Contribution to the Security Track at ApacheCon´98

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Security with

The Apache Interface to SSLeay

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Develop.
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Use Cases

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Motivation

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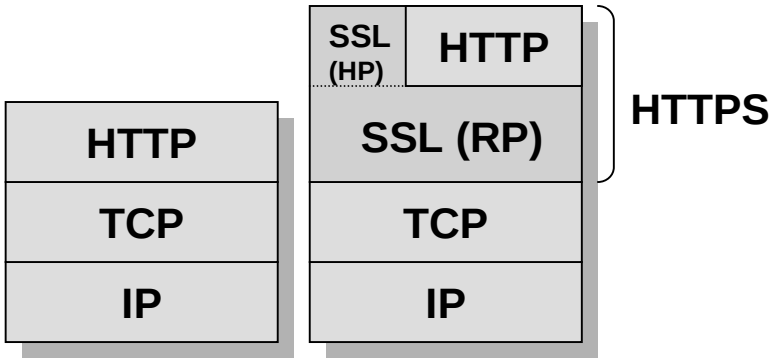
- HyperText Transfer Protocol (HTTP) is an unsecure application level protocol on top of TCP/IP
- HTTP lacks both peer authentication and reliable encrypted communication



- Secure Sockets Layer (SSL) is an additional transport protocol on top of TCP/IP providing communication auth-entication, privacy and reliability through strong cryptography techniques
- Current standards: SSLv3 (Netscape) and TLSv1 (IETF)
- HTTP Secure (HTTPS) is HTTP over SSL and thus a a secure HTTP variant

Solutions: Overview

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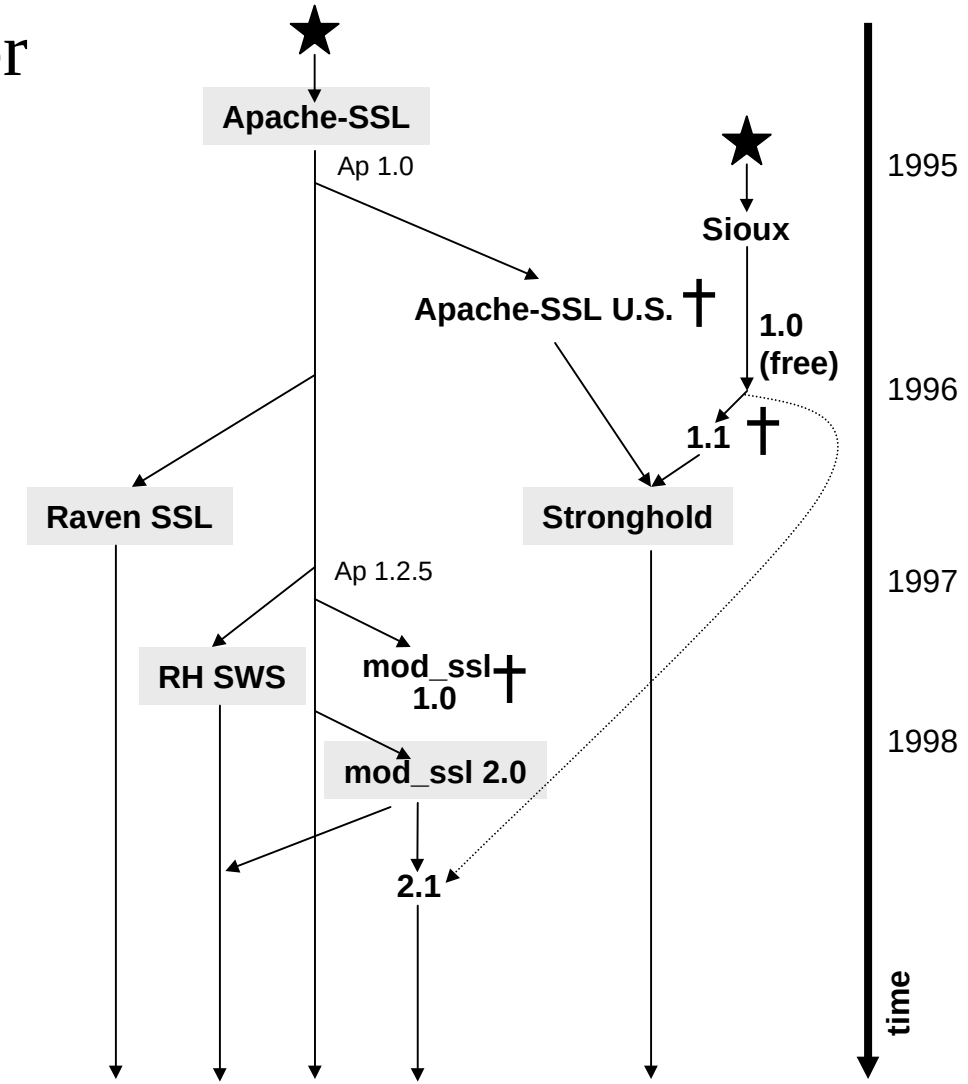
- Five SSL solutions for Apache are currently available:
  - **Apache-SSL**
    Ben Laurie, UK
    www.apache-ssl.org/
  - **mod_ssl**
    Ralf S. Engelschall, DE
    www.engelschall.com/sw/mod_ssl/
  - **Stronghold**
    C2Net, US/UK
    www.c2.net/products/stronghold/
  - **Raven SSL**
    Covalent, US
    raven.covalent.com/
  - **RH SWS**
    RedHat, US
    www.redhat.com/products/product-details.phtml?id=rhsa



