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Entrust/Toolkit Java™ Edition

March 2000

Entrust/Toolkit Java™ Edition Overview

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- Java vs CGI scripts
- Why use Java for security?
- Entrust/Toolkit Java™ Edition
  - Capabilities and Benefits
  - Architecture
  - Key Classes and Class Usage
- Web Application Server Security
- Web Application Server Limitations
- Entrust/PKI™ and Web Application Servers

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Java vs CGI Scripts

- CGI scripts are known for being insecure
- ActiveX controls, ASP, VBScript, JavaScript possess known vulnerabilities
- Notorious for memory leaks and buffer overruns
- Hackers have already exploited these holes
- Web security breaches are related to memory vulnerabilities

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Why Use Java for Security?

- Java uses a mechanism called “Type Safety”
- Bypasses memory vulnerabilities
- Compiler verifies code, ensures that no dangerous access to memory is performed
- Security manager verifies code before it is executed
- Hacker has no direct access to server-side Java code
- Hacker can only view client HTML source generated by the application server

Entrust/Toolkit Java™ Edition Capabilities

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- Leverages Entrust/PKI for Java applications and applets
- Supports use of Entrust Profiles and Entrust PKIX-based protocols
- Full X.509 Version 3 certificate and chain validation
- Uses a high-level API to provide PKCS#7 enveloped messages
- SSLv3 connections, server side and mutual authentication
- Multi-ca support
- RMI support
- PKCS12 key repository access

Entrust/Toolkit Java™ Edition Benefits

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- Entrust-Ready security provider for the Java Cryptography Extension (JCE)
- Provides many of the features found in Entrust's C / C++ toolkits
- Consistent and manageable interface
- Platform neutral Java-based security
  - Linux, Solaris, Win2000...
- Comprehensive cryptographic core
- Supports JDK 1.1 and 1.2 (Java 2)
- Client and server ID

Entrust/Toolkit Java™ Edition Architecture

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Entrust Profiles

X.509 Certificate Validation

PKCS#7

SSL

ASN.1

JCE
RSA,DES,CAST....

Entrust/Toolkit Java™ Edition Architecture

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- Entrust profile module supports
  - Creation and recovery
  - Key and certificate usage
  - Key and certificate management
- X.509 certificate validation module supports
  - Cross-certification
  - CRL checking
  - X.509 certificate extensions
- PKCS#7 module supports PKCS#7 for securing data
  - S/MIME uses PKCS#7

Entrust/Toolkit Java™ Edition Architecture

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- SSL module provides support for SSLv3
  - Server and mutual authentication
- ASN.1 module simplifies the process of encoding and decoding required structures, such as:
  - X.509 Certificates
  - X.509 Standard Extensions
  - Certificate Revocation Lists
- JCE module provides a modular interface to standard cryptographic algorithms
  - RSA, DSA, DH
  - SHA1, MD5, MD2
  - DES, Triple-DES, CAST, IDEA, RC2, RC4

