to SSLRequire or SSLRequireSSL overrides all other access checking

ssloptions (cont.)

- OptRenegotiate - by default, every per-directory SSL parameter reconfiguration causes a full SSL renegotiation handshake (slow!). This option tries to be more granular, but may cause unexpected results.

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custom log formats

- Extra format function for use by the mod_log_custom module
- %{varname}x - inserts the value of the varname env variable into the message
- **`CustomLog logs/ssl_request_log "%t %h %{SSL_PROTOCOL}x %{SSL_CIPHER}x \"%r\" %b"`**

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accounting structure

- Same scheme as Apache 1.3.14 A.02.00:
  - APACHE account (PM)
  - PUB group (PM)
  - V.UU.FF-based A0300 group (PM)
  - MGR user (PM)
  - WWW user (non-PM)
  - /APACHE/CURRENT symbolic link points to /APACHE/A0300

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directory & file structure

- Same scheme as Apache 1.3.14 A.02.00
- All files owned & managed by MGR.APACHE
- Sensitive files MUST be protected with owner-only security!

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new files and directories compared to apache

- bin/openssl - general crypto utility
  - supported for key/cert management only
  - add /APACHE/CURRENT/bin to PATH
- bin/sign.sh - cert-signing shell script
  - supported for self-signed CA cert only

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new files and directories compared to apache (cont.)

- conf/ssl.crl/ - CRL directory
- conf/ssl.crt/ - certificate directory
  - protect directory with chmod 700
  - server.crt - server certificate (chmod 400)
  - Sensitive data! Protect it!
- conf/ssl.csr/ - CSR directory
- conf/ssl.key/ - key directory
  - protect directory with chmod 700
  - server.key - server private key (chmod 400)
  - Sensitive data! Protect it!

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new files and directories compared to apache (cont.)

- logs/ssl_engine_log - the SSL error_log
- logs/ssl_request_log - the SSL access_log
  - includes protocol and cipher used
- logs/ssl_mutex.nnn - semaphore file

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version information

- **`HTTPD -v`** (same as Apache)

```
Server version: Apache/1.3.22 (HP MPE/iX
WebWise A.03.00)
Server built:   Jan 15 2002 15:47:50
```

- **`bin/openssl version`**

```
OpenSSL 0.9.6b 9 Jul 2001
```

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server configuration

- Copy sample files to normal names
- /APACHE/PUB/JHTTPD.sample
- conf/access.conf.sample, httpd.conf.sample, magic.sample, mime.types.sample, srm.conf.sample
- conf/ssl.crt/server.crt.sample (test only!)
- conf/ssl.key/server.key.sample (test only!)

browser configuration

- MSIE allows you to enable/disable SSLv2.0, SSLv3.0, and TLSv1.0; no cipher choice
- Netscape allows you to enable/disable SSLv2.0, SSLv3.0, TLSv1.0, and to choose the ciphers for each one
- Both browsers allow you to manage personal and CA certificates