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Solutions: Comparison

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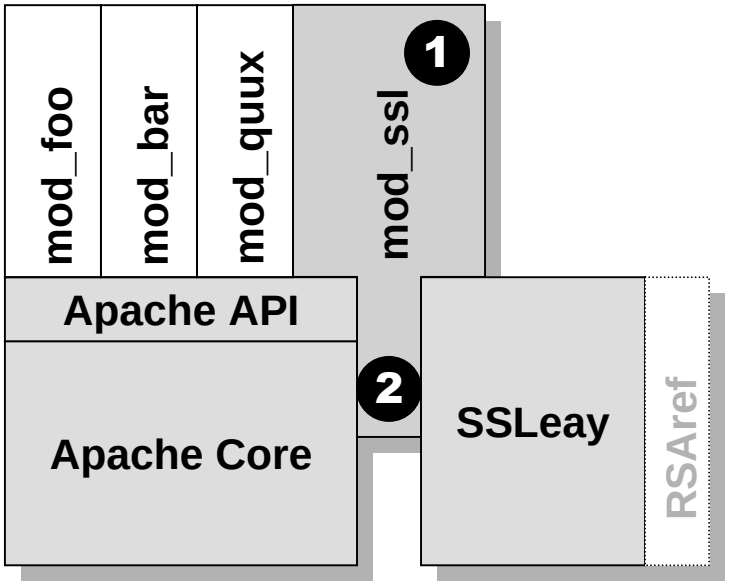
	Apache-SSL	mod_ssl	RH SWS	Raven SSL	Stronghold
Author	B. Laurie	R. Engelschall	RedHat	Covalent	C2 Net
Location	UK	DE	US	US	US, UK
License	open-source	open-source	commercial	commercial	commercial
Price	$0	$0	$99	$357	$995
Distribution	full source	full source	source (Ap.) + binary (SSL)	source (Ap.) + binary (SSL)	source (Ap.) + binary (SSL)
Availability	world-wide	world-wide	US only	US only	world-wide
US Usage	restricted	restricted	unlimited	unlimited	unlimited
Support	voluntary, always free	voluntary, always free	conceding, 90 days free	conceding, 30 days free	conceding, 30 days free
SSL Engine	SSLeay	SSLeay [+ RSAref]	SSLeay + BSAFE	SSLeay + BSAFE	SSLeay
Unix	All derivates	All derivates	RH Linux	15 derivates	20 derivates
Win32	no	yes	no	no	no
Current Version	1.27 (1.3)	2.0.13 (1.3) 2.1b6 (1.3)	2.0 (1.3)	-- (1.3)	2.3 (1.2) 2.4 (1.3)