Entrust/Toolkit Java™ Edition Architecture

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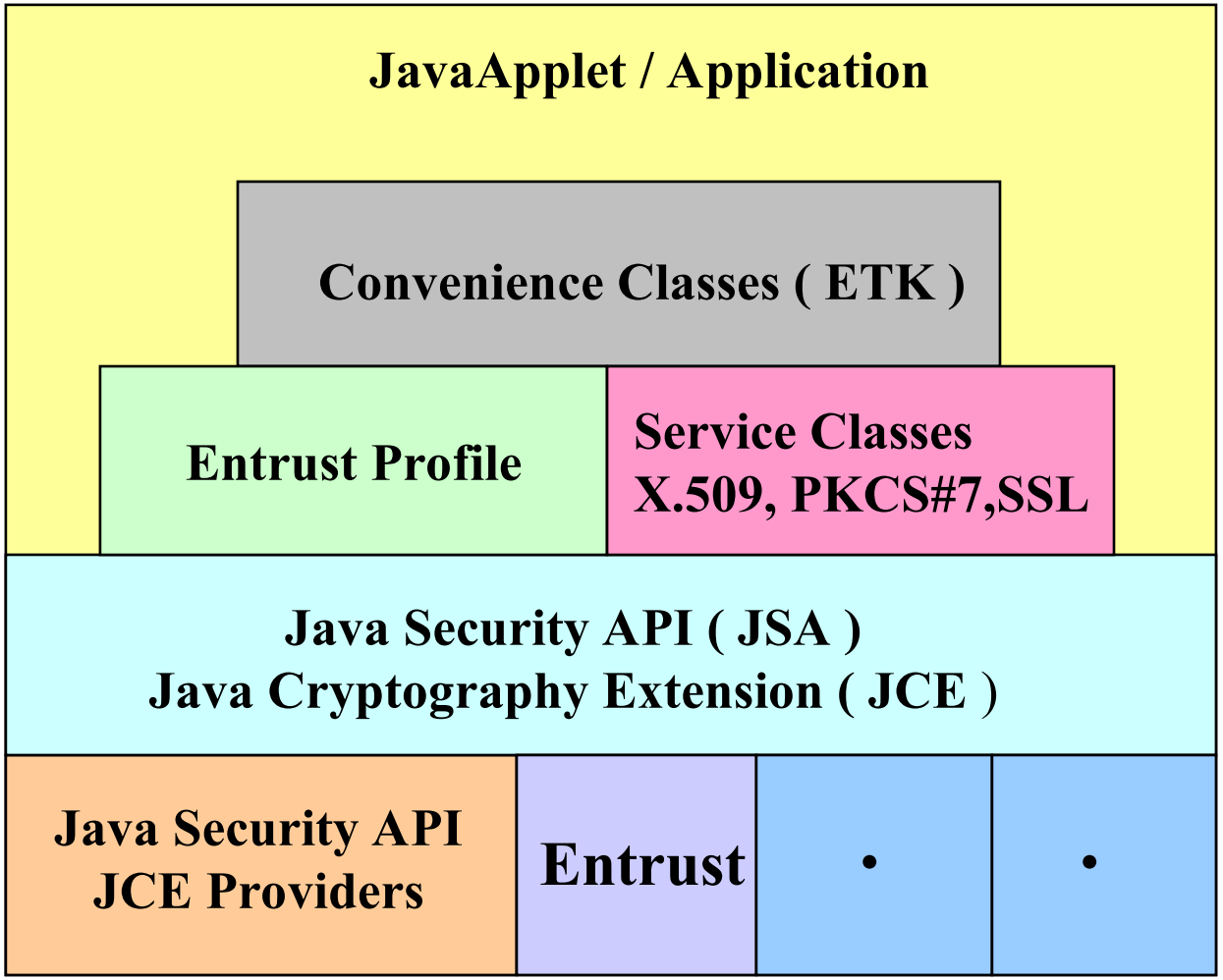

Entrust/Toolkit Java™ Edition Architecture

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- The Java Cryptography Architecture (JCA) provided by the JDK consists of:
  - Java Security API (JSA)
  - Java Cryptography Extension (JCE)
- The JCA allows you to specify third party cryptographic classes
  - Entrust classes are grouped as a security provider
- The Entrust/Toolkit contains a provider
  - The Entrust Provider acts as a bridge between the core cryptographic classes and elements of the Entrust/PKI architecture, such as Entrust Profiles

Entrust/Toolkit Java™ Edition Key Classes

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- EntrustProfile
  - Provides a consistent interface for working with Entrust Profiles
- ETKPKCS7
  - Provides a consistent interface for performing PKCS#7 operations
- SSLSocket, and SSLServerSocket
  - Provide consistent interfaces for SSLv3 communications
- ETKCertificateVerifier
  - Provides a consistent interface for verifying certificates

Entrust/Toolkit Java™ Edition Class Usage

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- **EntrustProfile Class**
  - Instantiate an **EntrustProfile** object representing the entrust profile of your application's user
  - Call the **EntrustProfile.Logon()** method so that the **EntrustProfile** object can be used perform security operations

```
// Log on with a profile
EntrustProfile profile = new EntrustProfile();
profile.logon( profileStream, password );
```

Entrust/Toolkit Java™ Edition Class Usage

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- **ETPKCS7 class**
  - Construct **ETKPKCS7** object specifying the **EntrustProfile** object as the parameter in the **ETKPKCS7()** constructor
  - Call the **ETKPKCS7** object's methods for processing PKCS #7 data structures

```
// Prepare a PKCS#7 helper
ETKPKCS7 pkcs7 = new ETKPKCS7( profile );

// Sign your plain text and encrypt the signed copy with 128 bit CAST 5
CBC mode
Data data = pkcs7.encodeData( PlainText );
SignedData signedData = pkcs7.encodeSignedData( data,
pkcs7.SIGNED_CONTENT );
EnvelopedData envelopedData = pkcs7.encodeEnvelopedData( signedData, Cer
                                        AlgorithmID. cast5_CBC, 128 );
ContentInfo contentInfo = pkcs7.encodeContentInfo( envelopedData );
```

Entrust/Toolkit Java™ Edition Class Usage

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- **SSLSocket and SSLServerSocket class**
  - Construct a **SSLServerSocket** object
  - For a SSL **client**, construct a **SSLSocket** object
  - **SSLServerSocket** and **SSLSocket** classes extend the IDK's core **ServerSocket** and **Socket** classes

```
/ Create a context
SSLClientContext context = new SSLClientContext();

/ Create an SSLv3 connection
SSLSocket socket = new SSLSocket( server, port, clientContext );
SSLout = socket.getOutputStream();
```