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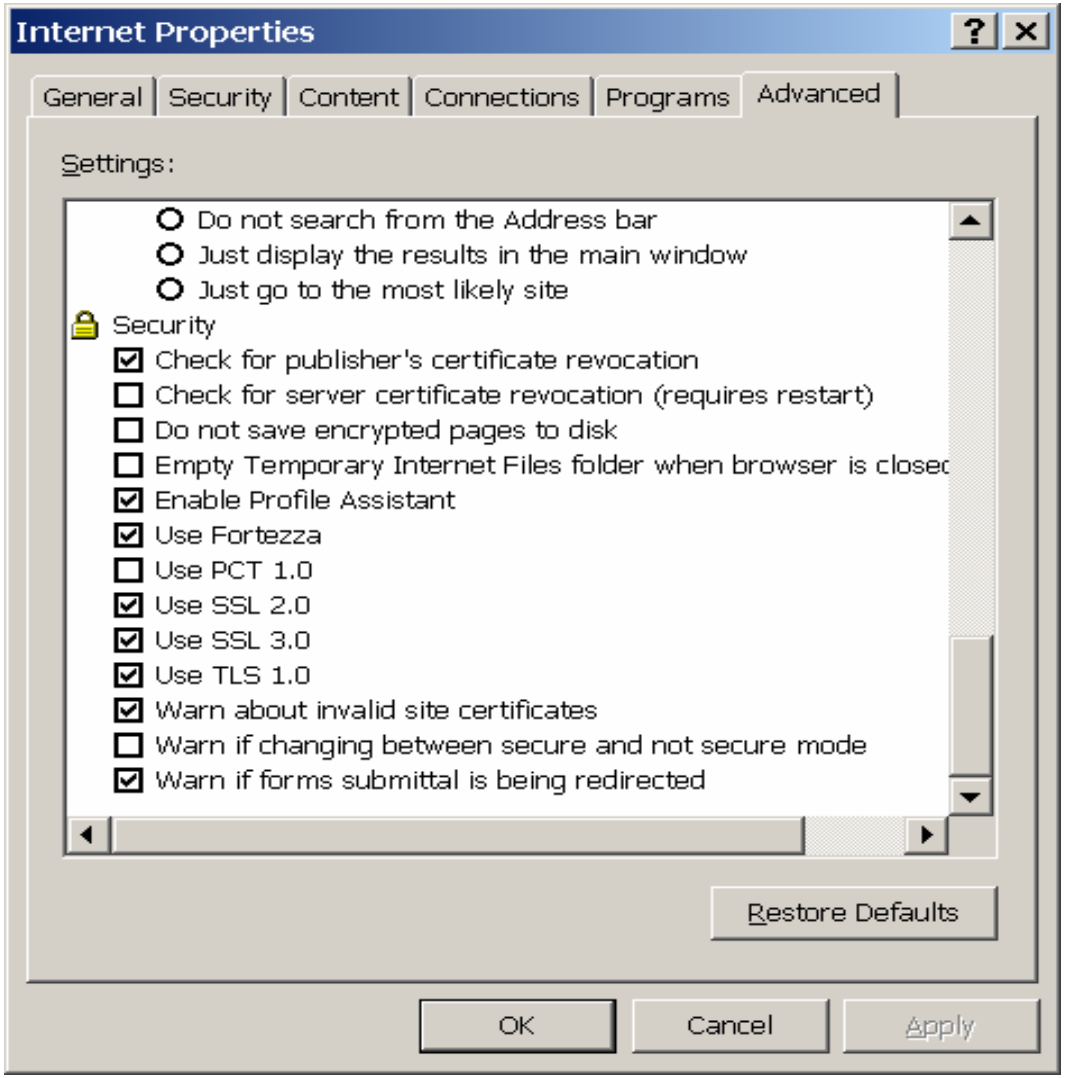
browser configuration - msie5.5