Package Overview

- mod_ssl is...
  1. an Apache API conforming module (basic functionality)
  2. a source patch for the Apache API (crypto hooks)



- mod_ssl is actively developed and enhanced
- mod_ssl is maintained and distributed from Germany and Switzerland
- for easy building and installing mod_ssl uses an automated patching mechanism and is fully integrated into APACI

Development Cycle

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mod_ssl 2.0

current stable version

- Complete code overhauling and cleanups
- Finally porting to Apache 1.3 (API, source config stubs)
- Fixing long-standing bugs and flaws
- Fully documenting the whole package (`INSTALL`, `mod_ssl.html`)

mod_ssl 2.1

current development version

- New pass phrase handling
- New session cache
- New SSL engine logging (levels, error dup, annotat.)
- New „`make certificate`“
- Internal „Mutex“
- HTTPS support for Proxy module
- RSAref support
- Port to Win32

mod_ssl 2.2

forthcoming version

- Integrated real CA/client cert. management
- Certificate Revocation List (CRL) support
- LDAP support for authentication
- IPC Shared Memory support for session cache

Installation Illustration

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```
$ gunzip <apache_1.3.3.tar.gz | tar xf -
$ gunzip <mod_ssl-2.1b6-1.3.3.tar.gz | tar xf -
$ gunzip <SSLeay-0.9.0b.tar.gz | tar xf -

$ cd SSLeay-0.9.0b
$ make -f Makefile.ssl links
$ perl ./Configure gcc
$ make

$ cd ../mod_ssl-2.1b6-1.3.3
$ ./configure --with-apache=../apache_1.3.3
              --with-ssleay=../SSLeay-0.9.0b
              --prefix=/usr/local/apache