Entrust/Toolkit Java™ Edition Class Usage

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- **ETKCertificateVerifier class**
  - To simplify obtaining and verifying certificates, the **ETKCertificateVerifier** class
  - For SSL connections in which one of the parties is not an Entrust user, the Toolkit provides the **TrustDecider** interface
  - Detailed information about the **ETKCertificateVerifier** and **TrustDecider** classes can be found in the Programmer's Guide

sign a TrustDecider

```
tTrustDecider trustDecider = new ETKCertificateVerifier( directory, profi
ext.setTrustDecider( trustDecider );
```

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Web Application Server Security

- LDAP for authentication
- X.509 certificates for encryption/signing
- Compatibility with firewalls
- Controlled access to pages, data sources
- EJB security focuses on access control

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Web Application Server Limitations

- Exposed to man-in-the-middle attack
- No private keystore mechanism
- No persistence for digital signature or encryption
  - End-to-end verification
  - Non-repudiation
  - Data privacy
- SSL crypto lowered to lowest common level
- No key management support
- No automatic key update, CRL…

Entrust/PKI and Web Application Servers

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- We secure transactions in a web-based architecture
- Applications written for PKI and web application servers offer flexible and reliable security
- We provide secure, efficient exchange of data across Enterprise and B2B environments

Entrust/PKI and Web Application Servers

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- Private key storage
- Complete key management lifecycle
- End to end prevents man in the middle attacks
- Secure auditing for large value transactions
- Strong authentication to realms
- Non-repudiation for digitally signed transactions
- Standard compliance

Entrust/PKI and Web Application Servers

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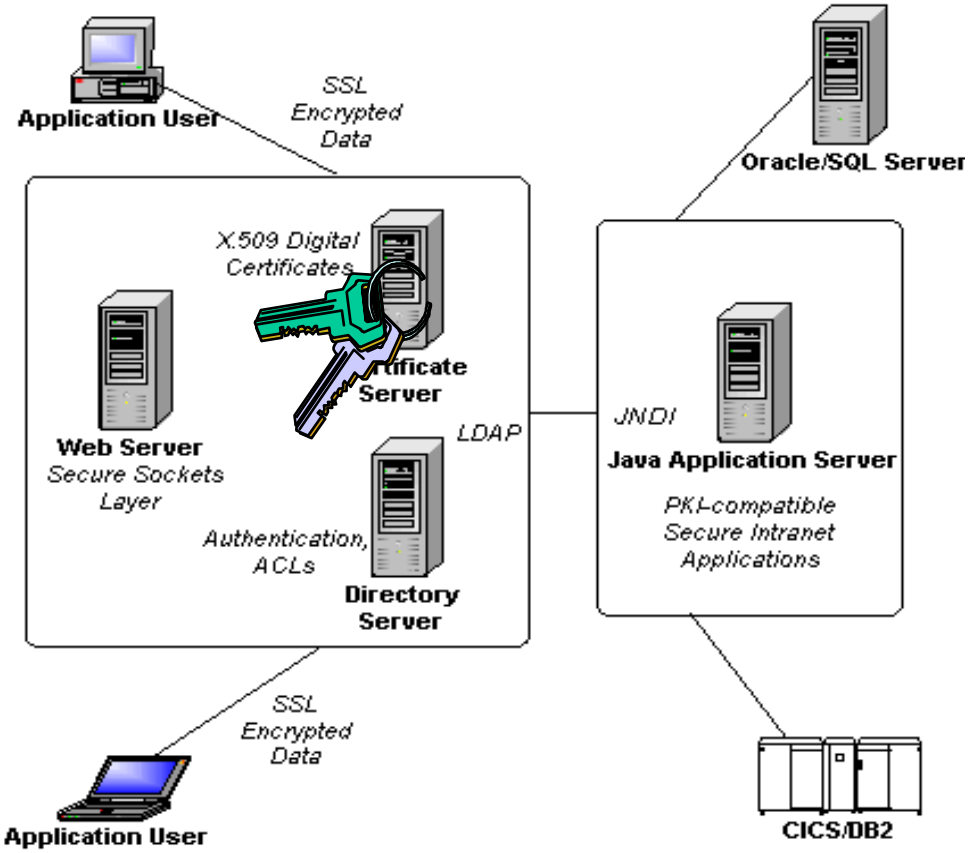
ENTRUST PKI



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Thank You

For more information, please visit our web site at:

http://developer.entrust.com