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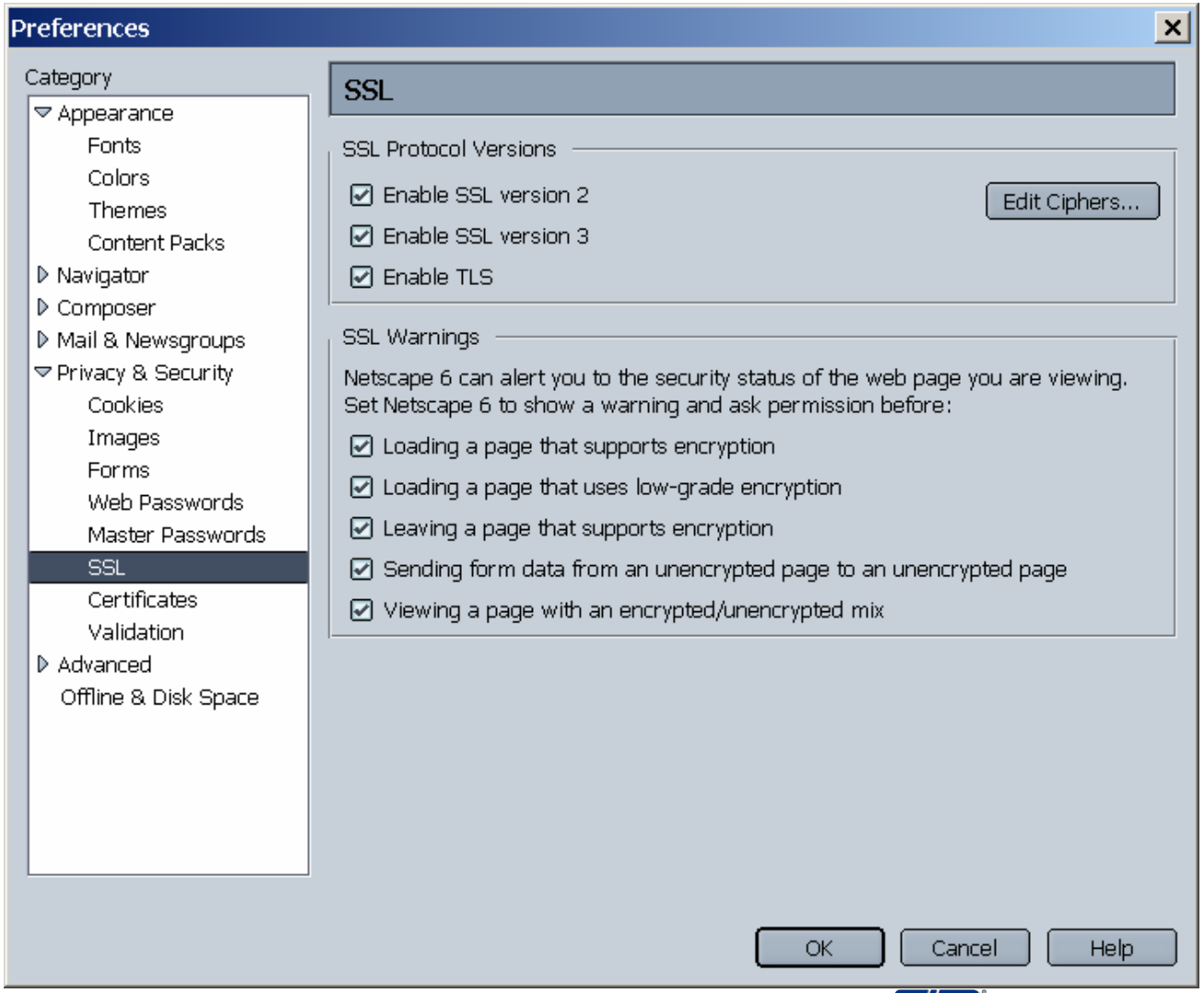
browser configuration – netscape 6.2.1