$ cd ../apache_1.3.3
$ make all
$ make certificate
$ make install

$ /usr/local/apache/sbin/httpd -DSSL
$ netscape https://localhost/
```

1. extract sources
2. build SSLeay
3. apply mod_ssl to the Apache source tree
4. build and install Apache
5. test the server!

HTTPS Communication

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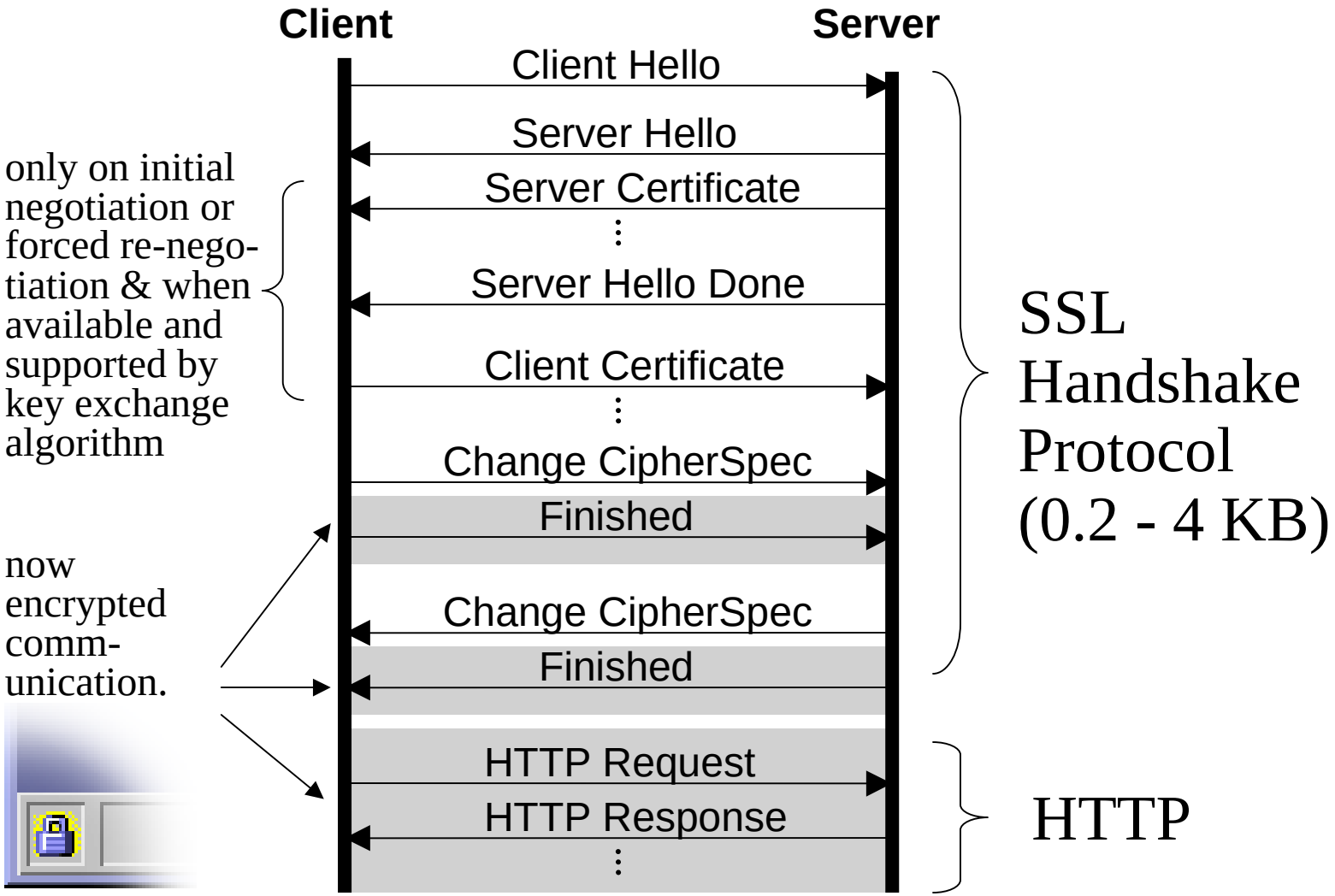

Use Cases (1)

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- Standard Setup:
  - HTTP on port 80
  - HTTPS on port 443
- Startup:
  - HTTP only:
    `$ httpd`
  - HTTP and HTTPS:
    `$ httpd -DSSL`

```
# httpd.conf
  :
Port 80
  :

<IfDefine SSL>
Listen 80
Listen 443

SSLSessionCache dbm:/var/run/ssl.scache
SSLMutex        file:/var/run/ssl.mutex
SSLLog          /var/log/ssl.log

<VirtualHost _default_:443>
SSLEngine               on
SSLCertificateFile    /etc/ssl.server.crt
SSLCertificateKeyFile /etc/ssl.server.key
SSLVerifyClient       none
</VirtualHost>
</IfDefine>
   :
```

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Use Cases (2)

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- Access Control with „Basic Auth“ through the Subject-DN of the X.509 certificate

```
# /etc/ssl.passwd.foo

/C=DE/L=Munich/CN=Foo:xxj31ZMTZzkVA
/C=US/L=S.F./CN=Bar:xxj31ZMTZzkVA
/C=US/L=L.A./CN=Quux:xxj31ZMTZzkVA
```

```
# httpd.conf
    :
AllowOverride FileInfo AuthConfig
    :
<VirtualHost _default_:443>
    :
SSLCACertificatePath /path/ssl.ca/
SSLVerifyClient      require
SSLVerifyDepth       10
SSLFakeBasicAuth
    :
</VirtualHost>
    :
```

```
# .htaccess

    :
<Files foo.html>
SSLRequireSSL
AuthType      Basic
AuthName      "foo"
AuthUserFile  /etc/ssl.passwd.foo
require       valid-user
</Files>
    :
```

Use Cases (3)

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- Access Control with „SSLRequire“ through arbitrary boolean expressions

```
# httpd.conf
    :
<VirtualHost _default_:443>
    :
SSLCACertificatePath /path/ssl.ca/
SSLVerifyClient      optional
SSLVerifyDepth       10
SSLRequireSSL
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]+$/
    :
</VirtualHost>
    :
```

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