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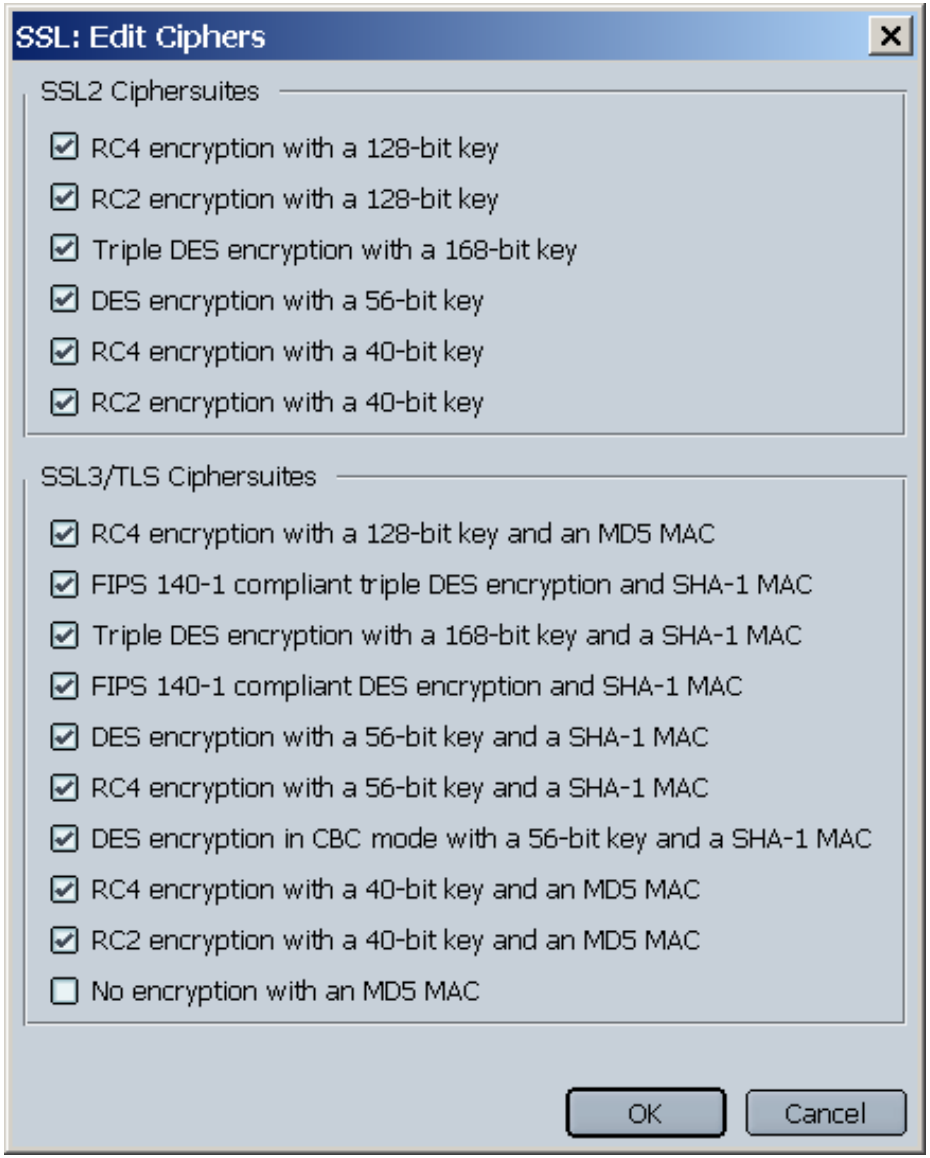
browser configuration – netscape 6.2.1 (cont.)



creating the server key

- conf/ssl.key/server.key.sample (test only)
- key generated as a random number - use openssl -rand parameter to specify random data file for better seed
- pass phrase strongly recommended!
  - Encrypts the key file with DES3 via openssl -des3 option
  - See SSLPassPhraseDialog directive
  - Protect the pass phrase!
- Protect the key file!

creating the server key (cont.)

- **$ cd conf/ssl.key**
- **$ openssl genrsa -rand /SYS/PUB/HPSWINFO **
  -des3 -out server.key 1024

```
unable to load 'random state'
 28199 semi-random bytes loaded
Generating RSA private key, 1024 bit long
modulus
 ..................+++++
 ..................+++++
e is 65537 (0x10001)
Enter PEM pass phrase:
Verifying password - Enter PEM pass phrase:
```

creating the server key (cont.)

```
-----BEGIN RSA PRIVATE KEY-----
Proc-Type: 4,ENCRYPTED
DEK-Info: DES-EDE3-CBC,1EF909EDE2B056B0

cctYqA7Rm5LS6G8vcqlhVRRzg78epZ+SRMs7jF8TuCHJB
ds0ScXxjOd2TRORqNVC/IAsmbc5nc2kB9GJswJ6HhcqcT
m0oI0NXBKiXWnhM2raHHlzBI161+4dBMTpgPjqYj4w4ei
VlveDqqm8W38D/YKm3w+tocUMSwbj8KFFnYDHuvq6TI8u
pRUD79ukSYhIDRs18Od2yuhepEAe9P3P/wAuZDPjRtmjt
4b1UgO5aSt+zflq6Zchikv5GsPQPWaBu3a6eykZwc47zx
a86X1eQLeuLoeV1QlEPAvi4Ade3tQ0n3h1bAfaHDSkgoU
S6toA3oAVrPkeUOP3Y8qF6UEuyP2LCK5vo6Ccp9XgHBDd
-----END RSA PRIVATE KEY-----
```

creating the server key (cont.)

- **`$ openssl rsa -noout -text -in server.key`**
  - displays details about the newly created key
- **`$ chmod 400 server.key`**
- Protect the key file!

server key pass phrase

- SSLPassPhraseDialog builtin
  - HTTPD reads pass phrase from stdin (I.e. JHTTPD)
  - Protect JHTTPD from unauthorized readers!
- SSLPassPhraseDialog exec:/path/to/pgm
  - Program/script prints pass phrase to stdout
  - Protect the program from unauthorized readers or executors!
  - Have program perform security checking before writing to stdout

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creating the server csr

- Identifies the company and the server
- Attributes chosen here are visible to browser users, so choose carefully

creating the server csr (cont.)

- **$ cd conf/ssl.csr**
- **$ openssl req -new -key ../ssl.key/server.key **
  -out server.csr
  Country Name (2 letter code) [AU]:US
  State or Prov Name (full name) []:My State
  Locality Name (eg, city) []:My City
  Organization Name (eg, company) []:My Company
  Organizational Unit Name []:My Org
  Common Name []:www.mycompany.com
  Email Address []:webmaster@www.mycompany.com
- Leave the “extra attributes” blank

creating the server csr (cont.)

```
-----BEGIN CERTIFICATE REQUEST-----
MIIB4TCCAUoCAQAwgaAxCzAJBgNVBAYTAlVTMREwDwYDV
MA4GA1UEBxMHTXkgQ2l0eTETMBEGA1UEChMKTXkgQ29tc
TXkgT3JnMRowGAYDVQQDExF3d3cubXljb21wYW55LmNvb
ARYbd2VibWFzdGVyQHd3dy5teWNvbXBhbnkuY29tMIGfM
A4GNADCBiQKBgQDS1iRItFKSDzOhDShFeoiWkfnc0yPGp
H/Umn2uM/tSNOiguAPBYce8prLYjNqyXY4QBCzWQNGv/N
+TyPMF/dYdH+1oOaaTZ0ZE0WP0l6CimzzXjvwCupOpcQ8
oAAwDQYJKoZIhvcNAQEEBQADgYEAj1vTRa5SamY2IwkLu
grIsPyS74PBHGQKdPp8y0L6aVD28wO1jZ82j62ihLXoPl
+6erc4gXI5CzSVh/1QJV8YWB+OpI2UC8Kd747eMEnLmxw
-----END CERTIFICATE REQUEST-----
```

creating the server csr (cont.)

- **$ openssl req -noout -text -in server.csr**

```
Certificate Request:
    Data:
        Version: 0 (0x0)
        Subject: C=US, ST=My State, L=My
City, O=My Company, OU=My Org,
CN=www.mycompany.com/Email=webmaster@www.myco
mpany.com
        Subject Public Key Info:
            Public Key Algorithm:
rsaEncryption
            RSA Public Key: (1024 bit)
                Modulus (1024 bit):
```

- **$ chmod 400 server.csr**

get signed by a trusted ca...

- Browsers configured with trusted CAs
  - I.e. www.verisign.com and many others
  - can add additional trusted CAs
- Paste your CSR into a CA web form
- Receive certificate by e-mail, save as conf/ssl.crt/server.crt
- Most CAs offer temporary testing certificates

...or become your own ca

- **`$ cd conf/ssl.key`**
- **`$ openssl genrsa -des3 -out ca.key 1024`**
- **`$ chmod 400 ca.key`**
- Protect the key file!

...or become your own ca (cont.)

- **$ openssl req -new -x509 -days 365 **
  -key ca.key -out ca.crt
  Country Name (2 letter code) [AU]:US
  State or Province Name [Some-State]:My State
  Locality Name (eg, city) []:My City
  Organization Name (eg, company) []:My Company
  Organizational Unit Name []:My Company CA
  Common Name []:Certificate Authority
  Email Address []:ca@mycompany.com

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...or become your own ca (cont.)

```
-----BEGIN CERTIFICATE-----
eS5jb20wgZ8wDQYJKoZIhvcNAQEBBQADgY0AMIGJAoGBAMTu
+s3Y2eodSY5GTQIc6vmzeWNS8iMq3OMrXEOXU01i7UPZnU/L
czBYVfMZk+IBXMQbYxgbkWXd5wgo8aLxgIEa3BcIs794KWeN
8kHWgoJcB8z28EL9JsS7irYFAgMBAAGjggEAMIH9MB0GA1Ud
Mz9xW15QUriuZRe0QTCBzQYDVR0jBIHFMIHCgBSZAey+GvYO
QaGBpqSBozCBoDELMAkGA1UEBhMCVVMxETAPBgNVBAgTCE15
VQQHEwdNeSBDaXR5MRMwEQYDVQQKEwpNeSBDb21wYW55MRYw
b21wYW55IENBMR4wHAYDVQQDExVDZXJ0aWZpY2F0ZSBBdXRo
hkiG9w0BCQEWEGNhQG15Y29tcGFueS5jb22CAQAwDAYDVR0T
hkiG9w0BAQQFAAOBgQB2brOu05pOu1JjnyQltijVkQjxqy15
SjvtyOL++IxL7IbrLSYp5ASpGSsjjyRBaNWIYFxIOhnM3Cho
4K8ZH8eVP/TY6W+KsgQJeXMLObagv9HcoZFpQX40A6KJAcFT
-----END CERTIFICATE-----
```

...or become your own ca (cont.)

- **$ openssl x509 -noout -text -in ca.crt**

```
Certificate:
  Data:
    Signature Algorithm: md5WithRSAEncryption
    Issuer: C=US, ST=My State, L=My City, O=My
Company, OU=My Company CA, CN=Certificate
Authority/Email=ca@mycompany.com
    Validity
      Not Before: Apr  7 23:19:40 2000 GMT
      Not After : Apr  7 23:19:40 2001 GMT
    Subject: C=US, ST=My State, L=My City, O=My
Company, OU=My Company CA, CN=Certificate
Authority/Email=ca@mycompany.com
```

- **$ chmod 400 ca.crt**

...or become your own ca (cont.)

```
$ sign.sh ../ssl.csr/server.csr
CA signing: ../ssl.csr/server.csr ->
  ../ssl.csr/server.crt:
The Subjects Distinguished Name is as follows
countryName             :PRINTABLE:'US'
stateOrProvinceName     :PRINTABLE:'My State'
localityName            :PRINTABLE:'My City'
organizationName        :PRINTABLE:'My Company'
organizationalUnitName:PRINTABLE:'My Org'
commonName              :PRINTABLE:'www.mycompany.com'
emailAddress
  :IA5STRING:'webmaster@www.mycompany.com'
Certificate is to be certified until Apr  7 23:54:01
  2001 GMT (365 days)
```

...or become your own ca (cont.)

```
Sign the certificate? [y/n]:y
1 out of 1 certificate requests certified, commit?
  [y/n]y
Write out database with 1 new entries
Data Base Updated
CA verifying: ../ssl.csr/server.crt <-> CA cert
../ssl.csr/server.crt: OK
```

...or become your own ca (cont.)

- **`$ rm -fR ca.db.*`**
  - remove temporary files from conf/ssl.key
- **`$ cd ..`**
- **`$ mv ssl.csr/server.crt ssl.crt/server.crt`**
  - move newly created server certificate into the correct location
- **`$ mv ssl.key/ca.crt ssl.crt/ca.crt`**
  - move newly created CA certificate into the correct location

installing the server certificate

- **$ openssl x509 -noout -text -in ssl.crt/server.crt**

```
Certificate:
  Data:
    Signature Algorithm: md5WithRSAEncryption
    Issuer: C=US, ST=My State, L=My City, O=My Company,
  OU=My Company CA, CN=Certificate
  Authority/Email=ca@mycompany.com
    Validity
      Not Before: Apr 7 23:54:01 2000 GMT
      Not After : Apr 7 23:54:01 2001 GMT
    Subject: C=US, ST=My State, L=My City, O=My Company,
  OU=My Org, CN=www.mycompany.com/
  Email=webmaster@www.mycompany.com
```

installing the server certificate (cont.)

- Rebuild the symlink hash
- **$ cd conf/ssl.crt**
- **$ make**

```
ca-bundle.crt    ... Skipped
ca.crt           ... dc91dd8e.0
server.crt       ... 2f66b362.0
snakeoil-ca-dsa.crt ... 0cf14d7d.0
snakeoil-ca-rsa.crt ... e52d41d0.0
snakeoil-dsa.crt ... 5d8360e1.0
snakeoil-rsa.crt ... 82ab5372.0
zzyzx-ca-rsa.crt ... f28a2a0f.0
```

- **$ chmod 400 server.crt**

starting the web server

- **:STREAM JHTTPD.PUB.APACHE**
- Will spend as much as the first few minutes in a tight CPU loop generating temporary crypto keys before ready to accept requests
- No records written to log files during this time

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webwise secure web server

using the web server

- conf/httpd.conf.sample uses ports 80 and 443
- Default browser ports are 80 and 443
  - **`http://your3000.host.name`** (port 80)
  - **`https://your3000.host.name`** (port 443)
- Non-default port numbers can also be used:
  - **`http://your3000.host.name:nnn`** (http port nnn)
  - **`https://your3000.host.name:nnn`** (https port nnn)

restarting the web server

- Why? To reread config files.
- Log on as SM user or MGR.APACHE
- Normal restart
  - **`$ kill -HUP $(cat /APACHE/PUB/logs/httpd.pid)`**
- Graceful restart
  - **`$ kill -USR1 $(cat /APACHE/PUB/logs/httpd.pid)`**

stopping the web server

- Log on as SM user or MGR.APACHE
- **`$ kill $(cat /APACHE/PUB/logs/httpd.pid)`**
- Only use :ABORTJOB as a last resort!
  - Will leak SVIPC semaphores
  - Use IPCS.HPBIN.SYS to display
  - Use IPCRM.HPBIN.SYS to manually remove

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performance

- First few minutes in tight CPU loop
- Brief CPU burst for new SSL sessions
- Use bytestream instead of MPE record format for content
  - Content-length: header problem
  - Symptom: browser hangs at end of content
- Make sure RESLVCNF.NET.SYS is valid
  - Non-responding DNS servers can add a minute to every browser request
  - Symptom: browser hangs for about a minute before any content is returned
  - /SENDMAIL/CURRENT/bin/dnscheck script

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webwise secure web server

security tips

- WebWise only protects the TCP/IP connection between browser and server!
- Protect the key and certificate files!
- Protect the key pass phrase!

security tips (cont.)

- Most security problems BY FAR are the result of sloppy CGI programming
  - Explicitly validate every byte of data sent by browser
  - A CGI hole can give the whole world the same access as a :HELLO WWW.APACHE session
- Restrict CGI/SSI authorship to trusted users
  - Don't allow CGI/SSI to be used outside of the APACHE account

security tips (cont.)

- Minimize the use of world-readable and world-writable permissions
- Make sure all accounts and/or users have passwords
- Change all default vendor passwords
- Disable all services not explicitly being used
- Use a firewall
- Stay current on releases & patches

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webwise secure web server

troubleshooting server problems

- All Apache troubleshooting methods apply
- Check the log files first!
- If JHTTPD terminates at startup, investigate Pass Phrase
- Is SSLEngine On?
- Does SSLProtocol match the browser?
- Does SSLCipherSuite match the browser?

troubleshooting server problems (cont.)

- **`echo “HEAD / HTTP/1.0\n” | \`**
  `bin/openssl s_client -connect host:port | \`
  `/bin/cat -`
  - Pipes used due to select() being unimplemented for terminals
  - -state - displays SSL protocol states
  - -debug - displays packet data
  - -ssl2 | -ssl3 | -tls1 - protocol selection
  - -ciper - cipher selection
  - bin/openssl s_client help

troubleshooting server problems (cont.)

- Browser displays pages after long delay while HTTPD chews on the CPU
  - Potential SSL Session Cache malfunction
  - Server doing full SSL handshake with each request
  - Use SSLLogLevel directive to increase verbosity
  - If using a disk-based cache, are the permissions correct?
- Browser displays pages after long delay while HTTPD seems idle
  - HostNameLookups On causing inverse DNS lookups to hang due to misconfigured RESLVCNF or DNS
  - /SENDMAIL/CURRENT/bin/dnscheck script

troubleshooting server problems (cont.)

- Are the configuration file permissions correct?
  - Parent process running as the JHTTPD !JOB user (MGR.APACHE) must be able to read everything
  - Child processes running as the conf/httpd.conf User user (WWW.APACHE) must be able to read CA & CRL files if doing X.509 client authentication
  - Child permissions problems manifest as weird browser errors
- Does the problem also occur in HPUX Apache?

troubleshooting server problems (cont.)

- Check the mod_ssl bug database
  - **`http://www.modssl.org/support/bugdb/`**
- No OpenSSL bug database :-(
  - Search the mailing list archives at **`http://www.openssl.org/support/`**
- Check the Apache bug database
  - **`http://bugs.apache.org/`**

troubleshooting browser problems

- No response to browser
  - Check httpd.conf or SOCKINFO.NET.SYS to verify the correct ports (80, 443) are being listened to
- “The page cannot be displayed” (MSIE)
  - Speaking https to the http server port
  - Speaking the wrong security protocol (I.e. SSLv2 when the server requires SSLv3)
- “A network error occurred while Netscape was receiving data”
  - Speaking https to the http server port
  - Speaking the wrong security protocol (I.e. SSLv2 when the server requires SSLv3)

troubleshooting browser problems (cont.)

- A server certificate dialog box always appears
  - Server certificate not signed by a trusted CA
  - Server certificate expired
  - Server certificate hostname doesn't match URL hostname
- Verifying protocol & cipher
  - Look in logs/ssl_request_log
  - MSIE: right-click, Properties
  - Netscape: right-click, View Page Info

further documentation

- Complete product documentation
  - **`http://your.host.name/manual/`**
- Mod_ssl documentation
  - **`http://www.modssl.org/docs/2.8/`**
- OpenSSL documentation
  - **`http://www.openssl.org/docs/apps/openssl.html`**
- Apache documentation
  - **`http://www.apache.org/docs/`**
- 7.5 Communicator
- 7.5 Configuring and Managing MPE/iX Internet Services Manual

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webwise secure web server

join the hp3000-l community

- Available as a mailing list and as the Usenet newsgroup comp.sys.hp.mpe
- In-depth discussions of all things HP e3000
- Talk with other WebWise & Apache users
  - seek advice, exchange tips & techniques
- Keep up with the latest HP e3000 news
- Interact with CSY
- **`http://jazz.external.hp.com/papers/hp3000-info.html`**